RIPDES Remediation General Permit Application
Lincoln Lace & Braid Remediation Project
55-61 Ponagansett Street
Providence, Rhode Island

Prepared for
Providence Parks Department
Dalrymple Boathouse – Roger Williams Park
Providence, Rhode Island 02905

Prepared by
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Warwick, Rhode Island 02886
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June 2010
FINAL
EA Project No.: 61891.05
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<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>cfs</td>
<td>Cubic feet per second</td>
</tr>
<tr>
<td>EA</td>
<td>EA Engineering, Science, and Technology, Inc.</td>
</tr>
<tr>
<td>I/CDEC</td>
<td>(RIDEM) Industrial/Commercial Direct Exposure Criteria</td>
</tr>
<tr>
<td>LDI</td>
<td>Limited design investigation</td>
</tr>
<tr>
<td>NOI</td>
<td>(RIPDES General Remediation Permit) Notice of Intent</td>
</tr>
<tr>
<td>PAH</td>
<td>Polycyclic aromatic hydrocarbon</td>
</tr>
<tr>
<td>RAWP</td>
<td>Remedial Action Work Plan</td>
</tr>
<tr>
<td>RDEC</td>
<td>(RIDEM) Residential Direct Exposure Criteria</td>
</tr>
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<td>RIDEM</td>
<td>Rhode Island Department of Environmental Protection</td>
</tr>
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<td>RIPDES</td>
<td>Rhode Island Pollutant Discharge Elimination System</td>
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<tr>
<td>TPH</td>
<td>Total petroleum hydrocarbon</td>
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1. INTRODUCTION

On behalf of the City of Providence, EA Engineering, Science, and Technology, Inc. (EA) has prepared this Rhode Island Pollutant Discharge Elimination System (RIPDES) Remediation General Permit: Application for the Lincoln Lace & Braid Remediation Project in Providence, Rhode Island (the Site). This Site is located to the north of Barbara Street and to the south of RI Route 6. This permit application package is being submitted in support of a remedial action proposed for the Lincoln Lace & Braid property. A Revised Remedial Action Work Plan (RAWP) has been submitted to the Rhode Island Department of Environmental Management (RIDEIM) Office of Waste Management and is currently under review, and a completed RIPDES Remediation General Permit Notice of Intent (NOI) is attached as Appendix C.

The remediation of the site represents an important step in the further development of Providence’s Woonasquatucket River Greenway and bike trail project. Completion of the Greenway project will help restore the Woonasquatucket River to its former grandeur and revitalize the neighborhoods of Olneyville, Hartford, and Manton. The project’s main goals are to increase the recreational and green space available to local residents, promote river conservation and environmental action, stimulate economic development, and increase awareness of local history and river ecology.
2. EXISTING CONDITIONS

2.1 SITE DESCRIPTION

The former Lincoln Lace & Braid complex is located at 55-61 Ponagansett Street in Providence, Rhode Island. The Site is located on approximately 6 acres of land adjacent to the Woonasquatucket River in the Hartford section of Providence, designated on the City of Providence Tax Assessor's Map as Plat 113, Lots 305 and 429. Figure 1 provides a Site Locus Map. An Existing Conditions Plan is provided on Sheet 2 of the Bid Plans, provided in Appendix A.

The lot slopes down from south to north, towards the Woonasquatucket River. Access from Ponagansett Avenue to the west is via a steep asphalt driveway (circa 1950) that begins at the east end of the street, traverses the embankment on a south-north trajectory, and then swings sharply to the east across the now-filled headrace to reach the former building locations.

The embankment has been graded into three distinct terraces, with retaining walls constructed of random and split stone and concrete masonry that step then slope down from south to north. A stepped, course, split masonry, and concrete wall lines the east wall of the taluice immediately south of the location of the former Wheel House. The remainder of the taluice has earthen embankments that suggest its original appearance as a flood channel. No traces of other mill buildings remain except for rubble piles, concrete slabs, and large split rectangular blocks scattered across the lot.

The Woonasquatucket River's north-south trajectory defines the eastern edge of the mill site and holds the remains of the 1918 dam in its channel near the north end of the lot. Concrete and rubblestone masonry dam abutments are located on both riverbanks and retain cast imprints and wood fragments of the spillway's timber cribbing. Remains of both a late 19th century and an early 20th century railroad bridge are located in the river channel approximately 240 ft downstream of the dam remains.

The former Ponagansett Avenue Landfill abuts the west end of the Site and is accessed by the same driveway as the subject site. This facility has been remediated in preparation for its potential conversion to a public park (DEM Case No. 2001-024).

2.2 HISTORICAL CONTEXT

The Lincoln Lace & Braid site was established in 1812 as Merino Mill. By 1870, there were mill villages on the Johnston and North Providence sides of the river at Olneyville, Dyerville, Manton Village, Lyman's Mill, Allendale, Centerdale, and Graniteville. Within Providence, mills included Union Cotton, Delaine, Lyman Manufacturing, and the Valley Bleachery. Local manufacturers formed a company to build reservoirs upstream to store water for use during the dry months. A reservoir was constructed west of the site (i.e. the Ponagansett Avenue Landfill). This was the first such water management system of its kind and was replicated on industrial rivers throughout the world (Beers 1870; Greenwood n.d.; RIHPHC 1976b, 1981, 1986). In 1994, the main building of the mill complex was destroyed by fire. Subsequent remediation efforts have removed the building debris, petroleum, and petroleum-contaminated soil from the Site. Only portions of the ruins of the former Merino Mill and its associated waterpower infrastructure are currently visible.
3. PREVIOUS INVESTIGATIONS

Previous investigations included soil and groundwater sampling (Cyn Environmental, October 1996). Further removal actions were conducted in November 1998. The 1996 removal action and investigation included the collection of soil and groundwater samples and the excavation and disposal of impacted soil and petroleum from an underground storage tank (UST). Soil and groundwater samples were collected from a total of 21 test pits, resulting in the subsequent (1998) removal of contaminated soil in areas identified during the 1996 investigation.

In May 1996, a RIDEM contractor collected 6 sediment samples within the sluiceway to determine if sediments were impacted. Analytical results indicate that the sediments are impacted with lead and arsenic in concentrations exceeding the RIDEM Residential Direct Exposure Criteria (RDEC) and/or Industrial/Commercial Direct Exposure Criteria (I/CDEC) for soil (no sediment standards are currently promulgated by RIDEM).

In August 2000, Fuss & O’Neill completed a limited design investigation (LDI) that concluded that anoxic conditions occur in the groundwater at the Site. The LDI stated that this condition allows iron to be released into a groundwater solution. When groundwater is exposed to oxygen (i.e., in the tailrace), the iron precipitates out of solution and deposits on the bed of the former tailrace.

3.1 CURRENT GOALS/OBJECTIVES

The primary contaminants of concern at the Site are the presence of elevated metal and polycyclic aromatic hydrocarbon (PAH) concentrations previously observed in soil and sediment samples throughout the Site above the RIDEM RDEC. Exceedances of the RDEC for arsenic, beryllium, lead, mercury, ethylbenzene, trichloroethene, tetrachloroethene, xylene, and total petroleum hydrocarbons (TPHs) were found in some soil samples.

The Revised RAWP includes details on the remedial objectives and proposed remedy for the former Lincoln Lace & Braid Site. The implementation and completion of the remedial actions proposed in the Revised RAWP will bring the Site into compliance with the RIDEM Remediation Regulations, as well as improve the aesthetic value of existing wetlands to provide valuable green space to the area.

3.2 OCTOBER 2009 INVESTIGATION

In October 2009, EA collected 8 sediment samples from the sluiceway to determine if previous remediation attempts were successful in the lower reaches of the sluiceway. Analytical results indicate that sediments on the downstream reaches of the sluiceway are not impacted with arsenic and lead at concentrations exceeding the RIDEM RDEC. Analytical results are tabulated below, in Table 1.
**TABLE 1 SEDIMENT SAMPLING ANALYTICAL RESULTS**

<table>
<thead>
<tr>
<th>Target Analyte</th>
<th>SED-01</th>
<th>SED-02</th>
<th>SED-03</th>
<th>SED-04</th>
<th>SED-05</th>
<th>SED-06</th>
<th>SED-07</th>
<th>SED-08</th>
<th>RIDEM RDEC</th>
<th>RIDEM 1/CDEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Arsenic (mg/kg)</td>
<td>&lt;1.84</td>
<td>&lt;1.69</td>
<td>2.82</td>
<td>3.09</td>
<td>&lt;1.84</td>
<td>3.55</td>
<td>3.97</td>
<td>7.71</td>
<td>7.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Total Iron (mg/kg)</td>
<td>24.900</td>
<td>4.880</td>
<td>13.200</td>
<td>10.200</td>
<td>10.400</td>
<td>11.600</td>
<td>30.300</td>
<td>105.000</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Total Lead (mg/kg)</td>
<td>21.3</td>
<td>&lt;6.8</td>
<td>72.1</td>
<td>69.4</td>
<td>24.6</td>
<td>48.8</td>
<td>1,270</td>
<td>398</td>
<td>150</td>
<td>500</td>
</tr>
<tr>
<td>TPH (mg/kg)</td>
<td>&lt;49.4</td>
<td>&lt;45.6</td>
<td>&lt;62.5</td>
<td>&lt;53.3</td>
<td>&lt;46.6</td>
<td>&lt;59.6</td>
<td>158</td>
<td>370</td>
<td>500</td>
<td>2,500</td>
</tr>
</tbody>
</table>

Notes:
1. Direct Exposure Criteria as provided in Table 1 of Section 8.02 of the RIDEM Remediation Regulations, February 2004.
2. "<" indicates analyte not detected above laboratory method reporting limits.
3. Bold value indicates an exceedance of RDEC.
4. Shaded value indicates an exceedance of I/CDEC.

Surface water samples were also collected to determine if the sluiceway is adversely impacting the Woonasquatucket River. One surface water sample was collected from the sluiceway, one sample was collected from the river upstream of the sluiceway, and one sample was collected from the river downstream of the sluiceway. Analytical results are tabulated below in Table 2.

Laboratory analytical results indicate that the sluiceway is not negatively impacting the Woonasquatucket River. The Supplemental Sampling Analytical Report, which summarizes this October 2009 investigation and provides full analytical reports, is attached as Appendix B.

**TABLE 2 SURFACE WATER SAMPLING ANALYTICAL RESULTS**

<table>
<thead>
<tr>
<th>Target Analyte</th>
<th>SW Upstream</th>
<th>SW Downstream</th>
<th>SW Sluiceway</th>
<th>RIDEM Water Quality Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°C)</td>
<td>13.93</td>
<td>13.86</td>
<td>10.78</td>
<td>None</td>
</tr>
<tr>
<td>Conductivity (µS/cm)</td>
<td>314</td>
<td>307</td>
<td>533</td>
<td>None</td>
</tr>
<tr>
<td>Dissolved Oxygen (mg/L)</td>
<td>8.04</td>
<td>8.72</td>
<td>5.54</td>
<td>5.0</td>
</tr>
<tr>
<td>pH</td>
<td>7.66</td>
<td>7.31</td>
<td>6.96</td>
<td>6.5-9.0°F</td>
</tr>
<tr>
<td>Oxidation Reduction Potential</td>
<td>64.1</td>
<td>61.9</td>
<td>6.8</td>
<td>None</td>
</tr>
<tr>
<td>Dissolved Iron (mg/L)</td>
<td>0.282</td>
<td>0.232</td>
<td>4.07</td>
<td>None</td>
</tr>
<tr>
<td>Total Iron (mg/L)</td>
<td>0.430</td>
<td>0.394</td>
<td>7.00</td>
<td>None</td>
</tr>
<tr>
<td>Dissolved Arsenic (mg/L)</td>
<td>&lt;0.0025</td>
<td>&lt;0.0025</td>
<td>&lt;0.0025</td>
<td>0.00018°F</td>
</tr>
<tr>
<td>Total Arsenic (mg/L)</td>
<td>&lt;0.0025</td>
<td>&lt;0.0025</td>
<td>&lt;0.0025</td>
<td>None</td>
</tr>
<tr>
<td>Dissolved Lead (mg/L)</td>
<td>0.0008</td>
<td>0.0010</td>
<td>&lt;0.0004</td>
<td>0.000540°F</td>
</tr>
<tr>
<td>Total Lead (mg/L)</td>
<td>&lt;0.010</td>
<td>&lt;0.010</td>
<td>&lt;0.010</td>
<td>None</td>
</tr>
</tbody>
</table>

Notes:
1. Measurements obtained in field using YSI 600XL.
2. Samples laboratory-filtered by ESS Laboratory.
3. "<" indicates analyte not detected above laboratory method reporting limit provided.
4. Bold value indicates an exceedance of regulatory criteria.
6. Criteria provided in Table 1, Page 16.
7. Criteria provided in Table 1, Page B7 (Human Health Criteria for Consumption of Water and Aquatic Organisms).
8. Criteria calculated using an assumed water hardness of 25 mg/l (conservative estimate); Table 2, page B-14 (Chronic). Increases in the assumed water hardness value increases the calculated regulatory criteria value.
4. PROPOSED ACTION

The proposed project involves the construction of an engineered barrier across the Site, construction of an engineered barrier within the sluiceway, and the installation of a series of check dams in the sluiceway. The engineered barriers are proposed to prevent direct exposure to the contaminated soils and sediments located across the site. The check dams are proposed to aerate the surface water to increase the precipitation of the metals out of the dissolved phase and to prevent downstream migration of the iron flocculent. The installation of the series of check dams will include limited grading of sediment, dewatering, and construction within regulated resource areas. Sheet 5 of Appendix A depicts proposed remediation within the sluiceway. Sheet 6 of Appendix A, Construction Management Plan, shows erosion controls and proposed locations of stockpiles, access roads, and fractionization tanks.

4.1 DESCRIPTION OF PROPOSED ACTION

4.1.1 Check Dam Construction

The proposed action involves construction of a series of check dams. The five check dams will consist of large stones (approximately 2 x 2 x 2 ft) set in the sluiceway. The stones will be surrounded with Class II riprap (D₅₀ = 18 in.) on the upstream and downstream sides. The riprap will not only provide additional stabilization for the stones but also collect the iron flocculent to prevent downstream migration. Furthermore, the water will flow along the rough surface of the riprap after flowing over the check dams, thereby further aerating the water. Check dam #4 will be unique in that a riffle will be created on the downstream face of the dam, as illustrated on Sheet 5 of Appendix A, Proposed Sluiceway. Riprap will extend to the crest of check dam #4 to prevent the waterfall effect that will be implemented on the other check dams. The construction of the riffle will deter children from curiously exploring this area of the Site.

To facilitate construction, cofferdams will be installed upstream and downstream of the location of each check dam prior to and during their construction. The area of construction for the five check dams is approximately 4,000 sf. Sandbag cofferdams will be constructed after installation of the engineered barrier in the upstream reaches of the sluiceway. Surface water will be diverted downstream and discharged into the Woonasquatucket River. Best Management Practices will be followed to avoid and minimize adverse impacts to sensitive receptors, including the placement of silt fences and hay bales around the entire construction area.

4.1.2 Handling of Contaminated Soil and Water

Grading and check dam construction will be conducted within the sluiceway as part of the remedial action at the Site. A cell will be created with two sandbag cofferdams for either the entire work area or for construction of each check dam, as determined by the contractor. The cell will then be dewatered to accommodate standard construction equipment (i.e., work “in the dry”). The water will be removed by installing a perforated pipe several feet into the base of the sluiceway (i.e., a sump). A pump will be utilized to dewater the cell as required. Additionally, water in the upstream reaches of the sluiceway will treated and discharged to the Woonasquatucket River on an as-needed basis. All water removed from the sluiceway will be
pumped into a series of fractionalization tanks prior to being pumped through a sand filter unit and silt bag. The effluent will then be discharged to an energy dissipation area along the Woonasquatucket River. The treatment system will be operated on an as-needed basis for the duration of the sluiceway grading and check dam construction components of the remediation project.

The riprap check dam is currently impounding water in the sluiceway and acting as a weir. The flow rate of water exiting the sluiceway has been conservatively estimated to be 11.5 cubic feet per second (cfs) when modeled as a broad-crested weir.

The contractor will utilize two 15,000-gal fractionalization tanks for settlement of solids within the evacuated water to treat the sluiceway water when bypass is required. Dissolved metals within the evacuated water will precipitate out into solid form as air is entrained into the system during pumping. Effluent from the tanks will be pumped through a 25 mm filter bag and then discharged to an energy dissipation area consisting of riprap along the sluiceway.

Effluent will be sampled prior to discharge to determine concentrations of total iron, arsenic, lead, total suspended solids, and polycyclic aromatic hydrocarbons. The effluent will not be analyzed for volatile organic compounds as they are “believed absent.”

EA utilized the Dilution Determination worksheet provided with the RIPDES Remediation General Permit to determine effluent maximum standards for metal concentrations. These calculations, provided as part of Appendix C, indicate that a dilution factor of 13.2 is appropriate for this water treatment activity. Therefore, EA will utilize the 10 to 20 dilution range standards (Part II.E of the RIPDES Remediation General Permit). This indicates a maximum effluent iron concentration of 8.0 mg/L, which is greater than the iron concentration observed in the surface water sample collected from the sluiceway in October 2009. Therefore, EA believes the proposed treatment system is adequate to meet the Remediation General Permit goals.
5. CERTIFICATIONS

The undersigned certify that this RAWP is a complete and accurate representation of the contaminated site and contains all known facts to the best of their knowledge.

Frank B. Postma, LSP, LEP, PG  
Senior Project Manager  
EA Engineering, Science, and Technology, Inc.

Date

Stephen C. Mason, P.E.  
Project Engineer  
EA Engineering, Science, and Technology, Inc.

Date

Lincoln Lace & Braid  
55-61 Ponagansett Street, Providence, Rhode Island  
RIPDES Remediation General Permit Application
FIGURES
APPENDIX A

Bid Plans
APPENDIX B

Supplemental Sampling
Analytical Report
30 November 2009

Mr. Timothy Fluery
RI Department of Environmental Management
Office of Waste Management
235 Promenade Street
Providence, RI 02908

RE: Supplemental Sampling Analytical Results
Lincoln Lace and Braid Sluiceway Investigation
Ponagansett Avenue; Providence, Rhode Island
EA Project No. 61891.05.0008

Dear Mr. Fluery:

EA Engineering, Science, and Technology, Inc. (EA), on behalf of the City of Providence (the City), is providing this letter report to summarize the collection of surface water, sediment, and iron floc samples to more adequately characterize the sluiceway at the former Lincoln Lace and Braid property located at 55 Ponagansett Street, Providence, RI (the “Site”). Previous site investigation reports have indicated that sediments within the sluiceway were not impacted by contaminants above the Rhode Island Department of Environmental Management (RIDEM) applicable standards. However, previously unknown investigation reports found during a recent file review at RIDEM, conducted by EA on behalf of the City and at RIDEM’s direction, document the collection and analysis of six sediment samples collected from within the sluiceway. These historical reports indicate that the sluiceway was impacted with lead, arsenic, and petroleum hydrocarbons at concentrations exceeding applicable regulatory standards. EA proposed in a document titled “Sampling and Analysis Plan and Site-Specific Quality Assurance Project Plan for Supplemental Sediment and Surface Water Sampling” (SAP/QAPP) dated August 2009 to collect additional sediment, surface water, and iron floc samples to more adequately characterize the sluiceway and determine if there is an impact to the surface water of the Woonasquatucket River.

SURFACE WATER CHARACTERIZATION AND RESULTS

The subject site is adjacent to the Woonasquatucket River, immediately southwest of Glenbridge Avenue. According to the RIDEM Water Quality Regulations, Amended May 2009, surface water quality in the Woonasquatucket River immediately south of Glenbridge Avenue is designated as Freshwater Class “B1 {a}” (RI Water Body ID R10002007R-10D). “Class B1 {a} water is designated for primary and secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for compatible industrial processes and cooling, hydropower, aquaculture use, navigation, and irrigation and other agriculture uses. These waters shall have good aesthetic value. Primary contact recreational activities must be impacted due to pathogens from approved wastewater discharges. However, all Class B criteria must be met...The {a} designation indicates a partial use designation due to impacts from combined sewer outfalls (CSOs).”

On 2 October 2009, EA collected the sediment, surface water, and iron floc samples at the Site in accordance with the above-referenced SAP/QAPP. Sampling commenced with the collection of
three surface water grab samples. The surface water was characterized using a YSI 600XL to provide pH, conductivity, dissolved oxygen, and oxidation reduction potential measurements. The results are provided in Table 1. Two surface water samples were collected from the Woonasquatucket River, one 20 ft upstream and one 20 ft downstream from the confluence of the sluiceway and the River. Additionally, one sample was collected from within the sluiceway, 20 ft upstream of the confluence of the sluiceway and the River. Analytical results indicate the presence of iron in all surface water samples collected. Note that there is no RIDEM Water Quality Criterion for iron. Iron was detected at similar concentrations in the two surface water samples collected from the Woonasquatucket River. The sample collected from the sluiceway contained much higher concentrations of iron than the two River samples.

The analytical laboratory did not detect arsenic (total and dissolved) or lead (total) above method detection limits. The laboratory was unable to meet the regulatory criteria with the analysis of these metals reportedly due to “interferences” with other metals; therefore, the detection values exceed the regulatory criteria. Dissolved lead was detected above the applicable regulatory criterion in both the up and downstream samples collected but was not detected in the sluiceway sample above regulatory criterion.

Laboratory analytical results indicate that the sluiceway is not negatively impacting the Woonasquatucket River. Surface water analytical laboratory results are summarized in Table 1 and provided in Appendix A.

<table>
<thead>
<tr>
<th>Target Analyte</th>
<th>SW Upstream</th>
<th>SW Downstream</th>
<th>SW Sluiceway</th>
<th>RIDEM Water Quality Criteria&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°C)&lt;sup&gt;1&lt;/sup&gt;</td>
<td>13.93</td>
<td>13.86</td>
<td>10.78</td>
<td>None</td>
</tr>
<tr>
<td>Conductivity (μS/cm)&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3.14</td>
<td>3.07</td>
<td>5.33</td>
<td>None</td>
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<tr>
<td>Dissolved Oxygen (mg/L)&lt;sup&gt;1&lt;/sup&gt;</td>
<td>8.04</td>
<td>8.72</td>
<td>5.54</td>
<td>5.0</td>
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<tr>
<td>pH&lt;sup&gt;1&lt;/sup&gt;</td>
<td>7.66</td>
<td>7.31</td>
<td>6.96</td>
<td>6.5-9.0&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Oxidation Reduction Potential&lt;sup&gt;1&lt;/sup&gt;</td>
<td>64.1</td>
<td>61.9</td>
<td>6.8</td>
<td>None</td>
</tr>
<tr>
<td>Dissolved Iron (mg/L)&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0.282</td>
<td>0.232</td>
<td>4.07</td>
<td>None</td>
</tr>
<tr>
<td>Total Iron (mg/L)</td>
<td>0.430</td>
<td>0.394</td>
<td>7.00</td>
<td>None</td>
</tr>
<tr>
<td>Dissolved Arsenic (mg/L)&lt;sup&gt;2&lt;/sup&gt;</td>
<td>&lt;0.0025</td>
<td>&lt;0.0025</td>
<td>&lt;0.0025</td>
<td>0.00018&lt;sup&gt;c&lt;/sup&gt;</td>
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<tr>
<td>Total Arsenic (mg/L)</td>
<td>&lt;0.0025</td>
<td>&lt;0.0025</td>
<td>&lt;0.0025</td>
<td>None</td>
</tr>
<tr>
<td>Dissolved Lead (mg/L)&lt;sup&gt;2&lt;/sup&gt;</td>
<td>0.0008</td>
<td>0.0010</td>
<td>&lt;0.0004</td>
<td>0.000540&lt;sup&gt;h&lt;/sup&gt;</td>
</tr>
<tr>
<td>Total Lead (mg/L)</td>
<td>&lt;0.010</td>
<td>&lt;0.010</td>
<td>&lt;0.010</td>
<td>None</td>
</tr>
</tbody>
</table>

Notes:
1. Measurements obtained in field using YSI 600XL.
2. Samples laboratory filtered by ESS Laboratory.
3. "<" indicates analyte not detected above laboratory method reporting limit provided.
4. Bold value indicates an exceedence of regulatory criteria.
6. Criteria provided in Table 1, Page 16.
7. Criteria provided in Table 1, Page B7 (Human Health Criteria for Consumption of Water and Aquatic Organisms).
8. Criteria calculated using an assumed water hardness of 25 mg/l (conservative estimate); Table 2, page B-14 (Chronic). Increases in the assumed water hardness value increases the calculated regulatory criteria value.
SEDIMENT CHARACTERIZATION AND RESULTS

Sediment samples were collected using a hand auger at locations along the sluiceway as depicted on Figure 1. Any visible iron floc (orange material) was removed prior to containerizing the sediment samples. The sediment encountered consisted of medium- to coarse-grain sands at the downstream end. The material encountered upstream was finer-grained. The auger samples collected furthest upstream also contained some glass and plastics. Analytical results indicate that the two sediment samples collected furthest upstream, SED-07 and SED-08, are impacted by lead and arsenic, respectively, at concentrations exceeding the RIDEM Residential Direct Exposure Criteria (RDEC) and Industrial/Commercial Direct Exposure Criteria (ICDEC). Additionally, lead was detected in the SED-08 sample above the RDEC. Iron concentrations of all sediment samples were elevated, with the highest concentration detected in sample SED-08 (105,000 mg/kg). All other samples contain concentrations of arsenic and lead below the RIDEM RDEC and ICDEC. Analytical results are summarized in Table 2 below and are provided as Appendix B.

<table>
<thead>
<tr>
<th>Target Analyte</th>
<th>SED-01</th>
<th>SED-02</th>
<th>SED-03</th>
<th>SED-04</th>
<th>SED-05</th>
<th>SED-06</th>
<th>SED-07</th>
<th>SED-08</th>
<th>RIDEM RDEC</th>
<th>RIDEM ICDEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Arsenic (mg/kg)</td>
<td>&lt;1.84</td>
<td>&lt;1.69</td>
<td>2.82</td>
<td>3.09</td>
<td>&lt;1.84</td>
<td>3.55</td>
<td>3.97</td>
<td>7.71</td>
<td>7.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Total Iron (mg/kg)</td>
<td>24.900</td>
<td>4.880</td>
<td>13.200</td>
<td>10.200</td>
<td>10.400</td>
<td>11.600</td>
<td>30.300</td>
<td>105.000</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Total Lead (mg/kg)</td>
<td>21.3</td>
<td>&lt;6.8</td>
<td>72.1</td>
<td>69.4</td>
<td>24.6</td>
<td>48.8</td>
<td>1,270</td>
<td>398</td>
<td>150</td>
<td>500</td>
</tr>
<tr>
<td>TPH (mg/kg)</td>
<td>&lt;49.4</td>
<td>&lt;45.6</td>
<td>&lt;62.5</td>
<td>&lt;53.3</td>
<td>&lt;46.8</td>
<td>&lt;59.6</td>
<td>158</td>
<td>370</td>
<td>500</td>
<td>2,500</td>
</tr>
</tbody>
</table>

Notes:
1. Direct Exposure Criteria as provided in Table 1 of Section 8.02 of the RIDEM Remediation Regulations, February 2004.
2. "<" indicates analyte not detected above laboratory method reporting limits.
3. Bold value indicates an exceedence of RDEC.
4. Shaded value indicates an exceedence of ICDEC

IRON FLOC CHARACTERIZATION AND RESULTS

Iron floc samples were collected from two discrete locations, as depicted on Figure 1. Floc-01 was collected from the upstream side of the stone check dam located near the confluence of the sluiceway and the Woonasquatucket River. Floc-02 was collected at the approximate location of SED-05, where a significant amount of iron floc was observed. The floc was entrained in the surface water within the sluiceway but was also immiscible. Total arsenic and lead were not detected above laboratory method reporting limits in either floc sample. For comparison purposes only, the total arsenic and lead detection limits were compared with the RIDEM soil RDEC. No soil RDEC was exceeded by the floc detection limits. There is no regulatory criterion for floc. Analytical results are summarized below in Table 3 and provided as Attachment B.

<table>
<thead>
<tr>
<th>Target Analyte</th>
<th>Floc-01</th>
<th>Floc-02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Arsenic (mg/kg)</td>
<td>&lt;2.40</td>
<td>&lt;2.15</td>
</tr>
<tr>
<td>Total Lead (mg/kg)</td>
<td>&lt;9.7</td>
<td>&lt;8.7</td>
</tr>
</tbody>
</table>

Notes:
1. "<" indicates analyte not detected above laboratory method reporting limits.
Results of this supplemental investigation of the sluiceway at the former Lincoln Lace and Braid property indicate sediment is the only matrix significantly impacted by arsenic and lead. This information will be utilized in determining the most appropriate remedial alternative for the sluiceway.

If you have any questions or require additional information, please contact me at (401) 736-3440, Ext. 202.

Sincerely,

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

Mark K. Speer, P.E.
Senior Engineer

Attachments
Attachment A: Surface Water Analytical Reports
Attachment B: Sediment and Iron Floc Analytical Report

Figures
Figure 1: Site Plan w/ Sampling Locations

cc: Robert McMahon, Providence Parks Department
    Alan Peterson, U.S. Environmental Protection Agency
    Frank Poota, PG, LEP, LSP, EA Engineering, Science, and Technology, Inc.
    Sam Whitin, EA Engineering, Science, and Technology, Inc.
Figure 1
Site Plan with Sampling Locations
Attachment A
Surface Water Analytical Reports
9 October 2009
CERTIFICATE OF ANALYSIS

PROJECT NARRATIVE

Ron Mack
EA Engineering, Science, and Technology
2530 Post Road
Warwick, RI 02886

RE: Lincoln Lace & Braid Site
ESS Laboratory Work Order Number: 0910039

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this Project Narrative, the entire report has been paginated. The ESS Laboratory Certifications sheet is the final report page. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

Digitally signed by Melissa Paglarini
Date: 2009.10.09 17:51:57 -04'00'

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration may be used instead of automated integration because it produces more accurate results. All ICP Metals were analyzed using the established linear dynamic range to determine acceptable analytical results.

ESS Laboratory certifies that the test results meet the requirements of NELAC and A2LA, except where noted within this project narrative.

Sample Receipt
The following sample(s) were received on October 02, 2009 for the analyses specified on the enclosed Chain of Custody Record.

<table>
<thead>
<tr>
<th>Laboratory ID</th>
<th>Matrix</th>
<th>Client SampleID</th>
</tr>
</thead>
<tbody>
<tr>
<td>0910039-01</td>
<td>Surface Water</td>
<td>SW - US</td>
</tr>
<tr>
<td>0910039-02</td>
<td>Surface Water</td>
<td>SW - DS</td>
</tr>
<tr>
<td>0910039-03</td>
<td>Surface Water</td>
<td>SW - SL</td>
</tr>
<tr>
<td>0910039-04</td>
<td>Aqueous</td>
<td>Trip Blank</td>
</tr>
</tbody>
</table>

185 Frances Avenue, Cranston, RI 02910-2211 Tel 401-461-7181 Fax 401-461-4466 http://www.ESSLaboratory.com Dependable • Quality • Service
Certiﬁcate of Analysis

Client Name: E A Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site

ESS Laboratory Work Order: 0910039

PROJECT NARRATIVE

8260B Volatile Organic Compounds
BJ90610-BS1 Blank Spike recovery is above upper control limit.
1,4-Dioxane - Screen
BJ90610-MS1 Matrix Spike recovery is below lower control limit.
Bromomethane, Naphthalene
BJ90610-MSD1 Matrix Spike recovery is below lower control limit.
Bromomethane
BSJ0035-CCV1 Continuing Calibration recovery is below lower control limit.
1,4-Dioxane - Screen

8270C Semi-Volatile Organic Compounds
BJ90727-BS1 Blank Spike recovery is below lower control limit.
Benzoic Acid
BJ90727-BSID1 Blank Spike recovery is below lower control limit.
Benzoic Acid
BJ90727-BSID1 Relative percent difference for duplicate is outside of criteria.
1,4-Dichlorobenzene, 2,4-Dinitrophenol, Aniline, Benzoic Acid, Hexachlorobutadiene, Hexachloroethane,
N-Nitrosodimethylamine

8270C(SIM) Semi-Volatile Organic Compounds
BJ90825-BSID1 Relative percent difference for duplicate is outside of criteria.
Hexachlorobenzene
BSJ0057-CCV1 Calibration required quadratic regression.
Pentachlorophenol
BSJ0057-CCV2 Calibration required quadratic regression.
Pentachlorophenol

No other observations noted.

End of Project Narrative.
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site
Client Sample ID: SW - US
Date Sampled: 10/02/09 09:00
Percent Solids: N/A

ESS Laboratory Work Order: 0910039
ESS Laboratory Sample ID: 0910039-01
Sample Matrix: Surface Water

3005A/6000/7000 Dissolved Metals

<table>
<thead>
<tr>
<th>Analyte</th>
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<th>Units</th>
<th>MRL</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
<th>Analyst</th>
<th>Analyzed</th>
<th>L/V</th>
<th>F/V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>ND</td>
<td>mg/L</td>
<td>0.0025</td>
<td>7060A</td>
<td>0.01</td>
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<td>JP</td>
<td>10/08/09</td>
<td>15:46</td>
<td>100</td>
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<tr>
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<td>6010B</td>
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<td>SVD</td>
<td>10/06/09</td>
<td>19:40</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Lead</td>
<td>ND</td>
<td>mg/L</td>
<td>0.010</td>
<td>6010B</td>
<td>0.013</td>
<td>1</td>
<td>SVD</td>
<td>10/06/09</td>
<td>19:40</td>
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</table>
**CERTIFICATE OF ANALYSIS**

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
Client Sample ID: SW - U S  
Date Sampled: 10/02/09 09:00  
Percent Solids: N/A

ESS Laboratory Work Order: 0910039  
ESS Laboratory Sample ID: 0910039-01  
Sample Matrix: Surface Water

---

### 3005A/6000/7000 Total Metals

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results</th>
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<th>MRL</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
<th>Analyst</th>
<th>Analyzed</th>
<th>L/V</th>
<th>F/V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>ND</td>
<td>mg/L</td>
<td>0.0025</td>
<td>7000A</td>
<td>0.01</td>
<td>1</td>
<td>JP</td>
<td>10/09/09</td>
<td>15.2K</td>
<td>100</td>
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<tr>
<td>Iron</td>
<td>0.430</td>
<td>mg/L</td>
<td>0.050</td>
<td>6010B</td>
<td></td>
<td>1</td>
<td>SVD</td>
<td>10/06/09</td>
<td>19.27</td>
<td>100</td>
</tr>
<tr>
<td>Lead</td>
<td>ND</td>
<td>mg/L</td>
<td>0.010</td>
<td>6010B</td>
<td>0.015</td>
<td>1</td>
<td>SVD</td>
<td>10/06/09</td>
<td>19.27</td>
<td>100</td>
</tr>
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</table>
## Certificate of Analysis

**Client Name:** EA Engineering, Science, and Technology  
**Client Project ID:** Lincoln Lace & Braid Site  
**Client Sample ID:** SW - D S  
**Date Sampled:** 10/02/09 09:15  
**Percent Solids:** N/A  
**ESS Laboratory Work Order:** 0910039  
**ESS Laboratory Sample ID:** 0910039-02  
**Sample Matrix:** Surface Water

### 3005A/6000/7000 Dissolved Metals

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<th>Results</th>
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<th>MRL</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
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<th>F/V</th>
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<td>Arsenic</td>
<td>ND</td>
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<td>0.0025</td>
<td>7006A</td>
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<td>1</td>
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<td>10/08/09</td>
<td>15.52</td>
<td>100</td>
</tr>
<tr>
<td>Iron</td>
<td>0.232</td>
<td>mg/L</td>
<td>0.050</td>
<td>6010B</td>
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<td>SVD</td>
<td>10/08/09</td>
<td>19.52</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Lead</td>
<td>ND</td>
<td>mg/L</td>
<td>0.010</td>
<td>6010B</td>
<td>0.015</td>
<td>1</td>
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<td>10/08/09</td>
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<td>100</td>
</tr>
</tbody>
</table>
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site
Client Sample ID: SW - D S
Date Sampled: 10/02/09 09:15
Percent Solids: N/A

ESS Laboratory Work Order: 0910039
ESS Laboratory Sample ID: 0910039-02
Sample Matrix: Surface Water

### 3005A/6000/7000 Total Metals

<table>
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<th>Results</th>
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<th>MRL</th>
<th>Method</th>
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<th>DF</th>
<th>Analyst</th>
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<th>F/V</th>
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<td>arsenic</td>
<td>ND</td>
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<td>0.0025</td>
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<td>0.01</td>
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<td>50</td>
<td></td>
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<tr>
<td>Iron</td>
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<td>mg/L</td>
<td>0.050</td>
<td>6010B</td>
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<td>10/06/09 19:31</td>
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<td>50</td>
</tr>
<tr>
<td>Lead</td>
<td>ND</td>
<td>mg/L</td>
<td>0.010</td>
<td>6010B</td>
<td>0.015</td>
<td>1</td>
<td>SVD</td>
<td>10/06/09 19:31</td>
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<td>50</td>
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</table>
### 3005A/6000/7000 Dissolved Metals

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results</th>
<th>Units</th>
<th>MRL</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
<th>Analyst</th>
<th>Analyzed</th>
<th>I/V</th>
<th>F/V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absence</td>
<td>ND</td>
<td>mg/L</td>
<td>0.0025</td>
<td>70360A</td>
<td>0.01</td>
<td>1</td>
<td>JP</td>
<td>10/08/09 15:58</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Iron</td>
<td>4.07</td>
<td>mg/L</td>
<td>0.050</td>
<td>60310B</td>
<td></td>
<td>1</td>
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<td>10/06/09 19:57</td>
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<td>50</td>
</tr>
<tr>
<td>Lead</td>
<td>ND</td>
<td>mg/L</td>
<td>0.010</td>
<td>60310B</td>
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<td>1</td>
<td>SVD</td>
<td>10/06/09 19:57</td>
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<td>50</td>
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</table>
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site
Client Sample ID: SW-S L
Date Sampled: 10/02/09 09:35
Percent Solids: N/A

ESS Laboratory Work Order: 0910039
ESS Laboratory Sample ID: 0910039-03
Sample Matrix: Surface Water

3005A/6000/7000 Total Metals

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<th>MRL</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
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<th>F/V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>ND</td>
<td>µg/L</td>
<td>0.0025</td>
<td>7000A</td>
<td>0.01</td>
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<td>JP</td>
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<td>50</td>
</tr>
<tr>
<td>Iron</td>
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<td>µg/L</td>
<td>0.05</td>
<td>6010B</td>
<td>1</td>
<td>SVD</td>
<td>10/06/09 19:35</td>
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<td>50</td>
<td></td>
</tr>
<tr>
<td>Lead</td>
<td>ND</td>
<td>µg/L</td>
<td>0.010</td>
<td>6010B</td>
<td>0.015</td>
<td>1</td>
<td>SVD</td>
<td>10/06/09 19:35</td>
<td>100</td>
<td>50</td>
</tr>
</tbody>
</table>
## CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
Client Sample ID: SW - S L  
Date Sampled: 10/02/09 09:35  
Percent Solids: N/A  
Initial Volume: 10  
Final Volume: 10  
Extraction Method: 5030B

### 8260B Volatile Organic Compounds

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results</th>
<th>Units</th>
<th>MRL</th>
<th>Limit</th>
<th>DF</th>
<th>Analyzed</th>
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</thead>
<tbody>
<tr>
<td>1,1,2-Tetrachloroethane</td>
<td>ND</td>
<td>mg/L</td>
<td>0.0010</td>
<td>1</td>
<td>10/06/09 13:10</td>
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<tr>
<td>1,1,1-Trichloroethane</td>
<td>ND</td>
<td>mg/L</td>
<td>0.0010</td>
<td>0.2</td>
<td>10/06/09 13:10</td>
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<tr>
<td>1,1,2,2-Tetrachloroethane</td>
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<td>mg/L</td>
<td>0.0005</td>
<td>1</td>
<td>10/06/09 13:10</td>
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</tr>
<tr>
<td>1,1,2-Trichloroethene</td>
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<td>mg/L</td>
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<td>0.005</td>
<td>1</td>
<td>10/06/09 13:10</td>
</tr>
<tr>
<td>1,1-Dichloroethane</td>
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<tr>
<td>1,1-Dichloroethylene</td>
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<td>mg/L</td>
<td>0.0010</td>
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<tr>
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<tr>
<td>1,2,3-Trichlorobenzene</td>
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<td>mg/L</td>
<td>0.0010</td>
<td>1</td>
<td>10/06/09 13:10</td>
<td></td>
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<tr>
<td>1,2,3-Trichloropropane</td>
<td>ND</td>
<td>mg/L</td>
<td>0.0010</td>
<td>1</td>
<td>10/06/09 13:10</td>
<td></td>
</tr>
<tr>
<td>1,2,4-Trichlorobenzene</td>
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<td>mg/L</td>
<td>0.0010</td>
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<tr>
<td>1,2,4-Trichlorobenzene</td>
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<td>mg/L</td>
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# ESS Laboratory

**CERTIFICATE OF ANALYSIS**

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
Client Sample ID: SW - S L  
Date Sampled: 10/02/09 09:35  
Percent Solids: N/A  
Initial Volume: 10  
Final Volume: 10  
Extraction Method: 5030B

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## ESS Laboratory

**Division of Thielco Engineering, Inc.**

### CERTIFICATE OF ANALYSIS

**Client Name:** EA Engineering, Science, and Technology  
**Client Project ID:** Lincoln Lace & Braid Site  
**Client Sample ID:** SW - S-L  
**Date Sampled:** 10/02/09 09:35  
**Percent Solids:** N/A  
**Initial Volume:** 10  
**Final Volume:** 10  
**Extraction Method:** 5030B  

**ESS Laboratory Work Order:** 0910039  
**ESS Laboratory Sample ID:** 0910039-03  
**Sample Matrix:** Surface Water  
**Analyst:** MD

### 8260B Volatile Organic Compounds

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**Surrogate:**
- 1,1-Dichloroethylene (12 %)
- 1,2-Dichloroethane (12 %)
- 1,4-Dichlorobenzene (12 %)
- 1,2-Dichlorobenzene (12 %)
# ESS Laboratory

*Division of Thielsch Engineering, Inc.*

## Certificate of Analysis

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
Client Sample ID: SW - S L  
Date Sampled: 10/02/09 09:35  
Percent Solids: N/A  
Initial Volume: 1000  
Final Volume: 1  
Extraction Method: 3520C  

## 8270C Semi-Volatile Organic Compounds

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# CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
Client Sample ID: SW - S L  
Date Sampled: 10/02/09 09:35  
Percent Solids: N/A  
Initial Volume: 1000  
Final Volume: 1  
Extraction Method: 3520C

## 8270C Semi-Volatile Organic Compounds

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<tr>
<th>Compound</th>
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<th>% Recovery</th>
<th>Qualifier</th>
<th>Limits</th>
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ESS Laboratory Work Order: 0910039  
ESS Laboratory Sample ID: 0910039-03  
Sample Matrix: Surface Water  
Analyst: IBM  
Prepared: 10/7/09 20:00
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site
Client Sample ID: SW - S L
Date Sampled: 10/02/09 09:35
Percent Solids: N/A
Initial Volume: 1000
Final Volume: 0.25
Extraction Method: 3510C

ESS Laboratory Work Order: 0910039
ESS Laboratory Sample ID: 0910039-03
Sample Matrix: Surface Water
Analyst: IBM
Prepared: 10/8/09 15:00

8270C(SIM) Semi-Volatile Organic Compounds

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<th>Units</th>
<th>MRL</th>
<th>Limit</th>
<th>DF</th>
<th>Analyzed</th>
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% Recovery | Qualifier | Limits
---|-----------|------
58 % | 30-130
77 % | 15-110
56 % | 30-130
58 % | 30-130
69 % | 30-130
### 8260B Volatile Organic Compounds

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<tr>
<th>Analyte</th>
<th>Results</th>
<th>Units</th>
<th>MRL</th>
<th>Limit</th>
<th>DF</th>
<th>Analyzed</th>
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<tbody>
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## 8260B Volatile Organic Compounds

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**CERTIFICATE OF ANALYSIS**

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Luce & Braid Site  
Client Sample ID: Trip Blank  
Date Sampled: 10/02/09 00:00  
Percent Solids: N/A  
Initial Volume: 10  
Final Volume: 10  
Extraction Method: 5030B  

---

**ESS Laboratory Work Order: 09100039**  
**ESS Laboratory Sample ID: 09100039-04**  
**Sample Matrix: Aqueous**  
**Analyst: MD**

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### 8260B Volatile Organic Compounds

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**Surrogate 1,1-Dichloroethylene-84**  
**Surrogate 4-Fluorobenzene**  
**Surrogate Dichloromethane**  
**Surrogate Tolane-88**  

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**185 Francis Avenue, Cranston, RI 02910-2211 | Tel: 401-461-7181 | Fax: 401-461-4486 | http://www.esslaboratory.com**
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**82608 Volatile Organic Compounds**

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- **_client Name:** EA Engineering, Science, and Technology  
- **Client Project ID:** Lincoln Lace & Braid Site  
- **ESS Laboratory Work Order:** 0910039  
- **CERTIFICATE OF ANALYSIS**

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8260B Volatile Organic Compounds
# ESS Laboratory

**Division of Thielsch Engineering, Inc.**

## CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
ESS Laboratory Work Order: 0910039

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185 Frances Avenue, Cranston, RI 02920-2211  
Tel: 401-461-7181  
Fax: 401-461-4486  
http://www.ESSLaboratory.com

Dependability  
Quality  
Service
# ESS Laboratory

*Division of Thielisch Engineering, Inc.*

## CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
ESS Laboratory Work Order: 0910039

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## ESS Laboratory

**Division of Thielsch Engineering, Inc.**

### CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
ESS Laboratory Work Order: 0910039

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**Batch: 5290610 - 529398**

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# Quality Control Data

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1,1,1-Trichloroethane | 9.89 | ug/L | 10.00 | ND | 99 | 70-130 |  
1,1,2,2-Tetrachloroethane | 9.91 | ug/L | 10.00 | ND | 99 | 70-130 |  
1,1,2-Trichloroethane | 9.78 | ug/L | 10.00 | ND | 98 | 70-130 |  
1,1-Dichloroethane | 10.2 | ug/L | 10.00 | ND | 102 | 70-130 |  
1,1-Dichloroethylene | 9.90 | ug/L | 10.00 | ND | 99 | 70-130 |  
1,1-Dichloropropane | 9.52 | ug/L | 10.00 | ND | 95 | 70-130 |  
1,2,3-Trichlorobenzene | 8.12 | ug/L | 10.00 | ND | 81 | 70-130 |  
1,2,3-Trichloropropane | 9.80 | ug/L | 10.00 | ND | 99 | 70-130 |  
1,2,4-Trichlorobenzene | 7.79 | ug/L | 10.00 | ND | 76 | 70-130 |  
1,2,4-Trichloroethylene | 9.79 | ug/L | 10.00 | ND | 93 | 70-130 |  
1,2-Dibromo-3-Chloropropane | 9.50 | ug/L | 10.00 | ND | 95 | 70-130 |  
1,2-Dibromomethane | 5.13 | ug/L | 10.00 | ND | 91 | 70-130 |  
1,2-Dichlorobenzene | 9.45 | ug/L | 10.00 | ND | 94 | 70-130 |  
1,2-Dichloroethane | 9.77 | ug/L | 10.00 | ND | 98 | 70-130 |  
1,2-Dichloropropane | 9.98 | ug/L | 10.00 | ND | 100 | 70-130 |  
1,3,5-Trimethylbenzene | 9.16 | ug/L | 10.00 | ND | 92 | 70-130 |  
1,3-Dichlorobenzene | 9.56 | ug/L | 10.00 | ND | 96 | 70-130 |  
1,3-Dichloropropene | 10.1 | ug/L | 10.00 | ND | 101 | 70-130 |  
1,4-Dichlorobenzene | 5.97 | ug/L | 10.00 | 0.120 | 97 | 70-130 |  
1,4-Dioxane - Screen | 1.31 | ug/L | 200.0 | ND | 65 | 0-312 |  
1-Chloroethane | 8.21 | ug/L | 10.00 | ND | 82 | 70-130 |  
2,2-Dichloropropane | 8.86 | ug/L | 10.00 | ND | 89 | 70-130 |  
2-Butanone | 5.15 | ug/L | 50.00 | ND | 103 | 70-130 |  
2-Chloroethanol | 5.71 | ug/L | 10.00 | ND | 97 | 70-130 |  
2-Hexanone | 11.2 | ug/L | 50.00 | ND | 102 | 70-130 |  
4-Chlorobuene | 9.45 | ug/L | 10.00 | ND | 94 | 70-130 |  
4-Isopropyltoluene | 8.92 | ug/L | 10.00 | ND | 89 | 70-130 |  
4-Methyl-2-Pentanone | 4.69 | ug/L | 50.00 | ND | 94 | 70-130 |  
Aniline | 54.4 | ug/L | 50.00 | ND | 109 | 70-130 |  
Benzene | 9.97 | ug/L | 10.00 | ND | 103 | 70-130 |  
Bromobenzene | 9.50 | ug/L | 10.00 | ND | 95 | 70-130 |  
Bromochloromethane | 9.46 | ug/L | 10.00 | ND | 95 | 70-130 |  
Bromoform | 9.95 | ug/L | 10.00 | ND | 100 | 70-130 |  
Bromomethane | 8.81 | ug/L | 10.00 | ND | 88 | 70-130 |  
Carbon Disulfide | 10.0 | ug/L | 10.00 | ND | 109 | 70-130 |  
Carbon Tetrafluoride | 9.66 | ug/L | 10.00 | ND | 97 | 70-130 |  
Chloroethane | 9.70 | ug/L | 10.00 | ND | 97 | 70-130 |  
Chloroform | 11.3 | ug/L | 10.00 | ND | 113 | 70-130 |  
Chloromethane | 9.96 | ug/L | 10.00 | ND | 110 | 70-130 |  
Cis-1,2-Dichloroethene | 9.64 | ug/L | 10.00 | ND | 99 | 70-130 |  
Cis-1,3-Dichloropropene | 10.1 | ug/L | 10.00 | 0.100 | 97 | 70-130 |  
Cis-1,3-Dichloropropene | 8.93 | ug/L | 10.00 | ND | 93 | 70-130 |  
Dibromochloromethane | 9.29 | ug/L | 10.00 | ND | 94 | 70-130 |  
Dibromofluoromethane | 9.58 | ug/L | 10.00 | ND | 96 | 70-130 |  
Dichloro-difluoromethane | 8.93 | ug/L | 10.00 | ND | 98 | 70-130 |  

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**ES Laboratory**

Division of Thieloch Engineering, Inc.

**CERTIFICATE OF ANALYSIS**

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
ESS Laboratory Work Order: 0910039  

**Quality Control Data**

- **8260B Volatile Organic Compounds**

185 Frances Avenue, Cranston, RI 02910-2211  
Tel: 401-461-7181  
Fax: 401-461-4486  
http://www.ESSLaboratory.com

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**Dependability  *  Quality  *  Service**

24
# ESS Laboratory

**Division of Thielach Engineering, Inc.**

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**CERTIFICATE OF ANALYSIS**

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site

ESS Laboratory Work Order: 0910039

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## Quality Control Data

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185 Frances Avenue, Cranston, RI 02920-2211  
Tel: 401-461-2781  
Fax: 401-461-4486  
[www.ESSLaboratory.com](http://www.ESSLaboratory.com)
# ESS Laboratory

*Division of Thieloch Engineering, Inc.*

## CERTIFICATE OF ANALYSIS

**Client Name:** EA Engineering, Science, and Technology  
**Client Project ID:** Lincoln Lace & Braid Site  
**ESS Laboratory Work Order:** 0910039

## Quality Control Data

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**Batch BMW96610 - 50308**
### Quality Control Data

#### Batch 8260B Volatile Organic Compounds

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**CERTIFICATE OF ANALYSIS**

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site
ESS Laboratory Work Order: 0910039

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**LCS**

| 1,1-Dichloroethane                   | 0.073  | 0.010 | mg/L  | 0.1000 | 71          | 40-140  |
| 1,2,4-Trichlorobenzene               | 0.061  | 0.010 | mg/L  | 0.1000 | 61          | 40-140  |
| 1,2-Dichlorobenzene                  | 0.051  | 0.010 | mg/L  | 0.1000 | 54          | 40-140  |
| 1,3-Dichlorobenzene                  | 0.053  | 0.010 | mg/L  | 0.1000 | 53          | 40-140  |
| 1,4-Dichlorobenzene                  | 0.048  | 0.010 | mg/L  | 0.1000 | 48          | 40-140  |
| 2,3,4,6-Tetrachlorophenol            | 0.068  | 0.050 | mg/L  | 0.1000 | 88          | 40-140  |
## Quality Control Data

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<tr>
<th>Analyte</th>
<th>Result</th>
<th>MRL</th>
<th>Units</th>
<th>Spike Level</th>
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**Batch 8270C Semi-Volatile Organic Compounds**
# ESS Laboratory

*Division of Thielsch Engineering, Inc.*

## CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site

## Quality Control Data

<table>
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<th>Units</th>
<th>Spike Level</th>
<th>Source</th>
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<th>%REC Limits</th>
<th>RPD</th>
<th>Limit</th>
<th>Qualifier</th>
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### Batch ESS0722 - SVOCs

| Phenol                           | 0.054  | 0.010 | mg/L   | 0.1000      | 94     | 30-130 |
|----------------------------------|--------|-------|--------|-------------|--------|--------|-------------|-----|-------|-----------|
| Pyridine                         | 0.041  | 0.100 | mg/L   | 0.1000      | 44     | 40-140 |
| Summarep, 1,2-Dichlorobenzene-mk | 0.0613 |       | mg/L   | 0.1000      | 64     | 30-130 |
| Summarep, 2,4,6-Trinitrotoluene   | 0.146  |       | mg/L   | 0.1500      | 97     | 15-110 |
| Summarep, 2-Chlorophenol         | 0.0879 |       | mg/L   | 0.1500      | 59     | 15-110 |
| Summarep, 2-Fluorophenol         | 0.0743 |       | mg/L   | 0.1000      | 74     | 30-130 |
| Summarep, 2-Thiophenol           | 0.0752 |       | mg/L   | 0.1500      | 50     | 15-110 |
| Summarep, Hexabenzene-ds         | 0.0692 |       | mg/L   | 0.1000      | 69     | 30-130 |
| Summarep, Phenol-ds              | 0.0856 |       | mg/L   | 0.1500      | 57     | 15-110 |
| Summarep, p-Terphenyl-dH         | 0.0958 |       | mg/L   | 0.1000      | 96     | 30-130 |

### LCS Dups

| 1,1-Biphenyl                     | 0.080  | 0.010 | mg/L   | 0.1000      | 80     | 40-140 |
| 1,3-Dichlorobenzene              | 0.074  | 0.010 | mg/L   | 0.1000      | 74     | 40-140 |
| 1,3-Dichlorobenzene              | 0.065  | 0.010 | mg/L   | 0.1000      | 65     | 40-140 |
| 1,3-Dichlorobenzene              | 0.065  | 0.010 | mg/L   | 0.1000      | 65     | 40-140 |
| 1,4-Dichlorobenzene              | 0.050  | 0.010 | mg/L   | 0.1000      | 50     | 40-140 |
| 1,2,4,6-Tetrachlorobenzene       | 0.092  | 0.050 | mg/L   | 0.1000      | 92     | 40-140 |
| 1,2,3,5-Tetrachlorobenzene       | 0.089  | 0.010 | mg/L   | 0.1000      | 89     | 30-130 |
| 1,2,6-Trichlorophenol            | 0.084  | 0.010 | mg/L   | 0.1000      | 84     | 30-130 |
| 1,3-Dichlorophenol               | 0.082  | 0.010 | mg/L   | 0.1000      | 82     | 30-130 |
| 1,4-Dimethylbenzene              | 0.081  | 0.050 | mg/L   | 0.1000      | 81     | 30-130 |
| 1,2-Dimethylbenzene              | 0.070  | 0.050 | mg/L   | 0.1000      | 70     | 30-130 |
| 1,3-Dimethylbenzene              | 0.091  | 0.010 | mg/L   | 0.1000      | 91     | 40-140 |
| 1,3-Dimethylbenzene              | 0.086  | 0.010 | mg/L   | 0.1000      | 86     | 40-140 |
| 2-Chloroanisolethane             | 0.067  | 0.010 | mg/L   | 0.1000      | 67     | 40-140 |
| 2-Chloranthene                   | 0.067  | 0.010 | mg/L   | 0.1000      | 67     | 30-130 |
| 2-Methylphenol                   | 0.072  | 0.010 | mg/L   | 0.1000      | 72     | 30-130 |
| 2-Nitroaniline                   | 0.056  | 0.010 | mg/L   | 0.1000      | 86     | 40-140 |
| 2-Nitrophenol                    | 0.077  | 0.010 | mg/L   | 0.1000      | 77     | 30-130 |
| 3,1 -Dichloroethane              | 0.086  | 0.030 | mg/L   | 0.1000      | 86     | 40-140 |
| 3,4-Dimethylphenol               | 0.119  | 0.020 | mg/L   | 0.2000      | 59     | 30-130 |
| 3-Nitroaniline                   | 0.064  | 0.010 | mg/L   | 0.1000      | 94     | 40-140 |
| 4,6-Dinitro-2-Methylphenol       | 0.086  | 0.050 | mg/L   | 0.1000      | 86     | 30-130 |
| 4-Nitrophenol-phenyl ether       | 0.087  | 0.010 | mg/L   | 0.1000      | 87     | 40-140 |
| 4-Chloro-3-Methylphenol          | 0.082  | 0.010 | mg/L   | 0.1000      | 82     | 30-130 |
| 4-Chloroaniline                  | 0.070  | 0.020 | mg/L   | 0.1000      | 70     | 40-140 |
| 4-Chloro-phenyl-phenyl ether     | 0.081  | 0.010 | mg/L   | 0.1000      | 61     | 40-140 |
| 4-Nitroaniline                   | 0.085  | 0.010 | mg/L   | 0.1000      | 62     | 40-140 |
| 4-Nitrophenol                    | 0.082  | 0.010 | mg/L   | 0.1000      | 62     | 40-140 |
| 4-Methylphenol                   | 0.100  | 0.050 | mg/L   | 0.1000      | 100    | 30-130 |
| Acetophenone                     | 0.063  | 0.010 | mg/L   | 0.1000      | 63     | 40-140 |
| Aniline                          | 0.059  | 0.010 | mg/L   | 0.1000      | 59     | 40-140 |
| Arotenone                        | 0.068  | 0.020 | mg/L   | 0.1000      | 68     | 40-140 |
| Benzoic Acid                     | 0.023  | 0.100 | mg/L   | 0.1000      | 23     | 40-140 |
| Benzyl Alcohol                   | 0.016  | 0.010 | mg/L   | 0.1000      | 76     | 40-140 |
| Bis(2-Chloroethyl)ethene         | 0.072  | 0.010 | mg/L   | 0.1000      | 72     | 40-140 |
| Bis(2-Chloroethyl)phenyl         | 0.054  | 0.010 | mg/L   | 0.1000      | 64     | 40-140 |

185 Frances Avenue, Cranston, RI 02910-2211  
Tel: 401-461-7181  Fax: 401-461-4486  
http://www.esslaboratory.com

*Dependability *  
*Quality*  
*Service*  

30
# Quality Control Data

**8270C Semi-Volatile Organic Compounds**

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<th>Analyte</th>
<th>Result</th>
<th>MRL</th>
<th>Units</th>
<th>Spike Level</th>
<th>Source</th>
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<th>Limits</th>
<th>RPD Limit</th>
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<td>0.006</td>
<td>mg/L</td>
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**8270C(SIM) Semi-Volatile Organic Compounds**

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# Quality Control Data

## Analyte | Result | MRL | Units | Spike Level | Source Result | %AEC | %REC | Units | RPD | RPD Limit | Qualifier
---|---|---|---|---|---|---|---|---|---|---|---
**8270C(SIM) Semi-Volatile Organic Compounds**

**Bench Standard** - 25µL

| Analyte | Result | MRL | Units | Spike Level | Source Result | %AEC | %REC | Units | RPD | RPD Limit | Qualifier
---|---|---|---|---|---|---|---|---|---|---|---
Indeno(1,2,3-cd)Pyrene | ND | 0.00005 | mg/L | | | | | | | | |
Naphthalene | ND | 0.00010 | mg/L | | | | | | | | |
Pentachlorophenol | ND | 0.00100 | mg/L | | | | | | | | |
Phenanthrene | ND | 0.00010 | mg/L | | | | | | | | |
Pyrene | ND | 0.00020 | mg/L | | | | | | | | |
**Surrogate** | | | | | | | | | | | |
Surrogate, 1,2-Dichlorobenzene-d8 | 0.000607 | mg/L | 0.0006250 | 96 | 30-130 | | | | | |
Surrogate, 2,4,6-Tris(2-chlorophenol) | 0.000607 | mg/L | 0.0006250 | 76 | 15-110 | | | | | |
Surrogate, 2 Fluorobiphenyl | 0.000547 | mg/L | 0.0006250 | 87 | 30-130 | | | | | |
Surrogate, Naphthalene-d8 | 0.000572 | mg/L | 0.0006250 | 97 | 30-130 | | | | | |
Surrogate, p-Terphenyl-d14 | 0.000618 | mg/L | 0.0006250 | 99 | 30-130 | | | | | |
**LCS**

| Analyte | Result | MRL | Units | Spike Level | Source Result | %AEC | %REC | Units | RPD | RPD Limit | Qualifier
---|---|---|---|---|---|---|---|---|---|---|---
2-Methylanthracene | 0.00045 | 0.00020 | mg/L | 0.0005000 | 89 | 40-140 | | | | | |
Acenaphthene | 0.00045 | 0.00020 | mg/L | 0.0005000 | 94 | 40-140 | | | | | |
Acenaphthylene | 0.00046 | 0.00020 | mg/L | 0.0005000 | 94 | 40-140 | | | | | |
Anthracene | 0.00047 | 0.00020 | mg/L | 0.0005000 | 94 | 40-140 | | | | | |
Benzo(a)anthracene | 0.00047 | 0.00005 | mg/L | 0.0005000 | 94 | 40-140 | | | | | |
Benzo(k)pyrene | 0.00046 | 0.00005 | mg/L | 0.0005000 | 96 | 40-140 | | | | | |
Benzo(a)pyrene | 0.00045 | 0.00005 | mg/L | 0.0005000 | 90 | 40-140 | | | | | |
Benzo(a)pyrene | 0.00047 | 0.00020 | mg/L | 0.0005000 | 94 | 40-140 | | | | | |
Benzo(k)fluoranthene | 0.00050 | 0.00005 | mg/L | 0.0005000 | 100 | 40-140 | | | | | |
Chrycene | 0.00047 | 0.00005 | mg/L | 0.0005000 | 94 | 40-140 | | | | | |
Dibenzo(a,h)anthracene | 0.00047 | 0.00005 | mg/L | 0.0005000 | 94 | 40-140 | | | | | |
Fluoranthene | 0.00043 | 0.00020 | mg/L | 0.0005000 | 84 | 40-140 | | | | | |
Fluoranthene | 0.00045 | 0.00020 | mg/L | 0.0005000 | 95 | 40-140 | | | | | |
Mesoclonobenzene | 0.00039 | 0.00020 | mg/L | 0.0005000 | 78 | 40-140 | | | | | |
Indeno(1,2,3-cd)Pyrene | 0.00048 | 0.00005 | mg/L | 0.0005000 | 95 | 40-140 | | | | | |
Naphthalene | 0.00042 | 0.00020 | mg/L | 0.0005000 | 84 | 40-140 | | | | | |
Pentachlorophenol | 0.00037 | 0.00010 | mg/L | 0.0005000 | 85 | 30-130 | | | | | |
Phenanthrene | 0.00044 | 0.00020 | mg/L | 0.0005000 | 88 | 40-140 | | | | | |
Pyrene | 0.00046 | 0.00020 | mg/L | 0.0005000 | 92 | 40-140 | | | | | |
**Surrogate**, 1,2-Dichlorobenzene-d8 | 0.000622 | mg/L | 0.0006250 | 100 | 30-130 | | | | | |
# Certificate of Analysis

**Client Name:** EA Engineering, Science, and Technology  
**Client Project ID:** Lincoln Lace & Braid Site  
**ESS Laboratory Work Order:** 0910039  
**ESS Laboratory**  
**Division of Thielisch Engineering, Inc.**

## Quality Control Data

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<th>Units</th>
<th>Spike Level</th>
<th>Source Result</th>
<th>%REC Limits</th>
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**8270C(SIM) Semi-Volatile Organic Compounds**
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site

Notes and Definitions

U  Analyte included in the analysis, but not detected
Q  Calibration required quadratic regression.
M-  Matrix Spike recovery is below lower control limit.
D+  Relative percent difference for duplicate is outside of criteria.
C-  Continuing Calibration recovery is below lower control limit.
B+  Blank Spike recovery is above upper control limit.
B-  Blank Spike recovery is below lower control limit.
ND  Analyte NOT DETECTED above the detection limit
dry  Sample results reported on a dry weight basis
RPD  Relative Percent Difference
MDL  Method Detection Limit
MRL  Method Reporting Limit
I/V  Initial Volume
F/V  Final Volume
S  Subcontracted analysis; see attached report
1  Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2  Range result excludes concentrations of target analytes eluting in that range.
3  Range result excludes the concentration of the C9-C10 aromatic range.
Avg  Results reported as a mathematical average.
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site

ESS Laboratory Work Order: 0910039

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: A-179
http://www.health.ri.gov/labs/waterlabs-instate.php

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750

Maine Potable and Non Potable Water: R1002

Massachusetts Potable and Non Potable Water: M-R1002
http://public.dep.state.ma.us/labcert/labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 242405
http://www4.cgov.nh.gov/inspections/namerecsearch.aspx

New York (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comp.html

United States Department of Agriculture Soil Permit: S-54210

Maryland Potable Water: 301

South Carolina Volatile Organic Compounds in Potable Water: 78003

CHEMISTRY

A2LA Accredited: Testing Cert # 2864.01
Lead in Paint, Phthalates, Lead in Children's Metals Products (Including Jewelry)
http://www.A2LA.org/dispsearchnew/newsearch.cfm

CPSC ID# 1141
Lead Paint, Lead in Children's Metals Jewelry
http://www.cpsc.gov/cgi-bin/labapplist.aspx
**CHAIN OF CUSTODY**

**ESS Laboratory**
Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston, RI 02910-2211
Tel. (401) 461-7181  Fax (401) 461-4486
www.esslaboratory.com

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| Trip Plan |

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**Container Type:** P-Poly  G-Glass  S-Sterile  V-VOA  Matrix: S-Soil  SD-Solid  D-Sludge  WW-Waste Water  GW-Ground Water  SW-Surface Water  DW-Drinking Water  O-Oil  W-Wipes  P-Filters

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<td></td>
</tr>
</tbody>
</table>

**Preservation Code:** 1- NP, 2- HCl, 3- HSO4, 4- HNO3, 5- NaOH, 6- MeOH, 7- Acetic Acid, 8- ZnAcet, 9- 

**Sampled by:** RMA: MR

**Comments:** NO TPH ANALYSIS ON FLOC Sample or Iron Analysis

Please fax all changes to Chain of Custody in writing.
CERTIFICATE OF ANALYSIS

Ron Mack
EA Engineering, Science, and Technology
2530 Post Road
Warwick, RI 02886

RE: Lincoln Lace & Braid (61891.05)
ESS Laboratory Work Order Number: 0910276

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

ESS Laboratory certifies that the test results meet the requirements of NELAC and A2LA, except where noted within this project narrative.
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid

ESS Laboratory Work Order: 0910276

SAMPLE RECEIPT

The following samples were received on October 20, 2009 for the analyses specified on the enclosed Chain of Custody Record.

These samples were originally received on October 2, 2009 as ESS Laboratory Sample IDs 0910039-01, 0910039-02 and 0910039-03.

<table>
<thead>
<tr>
<th>Lab Number</th>
<th>SampleName</th>
<th>Matrix</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>0910276-01</td>
<td>SW-U-S</td>
<td>Surface Water</td>
<td>$</td>
</tr>
<tr>
<td>0910276-02</td>
<td>SW-D-S</td>
<td>Surface Water</td>
<td>$</td>
</tr>
<tr>
<td>0910276-03</td>
<td>SW-SL</td>
<td>Surface Water</td>
<td>$</td>
</tr>
</tbody>
</table>
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

Definitions of Quality Control Parameters
Semivolatile Organics Internal Standard Information
Semivolatile Organics Surrogate Information
Volatile Organics Internal Standard Information
Volatile Organics Surrogate Information
EPH and VPH Alkane Lists
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid
Client Sample ID: SW-U-S
Date Sampled: 10/02/09 09:00

ESS Laboratory Work Order: 0910276
ESS Laboratory Sample ID: 0910276-01
Sample Matrix: Surface Water
Units: §

200 Series/SM3113B Dissolved Metals

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results (MRL)</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
<th>Analyst</th>
<th>Analyzed</th>
<th>Batch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>See Attached</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


CERTIFICATE OF ANALYSIS

REPORTED: 10/28/2009
ORDER #: G0920829
SAMPLE DATE: 10/2/2009
DATE RECEIVED: 10/22/2009
SAMPLE ID: Grab
DESCRIPTION: WATER

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Analytical Method</th>
<th>Date Analyzed</th>
<th>Units</th>
<th>Det Limits</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Parameters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead (Dissolved)</td>
<td>EPA 200.8</td>
<td>10/27/2009</td>
<td>mg/L</td>
<td>0.0004</td>
<td>0.0008</td>
</tr>
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</table>

Due to matrix interference, reproducible arsenic results were unattainable.
## 200 Series/SM3113B Dissolved Metals

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results (MRL)</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
<th>Analyst</th>
<th>Analyzed</th>
<th>Batch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>See Attached</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**CERTIFICATE OF ANALYSIS**

REPORTED: 10/28/2009  
ORDER #: G0920929  
SAMPLE DATE: 10/2/2009  
DATE RECEIVED: 10/22/2009  
SAMPLE ID: Grab  
DESCRIPTION: WATER

### RESULTS OF ANALYSIS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Laboratory Method</th>
<th>Date Analyzed</th>
<th>Units</th>
<th>Def Limits*</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Parameters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead (Dissolved)</td>
<td>EPA 200.8</td>
<td>10/27/2009</td>
<td>mg/L</td>
<td>0.0004</td>
<td>0.0010</td>
</tr>
</tbody>
</table>

Due to matrix interference, reproducible arsenic results were unattainable.
**ESS Laboratory**  
*Division of Thielusch Engineering, Inc.*

**CERTIFICATE OF ANALYSIS**

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid  
Client Sample ID: SW-SL  
Date Sampled: 10/02/09 09:35

ESS Laboratory Work Order: 0910276  
ESS Laboratory Sample ID: 0910276-03  
Sample Matrix: Surface Water  
Unit: §

200 Series/SM3113B Dissolved Metals

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results (MRL)</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
<th>Analyst</th>
<th>Analyzed</th>
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<tbody>
<tr>
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<td>See Attached</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Certificate of Analysis

**Environmental Services**
- Site Assessment
- Data Auditing

**Analytical Balance Corporation**

**CERTIFICATE OF ANALYSIS**

**REPORTED:** 10/28/2009  
**ORDER #:** G0920929  
**SAMPLE DATE:** 10/2/2009  
**DATE RECEIVED:** 10/22/2009  
**SAMPLE ID:** Grab  
**DESCRIPTION:** WATER

**Parameter** | **Analytical Method** | **Date Analyzed** | **Units** | **Det Limit** | **Result**  
--- | --- | --- | --- | --- | ---  
Test Parameters  
Lead (Dissolved) | EPA 200.8 | 10/27/2009 | mg/L | 0.0004 | ND

Due to matrix interference, reproducible arsenic results were unattainable.

NA = Not Applicable  
ND = Not Detected  
< = Less Than  
* = Detection Limit

Approved by: [Signature]  
Lab Manager  
Date: 10/28/09
**CERTIFICATE OF ANALYSIS**

**Client Name:** EA Engineering, Science, and Technology  
**Client Project ID:** Lincoln Lace & Braid  
**ESS Laboratory Work Order:** 0910276

### Quality Control Data

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Result</th>
<th>MRL</th>
<th>Units</th>
<th>Spike Level</th>
<th>Source</th>
<th>%REC</th>
<th>Limits</th>
<th>RPD</th>
<th>Limit</th>
<th>Qualifier</th>
</tr>
</thead>
</table>

---

185 Frances Avenue, Cranston, RI 02910-2211  
Tel: 401-461-7181  
Fax: 401-461-4886  
http://www.ESSLaboratory.com  
Dependability • Quality • Service  
Page 10 of 13
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid

Notes and Definitions

Z-08  See Attached
ND  Analyte NOT DETECTED above the detection limit (LOD for DoD Reports)
dry Sample results reported on a dry weight basis
RPD  Relative Percent Difference
MDL  Method Detection Limit
MRL  Method Reporting Limit
IV  Initial Volume
NV  Final Volume

&  Subcontracted analysis; see attached report
1  Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2  Range result excludes concentrations of target analytes eluting in that range.
3  Range result excludes the concentration of the C9-C10 aromatic range.
Avg  Results reported as a mathematical average.
NR  No Recovery
LOD  Limit of Detection
[CALC]  Calculated Analyte
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid  

ESS Laboratory Work Order: 0910276

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: A-179  
http://www.health.ri.gov/labs/waterlabs-instate.php

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750  

Maine Potable and Non Potable Water: R1002  

Massachusetts Potable and Non Potable Water: M-R1002  
http://public.dep.state.ma.us/labcert/labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 242405  

New York (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 11313  
http://www.wadsworth.org/labcert/elap/comm.html

United States Department of Agriculture Soil Permit: S-54210

Maryland Potable Water: 301  

South Carolina Volatile Organic Compounds in Potable Water: 78003

CHEMISTRY

A2LA Accredited: Testing Cert # 2864.01  
Lead in Paint, Phthalates, Lead in Children's Metals Products (Including Jewelry)  
http://www.A2LA.org/digisearchnew/newsearch.cfm

CPSC ID# 1141  
Lead Paint, Lead in Children's Metals Jewelry  
http://www.cpsc.gov/cgi-bin/labapplist.aspx
## CHAIN OF CUSTODY

**E.S.S. Laboratory**

<table>
<thead>
<tr>
<th>Co. Name</th>
<th>Project #</th>
<th>Project Name (No. Chas. or loc)</th>
<th>City</th>
<th>State</th>
<th>Date</th>
<th>Phone #</th>
<th>Email Address</th>
<th>Address</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA</td>
<td>601891.05</td>
<td>Lincoln Lake # Road</td>
<td>Warwick</td>
<td>RI</td>
<td>10/2/09</td>
<td>401-734-3440</td>
<td><a href="mailto:knack@easest.com">knack@easest.com</a></td>
<td>2350 Post Road</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Date/Time</th>
<th>Compartment</th>
<th>Time</th>
<th>Sample Description</th>
<th>Type of Contaminant</th>
<th>Type of Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW-01</td>
<td>9:00</td>
<td>X</td>
<td>SW</td>
<td>SW-01</td>
<td>1</td>
<td></td>
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<tr>
<td></td>
<td>9:15</td>
<td></td>
<td>SW</td>
<td>SW-02</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4:35</td>
<td></td>
<td>SW</td>
<td>SW-03</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10:30</td>
<td></td>
<td>SED</td>
<td>SED-01</td>
<td>4</td>
<td></td>
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<tr>
<td></td>
<td>10:40</td>
<td></td>
<td>SED</td>
<td>SED-02</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4:35</td>
<td></td>
<td>SED</td>
<td>SED-03</td>
<td>6</td>
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</tr>
<tr>
<td></td>
<td>11:05</td>
<td></td>
<td>SED</td>
<td>SED-04</td>
<td>7</td>
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<td></td>
<td>11:20</td>
<td></td>
<td>SED</td>
<td>SED-05</td>
<td>8</td>
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<td></td>
<td>11:45</td>
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<td>SED</td>
<td>SED-06</td>
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<tr>
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<td>11:50</td>
<td></td>
<td>SED</td>
<td>SED-07</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

**Container Type:** P-Poly, G-Glass, S-Steril, V-VOA
**Matrix:** S-Sediment, SD-Sediment D-Dust, WW-Water, GW-Ground Water, SW-Surface Water, DW-Drinking Water, O-Oil, W-Wipes, F-Filters

**Sample Identification:** (2012: 3404 268, 01/20/10)

**Preservation Code:** 1-NP, 2-HCl, 3-HSO_4, 4-HNO_3, 5-NaOH, 6-MeOH, 7-Ascorbic Acid, 8-ZnAct, 9-

**Sampled by:** [Signature]

**Comments:** SEE LAUREL STP DRAINED W/ FLOC-01 AND FLOC-02
- CAUTION: GLASS PRESENT IN SOME SED SAMPLES

**Reaffirmed by:** [Signature]

**Date/Time:** 10/2/09 1:20 PM

**Received by:** [Signature]

**Date/Time:** 10/2/09 1:20 PM

**Reaffirmed by:** [Signature]

**Date/Time:** 10/2/09 1:20 PM

**Received by:** [Signature]

**Date/Time:** 10/2/09 1:20 PM

Please fax all changes to Chain of Custody in writing.

1 (White) Lab Copy 2 (Yellow) Client Receipt
CERTIFICATE OF ANALYSIS

PROJECT NARRATIVE

Ron Mack
EA Engineering, Science, and Technology
2530 Post Road
Warwick, RI 02886

RE: Lincoln Lace & Brald Site
ESS Laboratory Work Order Number: 0910040

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this Project Narrative, the entire report has been paginated. The ESS Laboratory Certifications sheet is the final report page. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

Digitally signed by Melissa Pagliarini
Date: 2009.10.09 16:53:34 -04'00"

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration may be used instead of automated integration because it produces more accurate results. All ICP Metals were analyzed using the established linear dynamic range to determine acceptable analytical results.

ESS Laboratory certifies that the test results meet the requirements of NELAC and A2LA, except where noted within this project narrative.

Sample Receipt
The following sample(s) were received on October 02, 2009 for the analyses specified on the enclosed Chain of Custody Record.

<table>
<thead>
<tr>
<th>Laboratory ID</th>
<th>Matrix</th>
<th>Client SampleID</th>
</tr>
</thead>
<tbody>
<tr>
<td>0910040-01</td>
<td>Soil</td>
<td>SED-01</td>
</tr>
<tr>
<td>0910040-02</td>
<td>Soil</td>
<td>SED-02</td>
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<tr>
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<td>0910040-04</td>
<td>Soil</td>
<td>SED-04</td>
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<td>0910040-05</td>
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<td>0910040-06</td>
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<td>0910040-10</td>
<td>Sludge</td>
<td>Floc-02</td>
</tr>
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</table>
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site
ESS Laboratory Work Order: 0910040

PROJECT NARRATIVE

3050B/6000/7000 Total Metals
BJ90724-DUP1 Relative percent difference for duplicate is outside of criteria.
   Lead
BJ90724-MS1 Matrix Spike recovery is above upper control limit.
   Iron
BJ90724-MS1 Matrix Spike recovery is below lower control limit.
   Lead

No other observations noted.

End of Project Narrative.
### 3050B/6000/7000 Total Metals

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results</th>
<th>Units</th>
<th>MRL</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
<th>Analyst</th>
<th>Analyzed</th>
<th>N/V</th>
<th>F/V</th>
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</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>ND</td>
<td>mg/kg dry</td>
<td>1.84</td>
<td>7060A</td>
<td>7</td>
<td>5</td>
<td>JP</td>
<td>10/08/09 13:43</td>
<td>1.75</td>
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<td>Iron</td>
<td>24900</td>
<td>mg/kg dry</td>
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<td>Lead</td>
<td>21.3</td>
<td>mg/kg dry</td>
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<td>SVD</td>
<td>10/07/09 23:05</td>
<td>1.75</td>
<td>100</td>
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</tbody>
</table>
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site
Client Sample ID: SED-01
Date Sampled: 10/02/09 10:30
Percent Solids: 77
Initial Volume: 19.7
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 0910040
ESS Laboratory Sample ID: 0910040-01
Sample Matrix: Soil
Analyst: ML
Prepared: 10/2/09 12:30

8100M Total Petroleum Hydrocarbons

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results</th>
<th>Units</th>
<th>MRL</th>
<th>Limit</th>
<th>DF</th>
<th>Analyzed</th>
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<tbody>
<tr>
<td>Total Petroleum Hydrocarbons</td>
<td>ND</td>
<td>mg/kg dry</td>
<td>49.4</td>
<td>900</td>
<td>1</td>
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<table>
<thead>
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<th>Percentage</th>
<th>Quality</th>
<th>Limit</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>73 %</td>
<td></td>
<td>40-140</td>
</tr>
</tbody>
</table>

185 Frances Avenue, Cranston, RI 02910-2211  Tel: 401-461-7181  Fax: 401-461-4486  http://www.ESSlaboratory.com
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site
Client Sample ID: SED-02
Date Sampled: 10/02/09 10:40
Percent Solids: 83

ESS Laboratory Work Order: 0910040
ESS Laboratory Sample ID: 0910040-02
Sample Matrix: Soil

### 3050B/6000/7000 Total Metals

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results</th>
<th>Units</th>
<th>MRL</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
<th>Analyst</th>
<th>Analyzed</th>
<th>I/V</th>
<th>F/V</th>
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<tbody>
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<td>100</td>
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<tr>
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<td>4880</td>
<td>mg/kg dry</td>
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<tr>
<td>Lead</td>
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<td>6.8</td>
<td>6010B</td>
<td>150</td>
<td>1</td>
<td>SVD</td>
<td>10/07/09 12:18</td>
<td>1.76</td>
<td>100</td>
</tr>
</tbody>
</table>
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site
Client Sample ID: SED-02
Date Sampled: 10/02/09 10:40
Percent Solids: 83
Initial Volume: 19.8
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 0910040
ESS Laboratory Sample ID: 0910040-02
Sample Matrix: Soil
Analyst: ML
Prepared: 10/2/09 12:30

8100M Total Petroleum Hydrocarbons

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results</th>
<th>Units</th>
<th>MRL</th>
<th>Limit</th>
<th>DF</th>
<th>Analyzed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Petroleum Hydrocarbons</td>
<td>ND</td>
<td>ng/kg dry</td>
<td>45.6</td>
<td>500</td>
<td>1</td>
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</tr>
</tbody>
</table>

Surrrogate: D-Terphenyl

Surrrogate Recovery : 70 %
Qualifier Limits: 40-140
**CERTIFICATE OF ANALYSIS**

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
Client Sample ID: SED-03  
Date Sampled: 10/02/09 10:30  
Percent Solids: 60

ESS Laboratory Work Order: 0910040  
ESS Laboratory Sample ID: 0910040-03  
Sample Matrix: Soil

---

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<tr>
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<th>Results</th>
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<th>MRL</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
<th>Analyst</th>
<th>Analyzed</th>
<th>I/V</th>
<th>F/V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>2.82</td>
<td>mg/kg dry</td>
<td>3.30</td>
<td>7060A</td>
<td>7</td>
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<td>JP</td>
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<tr>
<td>Iron</td>
<td>13200</td>
<td>mg/kg dry</td>
<td>9.3</td>
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<tr>
<td>Lead</td>
<td>72.1</td>
<td>mg/kg dry</td>
<td>9.3</td>
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**CERTIFICATE OF ANALYSIS**

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
Client Sample ID: SED-03  
Date Sampled: 10/02/09 10:50  
Percent Solids: 60  
Initial Volume: 20  
Final Volume: 1  
Extraction Method: 3546

ESS Laboratory Work Order: 0910040  
ESS Laboratory Sample ID: 0910040-03  
Sample Matrix: Soil  
Analyst: ML  
Prepared: 10/2/09 12:30

---

### 8100M Total Petroleum Hydrocarbons

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<th>Results</th>
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<th>MRL</th>
<th>Limit</th>
<th>DF</th>
<th>Analyzed</th>
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<tbody>
<tr>
<td>Total Petroleum Hydrocarbons</td>
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<td>mg/kg dry</td>
<td>62.5</td>
<td>500</td>
<td>1</td>
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<tr>
<td>Surrogate, D-Terphenyl</td>
<td>88 %</td>
<td>-</td>
<td>40-140</td>
</tr>
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</table>

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185 Frances Avenue, Cranston, RI 02910-2211  
Tel: 401-461-7181  
Fax: 401-461-4486  
http:www.LSSI.Laboratory.com  
Dependability  
Quality  
Service
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site
Client Sample ID: SED-04
Date Sampled: 10/02/09 11:05
Percent Solids: 68

ESS Laboratory Work Order: 0910040
ESS Laboratory Sample ID: 0910040-04
Sample Matrix: Soil

3050B/6000/7000 Total Metals

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Result</th>
<th>Units</th>
<th>MRL</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
<th>Analyst</th>
<th>Analyzed</th>
<th>I/V</th>
<th>F/V</th>
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<tbody>
<tr>
<td>Arsenic</td>
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<td>mg/kg dry</td>
<td>2.07</td>
<td>ICP-MS</td>
<td>7</td>
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<td>SVD</td>
<td>10/07/09 18:01</td>
<td>1.76</td>
<td>100</td>
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<tr>
<td>Iron</td>
<td>10200</td>
<td>mg/kg dry</td>
<td>8.4</td>
<td>ICP-MS</td>
<td>1</td>
<td>1</td>
<td>SVD</td>
<td>10/07/09 22:27</td>
<td>1.76</td>
<td>100</td>
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<tr>
<td>Lead</td>
<td>69.4</td>
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<td>8.4</td>
<td>ICP-MS</td>
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<td>1</td>
<td>SVD</td>
<td>10/07/09 22:27</td>
<td>1.76</td>
<td>100</td>
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</table>
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
Client Sample ID: SED-04  
Date Sampled: 10/02/09 11:05  
Percent Solids: 68  
Initial Volume: 20.7  
Final Volume: 1  
Extraction Method: 3546  

ESS Laboratory Work Order: 0910040  
ESS Laboratory Sample ID: 0910040-04  
Sample Matrix: Soil  
Analyst: ML  
Prepared: 10/2/09 12:30

8100M Total Petroleum Hydrocarbons

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results</th>
<th>Units</th>
<th>MRL</th>
<th>Limit</th>
<th>DF</th>
<th>Analyzed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Petroleum Hydrocarbons</td>
<td>ND</td>
<td>mg/kg dry</td>
<td>53.3</td>
<td>500</td>
<td>1</td>
<td>10/05/09 19:00</td>
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Surrogate: D-Terphenyl

<table>
<thead>
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<th>Limits</th>
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<tbody>
<tr>
<td>92%</td>
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</table>
### 3050B/6000/7000 Total Metals

<table>
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<th>MRL</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
<th>Analyst</th>
<th>Analyzed</th>
<th>I/V</th>
<th>F/V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>ND</td>
<td>mg/kg dry</td>
<td>1.84</td>
<td>7060A</td>
<td>7</td>
<td>5</td>
<td>JP</td>
<td>10/08/09 18:07</td>
<td>1.75</td>
<td>100</td>
</tr>
<tr>
<td>Iron</td>
<td>10480</td>
<td>mg/kg dry</td>
<td>7.4</td>
<td>6010B</td>
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<td>SVD</td>
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<td>100</td>
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<td>Lead</td>
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<td>1</td>
<td>SVD</td>
<td>10/07/09 22:31</td>
<td>1.75</td>
<td>100</td>
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**CERTIFICATE OF ANALYSIS**

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
Client Sample ID: SED-05  
Date Sampled: 10/02/09 11:20  
Percent Solids: 77  
Initial Volume: 20.9  
Final Volume: 1  
Extraction Method: 3546  

ESS Laboratory Work Order: 0910040  
ESS Laboratory Sample ID: 0910040-05  
Sample Matrix: Soil  
Analyst: ML  
Prepared: 10/2/09 12:30  

### 8100M Total Petroleum Hydrocarbons

<table>
<thead>
<tr>
<th>Analyte</th>
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<th>MRL</th>
<th>Limit</th>
<th>DF</th>
<th>Analyzed</th>
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<tbody>
<tr>
<td>Total Petroleum Hydrocarbons</td>
<td>ND</td>
<td>mg/kg dry</td>
<td>46.6</td>
<td>500</td>
<td>1</td>
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Sample: O-Terphenyl  
Recovery: 72%  
Qualifier Limits: 40-140
ESS Laboratory
Division of Thieltech Engineering, Inc.

CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site
Client Sample ID: SED-06
Date Sampled: 10/02/09 11:35
Percent Solids: 62

ESS Laboratory Work Order: 0910040
ESS Laboratory Sample ID: 0910040-06
Sample Matrix: Soil

3050B/6000/7000 Total Metals

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results</th>
<th>Units</th>
<th>MRL</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
<th>Analyst</th>
<th>Analyzed</th>
<th>I/V</th>
<th>F/V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>3.55</td>
<td>mg/kg dry</td>
<td>2.21</td>
<td>7060A</td>
<td>7</td>
<td>5</td>
<td>JP</td>
<td>10/08/09 18:36</td>
<td>1.81</td>
<td>100</td>
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<tr>
<td>Iron</td>
<td>11600</td>
<td>mg/kg dry</td>
<td>8.9</td>
<td>6010B</td>
<td>1</td>
<td>SVD</td>
<td>10/07/09 22:54</td>
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<tr>
<td>Lead</td>
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<td>8.9</td>
<td>6010B</td>
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<td>SVD</td>
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<td>1.81</td>
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</table>
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site
Client Sample ID: SED-06
Date Sampled: 10/02/09 11:35
Percent Solids: 62
Initial Volume: 20.3
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 0910040
ESS Laboratory Sample ID: 0910040-06
Sample Matrix: Soil
Analyst: ML
Prepared: 10/2/09 12:30

---

### 8100M Total Petroleum Hydrocarbons

<table>
<thead>
<tr>
<th>Analyte</th>
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<th>Units</th>
<th>MRL</th>
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<tbody>
<tr>
<td>Total Petroleum Hydrocarbons</td>
<td>ND</td>
<td>ng/kg dry</td>
<td>59.6</td>
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**Sample Details:**

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<tbody>
<tr>
<td>D-Terphenyl</td>
<td>85%</td>
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</tbody>
</table>

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185 Frances Avenue, Cranston, RI 02910-2211  Tel: 401-461-7181  Fax: 461-461-4486  http://www.ESSLaboratory.com
### 3050B/6000/7000 Total Metals

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results</th>
<th>Units</th>
<th>MRL</th>
<th>Method</th>
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<th>Analyzed</th>
<th>L/V</th>
<th>F/V</th>
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<tr>
<td>Arsenic</td>
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<td>5</td>
<td>JP</td>
<td>10/08/09 18:33</td>
<td>1.75</td>
<td>100</td>
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<tr>
<td>Iron</td>
<td>30300</td>
<td>mg/kg dry</td>
<td>161</td>
<td>6010B</td>
<td>20</td>
<td>JP</td>
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<td>1.75</td>
<td>100</td>
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<tr>
<td>Lead</td>
<td>1270</td>
<td>mg/kg dry</td>
<td>8.1</td>
<td>6010B</td>
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<td>1</td>
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CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Sample ID: SED-07
Date Sampled: 10/02/09 11:50
Percent Solids: 71
Initial Volume: 20.2
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 0910040
ESS Laboratory Sample ID: 0910040-07
Sample Matrix: Soil
Analyst: ML
Prepared: 10/2/09 12:30

8100M Total Petroleum Hydrocarbons

<table>
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<th>MRL</th>
<th>Limit</th>
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<td>Total Petroleum Hydrocarbons</td>
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<td>mg/kg dry</td>
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Surrogate: O-Terphenyl

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<tbody>
<tr>
<td>100 %</td>
<td></td>
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</table>

185 Frances Avenue, Cranston, RI 02910-2211 Tel: 401-461-7181 Fax: 401-461-4466 info@ESSlaboratory.com
# Certificate of Analysis

**Client Name:** EA Engineering, Science, and Technology  
**Client Project ID:** Lincoln Lacle & Braid Site  
**Client Sample ID:** SED-08  
**Date Sampled:** 10/02/09 12:20  
**Percent Solids:** 57

---

**3050B/6000/7000 Total Metals**

<table>
<thead>
<tr>
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<th>Results</th>
<th>Units</th>
<th>MRL</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
<th>Analyst</th>
<th>Analyzed</th>
<th>I/V</th>
<th>F/V</th>
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<tr>
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<td>2.40</td>
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<td>7</td>
<td>5</td>
<td>JP</td>
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<tr>
<td>Iron</td>
<td>105000</td>
<td>mg/kg dry</td>
<td>194</td>
<td>6010B</td>
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<td>JP</td>
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<tr>
<td>Lead</td>
<td>398</td>
<td>mg/kg dry</td>
<td>9.7</td>
<td>6010B</td>
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<td>SVD</td>
<td>10/07/09 23:11</td>
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</table>
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site
Client Sample ID: SED-08
Date Sampled: 10/02/09 12:20
Percent Solids: 57
Initial Volume: 20.2
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 0910040
ESS Laboratory Sample ID: 0910040-08
Sample Matrix: Soil
Analyst: ML
Prepared: 10/2/09 12:30

8100M Total Petroleum Hydrocarbons

<table>
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<th>Analyte</th>
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<th>MRL</th>
<th>Limit</th>
<th>DF</th>
<th>Analyzed</th>
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<tbody>
<tr>
<td>Total Petroleum Hydrocarbons</td>
<td>370</td>
<td>mg/kg dry</td>
<td>65.1</td>
<td>500</td>
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Surrogate: O-Terphenyl

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<td></td>
<td>105 %</td>
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</table>
# ESS Laboratory

**Division of Thielsch Engineering, Inc.**

## CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
Client Sample ID: Floc-01  
Date Sampled: 10/02/09 10:20  
Percent Solids: N/A  
ESS Laboratory Work Order: 0910040  
ESS Laboratory Sample ID: 0910040-09  
Sample Matrix: Sludge

## 3050B/6000/7000 Total Metals

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Results</th>
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<th>MRL</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
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<th>Analyzed</th>
<th>L/V</th>
<th>P/V</th>
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</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>ND</td>
<td>mg/kg wet</td>
<td>2.40</td>
<td>7060A</td>
<td>7</td>
<td>5</td>
<td>JP</td>
<td>10/08/09 19:04</td>
<td>1.03</td>
<td>100</td>
</tr>
<tr>
<td>Lead</td>
<td>ND</td>
<td>mg/kg wet</td>
<td>9.7</td>
<td>6010B</td>
<td>150</td>
<td>1</td>
<td>SVD</td>
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<td>1.03</td>
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</table>
**CERTIFICATE OF ANALYSIS**

Client Name: EA Engineering, Science, and Technology  
Client Project ID: Lincoln Lace & Braid Site  
Client Sample ID: Floc-02  
Date Sampled: 10/02/09 12:05  
Percent Solids: N/A  

ESS Laboratory Work Order: 0910040  
ESS Laboratory Sample ID: 0910040-10  
Sample Matrix: Sludge

### 3050B/6000/7000 Total Metals

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Result</th>
<th>Units</th>
<th>MRL</th>
<th>Method</th>
<th>Limit</th>
<th>DF</th>
<th>Analyst</th>
<th>Analyzed</th>
<th>I/V</th>
<th>F/V</th>
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</thead>
<tbody>
<tr>
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<td>mg/kg wet</td>
<td>2.15</td>
<td>706A</td>
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<td>JP</td>
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<tr>
<td>Lead</td>
<td>ND</td>
<td>mg/kg wet</td>
<td>8.7</td>
<td>6010B</td>
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<td>1.15</td>
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</table>
## Quality Control Data

### Batch B900724 - 3050B

**Blank**
- Arsenic: ND, mg/kg wet
- Iron: ND, mg/kg wet
- Lead: ND, mg/kg wet

**LCS**
- Arsenic: 37.0, 6.60, mg/kg wet, 32.33, 111, 80-120
- Iron: 188, 6.7, mg/kg wet, 106.7, 101, 80-120
- Lead: 23.7, 6.7, mg/kg wet, 33.33, 101, 80-120

**LCS Dup**
- Arsenic: 34.8, 6.60, mg/kg wet, 33.33, 110, 80-120, 0.8, 20
- Iron: 187, 6.7, mg/kg wet, 166.7, 100, 80-120, 0.8, 20
- Lead: 33.5, 6.7, mg/kg wet, 33.33, 100, 80-120, 0.6, 20

### Batch B900724 - 3050B (Duplicates)

**Sources: 0910040-05**
- Arsenic: 9.644, 1.79, mg/kg dry, 1.25, 71, 35
- Iron: 8170, 7.2, mg/kg dry, 10400, 24, 35
- Lead: 12.2, 7.2, mg/kg dry, 24.6, 67, 35

**Matrix Spike**

**Sources: 0910040-05**
- Arsenic: 29.9, 7.26, mg/kg dry, 36.69, 1.25, 78, 75-125
- Iron: 12400, 7.3, mg/kg dry, 163.4, 10400, NR, 75-125
- Lead: 45.1, 7.3, mg/kg dry, 36.69, 24.6, 56, 75-125

**Reference**
- Arsenic: 180, 74, 8, mg/kg wet, 158.0, 114, 82-118
- Iron: 12900, 10.0, mg/kg wet, 18600, 75, 50-145
- Lead: 170, 10.0, mg/kg wet, 172.0, 99, 75-120

### Batch B900724 - 3546

**Blank**
- Decane (C10): ND, 0.2, mg/kg wet
- Decane (C12): ND, 0.2, mg/kg wet
- Dodecane (C12): ND, 0.2, mg/kg wet
- Eicosane (C20): ND, 0.2, mg/kg wet
- Hexadecane (C16): ND, 0.2, mg/kg wet
- Hexadecane (C18): ND, 0.2, mg/kg wet
- Nonadecane (C19): ND, 0.2, mg/kg wet
- Octadecane (C22): ND, 0.2, mg/kg wet
- Octadecane (C18): ND, 0.2, mg/kg wet
- Tetradecane (C14): ND, 0.2, mg/kg wet
- Tetradecane (C14): ND, 0.2, mg/kg wet
- Total Petroleum Hydrocarbons: ND, 37.5, mg/kg wet
- Triphenylene (C10): ND, 0.2, mg/kg wet

**Sulforadion C7**
- 5,22, mg/kg wet, 5,000, 85, 40-140

---

ESS Laboratory
Division of Thielsch Engineering, Inc.

CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site
ESS Laboratory Work Order: 0910040

Quality Control Data

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8100M Total Petroleum Hydrocarbons
### Quality Control Data

**8100M Total Petroleum Hydrocarbons**

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**Surrogate: D-Terphenyl**

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CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site

ESS Laboratory Work Order: 0910040

Notes and Definitions

U       Analyte included in the analysis, but not detected
M+      Matrix Spike recovery is above upper control limit.
M-      Matrix Spike recovery is below lower control limit.
D+      Relative percent difference for duplicate is outside of criteria.
D       Diluted.
ND      Analyte NOT DETECTED above the detection limit
dry     Sample results reported on a dry weight basis
RPD     Relative Percent Difference
MDL     Method Detection Limit
MRL     Method Reporting Limit
I/V     Initial Volume
F/V     Final Volume
§       Subcontracted analysis; see attached report
1       Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2       Range result excludes concentrations of target analytes eluting in that range.
3       Range result excludes the concentration of the C9-C10 aromatic range.
Avg     Results reported as a mathematical average.
CERTIFICATE OF ANALYSIS

Client Name: EA Engineering, Science, and Technology
Client Project ID: Lincoln Lace & Braid Site

ESS Laboratory Work Order: 0910040

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: A-179
http://www.health.ri.gov/labs/waterlabs-instate.php

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750

Maine Potable and Non Potable Water: RI002

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/labcert/labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 242405
http://www4.cegov.nh.gov/des/nhelap/namesearch.asp

New York (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/glapp comm .html

United States Department of Agriculture Soil Permit: S-54210

Maryland Potable Water: 301

South Carolina Volatile Organic Compounds in Potable Water: 78003

CHEMISTRY

A2LA Accredited: Testing Cert # 2864.01
Lead in Paint, Phthalates, Lead in Children's Metals Products (Including Jewelry)
http://www.A2LA.org/dirsearchnew/newsearch.cfm

CPSC ID# 1141
Lead Paint, Lead in Children's Metals Jewelry
http://www.cpsc.gov/cgi-bin/labaplлист.aspx
# CHAIN OF CUSTODY

**ESS Laboratory**

*Division of Thielsch Engineering, Inc.*
185 Frances Avenue, Cranston, RI 02910-2211
Tel. (401) 461-7181  Fax (401) 461-4486
www.esslaboratory.com

---

**Turn Time:**
- [ ] Standard
- [ ] Other

**If faster than 5 days, prior approval by laboratory is required:**

**Reporting Limits:**

- [ ] RI

**Res. #/CM:** 08/00/Y0

**Electronic Deliverable:**
- [ ] Yes
  - [ ] No

**Forms:**
- Excel
- Access
- PDF
- Other

---

**Client:**
- [ ] MA
- [ ] CT
- [ ] NH
- [ ] NJ
- [ ] NY
- [ ] ME
- [ ] Other

**Is this project for any of the following:**
- MA-MCF
- Navy
- USACE
- Other

---

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**Co. Name:**

- [ ] EA

**Contact Person:**

RON MACK

**Address:**
2350 Post Road

**City:**
WARWICK

**State:**
RI

**Zip:**
02886

**Telephone #:**
901-734-3440

**Fax #:**
07216

**Email Address:**
rmack@esslaboratory.com

---

**ESS LAB Sample #**

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<tr>
<td>11:20</td>
<td></td>
<td>SW-SW-1/5</td>
<td>1</td>
<td>4</td>
<td>1</td>
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</tbody>
</table>

---

**Cons of:**
- P-Poly
- G-Glass
- S-Sterile
- V-VOA

**Matrix:**
- S-Soil
- SD-Solid
- D-Sludge
- WW-Waste Water
- GW-Ground Water
- SW-Surface Water
- DW-Drinking Water
- O-Oil
- W-Wipes
- F-Filters

**Cooler Present:**
- [ ] Yes
  - [ ] No

**Internal Use Only:**
- [ ] Yes
  - [ ] No

**Sampled by:**
RGM; MNR

**Comments:** SEE LAUREL STANDARD RE: FLOC-01 AND FLOC-02
- CAUTION: GLASS PRESENT IN SOME SED SAMPLES

---

**By circling MA-MCF, client acknowledges samples were collected in accordance with MADEP CAM VII A**

Please fax all changes to Chain of Custody in writing.
<table>
<thead>
<tr>
<th>ESS Laboratory</th>
<th>CHAIN OF CUSTODY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division of Thielsch Engineering, Inc.</td>
<td>Page 2 of 2</td>
</tr>
<tr>
<td>185 Frances Avenue, Cranston, RI 02910-2211</td>
<td></td>
</tr>
<tr>
<td>Tel. (401) 461-7181 Fax (401) 461-4486</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.esslaboratory.com">www.esslaboratory.com</a></td>
<td></td>
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<table>
<thead>
<tr>
<th>Co. Name</th>
<th>Project #</th>
<th>Project Name (in Chars or less)</th>
<th>Reporting Limits</th>
<th>ESS LAB PROJECT ID</th>
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</thead>
<tbody>
<tr>
<td>EA</td>
<td></td>
<td></td>
<td></td>
<td>6910040</td>
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<table>
<thead>
<tr>
<th>Contact Person</th>
<th>Address</th>
<th>City</th>
<th>State</th>
<th>Zip</th>
<th>PO#</th>
<th>Write Required Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ron Mack</td>
<td></td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>ESS LAB Sample#</th>
<th>Date</th>
<th>Collection Time</th>
<th>CONT</th>
<th>G-MK</th>
<th>MLK</th>
<th>Sample Identification (20 Chars or less)</th>
<th>Pres Code</th>
<th>Number of Containers</th>
<th>Type of Containers</th>
<th>Total Fe</th>
<th>Total Al</th>
<th>Total As</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>10/2/09</td>
<td>12:20</td>
<td>X</td>
<td>SED-08</td>
<td><em>1</em></td>
<td><em>4</em> XXXX</td>
<td></td>
<td></td>
<td></td>
<td><em>1</em></td>
<td><em>1</em></td>
<td><em>1</em></td>
</tr>
<tr>
<td>9</td>
<td>10/2/09</td>
<td>10:20</td>
<td>X D</td>
<td>Floc-01</td>
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<td><em>1</em></td>
<td><em>1</em></td>
<td><em>1</em></td>
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<tr>
<td>10</td>
<td>10/2/09</td>
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<td>X D</td>
<td>Floc-02</td>
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</table>

<table>
<thead>
<tr>
<th>Container Type: P-Poly</th>
<th>G-Glass</th>
<th>S-Sterile</th>
<th>V-VOA</th>
<th>Matrix: S-Soil</th>
<th>SD-Solid</th>
<th>D-Sludge</th>
<th>WW-Waste</th>
<th>GW-Ground</th>
<th>SW-Surface</th>
<th>DW-Drinking</th>
<th>Water</th>
<th>W-Oil</th>
<th>W-Waxes</th>
<th>W-Filters</th>
</tr>
</thead>
</table>

| Preservation Code: 1- NP, 2- HCl, 3- HSO4, 4- HNO3, 5- NaOH, 6- MeOH, 7- Ascorbic Acid, 8- ZnAc, 9- |

<table>
<thead>
<tr>
<th>Sampled by:</th>
<th>Preservation Code:</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGM MIR</td>
<td></td>
</tr>
</tbody>
</table>

| Comments: NO TEST ANALYSIS ON FLOC SAMPLES OR IRON ANALYSIS |

<table>
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<tr>
<th>Relinquished by: (Signature)</th>
<th>Date/Time</th>
<th>Received by: (Signature)</th>
<th>Date/Time</th>
<th>Relinquished by: (Signature)</th>
<th>Date/Time</th>
<th>Received by: (Signature)</th>
<th>Date/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGM MIR</td>
<td>10/2/09</td>
<td>2:30</td>
<td>10/2/09</td>
<td>RGM MIR</td>
<td>2:30</td>
<td>RGM MIR</td>
<td>10/2/09</td>
</tr>
</tbody>
</table>

*By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VII A

Please fax all changes to Chain of Custody in writing.

1 (White) Lab Copy 2 (Yellow) Client Receipt
APPENDIX C

RIPDES Remediation General Permit
Notice of Intent
### I. OWNER

Name: **City of Providence**  
Mailing Address: **25 Dorrance Street**  
City: **Providence**  
State: **RI**  
Zip: **02903**  
Phone: **(401) 785-9450**  
Contact Person: **Robert McMahon**  
Title: **Director, Parks Department**  
Email Address of Owner: **rmcmahon.c2aq3@providenceri.com**

### II. OPERATOR (if different from owner)

Name:  
Mailing Address:  
City:  
State:  
Zip:  
Phone:  
Contact Person:  
Title:  
Email Address of Contact Person:

### III. SITE INFORMATION

a. Please Include the following items as part of the NOI: brief history of the site, the source of contamination; a description of the proposed remedial and/or dewatering activity creating the discharge; all available analytical data on impacted groundwater; a site plan showing location of monitoring and recovery wells, discharge point, and receiving waters; and an 8.5" x 11" photocopy of a USGS 1:24,000 topographic map depicting site location.

Facility/Site Name: **Former Lincoln Lace and Braid**  
Facility/Site: Longitude: **41.820899**  
Latitude: **-71.456517**  
SIC code(s):  
Facility Address: **55-61 Ponagansett Avenue**  
City: **Providence**  
State: **RI**  
Zip: **02903**  
Type of Spill or Release:  
Approximate Duration of Project:

b. Has a prior NPDES permit been granted for the discharge? Yes _No_  
   If yes number:  

c. Has a prior NPDES application (Form 1 & 2C) ever been filed for the discharge? Yes _No_  
   If yes provide date of application and application number if available.

d. Is the site/facility covered by any other DEM permit including: 1. multi-sector storm water general permit, 2. phase I or II construction storm water general permit, 3. Individual RIPDES Permit, if so please list them below: **No**

e. Is the site/facility subject to any other DEM permitting or other action which is causing the generation of the discharge? Yes _or No_  
   If "Yes" please list the applicable permit numbers and DEM contacts here: **Case #2009-018**  
   **Tim Fleury, RIDEM OWM**
IV. DISCHARGE INFORMATION

a. Describe the discharge activities for which the owner/applicant is seeking coverage:

   Dewatering of sluiceway for OWM remediation

b. Provide the following information for each discharge:

   Number of Discharge Points: 1

   Maximum Flow Rate (cubic feet per second): 0.8
   Is the maximum flow a design value? Y
   Average Flow Rate (cubic feet per second): 0.8

c. Latitude and Longitude of the center of each outfall: pt. 1: long. 41.820416 lat. -71.456000, pt. 2 long. __________ lat. __________,
   pt. 3 long. __________ lat. __________, pt. 4 long. __________ lat. __________, pt. 5 long. __________ lat. __________, pt. 6 long. __________ lat. __________

d. If hydrostatic testing, total volume of the discharge (gallons):

e. Is the discharge intermittent ? or seasonal ?

f. Expected dates of discharge (mm/dd/yy): Start: 07 / 01 / 10  End: 10 / 31 / 10

V. TREATMENT SYSTEM INFORMATION

a. Attach a complete description of the treatment system including: a flow schematic depicting all major control points (i.e., alarms, sensors, valves) and treatment units; design calculations on the expected treatment performance (i.e., removal efficiency, carbon consumption calculations) including unit height and surface area; and manufacturers' specifications on major components of the treatment system. Also provide a basis for all design calculations and properly reference all design assumptions in order for calculations to be replicated. Include a discussion on the need for iron treatment to address iron scaling and/or iron bacteria build-up. Plans and specifications on all treatment systems must be signed and certified by a professional engineer registered in the State of Rhode Island.

b. Identify each applicable treatment unit (check all that apply):
   ☑ Oil/Water Separator, ☑ Granular Activated Carbon, ☑ Air Stripping, ☑ U/V Oxidation, ☑ Iron Treatment,
   ☑ Filtration, ☑ Ion Exchange ☑ Bag Filter ☑ Equalization Tanks, ☑ Chlorination, ☑ Dechlorination,
   ☑ Other (please specify):

   If system consists of GAC or Ion Exchange, provide time to carbon or resin exhaustion (days):
   If system consists of air stripping, provide air/water ratio:

c. Treatment System Design Flow (gpm): 250  d. Treatment System Maximum System Capacity (gpm): 400

e. Average Flow Rate of Treatment System (gpm): 250

f. Provide a description of chemical additives being used or planned to be used (attach MSDS sheets for each):
### VI. RECEIVING WATER INFORMATION

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Identify the discharge pathway:</td>
<td>☑ Direct, ☐ Indirect, ☐ Storm Drain, ☐ River/brook, ☐ Wetlands,</td>
</tr>
<tr>
<td></td>
<td>☐ Other (describe):</td>
</tr>
<tr>
<td>b. Provide a narrative description of the discharge pathway, including the names of the receiving waters:</td>
<td><strong>Areas of sluiceway will be isolated by cofferdams, and the area will be dewatered by pumping water into the Woonasquatucket River. The sluiceway normally discharges directly into the Woonasquatucket River.</strong></td>
</tr>
<tr>
<td>c. Attach a detailed map(s) indicating the site location and location of the outfall to the receiving water:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. For multiple discharges, number the discharges sequentially.</td>
</tr>
<tr>
<td></td>
<td>2. For Indirect discharges, indicate the location of the discharge to the indirect conveyance and the discharge to surface waters. The map should include the location and distance to the nearest sanitary sewer.</td>
</tr>
<tr>
<td>d. Provide the Water Quality Classification of the receiving water:</td>
<td><strong>B1(a)</strong></td>
</tr>
<tr>
<td>e. If the proposed discharge is to freshwaters, provide the reported or calculated seven day-ten year low flow (7Q10) of the receiving water for the point of discharge in cubic feet per second (cfs):</td>
<td><strong>9.78 cfs</strong></td>
</tr>
<tr>
<td></td>
<td>Attach any calculation sheets used to support stream flow and dilution calculations.</td>
</tr>
<tr>
<td>f. Is the receiving water a listed 303(d) water quality impaired or limited water?</td>
<td>☑ Yes ☐ No. If yes for which pollutant(s)?</td>
</tr>
<tr>
<td>g. Is there a TMDL?</td>
<td>☑ Yes ☐ No. If Yes, for which pollutants?</td>
</tr>
<tr>
<td>Pollutant</td>
<td>Believed Absent (Y/N)</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Total Suspended Solids</td>
<td></td>
</tr>
<tr>
<td>Total Residual Chlorine</td>
<td></td>
</tr>
<tr>
<td>Total Petroleum Hydrocarbons</td>
<td></td>
</tr>
<tr>
<td>Cyanide</td>
<td></td>
</tr>
<tr>
<td>Benzene</td>
<td></td>
</tr>
<tr>
<td>Toluene</td>
<td></td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td></td>
</tr>
<tr>
<td>Total Xylenes (m,p,o)</td>
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</tr>
<tr>
<td>Total BTEX</td>
<td></td>
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<tr>
<td>Ethylene dibromide</td>
<td></td>
</tr>
<tr>
<td>Methyl-1-Butyl Ether (MTBE)</td>
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</tr>
<tr>
<td>Tert-Butyl Alcohol</td>
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</tr>
<tr>
<td>Tert-Amyl Methyl Ether</td>
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<tr>
<td>Carbon Tetrachloride</td>
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<tr>
<td>1,4 Dichlorobenzene</td>
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<tr>
<td>1,2 Dichlorobenzene</td>
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<tr>
<td>1,3 Dichlorobenzene</td>
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<tr>
<td>Total Dichlorobenzene</td>
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</tr>
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<td>1,1 Dichloethane</td>
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<tr>
<td>1,2 Dichloethane</td>
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<tr>
<td>1,1 Dichloroethylene</td>
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<td>cis - 1,2 Dichloroethylene</td>
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<td>Dichloromethane</td>
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<td>1,1,2 Trichloroethane</td>
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<td>Total Group I PAHs</td>
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<td>Pollutant</td>
<td>Believed Absent (Y/N)</td>
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<tr>
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<tr>
<td>Benzo (a) Pyrene</td>
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<tr>
<td>Benzo (b) Fluoranthene</td>
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<td>Benzo (k) Fluoranthene</td>
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<td>Chrysene</td>
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<td>Dibenz(a,h) Anthracene</td>
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<td>Indeno (1,2,3-cd) Pyrene</td>
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<tr>
<td>Cadmium</td>
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<tr>
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<td>Chromium VI (hexavalent, total recoverable)</td>
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<tr>
<td>Copper</td>
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<tr>
<td>Lead (total recoverable)</td>
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<tr>
<td>Mercury</td>
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<td>Nickel (total recoverable)</td>
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<td>Zinc (total recoverable)</td>
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<tr>
<td>Iron (total recoverable)</td>
<td></td>
</tr>
<tr>
<td>Other (describe):</td>
<td></td>
</tr>
</tbody>
</table>
Dilution Determination for use with the RIPDES Remediation General Permit

1. Determine the point of discharge. The point of discharge is the location where the effluent first enters a surface water body.

2. Using a USGS map and the gauge station list given in the attached USGS table of 7Q10 Statistics for Rhode Island Stations, locate the gauge station that is closest to the point of discharge. The gauge station must be in the same watershed as the point of discharge.

3. Find the drainage area of the watershed that is upstream of the gauge station. (Given in the attached table.)

   \[ DA_{\text{Upstream of Gauge}} = 38.3 \, \text{mi}^2 \]

4. Find the 7Q10 flow for the gauge station from the attached table.

   \[ 7Q10 \, \text{Gauge} = 7.81 \, \text{cfs} \]

5. Determine the drainage area of the watershed that is upstream from the point of discharge.

   \[ DA_{\text{Upstream of Discharge}} = 48.0 \, \text{mi}^2 \]

6. Calculate the equivalent 7Q10 flow using the following formula:

   \[ 7Q10 \, \text{EQ} = \frac{7Q10 \, \text{Gauge}}{DA_{\text{Upstream of Gauge}}} \times DA_{\text{Upstream of Discharge}} = \frac{7.81 \, \text{cfs}}{38.3 \, \text{mi}^2} \times 48.0 \, \text{mi}^2 = 9.78 \, \text{cfs} \]

7. Calculate the dilution factor using the following formula:

   \[ \text{Dilution Factor} = \left\{ \frac{(7Q10 \, \text{EQ}) + (\text{System Design Flow})}{\text{System Design Flow}} \right\} = \left\{ \frac{9.78 \, \text{cfs}}{0.8} \right\} = 13.225 \]
VIII. OWNER/OPERATOR CERTIFICATION

I certify under penalty of law that I have read and understood all terms and conditions of the above-referenced General Permit. I also certify under penalty of law that this document and all attachments were prepared under the direction or supervision in accordance with a system design to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment for knowing violations.

Print Owner's Name: ____________________________
Robert McMahon

Print Owner's Title: ____________________________
Director, Providence Parks Dept.

Signature: ____________________________ Date: ____________

Print Operator's Name: ____________________________

Print Operator's Title: ____________________________

Signature: ____________________________ Date: ____________
APPLICATION(S) FEES FORM

Please complete the information below and submit this completed form and your check (payable to "R.I. General Treasurer") for the appropriate fee directly to:

R.I. Department of Environmental Management
Office of Management Services
235 Promenade Street
Providence, RI 02908

*** FEES ARE NOT REFUNDABLE ***

APPLICANT'S NAME:  Robert McNamara

OWNER'S NAME:  City of Providence

SITE LOCATION:  Lincoln Lace & Broad, Providence

APPLICATION TYPE (Permit, Order of Approval):  RIPDES General Permit (Remediation)

NOTE: The application and all accompanying documents, including a copy of this fee form and method of payment, should be submitted to the Office of Water Resources, RIPDES Program, 235 Promenade Street, Providence, RI 02908-5767. Application review will be initiated only upon receipt of the complete application and fee.

FOR OFFICE USE ONLY

OMS Receipt Date: ______________

Fee Amount Received: ______________

Processor Initials: ______________