

August 26, 2016

Mr. Ken Stone  
Braintree Electric Light Department (BELD)  
Energy Services & Accounting  
Braintree, Massachusetts 02184

Re: **Additional Phase II Environmental Site Assessment**  
**44 Allen Street**  
**Braintree, Massachusetts**  
**RTN- 4-26207**

Dear Mr. Stone:

Weston & Sampson is pleased to provide this letter report summarizing the results of our Additional Phase II Environmental Site Assessment (ESA) performed at 44 Allen Street, Braintree, Massachusetts (the "Site"). The Site consists of a 1.6 acre parcel of land that was previously occupied by the Braintree Electric Light Department (BELD). BELD operated a power station at the Site from the 1890's until the 1970's when the Site was then used as storage / office space. The Site buildings are now vacant and the Site is owned by the Town of Braintree.

As you are aware, in January and February 2016, Weston & Sampson performed a Phase II Environmental Site Assessment (ESA) of the Site on behalf of the Town of Braintree. The Phase II ESA identified petroleum impacted soil at concentrations above Massachusetts Department of Environmental Protection (DEP) Reportable Concentration (RC) S-1 standards in the area of two separate historic underground storage tanks (USTs). Additionally, polynuclear aromatic hydrocarbons (PAHs) and lead were identified at concentrations above Massachusetts Contingency Plan (MCP) Reportable Concentration (RC) S-1 in fill material soil samples collected at the Site. Groundwater impacts were not identified above applicable standards. The identification of impacted soil above RC's represented a 120-day DEP reportable release condition. On June 24, 2016, BELD submitted a Release Notification Form (RNF) to the DEP to report the release. The DEP subsequently assigned Release Tracking Number (RTN) 4-26207 to the Site.

## PHASE II ENVIRONMENTAL SITE ASSESSMENT

Weston & Sampson performed an additional Phase II ESA at the Site in July and August 2016 in accordance with our June 2, 2016 proposal to BELD. The purpose of the Phase II ESA was to perform additional Site characterization to evaluate data gaps in support Site redevelopment and MCP response actions.

Specifically, the Phase II ESA included:

- Excavation of 16 test pits.
- Field screening soil samples for the presence of total volatile organics (TVOCs).
- Analysis of soil samples for selected laboratory analysis.
- Update of previous risk characterization.

The following is a summary of the results of the Phase II ESA. See Figure 1 and 2 for a depiction of the Site and investigation areas and sample locations.

### Test Pit Excavations

Weston & Sampson contracted with Strategic Environmental Services, Inc. (SES) to perform test pit activities at the Site. On July 21 and 22, 2016 a total of 16 test pits (TP-11 through TP-26 and TP-9A) were excavated at the Site to depths ranging from 3 to 12 feet below grade surface. Test pits TP-11 through TP-17 were excavated throughout the Site to further assess Site wide fill material. Test pits TP-18 through TP-21 and TP-9A were excavated in the area of former test pit TP-9 in the central portion of the Site further assess elevated lead concentrations in soil in this area. Test pits TP-22 through TP-26 were excavated within the western portion of the Site in the Area of a Former Gasoline UST - South of BELD Office Building to further assess petroleum impacted soil previously identified in this area. Test pit logs are included as Attachment A.

### Soil Sampling, Observations, Field Screening and Laboratory Analysis

Soil samples were collected by Weston & Sampson within each test pit at continuous three foot intervals. Soils encountered consisted of fill material from grade surface to 9 to 12 feet below grade surface. Pieces of glass, asphalt, brick, wood, metal, concrete, coal, cinder and ash were observed in soil samples. Native material consisting of silty sands was identified beneath the fill material between 9 and 12 feet below grade surface. At test pit locations TP-24 and TP-25 excavation refusal was encountered on concrete slabs located at between 3 and 5 feet below grade surface.

Soil samples were field-screened for visual and olfactory evidence of impacts (odor, color, staining, etc.) and for total volatile organics (TVOCs) using a photoionization detector (PID). Field screening results are provided in the attached test pit logs. As shown in the logs, with the exception of test pits TP-22 and TP-23, field screening of soil samples collected from the test pits did not identify evidence of impact and TVOCs were not detected above 0.1 ppmv. Field screening of soil samples collected from test pits TP-22 and TP-23 identified soil with petroleum odors between 3 to 12 feet below grade surface. TVOCs ranging from 226 parts per million by volume (ppmv) to 620 ppmv were identified. These test pits were excavated on the western portion of the Site in the Area of a Former Gasoline UST - South of BELD Office Building. TP-22 was excavated adjacent to a chain link fence at the western property border. TP-23 was excavated adjacent to the former office building. Due to the building and fence, additional test pits could not be excavated in this area to establish the limits of impacts to the north and west in this area.

Seventeen (17) soil samples were selected from the test pits for laboratory analysis based on location, field screening results, and to obtain data for overall Site assessment purposes. The samples were placed in pre-labeled laboratory supplied containers, preserved on ice in a cooler, and transported to Con-test Analytical Laboratory in East Longmeadow Massachusetts. Samples collected from TP-9A and TP-11 through TP-21 were submitted for laboratory analysis of lead and PAHs. Samples collected from test pits TP-22 and TP-23 were submitted for analysis of Volatile Petroleum Hydrocarbons (VPH) with targeted Volatile Organic Compounds (VOCs). Summary tables of the soil analytical result are attached as Table 1 and Table 2. Complete copies of laboratory analytical reports are included as Attachment B. As shown in the attached tables, analysis identified the following:

- **Site Wide Fill Material:** Analysis of fill soil samples TP-14 (0-3'), TP-18 (0-3'), TP-20 (0-3') and TP-21 (0-3') identified PAH compounds and/or lead above MCP Method 1 S-1 cleanup standards. TP-18, TP-20 and TP-21 were excavated in the area of former test pit TP-9. Analysis of the remaining soil samples identified concentrations of lead and/or PAHs below S-1 standards. Levels of lead detected in samples collected from the test pits ranged from 7.3 mg/kg to 480 mg/kg
- **Area of Former Gasoline UST - South of BELD Office Building:** Analysis of soil sample TP-22 (3-6') identified VPH fractions above Method 1 S-1 cleanup standards. Analysis of soil sample TP-25 (10-12') did not identify detectable concentrations of VPH or VOCs.

### Risk Characterization

As part of our assessment, Weston & Sampson updated our previous Method 3 risk characterization for the Site with the soil data generated during this additional assessment. This risk characterization was performed to

evaluate risk for future Site use including residential, Town employee, and construction worker exposures to Site soil. The risk characterization was performed utilizing DEP Method 3 ShortForms for residential and construction workers and a modified ShortForm for employee use. Supporting data for the risk characterization is included as Attachment C. As shown in Attachment C, the risk characterization concluded total non-cancer and cancer risk from contaminants in Site soil are below acceptable levels for Town employees and construction workers. However, total risk for potential future residents is above acceptable levels. The risk is driven by lead concentrations in soil. Removing elevated concentrations of lead previously detected at TP-9 (0-3'), would reduce the levels of lead at the Site to acceptable levels for residential use.

### **Summary and Recommendations**

In summary, the results of the additional Phase II ESA identified the following:

Fill material impacted with PAHs and lead was identified throughout the Site. Concentrations identified are similar to those found in previous assessment. Risk characterization has confirmed that removal of elevated lead impacted soil in the area of TP-9 will reduce overall concentrations to levels that will support unrestricted use of the Site.

Assessment in the western portion of the Site in the Area of Former Gasoline UST - South of BELD Office Building confirmed petroleum impacts to depths between 3 and 12 feet below grade surface. The extent of impact appears to extend underneath the vacant office building to the north. The extent of impact to the west extends to the chain link fence that runs along the property border and may extend to the adjacent property.

Based on the results of the assessment we recommend the following remedial approach for the Site:

- **Area of TP-9 Elevated Lead Soil:** To support unrestricted Site use, soil excavation should be performed in the area of TP-9 to remove fill soil with elevated concentrations of lead. Based on existing data, approximately 85 cubic yards of soil removal will be required.
- **Area of Former Gasoline UST - South of BELD Office Building:** Additional assessment is required in this area of the Site to delineate the extent of petroleum impacted soil to the north under the existing building and to the west beyond the fence line for the Site. If the petroleum impacted soil is left in place additional risk characterization would also be required to assess potential impacts to indoor air of the Site building. In lieu of additional assessment/risk characterization, soil excavation could be performed to remove the impacted soil. Based on existing data, approximately 250 cubic yards of soil may need to be removed. Additional soil removal may also be required to the north and west of the former tank area. As the Site is slated for residential redevelopment which will utilize the existing office building, we recommend soil excavation be performed to remove the impacted soil. Excavation will confirm that the historic tank was removed, will remove impacted soil which could be a source for future groundwater impacts, and will alleviate any potential future concerns of impact to indoor air to the Site building.

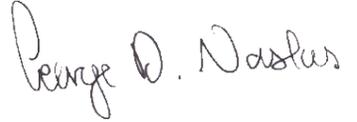
Future response actions at the Site should be performed in accordance with the MCP. Site construction soil management during redevelopment will likely be conducted as a Construction Release Abatement Measure (RAM) under the supervision of a Licensed Site Professional (LSP). The RAM can be conducted as a stand-alone remedial project or as part of overall Site development. Please note that an MCP Phase I Initial Site Investigation (ISI) Report and Tier Classification Submittal is required to be submitted for the Site by June 24, 2017, unless the Site has achieved regulatory closure prior to that date.

Weston & Sampson will provide scope of work and cost estimate for remedial excavation activities and additional LSP services at your request. If you have any questions regarding this letter report, please do not hesitate to contact the undersigned at (978) 532-1900.

Sincerely,  
WESTON & SAMPSON ENGINEERS, INC.



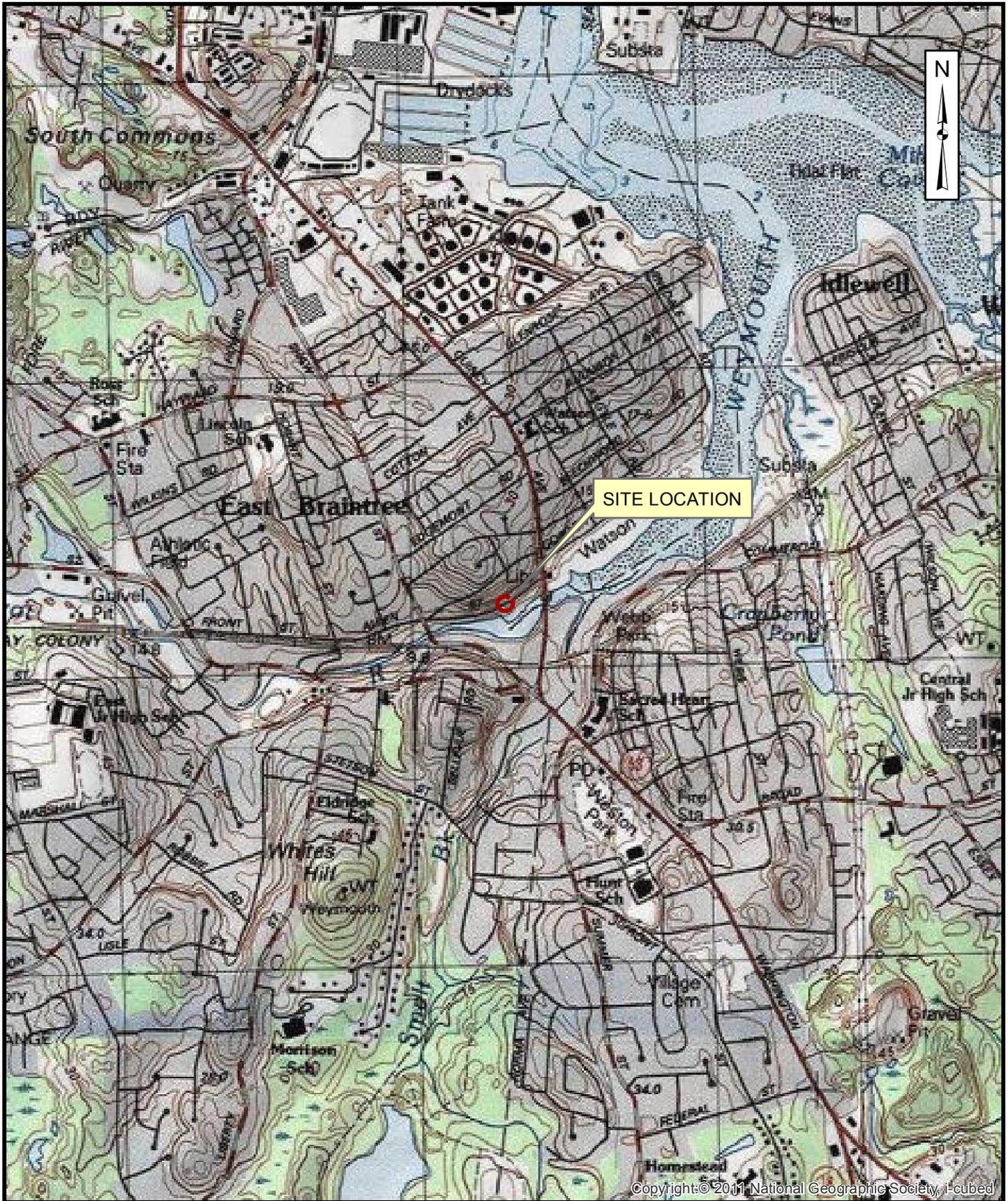
Sean F. Healey, LSP  
Team Leader



George Naslas, P.G., LSP  
Vice President

Attachments: Figures, Tables, Attachment A, B and C

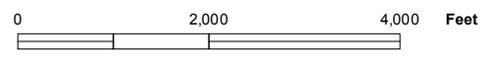
## FIGURES



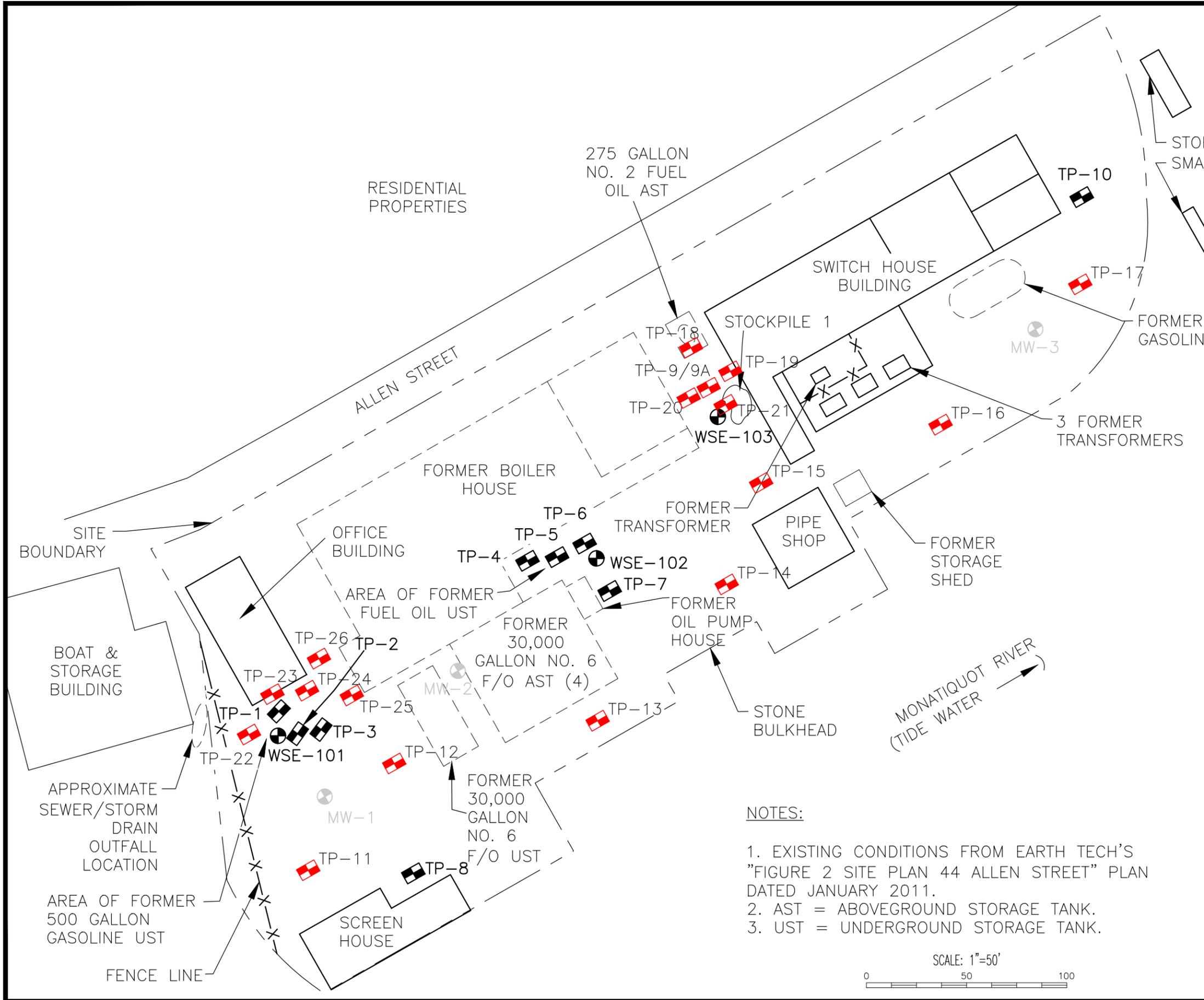
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**FIGURE 1**  
**TOWN OF BRAINTREE, MASSACHUSETTS**  
**44 Allen Street**

**LOCUS MAP**



**Weston & Sampson**



**LEGEND:**

- SITE BOUNDARY
- ▭ EXISTING STRUCTURE
- - - - - FORMER STRUCTURE
- MW-3 MONITORING WELL, PREVIOUS INVESTIGATION
- ⊙ WSE-101 MONITORING WELL, WESTON & SAMPSON 2016
- ⊠ TP-1 PREVIOUS TEST PIT LOCATIONS WESTON & SAMPSON, 2016
- ⊠ TP-11 TEST PIT LOCATION, JULY 2016

**NOTES:**

- EXISTING CONDITIONS FROM EARTH TECH'S "FIGURE 2 SITE PLAN 44 ALLEN STREET" PLAN DATED JANUARY 2011.
- AST = ABOVEGROUND STORAGE TANK.
- UST = UNDERGROUND STORAGE TANK.

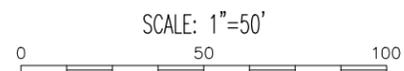


FIGURE 2		
FORMER BRAINTREE ELECTRIC LIGHT PLANT 44 ALLEN STREET		
SITE PLAN		
DESIGNED BY: D GK	CHECKED BY: SH	DATE: AUGUST 2016



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## **TABLES**

**Table 1  
Soil Analytical Results  
Additional Test Pits  
Former BELD Property  
44 Allen Street  
Braintree, Massachusetts**

Parameter	Units	Method 1 Cleanup Standard		Sample Identification																
		S-1 / GW-2	S-1 / GW-3	TP-9 (0-3')	TP-9A (9-10')	TP-11 (0-3')	TP-12 (0-3')	TP-12 (3-6')	TP-13 (0-3')	TP-13 (6-9')	TP-14 (0-3')	TP-15 (0-3')	TP-16 (0-3')	TP-17 (0-3')	TP-18 (0-3')	TP-19 (0-3')	TP-20 (0-3')	TP-21 (0-3')	DUP TP-21 (0-3')	TP-21 (6-9')
		Sample Date		1/29/2016	7/22/2016	7/21/2016	7/21/2016	7/21/2016	7/21/2016	7/21/2016	7/21/2016	7/21/2016	7/21/2016	7/21/2016	7/21/2016	7/22/2016	7/22/2016	7/22/2016	7/22/2016	7/22/2016
<b>PAH</b>																				
Acenaphthene	mg/kg	1,000	1,000	<b>6.3</b>	<0.21	<0.19	<0.18	<0.18	<0.19	<0.23	<0.22	<0.20	<0.18	<0.17	<b>0.97</b>	<0.21	<b>1.0</b>	<b>1.5</b>	<b>0.85</b>	<0.22
Acenaphthylene	mg/kg	600	10	<b>1.1</b>	<0.21	<b>0.29</b>	<0.18	<0.18	<0.19	<0.23	<0.22	<0.20	<0.18	<0.17	<0.19	<0.21	<0.20	<0.19	<0.20	<0.22
Anthracene	mg/kg	1,000	1,000	<b>12</b>	<0.21	<b>0.21</b>	<0.18	<b>0.20</b>	<0.19	<0.23	<b>0.43</b>	<0.20	<0.18	<0.17	<b>3.1</b>	<0.21	<b>2.2</b>	<b>4.6</b>	<b>3.1</b>	<0.22
Benzo(a)anthracene	mg/kg	7	7	<b>24</b>	<0.21	<b>1.5</b>	<b>0.36</b>	<b>1.3</b>	<0.19	<b>0.38</b>	<b>1.9</b>	<b>0.39</b>	<b>0.38</b>	<b>1.0</b>	<b>5.3</b>	<0.21	<b>3.9</b>	<b>12</b>	<b>5.1</b>	<0.22
Benzo(a)pyrene	mg/kg	2	2	<b>21</b>	<0.21	<b>1.4</b>	<b>0.35</b>	<b>1.2</b>	<0.19	<0.23	<b>1.8</b>	<b>0.54</b>	<b>0.36</b>	<b>0.99</b>	<b>4.6</b>	<0.21	<b>3.1</b>	<b>9.5</b>	<b>4.0</b>	<0.22
Benzo(b)fluoranthene	mg/kg	7	7	<b>28</b>	<0.21	<b>1.8</b>	<b>0.47</b>	<b>1.5</b>	<0.19	<b>0.62</b>	<b>2.2</b>	<b>0.63</b>	<b>0.48</b>	<b>1.3</b>	<b>5.5</b>	<0.21	<b>3.8</b>	<b>11</b>	<b>4.7</b>	<0.22
Benzo(g,h,i)perylene	mg/kg	1,000	1,000	<b>8.4</b>	<0.21	<b>0.80</b>	<b>0.24</b>	<b>0.73</b>	<0.19	<b>0.25</b>	<b>1.5</b>	<b>1.3</b>	<b>0.28</b>	<b>0.65</b>	<b>3.3</b>	<0.21	<b>1.9</b>	<b>6.0</b>	<b>3.5</b>	<0.22
Benzo(k)fluoranthene	mg/kg	70	70	<b>8.9</b>	<0.21	<b>0.75</b>	<0.18	<b>0.55</b>	<0.19	<b>0.23</b>	<b>0.79</b>	<b>0.24</b>	<0.18	<b>0.46</b>	<b>3.9</b>	<0.21	<b>1.4</b>	<b>4.5</b>	<b>3.3</b>	<0.22
Chrysene	mg/kg	70	70	<b>23</b>	<0.21	<b>1.3</b>	<b>0.32</b>	<b>1.1</b>	<0.19	<b>0.41</b>	<b>1.9</b>	<b>0.47</b>	<b>0.40</b>	<b>1.0</b>	<b>5.1</b>	<0.21	<b>3.5</b>	<b>11</b>	<b>4.8</b>	<0.22
Dibenzo(a,h)anthracene	mg/kg	0.7	0.7	<b>3.5</b>	<0.21	<b>0.19</b>	<0.18	<b>0.19</b>	<0.19	<0.23	<b>0.43</b>	<0.20	<0.18	<b>0.18</b>	<b>1.1</b>	<0.21	<b>0.48</b>	<b>1.4</b>	<b>0.94</b>	<0.22
Fluoranthene	mg/kg	1,000	1,000	<b>63</b>	<0.21	<b>2.4</b>	<b>0.59</b>	<b>2.2</b>	<0.19	<b>0.48</b>	<b>3.4</b>	<b>0.56</b>	<b>0.60</b>	<b>1.7</b>	<b>11</b>	<0.21	<b>8.5</b>	<b>28</b>	<b>11</b>	<0.22
Fluorene	mg/kg	1,000	1,000	<b>5.9</b>	<0.21	<0.19	<0.18	<0.18	<0.19	<0.23	<0.22	<0.20	<0.18	<0.17	<b>0.9</b>	<0.21	<b>0.85</b>	<b>1.6</b>	<b>0.96</b>	<0.22
Indeno(1,2,3-cd)pyrene	mg/kg	7	7	<b>8.2</b>	<0.21	<b>0.86</b>	<b>0.24</b>	<b>0.79</b>	<0.19	<b>0.29</b>	<b>1.4</b>	<b>0.46</b>	<b>0.28</b>	<b>0.71</b>	<b>3.5</b>	<0.21	<b>2.1</b>	<b>6.4</b>	<b>4.1</b>	<0.22
2-Methylnaphthalene	mg/kg	80	300	<b>3.1</b>	<0.21	<0.19	<0.18	<0.18	<0.19	<0.23	<0.22	<0.20	<0.18	<0.17	<0.19	<0.21	<b>0.29</b>	<0.19	<0.20	<0.22
Naphthalene	mg/kg	20	500	<b>4.6</b>	<0.21	<0.19	<0.18	<0.18	<0.19	<0.23	<0.22	<0.20	<0.18	<0.17	<b>0.19</b>	<0.21	<b>0.45</b>	<0.19	<0.20	<0.22
Phenanthrene	mg/kg	500	500	<b>70</b>	<0.21	<b>0.82</b>	<b>0.24</b>	<b>0.79</b>	<0.19	<0.23	<b>1.9</b>	<b>0.24</b>	<b>0.22</b>	<b>0.55</b>	<b>9.1</b>	<0.21	<b>9.1</b>	<b>17</b>	<b>6.6</b>	<0.22
Pyrene	mg/kg	1,000	1,000	<b>56</b>	<0.21	<b>2.1</b>	<b>0.54</b>	<b>1.9</b>	<0.19	<b>0.95</b>	<b>3.3</b>	<b>0.73</b>	<b>0.59</b>	<b>1.8</b>	<b>9.2</b>	<0.21	<b>7.6</b>	<b>20</b>	<b>8.5</b>	<0.22
<b>METALS</b>																				
Lead	mg/kg	200	200	<b>1700</b>	<b>9.4</b>	<b>180</b>	<b>100</b>	<b>180</b>	<b>8.7</b>	<b>27</b>	<b>480</b>	<b>170</b>	<b>71</b>	<b>90</b>	<b>180</b>	<b>7.3</b>	<b>300</b>	<b>240</b>	<b>230</b>	<b>8.7</b>

**Abbreviations:**

PAHs = Polycyclic Aromatic Hydrocarbons  
mg/Kg= milligrams per kilogram  
< = parameters not detected above laboratory method detection limit shown.  
NS= No Standard

**Notes:**

**BOLD** = Exceeds laboratory detection limit.  
**BOLD** = Exceeds the applicable Method 1 S-1 Standard.

Analytical results compared to the Massachusetts Contingency Plan (MCP) Reportable Concentration and Method 1 Cleanup Standards 310 CMR 40.0000, revised April 2014

Table 2  
Soil Analytical Results  
Area of Former Gasoline UST  
Former BELD Property  
44 Allen Street  
Braintree, Massachusetts

Parameter	Units	Method 1 Cleanup Standard		Sample Identification			
		S-1 / GW-2	S-1 / GW-3	TP-1 (6-9')	TP-3 (6-9')	TP-22 (3-6')	TP-25 (10-12')
Date				1/29/2016	1/29/2016	7/22/016	7/22/2016
<b>VPH</b>							
C5-C8 Aliphatics	mg/kg	100	100	<b>790</b>	<12	<b>2000</b>	<9.6
C9-C10 Aromatics	mg/kg	100	100	<b>440</b>	<12	<b>930</b>	<9.6
C9-C12 Aliphatics	mg/kg	1,000	1,000	<b>500</b>	<12	<890	<9.6
<b>VOCs</b>							
Benzene	mg/kg	40	40	<b>1.4</b>	<0.062	<4.4	<0.048
Ethylbenzene	mg/kg	500	500	<b>12</b>	<0.062	<b>36</b>	<0.048
Naphthalene	mg/kg	20	500	<b>9.9</b>	<0.31	<22	<0.024
Total Xylenes	mg/kg	100	500	<2.7	<0.12	<b>15</b>	<0.96
<b>METALS</b>							
Lead	mg/kg	200	200	<b>26</b>	<b>410</b>	--	--

**Abbreviations:**

VPH = Volatile Petroleum Hydrocarbons  
VOCs = Volatile Organic Compounds  
mg/Kg= milligrams per kilogram  
< = parameters not detected above laboratory method detection limit  
NS= No Standard  
-- = Not Analyzed

**Notes:**

**BOLD** = Exceeds laboratory detection limit.  
**BOLD** = Exceeds the applicable Method 1 S-1 Standard.  
Analytical results compared to the Massachusetts Contingency Plan  
(MCP) Reportable Concentration and Method 1 Cleanup Standards 310  
CMR 40.0000, revised April 2014

**ATTACHMENT A**

Test Pit Logs

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b> Former BELD Property		<b>TEST PIT ID</b> <b>TP-11</b>
<b>LOCATION</b> 44 Allen Street, Braintree MA		
<b>CLIENT</b> Town of Braintree		<b>GROUND SURFACE</b>
<b>CONTRACTOR</b> SES		<b>ELEVATION:</b> Not Measured (NM)
<b>OBSERVED BY</b> Padraic Kavanagh <b>DATE</b> 7/21/2016		<b>DEPTH TO GROUNDWATER BELOW</b>
<b>CHECKED BY</b> Sean Healey		<b>SURFACE:</b> NM
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Fine to coarse brown sand with fine to medium gravel, glass, red brick, and cinder fragments. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Fine to coarse brown sand with fine to medium gravel, glass, red brick, metal and cinder fragments. PID reading 0.0 ppmv.	
6-9'	FILL MATERIAL: Fine to medium, brown to grey sand with fine to coarse gravel, some silty sand and clay, cobbles and boulders. Groundwater visible at approximately 8 feet below grade surface (bgs). PID reading 0.0 ppmv.	
	Bottom of Test Pit at 9'.	
<b>NOTES:</b>		<b>TP-11</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b> Former BELD Property		<b>TEST PIT ID</b> <b>TP-12</b>
<b>LOCATION</b> 44 Allen Street, Braintree MA		
<b>CLIENT</b> Town of Braintree		<b>GROUND SURFACE</b>
<b>CONTRACTOR</b> SES		<b>ELEVATION:</b> Not Measured (NM)
<b>OBSERVED BY</b> Padraic Kavanagh <b>DATE</b> 7/21/2016		<b>DEPTH TO GROUNDWATER BELOW</b>
<b>CHECKED BY</b> Sean Healey		<b>SURFACE:</b> NM
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Fine to coarse brown sand with fine to medium gravel, glass, red brick, coal and cinder fragments. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Fine to coarse brown sand with fine to medium gravel, glass, and red brick fragments. PID reading 0.0 ppmv.	
6-9'	FILL MATERIAL: Fine to medium, brown to grey sand with fine to coarse gravel, cobbles and boulders. Groundwater visible at approximately 8 feet bgs. PID reading 0.0 ppmv.	
	Bottom of Test Pit at 9'.	
<b>NOTES:</b>		<b>TP-12</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b> Former BELD Property		<b>TEST PIT ID</b> <b>TP-13</b>
<b>LOCATION</b> 44 Allen Street, Braintree MA		
<b>CLIENT</b> Town of Braintree		<b>GROUND SURFACE</b>
<b>CONTRACTOR</b> SES		<b>ELEVATION:</b> Not Measured (NM)
<b>OBSERVED BY</b> Padraic Kavanagh <b>DATE</b> 7/21/2016		<b>DEPTH TO GROUNDWATER BELOW</b>
<b>CHECKED BY</b> Sean Healey		<b>SURFACE:</b> NM
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Fine to coarse brown sand with fine to medium gravel. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Fine to coarse brown sand with fine to medium gravel. PID reading 0.0 ppmv.	
6-9'	FILL MATERIAL: Fine to coarse brown sand with fine to coarse gravel, grey silty sand and organic material (wet). PID reading 0.0 ppmv.	
	Bottom of Test Pit at 9'.	
<b>NOTES:</b>		<b>TP-13</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b> Former BELD Property		<b>TEST PIT ID</b> <b>TP-14</b>
<b>LOCATION</b> 44 Allen Street, Braintree MA		
<b>CLIENT</b> Town of Braintree		<b>GROUND SURFACE</b>
<b>CONTRACTOR</b> SES		<b>ELEVATION:</b> Not Measured (NM)
<b>OBSERVED BY</b> Padraic Kavanagh <b>DATE</b> 7/21/2016		<b>DEPTH TO GROUNDWATER BELOW</b>
<b>CHECKED BY</b> Sean Healey		<b>SURFACE:</b> NM
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Fine to coarse brown sand with fine to medium gravel, brick, ash, coal and cinder. Light brown silty sand at 3 feet. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Light brown silty sand with organic material and some wood fragments. Groundwater visible at approximately 5 feet. PID reading 0.0 ppmv.	
6-9'	FILL MATERIAL: Fine grey silty sand with organic material and sedimentary rock saturated. PID reading 0.0 ppmv.	
	Bottom of Test Pit at 9'.	
<b>NOTES:</b>		<b>TP-14</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b> Former BELD Property		<b>TEST PIT ID</b> <b>TP-15</b>
<b>LOCATION</b> 44 Allen Street, Braintree MA		
<b>CLIENT</b> Town of Braintree		<b>GROUND SURFACE</b>
<b>CONTRACTOR</b> SES		<b>ELEVATION:</b> Not Measured (NM)
<b>OBSERVED BY</b> Padraic Kavanagh <b>DATE</b> 7/21/2016		<b>DEPTH TO GROUNDWATER BELOW</b>
<b>CHECKED BY</b> Sean Healey		<b>SURFACE:</b> NM
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Fine to coarse brown sand with fine to medium gravel, brick, ash, coal, cinder, and concrete footings. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Fine to medium sand and gravel with ash, cinder, light brown silty sand and grey silty sand with organic material. PID reading 0.0 ppmv.	
6-9'	FILL MATERIAL: Fine grey silty sand with organic material and boulders. PID reading 0.0 ppmv.	
	Bottom of Test Pit at 9'.	
<b>NOTES:</b>		<b>TP-15</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b> Former BELD Property		<b>TEST PIT ID</b> <b>TP-16</b>
<b>LOCATION</b> 44 Allen Street, Braintree MA		
<b>CLIENT</b> Town of Braintree		<b>GROUND SURFACE</b>
<b>CONTRACTOR</b> SES		<b>ELEVATION:</b> Not Measured (NM)
<b>OBSERVED BY</b> Padraic Kavanagh <b>DATE</b> 7/21/2016		<b>DEPTH TO GROUNDWATER BELOW</b>
<b>CHECKED BY</b> Sean Healey		<b>SURFACE:</b> NM
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Fine to medium brown sand with fine to coarse gravel, brown to grey fine silty sand, ash and cinder. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Fine brown to grey silty sand with organic material, glass, red brick, metal and cinder fragments. PID reading 0.0 ppmv.	
6-9'	FILL MATERIAL: Fine grey silty sand with organic material and some cinder. PID reading 0.0 ppmv.	
	Bottom of Test Pit at 9'.	
<b>NOTES:</b>		<b>TP-16</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b> Former BELD Property		<b>TEST PIT ID</b> <b>TP-17</b>
<b>LOCATION</b> 44 Allen Street, Braintree MA		
<b>CLIENT</b> Town of Braintree		<b>GROUND SURFACE</b>
<b>CONTRACTOR</b> SES		<b>ELEVATION:</b> Not Measured (NM)
<b>OBSERVED BY</b> Padraic Kavanagh <b>DATE</b> 7/21/2016		<b>DEPTH TO GROUNDWATER BELOW</b>
<b>CHECKED BY</b> Sean Healey		<b>SURFACE:</b> NM
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3'	FILL MATERIAL: Light brown fine silty sand, fine to coarse gravel and boulders with some brick and wood fragments. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Light brown fine silty sand, red brick, trace metal and cinder fragments. PID reading 0.0 ppmv.	
6-9'	FILL MATERIAL: Light brown fine silty sand with trace wood fragments. PID reading 0.0 ppmv.	
	Bottom of Test Pit at 9'.	
<b>NOTES:</b>		<b>TP-17</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b>	Former BELD Property	<b>TEST PIT ID</b> <b>TP-18</b>
<b>LOCATION</b>	44 Allen Street, Braintree MA	
<b>CLIENT</b>	Town of Braintree	
<b>CONTRACTOR</b>	SES	
<b>OBSERVED BY</b>	Padraic Kavanagh	
<b>CHECKED BY</b>	Sean Healey	<b>DATE</b> 7/22/2016
		GROUND SURFACE ELEVATION: Not Measured (NM) DEPTH TO GROUNDWATER BELOW SURFACE: NM
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Brown to grey fine to medium sand with light brown silty sand, fine to coarse gravel and boulders with ash and cinder. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Brown to grey fine silty sand with some gravel. PID reading 0.0 ppmv.	
6-9'	FILL MATERIAL: Brown fine silty sand with some gravel and cobbles. PID reading 0.0 ppmv	
	Bottom of Test Pit at 9'.	
<b>NOTES:</b>		<b>TP-18</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b>	Former BELD Property	<b>TEST PIT ID</b> <b>TP-19</b>
<b>LOCATION</b>	44 Allen Street, Braintree MA	
<b>CLIENT</b>	Town of Braintree	
<b>CONTRACTOR</b>	SES	
<b>OBSERVED BY</b>	Padraic Kavanagh	
<b>CHECKED BY</b>	Sean Healey	<b>DATE</b> 7/22/2016
		GROUND SURFACE ELEVATION: Not Measured (NM) DEPTH TO GROUNDWATER BELOW SURFACE: NM
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Brown fine to medium sand with fine to coarse gravel and boulders, brick and some cinder. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Brown to grey fine silty sand with some gravel and cobbles. PID reading 0.0 ppmv.	
6-9'	FILL MATERIAL: Brown to grey silty sand with some gravel, and cobbles. PID reading 0.0 ppmv.	
	Bottom of Test Pit at 9'.	
<b>NOTES:</b>		<b>TP-19</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b> Former BELD Property		<b>TEST PIT ID</b> <b>TP-20</b>
<b>LOCATION</b> 44 Allen Street, Braintree MA		
<b>CLIENT</b> Town of Braintree		<b>GROUND SURFACE</b>
<b>CONTRACTOR</b> SES		<b>ELEVATION:</b> Not Measured (NM)
<b>OBSERVED BY</b> Padraic Kavanagh <b>DATE</b> 7/22/2016		<b>DEPTH TO GROUNDWATER BELOW</b>
<b>CHECKED BY</b> Sean Healey		<b>SURFACE:</b> NM
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Brown fine to medium sand with ash and cinder along concrete footing. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Brown fine silty sand and cobbles. PID reading 0.0 ppmv.	
6-9'	FILL MATERIAL: Brown to grey silty sand with some gravel, and cobbles.(wet) PID reading 0.0 ppmv.	
	Bottom of Test Pit at 9'.	
<b>NOTES:</b>		<b>TP-20</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b>	Former BELD Property	<b>TEST PIT ID</b> <b>TP-21</b>
<b>LOCATION</b>	44 Allen Street, Braintree MA	
<b>CLIENT</b>	Town of Braintree	
<b>CONTRACTOR</b>	SES	
<b>OBSERVED BY</b>	Padraic Kavanagh	
<b>CHECKED BY</b>	Sean Healey	GROUND SURFACE ELEVATION: Not Measured (NM) DEPTH TO GROUNDWATER BELOW SURFACE: NM
<b>DATE</b>	7/22/2016	
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Brown to grey fine to medium sand with dark brown fine sand ash and cinder. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Dark brown fine to medium sand with light brown silty sand, ash and cinder. PID reading 0.0 ppmv.	
6-9'	FILL MATERIAL: Brown fine silty sand. PID reading 0.0 ppmv.	
	Bottom of Test Pit at 9'.	
<b>NOTES:</b>		<b>TP-21</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b> Former BELD Property		<b>TEST PIT ID</b> <b>TP-22</b>
<b>LOCATION</b> 44 Allen Street, Braintree MA		
<b>CLIENT</b> Town of Braintree		<b>GROUND SURFACE</b>
<b>CONTRACTOR</b> SES		<b>ELEVATION:</b> Not Measured (NM)
<b>OBSERVED BY</b> Padraic Kavanagh <b>DATE</b> 7/22/2016		<b>DEPTH TO GROUNDWATER BELOW</b>
<b>CHECKED BY</b> Sean Healey		<b>SURFACE:</b> NM
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Brown fine to medium sand with dark brown fine sand ash and cinder. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Grey fine silty sand with fine to medium sand, gravel and boulders. Strong petroleum odor from approximately 4 to 6 feet bgs. PID reading 426 ppmv.	
6-9'	FILL MATERIAL: Grey fine silty sand with fine to medium sand, gravel and boulders. Strong petroleum odor. Groundwater visible at approximately 7 to 8 feet bgs. PID reading 245 ppmv.	
9-12'	Grey fine silty sand with fine to medium sand, gravel and cobbles. Strong petroleum odor. Hole collapsing. PID reading 226 ppmv. Bottom of test pit is 12 feet.	
<b>NOTES:</b>		<b>TP-22</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b> Former BELD Property		<b>TEST PIT ID</b> <b>TP-23</b>
<b>LOCATION</b> 44 Allen Street, Braintree MA		
<b>CLIENT</b> Town of Braintree		<b>GROUND SURFACE</b>
<b>CONTRACTOR</b> SES		<b>ELEVATION:</b> Not Measured (NM)
<b>OBSERVED BY</b> Padraic Kavanagh <b>DATE</b> 7/22/2016		<b>DEPTH TO GROUNDWATER BELOW</b>
<b>CHECKED BY</b> Sean Healey		<b>SURFACE:</b> NM
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Brown fine to medium sand with brick fragments. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Grey fine silty sand with fine to medium sand, gravel and boulders. Strong odor at approximately 4 to 6 feet bgs. PID reading 620 ppmv.	
6-9'	FILL MATERIAL: Grey fine silty sand with fine to medium sand, gravel and boulders. Strong petroleum odor. Groundwater visible at approximately 7 to 8 feet bgs. PID reading 325 ppmv.	
9-12'	Grey fine silty sand with fine to medium sand, gravel and boulders (saturated). Strong petroleum odor. Hole collapsed. PID reading 226 ppmv. Bottom of test pit at 12 feet.	
<b>NOTES:</b>		<b>TP-23</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b> Former BELD Property		<b>TEST PIT ID</b> <b>TP-24</b>
<b>LOCATION</b> 44 Allen Street, Braintree MA		
<b>CLIENT</b> Town of Braintree		<b>GROUND SURFACE</b>
<b>CONTRACTOR</b> SES		<b>ELEVATION:</b> Not Measured (NM)
<b>OBSERVED BY</b> Padraic Kavanagh <b>DATE</b> 7/22/2016		<b>DEPTH TO GROUNDWATER BELOW</b>
<b>CHECKED BY</b> Sean Healey		<b>SURFACE:</b> NM
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Brown fine to medium sand. Concrete slab encountered at 3 feet. Refusal at 3 feet. PID reading 0.0 ppmv. Bottom of test pit at 3 feet.	
3-6'		
<b>NOTES:</b>		<b>TP-24</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b>	Former BELD Property	<b>TEST PIT ID</b> <b>TP-25</b>
<b>LOCATION</b>	44 Allen Street, Braintree MA	
<b>CLIENT</b>	Town of Braintree	
<b>CONTRACTOR</b>	SES	
<b>OBSERVED BY</b>	Padraic Kavanagh	
<b>CHECKED BY</b>	Sean Healey	<b>GROUND SURFACE</b> ELEVATION: Not Measured (NM) <b>DEPTH TO GROUNDWATER BELOW</b> SURFACE: NM
<b>DATE</b>	7/22/2016	
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Brown fine to medium sand and gravel with some red brick fragments, cobbles and boulders. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Brown fine to medium sand and gravel with some red brick fragments, cobbles and boulders from 3 to 5 feet. Concrete slab at 5 feet. Refusal at 5 feet. PID reading 0.0 ppmv.	
	Bottom of test pit at 5 feet.	
<b>NOTES:</b>		<b>TP-25</b> <b>WESTON &amp; SAMPSON</b>

**TEST PIT LOG**

<b>PROJECT NAME/NO.</b> Former BELD Property		<b>TEST PIT ID</b> <b>TP-26</b>
<b>LOCATION</b> 44 Allen Street, Braintree MA		
<b>CLIENT</b> Town of Braintree		<b>GROUND SURFACE</b>
<b>CONTRACTOR</b> SES		<b>ELEVATION:</b> Not Measured (NM)
<b>OBSERVED BY</b> Padraic Kavanagh <b>DATE</b> 7/22/2016		<b>DEPTH TO GROUNDWATER BELOW</b>
<b>CHECKED BY</b> Sean Healey		<b>SURFACE:</b> NM
<b>DEPTH BELOW GROUND SURFACE (ft.)</b>	<b>SOIL DESCRIPTION</b>	
0-3"	Asphalt	
3"-3'	FILL MATERIAL: Brown fine to medium sand with gravel, cobbles and brick fragments. PID reading 0.0 ppmv.	
3-6'	FILL MATERIAL: Brown fine to medium sand with gravel, cobbles and brick fragments. PID reading 0.0 ppmv.	
6-9'	FILL MATERIAL: Brown fine to medium sand, gravel and boulders. Wet at approximately 9 feet bgs. PID reading 0.0 ppmv.	
9-12'	FILL MATERIAL: Brown fine to medium sand, gravel and boulders. Wet PID reading 0.0 ppmv. Bottom of test pit at 12 feet.	
<b>NOTES:</b>		<b>TP-26</b> <b>WESTON &amp; SAMPSON</b>

**ATTACHMENT B**

Laboratory Analytical Reports

July 29, 2016

Sean Healey  
Weston & Sampson - Foxborough  
100 Foxboro Boulevard, Suite 250  
Foxborough, MA 02035

Project Location: 44 Allen St., Braintree, MA  
Client Job Number:  
Project Number: [none]  
Laboratory Work Order Number: 16G1034

Enclosed are results of analyses for samples received by the laboratory on July 22, 2016. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Meghan E. Kelley". The signature is written in a cursive style with a large, flowing "y" at the end.

Meghan E. Kelley  
Project Manager

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

Weston & Sampson - Foxborough  
 100 Foxboro Boulevard, Suite 250  
 Foxborough, MA 02035  
 ATTN: Sean Healey

REPORT DATE: 7/29/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: [none]

**ANALYTICAL SUMMARY**

WORK ORDER NUMBER: 16G1034

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

PROJECT LOCATION: 44 Allen St., Braintree, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
TP-11 (0-3)	16G1034-01	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	
TP-11 (6-9)	16G1034-02	Soil		-	
TP-12 (0-3)	16G1034-03	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	
TP-12 (3-6)	16G1034-04	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	
TP-13 (0-3)	16G1034-05	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	
TP-13 (6-9)	16G1034-06	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	

**CASE NARRATIVE SUMMARY**

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

**SW-846 6010C/D SW-846 6020A/B**

For NC, Metals methods SW-846 6010D and SW-846 6020B are followed, and for all other states methods SW-846 6010C and SW-846 6020A are followed.

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.

I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

A handwritten signature in black ink, appearing to read "Lisa A. Worthington", is written over a light gray rectangular background.

Lisa A. Worthington  
Project Manager

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Field Sample #: TP-11 (0-3)

Sampled: 7/21/2016 09:30

Sample ID: 16G1034-01

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	BGL
Acenaphthylene	0.29	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Anthracene	0.21	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Benzo(a)anthracene	1.5	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Benzo(a)pyrene	1.4	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Benzo(b)fluoranthene	1.8	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Benzo(g,h,i)perylene	0.80	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Benzo(k)fluoranthene	0.75	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Chrysene	1.3	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Dibenz(a,h)anthracene	0.19	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Fluoranthene	2.4	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Indeno(1,2,3-cd)pyrene	0.86	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Phenanthrene	0.82	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Pyrene	2.1	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:20	WSD
Surrogates		% Recovery	Recovery Limits		Flag/Qual				
Nitrobenzene-d5		106	30-130					7/25/16 14:20	
2-Fluorobiphenyl		102	30-130					7/25/16 14:20	
p-Terphenyl-d14		107	30-130					7/25/16 14:20	

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Field Sample #: TP-11 (0-3)

Sampled: 7/21/2016 09:30

Sample ID: 16G1034-01

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	180	0.78	mg/Kg dry	1		SW-846 6010C-D	7/25/16	7/27/16 19:51	JK

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Sampled: 7/21/2016 09:30

Field Sample #: TP-11 (0-3)

Sample ID: 16G1034-01

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	89.5		% Wt	1		SM 2540G	7/25/16	7/26/16 9:29	MRL

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Field Sample #: TP-12 (0-3)

Sampled: 7/21/2016 10:00

Sample ID: 16G1034-03

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Acenaphthylene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Benzo(a)anthracene	0.36	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Benzo(a)pyrene	0.35	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Benzo(b)fluoranthene	0.47	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Benzo(g,h,i)perylene	0.24	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Benzo(k)fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Chrysene	0.32	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Dibenz(a,h)anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Fluoranthene	0.59	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Fluorene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Indeno(1,2,3-cd)pyrene	0.24	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
2-Methylnaphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Naphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Phenanthrene	0.24	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Pyrene	0.54	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 14:49	WSD
Surrogates		% Recovery	Recovery Limits		Flag/Qual				
Nitrobenzene-d5		98.0	30-130					7/25/16 14:49	
2-Fluorobiphenyl		95.0	30-130					7/25/16 14:49	
p-Terphenyl-d14		105	30-130					7/25/16 14:49	

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Field Sample #: TP-12 (0-3)

Sampled: 7/21/2016 10:00

Sample ID: 16G1034-03

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	100	0.78	mg/Kg dry	1		SW-846 6010C-D	7/25/16	7/27/16 1:10	JK

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Field Sample #: TP-12 (0-3)

Sampled: 7/21/2016 10:00

Sample ID: 16G1034-03

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	93.3		% Wt	1		SM 2540G	7/25/16	7/26/16 9:29	MRL

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Field Sample #: TP-12 (3-6)

Sampled: 7/21/2016 10:15

Sample ID: 16G1034-04

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Acenaphthylene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Anthracene	0.20	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Benzo(a)anthracene	1.3	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Benzo(a)pyrene	1.2	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Benzo(b)fluoranthene	1.5	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Benzo(g,h,i)perylene	0.73	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Benzo(k)fluoranthene	0.55	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Chrysene	1.1	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Dibenz(a,h)anthracene	0.19	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Fluoranthene	2.2	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Fluorene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Indeno(1,2,3-cd)pyrene	0.79	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
2-Methylnaphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Naphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Phenanthrene	0.79	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Pyrene	1.9	0.18	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:18	WSD
Surrogates		% Recovery	Recovery Limits		Flag/Qual				
Nitrobenzene-d5		102	30-130					7/25/16 15:18	
2-Fluorobiphenyl		94.8	30-130					7/25/16 15:18	
p-Terphenyl-d14		109	30-130					7/25/16 15:18	

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Field Sample #: TP-12 (3-6)

Sampled: 7/21/2016 10:15

Sample ID: 16G1034-04

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	180	0.77	mg/Kg dry	1		SW-846 6010C-D	7/25/16	7/27/16 1:15	JK

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Field Sample #: TP-12 (3-6)

Sampled: 7/21/2016 10:15

Sample ID: 16G1034-04

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	92.3		% Wt	1		SM 2540G	7/25/16	7/26/16 9:29	MRL

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Field Sample #: TP-13 (0-3)

Sampled: 7/21/2016 10:30

Sample ID: 16G1034-05

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 15:47	WSD
Surrogates		% Recovery	Recovery Limits		Flag/Qual				
Nitrobenzene-d5		98.0	30-130					7/25/16 15:47	
2-Fluorobiphenyl		96.3	30-130					7/25/16 15:47	
p-Terphenyl-d14		110	30-130					7/25/16 15:47	

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Field Sample #: TP-13 (0-3)

Sampled: 7/21/2016 10:30

Sample ID: 16G1034-05

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	8.7	0.83	mg/Kg dry	1		SW-846 6010C-D	7/25/16	7/27/16 1:19	JK

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Field Sample #: TP-13 (0-3)

Sampled: 7/21/2016 10:30

Sample ID: 16G1034-05

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	90.5		% Wt	1		SM 2540G	7/25/16	7/26/16 9:29	MRL

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Field Sample #: TP-13 (6-9)

Sampled: 7/21/2016 10:45

Sample ID: 16G1034-06

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Acenaphthylene	ND	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Anthracene	ND	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Benzo(a)anthracene	0.38	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Benzo(a)pyrene	ND	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Benzo(b)fluoranthene	0.62	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Benzo(g,h,i)perylene	0.25	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Benzo(k)fluoranthene	0.23	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Chrysene	0.41	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Dibenz(a,h)anthracene	ND	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Fluoranthene	0.48	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Fluorene	ND	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Indeno(1,2,3-cd)pyrene	0.29	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
2-Methylnaphthalene	ND	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Naphthalene	ND	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Phenanthrene	ND	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Pyrene	0.95	0.23	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:17	WSD
Surrogates		% Recovery	Recovery Limits		Flag/Qual				
Nitrobenzene-d5		92.6	30-130					7/25/16 16:17	
2-Fluorobiphenyl		87.4	30-130					7/25/16 16:17	
p-Terphenyl-d14		101	30-130					7/25/16 16:17	

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Field Sample #: TP-13 (6-9)

Sampled: 7/21/2016 10:45

Sample ID: 16G1034-06

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	27	0.99	mg/Kg dry	1		SW-846 6010C-D	7/25/16	7/27/16 1:25	JK

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1034

Date Received: 7/22/2016

Sampled: 7/21/2016 10:45

Field Sample #: TP-13 (6-9)

Sample ID: 16G1034-06

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	74.5		% Wt	1		SM 2540G	7/25/16	7/26/16 9:29	MRL

**Sample Extraction Data**

**Prep Method: % Solids-SM 2540G**

Lab Number [Field ID]	Batch	Date
16G1034-01 [TP-11 (0-3)]	B154423	07/25/16
16G1034-03 [TP-12 (0-3)]	B154423	07/25/16
16G1034-04 [TP-12 (3-6)]	B154423	07/25/16
16G1034-05 [TP-13 (0-3)]	B154423	07/25/16
16G1034-06 [TP-13 (6-9)]	B154423	07/25/16

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

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16G1034-01 [TP-11 (0-3)]	B154359	1.07	50.0	07/25/16
16G1034-03 [TP-12 (0-3)]	B154359	1.04	50.0	07/25/16
16G1034-04 [TP-12 (3-6)]	B154359	1.06	50.0	07/25/16
16G1034-05 [TP-13 (0-3)]	B154359	1.00	50.0	07/25/16
16G1034-06 [TP-13 (6-9)]	B154359	1.02	50.0	07/25/16

**Prep Method: SW-846 3546-SW-846 8270D**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16G1034-01 [TP-11 (0-3)]	B154337	30.2	1.00	07/24/16
16G1034-03 [TP-12 (0-3)]	B154337	30.1	1.00	07/24/16
16G1034-04 [TP-12 (3-6)]	B154337	30.1	1.00	07/24/16
16G1034-05 [TP-13 (0-3)]	B154337	30.1	1.00	07/24/16
16G1034-06 [TP-13 (6-9)]	B154337	30.2	1.00	07/24/16

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**QUALITY CONTROL**

**Semivolatile Organic Compounds by GC/MS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B154337 - SW-846 3546</b>										
<b>Blank (B154337-BLK1)</b>										
Prepared: 07/24/16 Analyzed: 07/25/16										
Acenaphthene	ND	0.17	mg/Kg wet							
Acenaphthylene	ND	0.17	mg/Kg wet							
Anthracene	ND	0.17	mg/Kg wet							
Benzo(a)anthracene	ND	0.17	mg/Kg wet							
Benzo(a)pyrene	ND	0.17	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.17	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.17	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.17	mg/Kg wet							
Chrysene	ND	0.17	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.17	mg/Kg wet							
Fluoranthene	ND	0.17	mg/Kg wet							
Fluorene	ND	0.17	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.17	mg/Kg wet							
2-Methylnaphthalene	ND	0.17	mg/Kg wet							
Naphthalene	ND	0.17	mg/Kg wet							
Phenanthrene	ND	0.17	mg/Kg wet							
Pyrene	ND	0.17	mg/Kg wet							
Surrogate: Nitrobenzene-d5	3.21		mg/Kg wet	3.33		96.3	30-130			
Surrogate: 2-Fluorobiphenyl	3.48		mg/Kg wet	3.33		105	30-130			
Surrogate: p-Terphenyl-d14	3.97		mg/Kg wet	3.33		119	30-130			
<b>LCS (B154337-BS1)</b>										
Prepared: 07/24/16 Analyzed: 07/25/16										
Acenaphthene	1.40	0.17	mg/Kg wet	1.67		84.2	40-140			
Acenaphthylene	1.46	0.17	mg/Kg wet	1.67		87.4	40-140			
Anthracene	1.50	0.17	mg/Kg wet	1.67		89.7	40-140			
Benzo(a)anthracene	1.55	0.17	mg/Kg wet	1.67		92.9	40-140			
Benzo(a)pyrene	1.56	0.17	mg/Kg wet	1.67		93.5	40-140			
Benzo(b)fluoranthene	1.53	0.17	mg/Kg wet	1.67		91.8	40-140			
Benzo(g,h,i)perylene	1.50	0.17	mg/Kg wet	1.67		90.2	40-140			
Benzo(k)fluoranthene	1.51	0.17	mg/Kg wet	1.67		90.8	40-140			
Chrysene	1.46	0.17	mg/Kg wet	1.67		87.9	40-140			
Dibenz(a,h)anthracene	1.47	0.17	mg/Kg wet	1.67		88.3	40-140			
Fluoranthene	1.44	0.17	mg/Kg wet	1.67		86.1	40-140			
Fluorene	1.53	0.17	mg/Kg wet	1.67		91.9	40-140			
Indeno(1,2,3-cd)pyrene	1.54	0.17	mg/Kg wet	1.67		92.6	40-140			
2-Methylnaphthalene	1.50	0.17	mg/Kg wet	1.67		89.7	40-140			
Naphthalene	1.38	0.17	mg/Kg wet	1.67		82.5	40-140			
Phenanthrene	1.48	0.17	mg/Kg wet	1.67		88.9	40-140			
Pyrene	1.63	0.17	mg/Kg wet	1.67		97.7	40-140			
Surrogate: Nitrobenzene-d5	3.21		mg/Kg wet	3.33		96.3	30-130			
Surrogate: 2-Fluorobiphenyl	3.37		mg/Kg wet	3.33		101	30-130			
Surrogate: p-Terphenyl-d14	3.75		mg/Kg wet	3.33		112	30-130			

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**QUALITY CONTROL**

**Semivolatile Organic Compounds by GC/MS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B154337 - SW-846 3546</b>										
<b>LCS Dup (B154337-BSD1)</b>										
					Prepared: 07/24/16 Analyzed: 07/25/16					
Acenaphthene	1.42	0.17	mg/Kg wet	1.67		85.1	40-140	1.04	30	
Acenaphthylene	1.47	0.17	mg/Kg wet	1.67		88.1	40-140	0.798	30	
Anthracene	1.53	0.17	mg/Kg wet	1.67		92.1	40-140	2.57	30	
Benzo(a)anthracene	1.58	0.17	mg/Kg wet	1.67		95.1	40-140	2.34	30	
Benzo(a)pyrene	1.59	0.17	mg/Kg wet	1.67		95.5	40-140	2.12	30	
Benzo(b)fluoranthene	1.55	0.17	mg/Kg wet	1.67		93.1	40-140	1.45	30	
Benzo(g,h,i)perylene	1.61	0.17	mg/Kg wet	1.67		96.4	40-140	6.65	30	
Benzo(k)fluoranthene	1.54	0.17	mg/Kg wet	1.67		92.4	40-140	1.81	30	
Chrysene	1.52	0.17	mg/Kg wet	1.67		91.2	40-140	3.66	30	
Dibenz(a,h)anthracene	1.56	0.17	mg/Kg wet	1.67		93.4	40-140	5.57	30	
Fluoranthene	1.46	0.17	mg/Kg wet	1.67		87.4	40-140	1.43	30	
Fluorene	1.56	0.17	mg/Kg wet	1.67		93.7	40-140	1.90	30	
Indeno(1,2,3-cd)pyrene	1.64	0.17	mg/Kg wet	1.67		98.5	40-140	6.15	30	
2-Methylnaphthalene	1.51	0.17	mg/Kg wet	1.67		90.7	40-140	1.04	30	
Naphthalene	1.39	0.17	mg/Kg wet	1.67		83.5	40-140	1.23	30	
Phenanthrene	1.51	0.17	mg/Kg wet	1.67		90.4	40-140	1.70	30	
Pyrene	1.68	0.17	mg/Kg wet	1.67		101	40-140	2.92	30	
Surrogate: Nitrobenzene-d5	3.21		mg/Kg wet	3.33		96.4	30-130			
Surrogate: 2-Fluorobiphenyl	3.43		mg/Kg wet	3.33		103	30-130			
Surrogate: p-Terphenyl-d14	3.79		mg/Kg wet	3.33		114	30-130			

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**QUALITY CONTROL**

**Metals Analyses (Total) - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B154359 - SW-846 3050B</b>										
<b>Blank (B154359-BLK1)</b>										
					Prepared: 07/25/16 Analyzed: 07/26/16					
Lead	ND	0.75	mg/Kg wet							
<b>LCS (B154359-BS1)</b>										
					Prepared: 07/25/16 Analyzed: 07/26/16					
Lead	77.8	1.5	mg/Kg wet	85.6		90.9	82.4-117.8			
<b>LCS Dup (B154359-BSD1)</b>										
					Prepared: 07/25/16 Analyzed: 07/26/16					
Lead	80.3	1.5	mg/Kg wet	85.6		93.8	82.4-117.8	3.11	30	
<b>MRL Check (B154359-MRL1)</b>										
					Prepared: 07/25/16 Analyzed: 07/26/16					
Lead	0.786	0.73	mg/Kg wet	0.731		108	80-120			

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**QUALITY CONTROL**

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

**Batch B154423 - % Solids**

**Duplicate (B154423-DUP2)**

**Source: 16G1034-01**

Prepared: 07/25/16 Analyzed: 07/26/16

% Solids	89.1		% Wt		89.5			0.448	20	
----------	------	--	------	--	------	--	--	-------	----	--

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**FLAG/QUALIFIER SUMMARY**

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit
DL	Method Detection Limit
MCL	Maximum Contaminant Level

Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.

No results have been blank subtracted unless specified in the case narrative section.

**CERTIFICATIONS**

**Certified Analyses included in this Report**

Analyte	Certifications
<i>SW-846 6010C-D in Soil</i>	
Lead	CT,NH,NY,AIHA,ME,VA,NC
<i>SW-846 8270D in Soil</i>	
Acenaphthene	CT,NY,NH,ME,NC,VA
Acenaphthylene	CT,NY,NH,ME,NC,VA
Anthracene	CT,NY,NH,ME,NC,VA
Benzo(a)anthracene	CT,NY,NH,ME,NC,VA
Benzo(a)pyrene	CT,NY,NH,ME,NC,VA
Benzo(b)fluoranthene	CT,NY,NH,ME,NC,VA
Benzo(g,h,i)perylene	CT,NY,NH,ME,NC,VA
Benzo(k)fluoranthene	CT,NY,NH,ME,NC,VA
Chrysene	CT,NY,NH,ME,NC,VA
Dibenz(a,h)anthracene	CT,NY,NH,ME,NC,VA
Fluoranthene	CT,NY,NH,ME,NC,VA
Fluorene	CT,NY,NH,ME,NC,VA
Indeno(1,2,3-cd)pyrene	CT,NY,NH,ME,NC,VA
2-Methylnaphthalene	CT,NY,NH,ME,NC,VA
Naphthalene	CT,NY,NH,ME,NC,VA
Phenanthrene	CT,NY,NH,ME,NC,VA
Pyrene	CT,NY,NH,ME,NC,VA

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

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC	100033	02/1/2018
MA	Massachusetts DEP	M-MA100	06/30/2017
CT	Connecticut Department of Public Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2017
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2017
RI	Rhode Island Department of Health	LAO00112	12/30/2016
NC	North Carolina Div. of Water Quality	652	12/31/2016
NJ	New Jersey DEP	MA007 NELAP	06/30/2017
FL	Florida Department of Health	E871027 NELAP	06/30/2017
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2017
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2016
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2016



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

# CHAIN OF CUSTODY RECORD

39 Spruce Street  
 East Longmeadow, MA 01028

Page 1 of 1

Company Name: WESTON & Sampson

Address: 100 FOXBORO BLVD.

Telephone: 1800 Sampson

Project #

Attention: SEAN HEALEY

Client PO#

Project Location: 44 ALLEN ST BRAINARD

Sampled By: PTC 781-710-4391

DATA DELIVERY (check all that apply)  
 FAX  EMAIL  WEBSITE

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

Format  
 PDF  EXCEL  GIS  
 OTHER  "Enhanced Data Package"

Con-Test Lab ID <small>(laboratory use only)</small>	Client Sample ID / Description	Collection		Composite	Grab	*Matrix Code	*Preservation
		Beginning Date/Time	Ending Date/Time				
<u>01</u>	<u>TP-11 (0-3)</u>	<u>7/21</u>	<u>9:30</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>S</u>	<u>Iced</u>
<u>02</u>	<u>TP-11 (6-9)</u>		<u>9:45</u>				
<u>03</u>	<u>TP-12 (0-3)</u>		<u>10:00</u>				
<u>04</u>	<u>TP-12 (3-6)</u>		<u>10:15</u>				
<u>05</u>	<u>TP-13 (0-3)</u>		<u>10:30</u>				
<u>06</u>	<u>TP-13 (6-9)</u>		<u>10:45</u>				

Comments: \* Hold

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

### Detection Limit Requirements

Massachusetts: \_\_\_\_\_  
 Connecticut: \_\_\_\_\_  
 Other: \_\_\_\_\_

### Turnaround

7-Day  
 10-Day  
 Other 5  
RUSH  
 24-Hr  48-Hr  
 72-Hr  4-Day  
 Require lab approval

Relinquished by: (signature) [Signature] Date/Time: 7/21/11 12:00

Received by: (signature) [Signature] Date/Time: 7/21/11 12:00

Inquired by: (signature) [Signature] Date/Time: 7/21/11 12:00

Sealed by: (signature) [Signature] Date/Time: 7/21/11 12:00

### Is your project MCP or RCP?

MCP Form Required  
 RCP Form Required  
 MA State DW Form Required PWSID # \_\_\_\_\_

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



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

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



### Sample Receipt Checklist

CLIENT NAME: Weston & Sampson RECEIVED BY: EB DATE: 7/22/16

- 1) Was the chain(s) of custody relinquished and signed? Yes  No  No COC Incl.
- 2) Does the chain agree with the samples? Yes  No   
 If not, explain: \_\_\_\_\_
- 3) Are all the samples in good condition? Yes  No   
 If not, explain: \_\_\_\_\_

4) How were the samples received:

On Ice  Direct from Sampling  Ambient  In Cooler(s)

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

Temperature °C by Temp blank \_\_\_\_\_ Temperature °C by Temp gun 4.1

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:

Log In

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

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

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

10) Was the PC notified of any discrepancies with the CoC vs the samples: Yes  N/A

### Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber		16 oz amber	
500 mL Amber		8 oz amber/clear jar	<u>6</u>
250 mL Amber (8oz amber)		4 oz amber/clear jar	
1 Liter Plastic		2 oz amber/clear jar	
500 mL Plastic		Plastic Bag / Ziploc	
250 mL plastic		SOC Kit	
40 mL Vial - type listed below		Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

40 mL vials: # HCl _____ # Methanol _____	Time and Date Frozen: _____
Doc# 277 # Bisulfate _____ # DI Water _____	
Rev. 4 August 2013 # Thiosulfate _____ Unpreserved _____	

**Login Sample Receipt Checklist**

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

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

Doc #277 Rev. 4 August 2013

Who notified of False statements?  
Log-In Technician Initials: EB

Date/Time: 7/22/16  
Date/Time: 1600

## MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory			Project #: 16G1034		
Project Location: 44 Allen St., Braintree, MA			RTN:		
This Form provides certifications for the following data set: [list Laboratory Sample ID Number(s)] 16G1034-01 thru 16G1034-06					
Matrices: Soil					
<b>CAM Protocol (check all that below)</b>					
8260 VOC CAM II A ( )	7470/7471 Hg CAM IIIB ( )	MassDEP VPH CAM IV A ( )	8081 Pesticides CAM V B ( )	7196 Hex Cr CAM VI B ( )	MassDEP APH CAM IX A ( )
8270 SVOC CAM II B (X)	7010 Metals CAM III C ( )	MassDEP EPH CAM IV A ( )	8151 Herbicides CAM V C ( )	8330 Explosives CAM VIII A ( )	TO-15 VOC CAM IX B ( )
6010 Metals CAM III A (X)	6020 Metals CAM III D ( )	8082 PCB CAM V A ( )	9014 Total Cyanide/PAC CAM VI A ( )	6860 Perchlorate CAM VIII B ( )	
<b>Affirmative response to Questions A through F is required for "Presumptive Certainty" status</b>					
<b>A</b>	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?				<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>B</b>	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?				<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>C</b>	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?				<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>D</b>	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?				<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>E a</b>	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).				<input type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>E b</b>	APH and TO-15 Methods only: Was the complete analyte list reported for each method?				<input type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>F</b>	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all No responses to Questions A through E)?				<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>A response to questions G, H and I below is required for "Presumptive Certainty" status</b>					
<b>G</b>	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?				<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>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.</b>					
<b>H</b>	Were all QC performance standards specified in the CAM protocol(s) achieved?				<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>I</b>	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?				<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <sup>1</sup>
<sup>1</sup> All Negative responses must be addressed in an attached Environmental Laboratory case narrative.					
<b>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.</b>					
Signature: _____ 		Position: Project Manager			
Printed Name: Lisa A. Worthington		Date: 07/29/16			

July 29, 2016

Sean Healey  
Weston & Sampson - Foxborough  
100 Foxboro Boulevard, Suite 250  
Foxborough, MA 02035

Project Location: 44 Allen St., Braintree, MA  
Client Job Number:  
Project Number: [none]  
Laboratory Work Order Number: 16G1036

Enclosed are results of analyses for samples received by the laboratory on July 22, 2016. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Meghan E. Kelley". The signature is written in a cursive style with a large, sweeping flourish at the end.

Meghan E. Kelley  
Project Manager

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Weston & Sampson - Foxborough  
 100 Foxboro Boulevard, Suite 250  
 Foxborough, MA 02035  
 ATTN: Sean Healey

REPORT DATE: 7/29/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: [none]

**ANALYTICAL SUMMARY**

WORK ORDER NUMBER: 16G1036

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

PROJECT LOCATION: 44 Allen St., Braintree, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
TP-18 (0-3)	16G1036-01	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	
TP-18 (6-9)	16G1036-02	Soil		-	
TP-19 (6-9)	16G1036-03	Soil		-	
TP-19 (0-3)	16G1036-04	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	
TP-9 (9-10)	16G1036-05	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	
TP-20 (0-3)	16G1036-06	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	
TP-20 (6-9)	16G1036-07	Soil		-	
DUP-1	16G1036-08	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	
TP-21 (0-3)	16G1036-09	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	
TP-21 (6-9)	16G1036-10	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	

**CASE NARRATIVE SUMMARY**

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

**SW-846 6010C/D SW-846 6020A/B**

For NC, Metals methods SW-846 6010D and SW-846 6020B are followed, and for all other states methods SW-846 6010C and SW-846 6020A are followed.

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.

I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.



Lisa A. Worthington  
Project Manager

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-18 (0-3)

Sampled: 7/22/2016 09:00

Sample ID: 16G1036-01

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	0.97	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:48	WSD
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:48	WSD
Anthracene	3.1	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:48	WSD
Benzo(a)anthracene	5.3	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 12:32	BGL
Benzo(a)pyrene	4.6	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 12:32	BGL
Benzo(b)fluoranthene	5.5	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 12:32	BGL
Benzo(g,h,i)perylene	3.3	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 12:32	BGL
Benzo(k)fluoranthene	3.9	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:48	WSD
Chrysene	5.1	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 12:32	BGL
Dibenz(a,h)anthracene	1.1	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:48	WSD
Fluoranthene	11	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 12:32	BGL
Fluorene	0.90	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:48	WSD
Indeno(1,2,3-cd)pyrene	3.5	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 12:32	BGL
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:48	WSD
Naphthalene	0.19	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 16:48	WSD
Phenanthrene	9.1	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 12:32	BGL
Pyrene	9.2	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 12:32	BGL
Surrogates		% Recovery	Recovery Limits		Flag/Qual				
Nitrobenzene-d5		98.8	30-130					7/25/16 16:48	
Nitrobenzene-d5		64.3	30-130					7/26/16 12:32	
2-Fluorobiphenyl		91.7	30-130					7/25/16 16:48	
2-Fluorobiphenyl		66.3	30-130					7/26/16 12:32	
p-Terphenyl-d14		99.5	30-130					7/25/16 16:48	
p-Terphenyl-d14		60.4	30-130					7/26/16 12:32	

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-18 (0-3)

Sampled: 7/22/2016 09:00

Sample ID: 16G1036-01

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	180	0.78	mg/Kg dry	1		SW-846 6010C-D	7/25/16	7/27/16 1:29	JK

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-18 (0-3)

Sampled: 7/22/2016 09:00

Sample ID: 16G1036-01

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	90.4		% Wt	1		SM 2540G	7/25/16	7/26/16 9:29	MRL

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-19 (0-3)

Sampled: 7/22/2016 10:15

Sample ID: 16G1036-04

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Acenaphthylene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Anthracene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Benzo(a)anthracene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Benzo(a)pyrene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Benzo(b)fluoranthene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Benzo(g,h,i)perylene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Benzo(k)fluoranthene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Chrysene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Dibenz(a,h)anthracene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Fluoranthene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Fluorene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Indeno(1,2,3-cd)pyrene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
2-Methylnaphthalene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Naphthalene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Phenanthrene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Pyrene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:18	WSD
Surrogates		% Recovery	Recovery Limits		Flag/Qual				
Nitrobenzene-d5		68.3	30-130					7/25/16 17:18	
2-Fluorobiphenyl		66.4	30-130					7/25/16 17:18	
p-Terphenyl-d14		83.1	30-130					7/25/16 17:18	

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-19 (0-3)

Sampled: 7/22/2016 10:15

Sample ID: 16G1036-04

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	7.3	0.92	mg/Kg dry	1		SW-846 6010C-D	7/25/16	7/27/16 1:39	JK

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Sampled: 7/22/2016 10:15

Field Sample #: TP-19 (0-3)

Sample ID: 16G1036-04

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	79.2		% Wt	1		SM 2540G	7/25/16	7/26/16 9:29	MRL

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-9 (9-10)

Sampled: 7/22/2016 10:00

Sample ID: 16G1036-05

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Acenaphthylene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Anthracene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Benzo(a)anthracene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Benzo(a)pyrene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Benzo(b)fluoranthene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Benzo(g,h,i)perylene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Benzo(k)fluoranthene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Chrysene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Dibenz(a,h)anthracene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Fluoranthene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Fluorene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Indeno(1,2,3-cd)pyrene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
2-Methylnaphthalene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Naphthalene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Phenanthrene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Pyrene	ND	0.21	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 17:48	WSD
Surrogates		% Recovery	Recovery Limits		Flag/Qual				
Nitrobenzene-d5		70.1	30-130					7/25/16 17:48	
2-Fluorobiphenyl		64.9	30-130					7/25/16 17:48	
p-Terphenyl-d14		77.5	30-130					7/25/16 17:48	

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-9 (9-10)

Sampled: 7/22/2016 10:00

Sample ID: 16G1036-05

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	9.4	0.91	mg/Kg dry	1		SW-846 6010C-D	7/25/16	7/27/16 1:44	JK

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Sampled: 7/22/2016 10:00

Field Sample #: TP-9 (9-10)

Sample ID: 16G1036-05

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	80.8		% Wt	1		SM 2540G	7/25/16	7/26/16 9:29	MRL

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-20 (0-3)

Sampled: 7/22/2016 11:00

Sample ID: 16G1036-06

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	1.0	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:18	WSD
Acenaphthylene	ND	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:18	WSD
Anthracene	2.2	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:18	WSD
Benzo(a)anthracene	3.9	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:18	WSD
Benzo(a)pyrene	3.1	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:18	WSD
Benzo(b)fluoranthene	3.8	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:18	WSD
Benzo(g,h,i)perylene	1.9	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:18	WSD
Benzo(k)fluoranthene	1.4	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:18	WSD
Chrysene	3.5	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:18	WSD
Dibenz(a,h)anthracene	0.48	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:18	WSD
Fluoranthene	8.5	1.0	mg/Kg dry	5		SW-846 8270D	7/24/16	7/26/16 13:03	BGL
Fluorene	0.85	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:18	WSD
Indeno(1,2,3-cd)pyrene	2.1	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:18	WSD
2-Methylnaphthalene	0.29	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:18	WSD
Naphthalene	0.45	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:18	WSD
Phenanthrene	9.1	1.0	mg/Kg dry	5		SW-846 8270D	7/24/16	7/26/16 13:03	BGL
Pyrene	7.6	1.0	mg/Kg dry	5		SW-846 8270D	7/24/16	7/26/16 13:03	BGL
Surrogates		% Recovery	Recovery Limits		Flag/Qual				
Nitrobenzene-d5		89.3	30-130					7/25/16 18:18	
Nitrobenzene-d5		82.7	30-130					7/26/16 13:03	
2-Fluorobiphenyl		86.0	30-130					7/25/16 18:18	
2-Fluorobiphenyl		85.3	30-130					7/26/16 13:03	
p-Terphenyl-d14		95.2	30-130					7/25/16 18:18	
p-Terphenyl-d14		84.5	30-130					7/26/16 13:03	

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-20 (0-3)

Sampled: 7/22/2016 11:00

Sample ID: 16G1036-06

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	300	0.87	mg/Kg dry	1		SW-846 6010C-D	7/25/16	7/27/16 1:49	JK

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-20 (0-3)

Sampled: 7/22/2016 11:00

Sample ID: 16G1036-06

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	84.8		% Wt	1		SM 2540G	7/25/16	7/26/16 9:29	MRL

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: DUP-1

Sampled: 7/22/2016 00:00

Sample ID: 16G1036-08

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	0.85	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:49	WSD
Acenaphthylene	ND	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:49	WSD
Anthracene	3.1	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:49	WSD
Benzo(a)anthracene	5.1	2.0	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:30	BGL
Benzo(a)pyrene	4.0	2.0	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:30	BGL
Benzo(b)fluoranthene	4.7	2.0	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:30	BGL
Benzo(g,h,i)perylene	3.5	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:49	WSD
Benzo(k)fluoranthene	3.3	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:49	WSD
Chrysene	4.8	2.0	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:30	BGL
Dibenz(a,h)anthracene	0.94	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:49	WSD
Fluoranthene	11	2.0	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:30	BGL
Fluorene	0.96	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:49	WSD
Indeno(1,2,3-cd)pyrene	4.1	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:49	WSD
2-Methylnaphthalene	ND	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:49	WSD
Naphthalene	ND	0.20	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 18:49	WSD
Phenanthrene	6.6	2.0	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:30	BGL
Pyrene	8.5	2.0	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:30	BGL
Surrogates	% Recovery		Recovery Limits		Flag/Qual				
Nitrobenzene-d5	98.2		30-130				7/25/16 18:49		
Nitrobenzene-d5	61.9		30-130				7/26/16 13:30		
2-Fluorobiphenyl	92.1		30-130				7/25/16 18:49		
2-Fluorobiphenyl	63.7		30-130				7/26/16 13:30		
p-Terphenyl-d14	126		30-130				7/25/16 18:49		
p-Terphenyl-d14	62.6		30-130				7/26/16 13:30		

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Sampled: 7/22/2016 00:00

Field Sample #: DUP-1

Sample ID: 16G1036-08

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	230	0.81	mg/Kg dry	1		SW-846 6010C-D	7/25/16	7/27/16 1:53	JK

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Sampled: 7/22/2016 00:00

Field Sample #: DUP-1

Sample ID: 16G1036-08

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	86.8		% Wt	1		SM 2540G	7/25/16	7/26/16 9:29	MRL

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-21 (0-3)

Sampled: 7/22/2016 11:30

Sample ID: 16G1036-09

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	1.5	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:19	WSD
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:19	WSD
Anthracene	4.6	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:57	BGL
Benzo(a)anthracene	12	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:57	BGL
Benzo(a)pyrene	9.5	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:57	BGL
Benzo(b)fluoranthene	11	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:57	BGL
Benzo(g,h,i)perylene	6.0	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:57	BGL
Benzo(k)fluoranthene	4.5	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:19	WSD
Chrysene	11	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:57	BGL
Dibenz(a,h)anthracene	1.4	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:19	WSD
Fluoranthene	28	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:57	BGL
Fluorene	1.6	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:19	WSD
Indeno(1,2,3-cd)pyrene	6.4	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:57	BGL
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:19	WSD
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:19	WSD
Phenanthrene	17	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:57	BGL
Pyrene	20	1.9	mg/Kg dry	10		SW-846 8270D	7/24/16	7/26/16 13:57	BGL
Surrogates	% Recovery		Recovery Limits		Flag/Qual				
Nitrobenzene-d5	81.9		30-130				7/25/16 19:19		
Nitrobenzene-d5	87.7		30-130				7/26/16 13:57		
2-Fluorobiphenyl	76.9		30-130				7/25/16 19:19		
2-Fluorobiphenyl	89.1		30-130				7/26/16 13:57		
p-Terphenyl-d14	99.8		30-130				7/25/16 19:19		
p-Terphenyl-d14	85.4		30-130				7/26/16 13:57		

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-21 (0-3)

Sampled: 7/22/2016 11:30

Sample ID: 16G1036-09

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	240	0.83	mg/Kg dry	1		SW-846 6010C-D	7/25/16	7/27/16 1:58	JK

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Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Sampled: 7/22/2016 11:30

Field Sample #: TP-21 (0-3)

Sample ID: 16G1036-09

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	87.3		% Wt	1		SM 2540G	7/25/16	7/26/16 9:29	MRL

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-21 (6-9)

Sampled: 7/22/2016 11:40

Sample ID: 16G1036-10

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Acenaphthylene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Anthracene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Benzo(a)anthracene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Benzo(a)pyrene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Benzo(b)fluoranthene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Benzo(g,h,i)perylene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Benzo(k)fluoranthene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Chrysene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Dibenz(a,h)anthracene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Fluoranthene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Fluorene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Indeno(1,2,3-cd)pyrene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
2-Methylnaphthalene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Naphthalene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Phenanthrene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Pyrene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/24/16	7/25/16 19:48	WSD
Surrogates		% Recovery	Recovery Limits		Flag/Qual				
Nitrobenzene-d5		95.2	30-130					7/25/16 19:48	
2-Fluorobiphenyl		94.0	30-130					7/25/16 19:48	
p-Terphenyl-d14		105	30-130					7/25/16 19:48	

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-21 (6-9)

Sampled: 7/22/2016 11:40

Sample ID: 16G1036-10

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	8.7	0.92	mg/Kg dry	1		SW-846 6010C-D	7/25/16	7/27/16 2:26	JK

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

Project Location: 44 Allen St., Braintree, MA

Sample Description:

Work Order: 16G1036

Date Received: 7/22/2016

Field Sample #: TP-21 (6-9)

Sampled: 7/22/2016 11:40

Sample ID: 16G1036-10

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	78.2		% Wt	1		SM 2540G	7/25/16	7/26/16 9:29	MRL

**Sample Extraction Data**

**Prep Method: % Solids-SM 2540G**

Lab Number [Field ID]	Batch	Date
16G1036-01 [TP-18 (0-3)]	B154423	07/25/16
16G1036-04 [TP-19 (0-3)]	B154423	07/25/16
16G1036-05 [TP-9 (9-10)]	B154423	07/25/16
16G1036-06 [TP-20 (0-3)]	B154423	07/25/16
16G1036-08 [DUP-1]	B154423	07/25/16
16G1036-09 [TP-21 (0-3)]	B154423	07/25/16
16G1036-10 [TP-21 (6-9)]	B154423	07/25/16

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

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16G1036-01 [TP-18 (0-3)]	B154359	1.06	50.0	07/25/16
16G1036-04 [TP-19 (0-3)]	B154359	1.03	50.0	07/25/16
16G1036-05 [TP-9 (9-10)]	B154359	1.02	50.0	07/25/16
16G1036-06 [TP-20 (0-3)]	B154359	1.02	50.0	07/25/16
16G1036-08 [DUP-1]	B154359	1.07	50.0	07/25/16
16G1036-09 [TP-21 (0-3)]	B154359	1.04	50.0	07/25/16
16G1036-10 [TP-21 (6-9)]	B154359	1.05	50.0	07/25/16

**Prep Method: SW-846 3546-SW-846 8270D**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16G1036-01 [TP-18 (0-3)]	B154337	30.0	1.00	07/24/16
16G1036-01RE1 [TP-18 (0-3)]	B154337	30.0	1.00	07/24/16
16G1036-04 [TP-19 (0-3)]	B154337	30.0	1.00	07/24/16
16G1036-05 [TP-9 (9-10)]	B154337	30.1	1.00	07/24/16
16G1036-06 [TP-20 (0-3)]	B154337	30.0	1.00	07/24/16
16G1036-06RE1 [TP-20 (0-3)]	B154337	30.0	1.00	07/24/16
16G1036-08 [DUP-1]	B154337	30.0	1.00	07/24/16
16G1036-08RE1 [DUP-1]	B154337	30.0	1.00	07/24/16
16G1036-09 [TP-21 (0-3)]	B154337	30.1	1.00	07/24/16
16G1036-09RE1 [TP-21 (0-3)]	B154337	30.1	1.00	07/24/16
16G1036-10 [TP-21 (6-9)]	B154337	30.0	1.00	07/24/16

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**QUALITY CONTROL**

**Semivolatile Organic Compounds by GC/MS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B154337 - SW-846 3546**

**Blank (B154337-BLK1)**

Prepared: 07/24/16 Analyzed: 07/25/16

Acenaphthene	ND	0.17	mg/Kg wet							
Acenaphthylene	ND	0.17	mg/Kg wet							
Anthracene	ND	0.17	mg/Kg wet							
Benzo(a)anthracene	ND	0.17	mg/Kg wet							
Benzo(a)pyrene	ND	0.17	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.17	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.17	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.17	mg/Kg wet							
Chrysene	ND	0.17	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.17	mg/Kg wet							
Fluoranthene	ND	0.17	mg/Kg wet							
Fluorene	ND	0.17	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.17	mg/Kg wet							
2-Methylnaphthalene	ND	0.17	mg/Kg wet							
Naphthalene	ND	0.17	mg/Kg wet							
Phenanthrene	ND	0.17	mg/Kg wet							
Pyrene	ND	0.17	mg/Kg wet							
Surrogate: Nitrobenzene-d5	3.21		mg/Kg wet	3.33		96.3	30-130			
Surrogate: 2-Fluorobiphenyl	3.48		mg/Kg wet	3.33		105	30-130			
Surrogate: p-Terphenyl-d14	3.97		mg/Kg wet	3.33		119	30-130			

**LCS (B154337-BS1)**

Prepared: 07/24/16 Analyzed: 07/25/16

Acenaphthene	1.40	0.17	mg/Kg wet	1.67		84.2	40-140			
Acenaphthylene	1.46	0.17	mg/Kg wet	1.67		87.4	40-140			
Anthracene	1.50	0.17	mg/Kg wet	1.67		89.7	40-140			
Benzo(a)anthracene	1.55	0.17	mg/Kg wet	1.67		92.9	40-140			
Benzo(a)pyrene	1.56	0.17	mg/Kg wet	1.67		93.5	40-140			
Benzo(b)fluoranthene	1.53	0.17	mg/Kg wet	1.67		91.8	40-140			
Benzo(g,h,i)perylene	1.50	0.17	mg/Kg wet	1.67		90.2	40-140			
Benzo(k)fluoranthene	1.51	0.17	mg/Kg wet	1.67		90.8	40-140			
Chrysene	1.46	0.17	mg/Kg wet	1.67		87.9	40-140			
Dibenz(a,h)anthracene	1.47	0.17	mg/Kg wet	1.67		88.3	40-140			
Fluoranthene	1.44	0.17	mg/Kg wet	1.67		86.1	40-140			
Fluorene	1.53	0.17	mg/Kg wet	1.67		91.9	40-140			
Indeno(1,2,3-cd)pyrene	1.54	0.17	mg/Kg wet	1.67		92.6	40-140			
2-Methylnaphthalene	1.50	0.17	mg/Kg wet	1.67		89.7	40-140			
Naphthalene	1.38	0.17	mg/Kg wet	1.67		82.5	40-140			
Phenanthrene	1.48	0.17	mg/Kg wet	1.67		88.9	40-140			
Pyrene	1.63	0.17	mg/Kg wet	1.67		97.7	40-140			
Surrogate: Nitrobenzene-d5	3.21		mg/Kg wet	3.33		96.3	30-130			
Surrogate: 2-Fluorobiphenyl	3.37		mg/Kg wet	3.33		101	30-130			
Surrogate: p-Terphenyl-d14	3.75		mg/Kg wet	3.33		112	30-130			

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**QUALITY CONTROL**

**Semivolatile Organic Compounds by GC/MS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B154337 - SW-846 3546</b>										
<b>LCS Dup (B154337-BSD1)</b>										
					Prepared: 07/24/16 Analyzed: 07/25/16					
Acenaphthene	1.42	0.17	mg/Kg wet	1.67		85.1	40-140	1.04	30	
Acenaphthylene	1.47	0.17	mg/Kg wet	1.67		88.1	40-140	0.798	30	
Anthracene	1.53	0.17	mg/Kg wet	1.67		92.1	40-140	2.57	30	
Benzo(a)anthracene	1.58	0.17	mg/Kg wet	1.67		95.1	40-140	2.34	30	
Benzo(a)pyrene	1.59	0.17	mg/Kg wet	1.67		95.5	40-140	2.12	30	
Benzo(b)fluoranthene	1.55	0.17	mg/Kg wet	1.67		93.1	40-140	1.45	30	
Benzo(g,h,i)perylene	1.61	0.17	mg/Kg wet	1.67		96.4	40-140	6.65	30	
Benzo(k)fluoranthene	1.54	0.17	mg/Kg wet	1.67		92.4	40-140	1.81	30	
Chrysene	1.52	0.17	mg/Kg wet	1.67		91.2	40-140	3.66	30	
Dibenz(a,h)anthracene	1.56	0.17	mg/Kg wet	1.67		93.4	40-140	5.57	30	
Fluoranthene	1.46	0.17	mg/Kg wet	1.67		87.4	40-140	1.43	30	
Fluorene	1.56	0.17	mg/Kg wet	1.67		93.7	40-140	1.90	30	
Indeno(1,2,3-cd)pyrene	1.64	0.17	mg/Kg wet	1.67		98.5	40-140	6.15	30	
2-Methylnaphthalene	1.51	0.17	mg/Kg wet	1.67		90.7	40-140	1.04	30	
Naphthalene	1.39	0.17	mg/Kg wet	1.67		83.5	40-140	1.23	30	
Phenanthrene	1.51	0.17	mg/Kg wet	1.67		90.4	40-140	1.70	30	
Pyrene	1.68	0.17	mg/Kg wet	1.67		101	40-140	2.92	30	
Surrogate: Nitrobenzene-d5	3.21		mg/Kg wet	3.33		96.4	30-130			
Surrogate: 2-Fluorobiphenyl	3.43		mg/Kg wet	3.33		103	30-130			
Surrogate: p-Terphenyl-d14	3.79		mg/Kg wet	3.33		114	30-130			

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**QUALITY CONTROL**

**Metals Analyses (Total) - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B154359 - SW-846 3050B</b>										
<b>Blank (B154359-BLK1)</b>										
					Prepared: 07/25/16 Analyzed: 07/26/16					
Lead	ND	0.75	mg/Kg wet							
<b>LCS (B154359-BS1)</b>										
					Prepared: 07/25/16 Analyzed: 07/26/16					
Lead	77.8	1.5	mg/Kg wet	85.6		90.9	82.4-117.8			
<b>LCS Dup (B154359-BSD1)</b>										
					Prepared: 07/25/16 Analyzed: 07/26/16					
Lead	80.3	1.5	mg/Kg wet	85.6		93.8	82.4-117.8	3.11	30	
<b>MRL Check (B154359-MRL1)</b>										
					Prepared: 07/25/16 Analyzed: 07/26/16					
Lead	0.786	0.73	mg/Kg wet	0.731		108	80-120			

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**FLAG/QUALIFIER SUMMARY**

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit
DL	Method Detection Limit
MCL	Maximum Contaminant Level

Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.

No results have been blank subtracted unless specified in the case narrative section.

**CERTIFICATIONS**

**Certified Analyses included in this Report**

Analyte	Certifications
<i>SW-846 6010C-D in Soil</i>	
Lead	CT,NH,NY,AIHA,ME,VA,NC
<i>SW-846 8270D in Soil</i>	
Acenaphthene	CT,NY,NH,ME,NC,VA
Acenaphthylene	CT,NY,NH,ME,NC,VA
Anthracene	CT,NY,NH,ME,NC,VA
Benzo(a)anthracene	CT,NY,NH,ME,NC,VA
Benzo(a)pyrene	CT,NY,NH,ME,NC,VA
Benzo(b)fluoranthene	CT,NY,NH,ME,NC,VA
Benzo(g,h,i)perylene	CT,NY,NH,ME,NC,VA
Benzo(k)fluoranthene	CT,NY,NH,ME,NC,VA
Chrysene	CT,NY,NH,ME,NC,VA
Dibenz(a,h)anthracene	CT,NY,NH,ME,NC,VA
Fluoranthene	CT,NY,NH,ME,NC,VA
Fluorene	CT,NY,NH,ME,NC,VA
Indeno(1,2,3-cd)pyrene	CT,NY,NH,ME,NC,VA
2-Methylnaphthalene	CT,NY,NH,ME,NC,VA
Naphthalene	CT,NY,NH,ME,NC,VA
Phenanthrene	CT,NY,NH,ME,NC,VA
Pyrene	CT,NY,NH,ME,NC,VA

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

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC	100033	02/1/2018
MA	Massachusetts DEP	M-MA100	06/30/2017
CT	Connecticut Department of Public Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2017
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2017
RI	Rhode Island Department of Health	LAO00112	12/30/2016
NC	North Carolina Div. of Water Quality	652	12/31/2016
NJ	New Jersey DEP	MA007 NELAP	06/30/2017
FL	Florida Department of Health	E871027 NELAP	06/30/2017
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2017
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2016
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2016



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



### Sample Receipt Checklist

CLIENT NAME: Weston & Sampson RECEIVED BY: EB DATE: 7/22/16

- 1) Was the chain(s) of custody relinquished and signed? Yes  No  No COC Incl.
- 2) Does the chain agree with the samples? Yes  No   
 If not, explain: \_\_\_\_\_
- 3) Are all the samples in good condition? Yes  No   
 If not, explain: \_\_\_\_\_

4) How were the samples received:  
 On Ice  Direct from Sampling  Ambient  In Cooler(s)   
 Were the samples received in Temperature Compliance of (2-6°C)? Yes  No  N/A   
 Temperature °C by Temp blank \_\_\_\_\_ Temperature °C by Temp gun 4.1

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

- 8) Do all samples have the proper Acid pH: Yes  No  N/A
- 9) Do all samples have the proper Base pH: Yes  No  N/A
- 10) Was the PC notified of any discrepancies with the CoC vs the samples: Yes  N/A

### Containers received at Con-Test

# of containers		# of containers	
1 Liter Amber		16 oz amber	
500 mL Amber		8 oz amber/clear jar	<u>10</u>
250 mL Amber (8oz amber)		4 oz amber/clear jar	
1 Liter Plastic		2 oz amber/clear jar	
500 mL Plastic		Plastic Bag / Ziploc	
250 mL plastic		SOC Kit	
40 mL Vial - type listed below		Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

40 mL vials: # HCl \_\_\_\_\_ # Methanol \_\_\_\_\_  
 # Bisulfate \_\_\_\_\_ # DI Water \_\_\_\_\_  
 # Thiosulfate \_\_\_\_\_ Unpreserved \_\_\_\_\_  
 Time and Date Frozen: \_\_\_\_\_

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**Login Sample Receipt Checklist**  
 (Rejection Criteria Listing - Using Sample Acceptance Policy)  
 Any False statement will be brought to the attention of Client

Question	Answer (True/False)	Comment
	T/F/NA	
1) The cooler's custody seal, if present, is intact.	N/A	
2) The cooler or samples do not appear to have been compromised or tampered with.	T	
3) Samples were received on ice.	T	
4) Cooler Temperature is acceptable.	T	
5) Cooler Temperature is recorded.	T	4.1 with gun
6) COC is filled out in ink and legible.	T	
7) COC is filled out with all pertinent information.	T	
8) Field Sampler's name present on COC.	T	
9) There are no discrepancies between the sample IDs on the container and the COC.	T	
10) Samples are received within Holding Time.	T	
11) Sample containers have legible labels.	T	
12) Containers are not broken or leaking.	T	
13) Air Cassettes are not broken/open.	N/A	
14) Sample collection date/times are provided.	T	
15) Appropriate sample containers are used.	T	
16) Proper collection media used.	T	
17) No headspace sample bottles are completely filled.	N/A	
18) There is sufficient volume for all requested analyses, including any requested MS/MSDs.	T	
19) Trip blanks provided if applicable.	N/A	
20) VOA sample vials do not have head space or bubble is <6mm (1/4") in diameter.	N/A	
21) Samples do not require splitting or compositing.	T	

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Who notified of False statements?  
 Log-In Technician Initials: *ELB*

Date/Time:

Date/Time: *7/22/16*

~~1500~~ 1600

## MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 16G1036
Project Location: 44 Allen St., Braintree, MA	RTN:

This Form provides certifications for the following data set: [list Laboratory Sample ID Number(s)]  
16G1036-01 thru 16G1036-10

Matrices: Soil

**CAM Protocol (check all that below)**

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

**Affirmative response to Questions A through F is required for "Presumptive Certainty" status**

<b>A</b>	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?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>B</b>	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>C</b>	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>D</b>	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>E a</b>	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).	<input type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>E b</b>	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	<input type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>F</b>	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all No responses to Questions A through E)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>

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

<b>G</b>	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
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**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.**

<b>H</b>	Were all QC performance standards specified in the CAM protocol(s) achieved?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>I</b>	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <sup>1</sup>

<sup>1</sup>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: \_\_\_\_\_ *Lisa Worthington* \_\_\_\_\_ Position: Project Manager  
Printed Name: Lisa A. Worthington Date: 07/29/16

August 1, 2016

Sean Healey  
Weston & Sampson - Foxborough  
100 Foxboro Boulevard, Suite 250  
Foxborough, MA 02035

Project Location: 44 A Allen St., Braintree  
Client Job Number:  
Project Number: [none]  
Laboratory Work Order Number: 16G1118

Enclosed are results of analyses for samples received by the laboratory on July 25, 2016. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, reading "Meghan E. Kelley". The signature is written in a cursive style with a large, sweeping flourish at the end.

Meghan E. Kelley  
Project Manager

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Weston & Sampson - Foxborough  
 100 Foxboro Boulevard, Suite 250  
 Foxborough, MA 02035  
 ATTN: Sean Healey

REPORT DATE: 8/1/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: [none]

**ANALYTICAL SUMMARY**

WORK ORDER NUMBER: 16G1118

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

PROJECT LOCATION: 44 A Allen St., Braintree

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
TP-14 (0-3)	16G1118-01	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	
TP-14 (6-9)	16G1118-02	Soil		-	
TP-15 (0-3)	16G1118-03	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	
TP-15 (6-9)	16G1118-04	Soil		-	
TP-16 (0-3)	16G1118-05	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	
TP-16 (6-9)	16G1118-06	Soil		-	
TP-17 (0-3)	16G1118-07	Soil		SM 2540G SW-846 6010C-D SW-846 8270D	
TP-17 (6-9)	16G1118-08	Soil		-	
TP-25 (10-12)	16G1118-09	Soil		MADEP-VPH-04-1.1 SM 2540G	
TP-22 (3-6)	16G1118-10	Soil		MADEP-VPH-04-1.1 SM 2540G	

**CASE NARRATIVE SUMMARY**

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

**MADEP-VPH-04-1.1****Qualifications:**

---

**O-01**

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

**Analyte & Samples(s) Qualified:**

16G1118-09[TP-25 (10-12)], 16G1118-10[TP-22 (3-6)]

---

**RL-05**

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

**Analyte & Samples(s) Qualified:****Benzene**

16G1118-10[TP-22 (3-6)]

**Methyl tert-Butyl Ether (MTBE)**

16G1118-10[TP-22 (3-6)]

**Naphthalene**

16G1118-10[TP-22 (3-6)]

**o-Xylene**

16G1118-10[TP-22 (3-6)]

**Toluene**

16G1118-10[TP-22 (3-6)]

**SW-846 8270D****Qualifications:**

---

**V-06**

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

**Analyte & Samples(s) Qualified:****Benzo(g,h,i)perylene**

B154485-BLK1, B154485-BS1, B154485-BSD1, B154485-MS1, B154485-MSD1

**Indeno(1,2,3-cd)pyrene**

B154485-BLK1, B154485-BS1, B154485-BSD1, B154485-MS1, B154485-MSD1

---

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**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.

**SW-846 6010C/D SW-846 6020A/B**

For NC, Metals methods SW-846 6010D and SW-846 6020B are followed, and for all other states methods SW-846 6010C and SW-846 6020A are followed.

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.

I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

A handwritten signature in black ink, appearing to read "Lisa A. Worthington", is written over a light gray rectangular background.

Lisa A. Worthington  
Project Manager

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

Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Field Sample #: TP-14 (0-3)

Sampled: 7/21/2016 11:00

Sample ID: 16G1118-01

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Acenaphthylene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Anthracene	0.43	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Benzo(a)anthracene	1.9	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Benzo(a)pyrene	1.8	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Benzo(b)fluoranthene	2.2	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Benzo(g,h,i)perylene	1.5	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Benzo(k)fluoranthene	0.79	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Chrysene	1.9	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Dibenz(a,h)anthracene	0.43	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Fluoranthene	3.4	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Fluorene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Indeno(1,2,3-cd)pyrene	1.4	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
2-Methylnaphthalene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Naphthalene	ND	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Phenanthrene	1.9	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Pyrene	3.3	0.22	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 20:30	BGL
Surrogates		% Recovery	Recovery Limits		Flag/Qual				
Nitrobenzene-d5		78.9	30-130					7/28/16 20:30	
2-Fluorobiphenyl		76.7	30-130					7/28/16 20:30	
p-Terphenyl-d14		79.3	30-130					7/28/16 20:30	

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Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Sampled: 7/21/2016 11:00

Field Sample #: TP-14 (0-3)

Sample ID: 16G1118-01

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	480	0.96	mg/Kg dry	1		SW-846 6010C-D	7/26/16	7/27/16 14:06	JK

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Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Field Sample #: TP-14 (0-3)

Sampled: 7/21/2016 11:00

Sample ID: 16G1118-01

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	77.6		% Wt	1		SM 2540G	7/26/16	7/27/16 9:04	MRL

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Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Field Sample #: TP-15 (0-3)

Sampled: 7/21/2016 11:15

Sample ID: 16G1118-03

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Acenaphthylene	ND	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Anthracene	ND	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Benzo(a)anthracene	0.39	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Benzo(a)pyrene	0.54	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Benzo(b)fluoranthene	0.63	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Benzo(g,h,i)perylene	1.3	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Benzo(k)fluoranthene	0.24	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Chrysene	0.47	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Dibenz(a,h)anthracene	ND	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Fluoranthene	0.56	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Fluorene	ND	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Indeno(1,2,3-cd)pyrene	0.46	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
2-Methylnaphthalene	ND	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Naphthalene	ND	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Phenanthrene	0.24	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Pyrene	0.73	0.20	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:06	BGL
Surrogates		% Recovery	Recovery Limits		Flag/Qual				
Nitrobenzene-d5		85.6	30-130					7/28/16 21:06	
2-Fluorobiphenyl		85.4	30-130					7/28/16 21:06	
p-Terphenyl-d14		101	30-130					7/28/16 21:06	

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Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Sampled: 7/21/2016 11:15

Field Sample #: TP-15 (0-3)

Sample ID: 16G1118-03

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	170	0.81	mg/Kg dry	1		SW-846 6010C-D	7/26/16	7/27/16 14:10	JK

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Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Sampled: 7/21/2016 11:15

Field Sample #: TP-15 (0-3)

Sample ID: 16G1118-03

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	85.8		% Wt	1		SM 2540G	7/26/16	7/27/16 9:04	MRL

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Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Field Sample #: TP-16 (0-3)

Sampled: 7/21/2016 14:15

Sample ID: 16G1118-05

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Acenaphthylene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Benzo(a)anthracene	0.38	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Benzo(a)pyrene	0.36	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Benzo(b)fluoranthene	0.48	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Benzo(g,h,i)perylene	0.28	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Benzo(k)fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Chrysene	0.40	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Dibenz(a,h)anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Fluoranthene	0.60	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Fluorene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Indeno(1,2,3-cd)pyrene	0.28	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
2-Methylnaphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Naphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Phenanthrene	0.22	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
Pyrene	0.59	0.18	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 21:49	BGL
<b>Surrogates</b>		<b>% Recovery</b>	<b>Recovery Limits</b>		<b>Flag/Qual</b>				
Nitrobenzene-d5		80.8	30-130					7/28/16 21:49	
2-Fluorobiphenyl		85.2	30-130					7/28/16 21:49	
p-Terphenyl-d14		88.2	30-130					7/28/16 21:49	

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Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Sampled: 7/21/2016 14:15

Field Sample #: TP-16 (0-3)

Sample ID: 16G1118-05

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	71	0.81	mg/Kg dry	1		SW-846 6010C-D	7/26/16	7/27/16 14:15	JK

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

Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Sampled: 7/21/2016 14:15

Field Sample #: TP-16 (0-3)

Sample ID: 16G1118-05

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	90.7		% Wt	1		SM 2540G	7/26/16	7/27/16 9:04	MRL

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

Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Field Sample #: TP-17 (0-3)

Sampled: 7/21/2016 12:30

Sample ID: 16G1118-07

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Acenaphthylene	ND	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Anthracene	ND	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Benzo(a)anthracene	1.0	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Benzo(a)pyrene	0.99	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Benzo(b)fluoranthene	1.3	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Benzo(g,h,i)perylene	0.65	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Benzo(k)fluoranthene	0.46	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Chrysene	1.0	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Dibenz(a,h)anthracene	0.18	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Fluoranthene	1.7	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Fluorene	ND	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Indeno(1,2,3-cd)pyrene	0.71	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
2-Methylnaphthalene	ND	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Naphthalene	ND	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Phenanthrene	0.55	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
Pyrene	1.8	0.17	mg/Kg dry	1		SW-846 8270D	7/26/16	7/28/16 22:28	BGL
<b>Surrogates</b>		<b>% Recovery</b>	<b>Recovery Limits</b>		<b>Flag/Qual</b>				
Nitrobenzene-d5		89.6	30-130					7/28/16 22:28	
2-Fluorobiphenyl		94.8	30-130					7/28/16 22:28	
p-Terphenyl-d14		114	30-130					7/28/16 22:28	

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Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Field Sample #: TP-17 (0-3)

Sampled: 7/21/2016 12:30

Sample ID: 16G1118-07

Sample Matrix: Soil

**Metals Analyses (Total)**

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	90	0.76	mg/Kg dry	1		SW-846 6010C-D	7/26/16	7/27/16 14:20	JK

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

Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Sampled: 7/21/2016 12:30

Field Sample #: TP-17 (0-3)

Sample ID: 16G1118-07

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	97.4		% Wt	1		SM 2540G	7/26/16	7/27/16 9:04	MRL

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

Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Field Sample #: TP-25 (10-12)

Sampled: 7/22/2016 15:00

Sample ID: 16G1118-09

Sample Matrix: Soil

Sample Flags: O-01

**Petroleum Hydrocarbons Analyses - VPH**

Soil/Methanol Preservation Ratio: 1.53

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	9.6	mg/Kg dry	1		MADEP-VPH-04-1.1	7/25/16	7/26/16 5:46	EEH
C5-C8 Aliphatics	ND	9.6	mg/Kg dry	1		MADEP-VPH-04-1.1	7/25/16	7/26/16 5:46	EEH
Unadjusted C9-C12 Aliphatics	ND	9.6	mg/Kg dry	1		MADEP-VPH-04-1.1	7/25/16	7/26/16 5:46	EEH
C9-C12 Aliphatics	ND	9.6	mg/Kg dry	1		MADEP-VPH-04-1.1	7/25/16	7/26/16 5:46	EEH
C9-C10 Aromatics	ND	9.6	mg/Kg dry	1		MADEP-VPH-04-1.1	7/25/16	7/26/16 5:46	EEH
Benzene	ND	0.048	mg/Kg dry	1		MADEP-VPH-04-1.1	7/25/16	7/26/16 5:46	EEH
Ethylbenzene	ND	0.048	mg/Kg dry	1		MADEP-VPH-04-1.1	7/25/16	7/26/16 5:46	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.048	mg/Kg dry	1		MADEP-VPH-04-1.1	7/25/16	7/26/16 5:46	EEH
Naphthalene	ND	0.24	mg/Kg dry	1		MADEP-VPH-04-1.1	7/25/16	7/26/16 5:46	EEH
Toluene	ND	0.048	mg/Kg dry	1		MADEP-VPH-04-1.1	7/25/16	7/26/16 5:46	EEH
m+p Xylene	ND	0.096	mg/Kg dry	1		MADEP-VPH-04-1.1	7/25/16	7/26/16 5:46	EEH
o-Xylene	ND	0.048	mg/Kg dry	1		MADEP-VPH-04-1.1	7/25/16	7/26/16 5:46	EEH
<b>Surrogates</b>		<b>% Recovery</b>	<b>Recovery Limits</b>		<b>Flag/Qual</b>				
2,5-Dibromotoluene (FID)		104	70-130					7/26/16 5:46	
2,5-Dibromotoluene (PID)		104	70-130					7/26/16 5:46	

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

Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Field Sample #: TP-25 (10-12)

Sampled: 7/22/2016 15:00

Sample ID: 16G1118-09

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	84.2		% Wt	1		SM 2540G	7/26/16	7/27/16 9:04	MRL

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

Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Field Sample #: TP-22 (3-6)

Sampled: 7/22/2016 15:20

Sample ID: 16G1118-10

Sample Matrix: Soil

Sample Flags: O-01

**Petroleum Hydrocarbons Analyses - VPH**

Soil/Methanol Preservation Ratio: 1.77

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	2000	890	mg/Kg dry	20		MADEP-VPH-04-1.1	7/27/16	7/28/16 2:01	EEH
C5-C8 Aliphatics	2000	890	mg/Kg dry	20		MADEP-VPH-04-1.1	7/27/16	7/28/16 2:01	EEH
Unadjusted C9-C12 Aliphatics	920	890	mg/Kg dry	20		MADEP-VPH-04-1.1	7/27/16	7/28/16 2:01	EEH
C9-C12 Aliphatics	ND	890	mg/Kg dry	20		MADEP-VPH-04-1.1	7/27/16	7/28/16 2:01	EEH
C9-C10 Aromatics	930	890	mg/Kg dry	20		MADEP-VPH-04-1.1	7/27/16	7/28/16 2:01	EEH
Benzene	ND	4.4	mg/Kg dry	20	RL-05	MADEP-VPH-04-1.1	7/27/16	7/28/16 2:01	EEH
Ethylbenzene	36	4.4	mg/Kg dry	20		MADEP-VPH-04-1.1	7/27/16	7/28/16 2:01	EEH
Methyl tert-Butyl Ether (MTBE)	ND	4.4	mg/Kg dry	20	RL-05	MADEP-VPH-04-1.1	7/27/16	7/28/16 2:01	EEH
Naphthalene	ND	22	mg/Kg dry	20	RL-05	MADEP-VPH-04-1.1	7/27/16	7/28/16 2:01	EEH
Toluene	ND	4.4	mg/Kg dry	20	RL-05	MADEP-VPH-04-1.1	7/27/16	7/28/16 2:01	EEH
m+p Xylene	15	8.9	mg/Kg dry	20		MADEP-VPH-04-1.1	7/27/16	7/28/16 2:01	EEH
o-Xylene	ND	4.4	mg/Kg dry	20	RL-05	MADEP-VPH-04-1.1	7/27/16	7/28/16 2:01	EEH
<b>Surrogates</b>		<b>% Recovery</b>		<b>Recovery Limits</b>		<b>Flag/Qual</b>			
2,5-Dibromotoluene (FID)		93.3		70-130				7/28/16 2:01	
2,5-Dibromotoluene (PID)		81.2		70-130				7/28/16 2:01	

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

Project Location: 44 A Allen St., Braintree

Sample Description:

Work Order: 16G1118

Date Received: 7/25/2016

Field Sample #: TP-22 (3-6)

Sampled: 7/22/2016 15:20

Sample ID: 16G1118-10

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	28.9		% Wt	1		SM 2540G	7/26/16	7/27/16 9:04	MRL

**Sample Extraction Data**

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

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16G1118-09 [TP-25 (10-12)]	B154381	23.0	18.6	07/25/16

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

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16G1118-10 [TP-22 (3-6)]	B154577	26.5	33.9	07/27/16

**Prep Method: % Solids-SM 2540G**

Lab Number [Field ID]	Batch	Date
16G1118-01 [TP-14 (0-3)]	B154471	07/26/16
16G1118-03 [TP-15 (0-3)]	B154471	07/26/16
16G1118-05 [TP-16 (0-3)]	B154471	07/26/16
16G1118-07 [TP-17 (0-3)]	B154471	07/26/16
16G1118-09 [TP-25 (10-12)]	B154471	07/26/16
16G1118-10 [TP-22 (3-6)]	B154471	07/26/16

**Prep Method: SW-846 3051-SW-846 6010C-D**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16G1118-01 [TP-14 (0-3)]	B154454	1.01	50.0	07/26/16
16G1118-03 [TP-15 (0-3)]	B154454	1.07	50.0	07/26/16
16G1118-05 [TP-16 (0-3)]	B154454	1.02	50.0	07/26/16
16G1118-07 [TP-17 (0-3)]	B154454	1.01	50.0	07/26/16

**Prep Method: SW-846 3546-SW-846 8270D**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16G1118-01 [TP-14 (0-3)]	B154485	30.2	1.00	07/26/16
16G1118-03 [TP-15 (0-3)]	B154485	30.2	1.00	07/26/16
16G1118-05 [TP-16 (0-3)]	B154485	30.5	1.00	07/26/16
16G1118-07 [TP-17 (0-3)]	B154485	30.0	1.00	07/26/16

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

**QUALITY CONTROL**

**Semivolatile Organic Compounds by GC/MS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B154485 - SW-846 3546</b>										
<b>Blank (B154485-BLK1)</b>										
Prepared: 07/26/16 Analyzed: 07/27/16										
Acenaphthene	ND	0.17	mg/Kg wet							
Acenaphthylene	ND	0.17	mg/Kg wet							
Anthracene	ND	0.17	mg/Kg wet							
Benzo(a)anthracene	ND	0.17	mg/Kg wet							
Benzo(a)pyrene	ND	0.17	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.17	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.17	mg/Kg wet							V-06
Benzo(k)fluoranthene	ND	0.17	mg/Kg wet							
Chrysene	ND	0.17	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.17	mg/Kg wet							
Fluoranthene	ND	0.17	mg/Kg wet							
Fluorene	ND	0.17	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.17	mg/Kg wet							V-06
2-Methylnaphthalene	ND	0.17	mg/Kg wet							
Naphthalene	ND	0.17	mg/Kg wet							
Phenanthrene	ND	0.17	mg/Kg wet							
Pyrene	ND	0.17	mg/Kg wet							
Surrogate: Nitrobenzene-d5	3.04		mg/Kg wet	3.33		91.2	30-130			
Surrogate: 2-Fluorobiphenyl	3.38		mg/Kg wet	3.33		101	30-130			
Surrogate: p-Terphenyl-d14	4.33		mg/Kg wet	3.33		130	30-130			
<b>LCS (B154485-BS1)</b>										
Prepared: 07/26/16 Analyzed: 07/27/16										
Acenaphthene	1.34	0.17	mg/Kg wet	1.67		80.5	40-140			
Acenaphthylene	1.37	0.17	mg/Kg wet	1.67		82.4	40-140			
Anthracene	1.42	0.17	mg/Kg wet	1.67		85.1	40-140			
Benzo(a)anthracene	1.47	0.17	mg/Kg wet	1.67		88.0	40-140			
Benzo(a)pyrene	1.45	0.17	mg/Kg wet	1.67		87.2	40-140			
Benzo(b)fluoranthene	1.45	0.17	mg/Kg wet	1.67		86.8	40-140			
Benzo(g,h,i)perylene	1.63	0.17	mg/Kg wet	1.67		98.0	40-140			V-06
Benzo(k)fluoranthene	1.46	0.17	mg/Kg wet	1.67		87.3	40-140			
Chrysene	1.41	0.17	mg/Kg wet	1.67		84.5	40-140			
Dibenz(a,h)anthracene	1.48	0.17	mg/Kg wet	1.67		88.9	40-140			
Fluoranthene	1.33	0.17	mg/Kg wet	1.67		79.8	40-140			
Fluorene	1.45	0.17	mg/Kg wet	1.67		87.2	40-140			
Indeno(1,2,3-cd)pyrene	1.52	0.17	mg/Kg wet	1.67		91.1	40-140			V-06
2-Methylnaphthalene	1.44	0.17	mg/Kg wet	1.67		86.2	40-140			
Naphthalene	1.31	0.17	mg/Kg wet	1.67		78.9	40-140			
Phenanthrene	1.41	0.17	mg/Kg wet	1.67		84.6	40-140			
Pyrene	1.54	0.17	mg/Kg wet	1.67		92.2	40-140			
Surrogate: Nitrobenzene-d5	2.90		mg/Kg wet	3.33		87.0	30-130			
Surrogate: 2-Fluorobiphenyl	3.25		mg/Kg wet	3.33		97.4	30-130			
Surrogate: p-Terphenyl-d14	3.55		mg/Kg wet	3.33		106	30-130			

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**QUALITY CONTROL**

**Semivolatile Organic Compounds by GC/MS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B154485 - SW-846 3546</b>										
<b>LCS Dup (B154485-BSD1)</b>										
					Prepared: 07/26/16 Analyzed: 07/27/16					
Acenaphthene	1.59	0.17	mg/Kg wet	1.67		95.5	40-140	17.1	30	
Acenaphthylene	1.63	0.17	mg/Kg wet	1.67		97.8	40-140	17.1	30	
Anthracene	1.66	0.17	mg/Kg wet	1.67		99.6	40-140	15.7	30	
Benzo(a)anthracene	1.72	0.17	mg/Kg wet	1.67		104	40-140	16.2	30	
Benzo(a)pyrene	1.74	0.17	mg/Kg wet	1.67		104	40-140	17.9	30	
Benzo(b)fluoranthene	1.71	0.17	mg/Kg wet	1.67		103	40-140	16.9	30	
Benzo(g,h,i)perylene	1.97	0.17	mg/Kg wet	1.67		118	40-140	18.6	30	V-06
Benzo(k)fluoranthene	1.72	0.17	mg/Kg wet	1.67		103	40-140	16.5	30	
Chrysene	1.65	0.17	mg/Kg wet	1.67		99.0	40-140	15.8	30	
Dibenz(a,h)anthracene	1.81	0.17	mg/Kg wet	1.67		108	40-140	19.7	30	
Fluoranthene	1.56	0.17	mg/Kg wet	1.67		93.7	40-140	16.1	30	
Fluorene	1.75	0.17	mg/Kg wet	1.67		105	40-140	18.7	30	
Indeno(1,2,3-cd)pyrene	1.85	0.17	mg/Kg wet	1.67		111	40-140	19.5	30	V-06
2-Methylnaphthalene	1.69	0.17	mg/Kg wet	1.67		101	40-140	16.2	30	
Naphthalene	1.53	0.17	mg/Kg wet	1.67		91.9	40-140	15.2	30	
Phenanthrene	1.66	0.17	mg/Kg wet	1.67		99.5	40-140	16.2	30	
Pyrene	1.83	0.17	mg/Kg wet	1.67		110	40-140	17.7	30	
Surrogate: Nitrobenzene-d5	3.31		mg/Kg wet	3.33		99.3	30-130			
Surrogate: 2-Fluorobiphenyl	3.77		mg/Kg wet	3.33		113	30-130			
Surrogate: p-Terphenyl-d14	4.19		mg/Kg wet	3.33		126	30-130			
<b>Matrix Spike (B154485-MS1)</b>										
			<b>Source: 16G1118-07</b>		Prepared: 07/26/16 Analyzed: 07/27/16					
Acenaphthene	1.32	0.17	mg/Kg dry	1.70	ND	77.8	40-140			
Acenaphthylene	1.39	0.17	mg/Kg dry	1.70	0.0868	76.3	40-140			
Anthracene	1.45	0.17	mg/Kg dry	1.70	0.116	78.5	40-140			
Benzo(a)anthracene	2.62	0.17	mg/Kg dry	1.70	1.02	93.8	40-140			
Benzo(a)pyrene	2.67	0.17	mg/Kg dry	1.70	0.990	98.8	40-140			
Benzo(b)fluoranthene	3.09	0.17	mg/Kg dry	1.70	1.30	105	40-140			
Benzo(g,h,i)perylene	2.45	0.17	mg/Kg dry	1.70	0.649	106	40-140			V-06
Benzo(k)fluoranthene	2.18	0.17	mg/Kg dry	1.70	0.463	101	40-140			
Chrysene	2.56	0.17	mg/Kg dry	1.70	1.03	90.0	40-140			
Dibenz(a,h)anthracene	1.69	0.17	mg/Kg dry	1.70	0.176	89.0	40-140			
Fluoranthene	3.12	0.17	mg/Kg dry	1.70	1.66	85.4	40-140			
Fluorene	1.42	0.17	mg/Kg dry	1.70	ND	83.6	40-140			
Indeno(1,2,3-cd)pyrene	2.57	0.17	mg/Kg dry	1.70	0.705	109	40-140			V-06
2-Methylnaphthalene	1.39	0.17	mg/Kg dry	1.70	ND	81.5	40-140			
Naphthalene	1.28	0.17	mg/Kg dry	1.70	ND	75.2	40-140			
Phenanthrene	1.95	0.17	mg/Kg dry	1.70	0.546	82.8	40-140			
Pyrene	3.56	0.17	mg/Kg dry	1.70	1.77	105	40-140			
Surrogate: Nitrobenzene-d5	2.87		mg/Kg dry	3.41		84.4	30-130			
Surrogate: 2-Fluorobiphenyl	3.23		mg/Kg dry	3.41		94.9	30-130			
Surrogate: p-Terphenyl-d14	3.37		mg/Kg dry	3.41		98.9	30-130			

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**QUALITY CONTROL**

**Semivolatile Organic Compounds by GC/MS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B154485 - SW-846 3546</b>										
<b>Matrix Spike Dup (B154485-MSD1)</b>	<b>Source: 16G1118-07</b>			<b>Prepared: 07/26/16 Analyzed: 07/27/16</b>						
Acenaphthene	1.32	0.17	mg/Kg dry	1.70	ND	77.8	40-140	0.217	30	
Acenaphthylene	1.35	0.17	mg/Kg dry	1.70	0.0868	74.4	40-140	2.58	30	
Anthracene	1.52	0.17	mg/Kg dry	1.70	0.116	82.8	40-140	4.75	30	
Benzo(a)anthracene	2.56	0.17	mg/Kg dry	1.70	1.02	90.7	40-140	2.16	30	
Benzo(a)pyrene	2.60	0.17	mg/Kg dry	1.70	0.990	94.4	40-140	2.94	30	
Benzo(b)fluoranthene	2.86	0.17	mg/Kg dry	1.70	1.30	91.8	40-140	7.49	30	
Benzo(g,h,i)perylene	2.24	0.17	mg/Kg dry	1.70	0.649	93.4	40-140	9.04	30	V-06
Benzo(k)fluoranthene	2.10	0.17	mg/Kg dry	1.70	0.463	96.3	40-140	3.73	30	
Chrysene	2.53	0.17	mg/Kg dry	1.70	1.03	88.5	40-140	1.10	30	
Dibenz(a,h)anthracene	1.42	0.17	mg/Kg dry	1.70	0.176	73.4	40-140	17.1	30	
Fluoranthene	3.37	0.17	mg/Kg dry	1.70	1.66	100	40-140	7.71	30	
Fluorene	1.43	0.17	mg/Kg dry	1.70	ND	83.9	40-140	0.216	30	
Indeno(1,2,3-cd)pyrene	2.30	0.17	mg/Kg dry	1.70	0.705	94.1	40-140	10.7	30	V-06
2-Methylnaphthalene	1.34	0.17	mg/Kg dry	1.70	ND	78.9	40-140	3.38	30	
Naphthalene	1.24	0.17	mg/Kg dry	1.70	ND	72.8	40-140	3.38	30	
Phenanthrene	2.48	0.17	mg/Kg dry	1.70	0.546	114	40-140	23.7	30	
Pyrene	3.78	0.17	mg/Kg dry	1.70	1.77	118	40-140	5.86	30	
Surrogate: Nitrobenzene-d5	2.80		mg/Kg dry	3.40		82.4	30-130			
Surrogate: 2-Fluorobiphenyl	3.01		mg/Kg dry	3.40		88.6	30-130			
Surrogate: p-Terphenyl-d14	3.28		mg/Kg dry	3.40		96.6	30-130			

QUALITY CONTROL

Petroleum Hydrocarbons Analyses - VPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B154381 - MA VPH

Blank (B154381-BLK1)

Prepared & Analyzed: 07/25/16

Unadjusted C5-C8 Aliphatics	ND	0.20	mg/Kg wet							
C5-C8 Aliphatics	ND	0.20	mg/Kg wet							
Unadjusted C9-C12 Aliphatics	ND	0.20	mg/Kg wet							
C9-C12 Aliphatics	ND	0.20	mg/Kg wet							
C9-C10 Aromatics	ND	0.20	mg/Kg wet							
Benzene	ND	0.0010	mg/Kg wet							
Butylcyclohexane	ND	0.0010	mg/Kg wet							
Decane	ND	0.0010	mg/Kg wet							
Ethylbenzene	ND	0.0010	mg/Kg wet							
Methyl tert-Butyl Ether (MTBE)	ND	0.0010	mg/Kg wet							
2-Methylpentane	ND	0.0010	mg/Kg wet							
Naphthalene	ND	0.0050	mg/Kg wet							
Nonane	ND	0.0010	mg/Kg wet							
Pentane	ND	0.0010	mg/Kg wet							
Toluene	ND	0.0010	mg/Kg wet							
1,2,4-Trimethylbenzene	ND	0.0010	mg/Kg wet							
2,2,4-Trimethylpentane	ND	0.0010	mg/Kg wet							
m+p Xylene	ND	0.0020	mg/Kg wet							
o-Xylene	ND	0.0010	mg/Kg wet							
Surrogate: 2,5-Dibromotoluene (FID)	0.0413		mg/Kg wet	0.0400		103	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	0.0496		mg/Kg wet	0.0400		124	70-130			

LCS (B154381-BS1)

Prepared & Analyzed: 07/25/16

Benzene	0.0877	0.0010	mg/Kg wet	0.100		87.7	70-130			
Butylcyclohexane	0.0806	0.0010	mg/Kg wet	0.100		80.6	70-130			
Decane	0.0934	0.0010	mg/Kg wet	0.100		93.4	70-130			
Ethylbenzene	0.0768	0.0010	mg/Kg wet	0.100		76.8	70-130			
Methyl tert-Butyl Ether (MTBE)	0.0885	0.0010	mg/Kg wet	0.100		88.5	70-130			
2-Methylpentane	0.0775	0.0010	mg/Kg wet	0.100		77.5	70-130			
Naphthalene	0.0839	0.0050	mg/Kg wet	0.100		83.9	70-130			
Nonane	0.0900	0.0010	mg/Kg wet	0.100		90.0	30-130			
Pentane	0.0846	0.0010	mg/Kg wet	0.100		84.6	70-130			
Toluene	0.0849	0.0010	mg/Kg wet	0.100		84.9	70-130			
1,2,4-Trimethylbenzene	0.0868	0.0010	mg/Kg wet	0.100		86.8	70-130			
2,2,4-Trimethylpentane	0.0900	0.0010	mg/Kg wet	0.100		90.0	70-130			
m+p Xylene	0.155	0.0020	mg/Kg wet	0.200		77.4	70-130			
o-Xylene	0.0797	0.0010	mg/Kg wet	0.100		79.7	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	0.0459		mg/Kg wet	0.0400		115	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	0.0438		mg/Kg wet	0.0400		110	70-130			

LCS Dup (B154381-BSD1)

Prepared & Analyzed: 07/25/16

Benzene	0.0861	0.0010	mg/Kg wet	0.100		86.1	70-130	1.84	25	
Butylcyclohexane	0.0818	0.0010	mg/Kg wet	0.100		81.8	70-130	1.52	25	
Decane	0.0933	0.0010	mg/Kg wet	0.100		93.3	70-130	0.0803	25	
Ethylbenzene	0.0753	0.0010	mg/Kg wet	0.100		75.3	70-130	2.06	25	
Methyl tert-Butyl Ether (MTBE)	0.0862	0.0010	mg/Kg wet	0.100		86.2	70-130	2.65	25	
2-Methylpentane	0.0776	0.0010	mg/Kg wet	0.100		77.6	70-130	0.120	25	
Naphthalene	0.0785	0.0050	mg/Kg wet	0.100		78.5	70-130	6.73	25	
Nonane	0.0882	0.0010	mg/Kg wet	0.100		88.2	30-130	2.06	25	
Pentane	0.0756	0.0010	mg/Kg wet	0.100		75.6	70-130	11.2	25	
Toluene	0.0833	0.0010	mg/Kg wet	0.100		83.3	70-130	1.91	25	
1,2,4-Trimethylbenzene	0.0860	0.0010	mg/Kg wet	0.100		86.0	70-130	0.919	25	

**QUALITY CONTROL**

**Petroleum Hydrocarbons Analyses - VPH - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B154381 - MA VPH**

**LCS Dup (B154381-BSD1)**

Prepared & Analyzed: 07/25/16

2,2,4-Trimethylpentane	0.0879	0.0010	mg/Kg wet	0.100		87.9	70-130	2.36	25	
m+p Xylene	0.152	0.0020	mg/Kg wet	0.200		75.8	70-130	2.06	25	
o-Xylene	0.0800	0.0010	mg/Kg wet	0.100		80.0	70-130	0.354	25	
Surrogate: 2,5-Dibromotoluene (FID)	0.0376		mg/Kg wet	0.0400		94.1	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	0.0392		mg/Kg wet	0.0400		98.0	70-130			

**Batch B154577 - MA VPH**

**Blank (B154577-BLK1)**

Prepared & Analyzed: 07/27/16

Unadjusted C5-C8 Aliphatics	ND	10	mg/Kg wet							
C5-C8 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C9-C12 Aliphatics	ND	10	mg/Kg wet							
C9-C12 Aliphatics	ND	10	mg/Kg wet							
C9-C10 Aromatics	ND	10	mg/Kg wet							
Benzene	ND	0.050	mg/Kg wet							
Butylcyclohexane	ND	0.050	mg/Kg wet							
Decane	ND	0.050	mg/Kg wet							
Ethylbenzene	ND	0.050	mg/Kg wet							
Methyl tert-Butyl Ether (MTBE)	ND	0.050	mg/Kg wet							
2-Methylpentane	ND	0.050	mg/Kg wet							
Naphthalene	ND	0.25	mg/Kg wet							
Nonane	ND	0.050	mg/Kg wet							
Pentane	ND	0.050	mg/Kg wet							
Toluene	ND	0.050	mg/Kg wet							
1,2,4-Trimethylbenzene	ND	0.050	mg/Kg wet							
2,2,4-Trimethylpentane	ND	0.050	mg/Kg wet							
m+p Xylene	ND	0.10	mg/Kg wet							
o-Xylene	ND	0.050	mg/Kg wet							
Surrogate: 2,5-Dibromotoluene (FID)	0.0370		mg/Kg wet	0.0400		92.4	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	0.0310		mg/Kg wet	0.0400		77.4	70-130			

**LCS (B154577-BS1)**

Prepared & Analyzed: 07/27/16

Benzene	0.0961	0.0010	mg/Kg wet	0.100		96.1	70-130			
Butylcyclohexane	0.0903	0.0010	mg/Kg wet	0.100		90.3	70-130			
Decane	0.104	0.0010	mg/Kg wet	0.100		104	70-130			
Ethylbenzene	0.0981	0.0010	mg/Kg wet	0.100		98.1	70-130			
Methyl tert-Butyl Ether (MTBE)	0.111	0.0010	mg/Kg wet	0.100		111	70-130			
2-Methylpentane	0.105	0.0010	mg/Kg wet	0.100		105	70-130			
Naphthalene	0.0950	0.0050	mg/Kg wet	0.100		95.0	70-130			
Nonane	0.0964	0.0010	mg/Kg wet	0.100		96.4	30-130			
Pentane	0.0857	0.0010	mg/Kg wet	0.100		85.7	70-130			
Toluene	0.0982	0.0010	mg/Kg wet	0.100		98.2	70-130			
1,2,4-Trimethylbenzene	0.0878	0.0010	mg/Kg wet	0.100		87.8	70-130			
2,2,4-Trimethylpentane	0.0912	0.0010	mg/Kg wet	0.100		91.2	70-130			
m+p Xylene	0.189	0.0020	mg/Kg wet	0.200		94.4	70-130			
o-Xylene	0.0943	0.0010	mg/Kg wet	0.100		94.3	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	0.0381		mg/Kg wet	0.0400		95.2	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	0.0326		mg/Kg wet	0.0400		81.6	70-130			

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**QUALITY CONTROL**

**Petroleum Hydrocarbons Analyses - VPH - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B154577 - MA VPH</b>										
<b>LCS Dup (B154577-BSD1)</b>										
Prepared & Analyzed: 07/27/16										
Benzene	0.0947	0.0010	mg/Kg wet	0.100		94.7	70-130	1.43	25	
Butylcyclohexane	0.0916	0.0010	mg/Kg wet	0.100		91.6	70-130	1.37	25	
Decane	0.105	0.0010	mg/Kg wet	0.100		105	70-130	0.908	25	
Ethylbenzene	0.0970	0.0010	mg/Kg wet	0.100		97.0	70-130	1.05	25	
Methyl tert-Butyl Ether (MTBE)	0.108	0.0010	mg/Kg wet	0.100		108	70-130	2.24	25	
2-Methylpentane	0.0997	0.0010	mg/Kg wet	0.100		99.7	70-130	5.31	25	
Naphthalene	0.0930	0.0050	mg/Kg wet	0.100		93.0	70-130	2.20	25	
Nonane	0.0976	0.0010	mg/Kg wet	0.100		97.6	30-130	1.27	25	
Pentane	0.0842	0.0010	mg/Kg wet	0.100		84.2	70-130	1.71	25	
Toluene	0.0975	0.0010	mg/Kg wet	0.100		97.5	70-130	0.731	25	
1,2,4-Trimethylbenzene	0.0878	0.0010	mg/Kg wet	0.100		87.8	70-130	0.0239	25	
2,2,4-Trimethylpentane	0.0921	0.0010	mg/Kg wet	0.100		92.1	70-130	0.983	25	
m+p Xylene	0.188	0.0020	mg/Kg wet	0.200		93.8	70-130	0.674	25	
o-Xylene	0.0938	0.0010	mg/Kg wet	0.100		93.8	70-130	0.521	25	
Surrogate: 2,5-Dibromotoluene (FID)	0.0415		mg/Kg wet	0.0400		104	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	0.0336		mg/Kg wet	0.0400		84.0	70-130			

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**QUALITY CONTROL**

**Metals Analyses (Total) - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch B154454 - SW-846 3051</b>										
<b>Blank (B154454-BLK1)</b>										
					Prepared: 07/26/16 Analyzed: 07/27/16					
Lead	ND	0.75	mg/Kg wet							
<b>LCS (B154454-BS1)</b>										
					Prepared: 07/26/16 Analyzed: 07/27/16					
Lead	82.8	1.5	mg/Kg wet	85.6		96.7	82.4-117.8			
<b>LCS Dup (B154454-BSD1)</b>										
					Prepared: 07/26/16 Analyzed: 07/27/16					
Lead	85.5	1.5	mg/Kg wet	85.6		99.9	82.4-117.8	3.27	30	
<b>MRL Check (B154454-MRL1)</b>										
					Prepared: 07/26/16 Analyzed: 07/27/16					
Lead	0.896	0.75	mg/Kg wet	0.745		120	80-120			

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**FLAG/QUALIFIER SUMMARY**

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit
DL	Method Detection Limit
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
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.
V-06	Continuing calibration did not meet method specifications and was biased on the high side for this compound. Increased uncertainty is associated with the reported value which is likely to be biased on the high side.

**CERTIFICATIONS**

**Certified Analyses included in this Report**

Analyte	Certifications
<b>MADEP-VPH-04-1.1 in Soil</b>	
Unadjusted C5-C8 Aliphatics	CT,NC,ME,NH-P
C5-C8 Aliphatics	CT,NC,ME,NH-P
Unadjusted C9-C12 Aliphatics	CT,NC,ME,NH-P
C9-C12 Aliphatics	CT,NC,ME,NH-P
C9-C10 Aromatics	CT,NC,ME,NH-P
Benzene	CT,NC,ME,NH-P
Ethylbenzene	CT,NC,ME,NH-P
Methyl tert-Butyl Ether (MTBE)	CT,NC,ME,NH-P
Naphthalene	CT,NC,ME,NH-P
Toluene	CT,NC,ME,NH-P
m+p Xylene	CT,NC,ME,NH-P
o-Xylene	CT,NC,ME,NH-P
<b>SW-846 6010C-D in Soil</b>	
Lead	CT,NH,NY,AIHA,ME,VA,NC
<b>SW-846 8270D in Soil</b>	
Acenaphthene	CT,NY,NH,ME,NC,VA
Acenaphthylene	CT,NY,NH,ME,NC,VA
Anthracene	CT,NY,NH,ME,NC,VA
Benzo(a)anthracene	CT,NY,NH,ME,NC,VA
Benzo(a)pyrene	CT,NY,NH,ME,NC,VA
Benzo(b)fluoranthene	CT,NY,NH,ME,NC,VA
Benzo(g,h,i)perylene	CT,NY,NH,ME,NC,VA
Benzo(k)fluoranthene	CT,NY,NH,ME,NC,VA
Chrysene	CT,NY,NH,ME,NC,VA
Dibenz(a,h)anthracene	CT,NY,NH,ME,NC,VA
Fluoranthene	CT,NY,NH,ME,NC,VA
Fluorene	CT,NY,NH,ME,NC,VA
Indeno(1,2,3-cd)pyrene	CT,NY,NH,ME,NC,VA
2-Methylnaphthalene	CT,NY,NH,ME,NC,VA
Naphthalene	CT,NY,NH,ME,NC,VA
Phenanthrene	CT,NY,NH,ME,NC,VA
Pyrene	CT,NY,NH,ME,NC,VA

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

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC	100033	02/1/2018
MA	Massachusetts DEP	M-MA100	06/30/2017
CT	Connecticut Department of Public Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2017
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2017
RI	Rhode Island Department of Health	LAO00112	12/30/2016
NC	North Carolina Div. of Water Quality	652	12/31/2016
NJ	New Jersey DEP	MA007 NELAP	06/30/2017
FL	Florida Department of Health	E871027 NELAP	06/30/2017
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2017
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2016
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2016





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



### Sample Receipt Checklist

CLIENT NAME: Weston & Sampson RECEIVED BY: EB DATE: 7/25/16

1) Was the chain(s) of custody relinquished and signed? Yes  No  No COC Incl.

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

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

4) How were the samples received:

On Ice  Direct from Sampling  Ambient  In Cooler(s)

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

Temperature °C by Temp blank \_\_\_\_\_ Temperature °C by Temp gun 4.6

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:

Log In

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

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

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

10) Was the PC notified of any discrepancies with the CoC vs the samples: Yes  N/A

### Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber		16 oz amber	
500 mL Amber		8 oz amber/clear jar	8
250 mL Amber (8oz amber)		4 oz amber/clear jar	2
1 Liter Plastic		2 oz amber/clear jar	
500 mL Plastic		Plastic Bag / Ziploc	
250 mL plastic		SOC Kit	
40 mL Vial - type listed below	2	Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

\_\_\_\_\_

40 mL vials: # HCl _____ # Methanol <u>2</u>	Time and Date Frozen:
Doc# 277 # Bisulfate _____ # DI Water _____	
Rev. 4 August 2013 # Thiosulfate _____ Unpreserved _____	

**Login Sample Receipt Checklist**  
**(Rejection Criteria Listing - Using Sample Acceptance Policy)**  
**Any False statement will be brought to the attention of Client**

Question	Answer (True/False)	Comment
	T/F/NA	
1) The cooler's custody seal, if present, is intact.	N/A	
2) The cooler or samples do not appear to have been compromised or tampered with.	T	
3) Samples were received on ice.	T	
4) Cooler Temperature is acceptable.	T	
5) Cooler Temperature is recorded.	T	4.6 with gun
6) COC is filled out in ink and legible.	T	
7) COC is filled out with all pertinent information.	T	
8) Field Sampler's name present on COC.	T	
9) There are no discrepancies between the sample IDs on the container and the COC.	T	
10) Samples are received within Holding Time.	T	
11) Sample containers have legible labels.	T	
12) Containers are not broken or leaking.	T	
13) Air Cassettes are not broken/open.	N/A	
14) Sample collection date/times are provided.	T	
15) Appropriate sample containers are used.	T	
16) Proper collection media used.	T	
17) No headspace sample bottles are completely filled.	N/A	
18) There is sufficient volume for all requested analyses, including any requested MS/MSDs.	T	
19) Trip blanks provided if applicable.	N/A	
20) VOA sample vials do not have head space or bubble is <6mm (1/4") in diameter.	T	
21) Samples do not require splitting or compositing.	T	

Doc #277 Rev. 4 August 2013

Who notified of False statements?

Log-In Technician Initials:

CB

Date/Time:

Date/Time: 7/25/16

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## MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 16G1118
Project Location: 44 A Allen St., Braintree	RTN:

This Form provides certifications for the following data set: [list Laboratory Sample ID Number(s)]  
16G1118-01 thru 16G1118-10

Matrices: Soil

**CAM Protocol (check all that below)**

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

**Affirmative response to Questions A through F is required for "Presumptive Certainty" status**

<b>A</b>	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?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>B</b>	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>C</b>	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>D</b>	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>E a</b>	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).	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>E b</b>	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	<input type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>F</b>	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all No responses to Questions A through E)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>

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

<b>G</b>	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
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**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.**

<b>H</b>	Were all QC performance standards specified in the CAM protocol(s) achieved?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <sup>1</sup>
<b>I</b>	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <sup>1</sup>

<sup>1</sup>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: \_\_\_\_\_ *Lisa Worthington* \_\_\_\_\_ Position: Project Manager  
Printed Name: Lisa A. Worthington Date: 08/01/16

**ATTACHMENT C**

Method 3 Risk Characterization

# MEMORANDUM

**TO:** Sean Healey, LSP, Weston & Sampson

**FROM:** Marie Rudiman, Sr. Risk Assessor, Weston & Sampson

**DATE:** 8/17/16

**SUBJECT:** Updated Method 3 Risk Characterization, 44 Allen Street, Braintree, MA

Mr. Healey:

Pursuant to your request, an updated Method 3 risk characterization has been prepared for the 44 Allen Street property in Braintree, Massachusetts (Site). The risk characterization was performed to evaluate risk for future Site use including residential, employee, and construction worker exposures to Site soil. As you are aware, an initial risk characterization was performed using data obtained during our Phase II Environmental Site Assessment (ESA) performed in January and February 2016. This risk characterization has been updated with additional data obtained during our Additional Phase II ESA performed in July 2016. A detailed summary of the risk characterization is provided below. See attached Tables and Attachments for supporting information.

## Summary of Soil Data

Soil samples collected during the Phase II ESA were analyzed for total petroleum hydrocarbons (TPH), extractable petroleum hydrocarbons (EPH), polycyclic aromatic hydrocarbons (PAHs), volatile petroleum hydrocarbons (VPH), volatile organic compounds (VOCs), 8 RCRA Metals and polychlorinated biphenyls (PCBs). A statistical summary of all soil data (regardless of depth) is provided as Table 1. Table 2 presents the surficial soil data collected from 0 to 3 feet below grade at the Site. Table 3 presents the soil in the area of the former gasoline UST area separated from the soil data in the remainder of the Site.

Lead was found to be the constituent that drove the calculated potential health risks during this evaluation. Detections of VOCs, VPH and EPH fractions, PAHs, TPH, and other metals besides lead were of less concern. PCBs were not detected above detection limits in any of the soil samples analyzed.

VPH fractions were detected with the highest concentrations in soil collected from Test Pits TP-22 (3 to 6 feet) and TP-1 (6 to 9 feet), located in the Area of a Former Gasoline UST – South of BELD Office Building. Detections of VPH fractions in these samples were greater than DEP Method 1 S-1 GW-2/GW-3 soil standards. Similarly, TP-22 and TP-1 were the only soil samples that contained detectable concentrations of VOCs. Detected concentrations of VOCs were well below Method 1 S-1 soil standards.

The highest concentrations of EPH fractions were detected in soil sample TP-4 (2 to 5 feet) located in the Area of a Former Fuel Oil Tank South of the Former Boiler House. Detected concentrations of EPH fractions were greater

than Method 1 S-1 soil standards. As shown in Table 2, detected concentrations of EPH fractions were higher in surface soil (0 to 3 feet) than all soil across the Site.

Detections of TPH ranged from 120 to 910 mg/kg; with the highest detections at TP-9 (0 to 3 feet), located between the former boiler house building and the switch house building. As with the maximum concentrations of TPH, the highest concentrations of PAHs were detected in TP-9 (0 to 3 feet).

Concentrations of lead in soil samples ranged from 7 to 1,700 mg/kg with an average concentration of lead of 215 mg/kg across the Site and 276 mg/kg in surface soil from 0 to 3 feet below grade. The highest detected concentration of lead was detected in test pit TP-9 (0 to 3 feet). The highest concentrations of all metals were detected in TP-9 and TP-8. As shown in Table 2, detected concentrations of lead were higher in surface soil (0 to 3 feet) than all soil across the Site.

An evaluation of constituents of concern in soil indicates that while residual concentrations of certain samples are elevated compared to other parts of the Site, these detections do not meet the criteria of being a hotspot as they are not located in a central location, nor are they more than ten times the concentrations detected in other portions of the Site. Detections of contaminants in soil are heterogeneously distributed throughout the Site as would be expected at a Site with fill and from former use as an electric power station dating back to the 1890's. Based on this evaluation, residual concentrations of constituents at the Site are not considered to be hotspots.

### Summary of Groundwater Data

Groundwater samples collected during the Phase II ESA were analyzed for EPH, PAHs, VPH and VOCs. A statistical summary of groundwater analytical data is presented on Table 4. As shown on Table 4, naphthalene was detected in the groundwater sample collected from monitoring well WSE-101 and VPH, ethylbenzene, and xylenes were detected in the groundwater sample collected from WSE-102. Detected concentrations were well below DEP Method 1 GW-2/GW-3 groundwater standards. No constituents were identified above detection limits in WSE-103.

### Exposure Point Concentrations

The Exposure Point Concentrations (EPCs) for soil from this Site were calculated in three different ways:

- the average of all soil samples across the Site (Table 1) regardless of depth;
- the average of surficial soil samples collected at from 0 to 3 feet below grade (Table 2); and
- the average of soil samples collected from the former gasoline UST area (TP-1, TP-3, TP-22, and TP-25) (Table 3). To be conservative, since TP-3 and TP-25 did not have detectable concentrations of VPH fractions or VOCs, the results of VPH fractions and VOCs in these samples were not used. Lead detections in these two samples were used in the EPC calculations.

For samples that contained non-detectable concentrations of individual constituents, one-half of the laboratory detection limit was used as the concentration for the purpose of calculating averages.

Several PAHs including dibenzofuran, di-n-butylphthalate, and m/p-methylphenol were not evaluated in this risk characterization because there are no promulgated toxicity values for these constituents. Based on the generally low frequency of detection (they were each detected once in soil) and the low detected concentrations of these constituents, the potential risks associate with exposure to these PAHs is expected to be de-minimus (i.e., at least an order of magnitude below DEP risk limits). For this reason, these PAHs were not included in the risk calculations.

Detected PAHs and metals were compared to DEP published Background Concentrations in Natural Soil. The maximum concentrations of two metals, arsenic and chromium, were less than background concentrations and were therefore, eliminated from consideration in this risk evaluation (refer to Table 5).

### Calculated Human Health Risks

Under Method 3 risk characterization, cancer and non-cancer risks are calculated separately for each receptor. The non-cancer risk is characterized by a hazard quotient (HQI) which is the ratio of the receptor's exposure (ADD) to the maximum allowable exposure level (RfD) for each contaminant and exposure pathway or:

A condition of No Significant Risk (NSR) for non-cancer effects exists if the total Site Hazard Index (HI) is equal to or less than 1 for each receptor as follows:

$$HQ_i = ADD_i / RfD_i$$

$$HI = \sum \frac{ADD}{RfD} = \sum \frac{EPC \times EF \times ED \times EP \times PSF}{BW \times AP \times RfD}$$

where:

ADD	=	Average Daily Dose, mg/kg-day
RfD	=	Reference Dose, mg/kg-day
EPC	=	Exposure-Point Concentration of contaminant, mg/kg
EF	=	Exposure Frequency (events/day)
ED	=	Exposure Duration (time/event)
EP	=	Exposure Period (time)
PSF	=	Pathway/receptor-specific factor for ingestion and dermal contact
BW	=	Body Weight (kg)
AP	=	Averaging Period (time)

The LADD is calculated in the same manner as the ADD, except that the averaging period is over a lifetime of 70 years. A condition of NSR for cancer effects exists if the Excess Lifetime Cancer Risk (ELCR) is less than or equal to  $1 \times 10^{-5}$ , shown in the following equation:

$$ELCR = \sum LADD * CSF = \sum \frac{EPC \times EF \times ED \times EP \times PSF \times CSF}{BW \times AP}$$

### Risk Calculation Results

The total Site cancer and non-cancer risk calculations, using all soil from the Site, are provided in residential, commercial employee, and construction worker ShortForm (or ShortForm-modified for the employee) spreadsheets in Appendix B through D and Table 6 and are summarized below:

All Soil - Risk Calculation Results			
Receptor	Hazard Index		ELCR
	Subchronic	Chronic	
Resident	1	0.9	$5 \times 10^{-6}$
Employee	NA	0.1	$1 \times 10^{-7}$
Construction Worker	0.3	NA	$1 \times 10^{-7}$
DEP Acceptable Risk	1	1	$1 \times 10^{-5}$

NA=Not Applicable.

Bold Red=Above DEP Acceptable Risk

As shown above, the subchronic and chronic non-cancer risks for the future resident are equivalent to, but do not exceed DEP's acceptable non-cancer limit. The cancer risks for the future resident are less than DEP's acceptable cancer limit. The non-cancer and cancer risks for the employee and construction worker receptors are below DEP's acceptable limits.

The total Site cancer and non-cancer risk calculations, using surficial soil (0 to 3 feet) from the Site, are provided in residential and employee ShortForm (or ShortForm-modified for the employee) spreadsheets in Appendix D and are summarized below:

Surficial Soil 0-3'- Risk Calculation Results			
Receptor	Hazard Index		ELCR
	Subchronic	Chronic	
Resident	<b>2</b>	1	$6 \times 10^{-6}$
Employee	NA	0.1	$1 \times 10^{-6}$
DEP Acceptable Risk	1	1	$1 \times 10^{-5}$

NA=Not Applicable.

Bold Red=Above DEP Acceptable Risk

As shown above utilizing surficial soil 0 to 3 feet, the subchronic non-cancer risk for the future resident receptor is above DEP's acceptable limit. The chronic non-cancer risk for the future resident is equal to DEP's acceptable limit. The cancer risk estimate for the future resident is less than DEP's acceptable limit. The non-cancer and cancer risks for the employee receptor are below DEP's acceptable limits.

Soil in the Area of the Former Gasoline UST- Risk Calculation Results			
Receptor	Hazard Index		ELCR
	Subchronic	Chronic	
Resident	1	0.9	$4 \times 10^{-8}$
Employee	NA	0.1	$6 \times 10^{-10}$
Construction Worker	0.2	NA	$9 \times 10^{-10}$
DEP Acceptable Risk	1	1	$1 \times 10^{-5}$

NA=Not Applicable.

Bold Red=Above DEP Acceptable Risk

As shown above utilizing soil in the former gasoline UST area, the subchronic non-cancer risk for the future resident receptor is equivalent to but not above DEP's acceptable limit. The chronic non-cancer risk and cancer risks for the future resident are less than DEP's acceptable limits. The non-cancer and cancer risks for the employee receptor are below DEP's acceptable limits. The non-cancer and cancer risks for the construction worker receptors are also below DEP's acceptable limits.

It should be noted that these risk estimates do not take into account the potential for exposures via inhalation of indoor air in a future building. Evaluation of this potential pathway once the proposed building is built or removal of soil in the area of the former gasoline UST to mitigate potential exposures is recommended.

### Summary of Findings

In summary, utilizing the existing soil data set, the findings of this risk characterization indicate that a condition of No Significant Risk of harm to human health does not exist for potential future residents at the Site from exposure to Site surface soils. However, it is noted that the findings are primarily due to the detection of lead in surficial soil (0 to 3 feet) in the area of test pit TP-9 where a concentration of 1,700 mg/kg was identified. Lead throughout the remainder of the Site ranges from 26 to 480 mg/kg with an average of 144 mg/kg. This average would not pose a risk for residents using a Method 3 risk characterization. As such, there is potential that additional assessment and soil removal in the area of TP-9 could be performed to reduce site wide exposure point concentrations to acceptable levels for residential development. In lieu of additional assessment and soil removal, plans for residential development should include capping existing soil in planned landscaped areas with 3 feet of clean fill material and with asphalt in planned drive and parking areas.

Potential risks calculated for employees and construction workers were less than DEP acceptable limits. Therefore, a condition of no significant risk of harm to human health does exist for potential employee and construction worker receptors.

Please note, based on our discussions with you, we assume that petroleum impacted soil identified in the Area of a Former Gasoline UST – South of BELD Office Building and the Area of a Former Fuel Oil Tank South of the Former Boiler House will be excavated and removed as part of Site remediation. As such, an evaluation of potential impacts to indoor air from petroleum impacted soil in these locations was not performed as part of this risk characterization.

Residential exposure to homegrown produce was also calculated for informational purposes since this is a very unlikely pathway at the Site. As shown on Table RS-2 in Attachment B, the HI calculated for residential exposure to homegrown produce was greater than the MADEP target of 1 due to the presence of concentrations of cadmium and lead in soil. Best management practices should be used if vegetable gardening occurs at the Site, including the use of raised beds with imported clean soil.

If you have any questions regarding this memo, please do not hesitate to contact me.



Marie Rudiman  
Sr. Risk Assessor, Weston & Sampson

Attachments: Tables 1 - 6, Attachments A through D

**Table 1**  
**Summary of Analytical Data for Surface Soil Samples**  
**Former BELD Property**  
**44 Allen Street**  
**Braintree, Massachusetts**

Constituent	Frequency of Detection	Range Detected (mg/kg)	Location of Maximum Detected Concentration	Arithmetic Mean Concentration (mg/kg)
<u>VPH (MADEP-VPH-04-1.1)</u>				
C5-C8 Aliphatics	2 / 6	790	TP-22 (3-6')	472
C9-C10 Aromatics	3 / 6	91 - 930	TP-22 (3-6')	246
C9-C12 Aliphatics	2 / 6	96 - 500	TP-1	176
<u>Target VOCs</u>				
Benzene	1 / 11	1	TP-1	0.16
Ethylbenzene	2 / 11	12	TP-22 (3-6')	4
Naphthalene	1 / 11	10	TP-1	1
Xylenes, total	1 / 11	15	TP-22 (3-6')	2
<u>EPH (MADEP-EPH-04-1.1)</u>				
C9-C18 Aliphatics	1 / 2	1,500	TP-4	753
C19-C36 Aliphatics	2 / 2	24 - 3,100	TP-4	1,562
C11-C22 Aromatics	2 / 2	37 - 5,600	TP-4	2,819
<u>Target PAHs</u>				
Acenaphthene	6 / 22	0.2 - 6	TP-9	1
Acenaphthylene	3 / 22	0.2 - 1.1	TP-9	0.2
Anthracene	12 / 22	0.2 - 12	TP-9	1
Benzo(a)anthracene	17 / 22	0.4 - 24	TP-9	3
Benzo(a)pyrene	16 / 22	0.4 - 21	TP-9	2
Benzo(b)fluoranthene	17 / 22	0 - 28	TP-9	3
Benzo(g,h,i)perylene	17 / 22	0.2 - 8	TP-9	1
Benzo(k)fluoranthene	15 / 22	0.2 - 9	TP-9	1
Chrysene	17 / 22	0 - 23	TP-9	3
Dibenz(a,h)anthracene	11 / 22	0.2 - 4	TP-9	0
Dibenzofuran	1 / 5	6	TP-9	1
Di-n-butylphthalate	1 / 5	0.4	TP-9	0.3
Fluoranthene	17 / 22	0 - 63	TP-9	6
Fluorene	5 / 22	1 - 6	TP-9	1
Indeno(1,2,3-cd)pyrene	17 / 22	0.2 - 8	TP-9	1
2-Methylnaphthalene	2 / 22	0	TP-9	0
m/p-Methylphenol	1 / 5	0.4	TP-9	0.3
Naphthalene	3 / 22	0	TP-9	0
Phenanthrene	16 / 22	0.2 - 70	TP-9	5
Pyrene	18 / 22	1 - 56	TP-9	6
<u>Metals</u>				
Arsenic	3 / 5	8 - 10	TP-8	6
Barium	5 / 5	17 - 250	TP-9	111
Cadmium	5 / 5	0.37 - 3	TP-9	1
Chromium	5 / 5	7 - 27	TP-8	14
Lead	22 / 22	7 - 1,700	TP-9	215
Mercury	5 / 5	0.04 - 3.50	TP-9	0.86
<u>Total Petroleum Hydrocarbons</u>				
	5 / 5	120 - 910	TP-9	484

Notes:

1. For the purpose of calculating arithmetic mean concentrations, one-half the method detection limit was used to represent the concentrations of constituents reported as non-detects (ND).
2. Analytical results were based on samples collected in January and July 2016.

**Table 2**  
**Summary of Analytical Data for Surface Soil Samples**  
**Former BELD Property**  
**44 Allen Street**  
**Braintree, Massachusetts**

Constituent	Frequency of Detection	Range Detected (mg/kg)	Location of Maximum Detected Concentration	Arithmetic Mean Concentration (mg/kg)
<u>VPH (MADEP-VPH-04-1.1)</u>				
C9-C10 Aromatics	1 / 1	91	TP-4	91
C9-C12 Aliphatics	1 / 1	96	TP-4	96
<u>EPH (MADEP-EPH-04-1.1)</u>				
C9-C18 Aliphatics	1 / 1	1,500	TP-4	1,500
C19-C36 Aliphatics	1 / 1	3,100	TP-4	3,100
C11-C22 Aromatics	1 / 1	5,600	TP-4	5,600
<u>Target PAHs</u>				
Acenaphthene	5 / 15	0.9 - 6	TP-9	1
Acenaphthylene	3 / 15	0.2 - 1.1	TP-9	0.2
Anthracene	8 / 15	0.2 - 12	TP-9	2
Benzo(a)anthracene	12 / 15	0.4 - 24	TP-9	3
Benzo(a)pyrene	12 / 15	0.4 - 21	TP-9	3
Benzo(b)fluoranthene	12 / 15	0.5 - 28	TP-9	4
Benzo(g,h,i)perylene	12 / 15	0.2 - 8	TP-9	2
Benzo(k)fluoranthene	10 / 15	0.2 - 9	TP-9	1
Chrysene	12 / 15	0.3 - 23	TP-9	3
Dibenz(a,h)anthracene	8 / 15	0.2 - 4	TP-9	1
Dibenzofuran	1 / 3	5.9	TP-9	2
Di-n-butylphthalate	1 / 3	0.4	TP-9	0.3
Fluoranthene	12 / 15	1 - 63	TP-9	8
Fluorene	5 / 15	1 - 6	TP-9	1
Indeno(1,2,3-cd)pyrene	12 / 15	0.2 - 8	TP-9	2
2-Methylnaphthalene	2 / 15	0.3 - 3	TP-9	0.3
m/p-Methylphenol	1 / 3	0.4	TP-9	0.3
Naphthalene	3 / 15	0.2 - 4.6	TP-9	0.4
Phenanthrene	12 / 15	0.2 - 70	TP-9	7
Pyrene	13 / 15	0.5 - 56	TP-9	8
<u>Metals</u>				
Arsenic	2 / 3	8 - 10	TP-8	6
Barium	3 / 3	17 - 250	TP-9	139
Cadmium	3 / 3	0.46 - 3	TP-9	1
Chromium	3 / 3	8 - 27	TP-8	16
Lead	14 / 14	7 - 1,700	TP-9	276
Mercury	3 / 3	0.05 - 3.50	TP-9	1.32
<u>Total Petroleum Hydrocarbons</u>	3 / 3	120 - 910	TP-9	437

Notes:

1. For the purpose of calculating arithmetic mean concentrations, one-half the method detection limit was used to represent the concentrations of constituents reported as non-detects (ND).
2. Analytical results were based on samples collected in January and July 2016.

**Table 3**  
**Summary of Analytical Data for Soil Samples in the Former Gasoline UST Area**  
**Former BELD Property**  
**44 Allen Street**  
**Braintree, Massachusetts**

Constituent	Frequency of Detection	Range Detected (mg/kg)	Location of Maximum Detected Concentration	Arithmetic Mean Concentration (mg/kg)
<u>VPH (MADEP-VPH-04-1.1)</u>				
C5-C8 Aliphatics	2 / 2	790 - 2,000	TP-22 (3-6')	1395
C9-C10 Aromatics	2 / 2	440 - 930	TP-22 (3-6')	685
C9-C12 Aliphatics	1 / 2	500	TP-1	473
<u>Target VOCs</u>				
Benzene	1 / 2	1	TP-1	1.40
Ethylbenzene	2 / 2	12 - 500	TP-22 (3-6')	24
Naphthalene	1 / 2	10	TP-1	10
Xylenes, total	1 / 2	15	TP-22 (3-6')	8
<u>Metals</u>				
Lead	2 / 2	26 - 410	TP-3	218

Notes:

1. For the purpose of calculating arithmetic mean concentrations, one-half the method detection limit was used to represent the concentrations of constituents reported as non-detects (ND).
2. Analytical results were based on samples collected in January and July 2016.

Table 4  
Groundwater Analytical Results  
Former BELD Property  
44 Allen Street  
Braintree, Massachusetts

Parameters	Units	MCP - Method 1 Cleanup Standards		WSE-101	WSE-102	WSE-103
		GW-2	GW-3			
Sample Date				2/10/2016	2/10/2016	2/10/2016
<b>VPH</b>						
C5-C8 Aliphatics	µg/L	3,000	50,000	<100	<b>280</b>	<100
C9-C10 Aromatics	µg/L	4,000	50,000	<100	<b>160</b>	<100
C9-C12 Aliphatics	µg/L	5,000	50,000	<100	<100	<100
<b>Target VOCs</b>						
Benzene	µg/L	1,000	10,000	<1.0	<1.0	<1.0
Ethylbenzene	µg/L	20,000	5,000	<1.0	<b>20</b>	<1.0
Methyl tert-butyl ether	µg/L	50,000	50,000	<1.0	<1.0	<1.0
Naphthalene	µg/L	700	20,000	<5.0	<5.0	<5.0
Toluene	µg/L	50,000	40,000	<1.0	<1.0	<1.0
m-Xylene & p-Xylene	µg/L	NS	NS	<2.0	<b>8.0</b>	<2.0
o-Xylene	µg/L	NS	NS	<1.0	<1.0	<1.0
Total Xylenes	ug/L	3,000	5,000	<2.0	<b>8.0</b>	<2.0
<b>EPH</b>						
C9-C18 Aliphatics	µg/L	5,000	50,000	<100	<100	<100
C19-C36 Aliphatics	µg/L	NS	50,000	<100	<100	<100
C11-C22 Aromatics	µg/L	50,000	5,000	<100	<100	<100
<b>Target PAHs</b>						
Acenaphthene	µg/L	NS	10,000	<2.0	<2.0	<2.0
Acenaphthylene	µg/L	10,000	40	<2.0	<2.0	<2.0
Anthracene	µg/L	NS	30	<2.0	<2.0	<2.0
Benzo[a]anthracene	µg/L	NS	1,000	<2.0	<2.0	<2.0
Benzo[a]pyrene	µg/L	NS	500	<2.0	<2.0	<2.0
Benzo[b]fluoranthene	µg/L	NS	400	<2.0	<2.0	<2.0
Benzo[g,h,i]perylene	µg/L	NS	20	<2.0	<2.0	<2.0
Benzo[k]fluoranthene	µg/L	NS	100	<2.0	<2.0	<2.0
Chrysene	µg/L	NS	70	<2.0	<2.0	<2.0
Dibenz(a,h)anthracene	µg/L	NS	40	<2.0	<2.0	<2.0
Fluoranthene	µg/L	NS	200	<2.0	<2.0	<2.0
Fluorene	µg/L	NS	40	<2.0	<2.0	<2.0
Indeno[1,2,3-cd]pyrene	µg/L	NS	100	<2.0	<2.0	<2.0
2-Methylnaphthalene	µg/L	2,000	20,000	<2.0	<2.0	<2.0
Naphthalene	µg/L	700	20,000	<b>5.2</b>	<2.0	<2.0
Phenanthrene	µg/L	NS	10,000	<2.0	<2.0	<2.0
Pyrene	µg/L	NS	20	<2.0	<2.0	<2.0

**Abbreviations:**

EPH = Extractable Petroleum Hydrocarbons

VPH = Volatile Petroleum Hydrocarbons

PAHs = Polycyclic Aromatic Hydrocarbons

VOCs = Volatile Organic Compounds

µg/L= micrograms per Liter

< = parameters not detected above laboratory method detection limit shown.

NS= No Standard

-- = Not Analyzed

**Notes:**

**BOLD** = Exceeds laboratory detection limit.

Analytical results compared to the Massachusetts Contingency Plan (MCP) Reportable Concentration and Method 1 Cleanup Standards 310 CMR 40.0000, revised April 2014.

**Table 5**  
**Summary of Analytical Data for Surface Soil Samples**  
**Former BELD Property**  
**44 Allen Street**  
**Braintree, Massachusetts**

Constituent	Maximum Detected Concentration  mg/kg	Massachusetts Background Concentration In Natural Soil mg/kg	
<i>Target PAHs</i>			
Acenaphthene	6	0.5	*
Acenaphthylene	1	0.5	*
Anthracene	12	1	*
Benzo(a)anthracene	24	2	*
Benzo(a)pyrene	21	2	*
Benzo(b)fluoranthene	28	2	*
Benzo(g,h,i)perylene	8	1	*
Benzo(k)fluoranthene	9	1	*
Chrysene	23	2	*
Dibenz(a,h)anthracene	4	0.5	*
Dibenzofuran	6	NA	
Di-n-butylphthalate	0.4	NA	
Fluoranthene	63	4	*
Fluorene	6	1	*
Indeno(1,2,3-cd)pyrene	8	1	*
2-Methylnaphthalene	3	0.5	*
m/p-Methylphenol	0.4	NA	
Naphthalene	5	0.5	*
Phenanthrene	70	3	*
Pyrene	56	4	*
<i>Metals</i>			
Arsenic	10	20	
Barium	250	50	*
Cadmium	3	2	*
Chromium	27	30	
Lead	1,700	100	*
Mercury	4	0.3	*

Notes:

1. The Massachusetts Background Concentration was obtained from MADEP (2002) Characterizing Risks Posed by Petroleum Contaminated Sites: Implementation of the MADEP VPH/EPH Approach, Final Policy, Policy #WSC-02-411
2. \* Indicates maximum detected concentration in Site soil exceeds background concentration in natural soil.

**Table 6  
Summary of Results  
Former BELD Property  
44 Allen Street  
Braintree, Massachusetts**

Potential Receptor	Exposure Media	Exposure and Migration Pathway	Hazard Index		ELCR	
			Subchronic	Chronic		
<b>Arithmetic Mean Concentrations All Soil</b>						
On-Site Resident	Surface and Subsurface Soil	Incidental Ingestion and Dermal Contact	1	0.9	5E-06	
			Total:	<b>1</b>	<b>1</b>	<b>5E-06</b>
			DEP Risk Limit:	1	1	1E-05
			Exceeds DEP Risk Limit?	<b>NO*</b>	<b>NO</b>	<b>NO</b>
On-Site Employee	Surface and Subsurface Soil	Incidental Ingestion and Dermal Contact	NC	0.1	1E-07	
			Total:	<b>NC</b>	<b>0.1</b>	<b>1E-07</b>
			DEP Risk Limit:	1	1	1E-05
			Exceeds DEP Risk Limit?	<b>NO</b>	<b>NO</b>	<b>NO</b>
Construction Worker	Surface and Subsurface Soil	Incidental Ingestion and Dermal Contact and Inhalation of Soil-Derived Particulates in Air	0.3	NA	1E-07	
			Total:	<b>0.3</b>	<b>NC</b>	<b>1E-07</b>
			DEP Risk Limit:	1.0	1.0	1E-05
			Exceeds DEP Risk Limit?	<b>NO</b>	<b>NO</b>	<b>NO</b>
<b>Arithmetic Mean Concentrations Surface Soil (0 to 3 feet)</b>						
On-Site Resident	Surface Soil	Incidental Ingestion and Dermal Contact	2	1	6E-06	
			Total:	<b>2</b>	<b>1</b>	<b>6E-06</b>
			DEP Risk Limit:	1.0	1	1E-05
			Exceeds DEP Risk Limit?	<b>YES</b>	<b>NO*</b>	<b>NO</b>
On-Site Employee	Surface Soil	Incidental Ingestion and Dermal Contact	NC	0.1	1E-06	
			Total:	<b>NC</b>	<b>0.1</b>	<b>1E-06</b>
			DEP Risk Limit:	1.0	1.0	1E-05
			Exceeds DEP Risk Limit?	<b>NO</b>	<b>NO</b>	<b>NO</b>
<b>Arithmetic Mean Concentrations Former Gasoline UST Area</b>						
On-Site Resident	Gasoline UST Area	Incidental Ingestion and Dermal Contact	1	0.9	4E-08	
			Total:	<b>1</b>	<b>0.9</b>	<b>4E-08</b>
			DEP Risk Limit:	1	1.0	1E-05
			Exceeds DEP Risk Limit?	<b>NO*</b>	<b>NO</b>	<b>NO*</b>
On-Site Employee	Gasoline UST Area	Incidental Ingestion and Dermal Contact	NC	0.1	6E-10	
			Total:	<b>NC</b>	<b>0.1</b>	<b>6E-10</b>
			DEP Risk Limit:	1.0	1.0	1E-05
			Exceeds DEP Risk Limit?	<b>NO</b>	<b>NO</b>	<b>NO</b>
Construction Worker	Gasoline UST Area	Incidental Ingestion and Dermal Contact and Inhalation of Soil-Derived Particulates in Air	0.2	NA	9E-10	
			Total:	<b>0.2</b>	<b>NC</b>	<b>9E-10</b>
			DEP Risk Limit:	1.0	1.0	1E-05
			Exceeds DEP Risk Limit?	<b>NO</b>	<b>NO</b>	<b>NO</b>

1. NA = Not Applicable, NC = Not Calculated, ELCR = Excess Lifetime Cancer Risk.

2. \* Estimated risks are equivalent but do not exceed MADEP risk limits. Due to the conservative nature of assumptions used in this Method 3 Risk Characterization, it is likely that true risks are less than those calculated. Rounding to the single digit is applicable for Method 3 Risk Characterizations. MADEP, 2008, Technical Update: Expressing the Precision of Exposure Point Concentrations and Risk Estimates in MCP Risk Characterizations.

**ATTACHMENT A - SOIL DATA TABLES**



All Soil Data  
Former BELD Property  
44 Allen Street  
Braintree, Massachusetts

Sample ID:	TP-13 (6-9')	TP-14 (0-3')	TP-15 (0-3')	TP-16 (0-3')	TP-17 (0-3')	TP-18 (0-3')	TP-19 (0-3')	TP-20 (0-3')	TP-21 (0-3')	TP-21 (6-9')	TP-22 (3-6')	TP-25 (10-12')
Sample Date:	7/21/16	7/21/16	7/21/16	7/21/16	7/21/16	7/21/16	7/21/16	7/21/16	7/21/16	7/21/16	7/21/16	7/21/16
Depth:												
ANALYTES	Result MDL											
<u>VPH (MADEP-VPH-04-1.1)</u>												
C5-C8 Aliphatics											2000	ND 9.6
C9-C10 Aromatics											930	ND 9.6
C9-C12 Aliphatics											ND 890	ND 9.6
<u>Target VOCs</u>												
Benzene											ND 4.4	ND 0.048
Ethylbenzene											36	ND 0.048
Methyl-tert-butyl ether											ND 4.4	ND 0.048
Naphthalene											ND 22	ND 0.024
Xylenes, total											15	ND 0.96
<u>EPH (MADEP-EPH-04-1.1)</u>												
C9-C18 Aliphatics												
C19-C36 Aliphatics												
C11-C22 Aromatics												
<u>Target PAHs</u>												
Acenaphthene	ND 0.23	ND 0.22	ND 0.2	ND 0.18	ND 0.17	0.97	ND 0.21	1	1.175	ND 0.22		
Acenaphthylene	ND 0.23	ND 0.22	ND 0.2	ND 0.18	ND 0.17	ND 0.19	ND 0.21	ND 0.2	ND 0.195	ND 0.22		
Anthracene	ND 0.23	0.43	ND 0.2	ND 0.18	ND 0.17	3.1	ND 0.21	2.2	3.85	ND 0.22		
Benzo(a)anthracene	0.38	1.9	0.39	0.38	1	5.3	ND 0.21	3.9	8.55	ND 0.22		
Benzo(a)pyrene	ND 0.23	1.8	0.54	0.36	0.99	4.6	ND 0.21	3.1	6.75	ND 0.22		
Benzo(b)fluoranthene	0.62	2.2	0.63	0.48	1.3	5.5	ND 0.21	3.8	7.85	ND 0.22		
Benzo(g,h,i)perylene	0.25	1.5	1.3	0.28	0.65	3.3	ND 0.21	1.9	4.75	ND 0.22		
Benzo(k)fluoranthene	0.23	0.79	0.24	ND 0.18	0.46	3.9	ND 0.21	1.4	3.9	ND 0.22		
Chrysene	0.41	1.9	0.47	0.4	1	5.1	ND 0.21	3.5	7.9	ND 0.22		
Dibenz(a,h)anthracene	ND 0.23	0.43	ND 0.2	ND 0.18	0.18	1.1	ND 0.21	0.48	1.17	ND 0.22		
Dibenzofuran												
Di-n-butylphthalate												
Fluoranthene	0.48	3.4	0.56	0.6	1.7	11	ND 0.21	8.5	19.5	ND 0.22		
Fluorene	ND 0.23	ND 0.22	ND 0.2	ND 0.18	ND 0.17	0.9	ND 0.21	0.85	1.28	ND 0.22		
Indeno(1,2,3-cd)pyrene	0.29	1.4	0.46	0.28	0.71	3.5	ND 0.21	2.1	5.25	ND 0.22		
2-Methylnaphthalene	ND 0.23	ND 0.22	ND 0.2	ND 0.18	ND 0.17	ND 0.19	ND 0.21	0.29	ND 0.195	ND 0.22		
m/p-Methylphenol												
Naphthalene	ND 0.23	ND 0.22	ND 0.2	ND 0.18	ND 0.17	0.19	ND 0.21	0.45	ND 0.195	ND 0.22		
Phenanthrene	ND 0.23	1.9	0.24	0.22	0.55	9.1	ND 0.21	9.1	11.8	ND 0.22		
Pyrene	0.95	3.3	0.73	0.59	1.8	9.2	ND 0.21	7.6	14.25	ND 0.22		
<u>Metals</u>												
Arsenic												
Barium												
Cadmium												
Chromium												
Lead	27	480	170	71	90	180	7.3	300	235	8.7		
Mercury												
<u>Total Petroleum Hydrocarbons</u>												
<u>Polychlorinated Biphenyls</u>												

All Soil Data  
Former BELD Property  
44 Allen Street  
Braintree, Massachusetts

Sample ID:	Min	Max	Samples	Number	Mean	Location of
Sample Date:				Samples		Max
Depth:						Detected
ANALYTES						
<u>VPH (MADEP-VPH-04-1.1)</u>						
C5-C8 Aliphatics	790	2000	2	6	471.583333	TP-22 (3-6')
C9-C10 Aromatics	91	930	3	6	246	TP-22 (3-6')
C9-C12 Aliphatics	96	500	2	6	176	TP-1
	0	ND	0	0	NA	ND
<u>Target VOCs</u>	0	ND	0	0	NA	ND
Benzene	1.4	1.4	1	11	0.160035	TP-1
Ethylbenzene	12	36	2	11	4.38185	TP-22 (3-6')
Methyl-tert-butyl ether	0	ND	0	11	NCC	ND
Naphthalene	9.9	9.9	1	11	1.021235	TP-1
Xylenes, total	15	15	1	11	1.54866818	TP-22 (3-6')
	0	ND	0	0	NA	ND
	0	ND	0	0	NA	ND
<u>EPH (MADEP-EPH-04-1.1)</u>						
C9-C18 Aliphatics	1500	1500	1	2	752.75	TP-4
C19-C36 Aliphatics	24	3100	2	2	1562	TP-4
C11-C22 Aromatics	37	5600	2	2	2818.5	TP-4
	0	ND	0	0	NA	ND
	0	ND	0	0	NA	ND
<u>Target PAHs</u>	0	ND	0	0	NA	ND
Acenaphthene	0.24	6.3	6	22	0.55568182	TP-9
Acenaphthylene	0.21	1.1	3	22	0.16965909	TP-9
Anthracene	0.2	12	12	22	1.16522727	TP-9
Benzo(a)anthracene	0.36	24	17	22	2.65204545	TP-9
Benzo(a)pyrene	0.35	21	16	22	2.31545455	TP-9
Benzo(b)fluoranthene	0.47	28	17	22	2.96613636	TP-9
Benzo(g,h,i)perylene	0.24	8.4	17	22	1.34386364	TP-9
Benzo(k)fluoranthene	0.23	8.9	15	22	1.19386364	TP-9
Chrysene	0.32	23	17	22	2.54795455	TP-9
Dibenz(a,h)anthracene	0.16	3.5	11	22	0.43204545	TP-9
Dibenzofuran	5.9	5.9	1	5	1.379	TP-9
Di-n-butylphthalate	0.44	0.44	1	5	0.287	TP-9
Fluoranthene	0.48	63	17	22	6.01068182	TP-9
Fluorene	0.85	5.9	5	22	0.58977273	TP-9
Indeno(1,2,3-cd)pyrene	0.24	8.2	17	22	1.34613636	TP-9
2-Methylnaphthalene	0.29	3.1	2	22	0.25534091	TP-9
m/p-Methylphenol	0.44	0.44	1	5	0.287	TP-9
Naphthalene	0.19	4.6	3	22	0.34397727	TP-9
Phenanthrene	0.22	70	16	22	5.29590909	TP-9
Pyrene	0.54	56	18	22	5.84431818	TP-9
	0	ND	0	0	NA	ND
	0	ND	0	0	NA	ND
<u>Metals</u>	0	ND	0	0	NA	ND
Arsenic	7.6	10	3	5	5.75	TP-8
Barium	17	250	5	5	110.8	TP-9
Cadmium	0.37	3.1	5	5	1.046	TP-9
Chromium	6.9	27	5	5	13.64	TP-8
Lead	7.3	1700	22	22	214.822727	TP-9
Mercury	0.04	3.5	5	5	0.8602	TP-9
	0	ND	0	0	NA	ND
<u>Total Petroleum Hydrocarbons</u>	120	910	5	5	484	TP-9
<u>Polychlorinated Biphenyls</u>	0	ND	0	5	NCC	ND

Surface Soil Data  
Former BELD Property  
44 Allen Street  
Braintree, Massachusetts

Sample ID:	TP-4		TP-8		TP-9		TP-10	
Sample Date:	2/2/16		1/29/16		1/29/16		1/29/16	
Depth:	2-5'		0-3'		0-3'		0-3'	
ANALYTES	Result	MDL	Result	MDL	Result	MDL	Result	MDL
<u>VPH (MADEP-VPH-04-1.1)</u>								
C5-C8 Aliphatics	ND	49						
C9-C10 Aromatics	91							
C9-C12 Aliphatics	96							
<u>Target VOCs</u>								
Benzene	ND	0.24	ND	0.0014	ND	0.0014	ND	0.0014
Ethylbenzene	ND	0.24	ND	0.0014	ND	0.0014	ND	0.0014
Methyl-tert-butyl ether	ND	0.24	ND	0.0028	ND	0.0028	ND	0.0028
Naphthalene	ND	1.2	ND	0.0028	ND	0.0028	ND	0.0028
Xylenes, total								
<u>EPH (MADEP-EPH-04-1.1)</u>								
C9-C18 Aliphatics	1500							
C19-C36 Aliphatics	3100							
C11-C22 Aromatics	5600							
<u>Target PAHs</u>								
Acenaphthene	0.91		ND	0.2	6.3		ND	0.18
Acenaphthylene	ND	0.58	0.21		1.1		ND	0.18
Anthracene	ND	0.58	0.55		12		0.45	
Benzo(a)anthracene	ND	0.58	1.9		24		1.2	
Benzo(a)pyrene	ND	0.58	1.7		21		1.1	
Benzo(b)fluoranthene	ND	0.58	2.2		28		1.3	
Benzo(g,h,i)perylene	ND	0.58	0.98		8.4		0.84	
Benzo(k)fluoranthene	ND	0.58	0.91		8.9		0.55	
Chrysene	ND	0.58	2.1		23		1.2	
Dibenz(a,h)anthracene	ND	0.58	0.32		3.5		ND	0.18
Dibenzofuran			ND	0.4	5.9		ND	0.36
Di-n-butylphthalate			ND	0.4	0.44		ND	0.36
Fluoranthene	ND	0.58	3.8		63		3.1	
Fluorene	2.3		ND	0.2	5.9		ND	0.18
Indeno(1,2,3-cd)pyrene	ND	0.58	1		8.2		0.76	
2-Methylnaphthalene	ND	0.58	ND	0.2	3.1		ND	0.18
m/p-Methylphenol			ND	0.4	0.44		ND	0.36
Naphthalene	ND	0.58	ND	0.2	4.6		ND	0.18
Phenanthrene	ND	0.58	2.4		70		2.2	
Pyrene	11		4.1		56		3.2	
<u>Metals</u>								
Arsenic			10		7.6		ND	2.6
Barium			150		250		17	
Cadmium			0.65		3.1		0.46	
Chromium			27		13		8.3	
Lead			310		1700		29	
Mercury			0.4		3.5		0.046	
<u>Total Petroleum Hydrocarbons</u>								
			280		910		120	
<u>Polychlorinated Biphenyls</u>								
			ND	0.12	ND	0.11	ND	0.11

Surface Soil Data  
Former BELD Property  
44 Allen Street  
Braintree, Massachusetts

Sample ID:	Min	Max	Samples	Number	Mean	Location of
Sample Date:				Number		Max
Depth:				Samples		Detected
ANALYTES						
<u>VPH (MADEP-VPH-04-1.1)</u>						
C5-C8 Aliphatics	0	ND	0	1	NCC	ND
C9-C10 Aromatics	91	91	1	1	91	TP-4
C9-C12 Aliphatics	96	96	1	1	96	TP-4
	0	ND	0	0	NA	ND
<u>Target VOCs</u>	0	ND	0	0	NA	ND
Benzene	0	ND	0	4	NCC	ND
Ethylbenzene	0	ND	0	4	NCC	ND
Methyl-tert-butyl ether	0	ND	0	4	NCC	ND
Naphthalene	0	ND	0	4	NCC	ND
Xylenes, total	0	ND	0	0	NA	ND
	0	ND	0	0	NA	ND
<u>EPH (MADEP-EPH-04-1.1)</u>	0	ND	0	0	NA	ND
C9-C18 Aliphatics	1500	1500	1	1	1500	TP-4
C19-C36 Aliphatics	3100	3100	1	1	3100	TP-4
C11-C22 Aromatics	5600	5600	1	1	5600	TP-4
	0	ND	0	0	NA	ND
<u>Target PAHs</u>	0	ND	0	0	NA	ND
Acenaphthene	0.91	6.3	5	15	0.75433333	TP-9
Acenaphthylene	0.21	1.1	3	15	0.1965	TP-9
Anthracene	0.21	12	8	15	1.57633333	TP-9
Benzo(a)anthracene	0.36	24	12	15	3.39133333	TP-9
Benzo(a)pyrene	0.35	21	12	15	2.94533333	TP-9
Benzo(b)fluoranthene	0.47	28	12	15	3.73466667	TP-9
Benzo(g,h,i)perylene	0.24	8.4	12	15	1.69533333	TP-9
Benzo(k)fluoranthene	0.24	8.9	10	15	1.498	TP-9
Chrysene	0.32	23	12	15	3.24533333	TP-9
Dibenz(a,h)anthracene	0.18	3.5	8	15	0.54866667	TP-9
Dibenzofuran	5.9	5.9	1	3	2.09333333	TP-9
Di-n-butylphthalate	0.44	0.44	1	3	0.27333333	TP-9
Fluoranthene	0.56	63	12	15	7.90933333	TP-9
Fluorene	0.85	5.9	5	15	0.81266667	TP-9
Indeno(1,2,3-cd)pyrene	0.24	8.2	12	15	1.68333333	TP-9
2-Methylnaphthalene	0.29	3.1	2	15	0.32216667	TP-9
m/p-Methylphenol	0.44	0.44	1	3	0.27333333	TP-9
Naphthalene	0.19	4.6	3	15	0.43916667	TP-9
Phenanthrene	0.22	70	12	15	7.27066667	TP-9
Pyrene	0.54	56	13	15	7.64066667	TP-9
	0	ND	0	0	NA	ND
<u>Metals</u>	0	ND	0	0	NA	ND
Arsenic	7.6	10	2	3	6.3	TP-8
Barium	17	250	3	3	139	TP-9
Cadmium	0.46	3.1	3	3	1.40333333	TP-9
Chromium	8.3	27	3	3	16.1	TP-8
Lead	7.3	1700	14	14	275.785714	TP-9
Mercury	0.05	3.5	3	3	1.31533333	TP-9
	0	ND	0	0	NA	ND
<u>Total Petroleum Hydrocarbons</u>	120	910	3	3	436.666667	TP-9
<u>Polychlorinated Biphenyls</u>	0	ND	0	3	NCC	ND

Soil Data - Former Gasoline UST Area  
Former BELD Property  
44 Allen Street  
Braintree, Massachusetts

Sample ID:	TP-1	TP-3	TP-22 (3-6')	TP-25 (10-12')
Sample Date:	1/29/16	1/29/16	7/21/16	7/21/16
Depth:	6-9'	6-9'		
ANALYTES	Result	MDL	Result	MDL
<u>VPH (MADEP-VPH-04-1.1)</u>				
C5-C8 Aliphatics	790		2000	
C9-C10 Aromatics	440		930	
C9-C12 Aliphatics	500		ND	890
<u>Target VOCs</u>				
Benzene	1.4		ND	4.4
Ethylbenzene	12		36	
Methyl-tert-butyl ether	ND	1.4	ND	4.4
Naphthalene	9.9		ND	22
Xylenes, total	ND	2.7	15	
<u>EPH (MADEP-EPH-04-1.1)</u>				
C9-C18 Aliphatics				
C19-C36 Aliphatics				
C11-C22 Aromatics				
<u>Target PAHs</u>				
Acenaphthene				
Acenaphthylene				
Anthracene				
Benzo(a)anthracene				
Benzo(a)pyrene				
Benzo(b)fluoranthene				
Benzo(g,h,i)perylene				
Benzo(k)fluoranthene				
Chrysene				
Dibenz(a,h)anthracene				
Dibenzofuran				
Di-n-butylphthalate				
Fluoranthene				
Fluorene				
Indeno(1,2,3-cd)pyrene				
2-Methylnaphthalene				
m/p-Methylphenol				
Naphthalene				
Phenanthrene				
Pyrene				
<u>Metals</u>				
Arsenic				
Barium				
Cadmium				
Chromium				
Lead	26		410	
Mercury				
<u>Total Petroleum Hydrocarbons</u>				
<u>Polychlorinated Biphenyls</u>				

Soil Data - Former Gasoline UST Area  
Former BELD Property  
44 Allen Street  
Braintree, Massachusetts

Sample ID:	Min	Max	Samples	Number	Mean	Location of
Sample Date:				Samples		Max
Depth:						Detected
ANALYTES						
<u>VPH (MADEP-VPH-04-1.1)</u>						
C5-C8 Aliphatics	790	2000	2	2	1395	TP-22 (3-6')
C9-C10 Aromatics	440	930	2	2	685	TP-22 (3-6')
C9-C12 Aliphatics	500	500	1	2	472.5	TP-1
	0	ND	0	0	NA	ND
<u>Target VOCs</u>	0	ND	0	0	NA	ND
Benzene	1.4	1.4	1	2	1.4	TP-1
Ethylbenzene	12	36	2	2	24	TP-22 (3-6')
Methyl-tert-butyl ether	0	ND	0	2	NCC	ND
Naphthalene	9.9	9.9	1	2	9.9	TP-1
Xylenes, total	15	15	1	2	8.175	TP-22 (3-6')
	0	ND	0	0	NA	ND
<u>EPH (MADEP-EPH-04-1.1)</u>	0	ND	0	0	NA	ND
C9-C18 Aliphatics	0	ND	0	0	NA	ND
C19-C36 Aliphatics	0	ND	0	0	NA	ND
C11-C22 Aromatics	0	ND	0	0	NA	ND
	0	ND	0	0	NA	ND
<u>Target PAHs</u>	0	ND	0	0	NA	ND
Acenaphthene	0	ND	0	0	NA	ND
Acenaphthylene	0	ND	0	0	NA	ND
Anthracene	0	ND	0	0	NA	ND
Benzo(a)anthracene	0	ND	0	0	NA	ND
Benzo(a)pyrene	0	ND	0	0	NA	ND
Benzo(b)fluoranthene	0	ND	0	0	NA	ND
Benzo(g,h,i)perylene	0	ND	0	0	NA	ND
Benzo(k)fluoranthene	0	ND	0	0	NA	ND
Chrysene	0	ND	0	0	NA	ND
Dibenz(a,h)anthracene	0	ND	0	0	NA	ND
Dibenzofuran	0	ND	0	0	NA	ND
Di-n-butylphthalate	0	ND	0	0	NA	ND
Fluoranthene	0	ND	0	0	NA	ND
Fluorene	0	ND	0	0	NA	ND
Indeno(1,2,3-cd)pyrene	0	ND	0	0	NA	ND
2-Methylnaphthalene	0	ND	0	0	NA	ND
m/p-Methylphenol	0	ND	0	0	NA	ND
Naphthalene	0	ND	0	0	NA	ND
Phenanthrene	0	ND	0	0	NA	ND
Pyrene	0	ND	0	0	NA	ND
	0	ND	0	0	NA	ND
<u>Metals</u>	0	ND	0	0	NA	ND
Arsenic	0	ND	0	0	NA	ND
Barium	0	ND	0	0	NA	ND
Cadmium	0	ND	0	0	NA	ND
Chromium	0	ND	0	0	NA	ND
Lead	26	410	2	2	218	TP-3
Mercury	0	ND	0	0	NA	ND
	0	ND	0	0	NA	ND
<u>Total Petroleum Hydrocarbons</u>	0	ND	0	0	NA	ND
<u>Polychlorinated Biphenyls</u>	0	ND	0	0	NA	ND

**ATTACHMENT B - SHORT FORM - RESIDENT**

## Method 3 Risk Assessment for Resident Exposed to Chemicals in Soil - Shortform 2012 (sf12rs)

### Index

#### Tab

<b>EPCs</b>	Table RS-1: Select chemicals and enter Exposure Point Concentrations (EPCs). Estimated risks are shown to the right.
	Table RS-2: Produce risk. Select chemical and enter EPCs.
<b>C Eq</b>	Table RS-3: Equations to calculate cancer risks
<b>cNC Eq</b>	Table RS-4: Equations to calculate chronic noncancer risks
<b>scNC Eq</b>	Table RS-5: Equations to calculate subchronic noncancer risks
<b>Exp</b>	Table RS-6: Definitions and exposure factors
<b>Produce</b>	Table RS-7: Equations to calculate produce ingestion rate
<b>Chem</b>	Table RS-8: Chemical-specific data
<b>Cyanide</b>	Table RS-9: Cyanide Calculations

Spreadsheets designed by Andrew Friedmann, MassDEP

Questions and Comments may be addressed to:

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**Resident - Soil: Table RS-1 - All Soil  
Exposure Point Concentration (EPC)  
Based on Resident Ages 1-31 (Cancer), 1-8 (Chronic Noncancer), and 1-2 (Subchronic Noncancer)**

ShortForm Version 10-12  
Vlookup Versionv0315

ELCR (all chemicals) = 4.8E-06  
Chronic HI (all chemicals) = 9E-01  
Subchronic HI (all chemicals) = 1E+00

Do not insert or delete any rows  
Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material	EPC (mg/kg)	ELCR <sub>ingestion</sub>	ELCR <sub>dermal</sub>	Derm & Ing ELCR <sub>total</sub>	Chronic		Derm & Ing HQ <sub>total</sub>	Subchronic		Derm & Ing HQ <sub>total</sub>
					HQ <sub>ing</sub>	HQ <sub>derm</sub>		HQ <sub>ing</sub>	HQ <sub>derm</sub>	
ALIPHATICS C5 to C8	4.7E+02				2.9E-02	4.9E-02	7.7E-02	7.9E-03	9.2E-03	1.7E-02
AROMATICS C9 to C10	2.5E+02				2.0E-02	3.4E-02	5.4E-02	5.5E-03	6.4E-03	1.2E-02
ALIPHATICS C9 to C12	1.8E+02				4.3E-03	7.3E-03	1.2E-02	1.2E-03	1.4E-03	2.5E-03
BENZENE	1.6E-01	3.3E-09	1.0E-09	4.3E-09	9.7E-05	2.5E-05	1.2E-04	1.1E-04	1.9E-05	1.3E-04
ETHYLBENZENE	4.4E+00				2.1E-04	5.4E-05	2.7E-04	5.8E-04	1.0E-04	6.9E-04
NAPHTHALENE	1.0E+00				3.7E-05	1.1E-04	1.4E-04	1.0E-05	2.0E-05	3.0E-05
XYLENES (Mixed Isomers)	1.5E+00				1.9E-05	4.8E-06	2.4E-05	2.6E-05	4.5E-06	3.0E-05
ALIPHATICS C9 to C18	7.5E+02				1.8E-02	3.1E-02	4.9E-02	5.0E-03	5.9E-03	1.1E-02
ALIPHATICS C19 to C36	1.6E+03				1.9E-03	3.2E-03	5.1E-03	1.7E-03	2.0E-03	3.8E-03
AROMATICS C11 to C22	2.8E+03				6.8E-02	1.9E-01	2.6E-01	1.9E-02	3.7E-02	5.5E-02
ACENAPHTHENE	5.6E-01				6.7E-06	1.9E-05	2.6E-05	5.6E-06	1.1E-05	1.6E-05
ACENAPHTHYLENE	1.7E-01				4.1E-06	1.2E-05	1.6E-05	1.1E-06	2.2E-06	3.3E-06
ANTHRACENE	1.2E+00				2.8E-06	8.0E-06	1.1E-05	2.3E-06	4.5E-06	6.9E-06
BENZO(a)ANTHRACENE	2.7E+00	2.2E-07	1.5E-07	3.7E-07	6.4E-05	3.6E-05	1.0E-04	1.8E-05	6.9E-06	2.5E-05
BENZO(a)PYRENE	2.3E+00	1.9E-06	1.3E-06	3.2E-06	5.6E-05	3.2E-05	8.8E-05	1.5E-05	6.0E-06	2.1E-05
BENZO(b)FLUORANTHENE	3.0E+00	2.4E-07	1.7E-07	4.1E-07	7.2E-05	4.1E-05	1.1E-04	2.0E-05	7.7E-06	2.8E-05
BENZO(g,h,i)PERYLENE	1.3E+00				3.3E-05	9.2E-05	1.2E-04	9.0E-06	1.7E-05	2.6E-05
BENZO(k)FLUORANTHENE	1.2E+00	9.8E-09	6.8E-09	1.7E-08	2.9E-05	1.6E-05	4.5E-05	8.0E-06	3.1E-06	1.1E-05
CHRYSENE	2.5E+00	2.1E-08	1.4E-08	3.5E-08	6.2E-05	3.5E-05	9.7E-05	1.7E-05	6.6E-06	2.4E-05
DIBENZO(a,h)ANTHRACENE	4.3E-01	3.5E-07	2.4E-07	6.0E-07	1.0E-05	5.9E-06	1.6E-05	2.9E-06	1.1E-06	4.0E-06
FLUORANTHENE	6.0E+00				1.1E-04	3.1E-04	4.2E-04	1.2E-04	2.3E-04	3.5E-04
FLUORENE	5.9E-01				1.1E-05	3.0E-05	4.1E-05	3.0E-06	5.8E-06	8.7E-06
INDENO(1,2,3-cd)PYRENE	1.3E+00	1.1E-07	7.6E-08	1.9E-07	3.3E-05	1.9E-05	5.1E-05	9.0E-06	3.5E-06	1.2E-05
METHYLNAPHTHALENE, 2-	2.6E-01				4.6E-05	1.3E-04	1.8E-04	1.3E-04	2.5E-04	3.8E-04
PHENANTHRENE	5.3E+00				1.3E-04	3.6E-04	4.9E-04	3.5E-05	6.9E-05	1.0E-04
PYRENE	5.8E+00				1.4E-04	4.0E-04	5.4E-04	3.9E-05	7.6E-05	1.1E-04
BARIIUM	1.1E+02				1.3E-03	1.1E-03	2.5E-03	1.1E-02	6.2E-03	1.7E-02
CADMIUM	1.0E+00				2.5E-03	4.3E-04	3.0E-03	7.0E-03	8.2E-04	7.8E-03
LEAD	2.1E+02				3.5E-01	3.5E-02	3.8E-01	9.6E-01	6.7E-02	1.0E+00
MERCURY	8.6E-01				3.5E-03	5.9E-03	9.4E-03	9.6E-03	1.1E-02	2.1E-02

Note! Lead IH HQ limit is 1, not 10.

**Resident - Soil: Table RS-1 - Surface Soil**  
**Exposure Point Concentration (EPC)**  
**Based on Resident Ages 1-31 (Cancer), 1-8 (Chronic Noncancer), and 1-2 (Subchronic Noncancer)**

ShortForm Version 10-12  
 Vlookup Version0315

ELCR (all chemicals) = 6.1E-06  
 Chronic HI (all chemicals) = 1E+00  
 Subchronic HI (all chemicals) = 2E+00

Do not insert or delete any rows  
 Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material	EPC (mg/kg)	ELCR <sub>ingestion</sub>	ELCR <sub>dermal</sub>	Derm & Ing ELCR <sub>total</sub>	Chronic		Derm & Ing HQ <sub>total</sub>	Subchronic		Derm & Ing HQ <sub>total</sub>
					HQ <sub>ing</sub>	HQ <sub>derm</sub>		HQ <sub>ing</sub>	HQ <sub>derm</sub>	
AROMATICS C9 to C10	9.1E+01				7.4E-03	1.3E-02	2.0E-02	2.0E-03	2.4E-03	4.4E-03
ALIPHATICS C9 to C12	9.6E+01				2.3E-03	4.0E-03	6.3E-03	6.4E-04	7.5E-04	1.4E-03
ALIPHATICS C9 to C18	1.5E+03				3.6E-02	6.2E-02	9.8E-02	1.0E-02	1.2E-02	2.2E-02
ALIPHATICS C19 to C36	3.1E+03				3.8E-03	6.4E-03	1.0E-02	3.4E-03	4.0E-03	7.5E-03
AROMATICS C11 to C22	5.6E+03				1.4E-01	3.8E-01	5.2E-01	3.7E-02	7.3E-02	1.1E-01
ACENAPHTHENE	7.5E-01				9.1E-06	2.6E-05	3.5E-05	7.6E-06	1.5E-05	2.2E-05
ACENAPHTHYLENE	2.0E-01				4.8E-06	1.4E-05	1.8E-05	1.3E-06	2.6E-06	3.9E-06
ANTHRACENE	1.6E+00				3.8E-06	1.1E-05	1.5E-05	3.2E-06	6.1E-06	9.3E-06
BENZO(a)ANTHRACENE	3.4E+00	2.8E-07	1.9E-07	4.7E-07	8.2E-05	4.7E-05	1.3E-04	2.3E-05	8.8E-06	3.1E-05
BENZO(a)PYRENE	2.9E+00	2.4E-06	1.7E-06	4.1E-06	7.1E-05	4.0E-05	1.1E-04	2.0E-05	7.7E-06	2.7E-05
BENZO(b)FLUORANTHENE	3.7E+00	3.1E-07	2.1E-07	5.2E-07	9.1E-05	5.1E-05	1.4E-04	2.5E-05	9.7E-06	3.5E-05
BENZO(g,h,i)PERYLENE	1.7E+00				4.1E-05	1.2E-04	1.6E-04	1.1E-05	2.2E-05	3.3E-05
BENZO(k)FLUORANTHENE	1.5E+00	1.2E-08	8.5E-09	2.1E-08	3.6E-05	2.1E-05	5.7E-05	1.0E-05	3.9E-06	1.4E-05
CHRYSENE	3.2E+00	2.7E-08	1.8E-08	4.5E-08	7.9E-05	4.5E-05	1.2E-04	2.2E-05	8.4E-06	3.0E-05
DIBENZO(a,h)ANTHRACENE	5.5E-01	4.5E-07	3.1E-07	7.6E-07	1.3E-05	7.5E-06	2.1E-05	3.7E-06	1.4E-06	5.1E-06
FLUORANTHENE	7.9E+00				1.4E-04	4.1E-04	5.5E-04	1.6E-04	3.1E-04	4.7E-04
FLUORENE	8.1E-01				1.5E-05	4.2E-05	5.7E-05	4.1E-06	7.9E-06	1.2E-05
INDENO(1,2,3-cd)PYRENE	1.7E+00	1.4E-07	9.5E-08	2.3E-07	4.1E-05	2.3E-05	6.4E-05	1.1E-05	4.4E-06	1.6E-05
METHYLNAPHTHALENE, 2-	3.2E-01				5.9E-05	1.7E-04	2.2E-04	1.6E-04	3.1E-04	4.8E-04
NAPHTHALENE	4.4E-01				1.6E-05	4.5E-05	6.1E-05	4.4E-06	8.6E-06	1.3E-05
PHENANTHRENE	7.3E+00				1.8E-04	5.0E-04	6.8E-04	4.9E-05	9.5E-05	1.4E-04
PYRENE	7.6E+00				1.9E-04	5.3E-04	7.1E-04	5.1E-05	9.9E-05	1.5E-04
BARIUM	1.4E+02				1.7E-03	1.4E-03	3.1E-03	1.3E-02	7.7E-03	2.1E-02
CADMIUM	1.4E+00				3.4E-03	5.8E-04	4.0E-03	9.4E-03	1.1E-03	1.0E-02
LEAD	2.8E+02				4.5E-01	4.5E-02	4.9E-01	1.2E+00	8.6E-02	1.3E+00
MERCURY	1.3E+00				5.3E-03	9.0E-03	1.4E-02	1.5E-02	1.7E-02	3.2E-02

Note! Lead IH HQ limit is 1, not 10.

**Resident - Soil: Table RS-1 - Former Gasoline UST Area**  
**Exposure Point Concentration (EPC)**  
 Based on Resident Ages 1-31 (Cancer), 1-8 (Chronic Noncancer), and 1-2 (Subchronic Noncancer)

ShortForm Version 10-12  
 Vlookup Versionv0315

ELCR (all chemicals) = 3.8E-08  
 Chronic HI (all chemicals) = 9E-01  
 Subchronic HI (all chemicals) = 1E+00

Do not insert or delete any rows  
 Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material	EPC (mg/kg)	ELCR <sub>ingestion</sub>	ELCR <sub>dermal</sub>	Derm & Ing ELCR <sub>total</sub>	Chronic		Derm & Ing HQ <sub>total</sub>	Subchronic		Derm & Ing HQ <sub>total</sub>
					HQ <sub>ing</sub>	HQ <sub>derm</sub>		HQ <sub>ing</sub>	HQ <sub>derm</sub>	
AROMATICS C9 to C10	1.4E+03				1.1E-01	1.9E-01	3.0E-01	3.1E-02	3.6E-02	6.7E-02
AROMATICS C9 to C10	6.9E+02				5.5E-02	9.4E-02	1.5E-01	1.5E-02	1.8E-02	3.3E-02
ALIPHATICS C9 to C12	4.7E+02				1.1E-02	1.9E-02	3.1E-02	3.2E-03	3.7E-03	6.8E-03
BENZENE	1.4E+00	2.9E-08	9.0E-09	3.8E-08	8.5E-04	2.2E-04	1.1E-03	9.3E-04	1.6E-04	1.1E-03
ETHYLBENZENE	2.4E+01				1.2E-03	3.0E-04	1.5E-03	3.2E-03	5.6E-04	3.8E-03
NAPHTHALENE	9.9E+00				3.6E-04	1.0E-03	1.4E-03	9.9E-05	1.9E-04	2.9E-04
XYLENES (Mixed Isomers)	8.2E+00				9.9E-05	2.5E-05	1.2E-04	1.4E-04	2.4E-05	1.6E-04
LEAD	2.2E+02				3.5E-01	3.6E-02	3.9E-01	9.7E-01	6.8E-02	1.0E+00

Note! Lead IH HQ limit is 1, not 10.

**Resident - Soil: Table RS-2**  
**Exposure Point Concentration (EPC)**  
**Based on Resident Ages 1-31 (Cancer), 1-8 (Chronic Noncancer), and 1-2 (Subchronic Noncancer)**

Vlookup Versionv0315

ELCR (all chemicals) =  
 Chronic HI (all chemicals) = 2E+01  
 Subchronic HI (all chemicals) = 3E+01

\*Vegetable uptake is informational only and NOT included in totals on EPC tab.

**Do not insert or delete any rows**

Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material	EPC (mg/kg)	Chronic		Subchronic
		ELCR <sub>vegetable*</sub>	HQ <sub>vegetable*</sub>	HQ <sub>vegetable*</sub>
BARIUM	1.4E+02			
CADMIUM	1.4E+00		3.8E+00	5.4E+00
LEAD	2.8E+02		2.0E+01	2.8E+01
MERCURY	1.3E+00			

**Resident - Soil: Table RS-3**  
**Equations to Calculate Cancer Risk for Resident (Age 1-31 years)**

**Cancer Risk from Ingestion**

$$ELCR_{ing} = LADD_{ing(1-31)} * CSF$$

$$LADD_{ing(1-31)} = LADD_{ing(1-8)} + LADD_{ing(8-15)} + LADD_{ing(15-31)}$$

$$LADD_{ing(age\ group\ x)} = \frac{[OHM]_{soil} * IR_x * RAF_{c-ing} * EF_{ing} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

**Cancer Risk from Dermal Absorption**

$$ELCR_{derm} = LADD_{derm} * CSF$$

$$LADD_{derm(1-31)} = LADD_{derm(1-8)} + LADD_{derm(8-15)} + LADD_{derm(15-31)}$$

$$LADD_{derm(age\ group\ x)} = \frac{[OHM]_{soil} * SA_x * RAF_{c-derm} * SAF_x * EF_{derm} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

**Cancer Risk from Homegrown Produce**

$$ELCR_{produce} = LADD_{produce(1-31)} * CSF$$

$$LADD_{produce(1-31)} = LADD_{produce(1-8)} + LADD_{produce(8-15)} + LADD_{produce(15-31)}$$

$$LADD_{produce(age\ x)} = \frac{[OHM]_{soil} * PUF * PIR_x * RAF_{produce} * EF_{produce} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

Parameter	Value	Units
CSF	OHM specific	(mg/kg-day) <sup>-1</sup>
LADD	age/OHM specific	mg/kg-day
[OHM] <sub>soil</sub>	OHM specific	mg/kg
IR <sub>(1-8)</sub>	100	mg/day
IR <sub>(8-15)</sub>	50	mg/day
IR <sub>(15-31)</sub>	50	mg/day
PIR <sub>(1-8)</sub>	12,099	mg/day
PIR <sub>(8-15)</sub>	17,809	mg/day
PIR <sub>(15-31)</sub>	24,420	mg/day
RAF <sub>c-ing</sub>	OHM specific	dimensionless
RAF <sub>c-derm</sub>	OHM specific	dimensionless
RAF <sub>c-produce</sub>	OHM specific	dimensionless
EF <sub>ing,derm</sub>	0.412	event/day
EF <sub>produce</sub>	1.00	event/day
ED	1	day/event
EP <sub>(1-8)</sub>	7	years
EP <sub>(8-15)</sub>	7	years
EP <sub>(15-31)</sub>	16	years
C	0.000001	kg/mg
BW <sub>(1-8)</sub>	17.0	kg
BW <sub>(8-15)</sub>	39.9	kg
BW <sub>(15-31)</sub>	58.7	kg
AP <sub>(lifetime)</sub>	70	years
SA <sub>(1-8)</sub>	2431	cm <sup>2</sup> / day
SA <sub>(8-15)</sub>	4427	cm <sup>2</sup> / day
SA <sub>(15-31)</sub>	5653	cm <sup>2</sup> / day
SAF <sub>(1-8)</sub>	0.35	mg/cm <sup>2</sup>
SAF <sub>(8-15)</sub>	0.14	mg/cm <sup>2</sup>
SAF <sub>(15-31)</sub>	0.13	mg/cm <sup>2</sup>
PUF	OHM specific	(mg/mg)(mg/mg) <sup>-1</sup>

**Resident - Soil: Table RS-4**  
**Equations to Calculate Chronic Noncancer Risk for Resident Child (Age 1-8 years)**

Vlookup Versionv0315

**Chronic Noncancer Risk from Ingestion**

$$HQ_{ing} = \frac{ADD_{ing}}{RfD}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc-ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

**Chronic Noncancer Risk from Dermal Absorption**

$$HQ_{derm} = \frac{ADD_{ing,derm}}{RfD}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc-derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

**Chronic Noncancer Risk from Homegrown Produce**

$$HQ_{produce} = \frac{ADD_{produce}}{RfD}$$

$$ADD_{produce} = \frac{[OHM]_{soil} * PUF * PIR * RAF_{produce} * EF_{produce} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
[OHM] <sub>soil</sub>	OHM specific	mg/kg
IR	100	mg/day
PIR	12,099	mg/day
RAF <sub>nc-ing</sub>	OHM specific	dimensionless
RAF <sub>nc-derm</sub>	OHM specific	dimensionless
RAF <sub>nc-produce</sub>	OHM specific	dimensionless
EF <sub>ing,derm</sub>	0.412	event/day
EF <sub>produce</sub>	1.00	event/day
ED	1	day/event
EP	7	years
C	0.000001	kg/mg
BW	17.0	kg
AP	7	year
SA	2431	cm <sup>2</sup> / day
SAF	0.35	mg/cm <sup>2</sup>
PUF	OHM specific	(mg/mg)(mg/mg) <sup>-1</sup>

**Resident - Soil: Table RS-5**  
**Equations to Calculate Subchronic Noncancer Risk for Resident Child (Age 1-2 years)**

Vlookup Versionv0315

**Subchronic Noncancer Risk from Ingestion**

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{subchronic}}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc-ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

**Subchronic Noncancer Risk from Dermal Absorption**

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{subchronic}}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc-derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

**Subchronic Noncancer Risk from Homegrown Produce**

$$HQ_{produce} = \frac{ADD_{produce}}{RfD_{subchronic}}$$

$$ADD_{produce} = \frac{[OHM]_{soil} * PUF * PIR * RAF_{produce} * EF_{produce} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
[OHM] <sub>soil</sub>	OHM specific	mg/kg
IR	100	mg/day
PIR	10,900	mg/day
RAF <sub>nc-ing</sub>	OHM specific	dimensionless
RAF <sub>nc-derm</sub>	OHM specific	dimensionless
RAF <sub>nc-produce</sub>	OHM specific	dimensionless
EF <sub>ing,derm</sub>	0.714	event/day
EF <sub>produce</sub>	1.00	event/day
ED	1	day/event
EP	0.577	years
C	0.000001	kg/mg
BW	10.7	kg
AP	0.577	year
SA	1670	cm <sup>2</sup> / day
SAF	0.35	mg/cm <sup>2</sup>
PUF	OHM specific	(mg/mg)(mg/mg) <sup>-1</sup>

**Resident - Soil: Table RS-6**  
**Definitions and Exposure Factors**

Vlookup Versionv0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	(mg/kg-day) <sup>-1</sup>	see Table RS-7
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
LADE - Lifetime Average Daily Exposure	chemical specific	µg/m <sup>3</sup>	
HQ - Hazard Quotient	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
RfD - Reference Dose	chemical specific	mg/kg-day	see Table RS-7
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
ADE - Average Daily Exposure	chemical specific	mg/m <sup>3</sup>	
EPC - Exposure Point Concentration	chemical specific	mg/kg	
PUF - Plant Uptake Factor	chemical specific	(mg/mg)(mg/mg) <sup>-1</sup>	See Table RS-7; (mg <sub>OHW</sub> /mg <sub>plant</sub> )/(mg <sub>OHW</sub> /mg <sub>soil</sub> ) <sup>-1</sup>
IR <sub>(1-2)</sub> - Soil Ingestion Rate for age group 1-2	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. ( <a href="http://www.mass.gov/dep/ors/orspubs.htm">http://www.mass.gov/dep/ors/orspubs.htm</a> )
IR <sub>(1-8)</sub> - Soil Ingestion Rate for age group 1-8	100	mg/day	Ibid
IR <sub>(8-15)</sub> - Soil Ingestion Rate for age group 8-15	50	mg/day	Ibid
IR <sub>(15-31)</sub> - Soil Ingestion Rate for age group 15-31	50	mg/day	Ibid
PIR <sub>(1-2)</sub> = Produce Ingestion Rate for age group 1-2	10,900	mg/day	see Table RS-6
PIR <sub>(1-8)</sub> = Produce Ingestion Rate for age group 1-8	12,099	mg/day	see Table RS-6
PIR <sub>(8-15)</sub> = Produce Ingestion Rate for age group 8-15	17,809	mg/day	Ibid
PIR <sub>(15-31)</sub> = Produce Ingestion Rate for age group 15-31	24,420	mg/day	Ibid
RAF <sub>c</sub> - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	
EF <sub>subchronic</sub> - Exposure Frequency for subchronic ingestion or dermal exposure	0.714	event/day	5 days/week
EF <sub>chronic</sub> - Exposure Frequency for chronic ingestion or dermal exposure	0.412	event/day	5 days/week, 30 weeks/year
EF <sub>cancer</sub> - Exposure Frequency for cancer, ingestion or dermal exposure	0.412	event/day	5 days/week, 30 weeks/year
EF <sub>produce</sub> - Exposure Frequency for produce ingestion, cancer and noncancer	1.00	event/day	
ED - Exposure Duration	1	day/event	
EP <sub>(1-2)</sub> - Exposure Period for age group 1-2	0.577	years	30 weeks
EP <sub>(1-8)</sub> - Exposure Period for age group 1-8	7	years	
EP <sub>(8-15)</sub> - Exposure Period for age group 8-15	7	years	
EP <sub>(15-31)</sub> - Exposure Period for age group 15-31	16	years	
BW <sub>(1-2)</sub> - Body Weight for age group 1-2	10.7	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, females.
BW <sub>(1-8)</sub> - Body Weight for age group 1-8	17.0	kg	Ibid
BW <sub>(8-15)</sub> - Body Weight for age group 8-15	39.9	kg	Ibid
BW <sub>(15-31)</sub> - Body Weight for age group 15-31	58.7	kg	Ibid
AP <sub>subchronic</sub> - Averaging Period for subchronic noncancer	0.577	years	30 weeks
AP <sub>chronic</sub> - Averaging Period for chronic noncancer	7	years	
AP <sub>cancer</sub> - Averaging Period for lifetime	70	years	
SA <sub>(1-2)</sub> - Surface Area for age group 1-2	1670	cm <sup>2</sup> / day	50th percentile of face (1/3 head), forearms, hands, lower legs, and feet for females MADEP. 1995. Guidance for Disposal Site Risk Characterization. Appendix Table B-2.
SA <sub>(1-8)</sub> - Surface Area for age group 1-8	2431	cm <sup>2</sup> / day	Ibid
SA <sub>(8-15)</sub> - Surface Area for age group 8-15	4427	cm <sup>2</sup> / day	Ibid
SA <sub>(15-31)</sub> - Surface Area for age group 15-31	5653	cm <sup>2</sup> / day	Ibid
SAF <sub>(1-2)</sub> - Surface Adherence Factor for age group 1-2	0.35	mg/cm <sup>2</sup>	All SAFs developed for ShortForm according to procedure outlined in MA DEP Technical Update:Weighted Skin-Soil Adherence Factors, April 2002
SAF <sub>(1-8)</sub> - Surface Adherence Factor for age group 1-8	0.35	mg/cm <sup>2</sup>	
SAF <sub>(8-15)</sub> - Surface Adherence Factor for age group 8-15	0.14	mg/cm <sup>2</sup>	
SAF <sub>(15-31)</sub> - Surface Adherence Factor for age group 15-31	0.13	mg/cm <sup>2</sup>	

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**Resident - Soil: Table RS-7  
Homegrown Produce Ingestion Rate**

Data on mean produce ingestion rates (wet weight, ww) in the Northeast was obtained from the 1994-1996 Continuing Survey of Food Intakes by Individuals (USDA). Data for both genders were used for children under 6, while data for males was used for individuals 6 and older. The mean ingestion rates presented in the survey represent the arithmetic average of all individuals surveyed, regardless of whether or not they had consumed the produce item (e.g., an individual that did not consume the produce item was assigned a rate of 0 g/day). To determine the mean ingestion rate for individuals who ate each produce item, the ingestion rate for all individuals (consumers and nonconsumers) was divided by the percentage of individuals who ate the item (Table RS-7A). These mean ingestion rates for the produce consumers were summed to determine the total produce ingestion rate for each age-group and converted to dry weight assuming the produce items were all 90% water.

To convert mean ingestion rates for the age-groups studied in the survey to age-groups used in risk calculations, each age-group ingestion rate from the survey (i.e., 1 - 2 year olds, 3 - 5 year olds, 6 - 11 year olds, 12 - 19 year olds, and 20 - 39 year olds) was weighted according to the number of years spent in the risk calculation age group (i.e., 1 - 8 year olds, 8 - 15 year olds, and 15 - 31 year olds) (Table RS-7B). It was assumed that 25% of produce ingested was home-grown (Table RS-7C).

**Table RS-7**

Age-groups studied in survey	White Potatoes			Dark-green vegetables			Deep-yellow vegetables		
	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)
1-2	28	40.3	69.5	6	10.1	59.4	5	12.7	39.4
3-5	30	37.1	80.9	5	6.5	76.9	7	12.7	55.1
6-11	47	44.2	106.3	6	9.1	65.9	2	8.5	23.5
12-19	59	40.3	146.4	2	2.3	87.0	11	15.8	69.6
20-39	76	45.1	168.5	25	14.7	170.1	4	5.7	70.2

Age-groups studied in survey	Tomatoes			Lettuce			Green Beans		
	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)
1-2	10	27.9	35.8	1	6	16.7	7	12.1	57.9
3-5	10	37.1	27.0	4	14	28.6	3	5.7	52.6
6-11	20	42	47.6	8	14.9	53.7	1	2	50.0
12-19	29	45.2	64.2	19	28.7	66.2	2	2.4	83.3
20-39	48	50.9	94.3	18	29.6	60.8	4	3.7	108.1

Table RS-7a (continued)

Age-groups studied in survey	Corn, Green peas, Lima beans			Melons, berries			Totals	Totals
	Ingestion	% of individuals that consumed item.	Ingestion	Ingestion	% of individuals that consumed item.	Ingestion	Wet Weight	Dry Weight
	Rate for All g/d (ww)		Rate for Consumers g/d (ww)	Rate for All g/d (ww)		Rate for Consumers g/d (ww)	Rate for Consumers g/d (ww)	WWI g/day
1-2	12	15	80.0	7	9	77.8	436.4	43.6
3-5	14	21.7	64.5	14	11.6	120.7	506.3	50.6
6-11	9	13.6	66.2	5	5.9	84.7	498.0	49.8
12-19	14	9.9	141.4	17	5	340.0	998.1	99.8
20-39	12	7.3	164.4	6	4.5	133.3	969.7	97.0

Table RS-7B

Age-groups studied in survey	Years spent in age-group 1-8 year old	Years spent in age-group 8-15 year old	Years spent in age-group 15-31 year old
1-2	2		
3-5	3		
6-11	2	4	
12-19		3	4
20-39			12
	7	7	16

Table RS-7C

	Produce Intake, dry weight			
	Child 1-2 years g/day	Child 1-8 years g/day	Child 8-15 years g/day	Adult 15-31 g/day
<b>All Produce:</b>	43.6	48.4	71.2	97.7
<b>Homegrown:</b>	10.9	12.1	17.8	24.4

**Resident - Soil: Table RS-8  
Chemical-Specific Data**

Vlookup Versionv0315

Oil or Hazardous Material	CSF (mg/kg-day) <sup>-1</sup>	RAF <sub>c-ing</sub>	RAF <sub>c-derm</sub>	RAF <sub>c-prod</sub>	Chronic RfD mg/kg-day	Subchronic RfD mg/kg-day	Chronic RAF <sub>nc-ing</sub>	Chronic RAF <sub>nc-derm</sub>	Subchronic RAF <sub>nc-ing</sub>	Subchronic RAF <sub>nc-derm</sub>	RAF <sub>nc-prod</sub>	PUF
ALIPHATICS C5 to C9					4.0E-02	4.0E-01	1	0.2	1	0.2		
ALIPHATICS C9 to C11					3.0E-02	3.0E-01	1	0.2	1	0.2		
ALIPHATICS C9 to C11					1.0E-01	1.0E+00	1	0.2	1	0.2		
BENZENE	5.5E-02	1.00	0.03		4.0E-03	1.0E-02	1	0.03	1	0.03		
ETHYLBENZENE					5.0E-02	5.0E-02	1	0.03	1	0.03		
NAPHTHALENE					2.0E-02	2.0E-01	0.3	0.1	0.3	0.1		
XYLENES (Mixed Isomer)					2.0E-01	4.0E-01	1	0.03	1	0.03		
ALIPHATICS C9 to C11					1.0E-01	1.0E+00	1	0.2	1	0.2		
ALIPHATICS C19 to C21					2.0E+00	6.0E+00	1	0.2	1	0.2		
AROMATIC C11 to C14					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
ACENAPHTHENE					6.0E-02	2.0E-01	0.3	0.1	0.3	0.1		
ACENAPHTHYLENE					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
ANTHRACENE					3.0E-01	1.0E+00	0.3	0.1	0.3	0.1		
BENZO(a)ANTHRACENE	7.3E-01	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
BENZO(a)PYRENE	7.3E+00	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
BENZO(b)FLUORANTHENE	7.3E-01	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
BENZO(g,h,i)PERYLENE					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
BENZO(k)FLUORANTHENE	7.3E-02	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
CHRYSENE	7.3E-02	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
DIBENZO(a,h)ANTHRACENE	7.3E+00	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
FLUORANTHENE					4.0E-02	1.0E-01	0.3	0.1	0.3	0.1		
FLUORENE					4.0E-02	4.0E-01	0.3	0.1	0.3	0.1		
INDENO(1,2,3-cd)PYRENE	7.3E-01	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
METHYLNAPHTHALENE					4.0E-03	4.0E-03	0.3	0.1	0.3	0.1		
PHENANTHRENE					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
PYRENE					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
BARIUM					2.0E-01	7.0E-02	1	0.1	1	0.1		
CADMIUM					5.0E-04	5.0E-04	0.5	0.01	0.5	0.01	1	1.9
LEAD					7.5E-04	7.5E-04	0.5	0.006	0.5	0.006	0.5	0.15
MERCURY					3.0E-04	3.0E-04	0.5	0.1	0.5	0.1		

## Resident - Soil: Table RS-9 Cyanide Calculations

The soil cyanide concentration limit set to protect a child resident against an acute, potentially lethal one-time dose of cyanide from incidental ingestion of contaminated soil is 100 mg/kg soil. This is the concentration of available cyanide in soil below which acute human health effects would not be expected following a one-time exposure. This soil concentration is calculated using the equation below with a pica-type soil ingestion of 1000 mg<sub>soil</sub> and an available cyanide dose limit of 0.01 mg/kg<sub>body weight</sub>.

MassDEP's guidance on evaluating the risk from a one-time cyanide dose considers cyanide's potentially lethal effects as well as information on cyanide metabolism:

Cyanides are detoxified rapidly by the body, and a large acute dose which overwhelms the detoxification mechanism is potentially more toxic than the same dose distributed over a period of hours. (MassDEP *Background Documentation for the Development of an Available Cyanide Benchmark Concentration*, originally dated October 1992, Modified August 1998)

Assessment of a potential one-time dose requires an estimate of the maximum soil concentration the receptor could contact at any one time. The average soil concentration within a typical exposure area will underestimate the potential one-time dose. Therefore, to assess the acute risk of a one-time potentially lethal dose, the EPC for cyanide should be a conservative estimate of the maximum soil concentration.

**The residential soil concentration limit to protect against adverse effects from an acute (one-time) exposure to cyanide is 100 mg/kg.**

### Concentration Calculation for Cyanide

$$\text{Concentration} = \frac{\text{HQ} \times \text{Acute Dose Limit} \times \text{BW}}{\text{IR} \times \text{RAF} \times \text{Conversion Factor}}$$

Parameter	Value	Units
HQ (Hazard Quotient)	1	(unitless)
Acute Dose Limit	0.01	mg avail. CN/ kg BW
BW (Body Weight) <sub>1-2</sub>	10.7	kg
IR <sub>(1-time reasonable max)</sub>	1000	mg
Conversion Factor	1.0E-06	kg soil / mg soil
RAF	1	(unitless)

The toxicological basis for estimating an allowable one-time dose is documented in MassDEP's 1992 *Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration*, which is published at: <http://www.mass.gov/eea/docs/dep/toxics/stypes/dscyanide.pdf>

**ATTACHMENT C - SHORT FORM - EMPLOYEE**

### Method 3 Risk Assessment for Employee Exposed to Chemicals in Soil - Shortform 2012 (sf12em)

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<b>C Eq</b>	Table EM-2: Equations to calculate cancer risks
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<b>Chem</b>	Table EM-7: Chemical-specific data
<b>Cyanide</b>	Table EM-8: Cyanide Calculations

#### Spreadsheets designed by Andrew Friedmann, MassDEP

Modified for employee receptor.



**Employee - Soil: Table EM-1A - All Soil  
Exposure Point Concentration (EPC)  
Based on Employee**

ShortForm Version 10-12

Vlookup Version v1012

ELCR (all chemicals) = 1E-07  
Chronic HI (all chemicals) = 7E-02

Do not insert or delete any rows

Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material	EPC (mg/kg)	ELCR <sub>ingestion</sub>	ELCR <sub>dermal</sub>	Derm & Ing ELCR <sub>total</sub>	Chronic		Derm & Ing
					HQ <sub>ing</sub>	HQ <sub>derm</sub>	HQ <sub>total</sub>
ALIPHATICS C5 to C8	4.7E+02				3.2E-03	1.3E-03	4.5E-03
AROMATICS C9 to C10	2.5E+02				2.2E-03	9.2E-04	3.1E-03
ALIPHATICS C9 to C12	1.8E+02				4.8E-04	2.0E-04	6.7E-04
BENZENE	1.6E-01	6.1E-12	5.7E-11	6.3E-11	1.1E-05	6.8E-07	1.1E-05
ETHYLBENZENE	4.4E+00				2.4E-05	1.5E-06	2.5E-05
NAPHTHALENE	1.0E+00				4.1E-06	2.9E-06	7.0E-06
XYLENES (Mixed Isomers)	1.5E+00				2.1E-06	1.3E-07	2.2E-06
ALIPHATICS C9 to C18	7.5E+02				2.0E-03	8.5E-04	2.9E-03
ALIPHATICS C19 to C36	1.6E+03				2.1E-04	8.8E-05	3.0E-04
AROMATICS C11 to C22	2.8E+03				7.6E-03	5.3E-03	1.3E-02
ACENAPHTHENE	5.6E-01				7.5E-07	5.2E-07	1.3E-06
ACENAPHTHYLENE	1.7E-01				4.6E-07	3.2E-07	7.8E-07
ANTHRACENE	1.2E+00				3.1E-07	2.2E-07	5.3E-07
BENZO(a)ANTHRACENE	2.7E+00		8.4E-09	8.4E-09	7.2E-06	9.9E-07	8.2E-06
BENZO(a)PYRENE	2.3E+00	3.2E-10	7.3E-08	7.4E-08	6.3E-06	8.7E-07	7.1E-06
BENZO(b)FLUORANTHENE	3.0E+00		9.4E-09	9.4E-09	8.0E-06	1.1E-06	9.1E-06
BENZO(g,h,i)PERYLENE	1.3E+00				3.6E-06	2.5E-06	6.1E-06
BENZO(k)FLUORANTHENE	1.2E+00		3.8E-10	3.8E-10	3.2E-06	4.5E-07	3.7E-06
CHRYSENE	2.5E+00		8.1E-10	8.1E-10	6.9E-06	9.6E-07	7.8E-06
DIBENZO(a,h)ANTHRACENE	4.3E-01		1.4E-08	1.4E-08	1.2E-06	1.6E-07	1.3E-06
FLUORANTHENE	6.0E+00				1.2E-05	8.5E-06	2.1E-05
FLUORENE	5.9E-01				1.2E-06	8.3E-07	2.0E-06
INDENO(1,2,3-cd)PYRENE	1.3E+00		4.3E-09	4.3E-09	3.6E-06	5.1E-07	4.1E-06
METHYLNAPHTHALENE, 2-	2.6E-01				5.2E-06	3.6E-06	8.8E-06
PHENANTHRENE	5.3E+00				1.4E-05	9.9E-06	2.4E-05
PYRENE	5.8E+00				1.6E-05	1.1E-05	2.7E-05
BARIIUM	1.1E+02				1.5E-04	3.1E-05	1.8E-04
CADMIUM	1.0E+00				5.6E-04	1.2E-05	5.8E-04
LEAD	2.1E+02				3.9E-02	9.7E-04	4.0E-02

**Employee - Soil: Table EM-1B - Surface Soil**  
**Exposure Point Concentration (EPC)**  
 Based on Employee

ShortForm Version 10-12

Vlookup Version v1012

ELCR (all chemicals) = 1E-06  
 Chronic HI (all chemicals) = 9E-02

Do not insert or delete any rows

Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material	EPC (mg/kg)	ELCR <sub>ingestion</sub>	ELCR <sub>dermal</sub>	Derm & Ing ELCR <sub>total</sub>	Chronic		Derm & Ing
					HQ <sub>ing</sub>	HQ <sub>derm</sub>	HQ <sub>total</sub>
AROMATICS C9 to C10	9.1E+01				8.2E-04	3.4E-04	1.2E-03
ALIPHATICS C9 to C12	9.6E+01				2.6E-04	1.1E-04	3.7E-04
ALIPHATICS C9 to C18	1.5E+03				4.1E-03	1.7E-03	5.7E-03
ALIPHATICS C19 to C36	3.1E+03				4.2E-04	1.7E-04	5.9E-04
AROMATICS C11 to C22	5.6E+03				1.5E-02	1.1E-02	2.6E-02
ACENAPHTHENE	7.5E-01				1.0E-06	7.1E-07	1.7E-06
ACENAPHTHYLENE	2.0E-01				5.3E-07	3.7E-07	9.0E-07
ANTHRACENE	1.6E+00				4.3E-07	3.0E-07	7.2E-07
BENZO(a)ANTHRACENE	3.4E+00	9.5E-08	1.1E-08	1.1E-07	9.2E-06	1.3E-06	1.0E-05
BENZO(a)PYRENE	2.9E+00	3.6E-07	9.3E-08	4.6E-07	8.0E-06	1.1E-06	9.1E-06
BENZO(b)FLUORANTHENE	3.7E+00	1.2E-07	1.2E-08	1.3E-07	1.0E-05	1.4E-06	1.1E-05
BENZO(g,h,i)PERYLENE	1.7E+00				4.6E-06	3.2E-06	7.8E-06
BENZO(k)FLUORANTHENE	1.5E+00	2.4E-07	4.7E-10	2.4E-07	4.0E-06	5.6E-07	4.6E-06
CHRYSENE	3.2E+00		1.0E-09	1.0E-09	8.8E-06	1.2E-06	1.0E-05
DIBENZO(a,h)ANTHRACENE	5.5E-01	7.5E-11	1.7E-08	1.7E-08	1.5E-06	2.1E-07	1.7E-06
FLUORANTHENE	7.9E+00				1.6E-05	1.1E-05	2.7E-05
FLUORENE	8.1E-01				1.6E-06	1.1E-06	2.8E-06
INDENO(1,2,3-cd)PYRENE	1.7E+00		5.3E-09	5.3E-09	4.5E-06	6.3E-07	5.2E-06
METHYLNAPHTHALENE, 2-	3.2E-01				6.5E-06	4.5E-06	1.1E-05
NAPHTHALENE	4.4E-01				1.8E-06	1.2E-06	3.0E-06
PHENANTHRENE	7.3E+00				2.0E-05	1.4E-05	3.3E-05
PYRENE	7.6E+00				2.1E-05	1.4E-05	3.5E-05
BARIUM	1.4E+02				1.9E-04	3.9E-05	2.3E-04
CADMIUM	1.4E+00				7.6E-04	1.6E-05	7.7E-04
LEAD	2.8E+02				5.0E-02	1.2E-03	5.1E-02
MERCURY	1.3E+00				5.9E-04	2.5E-04	8.4E-04

**Employee - Soil: Table EM-1A - Former Gasoline UST Area**  
**Exposure Point Concentration (EPC)**  
 Based on Employee

ShortForm Version 10-12

Vlookup Version v1012

ELCR (all chemicals) = 6E-10  
 Chronic HI (all chemicals) = 7E-02

**Do not insert or delete any rows**

Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material	EPC (mg/kg)	ELCR <sub>ingestion</sub>	ELCR <sub>dermal</sub>	Derm & Ing ELCR <sub>total</sub>	Chronic		Derm & Ing
					HQ <sub>ing</sub>	HQ <sub>derm</sub>	HQ <sub>total</sub>
AROMATICS C9 to C10	1.4E+03				1.3E-02	5.2E-03	1.8E-02
AROMATICS C9 to C10	6.9E+02				6.2E-03	2.6E-03	8.7E-03
ALIPHATICS C9 to C12	4.7E+02				1.3E-03	5.3E-04	1.8E-03
BENZENE	1.4E+00	5.3E-11	5.0E-10	5.5E-10	9.5E-05	5.9E-06	1.0E-04
ETHYLBENZENE	2.4E+01				1.3E-04	8.1E-06	1.4E-04
NAPHTHALENE	9.9E+00				4.0E-05	2.8E-05	6.8E-05
XYLENES (Mixed Isomers)	8.2E+00				1.1E-05	6.9E-07	1.2E-05
LEAD	2.2E+02				3.9E-02	9.8E-04	4.0E-02

**Employee - Soil: Table EM-2**  
**Equations to Calculate Cancer Risk for Employee**

**Cancer Risk from Ingestion**

$$ELCR_{ing} = LADD_{ing} * CSF$$

$$LADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{c-ing} * EF_{ing} * ED * EP * C}{BW * AP_{lifetime}}$$

**Cancer Risk from Dermal Absorption**

$$ELCR_{derm} = LADD_{derm} * CSF$$

$$LADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{c-derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP_{lifetime}}$$

Vlookup Version v1012

Parameter	Value	Units
CSF	OHM specific	(mg/kg-day) <sup>-1</sup>
LADD	OHM specific	mg/kg-day
[OHM] <sub>soil</sub>	OHM specific	mg/kg
IR	50	mg/day
RAF <sub>c-ing</sub>	OHM specific	dimensionless
RAF <sub>c-derm</sub>	OHM specific	dimensionless
EF <sub>ing,derm</sub>	0.33	event/day
ED	1	day/event
EP	27	years
C	0.000001	kg/mg
BW	61.1	kg
AP <sub>(lifetime)</sub>	70	years
SA	3473	cm <sup>2</sup> / day
SAF	0.03	mg/cm <sup>2</sup>

**Employee - Soil: Table EM-3**  
**Equations to Calculate Chronic Noncancer Risk for Employee**

Vlookup Version v1012

**Chronic Noncancer Risk from Ingestion**

$$HQ_{ing} = \frac{ADD_{ing}}{RfD}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc-ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

**Chronic Noncancer Risk from Dermal Absorption**

$$HQ_{derm} = \frac{ADD_{ing,derm}}{RfD}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc-derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
[OHM] <sub>soil</sub>	OHM specific	mg/kg
IR	50	mg/day
RAF <sub>nc-ing</sub>	OHM specific	dimensionless
RAF <sub>nc-derm</sub>	OHM specific	dimensionless
EF <sub>ing,derm</sub>	0.33	event/day
ED	1	day/event
EP	27	years
C	0.000001	kg/mg
BW	61.1	kg
AP	27	year
SA	3473	cm <sup>2</sup> / day
SAF	0.03	mg/cm <sup>2</sup>

**Employee - Soil: Table EM-4  
Definitions and Exposure Factors**

Vlookup Version v1012

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	(mg/kg-day) <sup>-1</sup>	see Table EM-5
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
LADE - Lifetime Average Daily Exposure	chemical specific	µg/m <sup>3</sup>	
HQ - Hazard Quotient	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
RfD - Reference Dose	chemical specific	mg/kg-day	see Table EM-5
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
ADE - Average Daily Exposure	chemical specific	mg/m <sup>3</sup>	
EPC - Exposure Point Concentration	chemical specific	mg/kg	
IR - Soil Ingestion Rate	50	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate.
RAF <sub>c</sub> - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	( <a href="http://www.mass.gov/dep/ors/orspubs.htm">http://www.mass.gov/dep/ors/orspubs.htm</a> )
EF <sub>chronic</sub> - Exposure Frequency for chronic ingestion or dermal exposure	0.33	event/day	4 days/week, 30 weeks/year
EF <sub>cancer</sub> - Exposure Frequency for cancer, ingestion or dermal exposure	0.33	event/day	4 days/week, 30 weeks/year
ED - Exposure Duration	1	day/event	
EP - Exposure Period	27	years	
BW - Body Weight	61.1	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7
AP <sub>chronic</sub> - Averaging Period for chronic noncancer	27	years	
AP <sub>cancer</sub> - Averaging Period for lifetime	70	years	
SA - Surface Area	3473	cm <sup>2</sup> / day	50th percentile of face, forearms, hands, lower legs and feet for females.
SAF - Surface Adherence Factor	0.03	mg/cm <sup>2</sup>	MADEP 1995 Guidance for Disposal Site Risk Characterization, Table B-2. SAF developed for ShortForm according to procedure outlined in MA DEP Technical Update:

**Employee - Soil: Table EM-5  
Chemical-Specific Data**

Vlookup Version v1012

Oil or Hazardous Material	CSF (mg/kg-day) <sup>-1</sup>	RAF <sub>c-ing</sub>	RAF <sub>c-derm</sub>	RAF <sub>c-prod</sub>	Chronic RfD mg/kg-day	Subchronic RfD mg/kg-day	Chronic RAF <sub>nc-ing</sub>	Chronic RAF <sub>nc-derm</sub>	Subchronic RAF <sub>nc-ing</sub>	Subchronic RAF <sub>nc-derm</sub>	RAF <sub>nc-prod</sub>	PUF
ALIPHATICS C5 to C8					4.0E-02	4.0E-01	1	0.2	1	0.2		
AROMATIC C9 to C10					3.0E-02	3.0E-01	1	0.2	1	0.2		
ALIPHATICS C9 to C12					1.0E-01	1.0E+00	1	0.2	1	0.2		
BENZENE	5.5E-02	1.00	0.03		4.0E-03	1.0E-02	1	0.03	1	0.03		
ETHYLBENZENE					5.0E-02	5.0E-02	1	0.03	1	0.03		
NAPHTHALENE					2.0E-02	2.0E-01	0.3	0.1	0.3	0.1		
XYLENES (Mixed Isomers)					2.0E-01	4.0E-01	1	0.03	1	0.03		
ALIPHATICS C9 to C18					1.0E-01	1.0E+00	1	0.2	1	0.2		
ALIPHATICS C19 to C36					2.0E+00	6.0E+00	1	0.2	1	0.2		
AROMATIC C11 to C22					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
ACENAPHTHENE					6.0E-02	2.0E-01	0.3	0.1	0.3	0.1		
ACENAPHTHYLENE					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
ANTHRACENE					3.0E-01	1.0E+00	0.3	0.1	0.3	0.1		
BENZO(a)ANTHRACENE	7.3E-01	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
BENZO(a)PYRENE	7.3E+00	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
BENZO(b)FLUORANTHENE	7.3E-01	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
BENZO(g,h,i)PERYLENE					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
BENZO(k)FLUORANTHENE	7.3E-02	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
CHRYSENE	7.3E-02	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
DIBENZO(a,h)ANTHRACENE	7.3E+00	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
FLUORANTHENE					4.0E-02	4.0E-01	0.3	0.1	0.3	0.1		
FLUORENE					4.0E-02	4.0E-01	0.3	0.1	0.3	0.1		
INDENO(1,2,3-cd)PYRENE	7.3E-01	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
METHYLNAPHTHALENE, 2-PHENANTHRENE					4.0E-03	4.0E-03	0.3	0.1	0.3	0.1		
PYRENE					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
BARIUM					2.0E-01	7.0E-02	1	0.1	1	0.1		
CADMIUM					5.0E-04	5.0E-04	1	0.01	1	0.01	1	1.9

**ATTACHMENT D – SHORT FORM CONSTRUCTION WORKER**

## Method 3 Risk Assessment for Chemicals in Soil - Construction Worker Shortform 2012 (sf12cw)

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**Construction Worker - Soil: Table CW-1 All Soil  
Exposure Point Concentration (EPC) and Risk  
Based on Construction Worker 18-25 years of age**

ShortForm Version 10-12

Vlookup Version v0315

ELCR (all chemicals) = 1.2E-07

HI (all chemicals) = 2.5E-01

**\*\*Do not insert or delete any rows\*\***

Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	ELCR <sub>total</sub>	Subchronic				HQ <sub>total</sub>
							HQ <sub>ing</sub>	HQ <sub>derm</sub>	HQ <sub>inh-GI</sub>	HQ <sub>inh</sub>	
ALIPHATICS C5 to C8	4.7E+02						1.5E-03	2.9E-03	3.8E-05	8.8E-05	4.5E-03
AROMATIC C9 to C10	2.5E+02						1.0E-03	2.0E-03	2.6E-05	1.8E-05	3.1E-03
ALIPHATICS C9 to C12	1.8E+02						2.2E-04	4.4E-04	5.6E-06	1.1E-05	6.7E-04
BENZENE	1.6E-01	7.7E-11	2.3E-11	2.0E-12	3.3E-13	1.0E-10	2.0E-05	6.0E-06	5.1E-07	6.0E-07	2.7E-05
ETHYLBENZENE	4.4E+00						1.1E-04	3.3E-05	2.8E-06	1.8E-08	1.4E-04
NAPHTHALENE	1.0E+00						1.9E-06	6.3E-06	4.9E-08	1.3E-05	2.1E-05
XYLENES (Mixed Isomers)	1.5E+00						4.8E-06	1.4E-06	1.2E-07	1.4E-07	6.5E-06
ALIPHATICS C9 to C18	7.5E+02						9.3E-04	1.9E-03	2.4E-05	4.7E-05	2.9E-03
ALIPHATICS C19 to C36	1.6E+03						3.2E-04	6.5E-04	8.3E-06		9.7E-04
AROMATIC C11 to C22	2.8E+03						3.5E-03	1.2E-02	9.0E-05	2.1E-04	1.5E-02
ACENAPHTHENE	5.6E-01						1.0E-06	3.4E-06	2.7E-08	4.1E-08	4.5E-06
ACENAPHTHYLENE	1.7E-01						2.1E-07	7.0E-07	5.4E-09	1.3E-08	9.3E-07
ANTHRACENE	1.2E+00						4.3E-07	1.4E-06	1.1E-08	8.7E-08	2.0E-06
BENZO(a)ANTHRACENE	2.7E+00	5.1E-09	3.4E-09	1.3E-10	1.5E-10	8.8E-09	3.3E-06	2.2E-06	8.5E-08	2.0E-07	5.7E-06
BENZO(a)PYRENE	2.3E+00	4.4E-08	3.0E-08	1.2E-09	1.3E-09	7.7E-08	2.9E-06	1.9E-06	7.4E-08	1.7E-07	5.0E-06
BENZO(b)FLUORANTHENE	3.0E+00	5.7E-09	3.8E-09	1.5E-10	1.6E-10	9.8E-09	3.7E-06	2.5E-06	9.5E-08	2.2E-07	6.4E-06
BENZO(g,h,i)PERYLENE	1.3E+00						1.7E-06	5.6E-06	4.3E-08	1.0E-07	7.4E-06
BENZO(k)FLUORANTHENE	1.2E+00	2.3E-10	1.5E-10	5.9E-12	6.6E-12	4.0E-10	1.5E-06	9.9E-07	3.8E-08	8.9E-08	2.6E-06
CHRYSENE	2.5E+00	4.9E-10	3.3E-10	1.3E-11	1.4E-11	8.5E-10	3.1E-06	2.1E-06	8.1E-08	1.9E-07	5.5E-06
DIBENZO(a,h)ANTHRACENE	4.3E-01	8.3E-09	5.6E-09	2.2E-10	2.4E-10	1.4E-08	5.3E-07	3.6E-07	1.4E-08	3.2E-08	9.4E-07
FLUORANTHENE	6.0E+00						2.2E-05	7.5E-05	5.8E-07	4.5E-07	9.8E-05
FLUORENE	5.9E-01						5.4E-07	1.8E-06	1.4E-08	4.4E-08	2.4E-06
INDENO(1,2,3-cd)PYRENE	1.3E+00	2.6E-09	1.7E-09	6.7E-11	7.4E-11	4.5E-09	1.7E-06	1.1E-06	4.3E-08	1.0E-07	2.9E-06
METHYLNAPHTHALENE, 2-	2.6E-01						2.4E-05	7.9E-05	6.1E-07	1.9E-08	1.0E-04
PHENANTHRENE	5.3E+00						6.5E-06	2.2E-05	1.7E-07	3.9E-07	2.9E-05
PYRENE	5.8E+00						7.2E-06	2.4E-05	1.9E-07	4.4E-07	3.2E-05
BARIUM	1.1E+02						1.9E-03	2.0E-03	5.1E-05	8.3E-04	4.8E-03
CADMIUM	1.0E+00				5.0E-10	5.0E-10	1.3E-03	2.6E-04	3.3E-05	1.9E-03	3.5E-03
LEAD	2.1E+02						1.8E-01	2.1E-02	4.6E-03	8.0E-03	2.1E-01
MERCURY	8.6E-01						1.8E-03	3.6E-03	4.6E-05	1.1E-04	5.5E-03

**Construction Worker - Soil: Table CW-1 - Former Gasoline UST Area**  
**Exposure Point Concentration (EPC) and Risk**  
**Based on Construction Worker 18-25 years of age**

ShortForm Version 10-12  
 Vlookup Version v0315

ELCR (all chemicals) = 9.0E-10  
 HI (all chemicals) = 2.4E-01

**\*\*Do not insert or delete any rows\*\***  
 Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	ELCR <sub>total</sub>	Subchronic				HQ <sub>total</sub>
							HQ <sub>ing</sub>	HQ <sub>derm</sub>	HQ <sub>inh-GI</sub>	HQ <sub>inh</sub>	
AROMATICS C9 to C10	1.4E+03						5.7E-03	1.2E-02	1.5E-04	1.0E-04	1.8E-02
AROMATICS C9 to C10	6.9E+02						2.8E-03	5.7E-03	7.3E-05	5.1E-05	8.6E-03
ALIPHATICS C9 to C12	4.7E+02						5.8E-04	1.2E-03	1.5E-05	2.9E-05	1.8E-03
BENZENE	1.4E+00	6.8E-10	2.0E-10	1.8E-11	2.9E-12	9.0E-10	1.7E-04	5.2E-05	4.5E-06	5.2E-06	2.3E-04
ETHYLBENZENE	2.4E+01						5.9E-04	1.8E-04	1.5E-05	9.9E-08	7.9E-04
NAPHTHALENE	9.9E+00						1.8E-05	6.1E-05	4.7E-07	1.2E-04	2.0E-04
XYLENES (Mixed Isomers)	8.2E+00						2.5E-05	7.6E-06	6.5E-07	7.6E-07	3.4E-05
LEAD	2.2E+02						1.8E-01	2.2E-02	4.6E-03	8.1E-03	2.1E-01

## Construction Worker - Soil: Table CW-2

### Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0315

#### Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing} * CSF_{oral}$$

$$LADD_{ing} = \frac{EPC * IR * RAF_{c-ing} * EF * ED_{ing} * EP * C1}{BW * AP_{lifetime}}$$

#### Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF_{oral}$$

$$LADD_{derm} = \frac{EPC * SA * AF * RAF_{c-derm} * EF * ED_{derm} * EP * C1}{BW * AP_{lifetime}}$$

#### Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$ELCR_{inh-GI} = LADD_{inh-GI} * CSF_{oral}$$

$$LADD_{inh-GI} = \frac{EPC * RCAF_{inh-gi} * PM_{10} * VR_{work} * RAF_{c-ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

#### Cancer Risk from Particulate Inhalation - Pulmonary Absorption

$$ELCR_{inh} = LADD_{inh} * CSF_{inhalation}$$

$$LADD = \frac{EPC * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{c-inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Parameter	Value	Units
CSF	OHM-specific	(mg/kg-day) <sup>-1</sup>
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
RAF <sub>c-ing</sub>	OHM-specific	dimensionless
RAF <sub>c-derm</sub>	OHM-specific	dimensionless
RAF <sub>c-inh</sub>	OHM-specific	dimensionless
EF	0.714	event/day
ED <sub>ing &amp; derm</sub>	1	day/event
ED <sub>inh</sub>	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 <sup>3</sup> /L
BW	58.0	kg
AP <sub>(lifetime)</sub>	25,550	days
VR <sub>work</sub>	60	L/min
AF	0.29	mg/cm <sup>2</sup>
SA	3473	cm <sup>2</sup> /day
RCAF <sub>inh-gi</sub>	1.5	dimensionless
RCAF <sub>inh</sub>	0.5	dimensionless
PM <sub>10</sub>	60	μg/m <sup>3</sup>

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

Vlookup Version v0315

**Noncancer Risk from Ingestion**

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{oral-subchronic}}$$

$$ADD_{ing} = \frac{EPC * IR * RAF_{nc-ing} * EF * ED_{ing} * EP * C1}{BW * AP_{noncancer}}$$

**Noncancer Risk from Dermal Absorption**

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{oral-subchronic}}$$

$$ADD_{dermal} = \frac{EPC * SA * AF * RAF_{nc-derm} * EF * ED_{dermal} * EP * C1}{BW * AP_{noncancer}}$$

**Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption**

$$HQ_{inh-GI} = \frac{ADD_{inh-GI}}{RfD_{oral-subchronic}}$$

$$ADD_{inh-GI} = \frac{EPC * RCAF_{inh-gi} * PM_{10} * VR_{work} * RAF_{nc-ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

**Noncancer Risk from Particulate Inhalation - Pulmonary Absorption**

$$HQ_{inh} = \frac{ADD}{RfD_{inhalation-subchronic}}$$

$$ADD_{inh} = \frac{EPC_{soil} * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{nc-inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

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 <sub>nc-ing</sub>	OHM-specific	dimensionless
RAF <sub>nc-derm</sub>	OHM-specific	dimensionless
RAF <sub>nc-inh</sub>	OHM-specific	dimensionless
EF	0.714	event/day
ED <sub>ing &amp; derm</sub>	1	day/event
ED <sub>inh</sub>	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 <sup>3</sup> /L
BW	58.0	kg
AP <sub>noncancer</sub>	182	days
VR <sub>work</sub>	60	L/min
AF	0.29	mg/cm <sup>2</sup>
SA	3473	cm <sup>2</sup> /day
RCAF <sub>inh-gi</sub>	1.5	dimensionless
RCAF <sub>inh</sub>	0.5	dimensionless
PM10	60	μg/m <sup>3</sup>

## Construction Worker - Soil: Table CW-4 Definitions and Exposure Factors

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	(mg/kg-day) <sup>-1</sup>	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	mg/kg	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. ( <a href="http://www.mass.gov/dep/ors/orspubs.htm">http://www.mass.gov/dep/ors/orspubs.htm</a> ).
RAF <sub>c</sub> - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF <sub>nc</sub> - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
ED <sub>ing,derm</sub> - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED <sub>inh</sub> - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
AP <sub>(lifetime)</sub> - Averaging Period for lifetime	25,550	days	Represents 70 years
AP <sub>(noncancer)</sub> - Averaging Period for noncancer	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
AF - Adherence Factor	0.29	mg/cm <sup>2</sup>	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. ( <a href="http://www.mass.gov/dep/ors/orspubs.htm">http://www.mass.gov/dep/ors/orspubs.htm</a> )
VR <sub>work</sub> - 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 <sup>2</sup> /day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
IFAF <sub>inh-gi</sub> - Ingestion Fraction Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
IFAF <sub>inh</sub> - Inhalation Fraction Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM <sub>10</sub>	60	µg/m <sup>3</sup>	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

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

Vlookup Version v0315

Oil or Hazardous Material	Oral CSF (mg/kg-day) <sup>-1</sup>	RAF <sub>c-ing</sub>	RAF <sub>c-derm</sub>	RAF <sub>c-inh</sub>	Inhalation CSF (mg/kg-day) <sup>-1</sup>	Subchronic Oral RfD mg/kg-day	Subchronic RAF <sub>nc-ing</sub>	Subchronic RAF <sub>nc-derm</sub>	Subchronic RAF <sub>nc-inh</sub>	Subchronic Inhalation RfD
ALIPHATICS C5 to C8						4.0E-01	1	0.2	1	5.7E-02
AROMATIC C9 to C10						3.0E-01	1	0.2	1	1.4E-01
ALIPHATICS C9 to C12						1.0E+00	1	0.2	1	1.7E-01
BENZENE	5.5E-02	1	0.03	1	2.7E-02	1.0E-02	1	0.03	1	2.9E-03
ETHYLBENZENE						5.0E-02	1	0.03	1	2.6E+00
NAPHTHALENE						2.0E-01	0.3	0.1	1	8.6E-04
XYLENES (Mixed Isomers)						4.0E-01	1	0.03	1	1.1E-01
ALIPHATICS C9 to C18						1.0E+00	1	0.2	1	1.7E-01
ALIPHATICS C19 to C36						6.0E+00	1	0.2		
AROMATIC C11 to C22						3.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHENE						2.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHYLENE						3.0E-01	0.3	0.1	1	1.4E-01
ANTHRACENE						1.0E+00	0.3	0.1	1	1.4E-01
BENZO(a)ANTHRACENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(a)PYRENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(b)FLUORANTHENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(g,h,i)PERYLENE						3.0E-01	0.3	0.1	1	1.4E-01
BENZO(k)FLUORANTHENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
CHRYSENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
DIBENZO(a,h)ANTHRACENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
FLUORANTHENE						1.0E-01	0.3	0.1	1	1.4E-01
FLUORENE						4.0E-01	0.3	0.1	1	1.4E-01
INDENO(1,2,3-cd)PYRENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
METHYLNAPHTHALENE, 2-						4.0E-03	0.3	0.1	1	1.4E-01
PHENANTHRENE						3.0E-01	0.3	0.1	1	1.4E-01
PYRENE						3.0E-01	0.3	0.1	1	1.4E-01
BARIUM						7.0E-02	1	0.1	1	1.4E-03
CADMIUM					6.3E+00	5.0E-04	0.5	0.01	1	5.7E-06
LEAD						7.5E-04	0.5	0.006	1	2.9E-04
MERCURY						3.0E-04	0.5	0.1	1	8.6E-05

**Construction Worker - Soil: Table CW-6  
Cyanide Calculations**

The soil cyanide concentration limit set to protect a construction worker against an acute, potentially lethal one-time dose of cyanide from incidental ingestion of contaminated soil is 12,000 mg/kg<sub>soil</sub>. This is the concentration of available cyanide in soil below which acute human health effects would not be expected following a one-time exposure. This soil concentration is calculated using the equation below with a one-time soil ingestion estimate of 50 mg<sub>soil</sub> and an available cyanide dose limit of 0.01 mg/kg<sub>body weight</sub>.

MassDEP’s guidance on evaluating the risk from a one-time cyanide dose considers cyanide’s potentially lethal effects as well as information on cyanide metabolism:

Cyanides are detoxified rapidly by the body, and a large acute dose which overwhelms the detoxification mechanism is potentially more toxic than the same dose distributed over a period of hours. (MassDEP *Background Documentation for the Development of an Available Cyanide Benchmark Concentration*, originally dated October 1992, Modified August 1998)

Assessment of a potential one-time dose requires an estimate of the maximum soil concentration the trespasser could contact at any one time. The average soil concentration within a typical exposure area will underestimate the potential one-time dose. Therefore, to assess the acute risk of a one-time potentially lethal dose, the EPC for cyanide should be a conservative estimate of the maximum concentration.

The construction worker soil concentration limit to protect against adverse effects from an acute (one-time) exposure to cyanide is 12,000 mg/kg.

**Acute Concentration Calculation for Cyanide**

$$\text{Concentration} = \frac{\text{HQ} \times \text{Acute Dose Limit} \times \text{BW}}{\text{IR} \times \text{RAF} \times \text{Conversion Factor}}$$

Parameter	Value	Units
HQ (Hazard Quotient)	1	(unitless)
Acute Dose Limit	0.01	mg avail. CN/ kg BW
BW (Body Weight) <sup>11-12</sup>	58	kg
IR <sup>(1-time reasonable max)</sup>	50	mg
Conversion Factor	1.0E-06	kg soil / mg soil
RAF	1	(unitless)

The toxicological basis for estimating an allowable one-time dose is documented in MassDEP’s 1992 *Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration*, which is published at: <http://www.mass.gov/eea/docs/dep/toxics/stypes/dscyanide.pdf>