

S-1758-020
November 11, 2019

Massachusetts Department of Environmental Protection – Northeast Region
Bureau of Waste Site Cleanup
Attn: Erik Johnson
205B Lowell Street
Wilmington, MA 01887

Re: **Immediate Response Action (IRA) Status Report**
Gallows Hill Park
Salem, Massachusetts
RTN 3-35355

Dear Erik:

On behalf of City of Salem Department of Planning and Community Development Office, Tighe & Bond has prepared this Immediate Response Action (IRA) Status report for the Gallows Hill Park site located at 50 Proctor Street in Salem, Massachusetts in accordance with the Massachusetts Contingency Plan (MCP, 310 CMR 40.0000). The subject site is shown on a USGS Site Locus map (Figure 1), MassDEP Priority Resources map (Figure 2), and an Orthophotograph (Figure 3) provided in Appendix A.

Site Release Background

The Gallows Hills Park area consists of two parcels, listed at 53 Hanson Street (the main park parcel) and 50 Proctor Street (sometimes referred to as Mansell Field). The two parcels are separated by a right-of-way area, which is also owned by the City and part of the park area. These features are depicted on Figure 3.

During due diligence investigations that were being completed at the site in November 2018 in preparation for future park renovation work, elevated levels of arsenic were detected in shallow soils in a grass covered area on the eastern portion of the park on the 50 Proctor Street parcel. Subsequent hand boring soil sampling program completed by Tighe & Bond in this area in December 2018 indicated that a condition that could pose an Imminent Hazard (IH) to human health was triggered in accordance with MCP.

On December 19, 2018, the Massachusetts Department of Environmental Protection (MassDEP) issued Release Tracking Number (RTN) 3-35355 to the site. As an interim measure following initial notification to MassDEP, the City of Salem installed a snow fence “warning” barrier (with signage also posted) around the area of concern, and this area was closed to the general public. On January 17, 2019, Tighe & Bond submitted an IRA Plan to MassDEP for site RTN 3-35355. Under the IRA Plan, further mitigation measures were completed to address the IH condition, and further assessment was also completed. In May 2019, Tighe & Bond submitted an IRA Status report to MassDEP, which reviewed the mitigation measures that were installed and briefly summarized the assessment activities that were completed. Mitigation measures included the installation of a six-foot high chain link construction fence around the area of potential concern with warning signs posted. The approximate locations where this occurred are shown on Figure 4 provided in Appendix A. On September 10, 2019, Tighe & Bond submitted Phase I - Tier Classification report for site RTN 3-35355, which reviewed the comprehensive investigations completed across the subject site parcel to delineate site impacts. That submittal also included an IRA Status update.



Description of Additional Response Actions Completed Since

The additional assessment activities completed since the September 2019 IRA Status Report included the following:

- Collection of in-situ soil samples for preliminary disposal characterization analysis.
- Collection of sediment samples in off-site drainage swale.
- Continued fence maintenance and monitoring.

Preliminary Waste Disposal Characterization: In preparation for future response actions, a preliminary in-situ disposal characterization program was completed to help determine if site soils may be classified as a hazardous waste once generated.

On October 21, 2019, Tighe & Bond personnel collected 10 soil samples (HB-201 through HB-210) from the subject site in areas where total arsenic concentrations had previously been detected at concentrations above 500 milligrams per kilogram in shallow soils. During this event, Tighe & Bond surveyed the approximate sampling locations using a Global Positioning System (GPS) unit with sub-meter accuracy. The approximate locations of these additional shallow soil samples are depicted on Figure 5 in Appendix A.

The soil samples were collected using hand tools from the top two feet (or less) from below the grass and organic layer in these areas. Between sampling locations, the equipment was wiped down and then washed with a brush and non-phosphate detergent (i.e.,alconox) solution. Each sample was submitted for toxicity characteristic leaching procedure (TCLP) analysis for arsenic.

Off-Site Sediment Sample Collection: As you are also aware, a neighboring resident at 37 Proctor Street (i.e., east of the park across Proctor Street) discussed with MassDEP their concerns about potential impacts associated with a drainage swale to the rear of their property. Based on our research, that swale is connected to and receives flow from the underground storm drain system that crosses 50 Proctor Street park parcel and historical mapping indicates that it was likely part of an open stream channel that previously crossed the subject site and the properties across Proctor Street during earlier tannery operations.

In an email dated September 4, 2019, Tighe & Bond submitted a proposed sediment sampling plan to MassDEP for review and comment. In an email dated September 5, 2019, Erik Johnson acknowledged receipt of that plan, and had no comments relative to that scope. During a site meeting with MassDEP and EPA personnel on September 11, 2019, the drainage swale area was also reviewed, and it was generally agreed that the flow in the swale through the culverted system is constant (i.e., this is a culverted stream channel).

On October 21, 2019, Tighe & Bond personnel collected sediment samples from the off-site drainage swale area for laboratory analysis. During this event, Tighe & Bond surveyed the approximate sampling locations using the GPS unit, to the extent feasible. Prior to this event, the City obtained access permission for Tighe & Bond from the affected property owners.

Tighe & Bond collected 10 sediment samples (ID: SED-1 through SED-10) from the swale. The base of this open "stream channel" is approximately 50 feet in length, and sampling was conducted from "downstream to upstream" at approximate 5-foot intervals. The approximate locations of the samples are depicted on the Off-Site Sediment Sampling Plan provided as Figure 6 in Appendix A. At the time of this event, the water level in the drainage swale was generally 6 to 10 inches in depth, with slightly deeper depths where the drainage swale begins (i.e., at the discharge culvert for the stream). The width of the surface flow within the drainage swale was generally between approximately 3 and 4 feet, as it narrows to the

approximate 18-inch concrete effluent culvert pipe on the downstream portion of the drainage swale. In general, no stagnant water was observed in the swale. The steep bank areas surrounding the base of the drainage swale generally consists of rip-rap rock and/or small boulders, with overgrown vegetation.

Using dedicated scoopulas , Tighe Bond collected sediment samples from approximately 0 to 6-inches below surface grade at each location. In general, the sample descriptions were very consistent at each location (except SED-1), with sediment samples generally consisting of coarse sand, some gravel and trace silt. At sample SED-1 location, fine to coarse sand, little gravel, and trace silt were encountered. No organics were encountered in the sediments at each location.

Each of the sediment sample was submitted for laboratory analysis of arsenic.

Fence Maintenance and Monitoring: Consistent with the program reviewed in the September 2019 IRA Status Report submittal, the City has continued their weekly inspections of the temporary construction fencing as part of IRA “maintenance and monitoring program” for the site. Copies of field sheets for the first two inspection events are provided in Appendix D.

It should be also mentioned that MassDEP visited the site with Tighe & Bond on October 21, 2019 and it was noted that one section of the construction fence was missing. Following an email notification between the City, MassDEP, and Tighe & Bond on this date, the City had this fence section area replaced.

During a November 7, 2019 site visit, we observed the on-going cleanup work that is being conducted by Environmental Protection Agency’s (EPA’s) Emergency Response and Removal Section (under MassDEP oversight) to the rear of the 1, 3 and 5 Langdon Street properties abutting the subject site to the north under separate off-site RTN 3-35400. As MassDEP is aware, a portion of the subject Mansell Field area is being used by EPA (through an access agreement with the City) for staging equipment and for accessing the rear portions of these three residential properties for their contaminated soil excavation work. Further discussion regarding these activities along (and over) the City’s property line will be presented in future submittals.

Lastly, during our visits, we also noted the polyethylene sheeting that was placed over each of the former test pit areas within this fenced-in area were each still intact (i.e., weighted down).

Laboratory Results and Discussion

The soil and sediment samples collected during the activities described above were submitted to ESS Laboratory (ESS) of Cranston, Rhode Island for analysis. Summary tables are provided in Appendix C, and the laboratory reports are provided in Appendix D.

Preliminary Waste Disposal Characterization Results: Table 1 provided in Appendix C summarizes the results for the 10 shallow soil samples submitted for TCLP arsenic analysis. Within the table, TCLP arsenic results are reporting in milligram per liter (mg/L) with results compared to the hazardous waste threshold of 5 mg/L for arsenic.

As summarized in Table 1, TCLP arsenic was below the hazardous waste threshold of 5 mg/L in each of the samples, except in sample HB-203 which had TCLP arsenic at 5.5 mg/L. Tighe & Bond subsequently requested that the laboratory analyze the three samples with the highest TCLP arsenic results for total arsenic. Those results are also summarized in Table 1 and compared to Method 1, S-1 standard of 20 milligrams per kilogram (mg/kg) for reference. As shown, arsenic concentrations in these three samples ranged between 480 mg/kg and 1,170 mg/kg which is consistent with previous site findings.

Based on these findings, it appears the majority of soils at the subject site would not be characterized as hazardous waste (due to elevated TCLP arsenic levels) once soils are generated for off-site disposal.

Sediment Sample Results: Table 2 provided in Appendix C summarizes the results for the 10 sediment samples collected from the off-site drainage swale. Within Table 2, sediment results are compared to Probable Effects Concentrations (PECs), as referenced in MassDEP's Revised Sediment Screening Values, technical update document of January 2006. For further reference, sediment results are also compared to Method 1, S-1 standards.

As summarized in Table 2, arsenic detections in the 10 sediment samples ranged between 3.70 mg/kg and 8.10 mg/kg, well below the PEC screening value of 33 mg/kg.

Based on these findings, there is no evidence that former tannery operations at the 50 Proctor Street park parcel (i.e., subject of RTN 3-35355) has impacted the off-site drainage swale via stormwater runoff and/or from the earlier stream flow across the park parcel.

Management of Remediation Waste

No remediation wastes were generated during the IRA activities described herein.

Description of Remaining IRA

As documented in earlier submittals, the IRA condition at the site has not been eliminated because the construction fence is "temporary" in nature, and therefore the IH condition in site soils is still a concern that requires continued monitoring and maintenance until either permanent fencing is installed and/or cleanup response actions are completed. Therefore, the City will continue the fence maintenance and monitoring program, until either a permanent fence is installed and/or site remediation occurs.

If you have any questions or comments, please feel free to me at 413.572.3222 (office) or 617.548.8939 (cell) at your earliest convenience.

Very truly yours,

TIGHE & BOND, INC.



Todd D. Kirton, LSP
Senior Hydrologist

Appendices

Appendix A – Figures

Appendix B – Summary Tables

Appendix C – Laboratory Reports

Appendix D – Copies of City's Weekly Inspection Sheets (August through October 2019)

Appendix E – Report Limitations

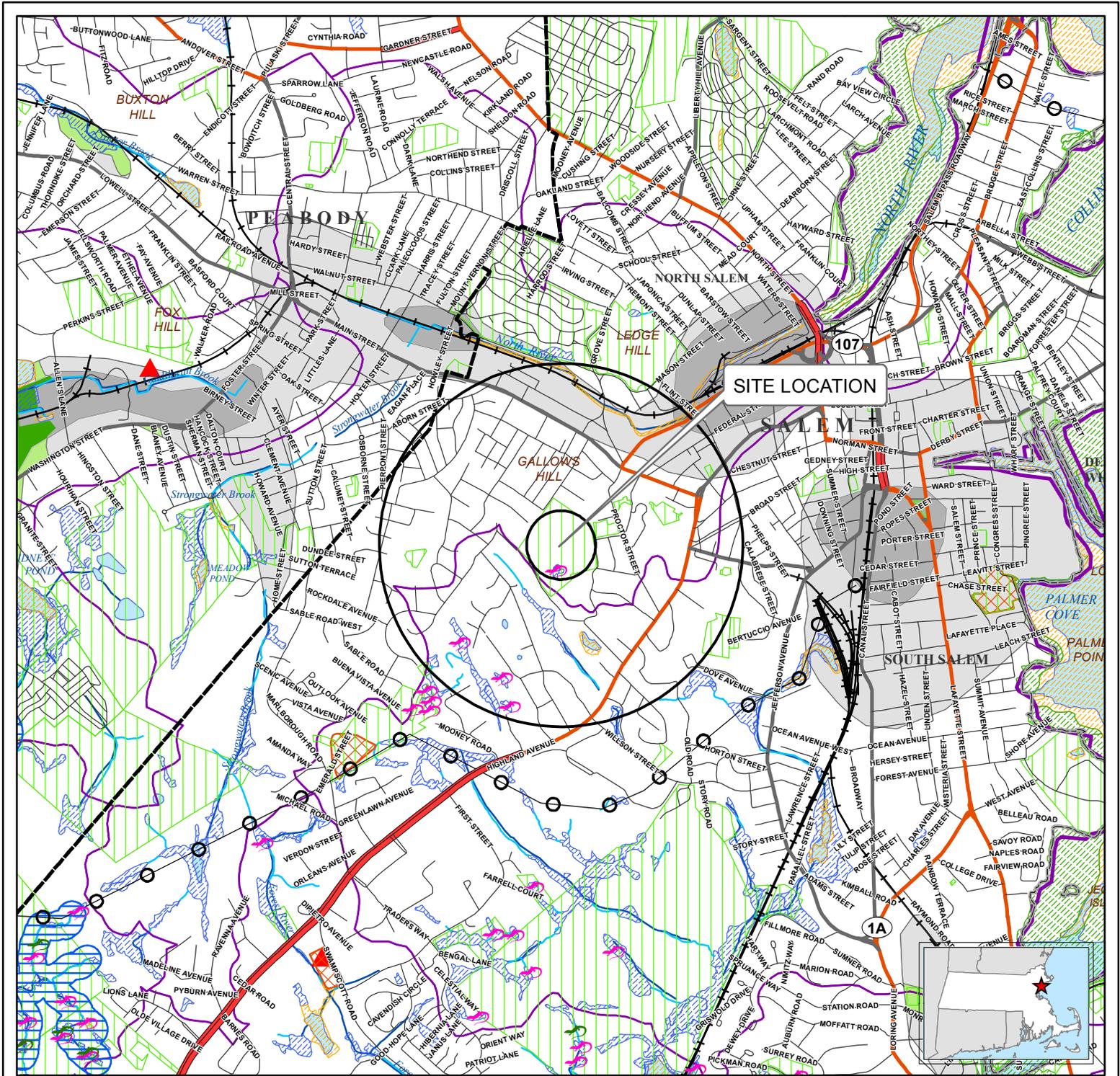
Tighe&Bond

APPENDIX A



FIGURE 1
SITE LOCATION

Gallows Hill Park
Salem, Massachusetts



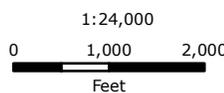
Legend

- | | | |
|---|--|---|
| NHESP Certified Vernal Pools | Powerline | MassDEP Open Water |
| NHESP Potential Vernal Pools | Pipeline | MassDEP Inland Wetlands |
| Non-Landfill Solid Waste Sites | Track or Trail | MassDEP Coastal Wetlands |
| Community Public Water Supply - Surface Water | Trains | MassDEP Not Interpreted Wetlands |
| Community Public Water Supply - Groundwater | Public Surface Water Supply Protection Area (Zone A) | Public Surface Water Supply (PSWS) |
| Non-Community Non-Transient Public Water Supply | DEP Approved Wellhead Protection Area (Zone I) | Water Bodies |
| Non-Community Transient Public Water Supply | DEP Approved Wellhead Protection Area (Zone II) | Non-Potential Drinking Water Source Area - High Yield |
| Limited Access Highway | DEP Interim Wellhead Protection Area (IWPA) | Non-Potential Drinking Water Source Area - Medium Yield |
| Multi-Lane Highway, NOT Limited Access | Protected and Recreational Open Space | Potentially Productive Medium Yield Aquifer |
| Other Numbered Highway | Solid Waste Landfill | Potentially Productive High Yield Aquifer |
| Major Road - Collector | Area of Critical Environmental Concern (ACEC) | County Boundary |
| Minor Street or Road | NHESP Priority Habitats for Rare Species | Town Boundary |
| Aqueducts | NHESP Estimated Habitats for Rare Wildlife | |
| Hydrologic Connections | EPA Designated Sole Source Aquifer | |
| Stream/Intermittent Stream | Major Drainage Basin | |
| | Sub Drainage Basin | |

FIGURE 2
PRIORITY RESOURCE MAP

Gallow's Hill Park
Salem, Massachusetts

Data source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology
Circles indicate 500-foot and half-mile radii.
Data valid as of January 2019.



January 2019

Tighe & Bond
Engineers | Environmental Specialists

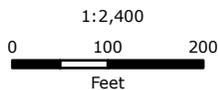


Legend

- Sewer Manholes
 Sewer Pipes
- Drain Manholes
 Drain Pipes
- Hydrants
 Approximate Site Parcel
- Water Mains

Tighe & Bond
 Engineers | Environmental Specialists

Based on MassGIS Color Orthophotography (2013-2014).
 Parcels Boundaries (FY 11) are approximate, downloaded from
 MassGIS. Utility data provided by City of Salem Engineering Dept.



**FIGURE 3
 ORTHOPHOTOGRAPH**

Gallows Hill Park
 Salem, Massachusetts

January 2019



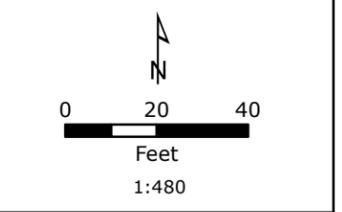
**FIGURE 4
IRA FENCE
MONITORING PLAN**

LEGEND

----- Approximate Location of construction chain link fence installation

□ Disposal Site Boundary Subject RTN 3-35355

See figure 3 for Utility References



NOTES

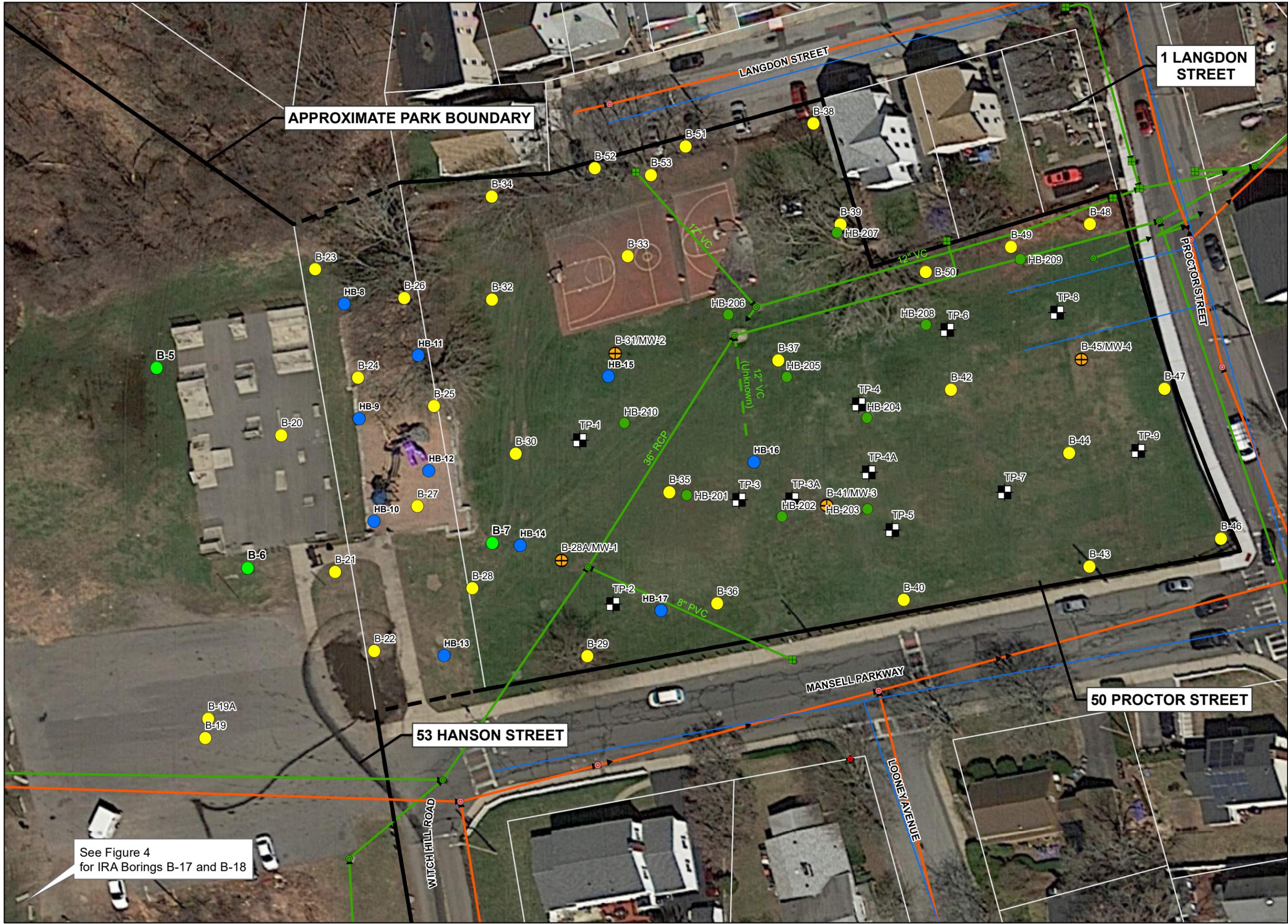
1. Based on MassGIS Color Orthophotography (2013).
2. Parcels (FY 2011) downloaded from MassGIS and are approximate.
3. Utility data provided by City of Salem Engineering Dept.

**Gallows Hill Park
50 Proctor Street
Salem, Massachusetts**

RTN 3-35355

November 2019

Tighe & Bond
Engineers | Environmental Specialists

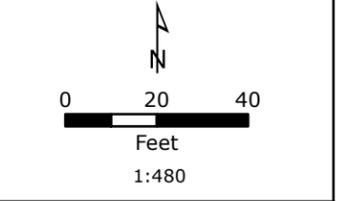


See Figure 4 for IRA Borings B-17 and B-18

FIGURE 5
Preliminary In-Situ Disposal Characterization Sampling Plan

- LEGEND**
- October 2019 Hand Borings for Preliminary Soil Disposal Characterization
 - IRA Soil Boring
 - ⊕ IRA Boring Completed as Well
 - ⊠ IRA Test Pit
 - Earlier Hand Boring Location (Approximate)
 - Earlier Drilling Location (Approximate)
 - - - Approximate Park Boundary

LOCUS MAP



- NOTES**
1. Based on Google(C) Imagery (2018)
 2. Parcels (FY 2011) downloaded from MassGIS and are approximate.
 3. Utility data provided by City of Salem Engineering Dept., and supplemented by camera utility line survey completed by city, 2-6-19

Gallows Hill Park
50 Proctor Street
Salem, Massachusetts

RTN 3-35355

November 2019



FIGURE 6
Off-Site Drainage
Swale Sampling Plan

LEGEND

-  Approximate Sediment Sample Location
-  Approximate Parcel Boundary

LOCUS MAP



0 10 20
 Feet
 1:300

OTHER NOTES

1. Based on Google(C) Imagery (2018)
2. Parcels (FY 2011) downloaded from MassGIS and are approximate.
3. Utility data provided by City of Salem Engineering Dept., and supplemented by camera utility line survey completed by City, 2-6-19
4. Samples collected by Tighe & Bond, October 2019

Gallows Hill Park
50 Proctor Street
Salem, Massachusetts

November 2019

Tighe & Bond
 Engineers | Environmental Specialists



Tighe&Bond

APPENDIX B

TABLE 1 - Summary of Preliminary Soil Disposal Characterization Results

Gallows Hill Park
 50 Proctor Street
 Salem, Massachusetts

| Analyses | MCP - Method 1 Standards S-1/GW-3 | Hazardous Waste Threshold | Sediment Sample: Sample Date: | HB-201 | HB-202 | HB-203 | HB-204 | HB-205 | HB-206 | HB-207 | HB-208 | HB-209 | HB-210 |
|-------------------------------|--------------------------------------|---------------------------|----------------------------------|----------|----------|-------------|----------|----------|----------|----------|----------|----------|----------|
| | | | | 10/21/19 | 10/21/19 | 10/21/19 | 10/21/19 | 10/21/19 | 10/21/19 | 10/21/19 | 10/21/19 | 10/21/19 | 10/21/19 |
| TCLP Metals (mg/L) | | | | | | | | | | | | | |
| Arsenic ⁽¹⁾ | - | 5 | | 2.30 | 0.367 | 5.50 | 4.51 | 3.36 | 3.64 | 0.437 | 0.108 | 0.463 | 2.40 |
| Metals (total - mg/kg) | | | | | | | | | | | | | |
| Arsenic ⁽²⁾ | 20 | - | | - | - | 1,090 | 1,170 | - | 480 | - | - | - | - |

NOTES:

⁽¹⁾ Results reported in milligrams per liter (mg/L)

⁽²⁾ Results in milligrams per kilogram (mg/kg)

TABLE 2 - Summary of Off-Site Drainage Swale Sediment Results

Gallows Hill Park
 50 Proctor Street
 Salem, Massachusetts

| Analyses | MassDEP Sediment Screening Criteria ⁽¹⁾ | MCP - Method 1 Standards | | Sediment Sample: | SED-1 | SED-2 | SED-3 | SED-4 | SED-5 | SED-6 | SED-7 | SED-8 | SED-9 | SED-10 |
|---------------|--|--------------------------|----------|-------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | S-1/GW-2 | S-1/GW-3 | Sample Depth ⁽²⁾ : | 0-6" | 0-6" | 0-6" | 0-6" | 0-6" | 0-6" | 0-6" | 0-6" | 0-6" | 0-6" |
| | | | | Sample Date: | 10/21/19 | 10/21/19 | 10/21/19 | 10/21/19 | 10/21/19 | 10/21/19 | 10/21/19 | 10/21/19 | 10/21/19 | 10/21/19 |
| Metals | | | | | | | | | | | | | | |
| Arsenic | 33 | 20 | 20 | | 3.71 | 4.43 | 7.50 | 3.70 | 4.54 | 5.60 | 6.98 | 5.78 | 8.10 | 5.23 |

NOTES:

Results in milligrams per kilogram (mg/kg)

⁽¹⁾ Probable Effects Concentrations (PECs), as referenced in MassDEP's Revised Sediment Screening Values, technical update document of January 2006.

⁽²⁾ Sample depth considered approximate.

Tighe&Bond

APPENDIX C



CERTIFICATE OF ANALYSIS

Todd Kirton
Tighe & Bond
120 Front Street, Suite 7
Worcester, MA 01608

RE: Gallows Hill Park Salem (S-1758-020)
ESS Laboratory Work Order Number: 19J0737

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

REVIEWED

By ESS Laboratory at 12:46 pm, Oct 29, 2019

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.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0737

SAMPLE RECEIPT

The following samples were received on October 22, 2019 for the analyses specified on the enclosed Chain of Custody Record.

To achieve CAM compliance for MCP data, ESS Laboratory has reviewed all QA/QC Requirements and Performance Standards listed in each method. Holding times and preservation have also been reviewed. All CAM requirements have been performed and achieved unless noted in the project narrative.

Each method has been set-up in the laboratory to reach required MCP standards. The methods for aqueous VOA and Soil Methanol VOA have known limitations for certain analytes. The regulatory standards may not be achieved due to these limitations. In addition, for all methods, matrix interferences, dilutions, and %Solids may elevate method reporting limits above regulatory standards. ESS Laboratory can provide, upon request, a Limit Checker (regulatory standard comparison spreadsheet) electronic deliverable which will highlight these exceedances.

Question I: All samples for Metals were analyzed for a subset of the required MCP list per the client's request.

| Lab Number | Sample Name | Matrix | Analysis |
|-------------------|--------------------|---------------|------------------|
| 19J0737-01 | HB-201 | Soil | 1311, 1311/6010C |
| 19J0737-02 | HB-202 | Soil | 1311, 1311/6010C |
| 19J0737-03 | HB-203 | Soil | 1311, 1311/6010C |
| 19J0737-04 | HB-204 | Soil | 1311, 1311/6010C |
| 19J0737-05 | HB-205 | Soil | 1311, 1311/6010C |
| 19J0737-06 | HB-206 | Soil | 1311, 1311/6010C |
| 19J0737-07 | HB-207 | Soil | 1311, 1311/6010C |
| 19J0737-08 | HB-208 | Soil | 1311, 1311/6010C |
| 19J0737-09 | HB-209 | Soil | 1311, 1311/6010C |
| 19J0737-10 | HB-210 | Soil | 1311, 1311/6010C |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0737

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

[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: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0737

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

- 1010A - Flashpoint
- 6010C - ICP
- 6020A - ICP MS
- 7010 - Graphite Furnace
- 7196A - Hexavalent Chromium
- 7470A - Aqueous Mercury
- 7471B - Solid Mercury
- 8011 - EDB/DBCP/TCP
- 8015C - GRO/DRO
- 8081B - Pesticides
- 8082A - PCB
- 8100M - TPH
- 8151A - Herbicides
- 8260B - VOA
- 8270D - SVOA
- 8270D SIM - SVOA Low Level
- 9014 - Cyanide
- 9038 - Sulfate
- 9040C - Aqueous pH
- 9045D - Solid pH (Corrosivity)
- 9050A - Specific Conductance
- 9056A - Anions (IC)
- 9060A - TOC
- 9095B - Paint Filter
- MADEP 04-1.1 - EPH
- MADEP 18-2.1 - VPH

Prep Methods

- 3005A - Aqueous ICP Digestion
- 3020A - Aqueous Graphite Furnace / ICP MS Digestion
- 3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
- 3060A - Solid Hexavalent Chromium Digestion
- 3510C - Separatory Funnel Extraction
- 3520C - Liquid / Liquid Extraction
- 3540C - Manual Soxhlet Extraction
- 3541 - Automated Soxhlet Extraction
- 3546 - Microwave Extraction
- 3580A - Waste Dilution
- 5030B - Aqueous Purge and Trap
- 5030C - Aqueous Purge and Trap
- 5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0737

MassDEP Analytical Protocol Certification Form

MADEP RTN: _____

This form provides certification for the following data set: **19J0737-01 through 19J0737-10**

Matrices: () Ground Water/Surface Water Soil/Sediment () Drinking Water () Air () Other: _____

CAM Protocol (check all that apply below):

- | | | | | | |
|--|--|--|---|--|---|
| <input type="checkbox"/> 8260 VOC CAM II A | <input type="checkbox"/> 7470/7471 Hg CAM III B | <input type="checkbox"/> MassDEP VPH (GC/PID/FID) CAM IV A | <input type="checkbox"/> 8082 PCB CAM V A | <input type="checkbox"/> 9014 Total Cyanide/PAC CAM VI A | <input type="checkbox"/> 6860 Perchlorate CAM VIII B |
| <input type="checkbox"/> 8270 SVOC CAM II B | <input type="checkbox"/> 7010 Metals CAM III C | <input type="checkbox"/> MassDEP VPH (GC/MS) CAM IV C | <input type="checkbox"/> 8081 Pesticides CAM V B | <input type="checkbox"/> 7196 Hex Cr CAM VI B | <input type="checkbox"/> MassDEP APH CAM IX A |
| <input checked="" type="checkbox"/> 6010 Metals CAM III A | <input type="checkbox"/> 6020 Metals CAM III D | <input type="checkbox"/> MassDEP EPH CAM IV B | <input type="checkbox"/> 8151 Herbicides CAM V C | <input type="checkbox"/> Explosives CAM VIII A | <input type="checkbox"/> TO-15 VOC CAM IX B |

Affirmative responses to questions A through F are required for "Presumptive Certainty" status

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

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

- G Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocols(s)? Yes No ()*
- Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.*
- H Were all QC performance standards specified in the CAM protocol(s) achieved? Yes No ()*
- I Were results reported for the complete analyte list specified in the selected CAM protocol(s)? Yes No ()*

**All negative responses must be addressed in an attached laboratory narrative.*

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

Signature: Laurel Stoddard
Printed Name: Laurel Stoddard

Date: October 28, 2019
Position: Laboratory Director



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-201
Date Sampled: 10/21/19 11:00
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-01
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>TCLP Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|-------------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 2.30 (0.050) | | 1311/6010C | | 1 | KJK | 10/24/19 3:22 | 50 | 50 | CJ92361 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-201
Date Sampled: 10/21/19 11:00
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-01
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>Batch</u> |
|---------------------|---|------------|---------------|--------------|-----------|----------------|-----------------|--------------|
| Temperature (Min C) | 20.7 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Max C) | 21.5 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Range) | Temperature is not within 23 +/-2 °C. (N/A) | | | | | | | |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-202
Date Sampled: 10/21/19 11:10
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-02
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>TCLP Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|-------------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 0.367 (0.050) | | 1311/6010C | | 1 | KJK | 10/24/19 3:26 | 50 | 50 | CJ92361 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-202
Date Sampled: 10/21/19 11:10
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-02
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>Batch</u> |
|---------------------|---|------------|---------------|--------------|-----------|----------------|-----------------|--------------|
| Temperature (Min C) | 20.7 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Max C) | 21.5 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Range) | Temperature is not within 23 +/-2 °C. (N/A) | | | | | | | |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-203
Date Sampled: 10/21/19 11:20
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-03
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>TCLP Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|-------------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 5.50 (0.050) | | 1311/6010C | | 1 | KJK | 10/24/19 3:30 | 50 | 50 | CJ92361 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-203
Date Sampled: 10/21/19 11:20
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-03
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>Batch</u> |
|---------------------|---|------------|---------------|--------------|-----------|----------------|-----------------|--------------|
| Temperature (Min C) | 20.7 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Max C) | 21.5 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Range) | Temperature is not within 23 +/-2 °C. (N/A) | | | | | | | |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-204
Date Sampled: 10/21/19 11:30
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-04
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>TCLP Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|-------------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 4.51 (0.050) | | 1311/6010C | | 1 | KJK | 10/24/19 3:36 | 50 | 50 | CJ92361 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-204
Date Sampled: 10/21/19 11:30
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-04
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>Batch</u> |
|---------------------|---|------------|---------------|--------------|-----------|----------------|-----------------|--------------|
| Temperature (Min C) | 20.7 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Max C) | 21.5 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Range) | Temperature is not within 23 +/-2 °C. (N/A) | | | | | | | |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-205
Date Sampled: 10/21/19 12:00
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-05
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>TCLP Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|-------------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 3.36 (0.050) | | 1311/6010C | | 1 | KJK | 10/24/19 3:54 | 50 | 50 | CJ92361 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-205
Date Sampled: 10/21/19 12:00
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-05
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>Batch</u> |
|---------------------|---|------------|---------------|--------------|-----------|----------------|-----------------|--------------|
| Temperature (Min C) | 20.7 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Max C) | 21.5 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Range) | Temperature is not within 23 +/-2 °C. (N/A) | | | | | | | |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-206
Date Sampled: 10/21/19 12:10
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-06
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>TCLP Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|-------------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 3.64 (0.050) | | 1311/6010C | | 1 | KJK | 10/24/19 3:59 | 50 | 50 | CJ92361 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-206
Date Sampled: 10/21/19 12:10
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-06
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>Batch</u> |
|---------------------|---|------------|---------------|--------------|-----------|----------------|-----------------|--------------|
| Temperature (Min C) | 20.7 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Max C) | 21.5 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Range) | Temperature is not within 23 +/-2 °C. (N/A) | | | | | | | |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-207
Date Sampled: 10/21/19 12:20
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-07
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>TCLP Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|-------------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 0.437 (0.050) | | 1311/6010C | | 1 | KJK | 10/24/19 4:05 | 50 | 50 | CJ92361 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-207
Date Sampled: 10/21/19 12:20
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-07
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>Batch</u> |
|---------------------|---|------------|---------------|--------------|-----------|----------------|-----------------|--------------|
| Temperature (Min C) | 20.7 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Max C) | 21.5 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Range) | Temperature is not within 23 +/-2 °C. (N/A) | | | | | | | |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-208
Date Sampled: 10/21/19 12:30
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-08
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>TCLP Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|-------------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 0.108 (0.050) | | 1311/6010C | | 1 | KJK | 10/24/19 9:19 | 50 | 50 | CJ92361 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-208
Date Sampled: 10/21/19 12:30
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-08
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>Batch</u> |
|---------------------|---|------------|---------------|--------------|-----------|----------------|-----------------|--------------|
| Temperature (Min C) | 20.7 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Max C) | 21.5 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Range) | Temperature is not within 23 +/-2 °C. (N/A) | | | | | | | |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-209
Date Sampled: 10/21/19 12:40
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-09
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>TCLP Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|-------------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 0.463 (0.050) | | 1311/6010C | | 1 | KJK | 10/24/19 4:13 | 50 | 50 | CJ92361 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-209
Date Sampled: 10/21/19 12:40
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-09
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>Batch</u> |
|---------------------|---|------------|---------------|--------------|-----------|----------------|-----------------|--------------|
| Temperature (Min C) | 20.7 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Max C) | 21.5 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Range) | Temperature is not within 23 +/-2 °C. (N/A) | | | | | | | |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-210
Date Sampled: 10/21/19 12:50
Percent Solids: N/A

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-10
Sample Matrix: Soil
Units: mg/L

Extraction Method: 3005A TCLP

1311 TCLP Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>TCLP Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|-------------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 2.40 (0.050) | | 1311/6010C | | 1 | KJK | 10/24/19 4:19 | 50 | 50 | CJ92361 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-210
Date Sampled: 10/21/19 12:50
Percent Solids: N/A
Initial Volume: 100
Final Volume: 2000
Extraction Method: 1311

ESS Laboratory Work Order: 19J0737
ESS Laboratory Sample ID: 19J0737-10
Sample Matrix: Soil
Units: °C
Analyst: DEL
Prepared: 10/22/19 22:00

TCLP Extraction by 1311

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>Batch</u> |
|---------------------|---|------------|---------------|--------------|-----------|----------------|-----------------|--------------|
| Temperature (Min C) | 20.7 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Max C) | 21.5 (N/A) | | 1311 | | 1 | DEL | 10/23/19 15:15 | CJ92250 |
| Temperature (Range) | Temperature is not within 23 +/-2 °C. (N/A) | | | | | | | |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0737

Quality Control Data

| Analyte | Result | MRL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Qualifier |
|---------|--------|-----|-------|-------------|---------------|------|-------------|-----|-----------|-----------|
|---------|--------|-----|-------|-------------|---------------|------|-------------|-----|-----------|-----------|

1311 TCLP Metals

Batch CJ92361 - 3005A_TCLP

Blank

| | | | | | | | | | | |
|---------|----|-------|------|--|--|--|--|--|--|--|
| Arsenic | ND | 0.050 | mg/L | | | | | | | |
|---------|----|-------|------|--|--|--|--|--|--|--|

LCS

| | | | | | | | | | | |
|---------|-------|-------|------|--------|--|-----|--------|--|--|--|
| Arsenic | 0.508 | 0.050 | mg/L | 0.5000 | | 102 | 80-120 | | | |
|---------|-------|-------|------|--------|--|-----|--------|--|--|--|

LCS Dup

| | | | | | | | | | | |
|---------|-------|-------|------|--------|--|-----|--------|---|----|--|
| Arsenic | 0.521 | 0.050 | mg/L | 0.5000 | | 104 | 80-120 | 2 | 20 | |
|---------|-------|-------|------|--------|--|-----|--------|---|----|--|



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0737

Notes and Definitions

- Z18 Temperature is not within 23 +/- 2 °C.
- U Analyte included in the analysis, but not detected
- ND Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- MDL Method Detection Limit
- MRL Method Reporting Limit
- LOD Limit of Detection
- LOQ Limit of Quantitation
- DL Detection 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.
- NR No Recovery
- [CALC] Calculated Analyte
- SUB Subcontracted analysis; see attached report
- RL Reporting Limit
- EDL Estimated Detection Limit
- MF Membrane Filtration
- MPN Most Probably Number
- TNTC Too numerous to Count
- CFU Colony Forming Units



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0737

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

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

http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutOfStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002

<http://www.maine.gov/dhhs/meecd/environmental-health/dwp/partners/labCert.shtml>

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: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

<http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx>

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Tighe & Bond - KPB/TB/MM

ESS Project ID: 19J0737
 Date Received: 10/22/2019
 Project Due Date: 10/29/2019
 Days for Project: 5 Day

Shipped/Delivered Via: ESS Courier

- 1. Air bill manifest present? No
Air No.: NA
- 2. Were custody seals present? No
- 3. Is radiation count <100 CPM? Yes
- 4. Is a Cooler Present? Yes
Temp: 0.3 Iced with: Ice
- 5. Was COC signed and dated by client? Yes

- 6. Does COC match bottles? Yes
- 7. Is COC complete and correct? Yes
- 8. Were samples received intact? Yes
- 9. Were labs informed about short holds & rushes? Yes / No / NA
- 10. Were any analyses received outside of hold time? Yes / No

11. Any Subcontracting needed? Yes / No
 ESS Sample IDs: _____
 Analysis: _____
 TAT: _____

12. Were VOAs received? Yes / No
 a. Air bubbles in aqueous VOAs? Yes / No
 b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? Yes / No
 a. If metals preserved upon receipt: Date: _____ Time: _____ By: _____
 b. Low Level VOA vials frozen: Date: _____ Time: _____ By: _____

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / No
 a. Was there a need to contact the client? Yes / No
 Who was contacted? _____ Date: _____ Time: _____ By: _____

| Sample Number | Container ID | Proper Container | Air Bubbles Present | Sufficient Volume | Container Type | Preservative | Record pH (Cyanide and 608 Pesticides) |
|---------------|--------------|------------------|---------------------|-------------------|--------------------|--------------|--|
| 01 | 401811 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 02 | 401810 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 03 | 401809 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 04 | 401808 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 05 | 401807 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 06 | 401806 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 07 | 401805 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 08 | 401804 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 09 | 401803 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 10 | 401802 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |

2nd Review

Were all containers scanned into storage/lab? Initials mt
 Are barcode labels on correct containers? Yes / No
 Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA
 Are all Hex Chrome stickers attached? Yes / No / NA
 Are all QC stickers attached? Yes / No / NA
 Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: [Signature] Date & Time: 10/22/19 2050

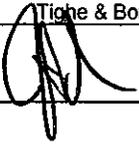
ESS Laboratory Sample and Cooler Receipt Checklist

Client: Tighe & Bond - KPBTB/MM

ESS Project ID: 19J0737

Date Received: 10/22/2019

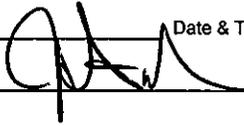
Reviewed
By:



Date & Time:

10/22/19 2:10

Delivered
By:



11/22/19 2:10

ESS Laboratory

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

CHAIN OF CUSTODY

Turn Time: Std. 5 day Rush:
 Regulatory State: MA

Is this project for any of the following?:
 MA-MCP CT-RCP RGP Remediation

Project # S-1752 Project Name Gallows Hill Park, Salem MA

Address 120 Front St PO #

City Warwick State MA Zip Code 01088

Telephone Number 401-238-1111 Email Address Kelvin.D.Edgecomb.com / TK@KlimoDiagnostics.com

ESS Lab # 1950737

Reporting Limits S-1 / S-2 / S-3

Electronic Deliverables Limit Checker Excel Other (Please Specify) → PDF

| ESS Lab ID | Collection Date | Collection Time | Sample Type | Sample Matrix | Sample ID | Analysis |
|------------|-----------------|-----------------|-------------|---------------|-----------|----------|
| 1 | 10/21/19 | 11:00 | 6 | S | HB-201 | X |
| 2 | | 11:10 | | | HB-202 | X |
| 3 | | 11:20 | | | HB-203 | X |
| 4 | | 11:30 | | | HB-204 | X |
| 5 | | 12:00 | | | HB-205 | X |
| 6 | | 12:10 | | | HB-206 | X |
| 7 | | 12:20 | | | HB-207 | X |
| 8 | | 12:30 | | | HB-208 | X |
| 9 | | 12:40 | | | HB-209 | X |
| 10 | | 12:50 | | | HB-210 | X |

Container Type: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAc2, NaOH 9-NH4Cl 10-DI H2O 11-Other* ag
 Preservation Code: 10 Number of Containers: 10

Laboratory Use Only

Cooler Present: Seals Intact:

Cooler Temperature: 0.5°C

Relinquished by: (Signature, Date & Time) [Signature] 10/21/19 16:30

Relinquished by: (Signature, Date & Time) [Signature] 10/22/19 19:09

Relinquished by: (Signature, Date & Time) [Signature] 10/22/19 13:07

Relinquished by: (Signature, Date & Time) [Signature] 10/22/19 13:07

Sampled by: KCC

Comments: Please specify "Other" preservative and containers types in this space
Use Gallows Hill, Salem Pumps



CERTIFICATE OF ANALYSIS

Todd Kirton
Tighe & Bond
120 Front Street, Suite 7
Worcester, MA 01608

RE: Gallows Hill Park Salem (S-1758-020)
ESS Laboratory Work Order Number: 19J0738

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

REVIEWED
By ESS Laboratory at 12:50 pm, Oct 29, 2019

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.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0738

SAMPLE RECEIPT

The following samples were received on October 22, 2019 for the analyses specified on the enclosed Chain of Custody Record.

To achieve CAM compliance for MCP data, ESS Laboratory has reviewed all QA/QC Requirements and Performance Standards listed in each method. Holding times and preservation have also been reviewed. All CAM requirements have been performed and achieved unless noted in the project narrative.

Each method has been set-up in the laboratory to reach required MCP standards. The methods for aqueous VOA and Soil Methanol VOA have known limitations for certain analytes. The regulatory standards may not be achieved due to these limitations. In addition, for all methods, matrix interferences, dilutions, and %Solids may elevate method reporting limits above regulatory standards. ESS Laboratory can provide, upon request, a Limit Checker (regulatory standard comparison spreadsheet) electronic deliverable which will highlight these exceedances.

Question I: All samples for Metals were analyzed for a subset of the required MCP list per the client's request.

| Lab Number | Sample Name | Matrix | Analysis |
|-------------------|--------------------|---------------|-----------------|
| 19J0738-01 | SED-1 | Sediment | 6010C |
| 19J0738-02 | SED-2 | Sediment | 6010C |
| 19J0738-03 | SED-3 | Sediment | 6010C |
| 19J0738-04 | SED-4 | Sediment | 6010C |
| 19J0738-05 | SED-5 | Sediment | 6010C |
| 19J0738-06 | SED-6 | Sediment | 6010C |
| 19J0738-07 | SED-7 | Sediment | 6010C |
| 19J0738-08 | SED-8 | Sediment | 6010C |
| 19J0738-09 | SED-9 | Sediment | 6010C |
| 19J0738-10 | SED-10 | Sediment | 6010C |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0738

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

[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: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0738

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

- 1010A - Flashpoint
- 6010C - ICP
- 6020A - ICP MS
- 7010 - Graphite Furnace
- 7196A - Hexavalent Chromium
- 7470A - Aqueous Mercury
- 7471B - Solid Mercury
- 8011 - EDB/DBCP/TCP
- 8015C - GRO/DRO
- 8081B - Pesticides
- 8082A - PCB
- 8100M - TPH
- 8151A - Herbicides
- 8260B - VOA
- 8270D - SVOA
- 8270D SIM - SVOA Low Level
- 9014 - Cyanide
- 9038 - Sulfate
- 9040C - Aqueous pH
- 9045D - Solid pH (Corrosivity)
- 9050A - Specific Conductance
- 9056A - Anions (IC)
- 9060A - TOC
- 9095B - Paint Filter
- MADEP 04-1.1 - EPH
- MADEP 18-2.1 - VPH

Prep Methods

- 3005A - Aqueous ICP Digestion
- 3020A - Aqueous Graphite Furnace / ICP MS Digestion
- 3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
- 3060A - Solid Hexavalent Chromium Digestion
- 3510C - Separatory Funnel Extraction
- 3520C - Liquid / Liquid Extraction
- 3540C - Manual Soxhlet Extraction
- 3541 - Automated Soxhlet Extraction
- 3546 - Microwave Extraction
- 3580A - Waste Dilution
- 5030B - Aqueous Purge and Trap
- 5030C - Aqueous Purge and Trap
- 5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0738

MassDEP Analytical Protocol Certification Form

MADEP RTN: _____

This form provides certification for the following data set: **19J0738-01 through 19J0738-10**

Matrices: Ground Water/Surface Water Soil/Sediment Drinking Water Air Other: _____

CAM Protocol (check all that apply below):

- | | | | | | |
|--|--|--|---|--|---|
| <input type="checkbox"/> 8260 VOC CAM II A | <input type="checkbox"/> 7470/7471 Hg CAM III B | <input type="checkbox"/> MassDEP VPH (GC/PID/FID) CAM IV A | <input type="checkbox"/> 8082 PCB CAM V A | <input type="checkbox"/> 9014 Total Cyanide/PAC CAM VI A | <input type="checkbox"/> 6860 Perchlorate CAM VIII B |
| <input type="checkbox"/> 8270 SVOC CAM II B | <input type="checkbox"/> 7010 Metals CAM III C | <input type="checkbox"/> MassDEP VPH (GC/MS) CAM IV C | <input type="checkbox"/> 8081 Pesticides CAM V B | <input type="checkbox"/> 7196 Hex Cr CAM VI B | <input type="checkbox"/> MassDEP APH CAM IX A |
| <input checked="" type="checkbox"/> 6010 Metals CAM III A | <input type="checkbox"/> 6020 Metals CAM III D | <input type="checkbox"/> MassDEP EPH CAM IV B | <input type="checkbox"/> 8151 Herbicides CAM V C | <input type="checkbox"/> Explosives CAM VIII A | <input type="checkbox"/> TO-15 VOC CAM IX B |

Affirmative responses to questions A through F are required for "Presumptive Certainty" status

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

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

- G Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocols(s)? Yes No *
Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40.1056 (2)(k) and WSC-07-350.
- H Were all QC performance standards specified in the CAM protocol(s) achieved? Yes No *
- I Were results reported for the complete analyte list specified in the selected CAM protocol(s)? Yes No *

**All negative responses must be addressed in an attached laboratory narrative.*

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

Signature: Laurel Stoddard
Printed Name: Laurel Stoddard

Date: October 29, 2019
Position: Laboratory Director



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-1
Date Sampled: 10/21/19 09:00
Percent Solids: 80

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-01
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|--------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 3.71 (2.81) | | 6010C | | 1 | KJK | 10/26/19 14:08 | 2.24 | 100 | CJ92561 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-2
Date Sampled: 10/21/19 09:10
Percent Solids: 84

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-02
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|--------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 4.43 (2.34) | | 6010C | | 1 | KJK | 10/26/19 14:38 | 2.53 | 100 | CJ92561 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-3
Date Sampled: 10/21/19 09:20
Percent Solids: 85

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-03
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|--------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 7.50 (2.44) | | 6010C | | 1 | KJK | 10/26/19 14:57 | 2.4 | 100 | CJ92561 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-4
Date Sampled: 10/21/19 09:30
Percent Solids: 84

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-04
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|--------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 3.70 (2.78) | | 6010C | | 1 | KJK | 10/26/19 15:01 | 2.13 | 100 | CJ92561 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-5
Date Sampled: 10/21/19 09:40
Percent Solids: 84

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-05
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|--------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 4.54 (1.89) | | 6010C | | 1 | KJK | 10/26/19 15:04 | 3.17 | 100 | CJ92561 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-6
Date Sampled: 10/21/19 09:50
Percent Solids: 90

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-06
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|--------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 5.60 (2.76) | | 6010C | | 1 | KJK | 10/26/19 15:20 | 2 | 100 | CJ92561 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-7
Date Sampled: 10/21/19 10:00
Percent Solids: 91

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-07
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|--------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 6.98 (2.15) | | 6010C | | 1 | KJK | 10/26/19 15:24 | 2.55 | 100 | CJ92561 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-8
Date Sampled: 10/21/19 10:10
Percent Solids: 91

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-08
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|--------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 5.78 (2.57) | | 6010C | | 1 | KJK | 10/26/19 15:28 | 2.14 | 100 | CJ92561 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-9
Date Sampled: 10/21/19 10:20
Percent Solids: 87

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-09
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|--------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 8.10 (1.70) | | 6010C | | 1 | KJK | 10/26/19 15:32 | 3.37 | 100 | CJ92561 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: SED-10
Date Sampled: 10/21/19 10:30
Percent Solids: 88

ESS Laboratory Work Order: 19J0738
ESS Laboratory Sample ID: 19J0738-10
Sample Matrix: Sediment
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|--------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 5.23 (1.70) | | 6010C | | 1 | KJK | 10/26/19 15:36 | 3.34 | 100 | CJ92561 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0738

Quality Control Data

| Analyte | Result | MRL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Qualifier |
|---------|--------|-----|-------|-------------|---------------|------|-------------|-----|-----------|-----------|
|---------|--------|-----|-------|-------------|---------------|------|-------------|-----|-----------|-----------|

Total Metals

Batch CJ92561 - 3050B

Blank

| | | | | | | | | | | |
|---------|----|------|-----------|--|--|--|--|--|--|--|
| Arsenic | ND | 2.50 | mg/kg wet | | | | | | | |
|---------|----|------|-----------|--|--|--|--|--|--|--|

LCS

| | | | | | | | | | | |
|---------|-----|------|-----------|-------|--|----|--------|--|--|--|
| Arsenic | 172 | 7.35 | mg/kg wet | 202.0 | | 85 | 80-120 | | | |
|---------|-----|------|-----------|-------|--|----|--------|--|--|--|

LCS Dup

| | | | | | | | | | | |
|---------|-----|------|-----------|-------|--|----|--------|---|----|--|
| Arsenic | 169 | 8.06 | mg/kg wet | 202.0 | | 84 | 80-120 | 2 | 20 | |
|---------|-----|------|-----------|-------|--|----|--------|---|----|--|



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0738

Notes and Definitions

- U Analyte included in the analysis, but not detected
- ND Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- MDL Method Detection Limit
- MRL Method Reporting Limit
- LOD Limit of Detection
- LOQ Limit of Quantitation
- DL Detection 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.
- NR No Recovery
- [CALC] Calculated Analyte
- SUB Subcontracted analysis; see attached report
- RL Reporting Limit
- EDL Estimated Detection Limit
- MF Membrane Filtration
- MPN Most Probably Number
- TNTC Too numerous to Count
- CFU Colony Forming Units



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J0738

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

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

http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutOfStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002

<http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml>

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: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

<http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx>

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Tighe & Bond - KP/B/TB/MM
 Shipped/Delivered Via: ESS Courier

ESS Project ID: 19J0738
 Date Received: 10/22/2019
 Project Due Date: 10/29/2019
 Days for Project: 5 Day

1. Air bill manifest present? No
 Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
 Temp: 0.3 Iced with: Ice
5. Was COC signed and dated by client? Yes

6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. Were labs informed about short holds & rushes? Yes / No NA
10. Were any analyses received outside of hold time? Yes / No

11. Any Subcontracting needed? Yes / No
 ESS Sample IDs: _____
 Analysis: _____
 TAT: _____

12. Were VOAs received? Yes / No
 a. Air bubbles in aqueous VOAs? Yes / No
 b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? Yes / No
 a. If metals preserved upon receipt: Date: _____ Time: _____ By: _____
 b. Low Level VOA vials frozen: Date: _____ Time: _____ By: _____

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / No
 a. Was there a need to contact the client? Yes / No
 Who was contacted? _____ Date: _____ Time: _____ By: _____

| Sample Number | Container ID | Proper Container | Air Bubbles Present | Sufficient Volume | Container Type | Preservative | Record pH (Cyanide and 608 Pesticides) |
|---------------|--------------|------------------|---------------------|-------------------|--------------------|--------------|--|
| 01 | 401821 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 02 | 401820 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 03 | 401819 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 04 | 401818 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 05 | 401817 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 06 | 401816 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 07 | 401815 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 08 | 401814 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 09 | 401813 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |
| 10 | 401812 | Yes | NA | Yes | 4 oz. Jar - Unpres | NP | |

2nd Review

Were all containers scanned into storage/lab? Initials MO
 Are barcode labels on correct containers? Yes / No
 Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA
 Are all Hex Chrome stickers attached? Yes / No / NA
 Are all QC stickers attached? Yes / No / NA
 Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: [Signature] Date & Time: 10/22/19 2054

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Tighe & Bond - KPB/TB/MM ESS Project ID: 19J0738
Date Received: 10/22/2019
Reviewed By: [Signature] Date & Time: 10/22/19 2109
Delivered By: [Signature] 10/22/19 2109



CERTIFICATE OF ANALYSIS

Todd Kirton
Tighe & Bond
120 Front Street, Suite 7
Worcester, MA 01608

RE: Gallows Hill Park Salem (S-1758-020)
ESS Laboratory Work Order Number: 19J1124

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

REVIEWED

By ESS Laboratory at 11:33 am, Nov 08, 2019

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.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J1124

SAMPLE RECEIPT

The following samples were received on October 31, 2019 for the analyses specified on the enclosed Chain of Custody Record.

To achieve CAM compliance for MCP data, ESS Laboratory has reviewed all QA/QC Requirements and Performance Standards listed in each method. Holding times and preservation have also been reviewed. All CAM requirements have been performed and achieved unless noted in the project narrative.

Each method has been set-up in the laboratory to reach required MCP standards. The methods for aqueous VOA and Soil Methanol VOA have known limitations for certain analytes. The regulatory standards may not be achieved due to these limitations. In addition, for all methods, matrix interferences, dilutions, and %Solids may elevate method reporting limits above regulatory standards. ESS Laboratory can provide, upon request, a Limit Checker (regulatory standard comparison spreadsheet) electronic deliverable which will highlight these exceedances.

These samples were originally received on 10/22/2019 as ESS Laboratory Sample IDs 19J0737-03, 19J0737-04, and 19J0737-06.

| <u>Lab Number</u> | <u>Sample Name</u> | <u>Matrix</u> | <u>Analysis</u> |
|-------------------|--------------------|---------------|-----------------|
| 19J1124-01 | HB-203 | Soil | 6010C |
| 19J1124-02 | HB-204 | Soil | 6010C |
| 19J1124-03 | HB-206 | Soil | 6010C |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J1124

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

[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: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J1124

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

- 1010A - Flashpoint
- 6010C - ICP
- 6020A - ICP MS
- 7010 - Graphite Furnace
- 7196A - Hexavalent Chromium
- 7470A - Aqueous Mercury
- 7471B - Solid Mercury
- 8011 - EDB/DBCP/TCP
- 8015C - GRO/DRO
- 8081B - Pesticides
- 8082A - PCB
- 8100M - TPH
- 8151A - Herbicides
- 8260B - VOA
- 8270D - SVOA
- 8270D SIM - SVOA Low Level
- 9014 - Cyanide
- 9038 - Sulfate
- 9040C - Aqueous pH
- 9045D - Solid pH (Corrosivity)
- 9050A - Specific Conductance
- 9056A - Anions (IC)
- 9060A - TOC
- 9095B - Paint Filter
- MADEP 04-1.1 - EPH
- MADEP 18-2.1 - VPH

Prep Methods

- 3005A - Aqueous ICP Digestion
- 3020A - Aqueous Graphite Furnace / ICP MS Digestion
- 3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
- 3060A - Solid Hexavalent Chromium Digestion
- 3510C - Separatory Funnel Extraction
- 3520C - Liquid / Liquid Extraction
- 3540C - Manual Soxhlet Extraction
- 3541 - Automated Soxhlet Extraction
- 3546 - Microwave Extraction
- 3580A - Waste Dilution
- 5030B - Aqueous Purge and Trap
- 5030C - Aqueous Purge and Trap
- 5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J1124

MassDEP Analytical Protocol Certification Form

MADEP RTN: _____

This form provides certification for the following data set: **19J1124-01 through 19J1124-03**

Matrices: () Ground Water/Surface Water Soil/Sediment () Drinking Water () Air () Other: _____

CAM Protocol (check all that apply below):

- | | | | | | |
|--|--|--|---|--|---|
| <input type="checkbox"/> 8260 VOC CAM II A | <input type="checkbox"/> 7470/7471 Hg CAM III B | <input type="checkbox"/> MassDEP VPH (GC/PID/FID) CAM IV A | <input type="checkbox"/> 8082 PCB CAM V A | <input type="checkbox"/> 9014 Total Cyanide/PAC CAM VI A | <input type="checkbox"/> 6860 Perchlorate CAM VIII B |
| <input type="checkbox"/> 8270 SVOC CAM II B | <input type="checkbox"/> 7010 Metals CAM III C | <input type="checkbox"/> MassDEP VPH (GC/MS) CAM IV C | <input type="checkbox"/> 8081 Pesticides CAM V B | <input type="checkbox"/> 7196 Hex Cr CAM VI B | <input type="checkbox"/> MassDEP APH CAM IX A |
| <input checked="" type="checkbox"/> 6010 Metals CAM III A | <input type="checkbox"/> 6020 Metals CAM III D | <input type="checkbox"/> MassDEP EPH CAM IV B | <input type="checkbox"/> 8151 Herbicides CAM V C | <input type="checkbox"/> Explosives CAM VIII A | <input type="checkbox"/> TO-15 VOC CAM IX B |

Affirmative responses to questions A through F are required for "Presumptive Certainty" status

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

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

- | | | |
|---|---|--|
| G | Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocols(s)? Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40.1056 (2)(k) and WSC-07-350. | Yes <input checked="" type="checkbox"/> No ()* |
| H | Were all QC performance standards specified in the CAM protocol(s) achieved? | Yes <input checked="" type="checkbox"/> No ()* |
| I | Were results reported for the complete analyte list specified in the selected CAM protocol(s)? | Yes () No <input checked="" type="checkbox"/> * |

***All negative responses must be addressed in an attached laboratory narrative.**

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

Signature: Laurel Stoddard
Printed Name: Laurel Stoddard

Date: November 08, 2019
Position: Laboratory Director



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-203
Date Sampled: 10/21/19 11:20
Percent Solids: 82

ESS Laboratory Work Order: 19J1124
ESS Laboratory Sample ID: 19J1124-01
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|--------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 1090 (12.2) | | 6010C | | 1 | KJK | 11/07/19 17:56 | 0.5 | 100 | CK90663 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-204
Date Sampled: 10/21/19 11:30
Percent Solids: 77

ESS Laboratory Work Order: 19J1124
ESS Laboratory Sample ID: 19J1124-02
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|--------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 1170 (6.84) | | 6010C | | 1 | KJK | 11/07/19 18:00 | 0.95 | 100 | CK90663 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem
Client Sample ID: HB-206
Date Sampled: 10/21/19 12:10
Percent Solids: 74

ESS Laboratory Work Order: 19J1124
ESS Laboratory Sample ID: 19J1124-03
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

| <u>Analyte</u> | <u>Results (MRL)</u> | <u>MDL</u> | <u>Method</u> | <u>Limit</u> | <u>DF</u> | <u>Analyst</u> | <u>Analyzed</u> | <u>I/V</u> | <u>F/V</u> | <u>Batch</u> |
|----------------|----------------------|------------|---------------|--------------|-----------|----------------|-----------------|------------|------------|--------------|
| Arsenic | 480 (6.05) | | 6010C | | 1 | KJK | 11/07/19 18:05 | 1.12 | 100 | CK90663 |



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J1124

Quality Control Data

| Analyte | Result | MRL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Qualifier |
|---------|--------|-----|-------|-------------|---------------|------|-------------|-----|-----------|-----------|
|---------|--------|-----|-------|-------------|---------------|------|-------------|-----|-----------|-----------|

Total Metals

Batch CK90663 - 3050B

Blank

| | | | | | | | | | | |
|---------|----|------|-----------|--|--|--|--|--|--|--|
| Arsenic | ND | 2.50 | mg/kg wet | | | | | | | |
|---------|----|------|-----------|--|--|--|--|--|--|--|

LCS

| | | | | | | | | | | |
|---------|-----|------|-----------|-------|--|-----|--------|--|--|--|
| Arsenic | 203 | 8.33 | mg/kg wet | 202.0 | | 100 | 80-120 | | | |
|---------|-----|------|-----------|-------|--|-----|--------|--|--|--|

LCS Dup

| | | | | | | | | | | |
|---------|-----|------|-----------|-------|--|-----|--------|-----|----|--|
| Arsenic | 204 | 6.85 | mg/kg wet | 202.0 | | 101 | 80-120 | 0.4 | 20 | |
|---------|-----|------|-----------|-------|--|-----|--------|-----|----|--|



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J1124

Notes and Definitions

- U Analyte included in the analysis, but not detected
- ND Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- MDL Method Detection Limit
- MRL Method Reporting Limit
- LOD Limit of Detection
- LOQ Limit of Quantitation
- DL Detection 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.
- NR No Recovery
- [CALC] Calculated Analyte
- SUB Subcontracted analysis; see attached report
- RL Reporting Limit
- EDL Estimated Detection Limit
- MF Membrane Filtration
- MPN Most Probably Number
- TNTC Too numerous to Count
- CFU Colony Forming Units



CERTIFICATE OF ANALYSIS

Client Name: Tighe & Bond
Client Project ID: Gallows Hill Park Salem

ESS Laboratory Work Order: 19J1124

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

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

http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutOfStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002

<http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml>

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: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

<http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx>

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Tighe & Bond - KPB/TB/MM

ESS Project ID: 19J1124

Date Received: 10/31/2019

Shipped/Delivered Via: ESS Courier

Project Due Date: 11/7/2019

Days for Project: 5 Day

- 1. Air bill manifest present? No
Air No.: NA
- 2. Were custody seals present? No
- 3. Is radiation count <100 CPM? Yes
- 4. Is a Cooler Present? NA
Temp: N/A Iced with: None
- 5. Was COC signed and dated by client? Yes

- 6. Does COC match bottles? Yes
- 7. Is COC complete and correct? Yes
- 8. Were samples received intact? Yes
- 9. Were labs informed about **short holds & rushes**? Yes / No / NA
- 10. Were any analyses received outside of hold time? Yes / No

- 11. Any Subcontracting needed? Yes / No
ESS Sample IDs: _____
Analysis: _____
TAT: _____

- 12. Were VOAs received? Yes / No
 - a. Air bubbles in aqueous VOAs? Yes / No
 - b. Does methanol cover soil completely? Yes / No / NA

- 13. Are the samples properly preserved? Yes / No
 - a. If metals preserved upon receipt: Date: _____ Time: _____ By: _____
 - b. Low Level VOA vials frozen: Date: _____ Time: _____ By: _____

Sample Receiving Notes:

INVOICE

- 14. Was there a need to contact Project Manager? Yes / No
 - a. Was there a need to contact the client? Yes / No
- Who was contacted? _____ Date: _____ Time: _____ By: _____

| Sample Number | Container ID | Proper Container | Air Bubbles Present | Sufficient Volume | Container Type | Preservative | Record pH (Cyanide and 608 Pesticides) |
|---------------|--------------|------------------|---------------------|-------------------|----------------|--------------|--|
| 01 | 407882 | Yes | NA | Yes | Other | NP | |

2nd Review

- Were all containers scanned into storage/lab?** Initials _____
- Are barcode labels on correct containers? Yes / No
 - Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA
 - Are all Hex Chrome stickers attached? Yes / No / NA
 - Are all QC stickers attached? Yes / No / NA
 - Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: [Signature] Date & Time: 10/31/19 1442

Reviewed By: _____ Date & Time: _____

Delivered By: _____

ESS Laboratory

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

CHAIN OF CUSTODY

Turn Time: *Std. Delay* Rush:

Regulatory State: *MA*

Is this project for any of the following?:

MA-MCP CT-RCP RGP Remediation

Project # *S-1988* Project Name *Callous Hill Park, Salem MA*

Address *120 Front St* PO #

State *MA* Zip Code *01828*

FAX Number *401-461-4486* Email Address *Kelvin.D.Engel@tdk.com*

Company Name *Tighe + Bond*

Contact Person *Kevin Lewis / Todd Kirtan*

City *Worcester*

Telephone Number *508-853-1100*

ESS Lab # *195073* *19J1124*

Reporting Limits *S-1 / S-2 / S-3*

Electronic Deliverables Limit Checker Excel Other (Please Specify) *PDF*

| ESS Lab ID | Collection Date | Collection Time | Sample Type | Sample Matrix | Sample ID | Analysis |
|------------|-----------------|-----------------|-------------|---------------|-----------|----------|
| 1 | 10/21/19 | 11:00 | G | S | HB-201 | X |
| 2 | | 11:10 | | | HB-202 | X |
| 3 | | 11:20 | | | HB-203 | X |
| 4 | | 11:30 | | | HB-204 | X |
| 5 | | 12:00 | | | HB-205 | X |
| 6 | | 12:10 | | | HB-206 | X |
| 7 | | 12:20 | | | HB-207 | X |
| 8 | | 12:30 | | | HB-208 | X |
| 9 | | 12:40 | | | HB-209 | X |
| 10 | | 12:50 | | | HB-210 | X |
| | | | | | | Total As |

Container Type: AG-Amber Glass B-BOD Bottle G-Glass P-Poly S-Sterile V-Vial O-Other
 Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAc2, NaOH 9-NH4Cl 10-DI H2O 11-Other
 Number of Containers: 10

Sampled by: *KCC*

Comments: *Use Callous Hill, Salem MA* Total As added 10/31/19 - PRB

Coder Present: Seals Intact:

Cooler Temperature: *0.5°C*

Relinquished by: (Signature, Date & Time) *[Signature] 10/21/19 16:30*

Relinquished by: (Signature, Date & Time) *[Signature] 10/22/19 19:09*

Relinquished By: (Signature, Date & Time) *[Signature] 10/22/19 13:27*

Relinquished By: (Signature, Date & Time) *[Signature]*

Tighe&Bond

APPENDIX D

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Devine
Signature: [Handwritten Signature]

Title: Senior Planner
Date: 8/1/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Deane

Signature: [Signature]

Title: Senior Planner

Date: 8/8/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Decker

Title: Senior Planner

Signature: [Handwritten Signature]

Date: 8/21/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Deike

Signature: 

Title: Senior Planner

Date: 9/18/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes/No No

If no, describe conditions and corrective actions taken:

DPW to repair damaged fencing @ skate park.

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes/No No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Deane

Title: Sr. Planner

Signature: [Signature]

Date: 9/5/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

Down to repair missing segment.

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Devie

Title: Sr. Planner

Signature: 

Date: 9/18/09

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

Dpw to repair segment that has come down

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Debra

Title: Sr. Planner

Signature: [Handwritten Signature]

Date: 9/15/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes No

If no, describe conditions and corrective actions taken:

Open to repair open fence segment.

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Devine

Title: Sr. Planner

Signature: [Handwritten Signature]

Date: 10/3/10

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes No

If no, describe conditions and corrective actions taken:

Open to six missing fence segments

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Deane
Signature: [Signature]

Title: Sr. Planner
Date: 10/16/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

UPS to repair fence gap

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name:

Tom Devine

Title:

Sr Planner

Signature:

[Handwritten Signature]

Date:

10/15/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes No

If no, describe conditions and corrective actions taken:

DPS to report fence

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Deane

Title: Sr. Planner

Signature: [Handwritten Signature]

Date: 10/20/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

Contractor to repair fence

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom DeMa

Signature: [Signature]

Title: Sr Planner

Date: 4/1/19

City of Salem Inspection Report

Mansell Field at 50 Proctor Street, Salem, MA

FENCING

Is temporary fencing intact? Yes / No

If no, describe conditions and corrective actions taken:

SITE ACTIVITY

Are there any signs of unauthorized activity within the fenced area? Yes / No

If yes, describe conditions and corrective actions taken:

OTHER OBSERVATIONS

Note any other pertinent site observations:

Inspector Name: Tom Deane

Title: Sr. Planner

Signature: [Handwritten Signature]

Date: 4/8/19

Tighe&Bond

APPENDIX E

1. This report has been prepared on behalf of and for the exclusive use of the Client and is subject to and issued in accordance with the Agreement and the provisions thereof. Documents provided on this project shall not, in whole or in part, be disseminated or conveyed to any other party, nor used by any other party without the prior written consent of Tighe & Bond. Reuse of documents by Client or others without Tighe & Bond's written permission and mutual agreement shall be at the user's sole risk, without liability on Tighe & Bond's part and Client agrees to indemnify and hold Tighe & Bond harmless from all claims, damages, and expenses, including attorney's fees, arising out of such unauthorized use or reuse.
2. Tighe & Bond acknowledges and agrees that, subject to the Limitations set forth herein and prior written approval by Tighe & Bond, this report may be provided to specific financial institutions, attorneys, title insurers, lessees and/or governmental agencies identified by Client at or about the time of issuance of the report in connection with the conveyance, mortgaging, leasing, or similar transaction involving the real property which is the subject matter of a report and any work product. Use of this report for any purpose by any persons, firm, entity, or governmental agency shall be deemed acceptance of the restrictions and conditions contained therein, these Limitations and the provisions of Tighe & Bond's Agreement with Client. No warranty, express or implied, is made by way of Tighe & Bond's performance of services or providing an environmental site assessment, including but not limited to any warranty with the contents of a report or with any and all work product.
3. Tighe & Bond performed the subsurface investigation in accordance with our Agreement (including any stated scope and schedule limitations) and used the degree of care and skill ordinarily exercised under similar circumstances by members of the profession practicing in the same or similar locality. The objective of a subsurface investigation is to evaluate the presence or absence of contamination. Where access was denied or conditions obscured, Tighe & Bond provides no opinion or report on such areas. The subsurface investigation may not identify all contaminated media as our scope may be limited to certain locations within a site or due to geologic variability, contamination variability, seasonal conditions, obstructions such as buildings, utilities, or other site features and/or other unknown conditions. Tighe & Bond performed the subsurface investigation using reasonable methods to access and identify the presence of contaminated media. Therefore, additional contaminated media may be present at the site and may be discovered during development and site work, so an appropriate cost contingency should be carried by the Client based on their risk tolerance. Tighe & Bond also makes no opinion or report of contamination that may have migrated off site unless off-site investigations are specifically including in the scope of services.
4. Findings, observations, and conclusions presented in this report, including but not limited to the extent of any subsurface explorations or other tests performed by Tighe & Bond, are limited by the scope of services outlined in the Agreement, which may establish schedule and/or budgetary constraints for an environmental assessment or phase thereof. Furthermore, while it is anticipated that each assessment will be performed in accordance with generally accepted professional practices and applicable standards (such as ASTM, etc.) and applicable state and Federal regulations, as may be further described in the report and/or the Agreement, Tighe & Bond does not assume responsibility for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of its services.

5. In preparing this report, Tighe & Bond, Inc. may have relied on certain information provided by governmental agencies or personnel as well as information and/or representations provided by other persons, firms, or entities, and on information in the files of governmental agencies made available to Tighe & Bond at the time of the site assessment. To the extent that such information, representations, or files may be inaccurate, missing, incomplete or not provided to Tighe & Bond, Tighe & Bond is not responsible. Although there may be some degree of overlap in the information provided by these various sources, Tighe & Bond does not assume responsibility for independently verifying the accuracy, authenticity, or completeness of any and all information reviewed by or received from others during the course of the site assessment.
6. The assessment presented is based solely upon information obtained or received prior to issuance of the report. If additional environmental or other relevant information is developed at a later date, Client agrees to bring such information to the attention of Tighe & Bond promptly. Upon evaluation of such information, Tighe & Bond reserves the right to recommend modification of this report and its conclusions. In addition, dense forested areas on the site created some visual and access limitations during the site reconnaissance.
7. Emerging contaminants, including per- and poly-fluorinated alkyl substances (PFAS), are hazardous materials or mixtures (including naturally occurring or manmade chemical, microbial, or radiological substances) that are characterized by having a perceived or real threat to human health, public safety, or the environment for which there are no published health standards or guidelines and there is insufficient or limited available toxicological information or toxicity information that is evolving or being re-evaluated; or there is not significant new source, pathway, or detection limit information. The state of these compounds is constantly being updated and therefore, Tighe & Bond cannot be held liable for not including these compounds in the list of analytes that are analyzed when our services are performed. Unless otherwise specified, Tighe & Bond will only analyze for compounds ordinarily included under similar circumstances by members of the profession practicing in the same or similar locality. Tighe & Bond will not be liable for not including these or any other compounds in the list of target analytes if information regarding their use is not made available by current or former operators/owners at the facility being evaluated. We will also not be liable for not analyzing for the presence of an emerging contaminant, even if that compound is detected at a later date.
8. Tighe & Bond makes no guarantee or warranty that this report (if provided to a regulatory agency) will pass a regulatory audit/review. The Licensed Site Professional (LSP), Licensed Environmental Professional (LEP), Professional Geologist (PG), Professional Engineer (PE) or other relevant professional licensure and the applicable regulatory reviewing agency may have differences of opinion on aspects of (and approaches to) the assessment, remediation, risk evaluation or closure and the regulatory agency may request additional information, sampling data, analysis and/or remediation. Such differences of opinion will not be interpreted to imply that Tighe & Bond's services were not performed competently and in accordance with the standard of care. If additional investigations, response action evaluations, or discussions are needed following a regulatory audit/review, Tighe & Bond can provide these services under a separate Agreement.

9. If an Opinion of Probable Construction Costs (OPCC) is provided, Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the contractor's method of pricing, and that the opinion of probable costs is made on the basis of Tighe & Bond's professional judgment and experience is based on currently available information. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the actual costs of the construction work will not vary from the OPCC.