GEC Project No. 1785-6080

RELEASE ABATEMENT MEASURE PLAN FOR PCBS AND METALS

COURTYARD BEHIND 169.2 BRIDGE STREET
LOWELL, MASSACHUSETTS
MASSDEP RTN 3-33474

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1.0 INTRODUCTION AND DESCRIPTION OF RELEASES

1.1 Introduction

Goldman Environmental Consultants, Inc., (GEC) of Braintree, Massachusetts was retained by R-M Developer, LLC to conduct response actions at 169.2 Bridge Street, Lowell, Massachusetts. GEC, on behalf of R-M Developer, LLC and Massachusetts Mill III Limited Partnership (owner), has prepared the following Release Abatement Measure (RAM) Plan for the PCB and metal contamination located in the soils of the courtyard located behind 169.2 Bridge Street. The PCB and metal contamination was assigned release tracking number (RTN) 3-33474. Refer to Figure 1 for the Site Locus.

This RAM Plan for RTN 3-33474 is intended to be conducted concurrent with and integral to both: (1) the conditionally-approved Immediate Response Action (IRA) for RTN 3-33101, 3-33793 and 3-33853; and (2) the Application for Risk-Based Cleanup of PCBs, which has been or will be submitted to USEPA Region I. RTN 3-33101 is a release associated with the presence of more than one-half inch of non-aqueous phase liquid (NAPL) in the subsurface of the courtyard. RTN 3-33793 is a release associated with the presence of a petroleum sheen in the Concord River. RTN 3-33853 is a release associated with the presence of asbestos in soils of the courtyard. Remedial actions of the RAM Plan of RTN 3-33474 will be conducted concurrent with the response actions of the IRA Plan Modification for RTN 3-33101 and RTN 3-33853. IRA remedial actions for RTN 3-33793 (petroleum sheen in the Concord River) are unrelated to the RAM remedial actions for RTN 3-33474, and are not discussed herein.

The Immediate Response Action (IRA) Plan Modification for RTNs 3-33101, 3-33793 and 3-33853 was submitted on November 2, 2016, and conditionally approved on November 22, 2016. One of the Site-specific conditions of approval required the submittal of a RAM Plan for RTN 3-33474 to provide a proposal for remediation of the PCBs and heavy metals. The IRA Plan Modification provided specific details on the remediation of the PCBs and heavy metals; therefore, this RAM Plan is a slightly modified version of the conditionally-approved IRA Plan Modification.

This RAM Plan is prepared in accordance with 310 CMR 40.0440, and as required by Site-specific condition no. 1 for the IRA Plan Modification.

1.2 Description of Releases

The original IRA Plan for RTN 3-33101 was submitted on October 20, 2015, and is intended to remediate petroleum contamination associated with the presence of greater than ½-inch of Non-Aqueous Phase Liquid (NAPL) in the subsurface. This condition constitutes a release to the environment pursuant to 310 CMR 40.0313(1) with a 72-hour reporting

obligation. This condition was reported to the Massachusetts Department of Environmental Protection (MassDEP) on August 21, 2015 and was assigned release tracking number (RTN) 3-33101.

Surficial renovation activities within the courtyard began at about the same time as the IRA remedial activities, i.e., in early 2016. The renovation activities entailed the removal of soils from window wells and from the top one foot of soil over a portion of the courtyard, and stockpiling the soils until their disposition could be determined. On February 29, 2016, a soil sample collected from the stockpiled soils was disposal criteria tested, and found to contain 63 mg/kg polychlorinated biphenyls (PCBs) (identified as Aroclor 1254), 23 mg/kg arsenic, 2,400 mg/kg lead, 3,500 mg/kg vanadium, 1,100 mg/kg zinc and 0.29 mg/kg heptachlor epoxide. Each of these hazardous materials was detected at a level exceeding its applicable RCS-1 Reportable Concentration. These soils have since been properly disposed offsite.

On March 17, 2016, MassDEP was notified of the 120-day reportable condition, and the release condition was assigned RTN 3-33474. The access doors within the buildings and the fence gate are locked and signs are posted prohibiting access to the courtyard except by authorized personnel.

During the period March 14 to 30, 2016, after the results of the stockpile soil data were received indicating elevated levels of PCBs, metals and insecticides in soils, additional investigations of the soils throughout the courtyard were conducted to determine the horizontal and vertical extent of the contamination. This investigation encountered a small PCB hot spot with concentrations exceeding 50 mg/kg. The IRA remedial activities began during early March 2016, which included: the removal of the two USTs and confirmatory soil sampling; investigation of soils overlying, within and beneath the concrete fuel oil bunkers; and initial excavation of soils within the concrete bunkers.

During excavation of the soils within the FO-1 fuel oil bunker, as part of the IRA, oil was observed oozing into the excavation at a depth of approximately 5.5 feet below grade. Because of the shallow depth to the petroleum contamination, the discovery that no. 6 fuel oil bunker FO-1 is larger than anticipated, and the levels of PCB and metal contamination in shallow soils, a decision was made to deal with the PCB and metal contamination before continuing with petroleum remediation. Therefore an IRA Plan Modification, dated April 19, 2016, was submitted to the MassDEP outlining steps necessary to remediate the PCB and metal contamination.

RTN 3-33807 was assigned to a release identified as asbestos fibers in soils. This condition was reported to MassDEP on September 14, 2016, at the recommendation of the MassDEP Bureau of Air and Waste, so that the presence of asbestos fibers in soils could be remediated under the MCP rather than under the MassDEP Asbestos Program. A Reportable

Quantity (1 pound) exists for asbestos; however, the condition in the courtyard is not consistent with the 2-hour release notification requirements specified at 310 CMR 40.0311, because the release is not "likely" to have occurred in a period of 24 consecutive hours or less. No Reportable Concentrations exist for asbestos. However, the asbestos release was reported as a 120-day release condition.

Subsequently, MassDEP requested that the asbestos release be reported as a 2-hour reportable condition, even though the mass of asbestos released and time period over which it was released is unknown. On October 12, 2016, a BWSC128 Release Notification form was submitted to MassDEP for the asbestos release, as a 2-hour reportable condition. RTN 3-33853 was assigned to this release. RTN 3-33807, assigned to the 120-day release notification for asbestos, has been or will be retracted. The IRA activities for RTN 3-33853 are consistent with the planned IRA activities for the metal and PCB-contaminated soils, and are included in this IRA

Asbestos fibers were discovered in the courtyard soils as a result of follow-up investigations required by the MassDEP Bureau of Air and Waste, following their inspection of the property on June 9, 2016 in response to a complaint due to dusts exiting a window of the Picker Building during interior renovation activities. Earlier, prior to the start of the renovation activities inside the Picker Building, an asbestos inspection and abatement program had been completed inside the building. The source of the asbestos in soils is uncertain; however, it may have originated from one or more of the following sources: (1) as a result of the historic fire in the Boiler House, which may have dispersed asbestos fibers from insulation within the building; (2) asbestos fibers blowing from the Boiler House, which has broken windows and is open to the courtyard; and / or (3) insulated pipes through the courtyard. The openings in the Boiler House, the asbestos-insulated pipes and demolition of a smoke stack in the courtyard will be addressed as part of a Non-Traditional Asbestos Abatement Work Plan, under the direction of the MassDEP Bureau of Air and Waste.

A new reportable release condition was discovered on September 8, 2016, when an oily sheen was observed seeping beneath the retaining wall of the courtyard into the Concord River. The oily sheen is likely attributable to the drop in the groundwater table as a result of the on-going drought. The tops of the groundwater table and surface water of the Concord River have dropped to below the bottom of the retaining wall separating the courtyard and river. Pursuant to 310 CMR 40.0313(4)(a), the presence of separate-phase oil on surface water is a Condition of Substantial Release Migration associated with RTN 3-33101, and is a separate 72-hour reportable condition. This condition was reported to MassDEP on September 8, 2016 and assigned RTN 3-33793. Although the IRA remedial activities for RTN 3-33793

are included in the conditionally-approved IRA Plan Modification document, they are not pertinent to this RAM are excluded from this document.

A Phase I Initial Site Investigation and Tier Classification Submittal was submitted to MassDEP on August 29, 2016 for RTN 3-33101 and RTN 3-33474, at which time RTN 3-33474 was linked to RTN 3-33101 as a secondary release tracking number. Currently, due to one 2-hour and two 72-hour release notifications, IRA activities are required for RTN 3-33101, RTN 3-33793 and RTN 3-33853.

The conditionally-approved IRA Plan Modification documented provided the following: (1) IRA Plan for RTN 3-33793 (oily sheen release to the Concord River); (2) IRA Plan for RTN 3-33853 (asbestos release); (3) the IRA Plan Modification No. 3 for RTN 3-33101 (NAPL in subsurface); and (4) the IRA Status Report No. 4 for RTN 3-33101 (NAPL in subsurface). The IRA Plans for RTN 3-33793 and RTN 3-33853 are included in the IRA Plan Modification for RTN 3-33101 because the releases are located within the same small courtyard, are at least partially commingled, and/or are the source of the oily sheen discharge to the Concord River.

The IRA Status Report No. 4 provided in the IRA Plan Modification summarized the results of supplemental subsurface investigations taken to determine the horizontal and vertical extent of asbestos and petroleum contamination. It is included in this RAM Plan as well, because it contains interpretations and assessments of the data necessary to understand Site conditions and to support the proposed RAM. For details on IRA activities conducted for RTN 3-33101 through August 11, 2016, please refer to the IRA Status Report, dated, December 15, 2015; the IRA Plan Modification and IRA Status Report No. 2, dated April 19, 2016; and the IRA Plan Modification No. 2 and IRA Status Report No. 3, dated August 11, 2016, for a description of IRAs under taken through August 11, 2016.

At the request of the MassDEP Bureau of Air and Waste, which has regulatory authority over the asbestos contamination, the IRA Plans / IRA Plan Modification describe the complete scope of the planned IRAs. This information is also provided in this RAM Plan. Also, included in the IRA Plan Modification were risk assessments for construction workers and residential exposure to soils of the courtyard, and a Phase III Remedial Action Plan, which evaluates remedial options including the planned placement of PCB-, asbestos- and metal-contaminated soils in subsurface soil repositories and covering all existing courtyard soils (remaining following completion of the IRA and RAM) with a protective barrier. The risk assessments and Phase III Remedial Action Plan are also provided in this RAM Plan.

2.0 SITE DESCRIPTION AND SURROUNDING RECEPTORS

The property where the releases were encountered is located approximately 450 feet southeast of Bridge Street and just northeast of Massmills Drive in Lowell, Massachusetts. The property is a portion of a former mill complex, commonly known as Massachusetts Mills and is located along the Merrimack and Concord Rivers. The property includes a portion of the tax parcel presently identified by the City of Lowell as Lot 169.2 of Block 780 on Map 177, and it is identified as Lot 3B on a Plan of Land of Massachusetts Mills, prepared by R.E. Cameron & Associates, Inc. and dated April 22, 2014. According to available records from the City of Lowell and the North Middlesex Registry of Deeds, the property may be addressed as 169.2 Bridge Street or 150 Massmills Drive. It was previously identified under an umbrella address of 95 Bridge Street. Refer to Figure 1 Site Locus and Figure 2 MassDEP Phase I Site Assessment Map. A Site Plan is provided as Figure 3.

The property consists of an irregularly-shaped, 47,218-square-foot area of land improved with a portion of a three-story brick building, which was formerly utilized as the Boiler House building for the mill and will hereafter be referred to as the "Boiler House." The Boiler House occupies approximately 40% of the property. The property also includes a courtyard south of the Boiler House and the adjacent property. The entire Boiler House is currently vacant and unused. According to the Site contact, the Boiler House building will be redeveloped eventually but there are no plans at present.

The location where the release was encountered (Disposal Site or Site) is located within the triangular shaped courtyard between the Boiler House building to the north and the Picker building to the south, and the Concord River to the east. Please refer to Figure 3.

The Site vicinity contains vacant former mill buildings and redeveloped former mill buildings that are currently used for multi-tenant residential housing. Lots 3A and 3B abut the south side of the courtyard, and are occupied by the Picker Building. The portion of the Picker Building on Lot 3A is currently being redeveloped into a residential apartment building, and the portion of the Picker Building on Lot 3B is being razed to develop parking space for the new residential apartments. Although the courtyard is on the subject property, it will be used as passive open space for residents on the adjacent property.

Based on available historic records, the property and its vicinity were originally occupied by the Massachusetts Cotton Mills complex. Based on historic atlases and maps, it appears that the property buildings were constructed in stages, prior to 1871. By 1911, river fill had been used to extend the mill area and construct the southeast end of the Picker building, as well as the north adjacent Boiler House.

Of note, the Boiler House was originally powered using coal, but switched to Bunker C (no. 6) fuel oil by the 1950s. At least two concrete bunkers, used to store the no. 6 fuel oil, remain in place in the courtyard. Two gasoline underground storage tanks (USTs) were installed in the courtyard and likely utilized by one of the property building tenants; these gasoline USTs were removed as part of this IRA. By the 1980s, the property and most of the surrounding mill buildings were abandoned. In 1988, certified rehabilitation to convert the former mill complex to residential apartments was commenced. Though south-southwest and west mill buildings have been converted to apartments, the Boiler House and south to southeast abutting Picker building have remained vacant and boarded up.

The Universal Transverse Mercator (UTM) coordinates of the Site are 5258337 meters north and -7937439 meters east. The topography of the Site is generally flat but gently slopes downward toward the northeast (Merrimack River), east, and southeast (Concord River). The elevation of the Site is approximately 55 to 65 feet above Mean Sea Level (MSL). On the east side of the courtyard, a retaining wall separates the courtyard from the Concord River. The Picker Building bounds the courtyard to the south, and the Boiler House to the north and west. The Merrimack River is located north of the Boiler House.

The MassDEP Phase I Site Assessment Map (Figure 2) indicated no Areas of Critical Environmental Concern (ACECs), Certified or Potential Vernal Pools, or Outstanding Resource Waters located in the vicinity of the Site. Additionally, the Site is not mapped within the boundaries of a Potentially Productive Aquifer (PPA), Sole Source Aquifer (SSA), Zone A of a Surface Water Supply Protection Area, Zone II of a public water supply well, an Interim Wellhead Protection Area (IWPA) or within the boundaries of a Non-Potential Drinking Water Source Area.

The property is located within a FEMA 100-year floodplain. The nearby Merrimack River is denoted as containing Rare Wetland Wildlife Habitat. Additionally, Protected Open Spaces are situated approximately 475 feet north, 500 feet west-southwest, and 560 feet northeast of the property.

Based on the Flood Insurance Rate Map (FIRM) Middlesex County Panel 250170143F, dated July 7, 2014, the Site is located within the 1% annual chance floodplain with a base flood elevation of 66 feet.

In the vicinity of the property, the Merrimack River generally flows from northwest to southeast, and the Concord River generally flows from south to north. In this area, the Merrimack River is a Class B (Warm Water, Treated Water Supply, CSO) water body according to Table 20 of the Massachusetts Surface Water Quality Standards [314 CMR 4.00]. At its confluence with the Merrimack River, the Concord River is a Class B (Warm Water, CSO) water body according to Table 18 of the Massachusetts Surface Water Quality

Standards. Class B water bodies are designated as a habitat for fish, other aquatic life and wildlife, and for primary and secondary contact recreation. Class B (Warm Water) water bodies are subject to dissolved oxygen and temperature criteria for warm water fisheries [310 CMR 4.06(1)(d)(7)]. Class B (Treated Water Supply) water bodies denotes those Class B waters that are suitable for use as a source of public water supply after appropriate treatment [310 CMR 4.05(3)(b) and 4.06(1)(d)(6)]. Class B (CSO) means these waters are identified as impacted by the discharge of combined sewer overflows; however, a long term control plan has not been approved or fully implemented for the CSO discharges [310 CMR 4.06(1)(d)(10)]. Class B (CSO) water bodies occasionally are subject to short-term impairment of swimming or other recreational uses due to untreated combined sewer overflow discharges in a typical year, and the aquatic life community may suffer adverse impact yet is still generally viable [310 CMR 4.06(1)(d)(11)].

3.0 IRA STATUS REPORT NO. 4 FOR RTN 3-33101

This IRA Status Report was originally presented in the IRA Plan Modification, which was submitted on November 2, 2016. It is prepared in accordance with 310 CMR 40.0425. Provided below and in the cited appendices are the following information required for an IRA Status Report: (a) the status of assessment and/or remedial actions; (b) any significant new site information or data; (c) details of and/or plans for the management of remediation waste, remedial wastewater and/or remedial additives; (d) any other information required by MassDEP in its approval of the IRA Plan; and (e) an LSP Opinion as to whether the IRA is being conducted in conformance with the IRA Plan and any conditions of approval established by the MassDEP.

Test boring and soil sampling locations are depicted on Figure 4 for the courtyard and Picker Building, Figure 4A for the B-11 PCB hot spot, Figure 4B for the gasoline UST and FO-1 fuel oil bunker area, and Figure 4C for the B-9 PCB contaminated area. Figure 4A also depicts the excavation area and confirmatory sampling locations for the B-11 PCB hot spot. Figure 5 shows the current condition of the courtyard, including the location of the utility vault, four dry wells, coal chute, and the following areas that have been excavated to date: (1) extreme eastern portion of courtyard (from the Boiler House to the north to the Picker Building to the south, and from the fuel oil bunker to the west to the retaining wall to the east) (excavated 3 feet below grade); (2) eastern portion of courtyard (between the fuel oil bunker to the east and the smoke stack to the west, and from the Boiler House to the north to the Picker Building to the south) (excavated to 1 foot below grade); (3) the B-11 PCB hot spot (excavated to 1.5 feet below grade); and (4) the west end of the courtyard (from just east of the utility vault to dry well no. 2 to the

east). Summaries of analytical data are provided in Tables 1 to 5, 6.1 to 6.4, 7 and 8. Boring logs for all test borings advanced to date are provided in Appendix A. Analytical reports for the September and October 2016 investigations are provided in Appendix B.

3.1 Description of IRA Activities Conducted to Date

August 21, 2015 to August 10, 2016

The last IRA Status Report for RTN 3-33101 was submitted on August 15, 2016. It was submitted at the same time as the IRA Plan Modification No. 2, which was prepared to include a Non-Traditional Asbestos Abatement Work Plan and a Phase III Focused Remedial Action Plan in the IRA. IRA activities have been conducted since August 21, 2015, starting with assessment only activities.

The remedial and assessment activities for this IRA are described below for the period through August 10, 2016. The interpretation of the analytical data collected during the assessment activities are provided in Section 3.2. Excluding the September 2016 assessment activities described below, the analytical data were collected during the course of the IRA for the following reasons: (1) to determine if the petroleum contamination extended beneath the Picker building; (2) to determine whether significant petroleum contamination existed at the side walls and bottoms of the two gasoline UST tank graves; (3) to obtain disposal criteria data for stockpile SP-1, which was generated when the renovation contractor cleaned out window wells and scraped the surface of the ground; (4) to obtain information on the horizontal and vertical extent of PCB, metal, insecticide, petroleum and polycyclic aromatic hydrocarbon (PAH) contamination in the 0-11 foot interval soils across the courtyard and in the gasoline UST graves, in part to determine whether the PCB/metal/insecticide contamination was commingled with the petroleum contamination; (5) to determine the proportion of the PCB contamination that contains dioxin-like toxicity; (6) to determine whether the water inside the UST tanks contained PCBs; and (7) to determine the residual levels of PCBs in soils following excavation of the B-11 PCB hot spot. At the request of MassDEP, Axiom Partners Inc. (Axiom), of Wakefield, Massachusetts collected soil samples for analysis of asbestos (described in more detail below). The courtyard soil analytical data are provided in Table 1, the groundwater analytical data are provided in Table 2, the Picker building soil data are provided in Table 3, the stockpiled soil analytical data are provided in Table 4, the water analytical data from the gasoline USTs are provided in Table 5, the PCB congener data for soil samples are provided and interpreted in Tables 6.1 to 6.4, and the asbestos analytical data for soil samples are summarized in Table 7.

The original planned IRA entailed two remedial phases and one investigative phase: (1) the removal of the two USTs, including the excavation of petroleum-contaminated soils

associated with the UST closure and confirmatory sampling of sidewall and bottom samples; (2) the excavation of sands located within the two concrete fuel oil bunkers, the confirmatory sampling to delineate the extent/presence of petroleum impacts and either the removal or closure in place of the concrete bunkers; and (3) the advancement of test borings and installation of monitoring wells near existing monitoring well GEC-1 and the USTs and concrete fuel oil bunkers to determine the extent of petroleum-related contamination. The IRA Plan (October 2015) assumed the excavation of up to 1,000 cubic yards of petroleum-contaminated soils for either off-site recycling or off-site disposal and the removal of up to 10,000 gallons of oily water for treatment. Based on available soil and groundwater data and boring logs, the petroleum-related contamination was believed to be located more than 15 feet below grade. Refer to Figure 3 for the locations of the former USTs (identified as GT-1 and GT-2) and existing concrete bunkers(s) (identified as FO-1).

Advancement of Test Borings and Installation of Soil Vapor Points in Picker Building

On February 12, 2016, GEC conducted a limited subsurface investigation beneath the Picker Building. GEC was joined by New England Geotech LLC (NEG), of Smithfield, Rhode Island, to advance borings using a hand-held GeoProbe in an attempt to reach the groundwater table and assess if the no. 6 fuel oil contamination extended under the building. Six hand borings were advanced within the basement of the Picker Building. Refusal was encountered prior to reaching the groundwater table. Therefore each of these borings were completed as a soil vapor point instead of a monitoring well, so that soil vapor sampling and analysis could be conducted in the future. This work was done in advance of the basement being filled with approximately six feet of "flow-able concrete". Therefore, the soil vapor points were constructed similar to monitoring wells. They were each constructed with five feet of screen from the bottom of the foundation floor to five below the floor. Because the basement will be renovated with six-feet of flow-able concrete and a vapor barrier and a radon system, a riser was installed from the top of each well screen to near the ceiling of the basement. The radon system is being installed in the basement beneath the future residences, because there is a known radon issue in this area of Lowell. It is not being installed to address vapor intrusion issues from contamination present in soils or groundwater at the Site.

Due to the limits on the hand-held GeoProbe, the borings could not be advanced to the water-table, as originally planned. The maximum depth achieved was 7.5 feet below the basement floor. The soils beneath the Picker Building consist of fill containing fine sand and silts, with coal, brick and ash. Soil samples were collected from each boring and submitted to Con-Test under chain of custody for analysis of extractable petroleum hydrocarbons (EPH) and PAHs via MassDEP's method and volatile petroleum hydrocarbons (VPH) and target volatile

organic compounds (VOCs) via MassDEP's method. No EPH subset was detected in any soil sample above a potentially applicable Method 1 S-1 soil standard. Several PAHs were detected in one soil sample at levels above their potentially applicable Method 1 S-1 soil standards. For the remaining soil samples, all PAHs were detected at levels less than their potentially applicable Method 1 S-1 soil standards. Likely the PAHs are attributable to coal ash present in the soils. VPH or target VOCs (except for naphthalene, which is a PAH) were not detected in any soil sample collected beneath the Picker Building. These soil analytical data are provided on Table 3. The sampling locations are provided on Figure 4. The placement of flow-able concrete was completed on February 25, 2016. These borings and soil vapor points are referred to as HB-1/SVP-1 to HB-6/SVP-6.

GEC had anticipated returning to screen each soil vapor point and collect soil vapor samples for analysis of air petroleum hydrocarbons (APH) and target VOCs. However, these soil vapor points were destroyed during the interior demolition work occurring in the Picker Building. Given that (1) little to no VOCs or VPH were detected in soil, (2) depth to groundwater is more than 15 feet below grade and (3) the NAPL is comprised of non-volatile no. 6 fuel oil, vapor intrusion is likely not a significant migration pathway at this Site.

Discovery and Sampling of Stockpile SP-1

On February 29, 2016, GEC returned to the Site for a safety/ logistics meeting with the subcontractor (ENPRO Services, Inc. (ENPRO) of Salisbury, Massachusetts) hired to remove the gasoline USTs. During this meeting GEC and ENPRO noted a stockpile (designated SP-1) of approximately forty cubic yards (40 CY) of soil and debris from the courtyard that had been placed over the location of the proposed UST removal. Subsequent conversations with the General Contractor, Delbrook, lead to the determination that this soil stockpile would need to be removed from the Site.

On February 29, 2016, GEC collected eight discrete soil samples from eight locations of the stockpile approximately twelve to eighteen inches into the stockpile bulk and homogenized them into a single composite sample, which was then submitted under chain of custody to Con-Test Analytical Laboratory (Con-Test), of East Longmeadow, Massachusetts, for disposal criteria analysis. This consisted of the following analyses: ignitability via USEPA Method 1030, specific conductance via USEPA Method 2510B, VOCs via USEPA Method 8260C, total petroleum hydrocarbons (TPH) via USEPA Method 8100M, semi-volatile organic compounds (SVOCs) via USEPA Method 8270D, MA14 metals via USEPA Methods 6010C/7471B, TCLP cadmium and TCLP lead via USEPA Method 6010C/1311, reactive sulfide via USEPA Method 9030A, reactive cyanide via USEPA Method 9014, PCBs with Soxhlet extraction via USEPA Method 8082A, pesticides and herbicides via USEPA Methods 8081B and 8151A, and TCLP heptachlor via USEPA Method 8081B/1311. On March 10,

2016, GEC collected a sample from SP-1 for analysis of hexavalent chromium, pH and oxygen-reduction potential (ORP) via USEPA Methods 7196A/SM2580 A/9045C.

Based on the analytical results for SP-1, elevated levels of PCBs, several metals and heptachlor epoxide were detected, and a new 120-day reportable condition was identified (assigned RTN 3-33474). The analytical data is summarized in Table 4.

Gasoline UST Removal

On March 7, 2016, ENPRO, under the oversight of GEC, began the removal of the two gasoline USTs. A safety meeting was conducted, soil erosion control measures were put in place to restrict any soils from leaving the Site, and the Fire Department was notified that the UST removal project was beginning. Lt Mello, of the Lowell FD was on-Site during the removal of overburden soils and the locating of the steel USTs. ENPRO determined that approximately 300 gallons of water/gas was still present in the USTs. GEC collected a water sample from each of the USTs, using a Solonist 410 peristaltic pump. These water samples, designated GT-1 and GT-2, were submitted to Con-Test under chain of custody for analysis of PCBs via USEPA Method 8082A, to determine whether the tank water was acceptable to send to Cyn Environmental Services. No PCBs were detected (Table 5).

The following day March, 8 2016, ENPRO proceeded to inert the USTs and cut a hole in the top of the USTs to remove the water/gas mix from within the USTs and placed this liquid in a 250-gallon tote for temporary storage and subsequent transport. Lt Mello of the Lowell FD returned to the site to observe the removal of the USTs from the tank grave. Once the USTs were removed from the tank grave, they were placed on poly-sheeting, to ensure that contact with the existing soils was minimized. There was no olfactory or visual evidence of a petroleum release in the tank graves. Soils collected from the sidewalls and bottom of the tank graves were headspace screened using a MiniRae 300 PPM photoionization detector (PID) equipped with a 10.6 eV lamp. The headspace readings ranged from 0.0 to 5.9 parts per million as volume (ppmv). GEC collected sidewall and bottom samples from around each of the USTs. The sample locations and depths are as follows: Gas Tank 1 (GT-1) northern sidewall (NSW-GT-1) (3-4') below surface grade (BSG), east sidewall (ESW-GT-1) (3-4' BSG), south sidewall (SSW-GT-1) (3-4' BSG) and a bottom sample BTM-GT-1 (6' BSG); Gas Tank 2 (GT-2) NSW-GT-2 (5-6' BSG), west sidewall (WSW-GT-2) (5-6' BSG), SSW-GT-2 (5-6' BSG) and BTM-GT-2 (8' BSG); the depths vary between tanks due to the varied size of the USTs. GT-1 was approximately four feet (4') in diameter and ten and one-half feet (10.5') long. GT-2 was six foot (6') in diameter and twelve feet (12') long. These soil samples were submitted to Con-Test for analysis of EPH and PAHs via MassDEP's method, VPH and target VOCs via MassDEP's method, PCBs via USEPA Method 8082A, pesticides via USEPA Method 8081B and MA14 metals via USEPA Methods 6010C/7471A.

The sidewall and bottom sampling locations are depicted on Figure 4B and the analytical data are summarized on Table 1. No elevated levels of EPH, VPH or target VOCs were detected in the sidewall or bottom soil samples. One sidewall sample (NSW-GT-1) had elevated levels of PAHs, which may be due to the presence of coal ash in the soils, a prevalent condition throughout the courtyard. Of the metals, only lead was detected at concentrations (up to 220 mg/kg) above its Method 1 S-1/GW-x standard (100 mg/kg), which is common in the shallow courtyard soils. PCBs were detected at levels ranging from <0.11 to 6.3 mg/kg, also consistent with courtyard soils. Chlordane and dieldrin were also detected at levels less than 1 mg/kg. Based on the results of PID screening, visual and olfactory observations, and confirmatory soil sampling, there is no evidence of a gasoline release from these USTs. In addition, there is no evidence that the no. 6 fuel oil release has impacted the tank grave. The soil contamination that is present is consistent with that observed in shallow soils (i.e., soils less than 15 feet below grade) throughout the courtyard.

On March 9, 2016 GEC and ENPRO collected wipe samples from the exterior of each of the steel USTs to determine if the soils that had been in contact had left residual PCBs on the tank walls. ENPRO submitted the wipe samples under chain of custody to Alpha Analytical, of Westborough, Massachusetts, for analysis of PCBs via USEPA Method 8082A. No PCBs were detected; therefore, the tanks were determined to be suitable to be sent off-site for recycling. Refer to Appendix B of the April 2016 IRA Plan Modification and IRA Status Report for the laboratory report.

On March 16, 2016 GEC returned to the Site to oversee the removal of the steel USTs from the courtyard. The wipe samples collected on March 9, 2016 came back as non-detect. The USTs were cleaned again and transported to Windfield Alloy Inc., of Lawrence Massachusetts, for recycling.

The tank graves were lined with poly-sheeting, and the overburden from above the tanks was placed in the tank grave. Another layer of poly-sheeting was placed on top of this material, then approximately 10 cubic yards from above the bunkers was placed on this poly-sheeting. This was done so that the loader could move over this area to place other soils from the top of the bunkers into stockpile SP-2.

Investigations associated with Fuel Oil Bunker

Based on prior investigations, the fuel oil bunkers were known to contain sands that were distinctly different from the overlying soil. At the top of the bunker, the sands did not appear to be contaminated with fuel oil. Additional investigations were conducted to determine if the sands were contaminated with PCBs, metals or insecticides detected in the shallow courtyard soils.

On March 9, 2016 GEC and ENPRO advanced test pit TP-FO-1 at fuel oil bunker FO-1. The overburden soils above the fuel oil bunker FO-1 were collected from the test pit at the following intervals: 0-1 foot, 1-2 foot and 2-3 foot. Once the sands within FO-1 were encountered, GEC collected a discrete sample of the sand from within the bunker at approximately 3.5' BSG, where it was apparent that the sands were undisturbed (i.e., there had been no mixing of the overburden soils and the sands within the bunker. The three samples collected from above the FO-1 were submitted to Con-Test under chain of custody for the following analyses designated FO-1-TP (0-1'), (1-2') and (2-3'): MA14 metals via USEPA Method 6010C/7471A; PCBs with Soxhlet extraction via USEPA Method 8082A; and pesticides via USEPA Method 8081B. The sand sample (designated FO-1 (3')) collected from just inside the top of the bunker (located 3.5 feet below surface grade) was submitted to Con-Test under chain of custody for analysis of EPH and PAHs via MassDEP's method, VPH and target VOCs via MassDEP's method, MA14 metals via USEPA Method 6010C/7471A, PCBs with Soxhlet extraction via USEPA Method 8082A, and pesticides via USEPA Method 8081B.

On March 10, 2016, GEC and ENPRO continued the test pit TP-FO-1 in FO-1 to collect samples from the tank bottom (5.5') (designated FO-1-BTM) and below the tank bottom (7-8') (designated FO-1), which were submitted for the following analyses: VPH and target VOCs via MassDEP's method; total petroleum hydrocarbons (TPH) via USEPA Method 8100M; MA14 metals via USEPA Method 6010C/7471A; PCBs with Soxhlet extraction via USEPA Method 8082A; pesticides via USEPA Method 8081B; and herbicides via USEPA Method 8151A. TPH was detected at 31 and 33,000 mg/kg at 5.5 feet and 7-8 feet, respectively, at FO-1. PCBs were detected at <0.11 and 0.45 mg/kg, respectively. The analytical data for TP-FO-1 are summarized in Table 1, and the test pit location is depicted on Figures 4 and 4B.

Fuel Oil Bunker Remediation

On March 28, 2016, GEC and ENPRO returned to the site to excavate the no. 6 fuel oil bunkers (FO-1 and FO-2). The PCB-containing soils lying atop of the FO-1 bunker were stockpiled between the pump house and the smokestack. This stockpile is identified as SP-2, and had a volume of approximately 25 cubic yards.

As a result of the excavation, GEC discovered that the previously believed dimensions of the FO-1 bunker were not correct. Based on early observations on March 28, FO-1's initial adjusted dimensions were believed closer to forty-two feet long, eight feet wide and five and one-half feet deep (42' x 8' x 5.5'). ENPRO removed the contents (sands) of this bunker and stockpiled them adjacent to the smokestack; this stockpile is identified as SP-3. SP-3 is estimated to be approximately 20 cubic yards.

Lt. Mello of the Lowell Fire Department was present for a portion of the excavation and was informed of the presence of PCBs in the courtyard. He advised posting additional signage warning of the presence of the PCBs, and stated that he would alert the Fire Department to the added hazards in the courtyard.

GEC and ENPRO continued excavating. The bottom of the bunker wall was encountered at approximately 4.5 feet below grade. Petroleum-impacted soils based on visual and olfactory observations at approximately 5.5 feet below ground surface or approximately 1 foot below the bottom of the wall. These petroleum-impacted soils were placed in a separate stockpile, estimated to be less than 10 cubic yards.

During the course of excavation, the adjusted dimensions of the FO-1 bunker were also determined to be incorrect. ENPRO dug to a depth of 5.5' BSG on one side of FO-1 and discovered a concrete structure angled such that it began at the base of the wall and continued downward to a depth of at least 8' BSG. It was at this time that the client, the LSP (Brian Butler of GEC) and the General Contractor (Delbrook) were contacted to inform them of the developments and receive additional instructions. Because the petroleum contamination was encountered at a shallower depth than anticipated and because the FO-1 bunker dimensions are much larger than anticipated, a determination was made that additional excavation could not occur given the complicated conditions, which included the presence of elevated levels of PCBs and metals in soils overlying the bunker. A decision was made to remediate the PCB- and metal-contaminated soils prior to continuing the remediation of the FO-1 and FO-2 bunkers.

GEC and ENPRO returned on the following day to replace the soils previously excavated from FO-1. The petroleum-impacted soils were returned to the original depth and the stockpiled sands (SP-3) were placed back into the bunker, on top of the petroleum-contaminated soils.

Shallow Soil Sampling across Courtyard (March 2016)

Investigations in the courtyard were conducted to determine the distribution of PCBs, metals and other oils and hazardous materials in soils, and to determine the type and concentration of dioxin-like PCB congeners. On March 11, 2016, GEC returned to the Site to lay out seven boring locations utilizing a three-meter assessment grid running north to south and east to west. The boring locations were placed on intersections on the grid, selected to obtain representative soil samples from the courtyard. On March 14, 2016, GEC and NEG advanced the seven borings using a 6622DT track-mounted GeoProbe rig. For each boring (as Site conditions allowed), soil samples were collected from the following intervals: (1) 0-1 foot interval; (2) 1-3 foot interval; (3) 3-6 foot interval; and (4) 6-11 or 6-9 foot interval. B-6 was

in the same location as TP-FO-1 (see above for details on TP-FO-1). Refer to the following table for a summary of the analysis performed:

Location	Depth	PCBs (with Soxhlet extr.)	PCB Congeners	EPH w/ PAHs	MA14 Metals	Pesticides / Herbicides
B-5	0-1'	X	X			
B-5	1-3'	X		X	X	X
B-5	3-6'	X				
B-5	6-11'	X				
B-7	0-1'	X				
B-7	1-3'	X	X		X	X
B-7	3-6'	X				
B-7	6-11'	X		X		
B-8	0-1'	X				
B-8	1-3'	X				
B-8	3-6'	X				
B-8	6-11'	X				
B-9	0-1'	X	X			
B-9	1-3'	X		X		
B-9	3-6'	X			X	X
B-9	6-11'	X				
B-10	0-1'	X				
B-10	1-3'	X			X	X
B-10	3-6'	X		X		
B-10	6-11'	X				
B-11	0-1'	X				
B-11	1-3'	X	X			
B-11	3-6'	X			X	X
B-11	6-11'	X		X		

On March 23, 2016, GEC advanced borings in the northwest section of the courtyard. GEC utilized a hand-held GeoProbe to advance an additional two borings B-12 and B-13. GEC collected samples from both of these borings at the following depth intervals: 0-1 feet, 1-3 feet, 0-3 feet and 3-6 feet. The samples collected from the 0-1, 1-3 and 3-6 foot intervals were analyzed for PCBs via USEPA Method 8082 with Soxhlet extraction. The samples collected from the 0-3 and 3-6 foot intervals were analyzed for EPH with PAHs via MassDEP's method, and for arsenic, lead and vanadium via USEPA Method 6010C.

For the B-11 0-1 foot interval soil sample, 100 mg/kg PCBs were detected. All other soil samples collected from B-5 to B-13 contained less than 50 mg/kg PCBs, and usually much less than 50 mg/kg PCBs. B-11 was identified as a potential hot spot of PCB-contaminated soils. Therefore, additional investigation was conducted to determine the extent of elevated PCBs near B-11.

On March 29, 2016, GEC collected additional soil samples in the vicinity of B-11 to delineate the area containing the highest detected level of PCBs in soils (i.e., 100 mg/kg in the 0-1 foot interval sample of B-11). GEC laid out a 5-foot radius and collected three samples

from this radius (B-11-r5A, B-11-r5B and B-11r5C), in the following horizons: (1) for PCB analysis via USEPA Method 8082 with soxhlet extraction – 0-1 and 1-3 foot intervals; and (2) for EPH and PAH analysis via MassDEP's method and vanadium analysis via USEPA Method 6010 – 0-3 foot interval. GEC also attempted to collect two samples from the ten-foot radius at locations designated B-11-10rA and B-11-10rB. B-11-10rA (located near a tin shed) was attempted three times; due to the presence of concrete on the courtyard, GEC was unable to collect a sample. B-11-10rB was collected from the same horizons and for the same analyses as the 5-foot radius sampling locations. All samples collected were submitted to Con-Test under chain of custody.

The soil analytical data are summarized in Table 1 for all OHM except PCB congener data. PCB congener data are summarized in Table 6.1. Sampling locations are depicted in Figure 4. The distributions of PCBs and vanadium in soils are depicted in Figures 6 and 7, respectively.

The April 2016 IRA Plan Modification proposed the following IRA activities: (1) removal of debris and structures from the courtyard to allow access to the courtyard soils; (2) the preparation of the utility void and coal chute as soil repositories; (3) the excavation of 0-1 foot interval soils for proper disposition; (4) the excavation of 1-3 foot interval soils for proper disposition; (5) the transport of key volumes of soils (i.e., SP-1 stockpiled soils and B-11 PCB hot spot soils) to a receiving facility approved to accept soils containing 50 mg/kg PCBs or more; (6) the transport of select volumes of soils to a receiving facility approved to accept less than 50 mg/kg PCBs and / or the placement of these soils into one or more on-Site soil repositories; (7) the construction of a protective barrier over the soils currently located more than 3 feet below grade; (8) continuation of the excavation of the petroleum-contaminated soils; and (9) if needed, creation of a soil repository within the former fuel oil bunker area, followed by completion of the excavation of PCB soils and placement into the final repository. The IRA remedial activities resumed on May 27, 2016.

B-11 PCB Hot Spot Activities

On May 27 2016, the National Response Corporation (NRC) (ENPRO Services Inc. was acquired by NRC), under the oversight of GEC, excavated the >50 mg/kg PCB soil area around B-11 and B-11-r5-C). The area excavated was approximately 12 feet wide by 16 feet long by 1-1.5 feet deep. The approximately 10 cubic yards of soil excavated from this area were added to the 40 cubic yard SP-1 stockpile. Sidewall and bottom soil samples were collected for confirmatory PCB analysis via USEPA Method 8082. Three composite (5-point) samples were collected from the following locations: eastern sidewall, western sidewall and the bottom. Since the excavation extended to the Picker building to the south and the Boiler House

to the north, there were no south or north sidewall samples. Refer to Figure 4A for sampling locations. The confirmatory PCB data are summarized in Table 1. The maximum concentration of PCBs detected was 1.1 mg/kg (in the west sidewall sample).

The >50 mg/kg PCB soils from the SP-1/B-11 stockpile were containerized on or about June 3 through 6, 2016, moved from the courtyard and placed in six roll-off dumpsters. The dumpsters were then shipped under six uniform hazardous waste manifests to a TSDF, Tradebe located at 410 Shattuck Way, Newington, NH, prior to shipment to Wayne Disposal Inc., in Belleville, Michigan. One dumpster was shipped and received by Wayne Disposal Inc. on June 7, 2016, before MassDEP required asbestos analysis.

No asbestos were detected in the soil samples collected from the remaining five dumpsters (as described below in Asbestos Activities). Therefore, these five dumpsters were shipped from Tradebe to Wayne Disposal Inc. during late June 2016 and received by Wayne Disposal Inc. on July 11 and 12, 2016. A total of 74.08 tons of PCB-contaminated soils were shipped to Wayne Disposal Inc. for disposal. Refer to Appendix B of the IRA Plan Modification No. 2 and IRA Status Report No. 3, submitted on August 15, 2016, for the completed uniform hazardous waste manifests.

Remaining Shallow Soil Courtyard Activities

After excavating the >50 mg/kg PCB area, GEC and NRC continued to execute the remainder of the modified IRA Plan. The top 1 foot of soils was excavated from the far west side of the courtyard, to prepare the area for stockpiling of soils excavated from the east end of the courtyard, overlying the fuel oil bunkers. A manhole cover was dislodged during this work and revealed a brick drywell. This drywell, designated dry well #1 on Figures 3, 5 and 5A, was designated a soil repository and was filled with soils from the west end of the courtyard.

Stockpile SP-2, comprised of the soils previously excavated from above the fuel oil bunkers, was placed within the "coal chute", which was prepared as a soil repository. The remainder of the space within the coal chute was filled with 0-1 foot interval soils excavated from the east end of the courtyard. The 0-1 foot interval soils from the east end of the courtyard were also placed in drywells #2, #3 and #4, depicted on Figures 3, 5 and 5A. A description of these repositories as well as the approximate volume of soils placed in each repository are provided in Section 3.3.

The top 0-1 foot interval soils were excavated from far west end of the courtyard, between the utility vault to the west and the B-11 PCB hot spot to the east, and from the east end of the courtyard, from the Boiler House smoke stack east to the retaining wall, separating the courtyard from the Concord River. Excavation of the top 1-3 feet of soil started at the east end of the courtyard, starting from east moving west. The work proceeded to about the west end of the fuel oil bunker to a depth of approximately 2.5 feet below grade, when the IRA was

put on hold by the MassDEP based on concerns regarding the potential for asbestos being present in the courtyard soils.

The soils excavated from the east end of the courtyard, which were not placed in a soil repository, were stockpiled on the west end of the courtyard, near the utility vault between the Picker building and the Boiler House. This 300-400 cubic yard stockpile was placed directly on the exposed 1-3 foot interval soils because these soils are also slated for future excavation. The stockpiled soils are covered with polyethylene sheeting. Refer to Figure 5 for a depiction of the areas excavated and the location of the stockpiled soils. Figure 5A shows the location of each repository that is filled (i.e., coal chute and dry wells #1 to #4), as well as planned future repositories (i.e., utility vault and FO-1 & FO-2 excavation area).

Asbestos Activities

MassDEP required the six dumpsters of SP-1/B-11 soils containing the PCB soils be analyzed for asbestos. This request made after the dumpsters were shipped from the Site. On June 21, 2016, Axiom intercepted five of the six dumpsters at Tradebe and collected one composite sample from each of these dumpsters; no asbestos was detected.

The MassDEP also required that the courtyard soils be analyzed for asbestos. On June 23, 2016, Axiom collected nine composite soil samples throughout the courtyard for the presence of asbestos. The composite soil samples were collected from the existing stockpile (Hi, Mid and Low) and from six areas of the courtyard (Areas 1 to 6), as depicted in Figure 9. Each composite soil sample is comprised of five 1-inch soil samples. Eight soil samples were positive for the presence of chrysotile, and one was positive for the presence of amosite. No quantitative data was available for these samples. Refer to Table 7 for a summary of the asbestos analytical data.

Due to the presence of asbestos in soils, MassDEP Bureau of Air and Waste and MassDEP Bureau of Waste Site Clean-up required the following before IRA activities can resume: (1) covering the soils of the courtyard with polyethylene overlain with plywood; and (2) submittal of a Non-Traditional Asbestos Work Plan (NT) and another IRA Plan Modification to include the asbestos contaminated soils.

Non-IRA Related Activities

The following asbestos-related activities were conducted following the temporary stoppage of the IRA: (1) installation of a temporary gravel road, over the polyethylene sheeting, on a portion of the courtyard, so that asbestos abatement activities could be conducted; (2) installation of plywood "windows" in the Boiler house to mitigate potential future asbestos releases into the courtyard; (3) abatement of an asbestos-wrapped pipe located on a wall in the courtyard; and (4) removal of brick from the bottom of the Picker building smoke stack prior to demolition of the smoke stack.

In addition, the debris and abandoned pipes in the utility vault were removed, including a pipe wrapped with suspect asbestos containing insulation. GEC was told that, based on analytical testing, the insulation was comprised of fiberglass not asbestos. A single active sewer pipe remains in the utility vault.

August 11, 2016 to October 28, 2016

Provided below is a description of the IRA assessment activities conducted since the last IRA Status Report was submitted on August 15, 2016. Additional assessment activities were conducted during September 2016, for the following purposes: (1) to obtain *in situ* disposal criteria data for the petroleum-contaminated soils so that a receiving facility can be identified such that petroleum-contaminated soils can be live-loaded for disposal; (2) to determine whether the petroleum-contaminated soils are also contaminated with asbestos and PCBs; (3) to determine the horizontal and vertical extent of petroleum-contaminated soils, so that the petroleum contamination can be added to the Phase III Remedial Action Plan; and (4) to obtain additional PCB analytical data requested by the U.S. Environmental Protection Agency (USEPA) Region I, so that a determination can be made whether all or a portion of the remaining remedial activities to be conducted within the courtyard fall under the U.S. Toxic Substances and Control Act (TSCA).

On September 15 and 16, 2016, Crawford Drilling Services, LLC (CDS) of Westminster, Massachusetts, advanced sixteen test borings (designated B-14, B-14A, B-15 to B-28), under the oversight of GEC, using a GeoProbe 7822 DT track rig, to depths up to 21 feet below current grade (or 23.5 feet below grade prior to removing three feet of soils from this portion of the courtyard during the earlier stage of the IRA). The initial intent was to advance the borings to 25 feet below current grade; however, refusal was encountered at depths ranging from 7 to 21 feet below current grade (i.e., 10 to 23.5 feet below original grade). Soils were recovered in 5-foot intervals using clean acetate sleeves. Soil recoveries were headspace screened with a MiniRAE 3000 photoionization detector equipped with a 10.6 eV lamp (10.6 eV PID). Soil samples were collected for analysis of EPH and PAHs via

MassDEP's method, PCBs via USEPA Method 8082 with Soxhlet extraction, asbestos via USEPA Method 600/R-93/116, and disposal criteria testing, as identified in the table below. Soil samples were submitted to Con-Test Analytical Laboratory (Con-Test), of East Longmeadow, Massachusetts, under chain-of-custody documentation, for analysis. Refer to Appendix A for the boring logs and Appendix B for the laboratory reports. Refer to Figure 4 for the new boring locations and to Table 1 for a summary of courtyard soil analytical data (except for the PCB congener analytical data, disposal criteria analytical data and asbestos analytical data), Table 4 for disposal criteria analytical data and Table 7 for asbestos analytical data.

Boring	Depth Interval (feet)	PCBs with Soxhlet	EPH and PAHs	Asbestos
B-14 **[A]	0-5			
	5-10			
	10-15***			
	15-16.5			
B-15 **[A]	0-5	X		
	5-10	Hold, then Activated	X	X
B-16 **[A]	0-5	X		
	5-10	Hold		X
	10-15	Hold	X	
B-17 **[A]	0-5	Hold		
	5-7.5	Hold	X	X
B-18 **[A]	0-5	X		
	5-10	Hold, then Activated	Hold, then X****	
	10-15	Hold, then Activated	X	
B-19 **[A]	0-5	X		
	5-10	Hold, then Activated	Hold, then X****	X
	10-15	Hold, then Activated	Hold, then X****	
	15-17		X	
B-20 **[A]	0-5	X		
	5-8	Hold	X	
B-21 **[A]	0-5*	X	X	X
	5-10*	X	X	X
	10-13.5*	X	X	X
B-22 **[B]	0-5		Hold	
	5-10		Hold	
	10-15		X	
	15-20		X	
B-23 **[B]	0-5		Hold	
	5-9		X	
B-24 **[A]	0-5*			
	5-8*			
B-25 **[A]	0-5*			
	5-7.5*			

B-14A **[A]	0-5	X	X	X
	5-10	X	X	X
	10-15***	X	X	X
	15-16.5	X	X	X
B-26 **[A]	0-5*			
	5-10*			
	10-13*, ***			
B-27 **[A]	0-5*			
	5-10*, ***			
	10-11*			
B-28 **[A]	0-5*			
	5-10*			
	10-15*, ***			
	15-18*			

* Sample recoveries collected from this boring had visible or olfactory evidence of petroleum contamination. All or a portion of this sample recovery was retained, mixed with other soils collected for disposal criteria testing, and four composite samples were created for disposal criteria testing. The composite soil samples were submitted to Con-Test for disposal criteria analysis, as follows: TPH via USEPA Method 8100M, SVOCs via USEPA Method 8270, PCBs via USEPA Method 8082 with Soxhlet extraction, pesticides via USEPA Method 8081, herbicides via USEPA Method 8151, MA14 metals via USEPA Method 6010, reactive sulfide via USEPA Method 9030A, reactive cyanide via USEPA Method 9014, specific conductance via Method SM 2510B, pH via USEPA Method 9045C, ignitability via USEPA Method 1030, and asbestos via USEPA Method 600/R-93/116.

**[A] Feet below current grade. Original grade was three feet higher, and was lowered during excavation activities during June 2016.

**[B] Feet below current grade. Original grade was one foot higher, and was lowered during excavation activities during June 2016.

***This soil sample was submitted for analysis of volatile organic compounds (VOCs) via USEPA Method 8260, as part of disposal criteria testing.

****This sample was held pending other EPH and PAH analytical results. Analysis was activated and conducted, with extraction occurring on day 29 (more than 2-fold the MassDEP's CAM (Compendium of Analytical Methods) 14-day limit for extraction for this analysis). As a result, the EPH and PAH data for this sample meets the CAM criterion for gross failure. This data was only used to define the distribution of petroleum-related contamination.

Urban fill, consisting of sands, silt, pebbles, gravel, pulverized rock, coal dust, ash, slag, roots, glass, brick and concrete, was encountered from ground surface to 16 feet and more below current grade (18.5 feet and more below original grade). Below the urban fill was unconsolidated material typically associated with a river bed (i.e., uniform fine, medium, coarse sands with trace pebbles and trace rounded stone). Often tight fine sands or pulverized rock were encountered at boring refusal.

Based on visual and olfactory evidence during test boring, petroleum contamination was observed in borings B-14, B-14A, B-21, B-22, B-25, B-26, B-27 and B-28, which (except for B-22) are located south of the former no. 6 fuel oil bunker FO-1. B-22 is located west of the pump house and fuel oil bunkers.

At B-14, evidence of petroleum contamination was encountered from approximately 2.5 feet to nearly the bottom of the boring, i.e., 16.5 feet below current grade (or 19 feet below original grade), within urban fill. The evidence of petroleum contamination consisted of oil smears along the wall of the sample sleeve, starting at approximately 2.5 feet below current grade; saturated urban fill starting at approximately 5-10 feet below current grade; and a petroleum odor at 10-15 feet current below grade, with a headspace screening of 7.4 ppmv. The fill layer ended at 16.5 feet current below grade (or 19 feet below original grade), below which were tight fine sands or pulverized rock. No visible evidence of petroleum contamination was encountered in the very fine sands / pulverized rock. Refusal was encountered at 17 feet below current grade.

At B-14A, evidence of petroleum contamination was encountered from approximately 2.25-15.5 feet below current grade (4.75-18 feet below original grade). The evidence of petroleum contamination consisted of oil-saturated urban fill. The fill layer ended at approximately 15.5 feet current below grade (or 18 feet below original grade), below which were tight fine sands. No visible evidence of petroleum contamination was encountered in the very fine sands. Refusal was encountered at 16.5 feet below current grade.

At B-21, a petroleum smearing and odor were observed at approximately 8-9 feet below current grade (10.5-11.5 feet below original grade), and a petroleum odor was observed at approximately 10-12 feet below current grade (12.5-14.5 feet below original grade), all within urban fill. Pulverized rock was observed below 12 feet. Refusal was encountered at 13 feet below current grade.

At B-22, a petroleum odor (more like gasoline than no. 6 fuel oil) was observed at the bottom of the urban fill layer at approximately 15-16 feet below current grade (16-17 feet below original grade). Soils beneath the fill appear consistent with river bed material (fine, medium, coarse sands, with trace amounts of pebbles and rounded stone. The boring was ended at 20 feet below current grade (21 feet below original grade).

At B-25, an oily smear was observed from approximately 2-5 feet below current grade (4.5-7.5 feet below original grade) and a sheen was observed from 5-6 feet below current grade (7.5-8.5 feet below original grade), all within the urban fill. Soils from 6-7.5 feet below current grade consist of pulverized stone with sand and silt. There is no evidence of petroleum contamination at 6-7.5 feet below current grade. The boring ended at 7.5 feet below current grade (10 feet below original grade).

At B-26, a petroleum sheen and petroleum contamination was observed from 3-13 feet below current grade (5.5-15.5 feet below original grade). At B-27, a petroleum odor was observed from 3-11 feet below current grade (5.5-13.5 feet below original grade). At B-28,

petroleum was present from 15-18 feet below current grade (17.5-20.5 feet below original grade).

On September 30, 2016, four shallow borings were advanced five feet east, west, south and north of boring B-9, to determine if PCB levels exceeding 50 mg/kg were present in this area. A shovel was used to remove the gravel from over each boring point, then a hole was placed through the polyethylene sheet. A hand-held GeoProbe was used to advance each boring to between one and three feet below grade. The 0-1 foot-interval soil samples collected from each boring and the 1-3 foot-interval soil sample was collected from the B-9 (5' E) boring. These samples were submitted under chain of custody to ConTest for analysis of PCBs via USEPA Method 8082A. The PCB analytical data are summarized in Table 1.

3.2 Interpretation of Analytical Results

The analytical data is interpreted relative to existing conditions and current grade, for PCBs, vanadium, petroleum hydrocarbons and asbestos. The existing grade level is the same as when IRA activities were stopped in June 2016.

PCB

The horizontal and vertical distribution of PCBs is depicted in Figure 6 and the analytical data is tabulated in Table 1. Based on an evaluation of the dioxin-like congener data for the PCBs, the PCBs are comprised of approximately 11% dioxin-like congeners. All dioxin-like congeners had a toxicity equivalence factor of 3E-05 relative to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Refer to Tables 6.1 to 6.4 for summaries and evaluations of the dioxin-like data.

Prior to IRA excavation, PCBs were detected at the highest levels in the 0-1 foot soil samples (up to 100 mg/kg), followed by 1-3 foot (up to 25 mg/kg), 3-6 foot (up to 6.3 mg/kg) and 6-11 foot (up to 6.2 mg/kg (only one out of nine samples with more than 0.5 mg/kg PCBs at this interval)). Horizontally, PCBs were detected in soils across the entire courtyard, with the highest level at B-11, located near a tin shed housing a stairway to the above grade walkway connecting the Boiler House and Picker building. A small hot spot of PCBs was detected in this area, comprised of the 0-1 foot interval at B-11 and B-11-r5C. Stockpile SP-1, which contains soils from window wells and scrapings of surficial soils of the courtyard, contain 63 mg/kg PCBs. Out of thirteen 0-1 foot interval soil samples, eight contained PCBs at levels exceeding 10 mg/kg. These sampling points were spread throughout the courtyard. For the 1-3 foot interval, the highest PCB level was detected at B-13, located on the far northwest corner of the courtyard. Two out of thirteen soil samples from this interval contained PCB levels exceeding 10 mg/kg. They were located at opposite ends of the courtyard. For the 3-6

foot interval, the maximum PCB concentration was detected in one of the sidewall samples collected during removal of the gasoline USTs. For the 6-11 foot interval, the maximum PCB concentration was detected at B-11 (beneath the 0-1 foot PCB hot spot).

During the period March through September 2016 (including before and after excavation), seventy-nine discrete soil samples and six composite soil samples were analyzed for Aroclor PCBs, and four discrete soil samples were analyzed for congener PCBs. Only three samples (stockpile SP-1, 0-1 foot interval of boring B-11 (100 mg/kg), and the 0-1 foot interval soil sample collected five feet south of B-11 (97 mg/kg)) out of these 89 samples contained PCB levels higher than 50 mg/kg. The 0-1 foot interval soils in the vicinity of B-11 were excavated and the combined SP-1 / B-11 soils were transported off-Site to a hazardous waste facility approved to accept wastes containing >50 mg/kg PCBs. Confirmatory soil samples collected at the sidewalls and bottom of the B-11 excavation indicated a maximum PCB concentration of 1.1 mg/kg.

The 0-1 foot interval soil sample from boring B-9 contained 42 mg/kg PCBs, while the 1-3 and 3-6 foot interval samples contained 1.1 mg/kg PCBs and none detected, respectively. USEPA Region I requested that soil sampling be conducted around B-9 to determine if any of the soils contain more than 50 mg/kg PCBs. Four shallow soil borings were advanced, one each five-feet east, west, north and south of B-9. The 0-1 foot interval soil samples collected from these shallow borings contained between 9.1 and 36.5 mg/kg PCBs. The 1-3 foot interval soil sample from the east boring contained 15.2 mg/kg PCBs. This new analytical data indicates that PCB concentrations in soils are less than 50 mg/kg in the B-9 area.

The 0-1 foot interval soils were excavated from the Boiler House smoke stack east to the retaining wall along the Concord River and also from the west end of the courtyard from the utility vault west to the former B-11 PCB hotspot. These soils were placed in soil repositories (i.e., coal chute and four drywells) and a portion of which is located in the soil stockpile at the west end of the courtyard. At the east end of the courtyard, a portion of the 1-3 foot interval soils (approximately 1-2.5 foot interval soils) were excavated near the FO-1 fuel oil bunker east to the retaining wall. These were placed in the stockpile at the west end of the courtyard. These areas were excavated in June 2016 prior to the IRA stoppage.

During September 2016, additional test borings were advanced in the east portion of the courtyard, in part to determine if the PCB contamination is commingled with the shallower petroleum contamination. Fifteen soil samples, mostly collected at five-foot intervals, were collected from five test borings (B-14A, B-15, B-18, B-19 and B-21) advanced in this area for analysis of PCBs. For the 0-5 foot interval soil samples, PCB levels ranged between none detected to 29 mg/kg. For the 5-10 foot interval soil samples, PCB levels ranged up to 2.1

mg/kg. Below 10 feet, the PCB levels ranged up to 0.14 mg/kg. The new sampling locations are shown on Figure 4A.

The horizontal and vertical distribution of the PCB contamination for the entire courtyard is depicted on Figure 6. This figure reflects the current grade; therefore, for the eastern and western ends of the courtyard, the sampling intervals were adjusted for those samples collected prior to June 2016 to reflect current grade. Figure 6 and Table 1 also indicates what data is representative of those soils that were excavated, then transported off-site to a hazardous waste facility, moved to a repository or to the existing stockpile. For the portion of the east end of the courtyard, where the 1-3 foot interval soils were started but advanced only to about 2.5 feet before the IRA was stopped, Figure 6 and Table 1 reflects the removal of all 1-3 foot interval soils although some of these soils remain to be excavated.

Vanadium

The horizontal and vertical distribution of vanadium is depicted in Figure 7 and the analytical data is tabulated in Table 1. The sampling intervals for both Figure 7 and Table 1 are adjusted to reflect current grade. The key metal contaminant in terms of magnitude of detection and distribution across the courtyard is vanadium. It is a common constituent of coal, and its presence in the soils of the courtyard is likely attributable to the long-term use of coal to fire the boiler in the Boiler House and the coal ash found throughout the fill land of the courtyard. A derelict coal chute is still located in the courtyard. The soils of the courtyard contain a large proportion of coal and coal ash, especially for the original 0-3 foot interval. In some areas, the soils contain more coal ash than sands, silts or clay. For the original 0-3 foot interval, vanadium was detected at levels up to 2,100 mg/kg, and, in SP-1, the detected level of vanadium was 3,500 mg/kg. For the original 0-3 foot interval, the maximum level was detected at B-10, located near the coal chute. For the original 3-6 foot interval, the maximum vanadium level was 900 mg/kg, and for the original 6-11 foot interval, the maximum vanadium level was 870 mg/kg. For these intervals, the maximum concentrations were detected at B-11. No new vanadium data was collected for discrete soil samples during the September 2016 assessment round.

Petroleum

The horizontal and vertical distribution of petroleum is depicted in Figure 8 (based on total EPH and TPH analytical data) and 8A (based on visual and olfactory evidence). The analytical data is tabulated in Table 1. The sampling intervals for these figures and Table 1 were adjusted to reflect the current grade.

The highest levels of petroleum contamination were detected beneath and in the immediate vicinity of the FO-1 fuel oil bunker. A soil sample collected immediately below the

presumed bottom of the FO-1 fuel oil bunker contained 33,000 mg/kg TPH. At B-14A, located immediately south of the FO-1 fuel oil bunker, soils were saturated with fuel oil from ground surface to the bottom of the boring 16.5 feet below current grade (historically 19.5 feet below grade). The maximum concentration of total EPH (34,300 mg/kg) was detected in the 10-15 foot interval sample from B-14A. Boring B-21, located near the southwest corner of the FO-1 fuel oil bunker, contained 598, 4,460 and 1,750 mg/kg total EPH at 0-5, 5-10 and 10-13.5 feet (historically 3-8, 8-13 and 14-16.5 feet), respectively. The total EPH concentration declined to 2,240 mg/kg in the 15-16.5 foot interval sample from B-14A. B-24 to B-28 were also advanced along the south side of the FO-1 fuel oil bunker, in order from west to east. B-24, located on the west end, was advanced to 8 feet below grade; the recoveries from B-24 had no visible or olfactory evidence of petroleum contamination. B-25 to B-27 had visible and / or olfactory evidence of petroleum contamination from near or slightly below current grade to the bottom of the borings (7.5 to 13 feet below grade). B-28 at the east end on the south side had saturated oil from 10 feet to the bottom of the boring (17 feet below grade).

B-1, B-4 and B-20 are located further south of the FO-1 fuel oil bunker. B-1 contained 5,910 mg/kg total EPH in the sample collected 12-17 feet below current grade (15-20 feet below historic grade). B-4 contained 5,370 mg/kg total EPH in the sample collected 12-17 feet below current grade (15-20 feet below historic grade). B-20 contained 99 mg/kg total EPH in the sample collected 5-8 feet below current grade. These three borings were advanced to 17, 22 and 8 feet below current grade, respectively. Visible evidence of contamination was encountered at 16 feet (staining) in B-1 and at 14.5 feet (sheen) in B-4. B-3 was advanced to 24 feet below current grade (25 feet below historic grade). A sheen was encountered at 16.5 feet below current grade; however, the sample collected from the current 14-19 foot interval contained only 325 mg/kg total EPH.

Immediately north of the fuel oil bunker, soils from the 5-10 foot interval of B-15 contained 8,540 mg/kg total EPH. The B-15 foot boring reached refusal at 10 feet below grade; therefore, the vertical extent of contamination could not be determined at this location. B-15, B-17 and B-5 are located along the north side of the FO-1 fuel oil bunker. There was little to no visible, olfactory or detected evidence of petroleum contamination in the 0-5 foot interval soils. Evidence of contamination began at about 5 feet below grade and extended to the bottom of each boring, which ended at a maximum depth of 10 feet below current grade.

Boring B-16 is located immediately east of the FO-1 fuel oil bunker. This boring extended to 14 feet below grade. A petroleum odor was observed at 14 feet below grade, and total EPH was 1,380 mg/kg in the 10-14 foot interval sample. Borings B-18 and B-19 are located further east near the retaining wall separating the courtyard from the Concord River. These two borings were advanced to 14 and 17 feet below grade, respectively. In the 5-10 foot

interval samples, the total EPH levels were 151 and 310 mg/kg, respectively, in these two borings. In the 10-15 foot interval samples, the total EPH levels were 899 and 1,050 mg/kg, respectively. The total EPH levels in the top 15 feet (based on current grade) are too low to suggest the potential presence of significant NAPL. The 15-17 foot interval sample from B-19 contained 2,538 mg/kg total EPH. This data suggests that near the retaining wall, the significant petroleum contamination is located more than 15 feet below current grade (18 feet below historic grade). In August 2015, depth to groundwater was measured in monitoring wells GEC-2 and GEC-3 at 19.87 and 22.70 feet below grade, which would correspond to 16.87 and 19.70 feet below current grade at the east end of the courtyard. The depth to groundwater could not be measured in monitoring well GEC-1 at that time due to the presence of a viscous NAPL. The depth to groundwater is consistent with the depth at which significant petroleum contamination is encountered away from the FO-1 fuel oil vault. The petroleum contamination is likely present as a smear zone straddling the water table.

Boring B-22, located west of the FO-1 fuel oil bunker, contained 953 mg/kg and none detected total EPH at 10-15 and 15-20 feet below grade (historically 11-16 and 16-21 feet below grade), respectively.

The results of the cumulative investigations indicate that immediately south of the FO-1 fuel oil vault, significant petroleum contamination extends from near current ground surface to depths likely spanning the water table. North of FO-1 fuel oil vault, the petroleum contamination extends from approximately 5 feet below grade to depths likely spanning the water table. Significant petroleum contamination does not appear to be located west of the FO-1 fuel oil bunker. East and further south of the FO-1 fuel oil bunker, the petroleum contamination appears located near, and likely spans, the water table.

Figure 8B depicts the locations at and depths below which significant petroleum contamination has been detected or observed. Near the fuel oil bunker, the significant petroleum-contaminated soils are located 2 to 5 feet or more below grade. Further from the bunker, as a conservative measure, all soils below 10 feet are presumed to contain significant petroleum contamination because it has been observed or detected in some soil samples at 1t feet. However, in this area, most of the petroleum contamination starts at a smear zone that straddles the water table, located at or more than 17 feet below grade.

Commingling of PCB and Petroleum Contamination

USEPA Region I requested that a sample of the non-aqueous phase liquid (NAPL) be collected and analyzed for PCBs to determine if the no. 6 fuel oil and PCB contamination are commingled. There was a plan, during the September 2016 sampling round, to install one or more monitoring wells, if groundwater was encountered. No groundwater was encountered; therefore, no NAPL could be collected for analysis of PCBs. As an alternative method of

evaluation, the levels of petroleum contamination and PCBs in soils were evaluated to determine to what extent the no. 6 fuel oil and PCB contamination are commingled. Petroleum-contaminated soils were collected for analysis of both PCBs and either TPH or EPH. The PCB levels in soil samples containing more than 2,000 mg/kg TPH or total EPH were evaluated to determine to what extent the PCB and petroleum contamination is commingled. This evaluation, documented in the table below, indicates that there is a low level, but not significant, commingling of PCB and petroleum contamination.

Boring	Depth (feet)*	Total EPH (mg/kg)	TPH (mg/kg)	PCBs (mg/kg)
FO-1	4-5		33,000	0.45
B-4	12-17	5,370		Not tested
B-5	3-8	2,450		0.29
B-14A	0-5	13,000		<0.15
B-14A	5-10	5,900		0.14
B-14A	10-15	34,300		0.14
B-14A	15-16.5	2,240		<0.13
B-15	5-10	8,540		0.30
B-19	15-17	2,530		Not tested
B-21	5-10	4,460		0.75
Comp 1			3,200	0.26
Comp 2			3,100	1.3
Comp 3			2,100	0.17
Comp 4			2,100	0.34

*Depth below current grade (as of 10/1/2016)

Further evaluation is provided below based on areas where excavation of petroleum contaminated soils is planned. Significant petroleum contamination immediately north of the FO-1 fuel oil bunker is located from approximately 5 feet below current grade to depths likely spanning the water table. This area is represented by borings B-17 (no PCB data available), B-15 and B-5. In this area, the soils located more than 5 feet below grade contained PCB levels ranging from 0.29 to 0.12 mg/kg. The 0-5 foot interval soils contained between 3.8 and 12 mg/kg PCBs. The 0-5 foot interval soils would be excavated and stockpiled from the area north of the FO-1 fuel oil bunker, prior to excavating the petroleum-contaminated soils. The 0-5 foot interval soils will be re-used on-Site within a soil repository.

Significant petroleum contamination immediately south of the FO-1 fuel oil bunker is located from ground surface to depths likely spanning the water table. This area is represented by borings B-14, B-14A, B-21 and B-24 to B-28. No PCB data exists for B-14, B-24 to B-28. B-21 and B-24 are located on the west end of this area, and no visible or olfactory evidence of petroleum contamination was encountered until 9 feet below grade. The 0-5 foot interval soil sample from B-21 contained a relatively low level of total EPH contamination (i.e., 598

mg/kg). Significant petroleum contamination was encountered at 5-10 feet below grade in this area. The PCB level for the 0-5 foot interval sample from B-21 was 11 mg/kg. Below 5 feet, the PCB levels ranged from <0.11 to 0.75 mg/kg.

Visible or olfactory evidence of petroleum contamination was first encountered at 5 feet for B-14 and B-14A (product/sheen), at 2 feet (smearing) for B-25, at 3 feet (smearing) for B-26, and at 0 feet (odor) at B-27. At B-28, located at the southeast end of the FO-1 fuel oil vault, visible evidence of petroleum contamination was not encountered until the 10-15 foot interval (saturated with oil). At B-14A, significant petroleum contamination was detected in the 0-5 foot interval sample (total EPH was 13,000 mg/kg). Based on these findings, the petroleum-contaminated soils in the area between B-25 to B-27 will be excavated from ground surface to depths spanning the water table.

Four composite soil samples were created using soils from borings B-21, B-24, B-25, B-26, B-27 and B-28 for disposal criteria testing. The levels of TPH ranged between 2,100 and 3,200 mg/kg, and the levels of PCBs ranged between 0.17 and 1.3 mg/kg. These samples are intended to be representative of conditions of soils slated for excavation and off-site disposition.

For the areas removed from the FO-1 fuel oil vault to the east and south, the following borings are representative of current Site conditions: (1) east: B-16, B-18 and B-19; and (2) south: B-1, B-4 and B-20. PCB data does not exist for B-28, B-1 or B-4. East and north of the FO-1 fuel oil bunker, the maximum PCB levels for the 0-5 foot interval were 29 and <0.11 mg/kg, respectively. For the 5-10 foot interval east of the FO-1 fuel oil bunker, the maximum PCB level was 2.1 mg/kg. Below 10 feet east of the FO-1 fuel oil bunker, the maximum PCB level was <0.11 mg/kg. East and south of the FO-1 fuel oil bunker, significant PCB contamination does not extend below 5 feet; however, petroleum contamination is not encountered until near the smear zone straddling the water table. The 0-5 foot interval soils from this area will be stockpiled separately from the soils excavated from 5 to the smear zone. The 0-5 foot interval soils will be placed in an on-site soil repository.

The PCB and petroleum analytical data are summarized in Table 1. The disposal criteria data are summarized in Table 4. The distribution of PCBs in soils, based on current grade, is depicted in Figure 6. The distributions of TPH/total EPH and visible/olfactory evidence of petroleum contamination in soils, based on current grade, are depicted in Figures 8 and 8A, respectively.

Asbestos

All asbestos data was obtained after IRA activities were stopped in June 2016, and were collected at depth intervals reflecting current grade. The distribution of asbestos is depicted in Figure 9 and the analytical data is tabulated in Table 7.

Axiom submitted nine 0-1 inch composite samples for analysis of asbestos. Three samples were collected from the stockpiled soils (currently located on the west side of the courtyard, and originated from the east side of the courtyard), and six samples from the *in situ* courtyard soils. Eight of the samples contained chrysotile asbestos, and one sample contained amosite asbestos. Two of the sampling locations (Areas 5 and 6) are located entirely within eastern portion of the courtyard where approximately 2.5 feet of soils were excavated prior to the stoppage of the IRA. It is unknown if the presence of asbestos in these soils is due to its presence throughout the PCB/metal/insecticide-contaminated soils or if cross-contamination occurred during the IRA excavation activities. The Axiom data did not include quantitative levels of asbestos.

During the September 2016 boring program, GEC collected soil samples for analysis of asbestos: (1) eleven discrete soil samples at depth intervals ranging between 0-5 feet and 15-16.5 feet; and (2) four composite samples created from soils recovered in borings with visible/olfactory evidence of petroleum contamination. The purpose of this investigation was to determine if the petroleum-contaminated soils planned for excavation and off-Site treatment, recycling or disposal contained asbestos.

Only one of the fifteen soil samples contained a measurable level of asbestos. The 0-5 foot interval soil sample from boring B-21 (located near the northwest corner of the petroleum-contaminated area) contained 2% chrysotile. This 0-5 foot interval soil sample did not contain a significant amount of petroleum-related contamination (i.e., 598 mg/kg total EPH, Figure 8, Table 1). Significant petroleum contamination (4,460 mg/kg total EPH) was detected in the 5-10 foot interval soil sample from B-21, but no asbestos was detected.

Based on this data, the petroleum-contaminated soils do not contain asbestos and do no need to be treated as asbestos contaminated waste once excavated. Prior to excavating the petroleum-contaminated soils, the shallow asbestos-contaminated soils over this area should be excavated and asbestos sampling of the 0-1 inch interval conducted to verify sufficient removal of asbestos-contaminated soils.

3.3 Description of Conditions of Courtyard / New Information

Figure 5 shows the current conditions of the courtyard, in terms of areas excavated, existing location of the 300-400 cubic yard stockpile of excavated soils, and other key features,

such as coal chute, utility vault, manholes, fuel oil bunker (FO-1) and former gasoline UST (GT-1 and GT-2) locations. There are four areas where excavation has occurred. Each is briefly described below:

1. B-11 PCB hot spot, where soils were excavated to 1.5 feet below grade. Following confirmatory sidewall and bottom sampling, part of this area was backfilled with surrounding soils to create a ramp (18 inches high at its highest end) to allow movement of soils from the east end of the courtyard to the stockpile at the west end of the courtyard.
2. At the west end of the courtyard, 1 foot of soils were excavated and placed in drywell #1. The stockpiled soils from the east end of the courtyard were placed immediately over the west end soils, because the PCB contaminant levels are comparable between the two locations.
3. At the east end of the courtyard, 1 foot of soils were excavated from the Boiler house smokestack to the retaining wall along the Concord River.
4. At the east end of the courtyard, an additional 1.5 feet of soils were excavated from the FO-1 fuel oil bunker to the retaining wall along the Concord River.

Seven soil repositories were identified for the courtyard, of which five have been used. Each of the soil repositories is described below. Figure 5A depicts the used and proposed soil repositories.

1. Coal Chute: The coal chute is located along the Boiler House exterior wall, within the courtyard. The chute is constructed of concrete blocks on three sides and, until recently, was open to the Boiler House basement on the fourth side. This wall was closed to prepare the coal chute for use as a soil repository. The coal chute's dimensions are 15 feet long by 10 feet wide by 10 feet deep, and would likely hold approximately 40 cubic yards from 3 feet below grade to the bottom of the chute. The coal chute also contained debris and metal remnants along the walls. These were removed to prepare the coal chute for use as a soil repository. These activities were conducted from inside the Boiler House basement. The capacity of the coal chute is approximately 60 cubic yards. The coal chute has been backfilled with soils from the SP-2 stockpile and some of the 0-1 foot soils from the east end of the courtyard, to the top. If a landscaped area is to be placed over the coal chute, the walls of the coal chute will have to be knocked down to approximately 3 feet below grade prior to covering the coal chute. The coal chute was temporarily filled to the top to eliminate this void space during remediation activities; if the top three feet of the coal chute is knocked down, the top three feet of soils will have to be removed. These soils are presumed to contain asbestos, in addition to PCBs.

2. Dry Well #1: This dry well is circular and constructed of brick. It is approximately 14 feet deep with a diameter of 10 feet. It has a capacity of approximately 41 cubic yards. It is filled with 0-1 foot interval soils to its top. Like the coal chute, some of the soils may have to be removed, if the walls will be knocked down 3 feet, so that a landscaped area can be constructed over the manhole. These soils are presumed to contain asbestos, in addition to PCBs.

3. Dry Well #2: This dry well is constructed of brick and has dimensions of 11 feet deep by five feet wide by five feet long. It has a capacity of approximately 10 cubic yards. It is

filled with 0-1 foot interval soils to its top. Like the coal chute, some of the soils may have to be removed, if the walls will be knocked down 3 feet, so that a landscaped area can be constructed over the manhole. These soils are presumed to contain asbestos, in addition to PCBs.

4. Dry Well #3: This dry well is constructed of brick and has dimensions of 8 feet by 8 feet by 6 feet. It has a capacity of approximately 14 cubic yards. It is filled with 0-1 foot interval soils to its top. Like the coal chute, some of the soils may have to be removed, if the walls will be knocked down 3 feet, so that a landscaped area can be constructed over the manhole. These soils are presumed to contain asbestos, in addition to PCBs.

5. Dry Well #4: This dry well is constructed of brick and has dimensions of 8 feet by 8 feet by 8 feet. It has a capacity of approximately 19 cubic yards. It is filled with 0-1 foot interval soils to its top. Like the coal chute, some of the soils may have to be removed, if the walls will be knocked down 3 feet, so that a landscaped area can be constructed over the manhole. These soils are presumed to contain asbestos, in addition to PCBs.

6. Utility Vault: The utility vault is located at the west end of the courtyard. The utility void has a trapezoid shape. It is approximately 5 feet wide at one end and 16 feet wide at the other end, with a length of approximately 60 feet and a depth of 14 feet. The vault has a capacity of approximately 250 cubic yards, from 3 to 14 feet below grade (presumes top of walls of utility vault is lowered by three feet). However, a clean utility corridor will have to be created around the live sewer line approximately 4 feet wide, which will reduce the storage capacity to approximately 125 cubic yards. Again, the walls of the void would have to be knocked down to 3 feet below grade, if the planned landscaped area is to extend over this area. The utility vault currently does not contain any soils.

7. FO-1 Fuel Oil Bunker Excavation Area: The portion of the excavation of petroleum contaminated soils above the smear zone of the water table is estimated to be at least 60 feet long from east to west, 30 feet wide from north to south, and 15 feet deep (based on existing grade), with a capacity of approximately 1,000 cubic yards. The sidewalls and bottom of the repository will have to have a marker layer, comprised of a geotextile fabric or similar material. Additional excavation will have to be conducted across the water table, in areas south and east of the FO-1 fuel oil bunker. If petroleum contamination is only present across the smear zone in these areas, these areas may not be used as part of the FO-1 Fuel Oil Bunker soil repository.

Both USEPA Region I and MassDEP had verbal requests for additional investigations or assessments. USEPA Region I requested the following to determine if additional remediation of the courtyard falls under the jurisdiction of TSCA:

1. Description and results of additional investigations conducted within the courtyard, in particular:
   a. Additional borings and soil sampling surrounding B-9 to determine if levels of PCBs are higher than 50 mg/kg in this area.
   b. Additional borings and soil sampling in the petroleum release area, to determine the vertical and horizontal extent of petroleum contamination and the extent to which the PCB contamination is commingled with the petroleum contamination.

2. The approximate cost to remove the existing stockpile of PCB-contaminated soils relative to the cost to re-use the soils on-Site.

The results of the requested investigations are described and interpreted in Sections 3.1 and 3.2, respectively. The appropriate off-site disposition of the soils is limited to a hazardous waste facility that can accept soils containing between 10 and <50 mg/kg PCBs, asbestos and petroleum contamination. ENPRO Services Inc. (ENPRO), who developed the cost estimates, identified Waste Management of Norridgewolk, Maine as a potential receiving facility. Given the constraints in accessing the courtyard, it is necessary to first move them using a front end loader along a narrow corridor between the Picker Building and retaining wall along the Concord River before placing them in a roll-off dumpster. Given the presence of asbestos and PCBs decontamination, there are significant potential issues with worker safety and decontamination of the expanded work area and additional equipment. ENPRO assumed the soils could be shipped under a Bill of Lading rather than under Uniform Hazardous Waste Manifests.

For the on-Site re-use option, the soils would be placed in an isolated soil repository located within the utility vault and / or the fuel oil bunker location, following petroleum excavation. This option would require less time and a smaller work area, and would be a greener choice since energy costs are not needed to transport and treat the soils.

ENPRO's cost estimate for the on-Site re-use option is between $17,995 and $22,754. Their cost estimate for the off-site transportation and disposal is between $145,045 and $154,058. When costs associated with disposal criteria sampling and testing are added, the cost for off-site transportation and disposal is likely approximately $170,000. Neither cost estimate includes oversight by a Licensed Site Profession or his/her representative.

Given that the remedial goal for the courtyard is a Permanent Solution, remediation will have to include elimination of NAPL in the subsurface, which is a source of petroleum sheens on the Concord River during times of drought. Therefore, significant additional remedial costs will occur for the following purposes: (1) excavation of petroleum-contaminated soils to depths straddling the water table; (2) potentially pumping oily water from the excavation hole; (3) installation of recovery wells / interceptor trenches so that oil water can be pumped from the subsurface if excavation does not eliminate the NAPL; and (4) improvements to the retaining wall to mitigate the seepage of oils into the Concord River. These costs are apt to be substantial, and, alone, will not result in a Permanent Solution.

Additional excavation of shallow PCB- and asbestos-contaminated soils will need to be conducted so that a protective barrier can be installed over the contaminated soils. The costs associated with this additional excavation are not included herein.

Given the additional remedial costs that will be incurred in an attempt to achieve a Permanent Solution, the difference in costs (approximately $150,000) between on-Site re-use and off-Site transport and disposal are significant enough to justify the on-Site re-use of the stockpiled soils.

MassDEP requested the following information be provided in the IRA Plan Modification:

1. The MassDEP Air and Waste Program requested that all information used to support and describe the planned IRA remedial activities be presented in single document. Therefore, this submittal contains the information necessary to support the planned IRA remedial activities and also provides a step by step description of the IRA remedial activities, including equipment to be used.

2. Initially MassDEP Bureau of Waste Clean-up requested a focused Phase III Remedial Action Plan (RAP), which GEC interpreted to address only the PCB/metal/insecticide contamination. MassDEP then requested that the focused Phase III RAP, which was submitted in the August 2016 IRA Plan Modification No. 2, be modified to include the petroleum contamination. Additional investigation of the petroleum release was necessary to have sufficient data for the Phase III RAP. These investigations are described and interpreted in Sections 3.1 and 3.2, respectively. The Phase III RAP is no longer "focused" but is considered a complete Phase III RAP. It is provided in Section 3.5 and Appendix E. The first IRA Plan Modification, submitted in April 2016, included a risk assessment to support the remedial decisions for the PCB/metal/insecticide-contaminated soils. The original risk assessment is described briefly in Section 3.4 and provided with minor modifications from the original in Appendix C. To support the Phase III RAP contained in Section 3.5, an updated risk assessment had to be conducted for the east portion of the courtyard to include the petroleum contamination. This new risk assessment is described briefly in Section 3.4 and provided in Appendix D.

3.4 Risk Assessments

Original Risk Assessment (April 2016), Modified

The modification to the original risk assessment (April 2016) was conducted for 0-1, 1-3, 3-6 and 6-11 foot interval soils of the courtyard, but excluded the petroleum contamination, which was believed to be located deeper than 11 feet. The original risk assessment also evaluated the fuel oil vault sands (SP-3). The receptors were construction workers and residents, because the Picker building is being redeveloped for residential use and the courtyard, when remediation / renovation is completed, is intended for passive use by the future residents. Assumptions were made that the courtyard soils would be located under a protective barrier, except during a six-month construction project. During the construction project, residential exposure is presumed to occur seven days a week via dermal contact, incidental ingestion and inhalation of dusts for the six-month period.

Based on the results of the original risk assessment, a Significant Risk of harm was found to exist for both the resident and construction from exposure to the 0-1 foot soils and the SP-3 vault sands. A Significant Risk of harm also exists to the resident (and nearly to to the construction worker) from exposure to 1-3 foot interval soils. Based on this finding, a decision was made that the 0-3 foot interval soils would have to be excavated and either: (1) placed in an on-Site isolate soil repository; or (2) transported off-site for disposal. If placed in an on-Site repository, these soils could not be excavated or disturbed in the future, except under the oversight of a Licensed Site Professional (LSP), under a Soil Management Plan, by persons 48-hour OSHA trained and under the oversight of a person permitted to remediate and monitor asbestos contamination, in accordance to the Massachusetts asbestos regulations. This finding did not consider that asbestos contamination is present in the shallow soils. No Significant Risk of harm was found to exist for the soils between 3 and 11 feet below grade, assuming that they remain covered with a protective barrier, which, since the courtyard is presumed to be renovated as a landscaped area, to consist of a marker barrier with three feet of clean fill. These findings are relative to the original grade of the courtyard, prior to the June 2016 excavations. Refer to Appendix C for this risk assessment.

East Portion of Courtyard Risk Assessment, including Petroleum Contamination (October 2016)

The risk assessment for the east portion of the courtyard was conducted based grade for the area from the Boiler house smoke stack east to the retaining wall along the Concord River. Separate risk assessments were conducted for the 0-3, 3-6 and 6-20 foot intervals, and included the petroleum contamination. The receptors were construction workers and residents, because the Picker building is being redeveloped for residential use and the courtyard, when remediation / renovation is completed, is intended for passive use by the future residents. Assumptions were made that the courtyard soils would be located under a protective barrier, except during a six-month construction project. During the construction project, residential exposure is presumed to occur three days a week via dermal contact and incidental ingestion and seven days per week via inhalation of dusts for the six-month period for the 0-3 and 3-6 foot intervals; and seven days a week via dermal contact, incidental ingestion and inhalation of dusts for the 6-20 foot interval soils.

Based on the results of this risk assessment, No Significant Risk of harm was found to exist for both the resident and construction from exposure to the 0-3, 3-6 and 6-20 foot interval soils. However, to reach a finding of No Significant Risk for the resident for the 0-3 and 3-6 foot intervals (but not the 6-20 foot interval), an assumption had to be made that the frequency of exposure to the resident would be limited during a construction project via specific provisions in the Soil Management Plan (such as fencing / barricading / containerizing

excavated soils; covering soils with polyethylene sheeting; and/or posting warning signs prohibiting access). Based on this finding and due to the presence of asbestos in at least some of the soils, a decision was made that one or more of the following would have to be done for the 0-3 and 3-6 foot interval soils for the current grade: (1) place the soils more than three feet below grade under a protective barrier and increasing the provisions of the Notice of AUL to include the additional Soil Management Plan requirements; (2) place the soils in an on-Site isolate soil repository that will prohibit access except under the oversight of a Licensed Site Professional and Massachusetts-certified asbestos contractor; or (3) transporting the soils off-site for disposal at an approved hazardous waste facility. This finding considers that asbestos contamination is present in the shallow soils. No Significant Risk of harm was found to exist for the soils between 6 and 20 feet below grade, assuming that they remain covered with a protective barrier, which, since the courtyard is presumed to be renovated as a landscaped area, to consist of a marker barrier with three feet of clean fill. These findings are relative to the current grade of eastern portion of the courtyard, and only apply to the eastern portion of the courtyard. Refer to Appendix D for this risk assessment.

The petroleum contamination is generally higher at depth; however, because an assumption is made that these soils will remain below a protective barrier, they do not pose a Significant Risk of harm to human health. However, due to the presence of NAPL with macro-scale mobility (as evidenced by the seepage of NAPL to the Concord River), a Significant Risk of harm would exist for both the environment and public welfare.

3.5 Phase III Remedial Action Plan

The revised Phase III RAP, which includes the soils contaminated with PCBs, asbestos, metals, insecticides and/or petroleum, is provided in Appendix E. Based on the Phase III RAP, the selected remedies are the following:

1. Excavate the shallow asbestos- and PCB-contaminated soils (0-3 foot interval) from the courtyard such and placement of the soils in on-Site soil repositories, with transportation of any soils beyond capacity to an appropriate facility that can receive >10 to 50 mg/kg PCB-contaminated soils, asbestos-contaminated soils and/or petroleum-contaminated soils (as applicable to specific volumes of soils). Distinctive markers would have to be installed marking the top of each soil repository. Markers would also have to be installed to mark the sidewalls and bottom of the FO-1 fuel oil bunker excavation. The location and elevation of each soil repository would have to be surveyed by a Massachusetts registered surveyor. A clean utility corridor would have to be installed in the utility vault for the live sewer line, if the utility vault will be used as a soil repository.

2. Excavation of petroleum-contaminated soils and transport of the soils to an appropriate facility that can receive up to 10 mg/kg PCBs and petroleum-contaminated soils.

Dewatering of the excavation may be needed to remove oily water and allow sufficient access to the petroleum-contaminated soils.

3. The application of a Gunite seal to the landside of the retaining wall, possibly followed by the installation of a cement/bentonite grout slurry wall along sections of the retaining wall, which are intended to contain the NAPL and preventing it from migrating to nearby surface water.

4. As a contingency in case the soil excavation is not sufficient to eliminate the NAPL and/or NAPL is still weeping from the retaining wall into the surface water, the installation of multiple oil recovery wells or an interception trench with recovery well, in case recoverable macro-scale or micro-scale NAPL. The appropriate method for NAPL recovery would be made in the field based on the location, depth and accessibility of the NAPL smear zone. No oil recovery pumps would be placed in the recovery wells at the time of installation. One or more recovery pumps would be installed only if NAPL is observed in one or more recovery wells and the NAPL is determined to be recoverable, based on NAPL transmissivity testing or other comparable testing method.

5. Installation of a marker barrier and protective barrier (such as three feet of clean soils) over the soils located more than 3 feet below final grade, and the installation of a clean utility corridor for the storm drainage system that is to be installed in the courtyard. The location of the clean utility corridor in the courtyard would have to be surveyed by a Massachusetts registered land surveyor.

3.6 Remediation Waste, Remedial Wastewater and Remedial Additives

To date, five stockpiles of soils are or were located in the courtyard. Stockpile SP-1 contains the soils and other solid debris created by the renovation General Contractor when soils and other debris were removed from the window wells and surface of the courtyard. This approximately 40-cubic yard stockpile is located in the east corner of the courtyard. Based on disposal criteria testing, these soils contain elevated levels of lead (2400 mg/kg), arsenic (23 mg/kg), vanadium (3500 mg/kg), zinc (1100 mg/kg), PCBs (63 mg/kg) and heptachlor epoxide (0.29 mg/kg). No TCLP lead, TCLP cadmium or TCLP heptachlor were detected above the applicable Resource Conservation and Recovery Act (RCRA) criteria. The disposal criteria data are summarized in Table 4. In late May 2016, approximately 10 cubic yards of soil was excavated from the B-11 PCB hot spot and were added to the 40 cubic yard SP-1 stockpile. The soils of this combined stockpile were containerized and were moved with difficulty through the Picker House building and placed in separate roll-off dumpsters so that they could be transported off-Site. The >50 mg/kg PCB soils from the SP-1/B-11 stockpile were containerized on or about June 3 through 6, 2016, moved from the courtyard and placed in six dumpsters. The dumpsters were then shipped under six uniform hazardous waste manifests to a TSDF, Tradebe located at 410 Shattuck Way, Newington, NH, prior to shipment to Wayne Disposal Inc., in Belleville, Michigan. One dumpster was shipped and received by

Wayne Disposal Inc. on June 7, 2016, before MassDEP required asbestos analysis. No asbestos were detected in the soil samples collected from the remaining five dumpsters. Therefore, these five dumpsters were shipped from Tradebe to Wayne Disposal Inc. during late June 2016 and received by Wayne Disposal Inc. on July 11 and 12, 2016. A total of 74.08 tons of PCB-contaminated soils were shipped to Wayne Disposal Inc. for disposal. Refer to Appendix B of the IRA Plan Modification No. 2 and IRA Status Report No. 3, submitted on August 15, 2016, for the completed uniform hazardous waste manifests.

Stockpile SP-2 contains the soils removed to access the FO-1 fuel oil bunker. In June 2016, this approximately 25-cubic yard stockpile was placed in the coal chute, which was modified to be an on-Site soil repository. No disposal criteria testing was done for these soils, because they are believed to be comparable to 0-3 foot interval soils elsewhere in the courtyard. Also, prior to excavation, these soils (FO-TP-1 (0-1'), FO-TP-1 (1-2') and FO-TP-1 (2-3')) were analyzed for PCBs, pesticides and herbicides, and were found to contain levels of lead (up to 1100 mg/kg), PCBs (up to 13 mg/kg) and dieldrin (0.19 mg/kg) consistent with other 0-1 and 1-3 foot interval soils throughout the courtyard. These data are summarized in Table 1.

The stockpile of petroleum contaminated soils (estimated at less than 10 cubic yards) was returned to the bottom of the FO-1 bunker excavation, when soil excavation was temporarily terminated in March 2016. Polyethylene sheeting was placed on top of the petroleum-contaminated soils, before backfilling with SP-3 soils, as described in the next paragraph.

Stockpile SP-3 contains the soils (sands) from the top portion of the FO-1 tank bunker. Based on disposal criteria testing, these soils contain elevated levels of thallium (9.8 mg/kg) and PCBs (2.6 mg/kg). The analytical data are summarized in Table 4. These soils (estimated to be 20 cubic yards) were returned to the FO-1 bunker (atop the polyethylene sheeting on the petroleum-contaminated soils) when soil excavation was temporarily terminated for the FO-1 bunker in March 2016.

In addition, the gasoline UST graves were lined with polyethylene sheeting and the soils from the gasoline UST excavation were placed on top of the polyethylene sheeting. Polyethylene sheeting was placed on top of these soils, and the tank grave was further backfilled using soils from the top of the no. 6 fuel oil bunkers (FO-1 and FO-2). The backfill in the tank graves is presumed to contain PCBs and metals.

On March 16, 2016, the two gasoline USTs were transported to Winfield Alloy Inc., of Lawrence, Massachusetts, for recycling. On March 28, 2016, the water (approximately 225 gallons) from the two USTs was shipped under a Uniform Hazardous Waste Manifest (UHWM) to Cyn Environmental Services, of Dover, New Hampshire, for treatment. The

receipts for the USTs and the UHWM for the tank water are provided in Appendix H of the April 2016 IRA Plan Modification and IRA Plan Status Report No. 2.

In June 2016, Soils from the 0-1 foot intervals at the east and west portions of the courtyard were excavated and placed in the following on-Site soil repositories: (1) dry wells #1, #2, #3 and #4, which have a current storage capacity of 41, 10, 14 and 19 cubic yards, respectively; and (2) the coal chute, which had an additional storage capacity of 35 cubic yards after the 25-cubic yards of SP-2 soils were placed in it. The total of soils placed in on-site soil repositories to date is approximately 144 cubic yards.

An additional 300 to 400 cubic yards of soil are currently located in the stockpile at the west end of the courtyard. These soils are lying directly on the dirt, because they contain the same contaminants at comparable levels, and are covered with polyethylene sheeting. These soils are slated for placement in on-site soil repositories, once IRA remediation is re-initiated.

No remedial additives were used during this IRA Status Report period.

3.7 LSP Opinion

This LSP Opinion is prepared by Brian T. Butler, L.S.P. no. 5736, and Goldman Environmental Consultants, Inc. for the courtyard release located at 169.2 Bridge St., in Lowell, MA, identified as RTN 3-33101. This LSP Opinion is prepared on behalf of R-M Developer, LLC, c/o Rees-Larkin Development, LLC and in accordance with 310 CMR 40.0425(3)(e). The IRA is being conducted in conformance with the IRA Plan and IRA Plan Modifications and the verbal requirements specified by the MassDEP Bureau of Waste Site Clean-up and MassDEP Bureau of Air and Waste, as demonstrated above. In addition, verbal requests by the USEPA Region I are also being followed. There are no written conditions of approval for the IRA.

4.0 RELEASE ABATEMENT MEASURE PLAN FOR RTN 3-33474

The RAM Plan for RTN 3-33474 is the same as the IRA Plan Modification for RTN 3-33101 and IRA Plan for RTN 3-33853, as presented in the conditionally-approved IRA Plan Modification. It is presented largely unchanged from the IRA Plan Modification, with the following exceptions: (1) the remedial activities of the IRA Plan for RTN 3-33793 are excluded from this RAM Plan; (2) as required by USEPA Region I, provisions are added for the collection and PCB analysis of soil samples surrounding boring B-18 (Section 4.3) and, if PCB levels exceed 50 mg/kg, the excavation and off-Site disposition of the PCB-contaminated soils surrounding B-18 (Sections 4.1 and 4.2); and (3) as required by MassDEP, the dust action level is reduced to a maximum of 150 $\mu g/m^3$ for all excavation work (Appendix F).

4.1 Objectives, Specific Plan and Proposed Schedule

The IRA remedial activities already conducted for RTN 3-33101 entail the following: (1) removal of the GT-1 and GT-2 gasoline USTs; (2) approximately 20 cubic yards of soils originating from the top of the fuel oil bunkers were temporarily placed on polyethylene sheeting overlying the petroleum-contaminated soils inside the FO-1 fuel oil bunker; (3) additional soils from the top of the fuel oil bunkers were placed on top of polyethylene sheeting inside the GT-1 and GT-2 tank graves; (4) excavation of approximately 10 cubic yards from the B-11 PCB hot spot (as depicted in Figures 4A and 5) and transport of it along with approximately 40 cubic yards of SP-1 stockpile soils to a hazardous waste facility approved to accept soils containing >50 mg/kg PCBs; (5) excavation of the 0-1 foot interval soils across the east end of the courtyard (as depicted in Figure 5); (6) placement of 0-1 foot interval soils into four dry wells and the coal chute, as depicted in Figure 5A; (7) excavation of 1 to approximately 2.5 foot interval soils from the east end of the courtyard (as depicted in Figure 5); and (8) placement of the remainder of the 0-1 foot interval soils and the 1-2.5 foot interval soils in an approximately 300-400 cubic yard stockpile located at the west end of the courtyard (as depicted in Figure 5). The stockpiled soil and courtyard soils are covered with 6-mil polyethylene sheeting, with plywood placed on top in some areas.

A small access road was created inside the courtyard to allow access of heavy machinery for asbestos-abatement related and demolition activities. The small access road was created within the courtyard, extending from the mouth of the corridor entering the courtyard on the northeast corner and extending to the Picker building shaft, which has been partially razed. This access road is constructed of 3 to 6 inches of clean processed sand and gravel placed directly on polyethylene sheeting. The access road is approximately 100 feet long and 8 to 10 feet wide, to allow access by heavy equipment and personnel during asbestos abatement and demolition activities. This access road will be dismantled during IRA remedial activities. The gravel will be stockpiled on and covered by 6-mil poly and will be re-used as part of the backfilling of the petroleum excavation and or for regrading prior to the placement of the marker barrier.

An existing masonry shaft (also called corridor) located along the east side of the Picker building has been converted into an access way for the courtyard. It is approximately 140 feet long and 10 feet wide, and is constructed of 6-mil polyethylene sheeting covered by 20-mil black polyethylene sheeting. A layer of ¾-inch plywood was placed on top of the polyethylene sheeting to protect it from tears and punctures, and another layer of 20-mil black polyethylene sheeting was placed on top of the plywood.

The planned remedial activities include the following: (1) creating of a clean utility corridor inside the utility vault and placement of stockpiled asbestos/PCB-contaminated soils

into the repository portion of the utility vault; (2) excavation of surficial asbestos-contaminated soils from the eastern portions of the courtyard; (3) segregating the eastern asbestos-remediated portion of the Site from the remainder of the courtyard that has asbestos-contaminated soils; (4) excavation of visibly petroleum-contaminated soils from the eastern portion of the courtyard and transportation off-site for treatment or disposal; (5) excavate soils along portions of the retaining wall to its base and the application of a Gunite spray or the installation of a slurry wall and (optional) installation of a water interceptor pipe along the retaining wall and the installation of NAPL recovery wells; (6) backfilling this area with soils that were excavated but did not contain visible evidence of contamination; (7) creation of FO-1 soil repository; (8) placement of the stockpiled soils at the west end of the courtyard into the FO-1 soil repository; (9) excavation of the remaining 1-3 foot interval soils at the west end of the courtyard and placement in the FO-1 repository; (10) excavation of the 0-1 and 1-3 foot interval soils from the remainder of the central portion of the courtyard and placement in the FO-1 repository; (11) removal of the top three feet of soils in the dry wells and coal chute and placement of these soils in the FO-1 repository, so that the walls of the dry wells and coal chute can be lowered to three feet below final grade: (12) capping the dry wells and coal chute with concrete, and placement of distinctive marker barriers over the utility vault and FO-1 soil repository; (13) placement of another distinctive marker barrier over the remaining soils of the courtyard, which would be located three feet below final grade; (14) installation of a clean utility corridor along the south side of the courtyard, near the Picker building, to house the storm water system; (15) survey of the locations and elevations of the six soil repositories and the two clean utility corridors; and (16) backfilling of the courtyard to final grade, with three feet of clean fill. Each of these remedial tasks will be conducted in the sequence described in greater detail below.

All work will be conducted in accordance to Site-specific health and safety plans (HASPs) prepared by each contractor for its personnel. All work will be conducted in accordance to GEC's Soil Management Plan and Dust Monitoring Procedures, provided in Appendix F. When excavation or movement of asbestos-contaminated soils is being conducted, the work will be conducted in accordance with Axiom's personnel protective equipment, air monitoring, decontamination, disposal and other asbestos-related procedures provided in Appendix F. If there is a conflict between GEC's and Axiom's procedures, Axiom's procedures will be followed.

At all times except during specific tasks requiring their removal, all courtyard soils and stockpiled soils must remain covered with 6-mil polyethylene sheeting. Dust monitoring will be conducted continuously during work in the courtyard. Asbestos monitoring will be conducted continuously during work in the courtyard unless the Massachusetts-licensed

asbestos project manager decides it is not warranted during a specific step of the remediation. Asbestos sampling locations are identified on Figure 10A. Two of these locations will also be used as dust monitoring locations. A three-stage personnel decontamination facility and equipment washing station will be located at the west end of the corridor away from the courtyard, as depicted in Figure 10A. The courtyard and corridor are considered exclusion zones.

Equipment that will be used during this project will include, at a minimum, the following:

(1) Excavator
(2) Front-end loader with front skid steers
(3) Water truck
(4) Compactor
(5) Pressure washer trailer
(6) Frac tanks
(7) Dewatering pump(s)
(8) Roll-off dumpsters, each lined with two form-fitted premanufactured bladder bags
(9) Dust monitors
(10) Asbestos air monitors
(11) Personal air monitors
(12) Personal protective equipment, including air-purifying respirators, tyvek or equivalent suits, nitrile gloves, rubber boots and safety glasses
(13) Asbestos soil sampling materials / sample bags
(14) Remote, three chamber decontamination facility, equipped with tepid water, soap, disposable towels and other items necessary for containment and control of asbestos
(15) A decontamination center for equipment, which includes a HEPA vacuum, power washing equipment, and appropriate containers for asbestos-contaminated debris
(16) 6-Mil polyethylene sheeting and ¾-inch plywood
(17) Three types of geotextile membranes having distinctive colors, for use in creating or marking soil repositories, clean utility corridors or covering the top of the courtyard soils that will be located three feet below final grade
(18) Orange snow fencing that will be used together with geotextile fabric to mark the sidewalls of the FO-1 soil repository, and that will be used to separate the asbestos cleared portion of the courtyard from that portion that still contains asbestos-contaminated soils
(19) Concrete to cap the top of the dry wells and coal chute soil repositories and/or for the slurry wall/gunite spray

(20) Any other materials necessary to complete the project, provide adequate control of the asbestos, and protection of personnel

The IRA activities will be conducted in five major parts, identified as the following: (1) creation of a clean utility corridor inside a portion of the utility vault, and moving a portion of the stockpiled asbestos/PCB-contaminated soils into the remainder of the utility vault; (2) removal of asbestos-contaminated soils from the east side of the courtyard and separating the east and west sides of the courtyard to divide the area cleared of asbestos from the area with asbestos-contaminated soils; this approach will allow for excavation of petroleum-contaminated soils so that the FO-1 soil repository can be created to receive the asbestos/PCB-contaminated soils; (3) excavation of the petroleum-contaminated soils, creation of the FO-1 soil repository, installation of a Gunite spray or slurry wall followed by either a cutoff trench (if necessary), and installation of oil recovery wells; (4) movement of asbestos/PCB-contaminated soils from the existing stockpile to the FO-1 soil repository, and excavation of 1-3 foot interval and 0-3 foot interval soils from the west end and west central portions of the courtyard for placement in the FO-1 soil repository; and (5) installation of marker barriers and a protective cover, including installation of a clean utility corridor to house a storm water system. The proposed location of the storm water system is depicted in the plans in Appendix G.

Additional step-wise details on the planned IRA activities are described below and in Figures 10B to 10K.

Remediation Step	Figure	Description
Utility Vault	10B	1. The top of the walls of the utility vault will be knocked to three feet below grade. 2. A 4-foot wide clean utility corridor will be constructed around the live sewer line, inside the utility vault. This utility corridor will be constructed using wood or other hard material to support its sides and will be lined on its sides and bottom with geotextile membrane. Clean sands will be used to fill the utility corridor, or other procedure may be used if a hard cover will be placed on the utility vault. If the top of the vault will not be covered with a hard cover, a geotextile membrane will be placed on top of the clean utility corridor that is different than the one placed on top of the remainder of the utility vault. 3. Approximately 125 cubic yards of PCB/asbestos-contaminated soils from the existing stockpile and will be placed inside the soil repository part of the utility vault. 4. After the utility vault is filled to three feet from final grade, a distinctively colored geotextile fabric will be placed over the soil repository portion of the vault, the fabric will be overlain with 3 inches of gravel and temporarily covered with clean 6-mil polyethylene sheeting and ¾-inch plywood while the remainder of the courtyard is being remediated. 5. The location and elevation of the utility vault soil repository and clean utility corridor will be surveyed by a Massachusetts-registered

		surveyor; the location of the clean utility corridor will be eventually permanently marked in the courtyard so that it can be located.
Asbestos Soil Excavation A*	10C	1. Prior to conducting work in this area (except perhaps for moving stockpiles if needed provide access), additional soil sampling will be conducted at boring B-18, as described in Section 4.3. If any soil sample contains more than 50 mg/kg total PCBs, these soils will require excavation and transport off-Site to a facility approved to accept both asbestos-contaminated soils and soils containing >50 mg/kg PCBs. This excavation, with TSCA-grid confirmatory sampling, will be done prior to proceeding with steps 2 to 8. Excavation will continue until all soil samples contain no more than 50 mg/kg PCBs. If no soil samples contain >50 mg/kg PCBs, then soil excavation can continue as described in steps 2 to 8. An assumption is made that no more than 50 cubic yards of soils contaminated with >50 mg/kg PCBs will need to be transported off-Site. 2. The SP-3 soils located on polyethylene sheeting at the top of the FO-1 fuel oil bunker will be removed and placed on the existing stockpile on the west end of the property. These soils are presumed to contain both asbestos and PCBs, because they originated from the fill over the FO-1 fuel oil bunker. 3. The backfill placed at the top of the GT-1 and GT-2 tank grave on polyethylene sheeting, also originated from the fill over the FO-1 fuel oil bunker. This soil will be excavated and placed on the existing stockpile at the west end of the courtyard. 4. The top one-foot of soils from the east end of the courtyard will be excavated and placed on the existing stockpile at the west end of the courtyard. 5. The Massachusetts-licensed asbestos manager will divide the east end of the courtyard into sections, and will collect five 0-1 inch soil samples from each section. For each section, these soil samples will be composited into a single sample, placed into a labeled container (e.g., Whirlpak™ sample bags), and submitted under chain of custody documentation to a Massachusetts-certified laboratory for analysis of asbestos via USEPA Method 600/R-93/116. 6. The soils of the east end will be covered with clean 6-mil polyethylene sheeting, pending the results of the asbestos analyses. 7. If asbestos is detected in any section of the east end of the courtyard, steps 3, 4 and 5 will be repeated for the affected section until no asbestos is detected. 8. Once the excavation of asbestos-contaminated soils is complete, these soils will remain covered with 6-mil polyethylene sheeting until excavation of petroleum contaminated soils is conducted. For more details see the Petroleum Soil Excavation Steps A and B.

Asbestos Soil Excavation B**	10D	1. The top one-foot of soils from the east central portion of the courtyard will be excavated and placed on the existing stockpile at the west end of the courtyard. 2. The Massachusetts-licensed asbestos manager will divide the east central portion of the courtyard into sections, and will collect five 0-1 inch soil samples from each section. For each section, these soil samples will be composited into a single sample, placed into a labeled container (e.g., Whirlpak™ sample bags), and submitted under chain of custody documentation to a Massachusetts-certified laboratory for analysis of asbestos via USEPA Method 600/R-93/116. 3. The soils of the east central portion of the courtyard will be covered with clean 6-mil polyethylene sheeting, pending the results of the asbestos analyses. 4. If asbestos is detected in any section of the east central portion of the courtyard, steps 3, 4 and 5 will be repeated for the affected section until no asbestos is detected. 5. Once the excavation of asbestos-contaminated soils is complete, these soils will remain covered with 6-mil polyethylene sheeting until excavation of the remainder of the 0-3 foot interval soils is completed. For more details see the Remainder of PCB Soil Excavation step.
Petroleum Soil Excavation A	10E	1. Soils from the petroleum-contaminated area close to and including the FO-1 fuel oil bunker area. This area (called the initial excavation area) will be the future location of the FO-1 soil repository. The soils of this area are contaminated from approximately 2-5 feet below grade to a smear zone straddling the water table. For this area, the visibly petroleum-contaminated soils from this area will be separated from those that are not visibly contaminated with petroleum. 2. The soils with no visible petroleum contamination will be stored in the non-asbestos soil storage area, located in the east central portion of the courtyard, pending on-Site re-use of the soils as backfill, more than three feet below final grade. 3. Disposal criteria data exists for the *in situ* petroleum contaminated soils of this area. If permitted by the receiving facility, the visibly petroleum-contaminated soils will be live loaded for off-site disposition. 4. Otherwise, these soils will be stockpiled separately from those scheduled for on-site re-use as backfill, within the east central portion of the courtyard. Discrete samples will be collected from the stockpiled petroleum-contaminated soils and composited for disposal criteria testing, following the procedures required by the receiving facility. These soils will remain in this location until a receiving facility provides approval of receipt. 5. If the petroleum contamination is present at and below the water table, if feasible, dewatering of the excavation will be conducted so that additional petroleum-contaminated soils can be excavated. Oily water removed from the excavation will be placed in frac tanks. The recovered oily water will be disposal criteria tested and shipped under appropriate documentation to a receiving facility. 6. Once the petroleum-contaminated soils are excavated to the extent feasible, soil samples will be collected from the bottom and sidewalls of the excavation for analysis of EPH and target PAHs via MassDEP's method and for TPH via USEPA Method 8100M. This analytical data

		will be used to evaluate the residual levels of petroleum contamination and whether free-phase petroleum remains following the completion of excavation.
Petroleum Soil Excavation B	10F	1. The soils of the petroleum-contaminated area located south and east of the initial excavation area (FO-1 fuel oil bunker area) will be excavated. This area (called the second excavation area) mostly has petroleum contamination in a smear zone straddling the water table, but in locations closer to the FO-1 fuel oil vault, may be as shallow as 10 feet below current grade. For this area, the overlying soils that are not visibly petroleum-contaminated will be excavated and placed in one of the following locations: (1) the non-asbestos soil storage area, located in the east central portion of the courtyard; or (2) temporarily in the excavated hole of the initial excavation area on polyethylene sheeting until they can be re-excavated. These soils will be re-used as on-Site backfill, more than three feet below final grade. Therefore, if petroleum-contaminated soils are excavated to the extent feasible, elsewhere in the second excavation area, soils that do not contain visible contamination can be directly placed in the area where excavation is completed, at depths more than 3 feet below final grade. 2. Disposal criteria data exists for the *in situ* petroleum contaminated soils, mostly from the shallow areas nearer the FO-1 fuel oil bunker. If permitted by the receiving facility, the visibly petroleum-contaminated soils will be live loaded for off-site disposition. 3. Otherwise, these soils will be stockpiled separately from those scheduled for on-site re-use as backfill, within the east central portion of the courtyard. Discrete samples will be collected from the stockpiled petroleum-contaminated soils and composited for disposal criteria testing, following the procedures required by the receiving facility. These soils will remain in this location until a receiving facility provides approval of receipt. 4. If the petroleum contamination is present at and below the water table, if feasible, dewatering of the excavation will be conducted so that additional petroleum-contaminated soils can be excavated. Oily water removed from the excavation will be placed in frac tanks. The recovered oily water will be disposal criteria tested and shipped under appropriate documentation to a receiving facility. 5. Once the petroleum-contaminated soils are excavated to the extent feasible, soil samples will be collected from the bottom and sidewalls of the excavation for analysis of EPH and target PAHs via MassDEP's method and for TPH via USEPA Method 8100M. This analytical data will be used to evaluate the residual levels of petroleum contamination and whether free-phase petroleum remains following the completion of excavation.
FO-1 Soil Repository	10G	1. Following completion of excavation of the petroleum soils near the retaining wall, the Gunite spray-on application will be applied to the retaining wall, or a concrete/bentonite slurry wall will be installed along portions of the base of the retaining wall; and (optional) a landtile PVC pipes and catch basin (water interceptor trench) will be installed in accordance with the specifications provided in Appendix H of the IRA Plan Modification and IRA Plans, submitted on November 2, 2016, to alleviate hydrostatic pressure that might increase from water buildup following sealing of the exterior of the retaining wall. However, the elevation of the water interceptor, if installed, will be

		determined in the field based on observations on the depth to water. 2. Either 6-inch or 8-inch oil recovery wells may be installed along the retaining wall in the excavation hole prior to backfilling, or they will be installed using a drill rig after backfilling the excavation. Another recovery well may also be located near the former GEC-1, where light NAPL was observed in August 2015. No recovery pump will be installed until such time as light NAPL is measured in one or more recovery wells and testing (such as light NAPL transmissivity testing) demonstrates that the light NAPL is recoverable. 3. Backfilling of the petroleum contaminated area outside the planned FO-1 soil repository will be completed using the stockpiled soils in the non-asbestos soil storage area that do not have visible petroleum contamination and well as any soils that may have been temporarily stored in the FO-1 soil repository. If needed, additional clean soils will be brought into the courtyard to complete the backfilling. 4. The FO-1 soil repository will be created. It is estimated to have dimensions of approximately 60 feet long by 40 feet deep and may have a depth as deep as two feet above the depth of the observed smear zone. The top of the FO-1 soil repository will be located three feet below final grade. The sides of the excavation will be lined with orange snow fencing. Inside the fencing, geotextile fabric will be installed along the sidewalls and bottom of the repository. If building wall or vault wall is present, it may also serve as part of the repository. 5. The dimensions of the FO-1 soil repository can modified based on field decisions; however, if possible, it should be designed to hold a minimum of 1,000 cubic yards. The FO-1 soil repository must not extend to the locations of the planned storm water drainage system (depicted in plans in Appendix G), the slurry wall, water interceptor trench (optional) or the oil recovery wells.
Asbestos Soil Excavation C**	10H	1. Once the FO-1 soil repository is ready, soils from the stockpile located at the west end of the courtyard will be placed into the FO-1 soil repository. 2. Soils will be removed from the top three feet of each dry well and placed in the FO-1 soil repository. 3. Soils at the west end of the courtyard will be excavated an additional two feet and placed in the FO-1 soil repository. 4. Brick at the top of each dry well will be removed to lower each dry well to three feet below final grade. The top of each dry well will be sealed with concrete. 6. The Massachusetts-licensed asbestos manager will divide the west end of the courtyard into sections, and will collect five 0-1 inch soil samples from each section. For each section, these soil samples will be composited into a single sample, placed into a labeled container (e.g., Whirlpak™ sample bags), and submitted under chain of custody documentation to a Massachusetts-certified laboratory for analysis of asbestos via USEPA Method 600/R-93/116. 7. The soils of the west end of the courtyard will be covered with clean 6-mil polyethylene sheeting, pending the results of the asbestos analyses. 8. If asbestos is detected in any section of the west end of the courtyard, steps 3 (at one-foot intervals), 6 and 7 will be repeated for the affected section until no asbestos is detected 9. Once the excavation of asbestos-contaminated soils is complete, these soils will remain covered with 6-mil polyethylene sheeting until the

		protective barrier is installed.

Asbestos Soil Excavation D**	10I	1. Soils will be removed from the top three feet of the coal chute and placed in the FO-1 soil repository, so that the walls of the coal chute can be lowered to three feet below final grade. The top of the coal chute soil repository will be sealed with concrete. 2. Soils at the west central portion of the courtyard will be excavated one foot and placed in the FO -1 soil repository. 3. The Massachusetts-licensed asbestos manager will divide the west central portion of the courtyard into sections, and will collect five 0-1 inch soil samples from each section. For each section, these soil samples will be composited into a single sample, placed into a labeled container (e.g., Whirlpak™ sample bags), and submitted under chain of custody documentation to a Massachusetts-certified laboratory for analysis of asbestos via USEPA Method 600/R-93/116. 4. The soils of the west central portion of the courtyard will be covered with clean 6-mil polyethylene sheeting, pending the results of the asbestos analyses. 5. If asbestos is detected in any section of the west central portion of the courtyard, steps 2, 3 and 4 will be repeated for the affected section until no asbestos is detected. 6. Once the excavation of asbestos-contaminated soils is complete, these soils will remain covered with 6-mil polyethylene sheeting until excavation of the remainder of the 0-3 foot interval soils is completed. For more details see the Remainder of PCB Soil Excavation step.
Remainder of PCB Soil Excavation	10J	1. The remainder of the soils (determined not to contain asbestos, but might contain elevated PCBs) from the east central and west central portions of the courtyard will be excavated until three feet below final grade. These excavated soils will be placed in the FO-1 soil repository, if space permits. 2. If space is not sufficient, the soils will be stockpiled atop the polyethylene sheeting at the west end of the courtyard and the soils will be disposal criteria tested in accordance with procedures required by the receiving facility. The soils will be shipped off-site to the receiving facility, upon the authorization of the receiving facility. 3. The FO-1 soil repository will be covered with a distinctively colored geotextile membrane, indicating that it is the location of a soil repository. Three inches of gravel will be placed over the geotextile membrane. 4. The locations and elevations of the utility vault, dry wells and coal chute will be surveyed. 5. A clean utility corridor will be installed along the south side of the courtyard, near the Picker building. This clean utility corridor will house the storm water drainage system. It will be lined with a distinctively colored geotextile membrane, indicating it is a clean utility corridor. The location and elevation of the clean utility corridor will be surveyed. Eventually, a marker will be installed in the courtyard indicating the location of the clean utility corridor.

Installation of Protective Cover	10K	1. A geotextile membrane (unique from those of the soil repositories and clean utility corridors) will be installed over the courtyard soils that will be located 3 feet below grade. 2. Three feet of clean fill will be placed over the geotextile membranes and cement covers covering the courtyard, including soil repositories. Together the clean fill, geotextile membranes and cement covers constitute a protective barrier. 3. No trees or bushes with root structures extending more than 2.5 feet below grade when mature can be planted in the soils of the protective barrier. Trees and bushes may be planted in containers that are not integral to the protective barrier. 4. Permanent markers must be placed in the courtyard so that the locations of the clean utility corridors can be found in case of an emergency utility repair.

Notes: Although four areas are described as Asbestos Soil Excavation Areas, they actually contain soils with significant levels of PCBs. This description is intended to differentiate those PCB-contaminated soils that contain asbestos from those that do not.

*Excavation of Asbestos Soil Excavation Area A will be conducted to the depth necessary to achieve no detectable asbestos for the 0-1 inch composite soil samples. This excavation is needed so that excavation of petroleum-contaminated soils can be conducted unhindered by asbestos requirements.

** Excavation of Soil Excavation Areas B, C and D will be conducted until soils are three feet below final grade. If asbestos is still detected in 0-1 inch composite soil samples after reaching 3 feet below final grade, no further excavation is likely to be conducted. These soils will remain below the three foot thick protective barrier and will be subject to restrictions in the Notice of AUL requiring that future construction or other soil disturbance work at depths more than 3 feet below grade be done under the oversight of a Massachusetts-licenses asbestos project manager (in addition to a Licensed Site Professional, which will already be required).

GEC plans to resume excavation of asbestos- and PCB-contaminated soils immediately after the 21-day IRA approval process is over and the MassDEP Bureau of Air and Water approves the Non-Traditional Asbestos Work Plan. The excavation of the no. 6 fuel oil bunkers (FO-1 and FO-2) will be conducted upon completion of the asbestos- and PCB-contaminated soils in the portion of the courtyard where the fuel oil bunkers are located. The water interceptor trench (if installed) and oil recovery wells will follow the completion of the excavation of petroleum-contaminated soils near the retaining wall and the application of the spry on Gunite to the retaining wall and/or the installation of a slurry wall. The FO-1 soil repository will be created following completion of the excavation of petroleum-contaminated soils within the eastern courtyard. It is anticipated that it will take approximately two months to complete this project. This schedule assumes that USEPA Region 1 will complete its evaluation of the work conducted within the next 21 days and determines that the remaining response actions can be completed under the MCP. The test boring and monitoring well

installation program described in the original IRA Plan will be conducted once the planned excavation of petroleum-contaminated soils and decommissioning of the no. 6 fuel oil bunkers are completed. Results of the proposed work will be documented in the next IRA Status Report.

4.2 Remediation Waste, Wastewater and Additives

For RTN 3-33101, RTN 3-33474 and RTN 3-33853, the following remediation waste is anticipated:

(1) between 1,500 and 2,000 cubic yards of soils from the original 0-3 foot interval contaminated (and as deep as an additional 6 feet near the FO-1 fuel oil bunker) with PCBs at levels <50 mg/kg, and may contain asbestos in all or part of the soils; Of this soil volume, to date, approximately 50 cubic yards of soils containing >50 mg/kg PCBs were excavated and transported to Wayne Disposal Inc., of Belleville, Michigan; approximately 144 cubic yards of soils were excavated and placed in on-Site soil repositories, and an additional 300 to 400 cubic yards of soils were excavated and are stockpiled at the west end of the courtyard. Approximately 600 cubic yards have been excavated to date, leaving approximately 900 to 1,400 cubic yards of PCB-contaminated soils left to excavate. Between the fuel oil vault and FO-1 excavation area, there is at least 1,125 cubic yards of anticipated soil repository storage space on-Site. If the volume of PCB/asbestos-contaminated soils exceed the available storage capacity, the excess contaminated soils will be transported off-site under Uniform Hazardous Waste Manifests to a facility approved to accept soils containing asbestos and/or >10 to 50 mg/kg PCBs (likely Waste Management of Norridgewolk, Maine).

(2) If PCB levels of soils samples near boring B-18 exceed 50 mg/kg, up to approximately 50 cubic yards of soils will excavated and live-loaded for transport under a Uniform Hazardous Waste Manifest to a facility approved to accept soils containing asbestos and >50 mg/kg PCBs. Wayne Disposal Inc., of Belleville, Michigan, is a potential receiving facility.

(3) Brick and/or concrete from the dismantling of the tops of the dry wells and coal chute so that these soil repository areas can be lowered to 3 feet below final grade. The brick and/or concrete will be disposed as asbestos-contaminated waste.

(4) All other solid wastes (e.g., PPE, polyethylene sheeting, plywood and spent decon supplies) will be shipped to Waste Management of Norridgewolk, Maine, as potential asbestos- and/or PCB-contaminated waste.

(5) The gravel from the temporary roadway will be re-used on-Site as fill placed more than three feet below final grade.

Other anticipated remediation waste for RTN 3-33101 is the petroleum-contaminated soils located, based on recent analytical data, mostly below the PCB- and asbestos-contaminated soils. The petroleum-contaminated soils within, surrounding and below the fuel

oil vaults will be excavated and transported under the appropriate manifests likely to ENPRO Services of Maine, Inc., in South Portland, Maine for disposal, or to Waste Management of Norridgewolk, Maine. GEC anticipates generating up to 2,000 cubic yards of petroleum-contaminated soil, which will be transported off-site. This is an increase of 1,000 cubic yards from the original IRA Plan.

Any generated decontamination waste water will be properly collected and disposed of in accordance with the provisions provided in Appendix F.

If the groundwater table is reached, oily water is likely to be pumped from the excavation so that additional petroleum-contaminated soils can be excavated. The oily water will be pumped and held in a frac tank, until the water can be disposal criteria tested and a receiving facility can be identified. The oily water will be shipped to an appropriate receiving facility, likely under a uniform hazardous waste manifest. An assumption is made that up to 2,000 gallons of oily water may be pumped from the excavation.

No remedial additives are planned for these IRAs.

4.3 Remedial Monitoring Plan

Because the 0-5 foot interval soil sample from B-18 contained 29 mg/kg PCBs, USEPA Region I is requiring additional investigation of this area before remedial excavation is conducted in this area. Soil samples will be collected from up to nine borings advanced at B-18 (designated B-18A); five feet north, south, east and west of B-18 (designated B-18-5N, B-18-5S, B-18-5E and B-18-5W); and ten feet north, south, east and west of B-18 (designated B-18-10N, B-18-10S, B-18-10E and B-18-10W). Each of these borings will be advanced as space permits (e.g., no foundation wall or retaining wall is in the way). For each boring, soil samples will be collected from the 0-2, 2-4 and 4-6 foot intervals for analysis of PCBs via USEPA Method 8082 with Soxhlet extraction. Extra soils from the 0-2 and 2-4 foot intervals of B-18A, B-18-5N, B-18-5S, B-18-5E and B-18-5W will be composited into a single sample and submitted for disposal criteria testing and asbestos testing. If insufficient soils are available to create the composite sample, additional borings will be advanced in the immediate vicinity of B-18 to add to the composite soil sample. The PCB analytical data will be used to determine if soils containing >50 mg/kg PCBs exist at the Site. If soils contain >50 mg/kg PCBs, the disposal criteria and asbestos data will be used to submit to a receiving facility to seek permission to ship prior to excavating the >50 mg/kg PCB soils. If excavation of >50 mg/kg PCB soils is conducted, confirmatory soil sampling will be conducted following a TSCA-gridded sampling plan. The confirmatory soil samples will be analyzed for PCBs via USEPA Method 8082 with Soxhlet extraction.

Excavation of asbestos-contaminated surface soils will be conducted in stages in the order east end of courtyard, east central portion of courtyard, west central portion of courtyard and west end of courtyard. The east end and east central portion of the courtyard will be excavated first, in order to create an asbestos-remediated area to allow for the excavation of the remainder of the PCB-contaminated soils and the excavation of the petroleum contaminated soils, without dealing with asbestos-contaminated material, asbestos decontamination and asbestos air monitoring. For each area in sequence, the top 1-foot of existing soils will be removed, then the area will be divided in subareas for the collection of collecting composited soil samples for asbestos analysis. Each composite will be comprised of five 0-1 inch samples collected from throughout a sub-area. The asbestos sampling will be conducted by Axiom asbestos project manager. If a sub-area is not clear of asbestos, another round of 1-foot excavation will be conducted in that sub-area, followed by another round of composite soil sampling. This procedure will be followed until all sub-areas have no detectable asbestos, before moving to the next stage of remediation.

Two types of air monitoring will be conducted: (1) dust monitoring during all soil excavation or movement activities, following the procedures provided in the Dust Monitoring Procedures (Appendix F), will be conducted by GEC personnel; and (2) asbestos air monitoring will be conducted during all soil excavation or movement activities, unless a particular area of the courtyard has been cleared of asbestos (Appendix F), by Axiom's asbestos project manager. Refer to Figure 10A for the asbestos air sampling locations. The dust monitoring locations will be set at two of the asbestos air sampling locations.

For PCB-contaminated or petroleum-contaminated soil volumes that will be transported off-Site, disposal criteria testing will be conducted in accordance with the requirements of the receiving facility, and will include asbestos analysis. During the September 2016 investigations, *in situ* sampling was conducted of the petroleum-contaminated soils and the samples were submitted for disposal criteria testing, including for asbestos. If sufficient for the receiving facility, the petroleum-contaminated soils will be excavated and live-loaded. Given the limited courtyard space, this is the preferred procedure.

During excavation of petroleum-contaminated soils, the sidewall and bottom soil samples from the excavation will be analyzed for EPH and PAHs via MassDEP's method and for total petroleum hydrocarbons via USEPA Method 8100M. This data will be used, in part, to determine the potential for free phase petroleum to still be present in the soils. Based on the available data and the characteristics of no. 6 fuel oil, VPH and target VOC analysis will not be conducted unless elevated PID readings are encountered during screening of the excavation or headspace screening of the soils.

As needed, any recovered oily water from the excavation, water pumped from the containment area along the exterior of the retaining wall, and decontamination water will be analyzed for disposal criteria, for use in obtaining approvals from receiving facilities.

Following completion of the excavation programs, test borings will be advanced and monitoring wells installed as described in the petroleum contaminated area, with the well screens spanning the entire smear zone of the petroleum contamination. Soil and groundwater samples will be collected for analysis of EPH and target PAHs via MassDEP's method and for total petroleum hydrocarbons via USEPA Method 8100M. Monitoring wells will be periodically gauged for depth to groundwater and product thickness. The soil and groundwater analytical data and monitoring well gauging data will be evaluated to determine if significant light NAPL may remain in the subsurface.

4.4 Federal, State or Local Permits

A modified Non-Traditional Asbestos Abatement Work Plan was or will be submitted to MassDEP Bureau of Air and Waste for approval. This Work Plan and any conditions specified by MassDEP will be followed during implementation of the RAM Plan, IRA Plan and IRA Plan Modifications.

The MassDEP Bureau of Waste Site Cleanup issued a conditional approval, dated November 22, 2016, of the IRA Plan Modification and IRA Plans for RTN 3-33101, 3-33793 and 3-33853, dated November 2, 2016. The conditions of the conditional approval will be followed during this RAM.

USEPA Region I determined that the Site conditions are subject to the PCB regulations within TSCA, and is requiring the submittal of an Application for Risk-Based Cleanup of PCBs pursuant to 40 CFR 761.61(c), with a request for coordinated approval from USEPA Region I and MassDEP pursuant to 40 CFR 761.77. This application has been or will be submitted to USEPA Region I in the near future. Any approval conditions and TSCA requirements will be followed.

The local Conservation Commission provided the developer with an Order of Conditions for the ongoing site work within the Picker building and courtyard. The required erosion controls, depicted on the drawings in Appendix G, are already in place. The requirements of the Order of Conditions will be complied with as they pertain to the IRA activities. Permits were obtained from the local Fire Department to remove the two gasoline USTs. The tank removals were already conducted. Copies of the permits are provided in Appendix G of the IRA Plan Modification for RTN 3-33101, submitted on April 19, 2016. It is anticipated that no other federal or state permits will be required to conduct the RAM Plan.

4.5 Public Involvement Activities

Pursuant to 310 CMR 40.0477 and 40.1403(3)(d), the Mayor of Lowell and Health Director were or will be provided written notification of the purpose, nature and expected duration of the RAM. The letters providing this notification has been or will be provided within 20 days prior to implementation of the RAM Plan. Copies of the notification letters are provided in Appendix H.

5.0 WARRANTY

The conclusions and recommendations contained in this report are based on the information readily available to GEC and upon the current regulatory climate as of November 30, 2016. GEC provides no warranties on information provided by third parties and contained herein. Data compiled was in accordance with GEC's existing procedures and should not be construed beyond its limitations. Any interpretations or use of this report other than those expressed herein are not warranted.

The use, partial use, or duplication of this report without the express written consent of Goldman Environmental Consultants, Inc. and/or R-M Developer, LLC is strictly prohibited. This report is subject to GEC's Contract for Consulting Services with R-M Developer, LLC.

Respectfully Submitted,
Goldman Environmental Consultants, Inc.

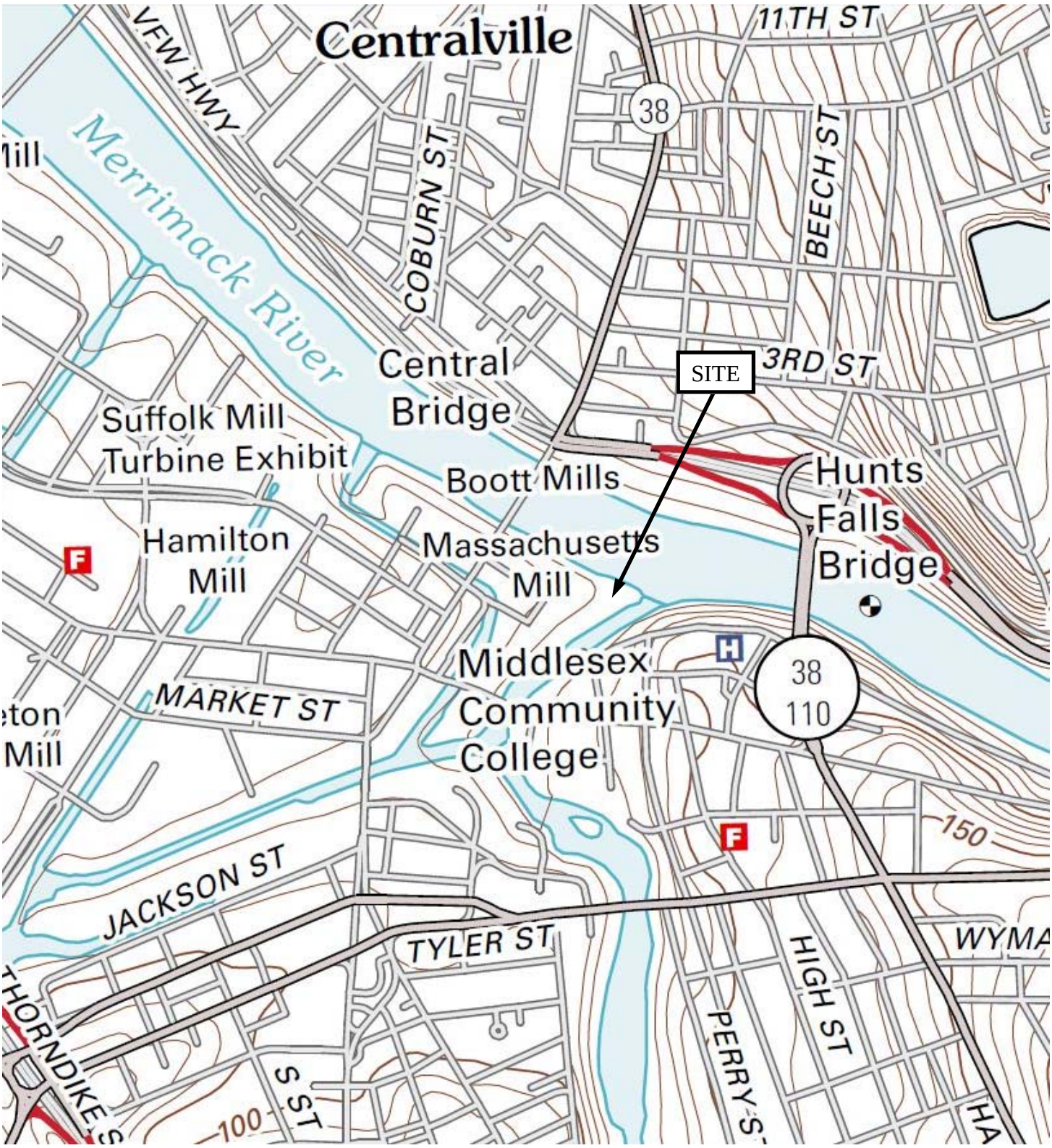
Eileen A. Furlong

Eileen A. Furlong
Sr. Risk Assessor

Brian T. Butler

Brian T. Butler, L.S.P.
Senior V.P., Operations

FIGURES



USGS 7.5 Minute Topographic, dated 2012

Lowell
Massachusetts Quadrangle

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SITE LOCUS

169.2 Bridge Street
(150 Massmills Drive)
Lowell, Massachusetts

GEC Project #: 1785-6090

Figure 1

Scale:
1 : 24,000

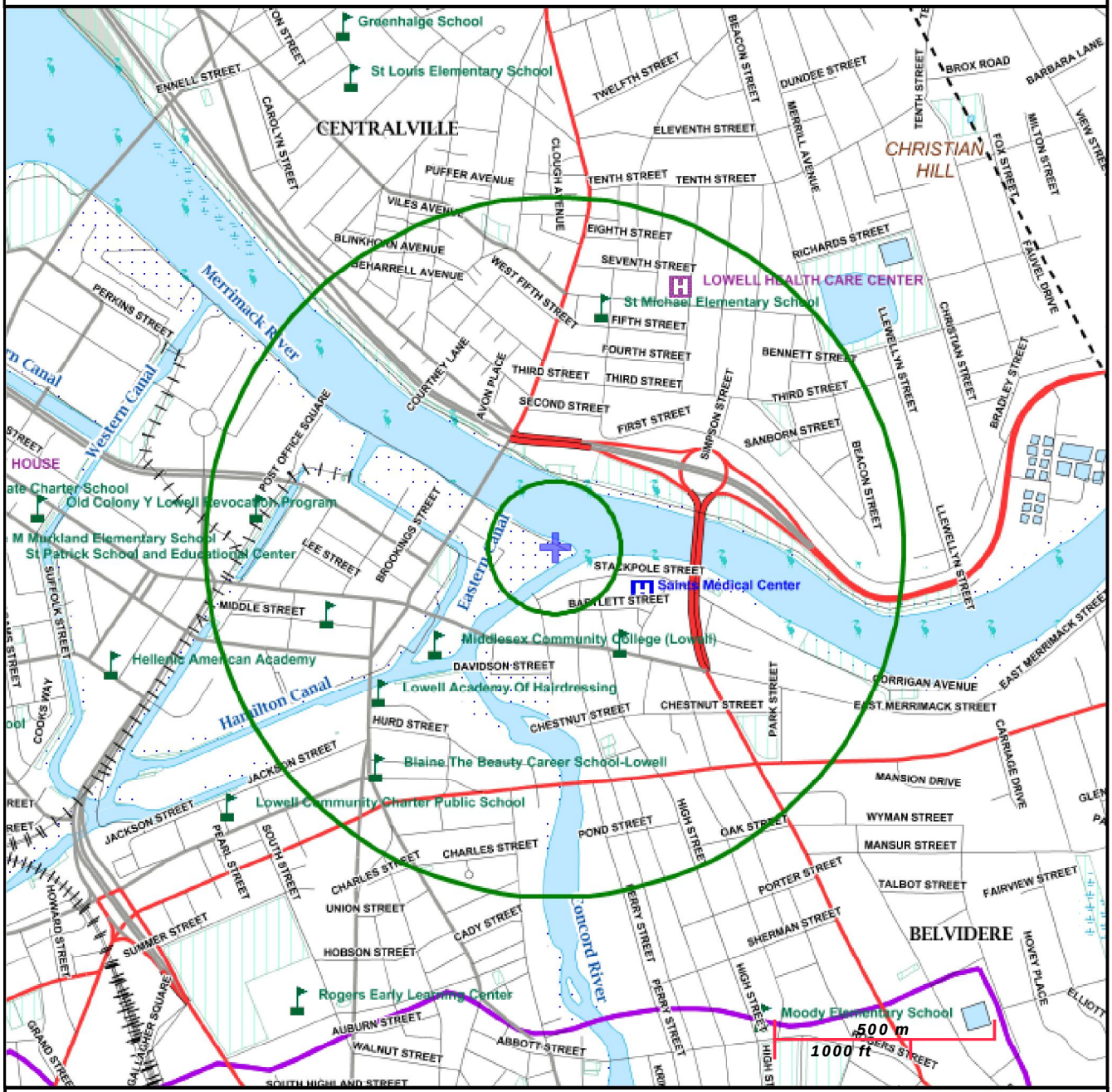
MassDEP - Bureau of Waste Site Cleanup

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

Site Information:
LOWELL, MA
NAD83 UTM Meters:
5258339mN , -7937440mE (Zone: 18)
August 15, 2016

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

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection



Roads: Limited Access, Divided, Other Hwy, Major Road, Minor Road, Track, Trail
Boundaries: Town, County, DEP Region; Train; Powerline; Pipeline; Aqueduct
Basins: Major,PWS; Streams: Perennial, Intermittent, Man Made Shore, Dam
Aquifers: Medium Yield, High Yield, EPA Sole Source
Non Potential Drinking Water Source Area: Medium, High (Yield)
PWS Protection Areas: Zone II, IWPA, Zone A
Hydrography: Open Water, PWS Reservoir, Tidal Flat
Wetlands: Freshwater, Saltwater, Cranberry Bog
FEMA 100yr Floodplain; Protected Open Space; ACEC
Est. Rare Wetland Wildlife Hab; Vernal Pool: Cert., Potential
Solid Waste Landfill; PWS: Com.GW,SW, Emerg.,Non-Com.

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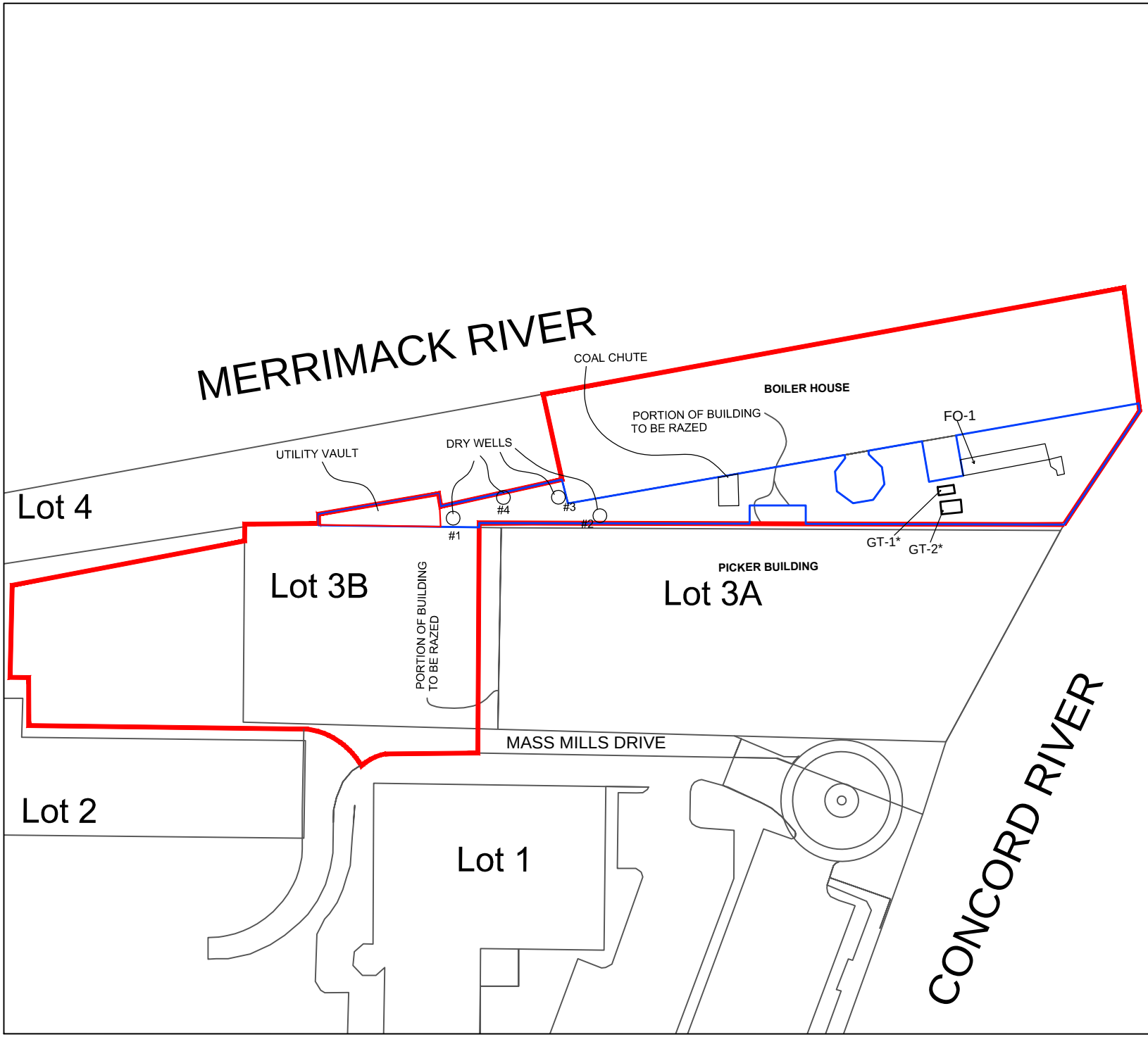

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Legend

Lot 3B

Disposal Site Boundaries

* Both Gasoline USTs are removed

Site Plan

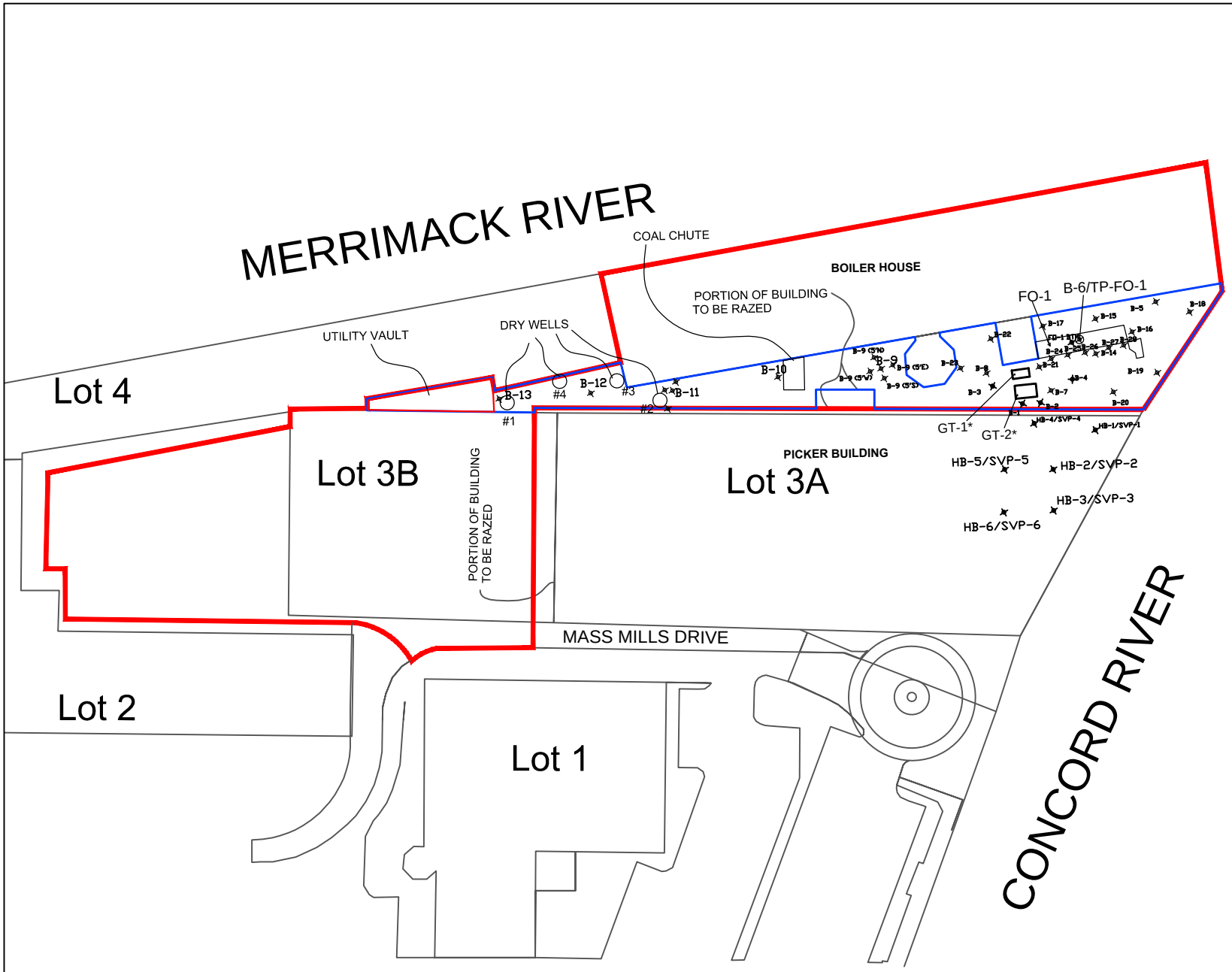
Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

GEC Project Number 1785-6090

Figure 3

SCALE
0 25 50

N



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Legend

- Lot 3B
- Calculated Area
- Hand Boring
- Test Pit
- Boring

Site Plan- Showing Test Pit and Boring Locations

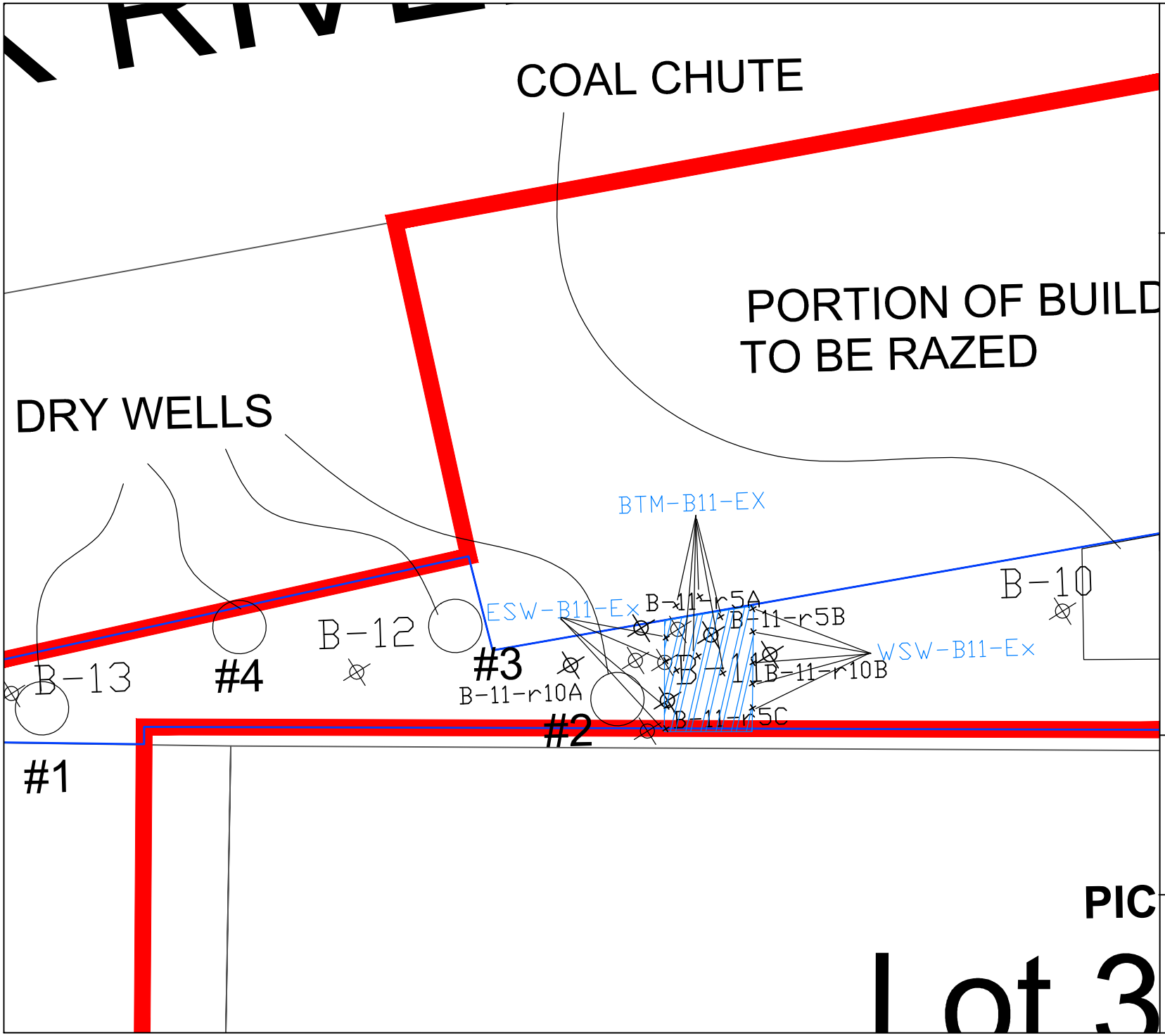
Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

GEC Project Number 1785-6090

Figure 4

SCALE
0 25 50

N



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Legend

- Lot 3B
- Calculated Area
- Hand Boring
- Test Pit
- Boring
- PCB Excavation Limit

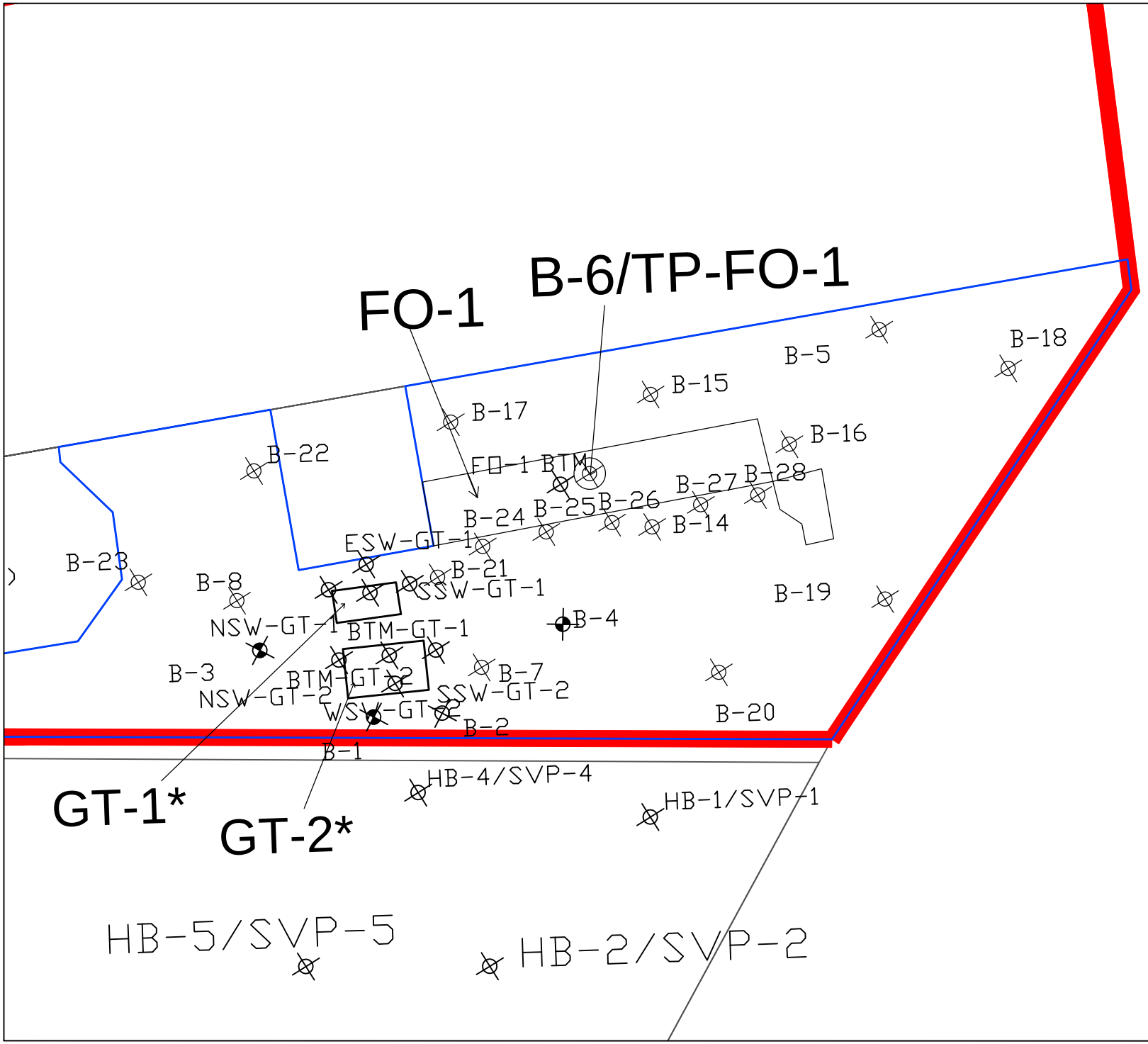
Courtyard Area Showing B-11 PCB Hot Spot

Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

GEC Project Number 1785-6090

Figure 4A

APPROX. SCALE
0 7.5 15
N



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Legend

- Lot 3B
- Calculated Area
- Hand Boring
- Test Pit
- Boring

Courtyard Area Showing Gasoline UST and Fuel Oil Bunker

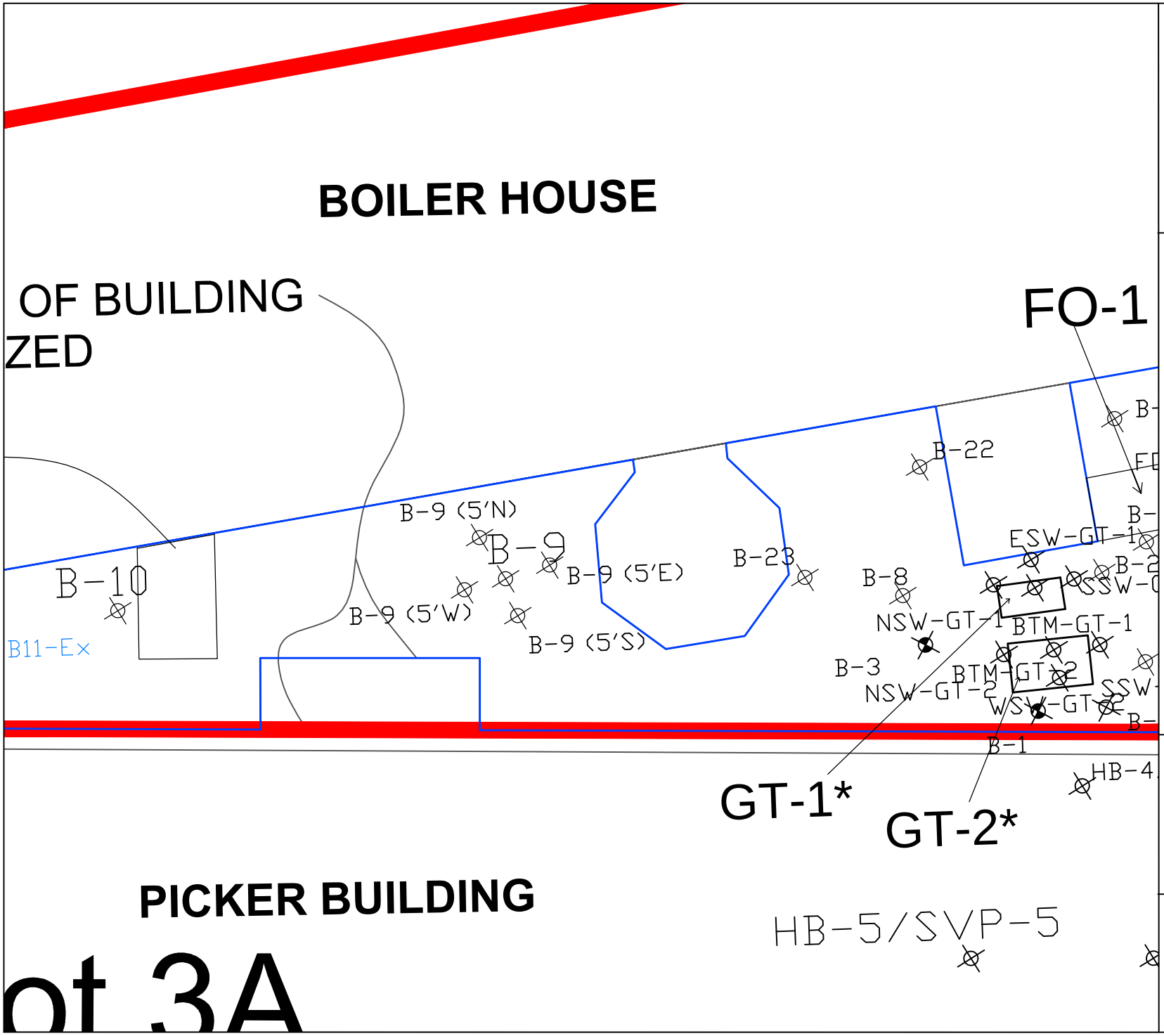
Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

GEC Project Number 1785-6090

Figure 4B

APPROX. SCALE
0 7.5 15

N



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Legend

- Lot 3B
- Calculated Area
- Hand Boring
- Test Pit
- Boring

Courtyard Area Showing B-9

Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

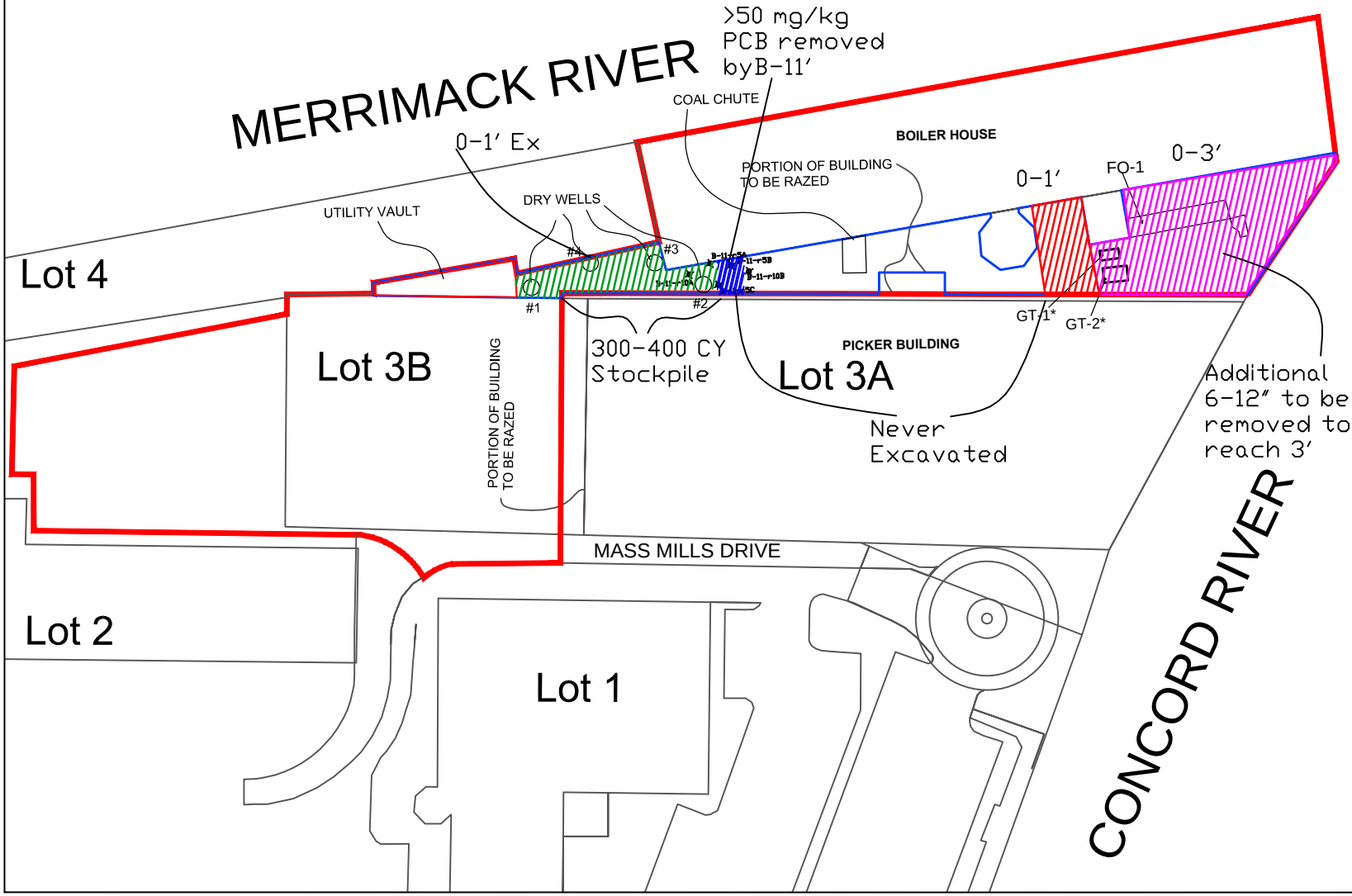
GEC Project Number 1785-6090

Figure 4C

APPROX. SCALE
0 7.5 15

N

Order Filled
1° ~ 19 CY
2° ~ 18 CY
3° ~ 10 CY
4° ~ 14 CY
The soils 0-1' by dry wells were placed into 1°



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Legend

Lot 3B

Disposal Site Boundaries

* Both Gasoline USTs are removed

Site Plan Showing Current Condition of Courtyard (10/1/2016)

Massachusetts Mills
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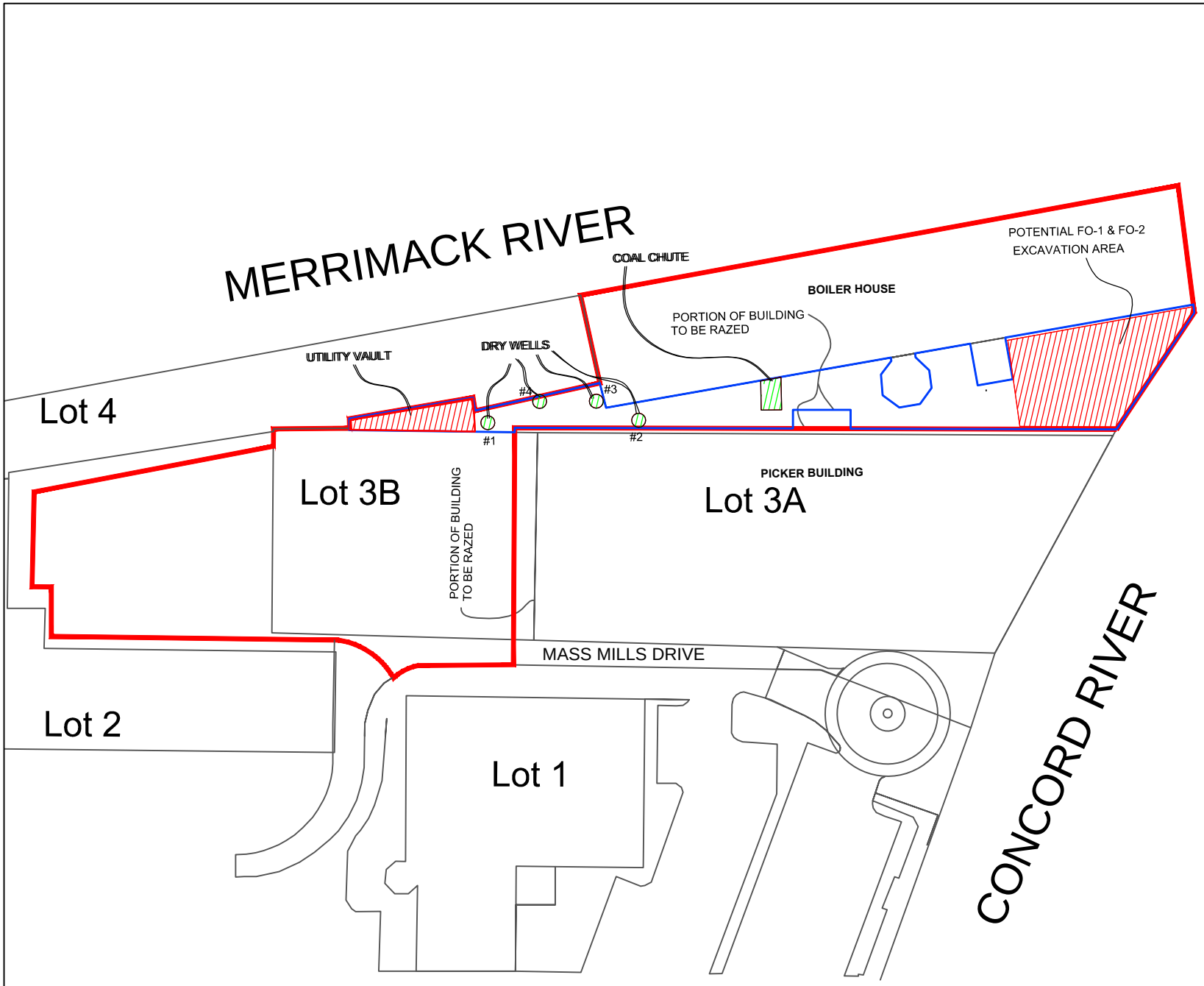
Lowell, Massachusetts

GEC Project Number 1785-6090

Figure 5

SCALE
0 25 50

N



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Legend

- Lot 3B
- Calculated Area
- Area of potential PCB repositories
- PCB Repositories Used

Site Plan- Showing Areas of Proposed & Used PCB Soil Repositories

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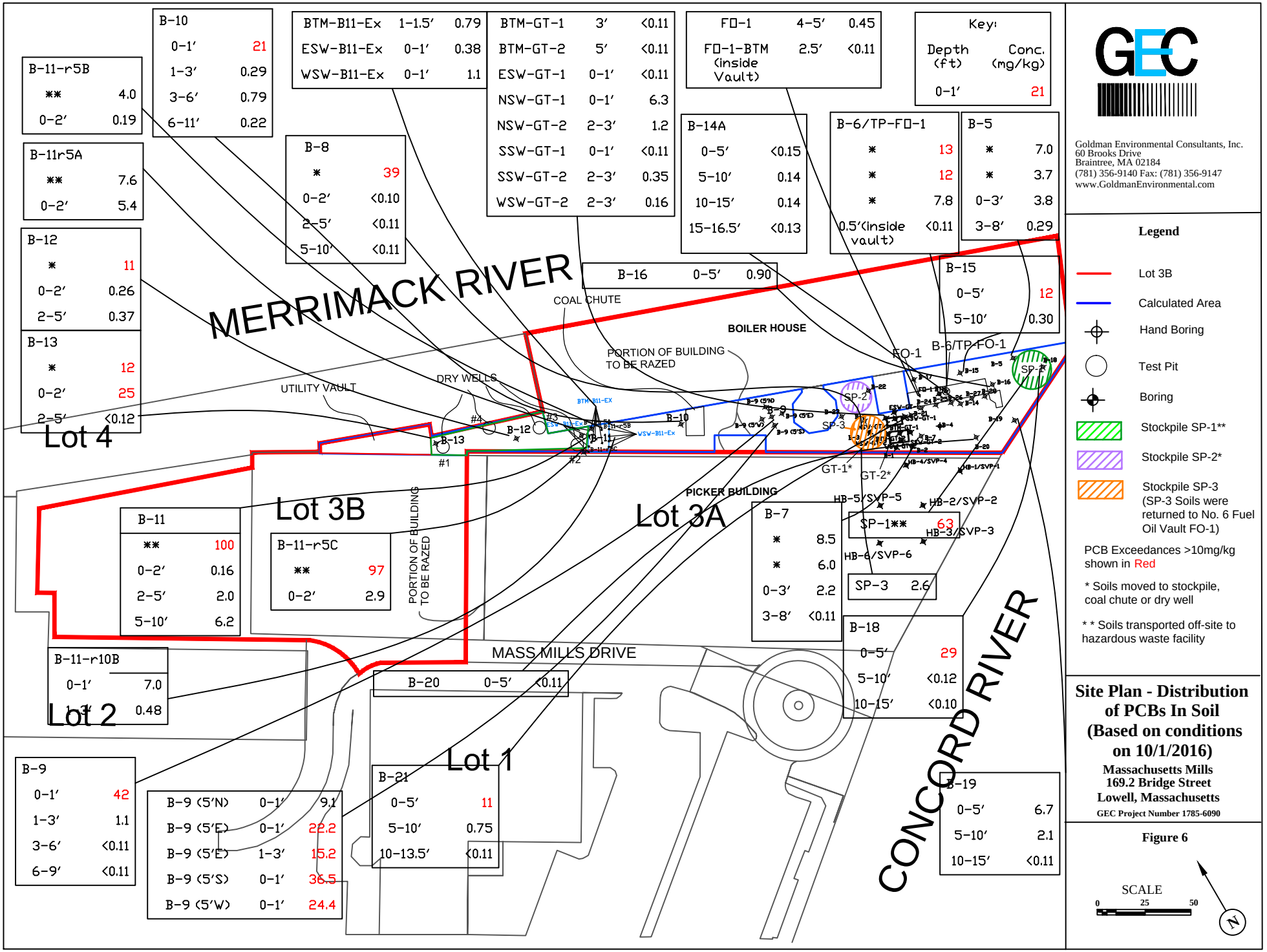
Lowell, Massachusetts

Figure 5A

SCALE
0 25 50

N

GEC Project Number 1785-6090



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Legend

- Lot 3B
- Calculated Area
- Hand Boring
- Test Pit
- Boring
- Stockpile SP-1**
- Stockpile SP-2*
- Stockpile SP-3 (SP-3 Soils were returned to No. 6 Fuel Oil Vault FO-1)

PCB Exceedances >10mg/kg shown in Red

* Soils moved to stockpile, coal chute or dry well

* * Soils transported off-site to hazardous waste facility

Site Plan - Distribution of PCBs In Soil (Based on conditions on 10/1/2016)

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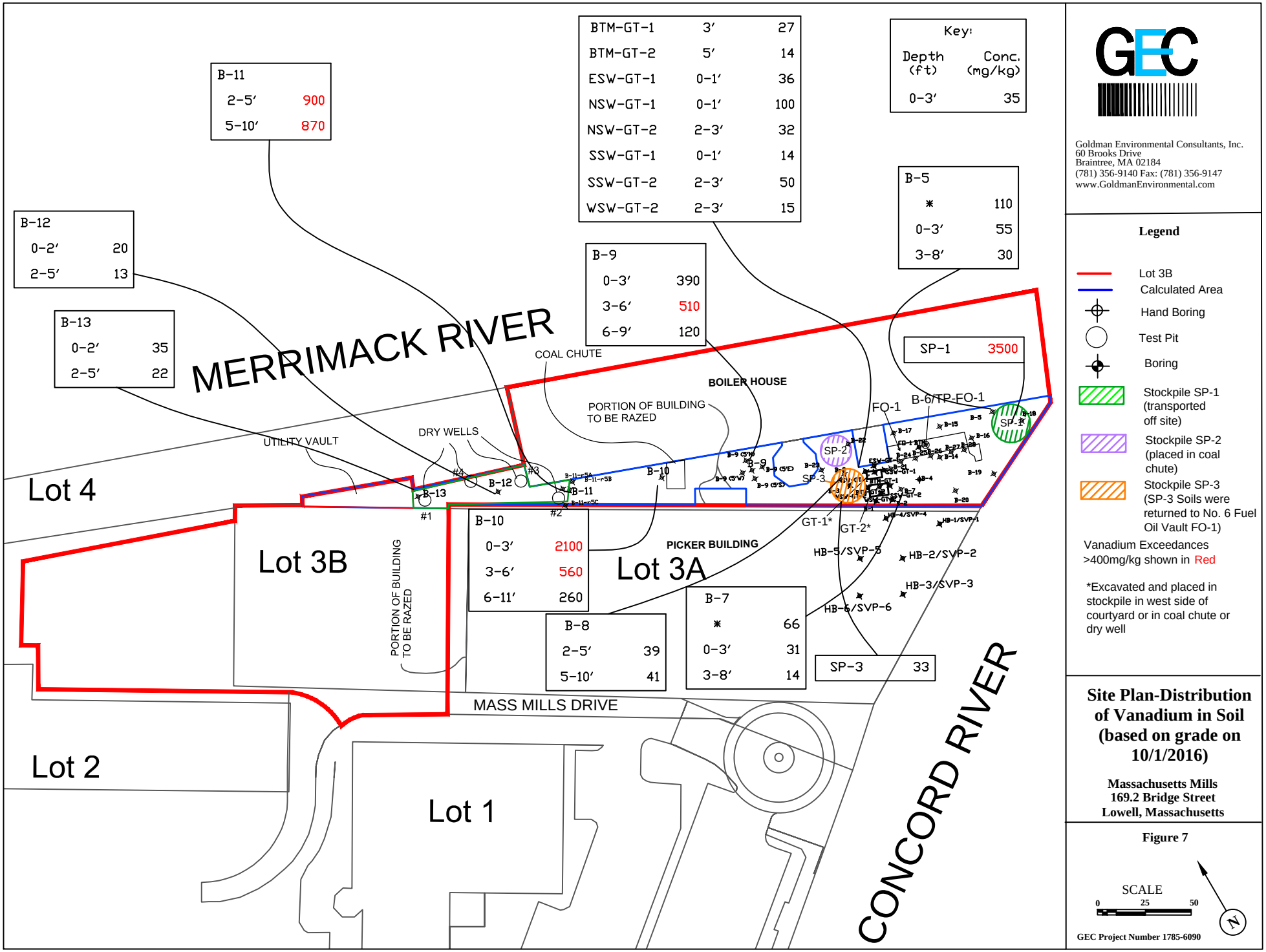
Figure 6

SCALE
0 25 50
N



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Legend

- Lot 3B
- Calculated Area
- Hand Boring
- Test Pit
- Boring
- Stockpile SP-1 (transported off site)
- Stockpile SP-2 (placed in coal chute)
- Stockpile SP-3 (SP-3 Soils were returned to No. 6 Fuel Oil Vault FO-1)

Vanadium Exceedances >400mg/kg shown in Red

*Excavated and placed in stockpile in west side of courtyard or in coal chute or dry well

Site Plan-Distribution of Vanadium in Soil (based on grade on 10/1/2016)

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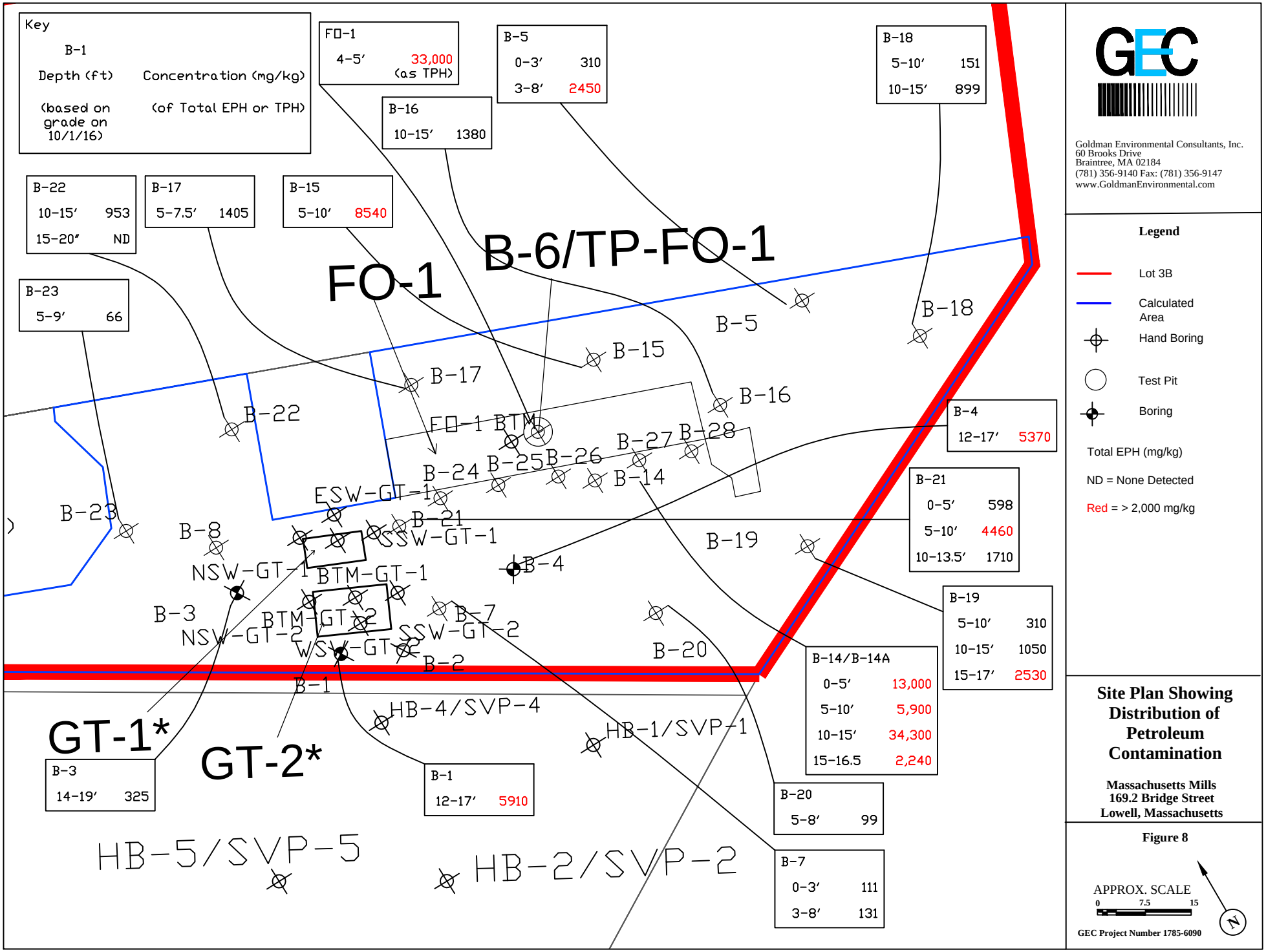
Figure 7

SCALE
0 25 50

N

GEC Project Number 1785-6090



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Legend

- Lot 3B
- Calculated Area
- Hand Boring
- Test Pit
- Boring

Total EPH (mg/kg)

ND = None Detected

Red = > 2,000 mg/kg

Site Plan Showing Distribution of Petroleum Contamination

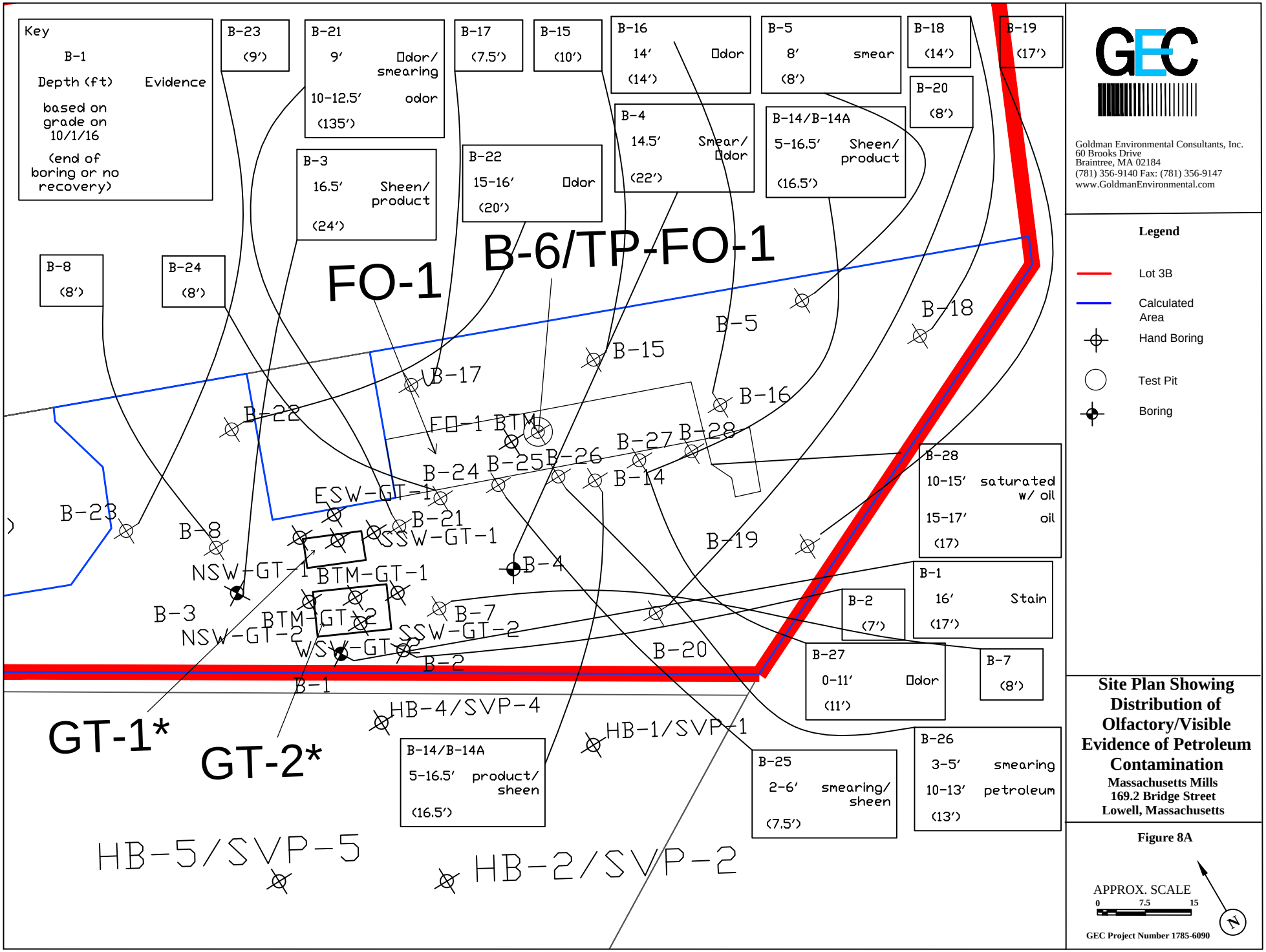
Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

Figure 8

APPROX. SCALE
0 7.5 15

N

GEC Project Number 1785-6090



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Legend

- Lot 3B
- Calculated Area
- Hand Boring
- Test Pit
- Boring

Site Plan Showing Distribution of Olfactory/Visible Evidence of Petroleum Contamination

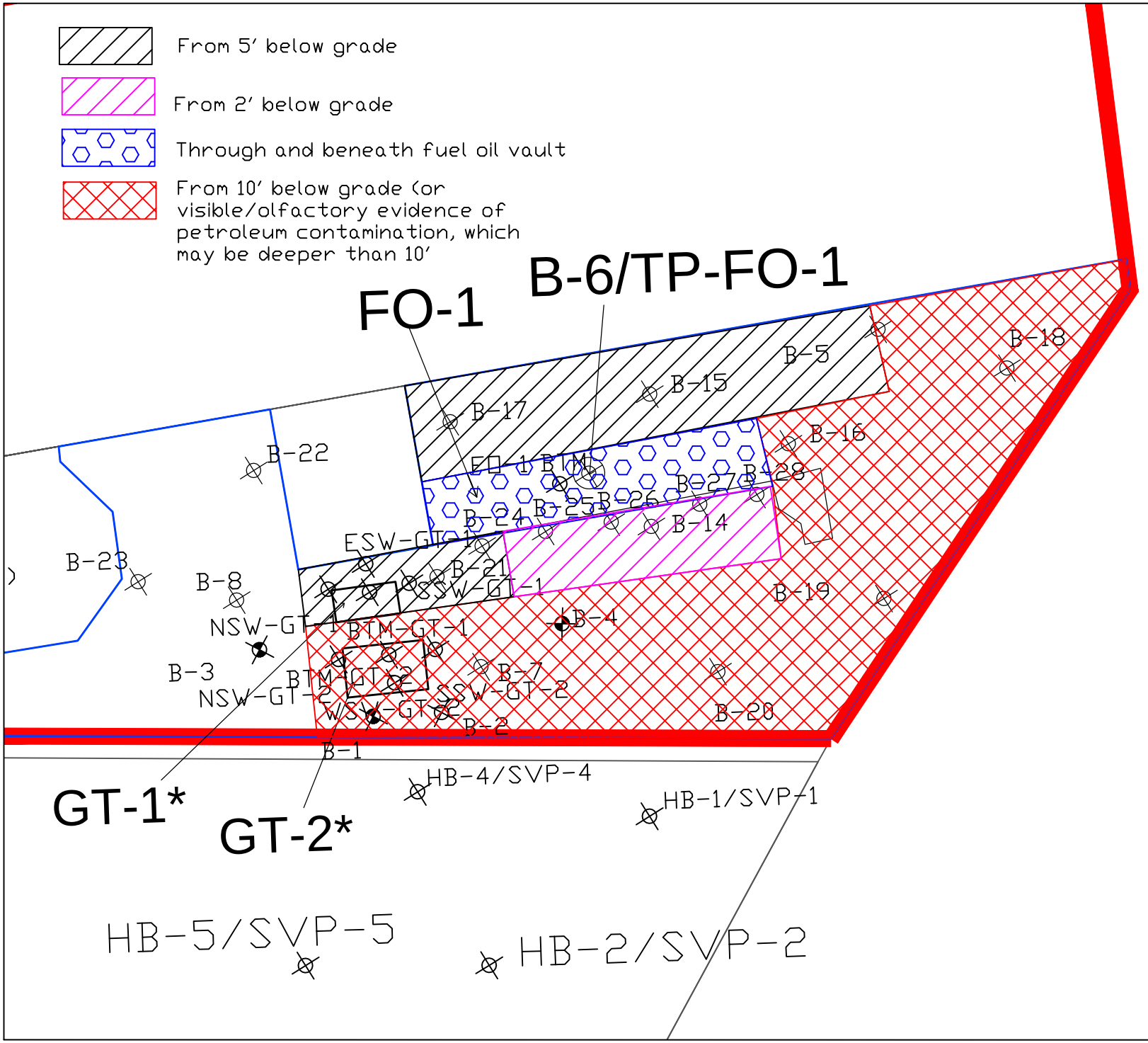
Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

Figure 8A

APPROX. SCALE
0 7.5 15

N

GEC Project Number 1785-6090



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Legend

- Lot 3B
- Calculated Area
- Hand Boring
- Test Pit
- Boring

Excavation from current grade* through smear zone spanning water table (10/1/2016)

*Grade prior to planned removal of asbestos contaminated soils

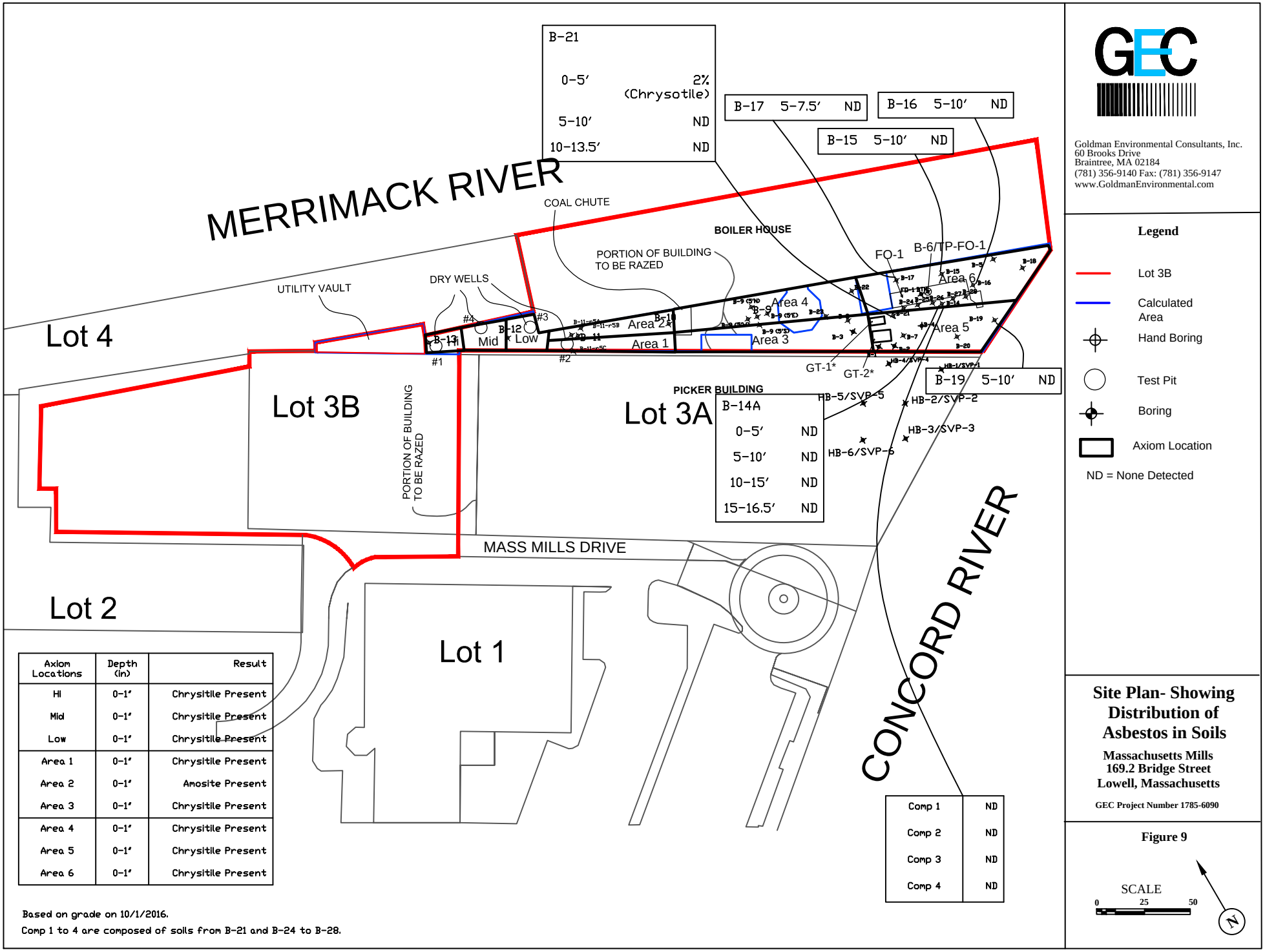
Courtyard Area - Planned Excavation Area for Petroleum Contaminated Soils

Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

GEC Project Number 1785-6090

Figure 8B

APPROX. SCALE
0 7.5 15
N



Axiom Locations	Depth (in)	Result
HI	0-1′	Chrysitile Present
Mid	0-1′	Chrysitile Present
Low	0-1′	Chrysitile Present
Area 1	0-1′	Chrysitile Present
Area 2	0-1′	Amosite Present
Area 3	0-1′	Chrysitile Present
Area 4	0-1′	Chrysitile Present
Area 5	0-1′	Chrysitile Present
Area 6	0-1′	Chrysitile Present

Based on grade on 10/1/2016.

Comp 1 to 4 are composed of soils from B-21 and B-24 to B-28.

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Legend

- Lot 3B
- Calculated Area
- Hand Boring
- Test Pit
- Boring
- Axiom Location

ND = None Detected

Site Plan- Showing Distribution of Asbestos in Soils

Massachusetts Mills
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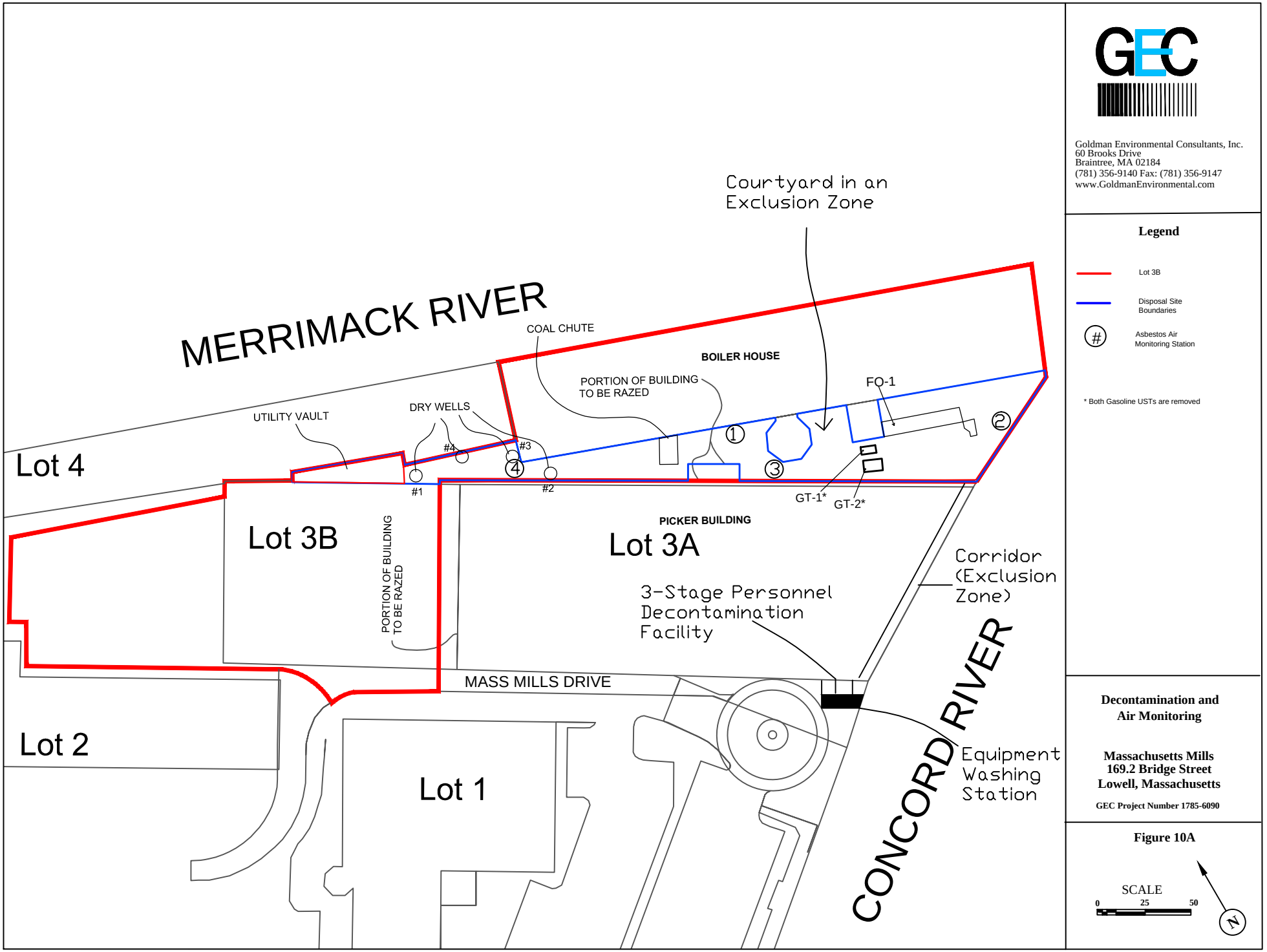
Lowell, Massachusetts

GEC Project Number 1785-6090

Figure 9

SCALE
0 25 50
N



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Legend

- Lot 3B
- Disposal Site Boundaries
- (#) Asbestos Air Monitoring Station

* Both Gasoline USTs are removed

Decontamination and Air Monitoring

Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

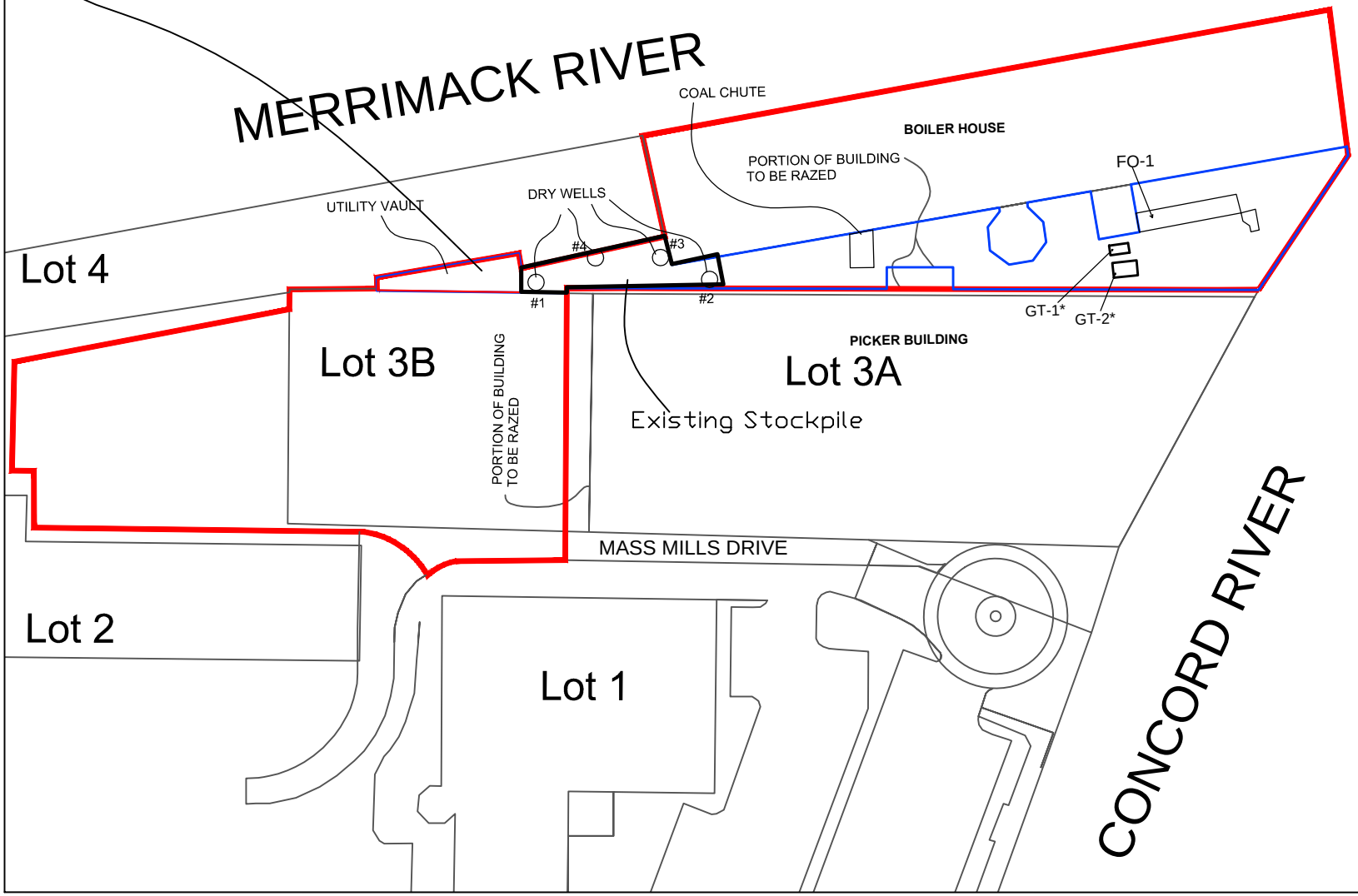
GEC Project Number 1785-6090

Figure 10A

SCALE
0 25 50

N

1. Knock down walls of utility vault to 3 feet below grade.
2. Prepare clean utility corridor (approximately 4 feet wide) around live sewer line, inside utility vault.
3. Move approximately 125 cubic yards of PCB/Asbestos-contaminated soils from the existing stockpile to the repository portion of the utility vault.
4. Cover with distinctively colored geotextile fabric overlain with 3 inches of gravel and temporarily cover geotextile fabric and gravel with clean poly covered with plywood.
5. Survey the location and elevation of utility vault repository and clean utility corridor.



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Legend

Lot 3B

Disposal Site Boundaries

* Both Gasoline USTs are removed

Remediation Step 1: Utility Vault

Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

GEC Project Number 1785-6090

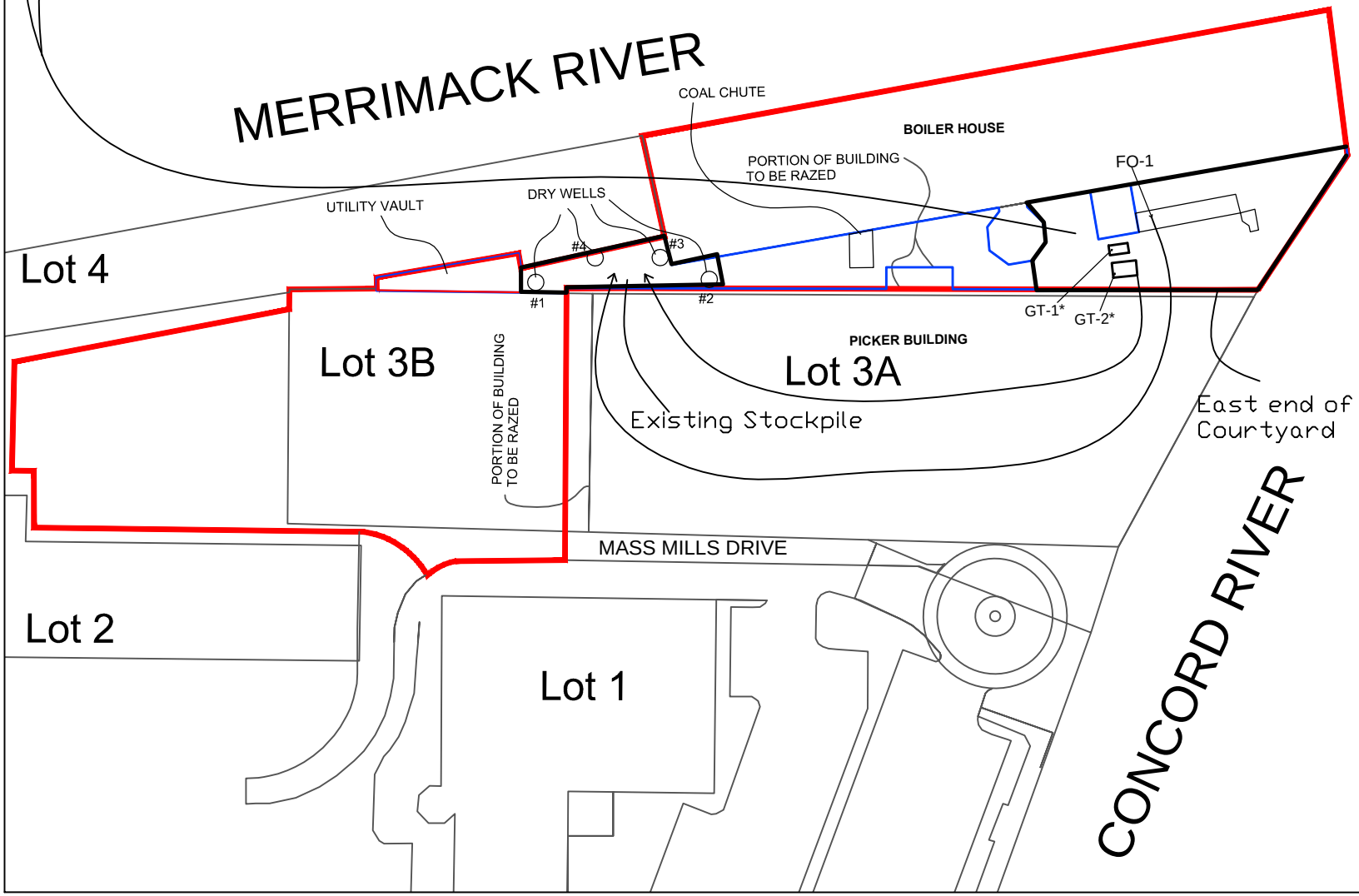
Figure 10B

SCALE
0 25 50

N

1. Remove SP-3 soils* from FO-1, place on existing stockpile
2. Remove backfill from GT-1 and GT-2 tank graves*, place on existing stockpile
3. Remove 1 foot of soils from remaining portion of east end of courtyard, and place on existing stockpile
4. Asbestos project manager to divide east end into sections and collect composite samples for analysis of asbestos
5. Cover eastern courtyard soils with clean 6-mil polyethylene sheeting, pending asbestos results
6. Repeat steps 3, 4, & 5 as needed, for a specific section until no asbestos detected

*These soils were placed on top of poly



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Legend

Lot 3B

Disposal Site Boundaries

* Both Gasoline USTs are removed

Remediation Step 2:
Asbestos Soil Excavation A

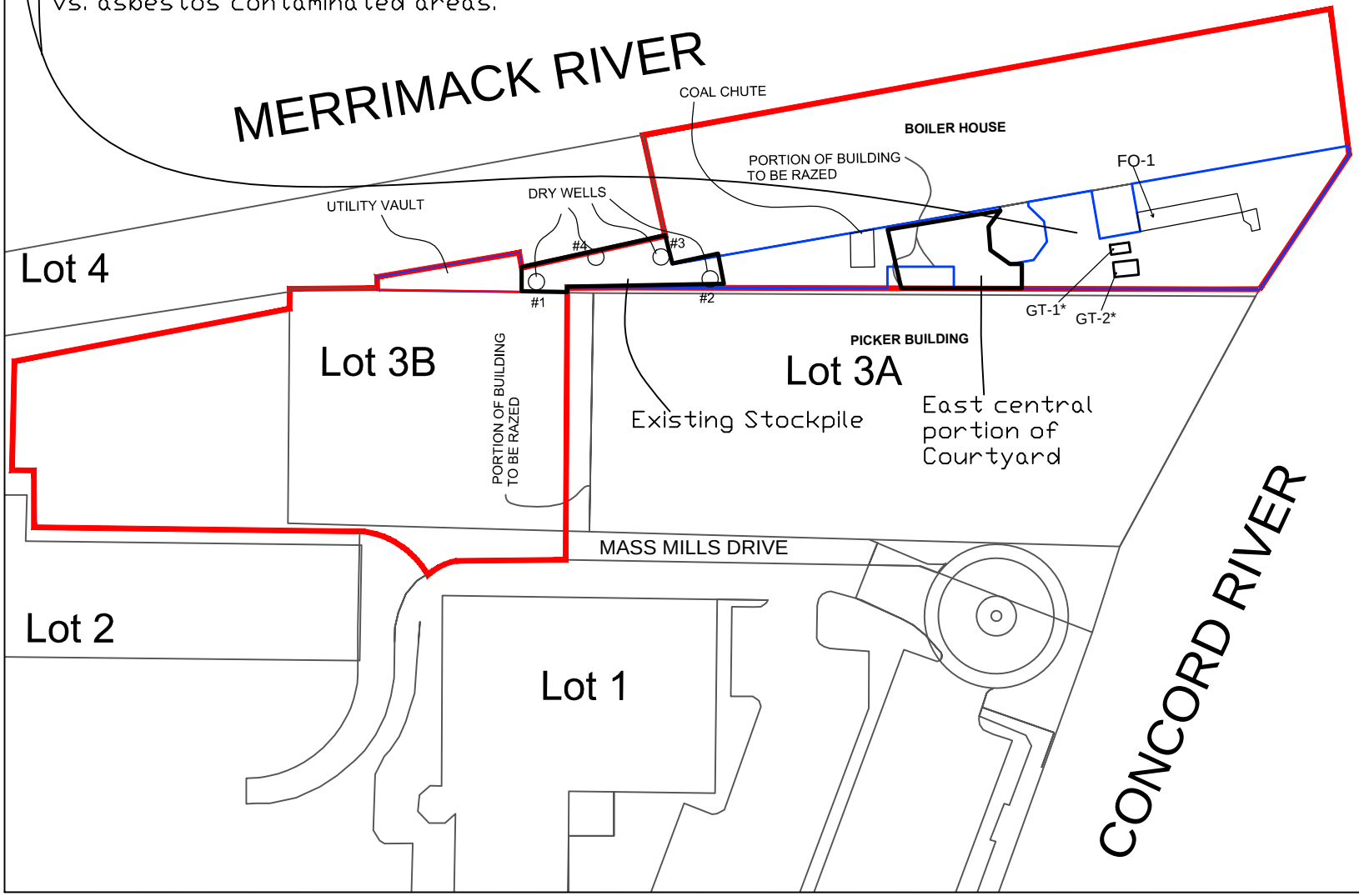
Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

GEC Project Number 1785-6090

Figure 10C

SCALE
0 25 50
N

1. Remove 1 foot of soils from east central portion of courtyard, and place on existing stockpile.
2. Asbestos project manager to divide east central portion of courtyard into sections and collect composite samples for analysis.
3. Cover east central portion of courtyard soils with clean 6-mil polyethylene sheeting, pending asbestos results.
4. Repeat steps 1, 2, & 3 as needed, for a specific section until no asbestos detected or until 3 feet below final grade is reached (whichever occurs first).
5. Following excavation of soils from east end and east central portion of courtyard, all stockpiled soils, filled soil respositories and west half of courtyard soils must be covered with 6-mil poly and an orange snow fence erected to divide the courtyard into asbestos remediated vs. asbestos contaminated areas.



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Legend

Lot 3B

Disposal Site Boundaries

* Both Gasoline USTs are removed

Remediation Step 3:
Asbestos Soil Excavation B

Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

GEC Project Number 1785-6090

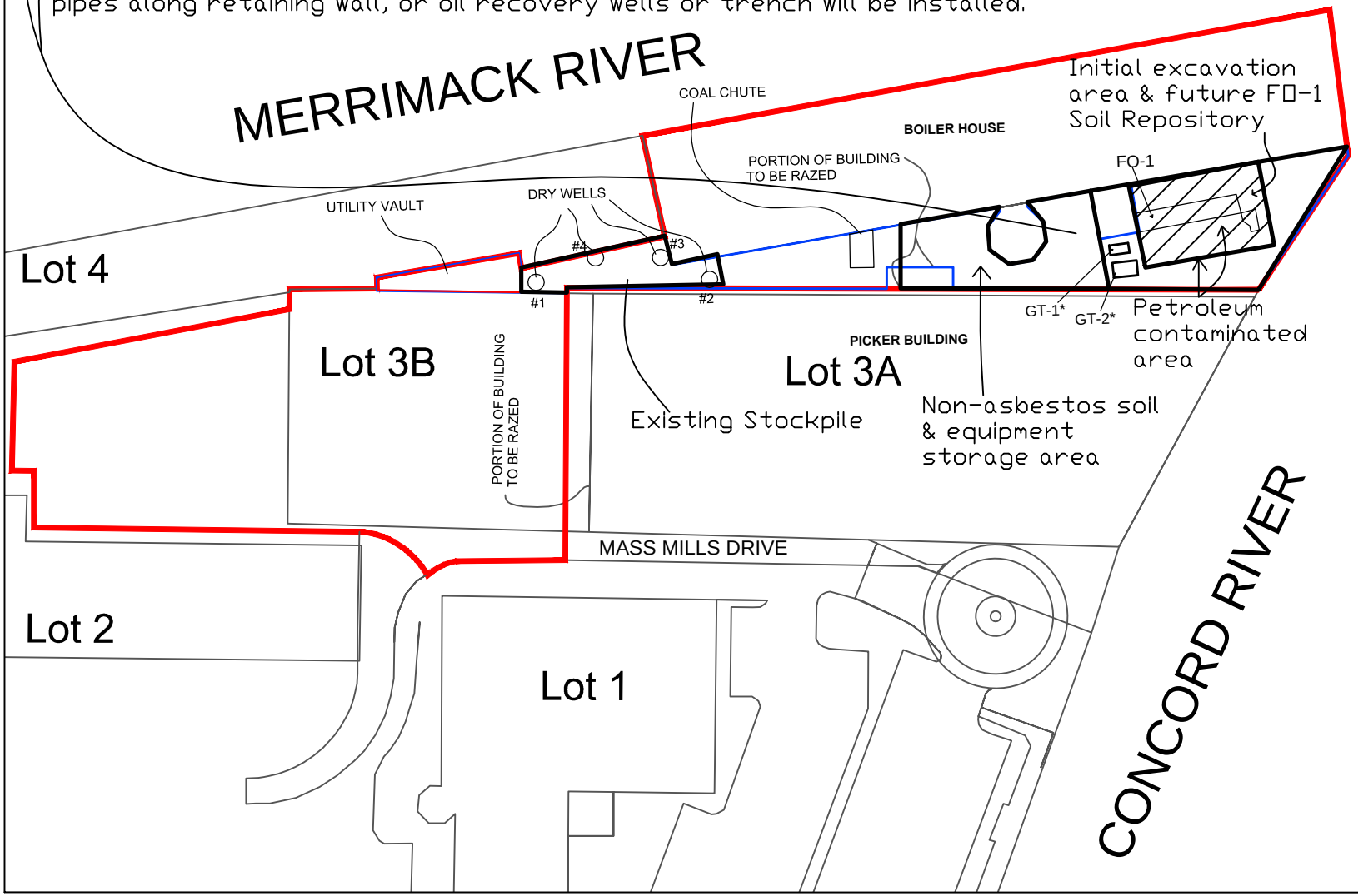
Figure 10D

SCALE
0 25 50

N

1. Excavate soils from initial excavation area, from existing top of grade to smear zone straddling water table. Separate grossly contaminated soils from soils with no visible sign of petroleum contamination.
2. Store soils with no visible sign of petroleum contamination in non-asbestos soil storage area, pending re-use of soils as backfill.
3. If permitted by receiving facility, grossly petroleum-contaminated soils will be excavated and liveloaded for off-site disposition. Otherwise, soils will be stockpiled in the non-asbestos soils area pending results of disposal criteria testing.
4. FO-1 Soil Repository will be created after petroleum soil excavation is complete.

*FO-1 Soil Repository cannot extend to areas where storm drainage system, PVC drainage pipes along retaining wall, or oil recovery wells or trench will be installed.



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Legend

Lot 3B

Disposal Site Boundaries

* Both Gasoline USTs are removed

Remediation Step 4:
Petroleum Soil Excavation A

Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

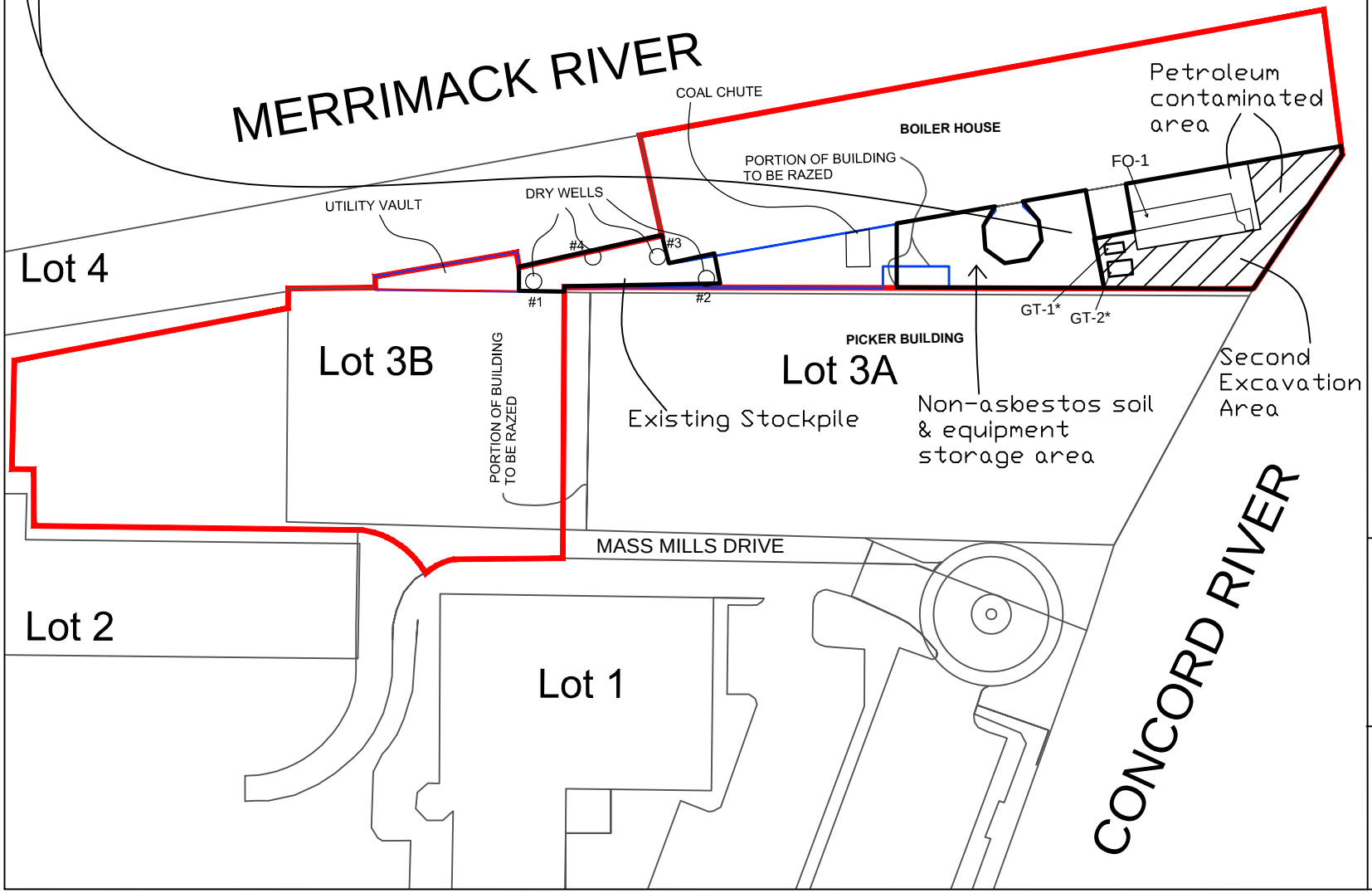
GEC Project Number 1785-6090

Figure 10E

SCALE
0 25 50

N

1. Excavate soils from second excavation area, from existing top of grade to where visible evidence of petroleum contamination is encountered. Place those soils that are not visibly contaminated in stockpile in non-asbestos soil area and/or temporarily in initial excavation area. These soils can also be placed in areas of the excavation where petroleum-contaminated soils are already excavated to the extent feasible.
2. If permitted by receiving facility, grossly petroleum contaminated soils will be excavated and live loaded for off-site disposition. Otherwise, soils will be stockpiled in the non-asbestos soil area pending results of disposal criteria testing.



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Legend

Lot 3B

Disposal Site Boundaries

* Both Gasoline USTs are removed

Remediation Step 5:

Petroleum Soil Excavation B

Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

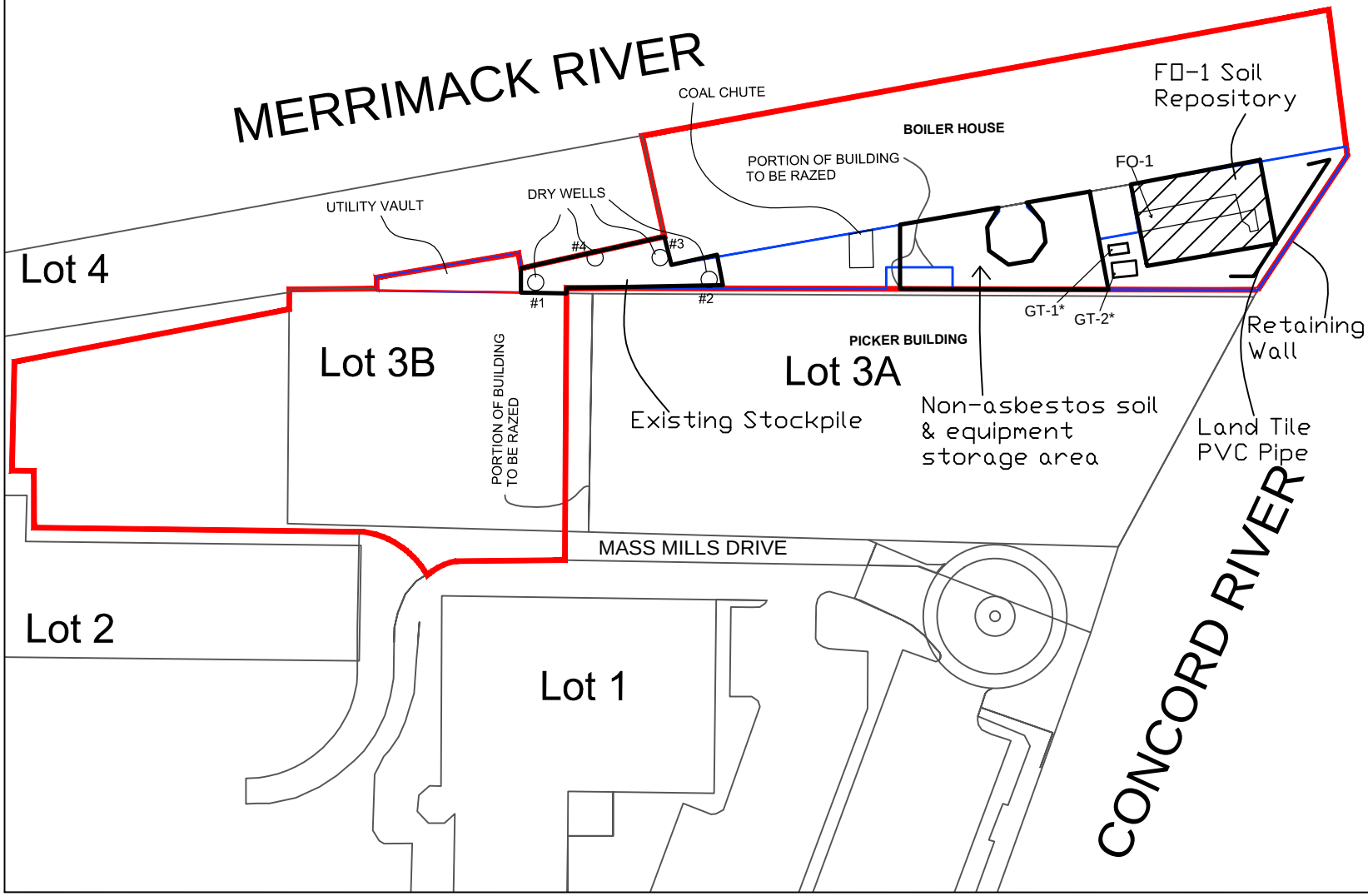
GEC Project Number 1785-6090

Figure 10F

SCALE
0 25 50

N

1. Install Land Tile PVC pipe along retaining wall at elevations based on field determination (optional), above the spray on Gunite application to the retaining wall or the concrete/bentonite slurry wall to be installed along portions of the bottom of the retaining wall..
2. Install 8-inch recovery wells in this area prior to backfilling (if feasible).
3. Backfill area outside of FO-1 Soil Repository with soils stored on non-asbestos soil storage area and/or soils temporarily stored in the initial soil excavation area.
4. Create FO-1 Soil Repository, which should be located 3 feet below final grade, and extend to two feet above historic smear zone, and should be at least 60 feet long and 40 feet wide.



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Legend

Lot 3B

Disposal Site Boundaries

* Both Gasoline USTs are removed

Remediation Step 6:
Petroleum Soil Excavation B

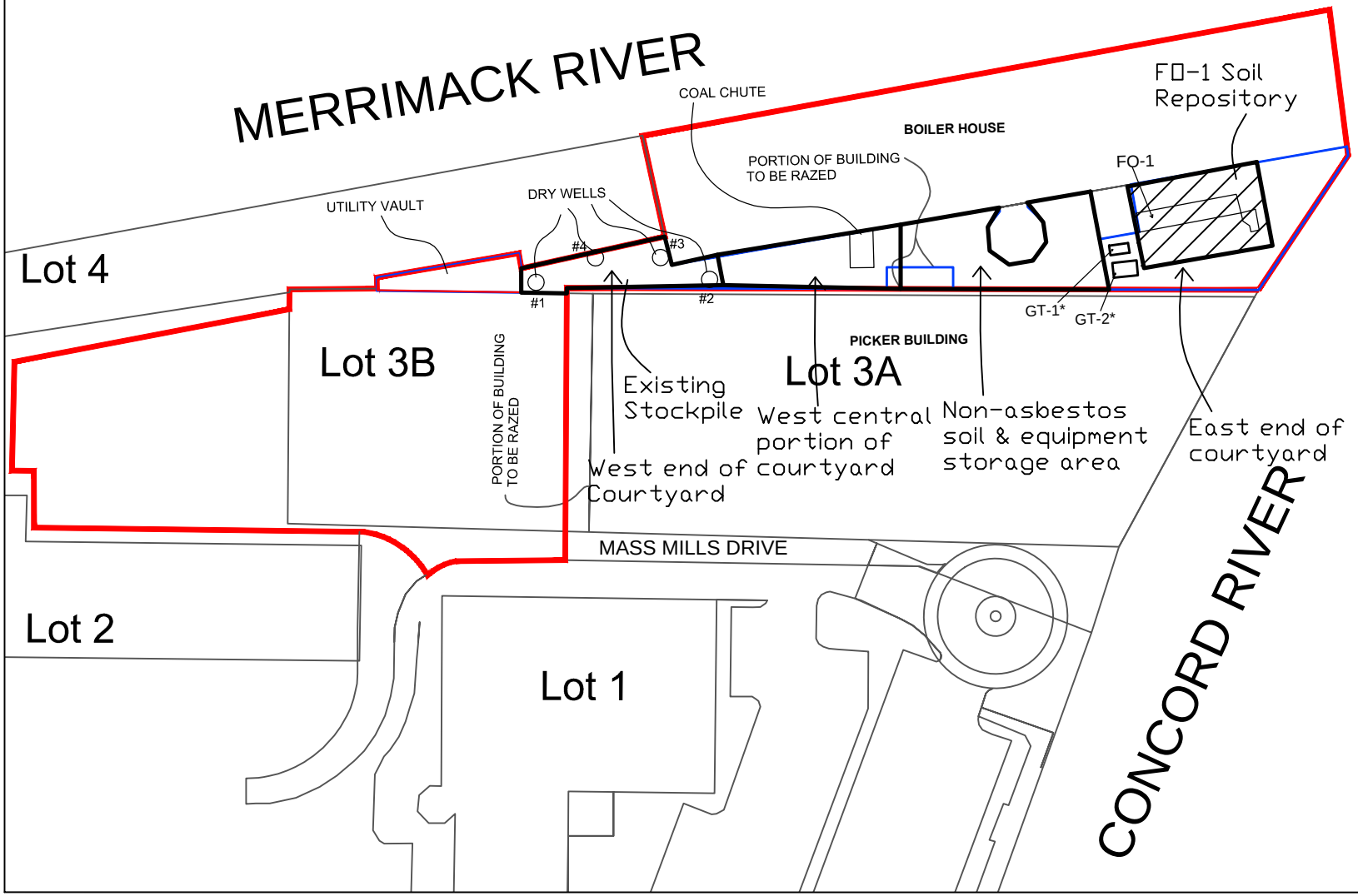
Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

GEC Project Number 1785-6090

Figure 10G

SCALE
0 25 50
N

1. Soils from the existing stockpile will be placed in FO-1 repository.
2. Soils will be removed from the top 3 feet of each dry well and placed in FO-1 soil repository.
3. Soils at the west end of the courtyard will be excavated an additional 2 feet.
4. Brick around each dry well will be removed until top of each dry well is 3' below final grade. The top of each dry well will be sealed with concrete.
5. An asbestos project manager will collect soil samples for asbestos analysis.
6. The west end soils will be covered with clean 6-mil poly pending results of asbestos testing.
7. If asbestos is present, steps 3, 5, and 6 will be repeated until no asbestos is detected, or to three feet below final grade (whichever occurs first).



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Legend

Lot 3B

Disposal Site Boundaries

* Both Gasoline USTs are removed

Remediation Step 7:
Asbestos Soil Excavation C

Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

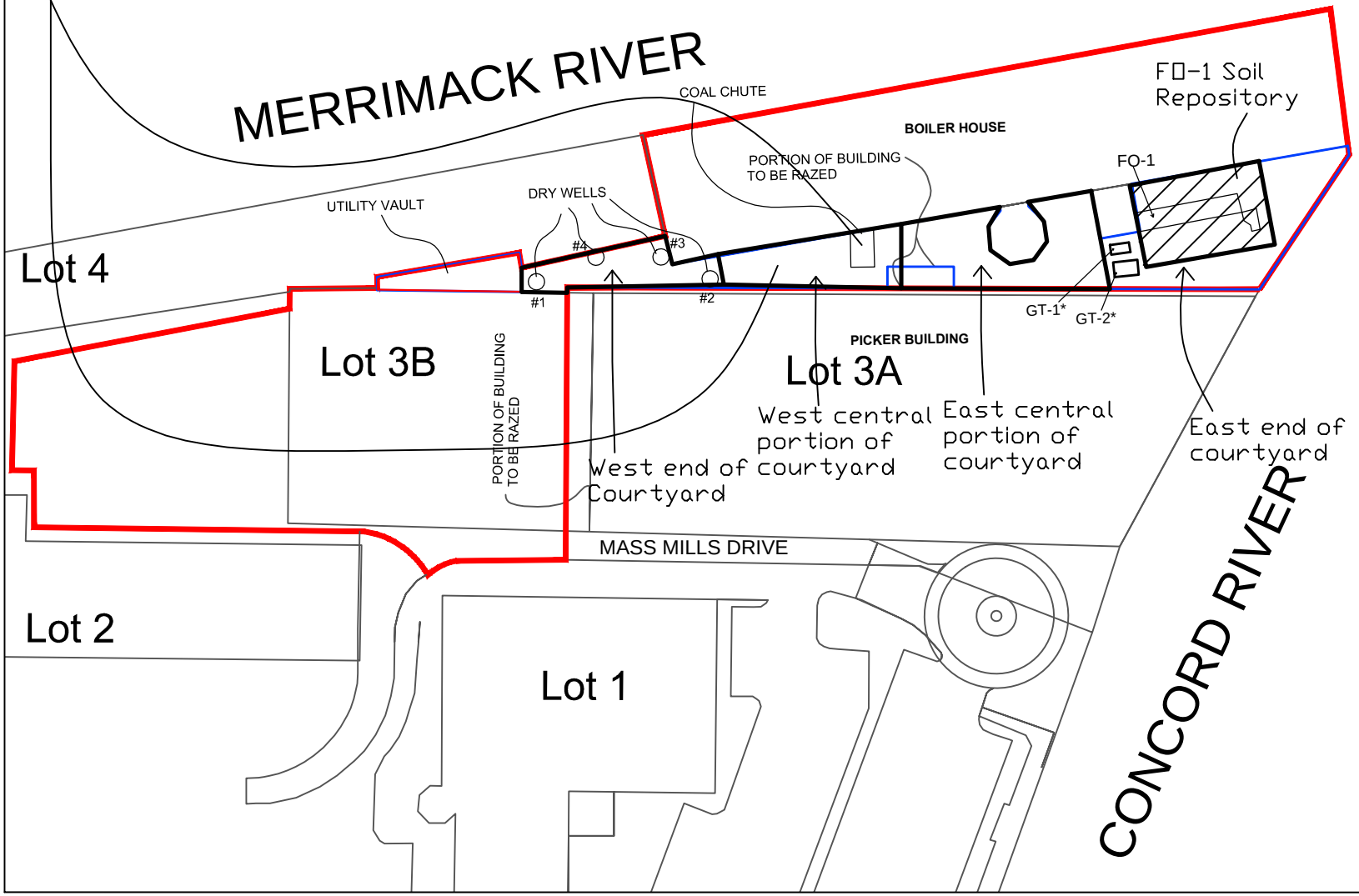
GEC Project Number 1785-6090

Figure 10H

SCALE
0 25 50

N

1. Soils from top 3 feet of coal chute will be excavated and moved to FO-1 Soil Repository, so that top of coal chute can be lowered to 3 feet below final grade. Top of coal chute soil repository will be sealed with concrete.
2. The top one foot of soil from the west central portion of the courtyard will be excavated and placed in the FO-1 Soil Repository.
3. An asbestos project manager will collect composite soil samples from this area for analysis of asbestos.
4. Clean 6-mil poly sheeting will be placed over the soils of west central courtyard, pending the results of the asbestos testing.
5. If asbestos is present, steps 2 to 4 will be repeated until no asbestos is detected, or to three feet below final grade (whichever is reached first).



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Legend

Lot 3B

Disposal Site Boundaries

* Both Gasoline USTs are removed

Remediation Step 8:
Asbestos Soil Excavation D

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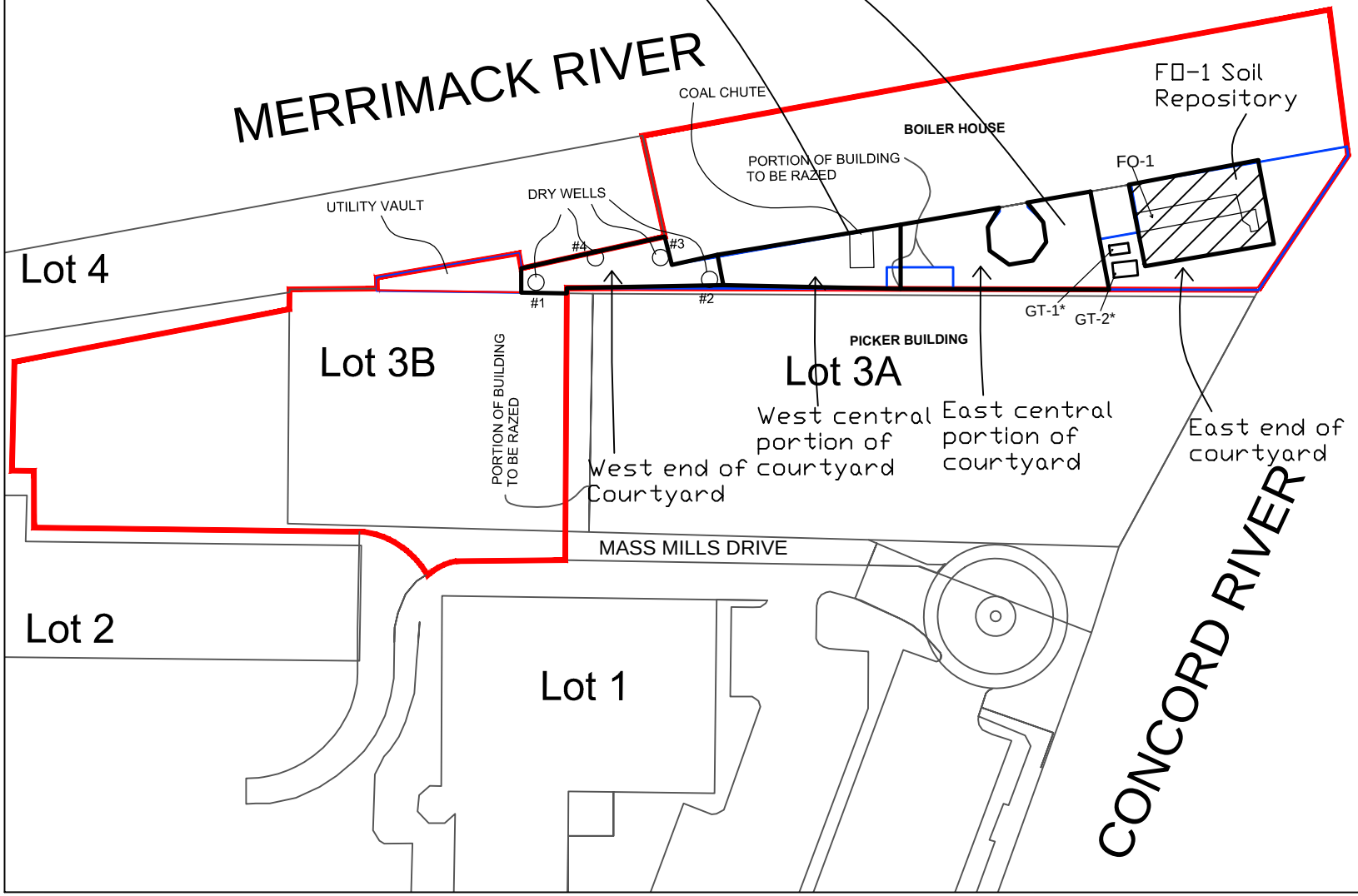
169.2 Bridge Street
Lowell, Massachusetts

GEC Project Number 1785-6090

Figure 10I

SCALE
0 25 50
N

1.The remainder (if any following asbestos soil excavation) of the soils from the east central, west central and west end portions of the courtyard will be excavated to three feet below final grade and placed in the FO-1 Soil Repository, if space permits.
2. The FO-1 Soil Repository will be covered with a distinctive geotextile membrane and covered with 3 inches of gravel.
3. The locations and elevations of the utility vault, dry wells and coal chute will be surveyed.
4. A clean utility corridor will be installed along the south side of the courtyard to house the storm drainage system. It will be lined and covered with a distinctive geotextile membrane. Its location and elevation will be surveyed.



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Legend

Lot 3B

Disposal Site Boundaries

* Both Gasoline USTs are removed

Remediation Step 9: Remainder of PCB Excavation

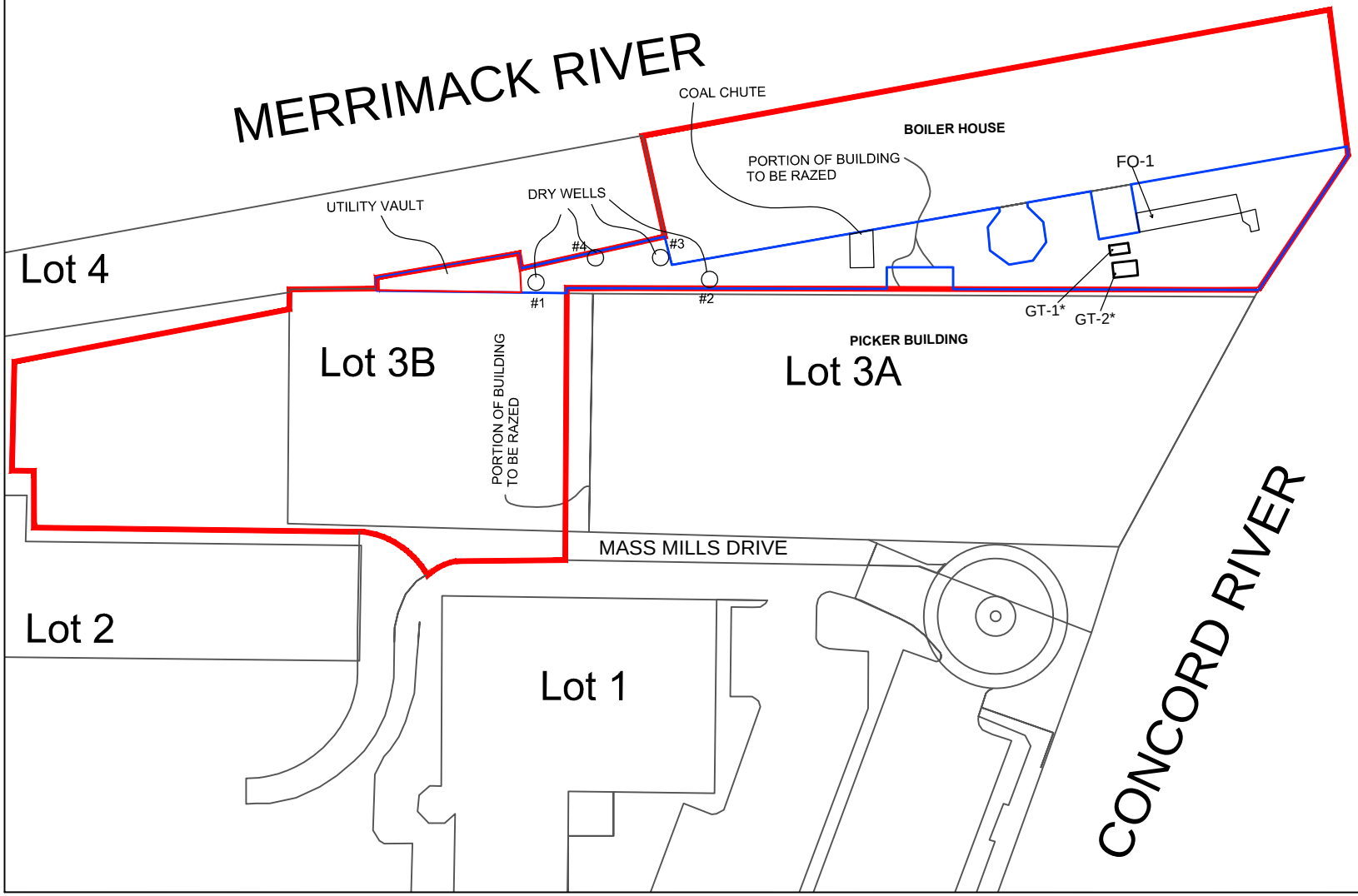
Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

GEC Project Number 1785-6090

Figure 10J

SCALE
0 25 50
N

1. A geotextile membrane (unique from those of the utility vault and FO-1 soil repositories and from that of the clean utility corridors in the utility vault and the south side of the courtyard) will be installed over the soils located 3 feet below final grade.
2. Three feet of clean fill will be placed over the geotextile membrane.
3. No trees or bushes with root structures extending more than 2.5 feet below grade when mature may be planted in these soils. Trees and bushes many be planted in containers separate from the soils of the protective barrier.
4. Permanent markers must be placed in the courtyard so that the locations of clean utility corridors can be identified.



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Legend

Lot 3B

Disposal Site Boundaries

* Both Gasoline USTs are removed

Remediation Step 10:
Installation of Protective Cover

Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

GEC Project Number 1785-6090

Figure 10K

SCALE
0 25 50
N

TABLES

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	MassDEP Published Background		Reportable Concentrations (RCs)		MCP - Method 1 Cleanup Standards									Upper Concentration Limit
	Natural Soils	Soils assoc. Fill	RCS-1	RCS-2	S-1/GW-1	S-1/GW-2	S-1/GW-3	S-2/GW-1	S-2/GW-2	S-2/GW-3	S-3/GW-1	S-3/GW-2	S-3/GW-3	UCL
Sampling Date														
Sample Depth During Investigative Event														
Sample Depth Relative to October 1, 2016														
NOTES:														
MADEP-EPH-04-1.1 (mg/Kg dry)														
C9-C18 ALIPHATICS			1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	20000
C19-C36 ALIPHATICS			3000	5000	3000	3000	3000	5000	5000	5000	5000	5000	5000	20000
UNADJUSTED C11-C22 AROMATICS			~	~	~	~	~	~	~	~	~	~	~	~
C11-C22 AROMATICS			1000	3000	1000	1000	1000	1000	3000	3000	1000	5000	5000	10000
ACENAPHTHENE	0.5	2	4	3000	4	1000	1000	4	3000	3000	4	5000	5000	10000
ACENAPHTHYLENE	0.5	1	1	10	1	600	10	1	600	10	1	600	10	10000
ANTHRACENE	1	4	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000
BENZO(A)ANTHRACENE	2	9	7	40	7	7	7	40	40	40	300	300	300	3000
BENZO(A)PYRENE	2	7	2	7	2	2	2	7	7	7	30	30	30	300
BENZO(B)FLUORANTHENE	2	8	7	40	7	7	7	40	40	40	300	300	300	3000
BENZO(G,H,I)PERYLENE	1	3	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000
BENZO(K)FLUORANTHENE	1	4	70	400	70	70	70	400	400	400	3000	3000	3000	10000
CHRYSENE	2	7	70	400	70	70	70	400	400	400	3000	3000	3000	10000
DIBENZ(A,H)ANTHRACENE	0.5	1	0.7	4	0.7	0.7	0.7	4	4	4	30	30	30	300
FLUORANTHENE	4	10	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000
FLUORENE	1	2	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000
INDENO(1,2,3-CD)PYRENE	1	3	7	40	7	7	7	40	40	40	300	300	300	3000
2-METHYLNAPHTHALENE	0.5	1	0.7	80	0.7	80	300	1	80	500	1	80	500	5000
NAPHTHALENE	0.5	1	4	20	4	20	500	4	20	1000	4	20	3000	10000
PHENANTHRENE	3	20	10	1000	10	500	500	20	1000	1000	20	3000	3000	10000
PYRENE	4	20	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)			90	600	90	90	90	600	600	600	2000	2000	2000	10000
DIBENZOFURAN (see notes 7, 9)			100	1000	~	~	~	~	~	~	~	~	~	~
DI-N-BUTYLPHTHALATE (see note 7)			50	500	~	~	~	~	~	~	~	~	~	~
MADEP-VPH-04-1.1 (mg/Kg dry)														
UNADJUSTED C5-C8 ALIPHATICS			~	~	~	~	~	~	~	~	~	~	~	~
C5-C8 ALIPHATICS			100	500	100	100	100	500	500	500	500	500	500	5000
UNADJUSTED C9-C12 ALIPHATICS			~	~	~	~	~	~	~	~	~	~	~	~
C9-C12 ALIPHATICS			1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	20000
C9-C10 AROMATICS			100	500	100	100	100	300	500	500	300	500	500	5000
BENZENE			2	200	2	40	40	2	200	200	2	400	1000	10000
ETHYLBENZENE			40	1000	40	500	500	40	1000	1000	40	1000	3000	10000
METHYL TERT-BUTYL ETHER (MTBE)			0.1	100	0.1	100	100	0.1	100	500	0.1	100	500	5000
NAPHTHALENE	0.5	1	4	20	4	20	500	4	20	1000	4	20	3000	10000
TOLUENE			30	1000	30	500	500	30	1000	1000	30	2000	3000	10000
M/P-XYLENE			100	100	400	100	500	400	100	1000	400	100	3000	10000
O-XYLENE			100	100	400	100	500	400	100	1000	400	100	3000	10000

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	MassDEP Published Background		Reportable Concentrations (RCs)		MCP - Method 1 Cleanup Standards									Upper Concentration Limit
	Natural Soils	Soils assoc. Fill	RCS-1	RCS-2	S-1/GW-1	S-1/GW-2	S-1/GW-3	S-2/GW-1	S-2/GW-2	S-2/GW-3	S-3/GW-1	S-3/GW-2	S-3/GW-3	UCL
SM 2540G (% Wt)														
% Solids			~	~	~	~	~	~	~	~	~	~	~	~
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
ANTIMONY	1	7	20	30	20	20	20	30	30	30	30	30	30	300
ARSENIC	20	20	20	20	20	20	20	20	20	20	50	50	50	500
BARIUM	50	50	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000
BERYLLIUM	0.4	0.9	90	200	90	90	90	200	200	200	200	200	200	2000
CADMIUM	2	3	70	100	70	70	70	100	100	100	100	100	10	1000
CHROMIUM (as +3)	30	40	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000
LEAD	100	600	200	600	200	200	200	600	600	600	600	600	600	6000
NICKEL	20	30	600	1000	600	600	600	1000	1000	1000	1000	1000	1000	10000
SELENIUM	0.5	1	400	700	400	400	400	700	700	700	700	700	700	7000
SILVER	0.6	5	100	200	100	100	100	200	200	200	200	200	200	2000
THALLIUM	0.6	5	8	60	8	8	8	60	60	60	80	80	80	800
VANADIUM	30	30	400	700	400	400	400	700	700	700	700	700	700	7000
ZINC	100	300	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000
SW-846 7471B (mg/Kg dry) Metals Digestion														
MERCURY	0.3	1	20	30	20	20	20	30	30	30	30	30	30	300
SW-846 7196A (mg/Kg dry)														
CHROMIUM +6	30	40	100	200	100	100	100	200	200	200	200	200	200	2000
SM2580 A (mV)														
OXIDATION/REDUCTION POTENTIAL			~	~	~	~	~	~	~	~	~	~	~	~
SW-846 9045C (pH Units)														
PH			~	~	~	~	~	~	~	~	~	~	~	~
SW-846 6010C-D (mg/L) 1311 TCLP EXT														
CADMIUM			~	~	~	~	~	~	~	~	~	~	~	~
LEAD			~	~	~	~	~	~	~	~	~	~	~	~
SW-846 8082A (mg/Kg dry)														
PCB 1016			1	4	1	1	1	4	4	4	4	4	4	100
PCB 1221			1	4	1	1	1	4	4	4	4	4	4	100
PCB 1232			1	4	1	1	1	4	4	4	4	4	4	100
PCB 1242			1	4	1	1	1	4	4	4	4	4	4	100
PCB 1248			1	4	1	1	1	4	4	4	4	4	4	100
PCB 1254			1	4	1	1	1	4	4	4	4	4	4	100
PCB 1260			1	4	1	1	1	4	4	4	4	4	4	100
PCB 1262			1	4	1	1	1	4	4	4	4	4	4	100
PCB 1268			1	4	1	1	1	4	4	4	4	4	4	100
TOTAL PCBs			1	4	1	1	1	4	4	4	4	4	4	100

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	MassDEP Published Background		Reportable Concentrations (RCs)		MCP - Method 1 Cleanup Standards									Upper Concentration Limit
	Natural Soils	Soils assoc. Fill	RCS-1	RCS-2	S-1/GW-1	S-1/GW-2	S-1/GW-3	S-2/GW-1	S-2/GW-2	S-2/GW-3	S-3/GW-1	S-3/GW-2	S-3/GW-3	UCL
SW-846 8081B (mg/Kg dry)														
ALDRIN			0.08	0.5	0.08	0.08	0.08	0.5	0.5	0.5	3	3	3	30
ALPHA-BHC			50	500	~	~	~	~	~	~	~	~	~	~
BETA-BHC			10	100	~	~	~	~	~	~	~	~	~	~
DELTA-BHC			10	100	~	~	~	~	~	~	~	~	~	~
GAMMA-BHC (LINDANE)			0.003	0.5	0.003	0.1	0.5	0.003	2	0.5	0.003	2	0.5	600
CHLORDANE			5	30	5	5	5	30	30	30	60	60	60	600
4,4'-DDD			8	40	8	8	8	40	40	40	60	60	60	600
4,4'-DDE			6	30	6	6	6	30	30	30	60	60	60	600
4,4'-DDT			6	30	6	6	6	30	30	30	60	60	60	600
DIELDRIN			0.08	0.5	0.08	0.08	0.08	0.5	0.5	0.5	3	3	3	30
ENDOSULFAN I			0.5	1	0.5	300	1	0.5	500	1	0.5	500	1	5000
ENDOSULFAN II			0.5	1	0.5	300	1	0.5	500	1	0.5	500	1	5000
ENDOSULFAN SULFATE			~	~	~	~	~	~	~	~	~	~	~	~
ENDRIN			10	20	10	10	10	20	20	20	20	20	20	200
ENDRIN KETONE			~	~	~	~	~	~	~	~	~	~	~	~
HEPTACHLOR			0.3	2	0.3	0.3	0.3	2	2	2	10	10	10	100
HEPTACHLOR EPOXIDE			0.1	0.9	0.1	0.1	0.1	0.9	0.9	0.9	1	1	1	10
HEXACHLOROBENZENE			0.7	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	8
METHOXYCHLOR			200	400	200	200	200	400	400	400	400	400	400	4000
SW-846 8081B (µg/L) 1311 TCLP EXT														
HEPTACHLOR			~	~	~	~	~	~	~	~	~	~	~	~
SW-846 8151A (mg/kg dry)														
2,4-D			100	1000	~	~	~	~	~	~	~	~	~	~
2,4-DB			100	1000	~	~	~	~	~	~	~	~	~	~
2,4,5-TP (SILVEX)			100	1000	~	~	~	~	~	~	~	~	~	~
2,4,5-T			100	1000	~	~	~	~	~	~	~	~	~	~
DALAPON			~	~	~	~	~	~	~	~	~	~	~	~
DICAMBA			500	5000	~	~	~	~	~	~	~	~	~	~
DICHLOROPROP			~	~	~	~	~	~	~	~	~	~	~	~
DINOSEB			500	5000	~	~	~	~	~	~	~	~	~	~
MCPA			100	1000	~	~	~	~	~	~	~	~	~	~
MCPP			~	~	~	~	~	~	~	~	~	~	~	~

NOTES:

1. An asterisk (*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regul. criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Bolded values exceed the Method 1 Cleanup Standards (exclusive of S-x/GW-1).
6. Italic values exceed MassDEP published background conc. for soils assoc. with fill containing coal ash or wood ash.
7. SP-1 is a sample from stockpile of surficial soil samples. It was analyzed for VOCs via USEPA Method 8260C. None were detected. It was also analyzed for SVOCs via USEPA Method 8270. PAHs, 2 phthalates and dibenzofuran were detected. These data are summarized with the EPH/PAH data. Analysis for TPH via USEPA Method 8100M was also conducted. TPH was detected at 3800 mg/kg.
Soils from B-11 were added to SP-1 and these soils were shipped off-Site to a hazardous waste facility approved to accept PCBs containing >50 mg/kg PCBs.
8. FO-1, FO-1 (3') and FO-1-BTM are samples inside and beneath vault. They were analyzed for VOCs via USEPA Method 8260C and SVOCs via USEPA Method 8270. No VOCs or SVOCs were detected except for SVOCs in FO-1. Analysis for TPH via USEPA Method 8100M was also conducted. No TPH was detected in FO-1 (3'), 31 mg/kg TPH was detected in FO-1-BTM, and 33,000 mg/kg TPH in FO-1.

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS														
	B-1 (15'-20')	B-3 (15'-20')	B-3 (15'-20') (25-28'')	B-4 (15'-20')	B-4 (15'-20') (21-24'')	B-5 (0-1')	B-5 (1-3')	B-5 (0-3')	B-5 (3-6')	B-5 (6-11')	B-7 (0-1')	B-7 (1-3')	B-7 (0-3')	B-7 (3-6')	B-7 (6-11')
Sampling Date	8/14/2015	8/14/2015	8/14/2015	8/14/2015	8/14/2015	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016
Sample Depth During Investigative Event	15-20 Feet	15-20 Feet	15-20 Feet	15-20 Feet	15-20 Feet	0-1 Feet	1-3 Feet	0-3 Feet	3-6 Feet	6-11 Feet	0-1 Feet	1-3 Feet	0-3 Feet	3-6 Feet	6-11 Feet
Sample Depth Relative to October 1, 2016	12-17 Feet	14-19 Feet	14-19 Feet	12-17 Feet	12-17 Feet	Excavated and Stockpiled	Excavated and Stockpiled	Excavated and Stockpiled	0-3 Feet	3-8 Feet	Excavated and Stockpiled	Excavated and Stockpiled	Excavated and Stockpiled	0-3 Feet	3-8 Feet
NOTES:			13		13	11	11	11			11	11	10, 11		
MADEP-EPH-04-1.1 (mg/Kg dry)															
C9-C18 ALIPHATICS	810	48	NT	570	NT	NT	NT	24	26	300	NT	NT	61	ND (11)	ND (22)
C19-C36 ALIPHATICS	1700	77	NT	1200	NT	NT	NT	160	64	750	NT	NT	140	28	48
UNADJUSTED C11-C22 AROMATICS	3400	220	NT	3700	NT	NT	NT	420	280	1400	NT	NT	240	120	96
C11-C22 AROMATICS	**3400**	200	NT	**3600**	NT	NT	NT	310	220	**1400**	NT	NT	180	83	83
ACENAPHTHENE	ND (0.22)	0.22	NT	ND (0.22)	NT	NT	NT	1.4	0.76	ND (0.49)	NT	NT	*2.6*	0.54	ND (0.22)
ACENAPHTHYLENE	ND (0.22)	ND (0.11)	NT	ND (0.22)	NT	NT	NT	0.37	0.11	ND (0.49)	NT	NT	0.38	ND (0.11)	ND (0.22)
ANTHRACENE	1.9	0.65	NT	5.4	NT	NT	NT	3.4	1.8	ND (0.49)	NT	NT	*5.4*	1.4	0.29
BENZO(A)ANTHRACENE	3.0	1.1	NT	**7.4**	NT	NT	NT	**7.4**	4.1	ND (0.49)	NT	NT	***11***	2.9	1.2
BENZO(A)PYRENE	ND (0.22)	0.88	NT	**5.5**	NT	NT	NT	**6.5**	**3.7**	ND (0.49)	NT	NT	***9.3***	**2.4**	1.1
BENZO(B)FLUORANTHENE	ND (0.22)	1.2	NT	**7.1**	NT	NT	NT	***9.1***	5.3	ND (0.49)	NT	NT	***12***	3.3	1.3
BENZO(G,H,I)PERYLENE	ND (0.22)	0.58	NT	1.5	NT	NT	NT	*3.4*	1.7	ND (0.49)	NT	NT	*5.0*	1.2	0.66
BENZO(K)FLUORANTHENE	ND (0.22)	0.43	NT	2.5	NT	NT	NT	3.0	2.0	ND (0.49)	NT	NT	*4.6*	1.2	0.52
CHRYSENE	3.8	1.2	NT	*7.8*	NT	NT	NT	*8.5*	5.0	ND (0.49)	NT	NT	*12*	3.2	1.3
DIBENZ(A,H)ANTHRACENE	ND (0.22)	ND (0.11)	NT	ND (0.22)	NT	NT	NT	***1.1***	0.65	ND (0.49)	NT	NT	***1.7***	0.41	ND (0.22)
FLUORANTHENE	3.5	2.3	NT	*15*	NT	NT	NT	*18*	9.5	1.2	NT	NT	*26*	6.6	2.3
FLUORENE	*3.5*	0.44	NT	*6.9*	NT	NT	NT	1.9	0.90	ND (0.49)	NT	NT	*3.4*	0.78	ND (0.22)
INDENO(1,2,3-CD)PYRENE	ND (0.22)	0.51	NT	2.6	NT	NT	NT	*4.1*	2.1	ND (0.49)	NT	NT	*5.1*	1.3	0.56
2-METHYLNAPHTHALENE	0.49	ND (0.11)	NT	***3.1***	NT	NT	NT	0.67	0.29	0.70	NT	NT	0.96	0.22	ND (0.22)
NAPHTHALENE	*1.3*	0.12	NT	*2.1*	NT	NT	NT	*1.7*	0.44	0.79	NT	NT	*1.5*	0.32	ND (0.22)
PHENANTHRENE	5.3	1.9	NT	***21***	NT	NT	NT	15	7.4	1.6	NT	NT	*23*	6.1	1.2
PYRENE	2.6	2.3	NT	13	NT	NT	NT	17	8.8	ND (0.49)	NT	NT	*22*	5.9	2.4
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DIBENZOFURAN (see notes 7, 9)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DI-N-BUTYLPHTHALATE (see note 7)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MADEP-VPH-04-1.1 (mg/Kg dry)															
UNADJUSTED C5-C8 ALIPHATICS	ND (29)	ND (12)	NT	ND (44)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C5-C8 ALIPHATICS	ND (29)	ND (12)	NT	ND (44)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
UNADJUSTED C9-C12 ALIPHATICS	88	53	NT	100	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C9-C12 ALIPHATICS	ND (29)	ND (12)	NT	ND (44)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C9-C10 AROMATICS	84	51	NT	100	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BENZENE	0.26	ND (0.062)	NT	0.52	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ETHYLBENZENE	ND (0.14)	ND (0.062)	NT	ND (0.22)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	ND (0.14)	ND (0.062)	NT	ND (0.22)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
NAPHTHALENE	ND (0.72)	ND (0.31)	NT	ND (1.1)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
TOLUENE	ND (0.14)	ND (0.062)	NT	0.32	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
M/P-XYLENE	ND (0.29)	ND (0.12)	NT	ND (0.44)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
O-XYLENE	ND (0.14)	ND (0.062)	NT	ND (0.22)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS														
	B-1 (15'-20')	B-3 (15'-20')	B-3 (15'-20') (25-28'')	B-4 (15'-20')	B-4 (15'-20') (21-24'')	B-5 (0-1')	B-5 (1-3')	B-5 (0-3')	B-5 (3-6')	B-5 (6-11')	B-7 (0-1')	B-7 (1-3')	B-7 (0-3')	B-7 (3-6')	B-7 (6-11')
SM 2540G (% Wt)															
% Solids	88.9	87.2	89.6	91.0	86.1	88.6	66.6	85.3	87.1	80.4	87.4	86.7	85.2	90.3	89
SW-846 6010C/D (mg/Kg dry) Metals Digestion															
ANTIMONY	NT	NT	NT	NT	NT	NT	NT	ND (2.7)	NT	NT	NT	NT	ND (2.8)	NT	NT
ARSENIC	NT	NT	NT	NT	NT	NT	NT	11	NT	NT	NT	NT	13	NT	NT
BARIUM	NT	NT	NT	NT	NT	NT	NT	*120*	NT	NT	NT	NT	*91*	NT	NT
BERYLLIUM	NT	NT	NT	NT	NT	NT	NT	*1.4*	NT	NT	NT	NT	*1.3*	NT	NT
CADMIUM	NT	NT	NT	NT	NT	NT	NT	0.89	NT	NT	NT	NT	1.2	NT	NT
CHROMIUM (as +3)	NT	NT	NT	NT	NT	NT	NT	34	NT	NT	NT	NT	*50*	NT	NT
LEAD	NT	NT	NT	NT	NT	NT	NT	100	NT	NT	NT	NT	150	NT	NT
NICKEL	NT	NT	NT	NT	NT	NT	NT	29	NT	NT	NT	NT	26	NT	NT
SELENIUM	NT	NT	NT	NT	NT	NT	NT	ND (5.4)	NT	NT	NT	NT	ND (5.7)	NT	NT
SILVER	NT	NT	NT	NT	NT	NT	NT	ND (0.54)	NT	NT	NT	NT	ND (0.57)	NT	NT
THALLIUM	NT	NT	NT	NT	NT	NT	NT	ND (2.7)	NT	NT	NT	NT	ND (2.8)	NT	NT
VANADIUM	NT	NT	NT	NT	NT	NT	NT	*110*	*55*	30	NT	NT	*66*	*31*	14
ZINC	NT	NT	NT	NT	NT	NT	NT	200	NT	NT	NT	NT	260	NT	NT
SW-846 7471B (mg/Kg dry) Metals Digestion															
MERCURY	NT	NT	NT	NT	NT	NT	NT	0.16	NT	NT	NT	NT	0.38	NT	NT
SW-846 7196A (mg/Kg dry)															
CHROMIUM +6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SM2580 A (mV)															
OXIDATION/REDUCTION POTENTIAL	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 9045C (pH Units)															
PH	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 6010C-D (mg/L) 1311 TCLP EXT															
CADMIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
LEAD	NT	NT	NT	NT	NT	NT	NT	0.050	NT	NT	NT	NT	0.027	NT	NT
SW-846 8082A (mg/Kg dry)															
PCB 1016	NT	NT	NT	NT	NT	ND (1.1) *	ND (0.56)	NT	ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *	NT	ND (0.55)	ND (0.11)
PCB 1221	NT	NT	NT	NT	NT	ND (1.1) *	ND (0.56)	NT	ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *	NT	ND (0.55)	ND (0.11)
PCB 1232	NT	NT	NT	NT	NT	ND (1.1) *	ND (0.56)	NT	ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *	NT	ND (0.55)	ND (0.11)
PCB 1242	NT	NT	NT	NT	NT	ND (1.1) *	ND (0.56)	NT	ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *	NT	ND (0.55)	ND (0.11)
PCB 1248	NT	NT	NT	NT	NT	ND (1.1) *	ND (0.56)	NT	ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *	NT	ND (0.55)	ND (0.11)
PCB 1254	NT	NT	NT	NT	NT	**7.0**	**3.7**	NT	**3.8**	0.29	**8.5**	**6.0**	NT	**2.2**	ND (0.11)
PCB 1260	NT	NT	NT	NT	NT	ND (1.1) *	ND (0.56)	NT	ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *	NT	ND (0.55)	ND (0.11)
PCB 1262	NT	NT	NT	NT	NT	ND (1.1) *	ND (0.56)	NT	ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *	NT	ND (0.55)	ND (0.11)
PCB 1268	NT	NT	NT	NT	NT	ND (1.1) *	ND (0.56)	NT	ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *	NT	ND (0.55)	ND (0.11)
TOTAL PCBs	NT	NT	NT	NT	NT	**7.0**	**3.7**	NT	**3.8**	0.29	**8.5**	**6.0**	NT	**2.2**	ND (0.11)

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS														
	B-1 (15'-20')	B-3 (15'-20')	B-3 (15'-20') (25-28'')	B-4 (15'-20')	B-4 (15'-20') (21-24'')	B-5 (0-1')	B-5 (1-3')	B-5 (0-3')	B-5 (3-6')	B-5 (6-11')	B-7 (0-1')	B-7 (1-3')	B-7 (0-3')	B-7 (3-6')	B-7 (6-11')
SW-846 8081B (mg/Kg dry)															
ALDRIN	NT	NT	NT	NT	NT	NT	NT	ND (0.12) *	NT	NT	NT	NT	ND (0.12) *	NT	NT
ALPHA-BHC	NT	NT	NT	NT	NT	NT	NT	ND (0.12)	NT	NT	NT	NT	ND (0.12)	NT	NT
BETA-BHC	NT	NT	NT	NT	NT	NT	NT	ND (0.12)	NT	NT	NT	NT	ND (0.12)	NT	NT
DELTA-BHC	NT	NT	NT	NT	NT	NT	NT	ND (0.12)	NT	NT	NT	NT	ND (0.12)	NT	NT
GAMMA-BHC (LINDANE)	NT	NT	NT	NT	NT	NT	NT	ND (0.047) *	NT	NT	NT	NT	ND (0.047) *	NT	NT
CHLORDANE	NT	NT	NT	NT	NT	NT	NT	ND (0.47)	NT	NT	NT	NT	ND (0.47)	NT	NT
4,4'-DDD	NT	NT	NT	NT	NT	NT	NT	ND (0.094)	NT	NT	NT	NT	ND (0.094)	NT	NT
4,4'-DDE	NT	NT	NT	NT	NT	NT	NT	ND (0.094)	NT	NT	NT	NT	ND (0.094)	NT	NT
4,4'-DDT	NT	NT	NT	NT	NT	NT	NT	ND (0.094)	NT	NT	NT	NT	0.11	NT	NT
DIELDRIN	NT	NT	NT	NT	NT	NT	NT	ND (0.094) *	NT	NT	NT	NT	ND (0.094) *	NT	NT
ENDOSULFAN I	NT	NT	NT	NT	NT	NT	NT	ND (0.12)	NT	NT	NT	NT	ND (0.12)	NT	NT
ENDOSULFAN II	NT	NT	NT	NT	NT	NT	NT	ND (0.19)	NT	NT	NT	NT	ND (0.19)	NT	NT
ENDOSULFAN SULFATE	NT	NT	NT	NT	NT	NT	NT	ND (0.19)	NT	NT	NT	NT	ND (0.19)	NT	NT
ENDRIN	NT	NT	NT	NT	NT	NT	NT	ND (0.19)	NT	NT	NT	NT	ND (0.19)	NT	NT
ENDRIN KETONE	NT	NT	NT	NT	NT	NT	NT	ND (0.19)	NT	NT	NT	NT	ND (0.19)	NT	NT
HEPTACHLOR	NT	NT	NT	NT	NT	NT	NT	ND (0.12)	NT	NT	NT	NT	ND (0.12)	NT	NT
HEPTACHLOR EPOXIDE	NT	NT	NT	NT	NT	NT	NT	ND (0.12) *	NT	NT	NT	NT	ND (0.12) *	NT	NT
HEXACHLOROBENZENE	NT	NT	NT	NT	NT	NT	NT	ND (0.14)	NT	NT	NT	NT	ND (0.14)	NT	NT
METHOXYCHLOR	NT	NT	NT	NT	NT	NT	NT	ND (1.2)	NT	NT	NT	NT	ND (1.2)	NT	NT
SW-846 8081B (µg/L) 1311 TCLP EXT															
HEPTACHLOR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8151A (mg/kg dry)															
2,4-D	NT	NT	NT	NT	NT	NT	NT	ND (0.029)	NT	NT	NT	NT	ND (0.029)	NT	NT
2,4-DB	NT	NT	NT	NT	NT	NT	NT	ND (0.029)	NT	NT	NT	NT	ND (0.029)	NT	NT
2,4,5-TP (SILVEX)	NT	NT	NT	NT	NT	NT	NT	ND (0.0029)	NT	NT	NT	NT	ND (0.0029)	NT	NT
2,4,5-T	NT	NT	NT	NT	NT	NT	NT	ND (0.0029)	NT	NT	NT	NT	ND (0.0029)	NT	NT
DALAPON	NT	NT	NT	NT	NT	NT	NT	ND (0.073)	NT	NT	NT	NT	ND (0.073)	NT	NT
DICAMBA	NT	NT	NT	NT	NT	NT	NT	ND (0.0029)	NT	NT	NT	NT	ND (0.0029)	NT	NT
DICHLOROPROP	NT	NT	NT	NT	NT	NT	NT	ND (0.029)	NT	NT	NT	NT	ND (0.029)	NT	NT
DINOSEB	NT	NT	NT	NT	NT	NT	NT	ND (0.015)	NT	NT	NT	NT	ND (0.015)	NT	NT
MCPA	NT	NT	NT	NT	NT	NT	NT	ND (2.9)	NT	NT	NT	NT	ND (2.9)	NT	NT
MCPP	NT	NT	NT	NT	NT	NT	NT	ND (2.9)	NT	NT	NT	NT	ND (2.9)	NT	NT

NOTES:

1. An asterisk (*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regul. criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Bolded values exceed the Method 1 Cleanup Standards (exclusive of S-x/GW-1).
6. Italic values exceed MassDEP published background conc. for soils assoc. with fill containing coal ash or wood ash.
9. SP-3 was analyzed for VPH via MADEP's Method and for VOCs via USEPA Method 8260C. No VPH or VOCs were detected. It was also analyzed for SVOCs via USEPA Method 8270. Only PAHs and dibenzofuran were detected and they are reported with the EPH data.
10. B-7 (03') and B-10 (0-3') were analyzed for PAHs via both MassDEP's Method and USEPA Method 8270D. For each PAH, the highest detected value for both methods is provided in this table.
11. Soils were excavated and some were placed in the coal chute, which was modified to be a soil repository. SP-2 stockpile soils were placed in the coal chute first, then the remainder of the coal chute was backfilled with excavated soils from east section of courtyard. Soil soils were also placed in dry wells no. 2 to 4, located between B-11 and the utility void. The remaining soils from the east end excavation were stockpiled in the west end of the courtyard. Approximately 300 to 400 cubic yards of soils are located in the stockpile.

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS															
	B-8 (0-1')	B-8 (1-3')	B-8 (3-6')	B-8 (6-11')	B-9 (0-1')	B-9 (1-3')	B-9 (0-3')	B-9 (3-6')	B-9 (6-9')	B-9 (5'E) (0-1)	B-9 (5'E) (1-3)	B-9 (5'N) (0-1)	B-9 (5'S) (0-1)	B-9 (5'W) (0-1)	B-10 (0-1')	B-10 (1-3')
Sampling Date	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	9/30/2016	9/30/2016	9/30/2016	9/30/2016	9/30/2016	3/14/2016	3/14/2016
Sample Depth During Investigative Event	0-1 Feet	1-3 Feet	3-6 Feet	6-11 Feet	0-1 Feet	1-3 Feet	0-3 Feet	3-6 Feet	6-9 Feet	0-1 Feet	1-3 Feet	0-1 Feet	0-1 Feet	0-1 Feet	0-1 Feet	1-3 Feet
Sample Depth Relative to October 1, 2016	Excavated and Stockpiled	0-2 Feet	2-5 Feet	5-10 Feet	0-1 Feet	1-3 Feet	0-3 Feet	3-6 Feet	6-9 Feet	0-1 Feet	1-3 Feet	0-1 Feet	0-1 Feet	0-1 Feet	0-1 Feet	1-3 Feet
NOTES:	11															
MADEP-EPH-04-1.1 (mg/Kg dry)																
C9-C18 ALIPHATICS	NT	NT	NT	NT	NT	NT	ND (12)	ND (11)	NT	NT	NT	NT	NT	NT	NT	NT
C19-C36 ALIPHATICS	NT	NT	NT	NT	NT	NT	ND (12)	ND (11)	NT	NT	NT	NT	NT	NT	NT	NT
UNADJUSTED C11-C22 AROMATICS	NT	NT	NT	NT	NT	NT	39	59	NT	NT	NT	NT	NT	NT	NT	NT
C11-C22 AROMATICS	NT	NT	NT	NT	NT	NT	37	46	NT	NT	NT	NT	NT	NT	NT	NT
ACENAPHTHENE	NT	NT	NT	NT	NT	NT	ND (0.12)	ND (0.11)	NT	NT	NT	NT	NT	NT	NT	NT
ACENAPHTHYLENE	NT	NT	NT	NT	NT	NT	ND (0.12)	ND (0.11)	NT	NT	NT	NT	NT	NT	NT	NT
ANTHRACENE	NT	NT	NT	NT	NT	NT	0.12	0.38	NT	NT	NT	NT	NT	NT	NT	NT
BENZO(A)ANTHRACENE	NT	NT	NT	NT	NT	NT	0.21	1.2	NT	NT	NT	NT	NT	NT	NT	NT
BENZO(A)PYRENE	NT	NT	NT	NT	NT	NT	0.22	1.0	NT	NT	NT	NT	NT	NT	NT	NT
BENZO(B)FLUORANTHENE	NT	NT	NT	NT	NT	NT	0.35	1.3	NT	NT	NT	NT	NT	NT	NT	NT
BENZO(G,H,I)PERYLENE	NT	NT	NT	NT	NT	NT	0.13	0.54	NT	NT	NT	NT	NT	NT	NT	NT
BENZO(K)FLUORANTHENE	NT	NT	NT	NT	NT	NT	ND (0.12)	0.50	NT	NT	NT	NT	NT	NT	NT	NT
CHRYSENE	NT	NT	NT	NT	NT	NT	0.30	1.3	NT	NT	NT	NT	NT	NT	NT	NT
DIBENZ(A,H)ANTHRACENE	NT	NT	NT	NT	NT	NT	ND (0.12)	ND (0.11)	NT	NT	NT	NT	NT	NT	NT	NT
FLUORANTHENE	NT	NT	NT	NT	NT	NT	0.44	2.4	NT	NT	NT	NT	NT	NT	NT	NT
FLUORENE	NT	NT	NT	NT	NT	NT	ND (0.12)	ND (0.11)	NT	NT	NT	NT	NT	NT	NT	NT
INDENO(1,2,3-CD)PYRENE	NT	NT	NT	NT	NT	NT	0.12	0.59	NT	NT	NT	NT	NT	NT	NT	NT
2-METHYLNAPHTHALENE	NT	NT	NT	NT	NT	NT	ND (0.12)	ND (0.11)	NT	NT	NT	NT	NT	NT	NT	NT
NAPHTHALENE	NT	NT	NT	NT	NT	NT	ND (0.12)	ND (0.11)	NT	NT	NT	NT	NT	NT	NT	NT
PHENANTHRENE	NT	NT	NT	NT	NT	NT	0.51	1.4	NT	NT	NT	NT	NT	NT	NT	NT
PYRENE	NT	NT	NT	NT	NT	NT	0.49	2.3	NT	NT	NT	NT	NT	NT	NT	NT
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DIBENZOFURAN (see notes 7, 9)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DI-N-BUTYLPHTHALATE (see note 7)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MADEP-VPH-04-1.1 (mg/Kg dry)																
UNADJUSTED C5-C8 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C5-C8 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
UNADJUSTED C9-C12 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C9-C12 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C9-C10 AROMATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BENZENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ETHYLBENZENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
NAPHTHALENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
TOLUENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
M/P-XYLENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
O-XYLENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS															
	B-8 (0-1')	B-8 (1-3')	B-8 (3-6')	B-8 (6-11')	B-9 (0-1')	B-9 (1-3')	B-9 (0-3')	B-9 (3-6')	B-9 (6-9')	B-9 (5'E) (0-1)	B-9 (5'E) (1-3)	B-9 (5'N) (0-1)	B-9 (5'S) (0-1)	B-9 (5'W) (0-1)	B-10 (0-1')	B-10 (1-3')
SM 2540G (% Wt)																
% Solids	82.9	93.9	89.2	88.2	84.1	88.5	85.7	87.7	88.8	81.7	86.7	88.9	85.2	63.1	77.7	83.2
SW-846 6010C/D (mg/Kg dry) Metals Digestion																
ANTIMONY	NT	NT	NT	NT	NT	NT	NT	ND (2.7)	NT	NT	NT	NT	NT	NT	NT	NT
ARSENIC	NT	NT	NT	NT	NT	NT	NT	11	NT	NT	NT	NT	NT	NT	NT	NT
BARIUM	NT	NT	NT	NT	NT	NT	NT	30	NT	NT	NT	NT	NT	NT	NT	NT
BERYLLIUM	NT	NT	NT	NT	NT	NT	NT	*6.7*	NT	NT	NT	NT	NT	NT	NT	NT
CADMIUM	NT	NT	NT	NT	NT	NT	NT	0.97	NT	NT	NT	NT	NT	NT	NT	NT
CHROMIUM (as +3)	NT	NT	NT	NT	NT	NT	NT	14	NT	NT	NT	NT	NT	NT	NT	NT
LEAD	NT	NT	NT	NT	NT	NT	NT	26	NT	NT	NT	NT	NT	NT	NT	NT
NICKEL	NT	NT	NT	NT	NT	NT	NT	*42*	NT	NT	NT	NT	NT	NT	NT	NT
SELENIUM	NT	NT	NT	NT	NT	NT	NT	ND (5.4)	NT	NT	NT	NT	NT	NT	NT	NT
SILVER	NT	NT	NT	NT	NT	NT	NT	ND (0.54)	NT	NT	NT	NT	NT	NT	NT	NT
THALLIUM	NT	NT	NT	NT	NT	NT	NT	ND (2.7)	NT	NT	NT	NT	NT	NT	NT	NT
VANADIUM	NT	NT	*39*	*41*	NT	NT	*390*	***510***	*120*	NT	NT	NT	NT	NT	NT	NT
ZINC	NT	NT	NT	NT	NT	NT	NT	81	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 7471B (mg/Kg dry) Metals Digestion																
MERCURY	NT	NT	NT	NT	NT	NT	NT	0.19	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 7196A (mg/Kg dry)																
CHROMIUM +6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SM2580 A (mV)																
OXIDATION/REDUCTION POTENTIAL	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 9045C (pH Units)																
PH	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 6010C-D (mg/L) 1311 TCLP EXT																
CADMIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
LEAD	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8082A (mg/Kg dry)																
PCB 1016	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *	ND (0.11)	NT	ND (0.11)	ND (0.11)	ND (2.4) *	ND (1.1) *	ND (1.1) *	ND (4.6) *	ND (3.1) *	ND (2.5) *	ND (0.12)
PCB 1221	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *	ND (0.11)	NT	ND (0.11)	ND (0.11)	ND (2.4) *	ND (1.1) *	ND (1.1) *	ND (4.6) *	ND (3.1) *	ND (2.5) *	ND (0.12)
PCB 1232	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *	ND (0.11)	NT	ND (0.11)	ND (0.11)	ND (2.4) *	ND (1.1) *	ND (1.1) *	ND (4.6) *	ND (3.1) *	ND (2.5) *	ND (0.12)
PCB 1242	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *	ND (0.11)	NT	ND (0.11)	ND (0.11)	ND (2.4) *	ND (1.1) *	ND (1.1) *	ND (4.6) *	ND (3.1) *	ND (2.5) *	ND (0.12)
PCB 1248	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *	ND (0.11)	NT	ND (0.11)	ND (0.11)	ND (2.4) *	2.5	ND (1.1) *	ND (4.6) *	ND (3.1) *	ND (2.5) *	ND (0.12)
PCB 1254	**39**	ND (0.10)	ND (0.11)	ND (0.11)	**42**	**1.1**	NT	ND (0.11)	ND (0.11)	**18**	**9.8**	**7.4**	**30**	**20**	**21**	0.29
PCB 1260	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *	ND (0.11)	NT	ND (0.11)	ND (0.11)	**4.2**	**5.4**	**1.7**	**6.5**	**4.4**	ND (2.5) *	ND (0.12)
PCB 1262	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *	ND (0.11)	NT	ND (0.11)	ND (0.11)	ND (2.4) *	ND (1.1) *	ND (1.1) *	ND (4.6) *	ND (3.1) *	ND (2.5) *	ND (0.12)
PCB 1268	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *	ND (0.11)	NT	ND (0.11)	ND (0.11)	ND (2.4) *	ND (1.1) *	ND (1.1) *	ND (4.6) *	ND (3.1) *	ND (2.5) *	ND (0.12)
TOTAL PCBs	**39**	ND (0.10)	ND (0.11)	ND (0.11)	**42**	**1.1**	NT	ND (0.11)	ND (0.11)	**22.2**	**15.2**	**9.1**	**36.5**	**24.4**	**21**	0.29

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS															
	B-8 (0-1')	B-8 (1-3')	B-8 (3-6')	B-8 (6-11')	B-9 (0-1')	B-9 (1-3')	B-9 (0-3')	B-9 (3-6')	B-9 (6-9')	B-9 (5'E) (0-1)	B-9 (5'E) (1-3)	B-9 (5'N) (0-1)	B-9 (5'S) (0-1)	B-9 (5'W) (0-1)	B-10 (0-1')	B-10 (1-3')
SW-846 8081B (mg/Kg dry)																
ALDRIN	NT	NT	NT	NT	NT	NT	NT	ND (0.11) *	NT	NT	NT	NT	NT	NT	NT	NT
ALPHA-BHC	NT	NT	NT	NT	NT	NT	NT	ND (0.11)	NT	NT	NT	NT	NT	NT	NT	NT
BETA-BHC	NT	NT	NT	NT	NT	NT	NT	ND (0.11)	NT	NT	NT	NT	NT	NT	NT	NT
DELTA-BHC	NT	NT	NT	NT	NT	NT	NT	ND (0.11)	NT	NT	NT	NT	NT	NT	NT	NT
GAMMA-BHC (LINDANE)	NT	NT	NT	NT	NT	NT	NT	ND (0.046) *	NT	NT	NT	NT	NT	NT	NT	NT
CHLORDANE	NT	NT	NT	NT	NT	NT	NT	ND (0.46)	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDD	NT	NT	NT	NT	NT	NT	NT	ND (0.091)	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDE	NT	NT	NT	NT	NT	NT	NT	ND (0.091)	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDT	NT	NT	NT	NT	NT	NT	NT	ND (0.091)	NT	NT	NT	NT	NT	NT	NT	NT
DIELDRIN	NT	NT	NT	NT	NT	NT	NT	ND (0.091) *	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN I	NT	NT	NT	NT	NT	NT	NT	ND (0.11)	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN II	NT	NT	NT	NT	NT	NT	NT	ND (0.18)	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN SULFATE	NT	NT	NT	NT	NT	NT	NT	ND (0.18)	NT	NT	NT	NT	NT	NT	NT	NT
ENDRIN	NT	NT	NT	NT	NT	NT	NT	ND (0.18)	NT	NT	NT	NT	NT	NT	NT	NT
ENDRIN KETONE	NT	NT	NT	NT	NT	NT	NT	ND (0.18)	NT	NT	NT	NT	NT	NT	NT	NT
HEPTACHLOR	NT	NT	NT	NT	NT	NT	NT	ND (0.11)	NT	NT	NT	NT	NT	NT	NT	NT
HEPTACHLOR EPOXIDE	NT	NT	NT	NT	NT	NT	NT	ND (0.11) *	NT	NT	NT	NT	NT	NT	NT	NT
HEXACHLOROBENZENE	NT	NT	NT	NT	NT	NT	NT	ND (0.14)	NT	NT	NT	NT	NT	NT	NT	NT
METHOXYCHLOR	NT	NT	NT	NT	NT	NT	NT	ND (1.1)	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8081B (µg/L) 1311 TCLP EXT																
HEPTACHLOR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8151A (mg/kg dry)																
2,4-D	NT	NT	NT	NT	NT	NT	NT	ND (0.028)	NT	NT	NT	NT	NT	NT	NT	NT
2,4-DB	NT	NT	NT	NT	NT	NT	NT	ND (0.028)	NT	NT	NT	NT	NT	NT	NT	NT
2,4,5-TP (SILVEX)	NT	NT	NT	NT	NT	NT	NT	ND (0.0028)	NT	NT	NT	NT	NT	NT	NT	NT
2,4,5-T	NT	NT	NT	NT	NT	NT	NT	ND (0.0028)	NT	NT	NT	NT	NT	NT	NT	NT
DALAPON	NT	NT	NT	NT	NT	NT	NT	ND (0.071)	NT	NT	NT	NT	NT	NT	NT	NT
DICAMBA	NT	NT	NT	NT	NT	NT	NT	ND (0.0028)	NT	NT	NT	NT	NT	NT	NT	NT
DICHLOROPROP	NT	NT	NT	NT	NT	NT	NT	ND (0.028)	NT	NT	NT	NT	NT	NT	NT	NT
DINOSEB	NT	NT	NT	NT	NT	NT	NT	ND (0.014)	NT	NT	NT	NT	NT	NT	NT	NT
MCPA	NT	NT	NT	NT	NT	NT	NT	ND (2.8)	NT	NT	NT	NT	NT	NT	NT	NT
MCPP	NT	NT	NT	NT	NT	NT	NT	ND (2.8)	NT	NT	NT	NT	NT	NT	NT	NT

NOTES:

1. An asterisk (*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regul. criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Bolded values exceed the Method 1 Cleanup Standards (exclusive of S-x/GW-1).
6. Italic values exceed MassDEP published background conc. for soils assoc. with fill containing coal ash or wood ash.
12. These soils contain >50 mg/kg PCBs and were excavated and transported off-site to a hazardous waste facility approved to accept >50 mg/kg PCBs.
13. Sample hydrocarbon fingerprinted via USEPA Method 8015C. Hydrocarbon was identified as Fuel Oil No. 6. B-3 (15'-20') (25-28") and B-4 (15'-20') (21-24") contained 10,000 and 6,300 mg/kg Fuel Oil No. 6, respectively.
14. EPH extraction for B-18(5-10), B-19 (5-10) and B-19 (10-15) was conducted on day 29 after sample collection, more than 2 times the extraction hold period of 14 days. This data is used only for qualitative purposes to evaluate distribution of petroleum contamination.
15. Located beneath stockpiled soils on west end of courtyard.
16. 0-1 Foot interval soils from this area were excavated and placed in dry well no. 1.

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS															
	B-10 (0-3')	**B-10 (3-6')**	**B-10 (6-11')**	**B-11 (0-1')**	**B-11 (1-3')**	**B-11 (3-6')**	**B-11 (6-11')**	**B-11-r10B (0-1')**	**B-11-r10B (0-3')**	**B-11-r10B (1-3')**	**B-11-r5A (0-1')**	**B-11-r5A (0-3')**	**B-11-r5A (1-3')**	**B-11-r5B (0-1')**	**B-11-r5B (0-3')**	**B-11-r5B (1-3')**
Sampling Date	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016
Sample Depth During Investigative Event	0-3 Feet	3-6 Feet	6-11 Feet	0-1 Feet	1-3 Feet	3-6 Feet	6-11 Feet	0-1 Feet	0-3 Feet	1-3 Feet	0-1 Feet	0-3 Feet	1-3 Feet	0-1 Feet	0-3 Feet	1-3 Feet
Sample Depth Relative to October 1, 2016	0-3 Feet	3-6 Feet	6-11 Feet	Excavated/ Transported Off-Site	1-3 Feet	3-6 Feet	6-11 Feet	0-1 Feet	0-3 Feet	1-3 Feet	Excavated/ Transported Off-Site	0-2 Feet	0-2 Feet	Excavated/ Transported Off-Site	0-2 Feet	0-2 Feet
NOTES:	10			7							7			7		
MADEP-EPH-04-1.1 (mg/Kg dry)																
C9-C18 ALIPHATICS	18	ND (11)	NT	NT	NT	NT	ND (12)	NT	180	NT	NT	42	NT	NT	24	NT
C19-C36 ALIPHATICS	150	19	NT	NT	NT	NT	46	NT	530	NT	NT	230	NT	NT	120	NT
UNADJUSTED C11-C22 AROMATICS	200	35	NT	NT	NT	NT	58	NT	1100	NT	NT	570	NT	NT	120	NT
C11-C22 AROMATICS	190	31	NT	NT	NT	NT	51	NT	**1100**	NT	NT	400	NT	NT	97	NT
ACENAPHTHENE	0.49	ND (0.11)	NT	NT	NT	NT	ND (0.12)	NT	ND (0.23)	NT	NT	0.46	NT	NT	0.58	NT
ACENAPHTHYLENE	ND (0.46)	ND (0.11)	NT	NT	NT	NT	ND (0.12)	NT	ND (0.23)	NT	NT	0.77	NT	NT	ND (0.23)	NT
ANTHRACENE	1.1	ND (0.11)	NT	NT	NT	NT	0.24	NT	0.38	NT	NT	4.0	NT	NT	0.86	NT
BENZO(A)ANTHRACENE	2.1	0.28	NT	NT	NT	NT	0.54	NT	0.74	NT	NT	***15***	NT	NT	1.4	NT
BENZO(A)PYRENE	1.4	0.29	NT	NT	NT	NT	0.54	NT	0.68	NT	NT	**15**	NT	NT	1.2	NT
BENZO(B)FLUORANTHENE	2.4	0.38	NT	NT	NT	NT	0.68	NT	ND (0.23)	NT	NT	**19**	NT	NT	1.5	NT
BENZO(G,H,I)PERYLENE	1.1	0.18	NT	NT	NT	NT	0.24	NT	0.89	NT	NT	8.7	NT	NT	0.58	NT
BENZO(K)FLUORANTHENE	0.67	0.15	NT	NT	NT	NT	0.25	NT	ND (0.23)	NT	NT	7	NT	NT	0.53	NT
CHRYSENE	2.4	0.37	NT	NT	NT	NT	0.61	NT	1.3	NT	NT	*15*	NT	NT	1.6	NT
DIBENZ(A,H)ANTHRACENE	ND (0.46)	ND (0.11)	NT	NT	NT	NT	ND (0.12)	NT	ND (0.23)	NT	NT	***2.3***	NT	NT	ND (0.23)	NT
FLUORANTHENE	4.1	0.61	NT	NT	NT	NT	1.3	NT	1.7	NT	NT	*31*	NT	NT	3.3	NT
FLUORENE	0.57	ND (0.11)	NT	NT	NT	NT	ND (0.12)	NT	ND (0.23)	NT	NT	0.6	NT	NT	0.41	NT
INDENO(1,2,3-CD)PYRENE	1.1	0.18	NT	NT	NT	NT	0.32	NT	ND (0.23)	NT	NT	***10***	NT	NT	0.7	NT
2-METHYLNAPHTHALENE	ND (0.46)	ND (0.11)	NT	NT	NT	NT	ND (0.12)	NT	ND (0.23)	NT	NT	0.31	NT	NT	ND (0.23)	NT
NAPHTHALENE	ND (0.46)	ND (0.11)	NT	NT	NT	NT	ND (0.12)	NT	ND (0.23)	NT	NT	*1.2*	NT	NT	ND (0.23)	NT
PHENANTHRENE	4.7	0.55	NT	NT	NT	NT	1.1	NT	1.7	NT	NT	**11**	NT	NT	4	NT
PYRENE	4.1	0.71	NT	NT	NT	NT	1.4	NT	1.2	NT	NT	*31*	NT	NT	3.5	NT
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DIBENZOFURAN (see notes 7, 9)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DI-N-BUTYLPHTHALATE (see note 7)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MADEP-VPH-04-1.1 (mg/Kg dry)																
UNADJUSTED C5-C8 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C5-C8 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
UNADJUSTED C9-C12 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C9-C12 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C9-C10 AROMATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BENZENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ETHYLBENZENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
NAPHTHALENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
TOLUENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
M/P-XYLENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
O-XYLENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS															
	B-10 (0-3')	B-10 (3-6')	B-10 (6-11')	B-11 (0-1')	B-11 (1-3')	B-11 (3-6')	B-11 (6-11')	B-11-r10B (0-1')	B-11-r10B (0-3')	B-11-r10B (1-3')	B-11-r5A (0-1')	B-11-r5A (0-3')	B-11-r5A (1-3')	B-11-r5B (0-1')	B-11-r5B (0-3')	B-11-r5B (1-3')
SM 2540G (% Wt)																
% Solids	86.6	88.7	90.3	79.4	88.2	85.2	84.2	83.6	86.5	85.3	81.2	85.7	83.2	82.2	86.4	86.3
SW-846 6010C/D (mg/Kg dry) Metals Digestion																
ANTIMONY	ND (2.7)	NT	NT	NT	NT	ND (2.8)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ARSENIC	10	NT	NT	NT	NT	9.2	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BARIUM	*64*	NT	NT	NT	NT	*160*	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BERYLLIUM	*25*	NT	NT	NT	NT	*11*	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CADMIUM	0.82	NT	NT	NT	NT	1.3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CHROMIUM (as +3)	26	NT	NT	NT	NT	33	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
LEAD	68	NT	NT	NT	NT	200	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
NICKEL	*64*	NT	NT	NT	NT	*85*	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SELENIUM	ND (5.4)	NT	NT	NT	NT	ND (5.6)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SILVER	ND (0.54)	NT	NT	NT	NT	ND (0.56)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
THALLIUM	ND (2.7)	NT	NT	NT	NT	ND (2.8)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
VANADIUM	***2100***	***560***	*260*	NT	NT	***900***	***870***	NT	*380*	NT	NT	*140*	NT	NT	***550***	NT
ZINC	65	NT	NT	NT	NT	180	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 7471B (mg/Kg dry) Metals Digestion																
MERCURY	0.13	NT	NT	NT	NT	*1.2*	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 7196A (mg/Kg dry)																
CHROMIUM +6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SM2580 A (mV)																
OXIDATION/REDUCTION POTENTIAL	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 9045C (pH Units)																
PH	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 6010C-D (mg/L) 1311 TCLP EXT																
CADMIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
LEAD	NT	NT	NT	NT	NT	0.029	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8082A (mg/Kg dry)																
PCB 1016	NT	ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	ND (0.59)	NT	ND (0.11)	ND (1.2) *	NT	ND (0.59)	ND (0.59)	NT	ND (0.11)
PCB 1221	NT	ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	ND (0.59)	NT	ND (0.11)	ND (1.2) *	NT	ND (0.59)	ND (0.59)	NT	ND (0.11)
PCB 1232	NT	ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	ND (0.59)	NT	ND (0.11)	ND (1.2) *	NT	ND (0.59)	ND (0.59)	NT	ND (0.11)
PCB 1242	NT	ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	ND (0.59)	NT	ND (0.11)	ND (1.2) *	NT	ND (0.59)	ND (0.59)	NT	ND (0.11)
PCB 1248	NT	ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	ND (0.59)	NT	ND (0.11)	ND (1.2) *	NT	ND (0.59)	ND (0.59)	NT	ND (0.11)
PCB 1254	NT	0.79	0.22	**100**	0.16	**2.0**	**6.2**	**6.2**	NT	0.48	**7.6**	NT	**5.4**	**4.0**	NT	0.19
PCB 1260	NT	ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	0.75	NT	ND (0.11)	ND (1.2) *	NT	ND (0.59)	ND (0.59)	NT	ND (0.11)
PCB 1262	NT	ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	ND (0.59)	NT	ND (0.11)	ND (1.2) *	NT	ND (0.59)	ND (0.59)	NT	ND (0.11)
PCB 1268	NT	ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	ND (0.59)	NT	ND (0.11)	ND (1.2) *	NT	ND (0.59)	ND (0.59)	NT	ND (0.11)
TOTAL PCBs	NT	0.79	0.22	**100**	0.16	**2.0**	**6.2**	**7.0**	NT	0.48	**7.6**	NT	**5.4**	**4.0**	NT	0.19

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS															
	B-10 (0-3')	B-10 (3-6')	B-10 (6-11')	B-11 (0-1')	B-11 (1-3')	B-11 (3-6')	B-11 (6-11')	B-11-r10B (0-1')	B-11-r10B (0-3')	B-11-r10B (1-3')	B-11-r5A (0-1')	B-11-r5A (0-3')	B-11-r5A (1-3')	B-11-r5B (0-1')	B-11-r5B (0-3')	B-11-r5B (1-3')
SW-846 8081B (mg/Kg dry)																
ALDRIN	ND (0.12) *	NT	NT	NT	NT	ND (0.12) *	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ALPHA-BHC	ND (0.12)	NT	NT	NT	NT	ND (0.12)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BETA-BHC	ND (0.12)	NT	NT	NT	NT	ND (0.12)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DELTA-BHC	ND (0.12)	NT	NT	NT	NT	ND (0.12)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
GAMMA-BHC (LINDANE)	ND (0.046) *	NT	NT	NT	NT	ND (0.047) *	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CHLORDANE	ND (0.46)	NT	NT	NT	NT	ND (0.47)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDD	ND (0.092)	NT	NT	NT	NT	ND (0.094)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDE	ND (0.092)	NT	NT	NT	NT	ND (0.094)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDT	ND (0.092)	NT	NT	NT	NT	0.16	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DIELDRIN	ND (0.092) *	NT	NT	NT	NT	ND (0.094) *	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN I	ND (0.12)	NT	NT	NT	NT	ND (0.12)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN II	ND (0.18)	NT	NT	NT	NT	ND (0.19)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN SULFATE	ND (0.18)	NT	NT	NT	NT	ND (0.19)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDRIN	ND (0.18)	NT	NT	NT	NT	ND (0.19)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDRIN KETONE	ND (0.18)	NT	NT	NT	NT	ND (0.19)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
HEPTACHLOR	ND (0.12)	NT	NT	NT	NT	ND (0.12)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
HEPTACHLOR EPOXIDE	ND (0.12) *	NT	NT	NT	NT	ND (0.12) *	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
HEXACHLOROBENZENE	ND (0.14)	NT	NT	NT	NT	ND (0.14)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
METHOXYCHLOR	ND (1.2)	NT	NT	NT	NT	ND (1.2)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8081B (µg/L) 1311 TCLP EXT																
HEPTACHLOR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8151A (mg/kg dry)																
2,4-D	ND (0.029)	NT	NT	NT	NT	ND (0.029)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2,4-DB	ND (0.029)	NT	NT	NT	NT	ND (0.029)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2,4,5-TP (SILVEX)	ND (0.0029)	NT	NT	NT	NT	ND (0.0029)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2,4,5-T	ND (0.0029)	NT	NT	NT	NT	ND (0.0029)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DALAPON	ND (0.072)	NT	NT	NT	NT	ND (0.073)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DICAMBA	ND (0.0029)	NT	NT	NT	NT	ND (0.0029)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DICHLOROPROP	ND (0.029)	NT	NT	NT	NT	ND (0.029)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DINOSEB	ND (0.014)	NT	NT	NT	NT	ND (0.015)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MCPA	ND (2.9)	NT	NT	NT	NT	ND (2.9)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MCPP	ND (2.9)	NT	NT	NT	NT	ND (2.9)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

NOTES:

1. An asterisk (*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regul. criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Bolded values exceed the Method 1 Cleanup Standards (exclusive of S-x/GW-1).
6. Italic values exceed MassDEP published background conc. for soils assoc. with fill containing coal ash or wood ash.

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS													
	B-11-r5C (0-1')	B-11-r5C (0-3')	B-11-r5C (1-3')	Btm-B11-ex	ESW-B11-ex	WSW-B11-ex	B-12 (0-1')	B-12 (1-3')	B-12 (0-3')	B-12 (3-6')	B-13 (0-1')	B-13 (1-3')	B-13 (0-3')	B-13 (3-6')
Sampling Date	3/30/2016	3/30/2016	3/30/2016	5/27/2016	5/27/2016	5/27/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016
Sample Depth During Investigative Event	0-1 Feet	0-3 Feet	1-3 Feet	1-1.5 Feet	0-1 Feet	0-1 Feet	0-1 Feet	1-3 Feet	0-3 Feet	3-6 Feet	0-1 Feet	1-3 Feet	0-3 Feet	3-6 Feet
Sample Depth Relative to October 1, 2016	Excavated/ Transported Off-Site	0-2 Feet	0-2 Feet	0-0.5 Feet	0-1 Feet	0-1 Feet	Excavated and Put in Dry Well	0-2 Feet	0-2 Feet	2-5 Feet	Excavated and Put in Dry Well	0-2 Feet	0-2 Feet	2-5 Feet
NOTES:	7			12	12	12	16	15	15	15	16	15	15	15
MADEP-EPH-04-1.1 (mg/Kg dry)														
C9-C18 ALIPHATICS	NT	57	NT	NT	NT	NT	NT	NT	ND (31)	ND (11)	NT	NT	17	ND (12)
C19-C36 ALIPHATICS	NT	310	NT	NT	NT	NT	NT	NT	65	16	NT	NT	80	19
UNADJUSTED C11-C22 AROMATICS	NT	320	NT	NT	NT	NT	NT	NT	140	44	NT	NT	280	110
C11-C22 AROMATICS	NT	290	NT	NT	NT	NT	NT	NT	130	34	NT	NT	240	26
ACENAPHTHENE	NT	0.49	NT	NT	NT	NT	NT	NT	1.3	0.39	NT	NT	1.1	0.93
ACENAPHTHYLENE	NT	ND (0.24)	NT	NT	NT	NT	NT	NT	ND (0.15)	ND (0.11)	NT	NT	ND (0.14)	ND (0.24)
ANTHRACENE	NT	0.88	NT	NT	NT	NT	NT	NT	2.3	0.52	NT	NT	0.42	1.5
BENZO(A)ANTHRACENE	NT	1.5	NT	NT	NT	NT	NT	NT	2.8	0.70	NT	NT	0.60	2.3
BENZO(A)PYRENE	NT	1.6	NT	NT	NT	NT	NT	NT	**2.2**	0.67	NT	NT	1.0	1.9
BENZO(B)FLUORANTHENE	NT	2	NT	NT	NT	NT	NT	NT	3.4	0.85	NT	NT	0.84	2.5
BENZO(G,H,I)PERYLENE	NT	0.98	NT	NT	NT	NT	NT	NT	0.93	0.36	NT	NT	0.32	0.96
BENZO(K)FLUORANTHENE	NT	0.78	NT	NT	NT	NT	NT	NT	1.4	0.33	NT	NT	0.28	0.92
CHRYSENE	NT	1.8	NT	NT	NT	NT	NT	NT	2.8	0.68	NT	NT	2.6	0.25
DIBENZ(A,H)ANTHRACENE	NT	ND (0.24)	NT	NT	NT	NT	NT	NT	0.41	ND (0.11)	NT	NT	0.35	ND (0.24)
FLUORANTHENE	NT	5.1	NT	NT	NT	NT	NT	NT	7.8	1.9	NT	NT	1.8	0.56
FLUORENE	NT	0.42	NT	NT	NT	NT	NT	NT	1.3	0.22	NT	NT	0.17	0.74
INDENO(1,2,3-CD)PYRENE	NT	1	NT	NT	NT	NT	NT	NT	1.2	0.41	NT	NT	1.5	1.2
2-METHYLNAPHTHALENE	NT	0.28	NT	NT	NT	NT	NT	NT	0.45	ND (0.11)	NT	NT	ND (0.14)	ND (0.24)
NAPHTHALENE	NT	0.88	NT	NT	NT	NT	NT	NT	0.98	0.16	NT	NT	0.68	ND (0.24)
PHENANTHRENE	NT	3.2	NT	NT	NT	NT	NT	NT	8.8	1.8	NT	NT	6.9	5.9
PYRENE	NT	3.7	NT	NT	NT	NT	NT	NT	7.1	1.7	NT	NT	6.4	0.51
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DIBENZOFURAN (see notes 7, 9)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DI-N-BUTYLPHTHALATE (see note 7)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MADEP-VPH-04-1.1 (mg/Kg dry)														
UNADJUSTED C5-C8 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C5-C8 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
UNADJUSTED C9-C12 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C9-C12 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C9-C10 AROMATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BENZENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ETHYLBENZENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
NAPHTHALENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
TOLUENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
M/P-XYLENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
O-XYLENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS													
	B-11-r5C (0-1')	B-11-r5C (0-3')	B-11-r5C (1-3')	Btm-B11-ex	ESW-B11-ex	WSW-B11-ex	B-12 (0-1')	B-12 (1-3')	B-12 (0-3')	B-12 (3-6')	B-13 (0-1')	B-13 (1-3')	B-13 (0-3')	B-13 (3-6')
SM 2540G (% Wt)														
% Solids	77.4	81.7	85.3	88.3	86.8	87.1	77.3	92.5	64.2	88.1	61.4	78.4	72.0	82.8
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
ANTIMONY	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ARSENIC	NT	NT	NT	NT	NT	NT	NT	NT	4.4	4.1	NT	NT	8.3	5.1
BARIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BERYLLIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CADMIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CHROMIUM (as +3)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
LEAD	NT	NT	NT	NT	NT	NT	NT	NT	**210**	120	NT	NT	***1300***	34
NICKEL	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SELENIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SILVER	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
THALLIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
VANADIUM	NT	***640***	NT	NT	NT	NT	NT	NT	20	13	NT	NT	*35*	22
ZINC	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 7471B (mg/Kg dry) Metals Digestion														
MERCURY	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 7196A (mg/Kg dry)														
CHROMIUM +6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SM2580 A (mV)														
OXIDATION/REDUCTION POTENTIAL	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 9045C (pH Units)														
PH	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 6010C-D (mg/L) 1311 TCLP EXT														
CADMIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
LEAD	NT	NT	NT	NT	NT	NT	NT	NT	0.47	ND (0.010)	NT	NT	0.64	NT
SW-846 8082A (mg/Kg dry)														
PCB 1016	ND (13) *	NT	ND (0.57)	ND (0.11)	ND (0.12)	ND (0.11)	ND (2.5) *	ND (0.10)	NT	ND (0.11)	ND (3.2) *	ND (6.3) *	NT	ND (0.12)
PCB 1221	ND (13) *	NT	ND (0.57)	ND (0.11)	ND (0.12)	ND (0.11)	ND (2.5) *	ND (0.10)	NT	ND (0.11)	ND (3.2) *	ND (6.3) *	NT	ND (0.12)
PCB 1232	ND (13) *	NT	ND (0.57)	ND (0.11)	ND (0.12)	ND (0.11)	ND (2.5) *	ND (0.10)	NT	ND (0.11)	ND (3.2) *	ND (6.3) *	NT	ND (0.12)
PCB 1242	ND (13) *	NT	ND (0.57)	ND (0.11)	ND (0.12)	ND (0.11)	ND (2.5) *	ND (0.10)	NT	ND (0.11)	ND (3.2) *	ND (6.3) *	NT	ND (0.12)
PCB 1248	ND (13) *	NT	ND (0.57)	ND (0.11)	ND (0.12)	ND (0.11)	ND (2.5) *	ND (0.10)	NT	ND (0.11)	ND (3.2) *	ND (6.3) *	NT	ND (0.12)
PCB 1254	**97**	NT	**2.9**	0.79	0.38	**1.1**	**11**	0.26	NT	0.37	**12**	**25**	NT	ND (0.12)
PCB 1260	ND (13) *	NT	ND (0.57)	ND (0.11)	ND (0.12)	ND (0.11)	ND (2.5) *	ND (0.10)	NT	ND (0.11)	ND (3.2) *	ND (6.3) *	NT	ND (0.12)
PCB 1262	ND (13) *	NT	ND (0.57)	ND (0.11)	ND (0.12)	ND (0.11)	ND (2.5) *	ND (0.10)	NT	ND (0.11)	ND (3.2) *	ND (6.3) *	NT	ND (0.12)
PCB 1268	ND (13) *	NT	ND (0.57)	ND (0.11)	ND (0.12)	ND (0.11)	ND (2.5) *	ND (0.10)	NT	ND (0.11)	ND (3.2) *	ND (6.3) *	NT	ND (0.12)
TOTAL PCBs	**97**	NT	**2.9**	0.79	0.38	**1.1**	**11**	0.26	NT	0.37	**12**	**25**	NT	ND (0.12)

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS													
	B-11-r5C (0-1')	B-11-r5C (0-3')	B-11-r5C (1-3')	Btm-B11-ex	ESW-B11-ex	WSW-B11-ex	B-12 (0-1')	B-12 (1-3')	B-12 (0-3')	B-12 (3-6')	B-13 (0-1')	B-13 (1-3')	B-13 (0-3')	B-13 (3-6')
SW-846 8081B (mg/Kg dry)														
ALDRIN	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ALPHA-BHC	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BETA-BHC	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DELTA-BHC	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
GAMMA-BHC (LINDANE)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CHLORDANE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDD	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DIELDRIN	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN I	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN II	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN SULFATE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDRIN	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDRIN KETONE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
HEPTACHLOR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
HEPTACHLOR EPOXIDE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
HEXACHLOROBENZENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
METHOXYCHLOR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8081B (µg/L) 1311 TCLP EXT														
HEPTACHLOR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8151A (mg/kg dry)														
2,4-D	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2,4-DB	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2,4,5-TP (SILVEX)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2,4,5-T	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DALAPON	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DICAMBA	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DICHLOROPROP	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DINOSEB	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MCPA	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MCPP	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
NOTES:														
1. An asterisk (*) following a detection limit														
indicates that the minimum laboratory reporting														
limit exceeds one or more of the regul. criteria.														
2. ND = Not detected above the lab reporting														
limits shown in parenthesis.														
3. NT = Not tested.														
4. ~ = No Method 1 Standard or UCL available														
5. Bolded values exceed the Method 1 Cleanup														
Standards (exclusive of S-x/GW-1).														
6. Italic values exceed MassDEP published														
background conc. for soils assoc. with fill														
containing coal ash or wood ash.														

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS														
	BTM-GT-1	**BTM-GT-2**	**ESW-GT-1**	**NSW-GT-1**	**NSW-GT-2**	**SSW-GT-1**	**SSW-GT-2**	**WSW-GT-2**	**SP-1**	**FO-1 (3')**	**SP-3**	**FO-1-TP (0-1')**	**FO-1-TP (1-2')**	**FO-1-TP (2-3')**	**FO-1**
Sampling Date	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	2/29/2016	3/9/2016	3/29/2016	3/9/2016	3/9/2016	3/9/2016	3/10/2016
Sample Depth During Investigative Event	6 Feet	8 Feet	3-4 Feet	3-4 Feet	5-6 Feet	3-4 Feet	5-6 Feet	5-6 Feet	Stockpile / Top Soils	3.5 Feet (just in vault)	Stockpile / Sands in vault	0-1 Feet (below grade / above vault)	1-2 Feet (below grade / above vault)	2-3 Feet (below grade / above vault)	7-8 feet (under vault, oily material)
Sample Depth Relative to October 1, 2016	3 Feet	5 Feet	0-1 Feet	0-1 Feet	2-3 Feet	0-1 Feet	2-3 Feet	2-3 Feet	Stockpile / Transported Off-Site	0.5 Feet (just in vault)	Stockpile / Sands in vault	Excavated and Stockpiled	Excavated and Stockpiled	Excavated and Stockpiled	4-5 feet (under vault, oil material)
NOTES:									7	8	9				8
MADEP-EPH-04-1.1 (mg/Kg dry)															via 8270C
C9-C18 ALIPHATICS	ND (12)	ND (11)	13	34	ND (22)	ND (11)	37	ND (11)	NT	ND (10)	NT	NT	NT	NT	NT
C19-C36 ALIPHATICS	ND (12)	31	29	140	77	17	200	ND (11)	NT	ND (10)	NT	NT	NT	NT	NT
UNADJUSTED C11-C22 AROMATICS	27	45	41	560	140	33	220	40	NT	ND (10)	NT	NT	NT	NT	NT
C11-C22 AROMATICS	25	45	41	420	120	31	210	33	NT	ND (10)	NT	NT	NT	NT	NT
ACENAPHTHENE	ND (0.12)	ND (0.11)	ND (0.11)	1.7	0.37	ND (0.11)	ND (0.43)	ND (0.11)	*2.4*	ND (0.10)	0.70	NT	NT	NT	***4.9***
ACENAPHTHYLENE	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.23)	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	ND (0.85)	ND (0.10)	ND (0.18)	NT	NT	NT	ND (3.8) *
ANTHRACENE	ND (0.12)	ND (0.11)	ND (0.11)	*4.7*	0.73	ND (0.11)	ND (0.43)	0.18	*5.3*	ND (0.10)	1.5	NT	NT	NT	*4.9*
BENZO(A)ANTHRACENE	ND (0.12)	ND (0.11)	ND (0.11)	***10***	1.7	ND (0.11)	0.78	0.5	***10***	ND (0.10)	3.0	NT	NT	NT	4.8
BENZO(A)PYRENE	0.27	0.11	ND (0.11)	***9.3***	0.69	0.24	0.94	0.52	***8.0***	ND (0.10)	**2.6**	NT	NT	NT	ND (3.8) *
BENZO(B)FLUORANTHENE	0.32	0.15	ND (0.11)	***13***	2	0.31	1.1	0.67	***9.8***	ND (0.10)	3.5	NT	NT	NT	ND (3.8)
BENZO(G,H,I)PERYLENE	0.38	ND (0.11)	ND (0.11)	*4.9*	0.96	0.33	0.77	0.41	*4.5*	ND (0.10)	1.4	NT	NT	NT	ND (3.8)
BENZO(K)FLUORANTHENE	ND (0.12)	ND (0.11)	ND (0.11)	*4.8*	0.73	ND (0.11)	0.44	0.26	3.9	ND (0.10)	1.4	NT	NT	NT	ND (3.8)
CHRYSENE	0.15	0.11	ND (0.11)	*12*	1.8	0.17	1.0	0.59	*9.7*	ND (0.10)	2.8	NT	NT	NT	6.6
DIBENZ(A,H)ANTHRACENE	ND (0.12)	ND (0.11)	ND (0.11)	***1.5***	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	***1.4***	ND (0.10)	0.59	NT	NT	NT	ND (3.8) *
FLUORANTHENE	0.15	0.17	0.14	*27*	3.7	0.19	1.6	1.1	*22*	ND (0.10)	7.0	NT	NT	NT	6.4
FLUORENE	ND (0.12)	ND (0.11)	ND (0.11)	*2.1*	0.37	ND (0.11)	ND (0.43)	ND (0.11)	*2.8*	ND (0.10)	0.93	NT	NT	NT	*11*
INDENO(1,2,3-CD)PYRENE	0.36	ND (0.11)	ND (0.11)	*5.2*	0.93	0.25	0.56	0.36	*5.1*	ND (0.10)	1.4	NT	NT	NT	ND (3.8)
2-METHYLNAPHTHALENE	ND (0.12)	ND (0.11)	ND (0.11)	0.48	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	0.93	ND (0.10)	0.29	NT	NT	NT	*33*
NAPHTHALENE	ND (0.12)	ND (0.11)	ND (0.11)	0.70	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	*1.6*	ND (0.10)	0.59	NT	NT	NT	*8.3*
PHENANTHRENE	0.34	ND (0.11)	0.4	19	3	0.24	1.2	0.74	*24*	ND (0.10)	5.9	NT	NT	NT	*32*
PYRENE	ND (0.12)	0.18	0.13	*25*	3.4	0.19	1.6	1	*23*	ND (0.10)	5.0	NT	NT	NT	*33*
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)	NT	NT	NT	NT	NT	NT	NT	NT	30	NT	ND (0.36)	NT	NT	NT	ND (7.5)
DIBENZOFURAN (see notes 7, 9)	NT	NT	NT	NT	NT	NT	NT	NT	1.9	NT	0.37	NT	NT	NT	ND (7.5)
DI-N-BUTYLPHTHALATE (see note 7)	NT	NT	NT	NT	NT	NT	NT	NT	5.6	NT	ND (0.36)	NT	NT	NT	ND (7.5)
MADEP-VPH-04-1.1 (mg/Kg dry)															
UNADJUSTED C5-C8 ALIPHATICS	ND (9.6)	ND (9.9)	ND (9.5)	ND (8.6)	ND (8.3)	ND (10)	ND (11)	ND (8.2)	NT	ND (7.9)	ND (8.9)	NT	NT	NT	NT
C5-C8 ALIPHATICS	ND (9.6)	ND (9.9)	ND (9.5)	ND (8.6)	ND (8.3)	ND (10)	ND (11)	ND (8.2)	NT	ND (7.9)	ND (8.9)	NT	NT	NT	NT
UNADJUSTED C9-C12 ALIPHATICS	ND (9.6)	ND (9.9)	ND (9.5)	ND (8.6)	ND (8.3)	ND (10)	ND (11)	ND (8.2)	NT	ND (7.9)	ND (8.9)	NT	NT	NT	NT
C9-C12 ALIPHATICS	ND (9.6)	ND (9.9)	ND (9.5)	ND (8.6)	ND (8.3)	ND (10)	ND (11)	ND (8.2)	NT	ND (7.9)	ND (8.9)	NT	NT	NT	NT
C9-C10 AROMATICS	ND (9.6)	ND (9.9)	ND (9.5)	ND (8.6)	ND (8.3)	ND (10)	ND (11)	ND (8.2)	NT	ND (7.9)	ND (8.9)	NT	NT	NT	NT
BENZENE	0.10	0.058	0.15	ND (0.043)	ND (0.042)	ND (0.052)	ND (0.053)	ND (0.041)	NT	ND (0.040)	ND (0.044)	NT	NT	NT	NT
ETHYLBENZENE	ND (0.048)	ND (0.050)	ND (0.047)	ND (0.043)	ND (0.042)	ND (0.052)	ND (0.053)	ND (0.041)	NT	ND (0.040)	ND (0.044)	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	ND (0.048)	ND (0.050)	ND (0.047)	ND (0.043)	ND (0.042)	ND (0.052)	ND (0.053)	ND (0.041)	NT	ND (0.040)	ND (0.044)	NT	NT	NT	NT
NAPHTHALENE	ND (0.24)	ND (0.25)	ND (0.24)	ND (0.22)	ND (0.21)	ND (0.26)	ND (0.26)	ND (0.20)	NT	ND (0.20)	ND (0.22)	NT	NT	NT	NT
TOLUENE	0.60	0.32	0.23	0.14	ND (0.042)	0.25	0.087	ND (0.041)	NT	ND (0.040)	ND (0.044)	NT	NT	NT	NT
M/P-XYLENE	ND (0.096)	ND (0.099)	ND (0.095)	ND (0.086)	ND (0.083)	ND (0.10)	ND (0.11)	ND (0.082)	NT	ND (0.079)	ND (0.089)	NT	NT	NT	NT
O-XYLENE	ND (0.048)	ND (0.050)	ND (0.047)	ND (0.043)	ND (0.042)	ND (0.052)	ND (0.053)	ND (0.041)	NT	ND (0.040)	ND (0.044)	NT	NT	NT	NT

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS														
	BTM-GT-1	BTM-GT-2	ESW-GT-1	NSW-GT-1	NSW-GT-2	SSW-GT-1	SSW-GT-2	WSW-GT-2	SP-1	FO-1 (3')	SP-3	FO-1-TP (0-1')	FO-1-TP (1-2')	FO-1-TP (2-3')	FO-1
SM 2540G (% Wt)															
% Solids	85.8	90.3	88.1	88	89.1	89.5	90.6	88.9	80.2	95.5	94.4	85.4	85.5	85.9	72.0
SW-846 6010C/D (mg/Kg dry) Metals Digestion															
ANTIMONY	ND (2.9)	ND (2.7)	ND (2.8)	ND (2.6)	ND (2.8)	ND (2.8)	ND (2.8)	ND (2.7)	ND (3.1)	ND (2.6)	ND (2.4)	3.0	ND (2.9)	ND (2.9)	ND (3.4)
ARSENIC	7.4	ND (2.7)	14	9.8	6.0	3.1	5.7	4.4	***23***	15	8.8	19	14	18	ND (3.4)
BARIUM	34	27	43	*72*	42	27	31	28	*800*	32	50	*140*	*95*	*130*	36
BERYLLIUM	ND (0.29)	ND (0.27)	ND (0.28)	ND (0.26)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.27)	*14*	0.63	0.73	0.68	0.39	*1.9*	0.58
CADMIUM	0.36	0.34	1.0	0.81	0.61	ND (0.28)	0.60	0.33	*3.9*	0.51	0.44	1.4	0.98	1.3	ND (0.34)
CHROMIUM (as +3)	11	10	14	26	19	12	18	11	*160*	25	30	36	31	37	3.1
LEAD	100	41	**290**	**230**	64	58	59	40	***2400***	7	25	**340**	***1100***	**220**	8.5
NICKEL	11	8.9	23	22	14	9.0	18	8.8	*240*	20	18	*32*	22	29	8.9
SELENIUM	ND (5.9)	ND (5.4)	ND (5.6)	ND (5.3)	ND (5.6)	ND (5.6)	ND (5.5)	ND (5.5)	ND (6.2)	ND (5.2)	ND (4.8)	ND (5.7)	ND (5.9)	ND (5.7)	ND (6.8)
SILVER	ND (0.59)	ND (0.54)	ND (0.56)	ND (0.53)	ND (0.56)	ND (0.56)	ND (0.55)	ND (0.55)	ND (0.62)	ND (0.52)	ND (0.48)	ND (1.1)	ND (0.59)	ND (0.57)	ND (0.68)
THALLIUM	ND (2.9)	ND (2.7)	ND (2.8)	ND (2.6)	ND (2.8)	ND (2.8)	ND (2.8)	ND (2.7)	ND (3.1)	ND (2.6)	***9.8***	ND (2.8)	ND (2.9)	ND (2.9)	ND (3.4)
VANADIUM	27	14	*36*	*100*	*32*	14	*50*	15	***3500***	*32*	33	*160*	*96*	*140*	42
ZINC	37	43	210	140	89	42	79	35	***1100***	23	43	250	160	190	5.1
SW-846 7471B (mg/Kg dry) Metals Digestion															
MERCURY	0.14	0.095	0.63	*1.3*	0.25	0.10	0.51	0.099	0.43	ND (0.025)	0.050	0.68	0.93	0.84	ND (0.035)
SW-846 7196A (mg/Kg dry)															
CHROMIUM +6	NT	NT	NT	NT	NT	NT	NT	NT	ND (4.9)	NT	NT	NT	NT	NT	NT
SM2580 A (mV)															
OXIDATION/REDUCTION POTENTIAL	NT	NT	NT	NT	NT	NT	NT	NT	120	NT	NT	NT	NT	NT	NT
SW-846 9045C (pH Units)															
PH	NT	NT	NT	NT	NT	NT	NT	NT	7.4	NT	NT	NT	NT	NT	4.6
SW-846 6010C-D (mg/L) 1311 TCLP EXT															
CADMIUM	NT	NT	NT	NT	NT	NT	NT	NT	0.025	NT	NT	NT	NT	NT	NT
LEAD	NT	NT	NT	NT	NT	NT	NT	NT	0.78	NT	NT	NT	NT	NT	NT
SW-846 8082A (mg/Kg dry)															
PCB 1016	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.14)
PCB 1221	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.14)
PCB 1232	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.14)
PCB 1242	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.14)
PCB 1248	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.14)
PCB 1254	ND (0.11)	ND (0.11)	ND (0.11)	**6.3**	**1.2**	ND (0.11)	0.35	0.16	**63**	ND (0.10)	**2.6**	**13**	**12**	**7.8**	0.45
PCB 1260	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.14)
PCB 1262	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.14)
PCB 1268	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.14)
TOTAL PCBs	ND (0.11)	ND (0.11)	ND (0.11)	**6.3**	**1.2**	ND (0.11)	0.35	0.16	**63**	ND (0.10)	**2.6**	**13**	**12**	**7.8**	0.45

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS														
	BTM-GT-1	BTM-GT-2	ESW-GT-1	NSW-GT-1	NSW-GT-2	SSW-GT-1	SSW-GT-2	WSW-GT-2	SP-1	FO-1 (3')	SP-3	FO-1-TP (0-1')	FO-1-TP (1-2')	FO-1-TP (2-3')	FO-1
SW-846 8081B (mg/Kg dry)															
ALDRIN	ND (0.0058)	ND (0.055)	ND (0.0056)	ND (0.11) *	ND (0.11) *	ND (0.0056)	ND (0.11) *	ND (0.0055)	ND (0.12) *	ND (0.0051)	ND (0.0053)	ND (0.11) *	ND (0.12) *	ND (0.11) *	ND (0.69) *
ALPHA-BHC	ND (0.0058)	ND (0.055)	ND (0.0056)	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.12)	ND (0.0051)	ND (0.0053)	ND (0.11)	ND (0.12)	ND (0.11)	ND (0.69)
BETA-BHC	ND (0.0058)	ND (0.055)	ND (0.0056)	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.12)	ND (0.0051)	ND (0.0053)	ND (0.11)	ND (0.12)	ND (0.11)	ND (0.69)
DELTA-BHC	ND (0.0058)	ND (0.055)	ND (0.0056)	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.12)	ND (0.0051)	ND (0.0053)	ND (0.11)	ND (0.12)	ND (0.11)	ND (0.69)
GAMMA-BHC (LINDANE)	ND (0.0023)	ND (0.022) *	ND (0.0022)	ND (0.045) *	ND (0.044) *	ND (0.0022)	ND (0.043) *	ND (0.0022)	ND (0.049) *	ND (0.0021)	ND (0.0021)	ND (0.046) *	ND (0.046) *	ND (0.045) *	ND (0.28) *
CHLORDANE	ND (0.023)	ND (0.22)	ND (0.022)	ND (0.45)	ND (0.44)	ND (0.022)	ND (0.43)	0.045	ND (0.49)	ND (0.021)	ND (0.021)	ND (0.46)	ND (0.46)	ND (0.45)	ND (2.8)
4,4'-DDD	ND (0.0046)	ND (0.044)	ND (0.0045)	ND (0.090)	ND (0.088)	ND (0.0045)	ND (0.087)	ND (0.0044)	ND (0.099)	ND (0.0041)	ND (0.0042)	ND (0.092)	ND (0.093)	ND (0.090)	ND (0.56)
4,4'-DDE	ND (0.0046)	ND (0.044)	ND (0.0045)	ND (0.090)	ND (0.088)	ND (0.0045)	ND (0.087)	ND (0.0044)	ND (0.099)	ND (0.0041)	ND (0.0042)	ND (0.092)	0.093	ND (0.090)	ND (0.56)
4,4'-DDT	ND (0.0046)	ND (0.044)	ND (0.0045)	ND (0.090)	ND (0.088)	ND (0.0045)	ND (0.087)	ND (0.0044)	ND (0.099)	ND (0.0041)	0.019	0.15	0.13	0.13	ND (0.56)
DIELDRIN	ND (0.0046)	ND (0.044)	ND (0.0045)	**0.11**	ND (0.088) *	ND (0.0045)	ND (0.087) *	ND (0.0044)	ND (0.099) *	ND (0.0041)	ND (0.0042)	**0.16**	**0.19**	**0.16**	ND (0.56) *
ENDOSULFAN I	ND (0.0058)	ND (0.055)	ND (0.0056)	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.12)	ND (0.0051)	ND (0.0053)	ND (0.11)	ND (0.12)	ND (0.11)	ND (0.69) *
ENDOSULFAN II	ND (0.0092)	ND (0.088)	ND (0.0089)	ND (0.18)	ND (0.18)	ND (0.0089)	ND (0.17)	ND (0.0088)	ND (0.20)	ND (0.0082)	ND (0.0085)	ND (0.18)	ND (0.19)	ND (0.18)	ND (1.1) *
ENDOSULFAN SULFATE	ND (0.0092)	ND (0.088)	ND (0.0089)	ND (0.18)	ND (0.18)	ND (0.0089)	ND (0.17)	ND (0.0088)	ND (0.20)	ND (0.0082)	ND (0.0085)	ND (0.18)	ND (0.19)	ND (0.18)	ND (1.1)
ENDRIN	ND (0.0092)	ND (0.088)	ND (0.0089)	ND (0.18)	ND (0.18)	ND (0.0089)	ND (0.17)	ND (0.0088)	ND (0.20)	ND (0.0082)	ND (0.0085)	ND (0.18)	ND (0.19)	ND (0.18)	ND (1.1)
ENDRIN KETONE	ND (0.0092)	ND (0.088)	ND (0.0089)	ND (0.18)	ND (0.18)	ND (0.0089)	ND (0.17)	ND (0.0088)	ND (0.20)	ND (0.0082)	ND (0.0085)	ND (0.18)	ND (0.19)	ND (0.18)	ND (1.1)
HEPTACHLOR	ND (0.0058)	ND (0.055)	ND (0.0056)	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.12)	ND (0.0051)	ND (0.0053)	ND (0.11)	ND (0.12)	ND (0.11)	ND (0.69) *
HEPTACHLOR EPOXIDE	ND (0.0058)	ND (0.055)	ND (0.0056)	ND (0.11) *	ND (0.11) *	ND (0.0056)	ND (0.11) *	ND (0.0055)	**0.29**	ND (0.0051)	ND (0.0053)	ND (0.11) *	ND (0.12) *	ND (0.11) *	ND (0.69) *
HEXACHLOROBENZENE	ND (0.0069)	ND (0.066)	ND (0.0067)	ND (0.14)	ND (0.13)	ND (0.0067)	ND (0.13)	ND (0.0066)	ND (0.15)	ND (0.0062)	ND (0.0064)	ND (0.14)	ND (0.14)	ND (0.14)	ND (0.83) *
METHOXYCHLOR	ND (0.058)	ND (0.55)	ND (0.056)	ND (1.1)	ND (1.1)	ND (0.056)	ND (1.1)	ND (0.055)	ND (1.2)	ND (0.051)	ND (0.053)	ND (1.1)	ND (1.2)	ND (1.1)	ND (6.9)
SW-846 8081B (µg/L) 1311 TCLP EXT															
HEPTACHLOR	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.050)	NT	NT	NT	NT	NT	NT
SW-846 8151A (mg/kg dry)															
2,4-D	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.31)	NT	ND (0.026)	NT	NT	NT	NT
2,4-DB	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.31)	NT	ND (0.026)	NT	NT	NT	NT
2,4,5-TP (SILVEX)	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.031)	NT	ND (0.026)	NT	NT	NT	NT
2,4,5-T	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.031)	NT	ND (0.026)	NT	NT	NT	NT
DALAPON	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.77)	NT	ND (0.066)	NT	NT	NT	NT
DICAMBA	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.031)	NT	ND (0.0026)	NT	NT	NT	NT
DICHLOROPROP	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.31)	NT	ND (0.026)	NT	NT	NT	NT
DINOSEB	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.15)	NT	ND (0.013)	NT	NT	NT	NT
MCPA	NT	NT	NT	NT	NT	NT	NT	NT	ND (31)	NT	ND (2.6)	NT	NT	NT	NT
MCPP	NT	NT	NT	NT	NT	NT	NT	NT	ND (31)	NT	ND (2.6)	NT	NT	NT	NT

NOTES:

1. An asterisk (*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regul. criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Bolded values exceed the Method 1 Cleanup Standards (exclusive of S-x/GW-1).
6. Italic values exceed MassDEP published background conc. for soils assoc. with fill containing coal ash or wood ash.

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS													
	FO-1-BTM	**B-14 (10-15)**	**B-14A (0-5)**	**B-14A (5-10)**	**B-14A (10-15)**	**B-14A (10-15)**	**B-14A (15-16.5)**	**B-15 (0-5)**	**B-15 (5-10)**	**B-16 (0-5)**	**B-16 (5-10)**	**B-16 (10-15)**	**B-17 (5-7.5)**	**B-18 (0-5)**
Sampling Date	3/10/2016	9/15/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016
Sample Depth During Investigative Event	Vault bottom (5.5 feet below grade)	10-15 Feet	0-5 Feet	5-10 Feet	10-15 Feet	10-15 Feet	15-16.5 Feet	0-5 Feet	5-10 Feet	0-5 Feet	5-10 Feet	10-15 Feet	5-7.5 Feet	0-5 Feet
Sample Depth Relative to October 1, 2016	2.5 Feet	10-15 Feet	0-5 Feet	5-10 Feet	10-15 Feet	10-15 Feet	15-16.5 Feet	0-5 Feet	5-10 Feet	0-5 Feet	5-10 Feet	10-15 Feet	5-7.5 Feet	0-5 Feet
NOTES:	8													
MADEP-EPH-04-1.1 (mg/Kg dry)														
C9-C18 ALIPHATICS	NT	NT	**2400**	**1300**	**8300**	NT	220	NT	140	NT	NT	150	85	NT
C19-C36 ALIPHATICS	NT	NT	**3400**	2100	**11000**	NT	420	NT	**4700**	NT	NT	380	670	NT
UNADJUSTED C11-C22 AROMATICS	NT	NT	7300	2600	15000	NT	1600	NT	3700	NT	NT	850	660	NT
C11-C22 AROMATICS	NT	NT	**7200**	**2500**	**15000**	NT	**1600**	NT	**3700**	NT	NT	850	650	NT
ACENAPHTHENE	NT	NT	ND (2.9)	ND (0.56)	ND (2.4)	NT	ND (1.3)	NT	ND (1.1)	NT	NT	ND (0.20)	ND (0.21)	NT
ACENAPHTHYLENE	NT	NT	ND (2.9) *	ND (0.56)	ND (2.4) *	NT	ND (1.3) *	NT	ND (1.1) *	NT	NT	ND (0.20)	ND (0.21)	NT
ANTHRACENE	NT	NT	ND (2.9)	1.4	*11*	NT	ND (1.3)	NT	ND (1.1)	NT	NT	ND (0.20)	ND (0.21)	NT
BENZO(A)ANTHRACENE	NT	NT	ND (2.9)	ND (0.56)	ND (2.4)	NT	ND (1.3)	NT	ND (1.1)	NT	NT	ND (0.20)	ND (0.21)	NT
BENZO(A)PYRENE	NT	NT	ND (2.9) *	ND (0.56)	ND (2.4) *	NT	ND (1.3)	NT	ND (1.1)	NT	NT	ND (0.20)	ND (0.21)	NT
BENZO(B)FLUORANTHENE	NT	NT	ND (2.9)	ND (0.56)	ND (2.4)	NT	ND (1.3)	NT	ND (1.1)	NT	NT	ND (0.20)	ND (0.21)	NT
BENZO(G,H,I)PERYLENE	NT	NT	ND (2.9)	ND (0.56)	ND (2.4)	NT	ND (1.3)	NT	ND (1.1)	NT	NT	ND (0.20)	ND (0.21)	NT
BENZO(K)FLUORANTHENE	NT	NT	ND (2.9)	ND (0.56)	ND (2.4)	NT	ND (1.3)	NT	ND (1.1)	NT	NT	ND (0.20)	ND (0.21)	NT
CHRYSENE	NT	NT	ND (2.9)	ND (0.56)	ND (2.4)	NT	ND (1.3)	NT	ND (1.1)	NT	NT	ND (0.20)	ND (0.21)	NT
DIBENZ(A,H)ANTHRACENE	NT	NT	ND (2.9) *	ND (0.56)	ND (2.4) *	NT	ND (1.3) *	NT	ND (1.1) *	NT	NT	ND (0.20)	ND (0.21)	NT
FLUORANTHENE	NT	NT	*12*	4.6	*22*	NT	ND (1.3)	NT	ND (1.1)	NT	NT	ND (0.20)	ND (0.21)	NT
FLUORENE	NT	NT	ND (2.9)	*3.1*	*29*	NT	*4.9*	NT	ND (1.1)	NT	NT	ND (0.20)	ND (0.21)	NT
INDENO(1,2,3-CD)PYRENE	NT	NT	ND (2.9)	ND (0.56)	ND (2.4)	NT	ND (1.3)	NT	ND (1.1)	NT	NT	ND (0.20)	ND (0.21)	NT
2-METHYLNAPHTHALENE	NT	NT	***12***	***5.7***	***65***	NT	***1.9***	NT	ND (1.1) *	NT	NT	ND (0.20)	ND (0.21)	NT
NAPHTHALENE	NT	NT	ND (2.9)	*3.1*	***27***	NT	ND (1.3)	NT	ND (1.1)	NT	NT	ND (0.20)	ND (0.21)	NT
PHENANTHRENE	NT	NT	**12**	4.0	***35***	NT	4.6	NT	ND (1.1)	NT	NT	ND (0.20)	0.63	NT
PYRENE	NT	NT	7.1	1.7	12	NT	ND (1.3)	NT	ND (1.1)	NT	NT	ND (0.20)	ND (0.21)	NT
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DIBENZOFURAN (see notes 7, 9)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DI-N-BUTYLPHTHALATE (see note 7)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MADEP-VPH-04-1.1 (mg/Kg dry)														
UNADJUSTED C5-C8 ALIPHATICS	ND (8.3)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C5-C8 ALIPHATICS	ND (8.3)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
UNADJUSTED C9-C12 ALIPHATICS	ND (8.3)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C9-C12 ALIPHATICS	ND (8.3)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C9-C10 AROMATICS	ND (8.3)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BENZENE	ND (0.042)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ETHYLBENZENE	ND (0.042)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	ND (0.042)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
NAPHTHALENE	ND (0.21)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
TOLUENE	ND (0.042)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
M/P-XYLENE	ND (0.083)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
O-XYLENE	ND (0.042)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS													
	FO-1-BTM	B-14 (10-15)	B-14A (0-5)	B-14A (5-10)	B-14A (10-15)	B-14A (10-15)	B-14A (15-16.5)	B-15 (0-5)	B-15 (5-10)	B-16 (0-5)	B-16 (5-10)	B-16 (10-15)	B-17 (5-7.5)	B-18 (0-5)
SM 2540G (% Wt)														
% Solids	91.9	NT	68.0	88.8	81.7	NT	75.4	91.1	92.3	92.5	NT	95.3	91.4	91.4
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
ANTIMONY	ND (2.5)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ARSENIC	7.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BARIUM	30	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BERYLLIUM	ND (0.25)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CADMIUM	0.26	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CHROMIUM (as +3)	20	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
LEAD	6.3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
NICKEL	14	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SELENIUM	ND (5.0)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SILVER	ND (0.50)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
THALLIUM	ND (2.5)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
VANADIUM	29	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ZINC	29	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 7471B (mg/Kg dry) Metals Digestion														
MERCURY	ND (0.026)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 7196A (mg/Kg dry)														
CHROMIUM +6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SM2580 A (mV)														
OXIDATION/REDUCTION POTENTIAL	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 9045C (pH Units)														
PH	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 6010C-D (mg/L) 1311 TCLP EXT														
CADMIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
LEAD	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8082A (mg/Kg dry)														
PCB 1016	ND (0.11)	NT	ND (0.15)	ND (0.11)	ND (0.12)	NT	ND (0.13)	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT	ND (5.5) *
PCB 1221	ND (0.11)	NT	ND (0.15)	ND (0.11)	ND (0.12)	NT	ND (0.13)	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT	ND (5.5) *
PCB 1232	ND (0.11)	NT	ND (0.15)	ND (0.11)	ND (0.12)	NT	ND (0.13)	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT	ND (5.5) *
PCB 1242	ND (0.11)	NT	ND (0.15)	ND (0.11)	ND (0.12)	NT	ND (0.13)	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT	ND (5.5) *
PCB 1248	ND (0.11)	NT	ND (0.15)	ND (0.11)	ND (0.12)	NT	ND (0.13)	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT	ND (5.5) *
PCB 1254	ND (0.11)	NT	ND (0.15)	0.14	0.14	NT	ND (0.13)	**12**	0.30	0.90	NT	NT	NT	**29**
PCB 1260	ND (0.11)	NT	ND (0.15)	ND (0.11)	ND (0.12)	NT	ND (0.13)	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT	ND (5.5) *
PCB 1262	ND (0.11)	NT	ND (0.15)	ND (0.11)	ND (0.12)	NT	ND (0.13)	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT	ND (5.5) *
PCB 1268	ND (0.11)	NT	ND (0.15)	ND (0.11)	ND (0.12)	NT	ND (0.13)	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT	ND (5.5) *
TOTAL PCBs	ND (0.11)	NT	ND (0.15)	0.14	0.14	NT	ND (0.13)	**12**	0.30	0.90	NT	NT	NT	**29**

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS													
	FO-1-BTM	B-14 (10-15)	B-14A (0-5)	B-14A (5-10)	B-14A (10-15)	B-14A (10-15)	B-14A (15-16.5)	B-15 (0-5)	B-15 (5-10)	B-16 (0-5)	B-16 (5-10)	B-16 (10-15)	B-17 (5-7.5)	B-18 (0-5)
SW-846 8081B (mg/Kg dry)														
ALDRIN	ND (0.0054)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ALPHA-BHC	ND (0.0054)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BETA-BHC	ND (0.0054)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DELTA-BHC	ND (0.0054)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
GAMMA-BHC (LINDANE)	ND (0.0022)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CHLORDANE	ND (0.022)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDD	ND (0.0043)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDE	ND (0.0043)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDT	ND (0.0043)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DIELDRIN	ND (0.0043)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN I	ND (0.0054)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN II	ND (0.0086)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN SULFATE	ND (0.0086)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDRIN	ND (0.0086)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDRIN KETONE	ND (0.0086)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
HEPTACHLOR	ND (0.0054)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
HEPTACHLOR EPOXIDE	ND (0.0054)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
HEXACHLOROBENZENE	ND (0.0065)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
METHOXYCHLOR	ND (0.054)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8081B (µg/L) 1311 TCLP EXT														
HEPTACHLOR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8151A (mg/kg dry)														
2,4-D	ND (0.027)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2,4-DB	ND (0.027)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2,4,5-TP (SILVEX)	ND (0.0027)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2,4,5-T	ND (0.0027)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DALAPON	ND (0.068)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DICAMBA	ND (0.0027)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DICHLOROPROP	ND (0.027)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DINOSEB	ND (0.014)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MCPA	ND (2.7)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MCPP	ND (2.7)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
NOTES:														
1. An asterisk (*) following a detection limit														
indicates that the minimum laboratory reporting														
limit exceeds one or more of the regul. criteria.														
2. ND = Not detected above the lab reporting														
limits shown in parenthesis.														
3. NT = Not tested.														
4. ~ = No Method 1 Standard or UCL available														
5. Bolded values exceed the Method 1 Cleanup														
Standards (exclusive of S-x/GW-1).														
6. Italic values exceed MassDEP published														
background conc. for soils assoc. with fill														
containing coal ash or wood ash.														

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS													
	B-18 (5-10)	**B-18 (10-15)**	**B-19 (0-5)**	**B-19 (5-10)**	**B-19 (10-15)**	**B-19 (15-17)**	**B-20 (0-5)**	**B-20 (5-8)**	**B-21 (0-5)**	**B-21 (5-10)**	**B-21 (10-13.5)**	**B-22 (10-15)**	**B-22 (15-20)**	**B-23 (5-9)**
Sampling Date	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016
Sample Depth During Investigative Event	5-10 Feet	10-15 Feet	0-5 Feet	5-10 Feet	10-15 Feet	15-17 Feet	0-5 Feet	5-8 Feet	0-5 Feet	5-10 Feet	10-13.5 Feet	10-15 Feet	15-20 Feet	5-9 Feet
Sample Depth Relative to October 1, 2016	5-10 Feet	10-15 Feet	0-5 Feet	5-10 Feet	10-15 Feet	15-17 Feet	0-5 Feet	5-8 Feet	0-5 Feet	5-10 Feet	10-13.5 Feet	10-15 Feet	15-20 Feet	5-9 Feet
NOTES:	14			14	14									
MADEP-EPH-04-1.1 (mg/Kg dry)														
C9-C18 ALIPHATICS	28	59	NT	20	110	200	NT	ND (11)	28	860	110	63	ND (11)	ND (11)
C19-C36 ALIPHATICS	33	310	NT	70	370	730	NT	32	180	1200	500	330	ND (11)	18
UNADJUSTED C11-C22 AROMATICS	92	530	NT	300	570	1600	NT	69	490	2400	1000	560	ND (11)	64
C11-C22 AROMATICS	90	530	NT	220	570	**1600**	NT	67	390	**2400**	1000	560	ND (11)	48
ACENAPHTHENE	ND (0.12)	ND (0.52)	NT	1.3	ND (0.53)	ND (0.53)	NT	ND (0.11)	1.6	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	0.32
ACENAPHTHYLENE	ND (0.12)	ND (0.52)	NT	ND (0.11)	ND (0.53)	ND (0.53)	NT	ND (0.11)	ND (0.22)	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	ND (0.11)
ANTHRACENE	ND (0.12)	ND (0.52)	NT	2.5	ND (0.53)	ND (0.53)	NT	ND (0.11)	3.0	ND (0.52)	ND (0.55)	0.28	ND (0.11)	0.32
BENZO(A)ANTHRACENE	ND (0.12)	ND (0.52)	NT	6.0	ND (0.53)	ND (0.53)	NT	0.14	6.7	ND (0.52)	ND (0.55)	0.53	ND (0.11)	1.2
BENZO(A)PYRENE	ND (0.12)	ND (0.52)	NT	**5.1**	ND (0.53)	ND (0.53)	NT	0.12	**6.3**	ND (0.52)	ND (0.55)	0.64	ND (0.11)	1.3
BENZO(B)FLUORANTHENE	0.15	ND (0.52)	NT	7.0	ND (0.53)	ND (0.53)	NT	0.23	***8.4***	ND (0.52)	ND (0.55)	0.85	ND (0.11)	1.6
BENZO(G,H,I)PERYLENE	ND (0.12)	ND (0.52)	NT	2.7	ND (0.53)	ND (0.53)	NT	0.13	*3.2*	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	0.82
BENZO(K)FLUORANTHENE	ND (0.12)	ND (0.52)	NT	2.6	ND (0.53)	ND (0.53)	NT	ND (0.11)	3.2	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	0.57
CHRYSENE	0.25	ND (0.52)	NT	6.7	ND (0.53)	ND (0.53)	NT	0.28	*7.9*	ND (0.52)	ND (0.55)	0.74	ND (0.11)	1.3
DIBENZ(A,H)ANTHRACENE	ND (0.12)	ND (0.52)	NT	**0.90**	ND (0.53)	ND (0.53)	NT	ND (0.11)	***1.2***	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	0.19
FLUORANTHENE	0.15	ND (0.52)	NT	*14*	ND (0.53)	ND (0.53)	NT	0.30	*18*	1.8	ND (0.55)	1.8	ND (0.11)	2.8
FLUORENE	0.13	ND (0.52)	NT	1.3	ND (0.53)	ND (0.53)	NT	ND (0.11)	1.7	1.5	ND (0.55)	ND (0.24)	ND (0.11)	0.15
INDENO(1,2,3-CD)PYRENE	ND (0.12)	ND (0.52)	NT	*3.3*	ND (0.53)	ND (0.53)	NT	ND (0.11)	*3.9*	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	0.79
2-METHYLNAPHTHALENE	0.16	ND (0.52)	NT	**0.99**	ND (0.53)	ND (0.53)	NT	ND (0.11)	0.39	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	ND (0.11)
NAPHTHALENE	0.31	ND (0.52)	NT	0.44	ND (0.53)	ND (0.53)	NT	ND (0.11)	0.41	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	0.18
PHENANTHRENE	0.49	ND (0.52)	NT	**11**	ND (0.53)	ND (0.53)	NT	0.37	**14**	3.3	ND (0.55)	0.41	ND (0.11)	1.9
PYRENE	0.18	ND (0.52)	NT	13	ND (0.53)	ND (0.53)	NT	0.37	17	ND (0.52)	ND (0.55)	1.7	ND (0.11)	2.7
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DIBENZOFURAN (see notes 7, 9)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DI-N-BUTYLPHTHALATE (see note 7)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MADEP-VPH-04-1.1 (mg/Kg dry)														
UNADJUSTED C5-C8 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C5-C8 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
UNADJUSTED C9-C12 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C9-C12 ALIPHATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
C9-C10 AROMATICS	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BENZENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ETHYLBENZENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
NAPHTHALENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
TOLUENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
M/P-XYLENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
O-XYLENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS													
	B-18 (5-10)	B-18 (10-15)	B-19 (0-5)	B-19 (5-10)	B-19 (10-15)	B-19 (15-17)	B-20 (0-5)	B-20 (5-8)	B-21 (0-5)	B-21 (5-10)	B-21 (10-13.5)	B-22 (10-15)	B-22 (15-20)	B-23 (5-9)
SM 2540G (% Wt)														
% Solids	86.9	95.1	90.1	94.3	93.9	92.5	88.1	86.2	91.0	94.0	89.3	81.6	91.6	89.3
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
ANTIMONY	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ARSENIC	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BARIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BERYLLIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CADMIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CHROMIUM (as +3)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
LEAD	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
NICKEL	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SELENIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SILVER	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
THALLIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
VANADIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ZINC	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 7471B (mg/Kg dry) Metals Digestion														
MERCURY	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 7196A (mg/Kg dry)														
CHROMIUM +6	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SM2580 A (mV)														
OXIDATION/REDUCTION POTENTIAL	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 9045C (pH Units)														
PH	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 6010C-D (mg/L) 1311 TCLP EXT														
CADMIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
LEAD	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8082A (mg/Kg dry)														
PCB 1016	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)	NT	ND (0.11)	NT	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT
PCB 1221	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)	NT	ND (0.11)	NT	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT
PCB 1232	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)	NT	ND (0.11)	NT	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT
PCB 1242	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)	NT	ND (0.11)	NT	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT
PCB 1248	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)	NT	ND (0.11)	NT	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT
PCB 1254	ND (0.12)	ND (0.10)	**6.7**	**2.1**	ND (0.11)	NT	ND (0.11)	NT	**11**	0.63	ND (0.11)	NT	NT	NT
PCB 1260	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)	NT	ND (0.11)	NT	ND (2.2) *	0.12	ND (0.11)	NT	NT	NT
PCB 1262	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)	NT	ND (0.11)	NT	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT
PCB 1268	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)	NT	ND (0.11)	NT	ND (2.2) *	ND (0.11)	ND (0.11)	NT	NT	NT
TOTAL PCBs	ND (0.12)	ND (0.10)	**6.7**	**2.1**	ND (0.11)	NT	ND (0.11)	NT	**11**	0.75	ND (0.11)	NT	NT	NT

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS													
	B-18 (5-10)	B-18 (10-15)	B-19 (0-5)	B-19 (5-10)	B-19 (10-15)	B-19 (15-17)	B-20 (0-5)	B-20 (5-8)	B-21 (0-5)	B-21 (5-10)	B-21 (10-13.5)	B-22 (10-15)	B-22 (15-20)	B-23 (5-9)
SW-846 8081B (mg/Kg dry)														
ALDRIN	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ALPHA-BHC	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BETA-BHC	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DELTA-BHC	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
GAMMA-BHC (LINDANE)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
CHLORDANE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDD	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
4,4'-DDT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DIELDRIN	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN I	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN II	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDOSULFAN SULFATE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDRIN	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ENDRIN KETONE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
HEPTACHLOR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
HEPTACHLOR EPOXIDE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
HEXACHLOROBENZENE	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
METHOXYCHLOR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8081B (µg/L) 1311 TCLP EXT														
HEPTACHLOR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8151A (mg/kg dry)														
2,4-D	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2,4-DB	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2,4,5-TP (SILVEX)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2,4,5-T	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DALAPON	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DICAMBA	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DICHLOROPROP	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
DINOSEB	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MCPA	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MCPP	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
NOTES:														
1. An asterisk (*) following a detection limit														
indicates that the minimum laboratory reporting														
limit exceeds one or more of the regul. criteria.														
2. ND = Not detected above the lab reporting														
limits shown in parenthesis.														
3. NT = Not tested.														
4. ~ = No Method 1 Standard or UCL available														
5. Bolded values exceed the Method 1 Cleanup														
Standards (exclusive of S-x/GW-1).														
6. Italic values exceed MassDEP published														
background conc. for soils assoc. with fill														
containing coal ash or wood ash.														

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS		
	B-26 (10-13)	B-27 (5-10)	B-28 (10-15)
Sampling Date	9/16/2016	9/16/2016	9/16/2016
Sample Depth During Investigative Event	10-13 Feet	5-10 Feet	10-15 Feet
Sample Depth Relative to October 1, 2016	10-13 Feet	5-10 Feet	10-15 Feet
NOTES:			
MADEP-EPH-04-1.1 (mg/Kg dry)			
C9-C18 ALIPHATICS	NT	NT	NT
C19-C36 ALIPHATICS	NT	NT	NT
UNADJUSTED C11-C22 AROMATICS	NT	NT	NT
C11-C22 AROMATICS	NT	NT	NT
ACENAPHTHENE	NT	NT	NT
ACENAPHTHYLENE	NT	NT	NT
ANTHRACENE	NT	NT	NT
BENZO(A)ANTHRACENE	NT	NT	NT
BENZO(A)PYRENE	NT	NT	NT
BENZO(B)FLUORANTHENE	NT	NT	NT
BENZO(G,H,I)PERYLENE	NT	NT	NT
BENZO(K)FLUORANTHENE	NT	NT	NT
CHRYSENE	NT	NT	NT
DIBENZ(A,H)ANTHRACENE	NT	NT	NT
FLUORANTHENE	NT	NT	NT
FLUORENE	NT	NT	NT
INDENO(1,2,3-CD)PYRENE	NT	NT	NT
2-METHYLNAPHTHALENE	NT	NT	NT
NAPHTHALENE	NT	NT	NT
PHENANTHRENE	NT	NT	NT
PYRENE	NT	NT	NT
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)	NT	NT	NT
DIBENZOFURAN (see notes 7, 9)	NT	NT	NT
DI-N-BUTYLPHTHALATE (see note 7)	NT	NT	NT
MADEP-VPH-04-1.1 (mg/Kg dry)			
UNADJUSTED C5-C8 ALIPHATICS	NT	NT	NT
C5-C8 ALIPHATICS	NT	NT	NT
UNADJUSTED C9-C12 ALIPHATICS	NT	NT	NT
C9-C12 ALIPHATICS	NT	NT	NT
C9-C10 AROMATICS	NT	NT	NT
BENZENE	NT	NT	NT
ETHYLBENZENE	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	NT	NT	NT
NAPHTHALENE	NT	NT	NT
TOLUENE	NT	NT	NT
M/P-XYLENE	NT	NT	NT
O-XYLENE	NT	NT	NT

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS		
	B-26 (10-13)	B-27 (5-10)	B-28 (10-15)
SM 2540G (% Wt)			
% Solids	NT	NT	NT
SW-846 6010C/D (mg/Kg dry) Metals Digestion			
ANTIMONY	NT	NT	NT
ARSENIC	NT	NT	NT
BARIUM	NT	NT	NT
BERYLLIUM	NT	NT	NT
CADMIUM	NT	NT	NT
CHROMIUM (as +3)	NT	NT	NT
LEAD	NT	NT	NT
NICKEL	NT	NT	NT
SELENIUM	NT	NT	NT
SILVER	NT	NT	NT
THALLIUM	NT	NT	NT
VANADIUM	NT	NT	NT
ZINC	NT	NT	NT
SW-846 7471B (mg/Kg dry) Metals Digestion			
MERCURY	NT	NT	NT
SW-846 7196A (mg/Kg dry)			
CHROMIUM +6	NT	NT	NT
SM2580 A (mV)			
OXIDATION/REDUCTION POTENTIAL	NT	NT	NT
SW-846 9045C (pH Units)			
PH	NT	NT	NT
SW-846 6010C-D (mg/L) 1311 TCLP EXT			
CADMIUM	NT	NT	NT
LEAD	NT	NT	NT
SW-846 8082A (mg/Kg dry)			
PCB 1016	NT	NT	NT
PCB 1221	NT	NT	NT
PCB 1232	NT	NT	NT
PCB 1242	NT	NT	NT
PCB 1248	NT	NT	NT
PCB 1254	NT	NT	NT
PCB 1260	NT	NT	NT
PCB 1262	NT	NT	NT
PCB 1268	NT	NT	NT
TOTAL PCBs	NT	NT	NT

Table 1
Summary of Soil Analytical Data: 0-20 Foot Interval Soils in Courtyard

Parameter	SAMPLING LOCATIONS		
	B-26 (10-13)	B-27 (5-10)	B-28 (10-15)
SW-846 8081B (mg/Kg dry)			
ALDRIN	NT	NT	NT
ALPHA-BHC	NT	NT	NT
BETA-BHC	NT	NT	NT
DELTA-BHC	NT	NT	NT
GAMMA-BHC (LINDANE)	NT	NT	NT
CHLORDANE	NT	NT	NT
4,4'-DDD	NT	NT	NT
4,4'-DDE	NT	NT	NT
4,4'-DDT	NT	NT	NT
DIELDRIN	NT	NT	NT
ENDOSULFAN I	NT	NT	NT
ENDOSULFAN II	NT	NT	NT
ENDOSULFAN SULFATE	NT	NT	NT
ENDRIN	NT	NT	NT
ENDRIN KETONE	NT	NT	NT
HEPTACHLOR	NT	NT	NT
HEPTACHLOR EPOXIDE	NT	NT	NT
HEXACHLOROBENZENE	NT	NT	NT
METHOXYCHLOR	NT	NT	NT
SW-846 8081B (µg/L) 1311 TCLP EXT			
HEPTACHLOR	NT	NT	NT
SW-846 8151A (mg/kg dry)			
2,4-D	NT	NT	NT
2,4-DB	NT	NT	NT
2,4,5-TP (SILVEX)	NT	NT	NT
2,4,5-T	NT	NT	NT
DALAPON	NT	NT	NT
DICAMBA	NT	NT	NT
DICHLOROPROP	NT	NT	NT
DINOSEB	NT	NT	NT
MCPA	NT	NT	NT
MCPP	NT	NT	NT
NOTES:			
1. An asterisk (*) following a detection limit			
indicates that the minimum laboratory reporting			
limit exceeds one or more of the regul. criteria.			
2. ND = Not detected above the lab reporting			
limits shown in parenthesis.			
3. NT = Not tested.			
4. ~ = No Method 1 Standard or UCL available			
5. Bolded values exceed the Method 1 Cleanup			
Standards (exclusive of S-x/GW-1).			
6. Italic values exceed MassDEP published			
background conc. for soils assoc. with fill			
containing coal ash or wood ash.			

Table 2
Summary of Groundwater Analytical Data: Courtyard

Parameter	Reportable Concentrations (RCs)		MCP - Method 1 Cleanup Standards			Upper Concentration Limits	SAMPLING LOCATION		
	RCGW-1	RCGW-2	GW-1	GW-2	GW-3	UCL	GEC-1	GEC-2	GEC-3
Sampling Date							8/18/2015	8/18/2015	8/18/2015
MADEP-EPH-04-1.1 (µg/L)									
C9-C18 ALIPHATICS	700	5000	700	5000	50000	100000	**6300**	ND (100)	120
C19-C36 ALIPHATICS	14000	50000	14000	~	50000	100000	13000	ND (100)	ND (100)
UNADJUSTED C11-C22 AROMATICS	~	~	~	~	~	~	26000	150	520
C11-C22 AROMATICS	200	5000	200	50000	5000	100000	**26000**	140	520
ACENAPHTHENE	20	6000	20	~	10000	100000	ND (2.0)	ND (2.0)	ND (2.0)
ACENAPHTHYLENE	30	40	30	10000	40	100000	ND (2.0)	ND (2.0)	ND (2.0)
ANTHRACENE	30	30	60	~	30	600	18	ND (2.0)	ND (2.0)
BENZO(A)ANTHRACENE	1	1000	1	~	1000	10000	ND (2.0) *	ND (2.0) *	ND (2.0) *
BENZO(A)PYRENE	0.2	500	0.2	~	500	5000	ND (2.0) *	ND (2.0) *	ND (2.0) *
BENZO(B)FLUORANTHENE	1	400	1	~	400	4000	ND (2.0) *	ND (2.0) *	ND (2.0) *
BENZO(G,H,I)PERYLENE	20	20	50	~	20	500	ND (2.0)	ND (2.0)	ND (2.0)
BENZO(K)FLUORANTHENE	1	100	1	~	100	1000	ND (2.0) *	ND (2.0) *	ND (2.0) *
CHRYSENE	2	70	2	~	70	700	ND (2.0)	ND (2.0)	ND (2.0)
DIBENZ(A,H)ANTHRACENE	0.5	40	0.5	~	40	400	ND (2.0) *	ND (2.0) *	ND (2.0) *
FLUORANTHENE	90	200	90	~	200	2000	32	2.9	ND (2.0)
FLUORENE	30	40	30	~	40	400	31	2.5	ND (2.0)
INDENO(1,2,3-CD)PYRENE	0.5	100	0.5	~	100	1000	ND (2.0) *	ND (2.0) *	ND (2.0) *
2-METHYLNAPHTHALENE	10	2000	10	2000	20000	100000	2.8	ND (2.0)	ND (2.0)
NAPHTHALENE	140	700	140	700	20000	100000	14	ND (2.0)	ND (2.0)
PHENANTHRENE	40	10000	40	~	10000	100000	63	3.2	ND (2.0)
PYRENE	20	20	60	~	20	600	18	2.7	ND (2.0)
MADEP-VPH-04-1.1 (µg/L)									
UNADJUSTED C5-C8 ALIPHATICS	~	~	~	~	~	~	NT	NT	ND (100)
C5-C8 ALIPHATICS	300	3000	300	3000	50000	100000	NT	NT	ND (100)
UNADJUSTED C9-C12 ALIPHATICS	~	~	~	~	~	~	NT	NT	ND (100)
C9-C12 ALIPHATICS	700	5000	700	5000	50000	100000	NT	NT	ND (100)
C9-C10 AROMATICS	200	4000	200	4000	50000	100000	NT	NT	ND (100)
BENZENE	5	1000	5	1000	10000	100000	NT	NT	ND (1.0)
ETHYLBENZENE	700	5000	700	20000	5000	100000	NT	NT	ND (1.0)
METHYL TERT-BUTYL ETHER (MTBE)	70	5000	70	50000	50000	100000	NT	NT	ND (1.0)
NAPHTHALENE	140	700	140	700	20000	100000	NT	NT	ND (5.0)
TOLUENE	1000	40000	1000	50000	40000	100000	NT	NT	ND (1.0)
M/P-XYLENE	3000	3000	10000	3000	5000	100000	NT	NT	ND (2.0)
O-XYLENE	3000	3000	10000	3000	5000	100000	NT	NT	ND (1.0)
NOTES:									
1. An asterisk (*) following a detection limit									
indicates that the minimum laboratory reporting									
limit exceeds one or more of the regul. criteria.									
2. ND = Not detected above the lab reporting									
limits shown in parenthesis.									
3. NT = Not tested.									
4. ~ = No Method 1 Standard or UCL available									
5. Bolded values exceed the Method 1 Cleanup									
Standards.									

Table 3
Summary of Soil Analytical Data: Soils Beneath Picker Building Basement Floor

Parameter	Reportable Concentrations (RCs)		MCP - Method 1 Cleanup Standards									Upper Concentration Limits
	RCS-1	RCS-2	S-1/GW-1	S-1/GW-2	S-1/GW-3	S-2/GW-1	S-2/GW-2	S-2/GW-3	S-3/GW-1	S-3/GW-2	S-3/GW-3	UCL
Sampling Date												
Sample Depth												
MADEP-EPH-04-1.1 (mg/Kg dry)												
C9-C18 ALIPHATICS	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	20000
C19-C36 ALIPHATICS	3000	5000	3000	3000	3000	5000	5000	5000	5000	5000	5000	20000
UNADJUSTED C11-C22 AROMATICS	~	~	~	~	~	~	~	~	~	~	~	~
C11-C22 AROMATICS	1000	3000	1000	1000	1000	1000	3000	3000	1000	5000	5000	10000
ACENAPHTHENE	4	3000	4	1000	1000	4	3000	3000	4	5000	5000	10000
ACENAPHTHYLENE	1	10	1	600	10	1	600	10	1	600	10	10000
ANTHRACENE	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000
BENZO(A)ANTHRACENE	7	40	7	7	7	40	40	40	300	300	300	3000
BENZO(A)PYRENE	2	7	2	2	2	7	7	7	30	30	30	300
BENZO(B)FLUORANTHENE	7	40	7	7	7	40	40	40	300	300	300	3000
BENZO(G,H,I)PERYLENE	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000
BENZO(K)FLUORANTHENE	70	400	70	70	70	400	400	400	3000	3000	3000	10000
CHRYSENE	70	400	70	70	70	400	400	400	3000	3000	3000	10000
DIBENZ(A,H)ANTHRACENE	0.7	4	0.7	0.7	0.7	4	4	4	30	30	30	300
FLUORANTHENE	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000
FLUORENE	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000
INDENO(1,2,3-CD)PYRENE	7	40	7	7	7	40	40	40	300	300	300	3000
2-METHYLNAPHTHALENE	0.7	80	0.7	80	300	1	80	500	1	80	500	5000
NAPHTHALENE	4	20	4	20	500	4	20	1000	4	20	3000	10000
PHENANTHRENE	10	1000	10	500	500	20	1000	1000	20	3000	3000	10000
PYRENE	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000
MADEP-VPH-04-1.1 (mg/Kg dry)												
UNADJUSTED C5-C8 ALIPHATICS	~	~	~	~	~	~	~	~	~	~	~	~
C5-C8 ALIPHATICS	100	500	100	100	100	500	500	500	500	500	500	5000
UNADJUSTED C9-C12 ALIPHATICS	~	~	~	~	~	~	~	~	~	~	~	~
C9-C12 ALIPHATICS	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	20000
C9-C10 AROMATICS	100	500	100	100	100	300	500	500	300	500	500	5000
BENZENE	2	200	2	40	40	2	200	200	2	400	1000	10000
ETHYLBENZENE	40	1000	40	500	500	40	1000	1000	40	1000	3000	10000
METHYL TERT-BUTYL ETHER (MTBE)	0.1	100	0.1	100	100	0.1	100	500	0.1	100	500	5000
NAPHTHALENE	4	20	4	20	500	4	20	1000	4	20	3000	10000
TOLUENE	30	1000	30	500	500	30	1000	1000	30	2000	3000	10000
M/P-XYLENE	100	100	400	100	500	400	100	1000	400	100	3000	10000
O-XYLENE	100	100	400	100	500	400	100	1000	400	100	3000	10000
SM 2540G (% Wt)												
% Solids	~	~	~	~	~	~	~	~	~	~	~	~
SW-846 8015C (mg/Kg dry)												
FUEL OIL #6	~	~	~	~	~	~	~	~	~	~	~	~
NOTES:												
1. *Sample collected from beneath Picker Building												
2. ND = Not detected above the lab reporting												
limits shown in parenthesis.												
3. NT = Not tested.												
4. ~ = No Method 1 Standard or UCL available												
5. Bolded values exceed the Method 1 Cleanup												
Standards.												

Table 3
Summary of Soil Analytical Data: Soils Beneath Picker Building Basement Floor

Parameter	SAMPLING LOCATION					
	B-1 (0-5')*	B-2 (2-5')*	B-3 (2-7')*	B-4 (2-5')*	B-5 (0-5')*	B-6 (0-4')*
Sampling Date	2/12/2016	2/12/2016	2/12/2016	2/12/2016	2/12/2016	2/12/2016
Sample Depth	0-5 Feet	2-5 Feet	2-7 Feet	2-5 Feet	0-5 Feet	0-4 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)						
C9-C18 ALIPHATICS	19	ND (11)	ND (11)	58	ND (11)	ND (11)
C19-C36 ALIPHATICS	120	20	15	130	19	ND (11)
UNADJUSTED C11-C22 AROMATICS	250	43	33	1700	140	38
C11-C22 AROMATICS	240	33	26	1000	89	28
ACENAPHTHENE	ND (0.11)	0.20	ND (0.11)	**8.8**	0.35	0.14
ACENAPHTHYLENE	ND (0.11)	ND (0.11)	ND (0.11)	**2.3**	ND (0.11)	ND (0.11)
ANTHRACENE	0.28	0.32	0.26	27	1.5	0.34
BENZO(A)ANTHRACENE	0.63	0.74	0.58	**45**	3.7	0.75
BENZO(A)PYRENE	1.1	0.76	0.58	**34**	**3.4**	0.70
BENZO(B)FLUORANTHENE	1.3	0.95	0.70	**45**	4.7	0.86
BENZO(G,H,I)PERYLENE	0.54	0.45	0.45	15	2.1	0.41
BENZO(K)FLUORANTHENE	0.51	0.33	0.25	17	1.5	0.32
CHRYSENE	1.9	0.87	0.64	46	3.9	0.80
DIBENZ(A,H)ANTHRACENE	0.27	0.14	ND (0.11)	**4.6**	0.52	0.13
FLUORANTHENE	2.1	1.7	1.2	120	8.5	1.6
FLUORENE	ND (0.11)	0.13	ND (0.11)	9.8	0.37	ND (0.11)
INDENO(1,2,3-CD)PYRENE	0.75	0.53	0.38	**18**	2.2	0.50
2-METHYLNAPHTHALENE	ND (0.11)	ND (0.11)	ND (0.11)	**3.2**	0.13	ND (0.11)
NAPHTHALENE	ND (0.11)	ND (0.11)	ND (0.11)	**5.8**	0.28	ND (0.11)
PHENANTHRENE	1.1	1.4	0.98	**96**	5.7	1.4
PYRENE	2.1	1.7	1.2	100	8.6	1.6
MADEP-VPH-04-1.1 (mg/Kg dry)						
UNADJUSTED C5-C8 ALIPHATICS	ND (11)	ND (10)	ND (10)	ND (11)	ND (9.0)	ND (8.2)
C5-C8 ALIPHATICS	ND (11)	ND (10)	ND (10)	ND (11)	ND (9.0)	ND (8.2)
UNADJUSTED C9-C12 ALIPHATICS	ND (11)	ND (10)	ND (10)	ND (11)	ND (9.0)	ND (8.2)
C9-C12 ALIPHATICS	ND (11)	ND (10)	ND (10)	ND (11)	ND (9.0)	ND (8.2)
C9-C10 AROMATICS	ND (11)	ND (10)	ND (10)	ND (11)	ND (9.0)	ND (8.2)
BENZENE	ND (0.056)	ND (0.052)	ND (0.051)	ND (0.053)	ND (0.045)	ND (0.041)
ETHYLBENZENE	ND (0.056)	ND (0.052)	ND (0.051)	ND (0.053)	ND (0.045)	ND (0.041)
METHYL TERT-BUTYL ETHER (MTBE)	ND (0.056)	ND (0.052)	ND (0.051)	ND (0.053)	ND (0.045)	ND (0.041)
NAPHTHALENE	ND (0.28)	ND (0.26)	ND (0.25)	**6.3**	0.29	0.33
TOLUENE	ND (0.056)	ND (0.052)	ND (0.051)	ND (0.053)	ND (0.045)	ND (0.041)
M/P-XYLENE	ND (0.11)	ND (0.10)	ND (0.10)	ND (0.11)	ND (0.090)	ND (0.082)
O-XYLENE	ND (0.056)	ND (0.052)	ND (0.051)	ND (0.053)	ND (0.045)	ND (0.041)
SM 2540G (% Wt)						
% Solids	87.1	89.1	88.7	88.0	89.0	93.7
SW-846 8015C (mg/Kg dry)						
FUEL OIL #6	NT	NT	NT	NT	NT	NT
NOTES:						
1. *Sample collected from beneath Picker Building						
2. ND = Not detected above the lab reporting						
limits shown in parenthesis.						
3. NT = Not tested.						
4. ~ = No Method 1 Standard or UCL available						
5. Bolded values exceed the Method 1 Cleanup						
Standards.						

Table 4
Summary of Soil Analytical Data: Disposal Criteria Testing for Stockpiled Soils and *In-Situ* Soils

Parameter	Reportable Concentrations (RCs)		MCP - Method 1 Cleanup Standards									Upper Concentration Limit	SAMPLING LOCATION		
	RCS-1	RCS-2	S-1/GW-1	S-1/GW-2	S-1/GW-3	S-2/GW-1	S-2/GW-2	S-2/GW-3	S-3/GW-1	S-3/GW-2	S-3/GW-3	UCL	SP-1	SP-3	FO-1 7-8' **
Sampling Date													2/29/2016	3/29/2016	3/29/2016
Sample Depth													Stockpile / Top Soils	Sands inside FO Vault	** Petroleum contaminated soils
SM 2540G (% Wt)															
% Solids	~	~	~	~	~	~	~	~	~	~	~	~	80.2	94.4	72.0
SM21-22 2510B Modified (µmhos/cm)															
SPECIFIC CONDUCTANCE	~	~	~	~	~	~	~	~	~	~	~	~	35	4.3	3.3
SW-846 1030 (present/absent)															
IGNITABILITY	~	~	~	~	~	~	~	~	~	~	~	~	Absent	Absent	Absent
SW-846 6010C/D (mg/Kg dry) Metals Digestion															
ANTIMONY	20	30	20	20	20	30	30	30	30	30	30	300	ND (3.1)	ND (2.4)	ND (3.4)
ARSENIC	20	20	20	20	20	20	20	20	50	50	50	500	**23**	8.8	ND (3.4)
BARIUM	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000	800	50	36
BERYLLIUM	90	200	90	90	90	200	200	200	200	200	200	2000	14	0.73	0.58
CADMIUM	70	100	70	70	70	100	100	100	100	100	10	1000	3.9	0.44	ND (0.34)
CHROMIUM (as CHROMIUM +3)	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000	160	30	3.1
LEAD	200	600	200	200	200	600	600	600	600	600	600	6000	**2400**	25	8.5
NICKEL	600	1000	600	600	600	1000	1000	1000	1000	1000	1000	10000	240	18	8.9
SELENIUM	400	700	400	400	400	700	700	700	700	700	700	7000	ND (6.2)	ND (4.8)	ND (6.8)
SILVER	100	200	100	100	100	200	200	200	200	200	200	2000	ND (0.62)	ND (0.48)	ND (0.68)
THALLIUM	8	60	8	8	8	60	60	60	80	80	80	800	ND (3.1)	**9.8**	ND (3.4)
VANADIUM	400	700	400	400	400	700	700	700	700	700	700	7000	**3500**	33	42
ZINC	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000	**1100**	43	5.1
SW-846 7471B (mg/Kg dry) Metals Digestion															
MERCURY	20	30	20	20	20	30	30	30	30	30	30	300	0.43	0.050	ND (0.035)
SW-846 7196A (mg/Kg dry)															
CHROMIUM +6	100	200	100	100	100	200	200	200	200	200	200	2000	ND (4.9)	NT	NT
SM2580 A (mV)															
OXIDATION/REDUCTION POTENTIAL	~	~	~	~	~	~	~	~	~	~	~	~	120	NT	NT
SW-846 9045C (pH Units)															
PH	~	~	~	~	~	~	~	~	~	~	~	~	7.4		
SW-846 6010C/D (mg/L) 1311 TCLP EXT															
CADMIUM	~	~	~	~	~	~	~	~	~	~	~	~	0.025	NT	NT
LEAD	~	~	~	~	~	~	~	~	~	~	~	~	0.78	NT	NT
SW-846 8081B (mg/Kg dry)															
ALDRIN	0.08	0.5	0.08	0.08	0.08	0.5	0.5	0.5	3	3	3	30	ND (0.12) *	ND (0.0053)	ND (0.69) *
ALPHA-BHC	50	500	~	~	~	~	~	~	~	~	~	~	ND (0.12)	ND (0.0053)	ND (0.69)
BETA-BHC	10	100	~	~	~	~	~	~	~	~	~	~	ND (0.12)	ND (0.0053)	ND (0.69)
DELTA-BHC	10	100	~	~	~	~	~	~	~	~	~	~	ND (0.12)	ND (0.0053)	ND (0.69)
GAMMA-BHC (LINDANE)	0.003	0.5	0.003	0.1	0.5	0.003	2	0.5	0.003	2	0.5	600	ND (0.049) *	ND (0.0021)	ND (0.28) *
CHLORDANE	5	30	5	5	5	30	30	30	60	60	60	600	ND (0.49)	ND (0.021)	ND (2.8)
4,4'-DDD	8	40	8	8	8	40	40	40	60	60	60	600	ND (0.099)	ND (0.0042)	ND (0.56)
4,4'-DDE	6	30	6	6	6	30	30	30	60	60	60	600	ND (0.099)	ND (0.0042)	ND (0.56)
4,4'-DDT	6	30	6	6	6	30	30	30	60	60	60	600	ND (0.099)	0.019	ND (0.56)
DIELDRIN	0.08	0.5	0.08	0.08	0.08	0.5	0.5	0.5	3	3	3	30	ND (0.099) *	ND (0.0042)	ND (0.56) *
ENDOSULFAN I	0.5	1	0.5	300	1	0.5	500	1	0.5	500	1	5000	ND (0.12)	ND (0.0053)	ND (0.69) *
ENDOSULFAN II	0.5	1	0.5	300	1	0.5	500	1	0.5	500	1	5000	ND (0.20)	ND (0.0085)	ND (1.1) *
ENDOSULFAN SULFATE	~	~	~	~	~	~	~	~	~	~	~	~	ND (0.20)	ND (0.0085)	ND (1.1)
ENDRIN	10	20	10	10	10	20	20	20	20	20	20	200	ND (0.20)	ND (0.0085)	ND (1.1)
ENDRIN KETONE	~	~	~	~	~	~	~	~	~	~	~	~	ND (0.20)	ND (0.0085)	ND (1.1)
HEPTACHLOR	0.3	2	0.3	0.3	0.3	2	2	2	10	10	10	100	ND (0.12)	ND (0.0053)	ND (0.69) *
HEPTACHLOR EPOXIDE	0.1	0.9	0.1	0.1	0.1	0.9	0.9	0.9	1	1	1	10	**0.29**	ND (0.0053)	ND (0.69) *
HEXACHLOROBENZENE	0.7	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	8	ND (0.15)	ND (0.0064)	ND (0.83) *
METHOXYCHLOR	200	400	200	200	200	400	400	400	400	400	400	4000	ND (1.2)	ND (0.053)	ND (6.9)
SW-846 8081B (µg/L) 1311 TCLP EXT															
HEPTACHLOR	~	~	~	~	~	~	~	~	~	~	~	~	ND (0.050)	NT	NT

Table 4
Summary of Soil Analytical Data: Disposal Criteria Testing for Stockpiled Soils and *In-Situ* Soils

Parameter	Reportable Concentrations (RCs)		MCP - Method 1 Cleanup Standards									Upper Concentration Limit	SAMPLING LOCATION		
	RCS-1	RCS-2	S-1/GW-1	S-1/GW-2	S-1/GW-3	S-2/GW-1	S-2/GW-2	S-2/GW-3	S-3/GW-1	S-3/GW-2	S-3/GW-3	UCL	SP-1	SP-3	FO-1 7-8' **
SW-846 8082A (mg/Kg dry)															
PCB 1016	1	4	1	1	1	4	4	4	4	4	4	100	ND (12) *	ND (0.53)	ND (0.14)
PCB 1221	1	4	1	1	1	4	4	4	4	4	4	100	ND (12) *	ND (0.53)	ND (0.14)
PCB 1232	1	4	1	1	1	4	4	4	4	4	4	100	ND (12) *	ND (0.53)	ND (0.14)
PCB 1242	1	4	1	1	1	4	4	4	4	4	4	100	ND (12) *	ND (0.53)	ND (0.14)
PCB 1248	1	4	1	1	1	4	4	4	4	4	4	100	ND (12) *	ND (0.53)	ND (0.14)
PCB 1254	1	4	1	1	1	4	4	4	4	4	4	100	**63**	**2.6**	0.45
PCB 1260	1	4	1	1	1	4	4	4	4	4	4	100	ND (12) *	ND (0.53)	ND (0.14)
PCB 1262	1	4	1	1	1	4	4	4	4	4	4	100	ND (12) *	ND (0.53)	ND (0.14)
PCB 1268	1	4	1	1	1	4	4	4	4	4	4	100	ND (12) *	ND (0.53)	ND (0.14)
SW-846 8100 Modified (mg/Kg dry)															
TPH	1000	3000	1000	1000	1000	1000	3000	5000	1000	5000	5000	10000	**3800**	280	**33000**
SW-846 8151A (mg/kg dry)															
2,4-D	100	1000	~	~	~	~	~	~	~	~	~		ND (0.31)	ND (0.026)	ND (0.13)
2,4-DB	100	1000	~	~	~	~	~	~	~	~	~		ND (0.31)	ND (0.026)	ND (0.13)
2,4,5-TP (SILVEX)	100	1000	~	~	~	~	~	~	~	~	~		ND (0.031)	ND (0.026)	ND (0.013)
2,4,5-T	100	1000	~	~	~	~	~	~	~	~	~		ND (0.031)	ND (0.026)	ND (0.013)
DALAPON	~	~	~	~	~	~	~	~	~	~	~		ND (0.77)	ND (0.066)	ND (0.34)
DICAMBA	500	5000	~	~	~	~	~	~	~	~	~		ND (0.031)	ND (0.0026)	ND (0.013)
DICHLOROPROP	~	~	~	~	~	~	~	~	~	~	~		ND (0.31)	ND (0.026)	ND (0.13)
DINOSEB	500	5000	~	~	~	~	~	~	~	~	~		ND (0.15)	ND (0.013)	ND (0.067)
MCPA	100	1000	~	~	~	~	~	~	~	~	~		ND (31)	ND (2.6)	ND (13)
MCPP	~	~	~	~	~	~	~	~	~	~	~		ND (31)	ND (2.6)	ND (13)
SW-846 8260C (mg/Kg dry)															
ACETONE	6	50	6	50	400	6	50	400	6	50	400	10000	ND (0.089)	ND (0.078)	ND (5.6)
TERT-AMYLMETHYL ETHER	~	~	~	~	~	~	~	~	~	~	~	~	ND (0.00089)	ND (0.00078)	ND (0.056)
BENZENE	2	200	2	40	40	2	200	200	2	400	1000	10000	ND (0.0018)	ND (0.0016)	ND (0.11)
BROMOBENZENE	100	1000	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.11)
BROMOCHLOROMETHANE	~	~	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.11)
BROMODICHLOROMETHANE	0.1	0.1	0.1	0.1	30	0.1	0.1	100	0.1	0.1	500	5000	ND (0.0018)	ND (0.0016)	ND (0.11) *
BROMOFORM	0.1	1	0.1	1	300	0.1	1	800	0.1	1	800	10000	ND (0.0089)	ND (0.0016)	ND (0.11) *
BROMOMETHANE	0.5	0.5	0.5	0.5	30	0.5	0.5	30	0.5	0.5	30	6000	ND (0.0089)	ND (0.0078)	ND (0.22)
2-BUTANONE (MEK)	4	50	4	50	400	4	50	400	4	50	400	10000	ND (0.036)	ND (0.031)	ND (2.2)
N-BUTYLBENZENE	~	~	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.11)
SEC-BUTYLBENZENE	~	~	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.11)
TERT-BUTYLBENZENE	100	1000	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.11)
TERT-BUTYLETHYL ETHER	~	~	~	~	~	~	~	~	~	~	~	~	ND (0.00089)	ND (0.00078)	ND (0.056)
CARBON DISULFIDE	100	1000	~	~	~	~	~	~	~	~	~	~	ND (0.0053)	ND (0.0047)	ND (1.1)
CARBON TETRACHLORIDE	5	5	10	5	30	10	5	100	10	5	1000	10000	ND (0.0018)	ND (0.0016)	ND (0.11)
CHLOROBENZENE	1	3	1	3	100	1	3	100	1	3	100	10000	ND (0.0018)	ND (0.0016)	ND (0.11)
CHLORODIBROMOMETHANE	0.005	0.03	0.005	0.03	20	0.005	0.03	100	0.005	0.03	500	5000	ND (0.00089)	ND (0.00078)	ND (0.056) *
CHLOROETHANE	100	1000	~	~	~	~	~	~	~	~	~	~	ND (0.0089)	ND (0.0078)	ND (0.22)
CHLOROFORM	0.2	0.2	0.4	0.2	500	0.4	0.2	1000	0.4	0.2	1000	10000	ND (0.0036)	ND (0.0031)	ND (0.22) *
CHLOROMETHANE	100	1000	~	~	~	~	~	~	~	~	~	~	ND (0.0089)	ND (0.0078)	ND (0.22)
2-CHLOROTOLUENE	100	1000	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.11)
4-CHLOROTOLUENE	100	1000	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.11)
1,2-DIBROMO-3-CHLOROPROPANE	10	100	~	~	~	~	~	~	~	~	~	~	ND (0.0036)	ND (0.0031)	ND (0.45)
1,2-DIBROMOETHANE (EDB)	0.1	0.1	0.1	0.1	1	0.1	0.1	5	0.1	0.1	40	400	ND (0.00089)	ND (0.00078)	ND (0.056)
DIBROMOMETHANE	500	5000	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.11)
1,2-DICHLOROBENZENE	9	100	9	100	300	9	100	300	9	100	300	10000	ND (0.0018)	ND (0.0016)	ND (0.11)
1,3-DICHLOROBENZENE	3	200	3	100	100	3	200	500	3	200	500	5000	ND (0.0018)	ND (0.0016)	ND (0.11)
1,4-DICHLOROBENZENE	0.7	1	0.7	1	80	0.7	1	400	0.7	1	2000	10000	ND (0.0018)	ND (0.0016)	ND (0.11)
DICHLORODIFLUOROMETHANE	1000	10000	~	~	~	~	~	~	~	~	~	~	ND (0.0089)	ND (0.0078)	ND (0.22)
1,1-DICHLOROETHANE	0.4	9	0.4	9	500	0.4	9	1000	0.4	9	1000	10000	ND (0.0018)	ND (0.0016)	ND (0.11)
1,2-DICHLOROETHANE	0.1	0.1	0.1	0.1	20	0.1	0.1	100	0.1	0.1	300	9000	ND (0.0018)	ND (0.0016)	ND (0.11) *
1,1-DICHLOROETHYLENE	3	40	3	40	500	3	40	1000	3	40	3000	10000	ND (0.0036)	ND (0.0031)	ND (0.11)
CIS-1,2-DICHLOROETHYLENE	0.1	0.1	0.3	0.1	100	0.3	0.1	500	0.3	0.1	500	5000	ND (0.0018)	ND (0.0016)	ND (0.11) *

Table 4
Summary of Soil Analytical Data: Disposal Criteria Testing for Stockpiled Soils and *In-Situ* Soils

Parameter	Reportable Concentrations (RCs)		MCP - Method 1 Cleanup Standards									Upper Concentration Limit	SAMPLING LOCATION		
	RCS-1	RCS-2	S-1/GW-1	S-1/GW-2	S-1/GW-3	S-2/GW-1	S-2/GW-2	S-2/GW-3	S-3/GW-1	S-3/GW-2	S-3/GW-3	UCL	SP-1	SP-3	FO-1 7-8' **
TRANS-1,2-DICHLOROETHYLENE	1	1	1	1	500	1	1	1000	1	1	3000	10000	ND (0.0018)	ND (0.0016)	ND (0.11)
1,2-DICHLOROPROPANE	0.1	0.1	0.1	0.1	30	0.1	0.1	100	0.1	0.1	1000	10000	ND (0.0018)	ND (0.0016)	ND (0.11) *
1,3-DICHLOROPROPANE	500	5000	~	~	~	~	~	~	~	~	~	~	ND (0.00089)	ND (0.00078)	ND (0.056)
2,2-DICHLOROPROPANE	0.1	0.2	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.11) *
1,1-DICHLOROPROPENE	0.01	0.1	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.22) *
CIS-1,3-DICHLOROPROPENE	0.01	0.1	0.01	0.4	9	0.01	0.4	70	0.01	0.4	100	4000	ND (0.00089)	ND (0.0031)	ND (0.056) *
TRANS-1,3-DICHLOROPROPENE	0.01	0.1	0.01	0.4	9	0.01	0.4	70	0.01	0.4	100	4000	ND (0.0036)	ND (0.0016)	ND (0.056) *
DIETHYL ETHER	100	1000	~	~	~	~	~	~	~	~	~	~	ND (0.0089)	ND (0.0078)	ND (0.22)
DIISOPROPYL ETHER	100	1000	~	~	~	~	~	~	~	~	~	~	ND (0.00089)	ND (0.00078)	ND (0.056)
1,4-DIOXANE	0.2	6	0.2	6	20	0.2	6	90	0.2	6	500	5000	ND (0.089)	ND (0.078)	ND (5.6) *
ETHYLBENZENE	40	1000	40	500	500	40	1000	1000	40	1000	3000	10000	ND (0.0018)	ND (0.0016)	ND (0.11)
HEXACHLOROBUTADIENE	30	100	30	30	30	100	100	100	100	100	100	1000	ND (0.0018)	ND (0.0016)	ND (0.11)
2-HEXANONE	100	1000	~	~	~	~	~	~	~	~	~	~	ND (0.018)	ND (0.016)	ND (1.1)
ISOPROPYLBENZENE	1000	10000	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.11)
P-ISOPROPYLTOLUENE	100	1000	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.11)
METHYL TERT-BUTYL ETHER (MTBE)	0.1	100	0.1	100	100	0.1	100	500	0.1	100	500	5000	ND (0.0036)	ND (0.0031)	ND (0.11) *
METHYLENE CHLORIDE	0.1	20	0.1	20	200	0.1	20	900	0.1	20	900	10000	ND (0.0089)	ND (0.0078)	ND (0.56) *
4-METHYL-2-PENTANONE (MIBK)	0.4	50	0.4	50	400	0.4	50	400	0.4	50	400	10000	ND (0.018)	ND (0.016)	ND (1.1) *
NAPHTHALENE	4	20	4	20	500	4	20	1000	4	20	3000	10000	ND (0.0089)	ND (0.0078)	ND (0.22)
N-PROPYLBENZENE	100	1000	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.11)
STYRENE	3	4	3	4	70	3	4	200	3	4	2000	10000	ND (0.0018)	ND (0.0016)	ND (0.11)
1,1,1,2-TETRACHLOROETHANE	0.1	0.1	0.1	0.1	80	0.1	0.1	400	0.1	0.1	500	5000	ND (0.0018)	ND (0.0016)	ND (0.11) *
1,1,2,2-TETRACHLOROETHANE	0.005	0.02	0.005	0.02	10	0.005	0.02	50	0.005	0.02	400	4000	ND (0.00089)	ND (0.00078)	ND (0.056) *
TETRACHLOROETHYLENE	1	10	1	10	30	1	10	200	1	10	1000	10000	ND (0.0018)	ND (0.0016)	ND (0.11)
TETRAHYDROFURAN	500	5000	~	~	~	~	~	~	~	~	~	~	ND (0.0089)	ND (0.0078)	ND (0.45)
TOLUENE	30	1000	30	500	500	30	1000	1000	30	2000	3000	10000	ND (0.0018)	ND (0.0016)	ND (0.11)
1,2,3-TRICHLOROBENZENE	~	~	~	~	~	~	~	~	~	~	~	~	ND (0.0036)	ND (0.0016)	ND (0.45)
1,2,4-TRICHLOROBENZENE	2	6	2	6	700	2	6	3000	2	6	5000	10000	ND (0.0036)	ND (0.0031)	ND (0.11)
1,1,1-TRICHLOROETHANE	30	600	30	500	500	30	600	1000	30	600	3000	10000	ND (0.0018)	ND (0.0016)	ND (0.11)
1,1,2-TRICHLOROETHANE	0.1	2	0.1	2	40	0.1	2	200	0.1	2	500	5000	ND (0.0018)	ND (0.0016)	ND (0.11) *
TRICHLOROETHYLENE	0.3	0.3	0.3	0.3	30	0.3	0.3	60	0.3	0.3	60	600	ND (0.0018)	ND (0.0016)	ND (0.11)
TRICHLOROFLUOROMETHANE	1000	10000	~	~	~	~	~	~	~	~	~	~	ND (0.0089)	ND (0.0078)	ND (0.22)
1,2,3-TRICHLOROPROPANE	100	1000	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.22)
1,2,4-TRIMETHYLBENZENE	1000	10000	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.11)
1,3,5-TRIMETHYLBENZENE	10	100	~	~	~	~	~	~	~	~	~	~	ND (0.0018)	ND (0.0016)	ND (0.11)
VINYL CHLORIDE	0.7	0.7	0.9	0.7	1	0.9	0.7	7	0.9	0.7	60	600	ND (0.0089)	ND (0.0078)	ND (0.22)
M/P-XYLENE	100	100	400	100	500	400	100	1000	400	100	3000	10000	ND (0.0036)	ND (0.0031)	ND (0.22)
O-XYLENE	100	100	400	100	500	400	100	1000	400	100	3000	10000	ND (0.0018)	ND (0.0016)	ND (0.11)

Table 4
Summary of Soil Analytical Data: Disposal Criteria Testing for Stockpiled Soils and *In-Situ* Soils

Parameter	Reportable Concentrations (RCs)		MCP - Method 1 Cleanup Standards									Upper Concentration Limit	SAMPLING LOCATION		
	RCS-1	RCS-2	S-1/GW-1	S-1/GW-2	S-1/GW-3	S-2/GW-1	S-2/GW-2	S-2/GW-3	S-3/GW-1	S-3/GW-2	S-3/GW-3	UCL	SP-1	SP-3	FO-1 7-8' **
SW-846 8270D (mg/Kg dry)															
ACENAPHTHENE	4	3000	4	1000	1000	4	3000	3000	4	5000	5000	10000	2.4	0.70	**4.9**
ACENAPHTHYLENE	1	10	1	600	10	1	600	10	1	600	10	10000	ND (0.85)	ND (0.18)	ND (3.8) *
ACETOPHENONE	1000	10000	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
ANILINE	1000	10000	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
ANTHRACENE	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000	5.3	1.5	4.9
BENZO(A)ANTHRACENE	7	40	7	7	7	40	40	40	300	300	300	3000	**10**	3.0	4.8
BENZO(A)PYRENE	2	7	2	2	2	7	7	7	30	30	30	300	**8.0**	**2.6**	ND (3.8) *
BENZO(B)FLUORANTHENE	7	40	7	7	7	40	40	40	300	300	300	3000	**9.8**	3.5	ND (3.8)
BENZO(G,H,I)PERYLENE	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000	4.5	1.4	ND (3.8)
BENZO(K)FLUORANTHENE	70	400	70	70	70	400	400	400	3000	3000	3000	10000	3.9	1.4	ND (3.8)
BIS(2-CHLOROETHOXY)METHANE	500	5000	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
BIS(2-CHLOROETHYL)ETHER	0.7	0.7	0.7	0.7	8	0.7	0.7	3	0.7	0.7	80	800	ND (1.7) *	ND (0.36)	ND (7.5) *
BIS(2-CHLOROISOPROPYL)ETHER	0.7	0.7	0.7	0.7	30	0.7	0.7	100	0.7	0.7	1000	10000	ND (1.7) *	ND (0.36)	ND (7.5) *
BIS(2-ETHYLHEXYL)PHTHALATE	90	600	90	90	90	600	600	600	2000	2000	2000	10000	30	ND (0.36)	ND (7.5)
4-BROMOPHENYL PHENYL ETHER	100	1000	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
BUTYLBENZYLPHTHALATE	100	1000	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
4-CHLOROANILINE	1	3	1	100	3	1	100	3	1	100	3	3000	ND (3.3) *	ND (0.70)	ND (15) *
2-CHLORONAPHTHALENE	1000	10000	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
2-CHLOROPHENOL	0.7	100	0.7	100	100	0.7	100	300	0.7	100	300	3000	ND (1.7) *	ND (0.36)	ND (7.5) *
CHRYSENE	70	400	70	70	70	400	400	400	3000	3000	3000	10000	9.7	2.8	6.6
DIBENZ(A,H)ANTHRACENE	0.7	4	0.7	0.7	0.7	4	4	4	30	30	30	300	**1.4**	0.37	ND (3.8) *
DIBENZOFURAN	100	1000	~	~	~	~	~	~	~	~	~	~	1.9	0.59	ND (7.5)
DI-N-BUTYLPHTHALATE	50	500	~	~	~	~	~	~	~	~	~	~	5.6	ND (0.36)	ND (7.5)
1,2-DICHLOROBENZENE	9	100	9	100	300	9	100	300	9	100	300	10000	ND (1.7)	ND (0.36)	ND (7.5)
1,3-DICHLOROBENZENE	3	200	3	100	100	3	200	500	3	200	500	5000	ND (1.7)	ND (0.36)	ND (7.5) *
1,4-DICHLOROBENZENE	0.7	1	0.7	1	80	0.7	1	400	0.7	1	2000	10000	ND (1.7) *	ND (0.36)	ND (7.5) *
3,3'-DICHLOROBENZIDINE	3	20	3	3	3	10	10	10	100	100	100	1000	ND (0.85)	ND (0.18)	ND (3.8) *
2,4-DICHLOROPHENOL	0.7	40	0.7	60	40	0.7	60	40	0.7	60	40	8000	ND (1.7) *	ND (0.36)	ND (7.5) *
DIETHYLPHTHALATE	10	200	10	200	300	10	200	300	10	200	300	10000	ND (1.7)	ND (0.36)	ND (7.5)
2,4-DIMETHYLPHENOL	0.7	100	0.7	100	500	0.7	100	1000	0.7	100	1000	10000	ND (1.7) *	ND (0.36)	ND (7.5) *
DIMETHYLPHTHALATE	0.7	50	0.7	50	600	0.7	50	600	0.7	50	600	10000	ND (1.7) *	ND (0.36)	ND (7.5) *
2,4-DINITROPHENOL	3	50	3	50	50	3	50	100	3	50	100	8000	ND (3.3) *	ND (0.70)	ND (15) *
2,4-DINITROTOLUENE	0.7	10	0.7	2	2	0.7	10	10	0.7	50	80	800	ND (1.7) *	ND (0.36)	ND (7.5) *
2,6-DINITROTOLUENE	100	1000	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
DI-N-OCTYLPHTHALATE	1000	10000	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
1,2-DIPHENYLHYDRAZINE (AZOBENZENE)	50	500	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
FLUORANTHENE	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000	22	7.0	6.4
FLUORENE	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000	2.8	0.93	11
HEXACHLOROBENZENE	0.7	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	8	ND (1.7) *	ND (0.36)	ND (7.5) *
HEXACHLOROBUTADIENE	30	100	30	30	30	100	100	100	100	100	100	1000	ND (1.7)	ND (0.36)	ND (7.5)
HEXACHLOROETHANE	0.7	3	0.7	3	50	0.7	3	200	0.7	3	200	2000	ND (1.7) *	ND (0.36)	ND (7.5) *
INDENO(1,2,3-CD)PYRENE	7	40	7	7	7	40	40	40	300	300	300	3000	5.1	1.4	ND (3.8)
ISOPHORONE	100	1000	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
2-METHYLNAPHTHALENE	0.7	80	0.7	80	300	1	80	500	1	80	500	5000	**0.93**	0.29	**33**
O-CRESOL	500	5000	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
M/P-CRESOL	500	5000	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
NAPHTHALENE	4	20	4	20	500	4	20	1000	4	20	3000	10000	1.6	0.59	**8.3**
NITROBENZENE	500	5000	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
2-NITROPHENOL	100	1000	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
4-NITROPHENOL	100	1000	~	~	~	~	~	~	~	~	~	~	ND (3.3)	ND (0.70)	ND (15)
PENTACHLOROPHENOL	3	10	3	3	3	3	20	10	3	70	10	700	ND (1.7)	ND (0.36)	ND (7.5) *
PHENANTHRENE	10	1000	10	500	500	20	1000	1000	20	3000	3000	10000	**24**	5.9	**32**
PHENOL	1	20	1	50	20	1	50	20	1	50	20	10000	ND (1.7) *	ND (0.36)	ND (7.5) *
PYRENE	1000	3000	1000	1000	1000	3000	3000	3000	5000	5000	5000	10000	23	5.0	33
PYRIDINE	500	5000	~	~	~	~	~	~	~	~	~	~	ND (1.7)	ND (0.36)	ND (7.5)
1,2,4-TRICHLOROBENZENE	2	6	2	6	700	2	6	3000	2	6	5000	10000	ND (1.7)	ND (0.36)	ND (7.5) *

Table 4
Summary of Soil Analytical Data: Disposal Criteria Testing for Stockpiled Soils and *In-Situ* Soils

Parameter	Reportable Concentrations (RCs)		MCP - Method 1 Cleanup Standards									Upper Concentration Limit	SAMPLING LOCATION		
	RCS-1	RCS-2	S-1/GW-1	S-1/GW-2	S-1/GW-3	S-2/GW-1	S-2/GW-2	S-2/GW-3	S-3/GW-1	S-3/GW-2	S-3/GW-3	UCL	SP-1	SP-3	FO-1 7-8' **
2,4,5-TRICHLOROPHENOL	4	600	4	1000	600	4	1000	600	4	100	200	10000	ND (1.7)	ND (0.36)	ND (7.5) *
2,4,6-TRICHLOROPHENOL	0.7	20	0.7	20	20	0.7	20	20	0.7	20	20	4000	ND (1.7) *	ND (0.36)	ND (7.5) *
SW-846 9014 (mg/Kg)															
REACTIVE CYANIDE	~	~	~	~	~	~	~	~	~	~	~	~	ND (3.9)	ND (3.9)	ND (4.0)
SW-846 9030A (mg/Kg)															
REACTIVE SULFIDE	~	~	~	~	~	~	~	~	~	~	~	~	ND (20)	ND (20)	ND (20)
SW-846 9045C (pH Units)															
PH	~	~	~	~	~	~	~	~	~	~	~	~	6.9	7.2	4.6

NOTES:

1. An asterisk (*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regul. criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Bolded values exceed the Method 1 Cleanup Standards.

SP-3 analyzed for volatile petroleum hydrocarbons (VPH) via MassDEP's Method. No VPH subsets or target VOCs were detected.

** Petroleum contaminated soils were excavated from the bottom of the vault at 7-8' below current grade, then returned to the vault when remediation was temporarily halted.

Table 4
Summary of Soil Analytical Data: Disposal Criteria Testing for Stockpiled Soils and *In-Situ* Soils

Parameter					SAMPLING LOCATION				
	Comp1	Comp2	Comp3	Comp4	B-14 (10-15)	B-14A (10-15)	B-26 (10-13)	B-27 (5-10)	B-28 (10-15)
Sampling Date	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/15/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016
Sample Depth	- Feet	- Feet	- Feet	- Feet	10-15 Feet	10-15 Feet	10-13 Feet	5-10 Feet	10-15 Feet
SM 2540G (% Wt)									
% Solids	78.6	79.1	82.4	77.9	NT	NT	NT	NT	NT
SM21-22 2510B Modified (µmhos/cm)									
SPECIFIC CONDUCTANCE	27	18	20	16	NT	NT	NT	NT	NT
SW-846 1030 (present/absent)									
IGNITABILITY	Present	Present	Present	Present	NT	NT	NT	NT	NT
SW-846 6010C/D (mg/Kg dry) Metals Digestion									
ANTIMONY	ND (3.2)	ND (3.2)	ND (3.0)	ND (3.1)	NT	NT	NT	NT	NT
ARSENIC	6.8	5.3	6.8	5.4	NT	NT	NT	NT	NT
BARIUM	67	50	110	53	NT	NT	NT	NT	NT
BERYLLIUM	0.33	ND (0.32)	0.31	ND (0.31)	NT	NT	NT	NT	NT
CADMIUM	0.48	0.51	0.52	0.53	NT	NT	NT	NT	NT
CHROMIUM (as CHROMIUM +3)	11	13	12	12	NT	NT	NT	NT	NT
LEAD	19	19	14	22	NT	NT	NT	NT	NT
NICKEL	13	14	13	16	NT	NT	NT	NT	NT
SELENIUM	ND (6.4)	ND (6.3)	ND (5.9)	ND (6.3)	NT	NT	NT	NT	NT
SILVER	ND (0.64)	ND (0.63)	ND (0.59)	ND (0.63)	NT	NT	NT	NT	NT
THALLIUM	ND (3.2)	ND (3.2)	ND (3.0)	ND (3.1)	NT	NT	NT	NT	NT
VANADIUM	42	43	44	44	NT	NT	NT	NT	NT
ZINC	17	34	14	24	NT	NT	NT	NT	NT
SW-846 7471B (mg/Kg dry) Metals Digestion									
MERCURY	ND (0.031)	ND (0.032)	ND (0.029)	ND (0.033)	NT	NT	NT	NT	NT
SW-846 7196A (mg/Kg dry)									
CHROMIUM +6	NT	NT	NT	NT	NT	NT	NT	NT	NT
SM2580 A (mV)									
OXIDATION/REDUCTION POTENTIAL	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 9045C (pH Units)									
PH									
SW-846 6010C/D (mg/L) 1311 TCLP EXT									
CADMIUM	NT	NT	NT	NT	NT	NT	NT	NT	NT
LEAD	NT	NT	NT	NT	NT	NT	NT	NT	NT
SW-846 8081B (mg/Kg dry)									
ALDRIN	ND (0.31) *	ND (0.32) *	ND (0.30) *	ND (0.31) *	NT	NT	NT	NT	NT
ALPHA-BHC	ND (0.31)	ND (0.32)	ND (0.30)	ND (0.31)	NT	NT	NT	NT	NT
BETA-BHC	ND (0.31)	ND (0.32)	ND (0.30)	ND (0.31)	NT	NT	NT	NT	NT
DELTA-BHC	ND (0.31)	ND (0.32)	ND (0.30)	ND (0.31)	NT	NT	NT	NT	NT
GAMMA-BHC (LINDANE)	ND (0.12) *	ND (0.13) *	ND (0.12) *	ND (0.13) *	NT	NT	NT	NT	NT
CHLORDANE	ND (1.2)	ND (1.3)	ND (1.2)	ND (1.3)	NT	NT	NT	NT	NT
4,4'-DDD	ND (0.25)	ND (0.25)	ND (0.24)	ND (0.25)	NT	NT	NT	NT	NT
4,4'-DDE	ND (0.25)	ND (0.25)	ND (0.24)	ND (0.25)	NT	NT	NT	NT	NT
4,4'-DDT	ND (0.25)	ND (0.25)	ND (0.24)	ND (0.25)	NT	NT	NT	NT	NT
DIELDRIN	ND (0.25) *	ND (0.25) *	ND (0.24) *	ND (0.25) *	NT	NT	NT	NT	NT
ENDOSULFAN I	ND (0.31)	ND (0.32)	ND (0.30)	ND (0.31)	NT	NT	NT	NT	NT
ENDOSULFAN II	ND (0.50)	ND (0.51) *	ND (0.49)	ND (0.50)	NT	NT	NT	NT	NT
ENDOSULFAN SULFATE	ND (0.50)	ND (0.51)	ND (0.49)	ND (0.50)	NT	NT	NT	NT	NT
ENDRIN	ND (0.50)	ND (0.51)	ND (0.49)	ND (0.50)	NT	NT	NT	NT	NT
ENDRIN KETONE	ND (0.50)	ND (0.51)	ND (0.49)	ND (0.50)	NT	NT	NT	NT	NT
HEPTACHLOR	ND (0.31) *	ND (0.32) *	ND (0.30)	ND (0.31) *	NT	NT	NT	NT	NT
HEPTACHLOR EPOXIDE	ND (0.31) *	ND (0.32) *	ND (0.30) *	ND (0.31) *	NT	NT	NT	NT	NT
HEXACHLOROBENZENE	ND (0.37)	ND (0.38)	ND (0.36)	ND (0.38)	NT	NT	NT	NT	NT
METHOXYCHLOR	ND (3.1)	ND (3.2)	ND (3.0)	ND (3.1)	NT	NT	NT	NT	NT
SW-846 8081B (µg/L) 1311 TCLP EXT									
HEPTACHLOR	NT	NT	NT	NT	NT	NT	NT	NT	NT

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Parameter					SAMPLING LOCATION				
	Comp1	Comp2	Comp3	Comp4	B-14 (10-15)	B-14A (10-15)	B-26 (10-13)	B-27 (5-10)	B-28 (10-15)
SW-846 8082A (mg/Kg dry)									
PCB 1016	ND (0.12)	ND (0.13)	ND (0.12)	ND (0.13)	NT	NT	NT	NT	NT
PCB 1221	ND (0.12)	ND (0.13)	ND (0.12)	ND (0.13)	NT	NT	NT	NT	NT
PCB 1232	ND (0.12)	ND (0.13)	ND (0.12)	ND (0.13)	NT	NT	NT	NT	NT
PCB 1242	ND (0.12)	ND (0.13)	ND (0.12)	ND (0.13)	NT	NT	NT	NT	NT
PCB 1248	ND (0.12)	ND (0.13)	ND (0.12)	ND (0.13)	NT	NT	NT	NT	NT
PCB 1254	0.26	**1.3**	0.17	0.34	NT	NT	NT	NT	NT
PCB 1260	ND (0.12)	ND (0.13)	ND (0.12)	ND (0.13)	NT	NT	NT	NT	NT
PCB 1262	ND (0.12)	ND (0.13)	ND (0.12)	ND (0.13)	NT	NT	NT	NT	NT
PCB 1268	ND (0.12)	ND (0.13)	ND (0.12)	ND (0.13)	NT	NT	NT	NT	NT
SW-846 8100 Modified (mg/Kg dry)									
TPH	**3200**	**3100**	**2100**	**2100**	NT	NT	NT	NT	NT
SW-846 8151A (mg/kg dry)									
2,4-D	ND (0.13)	ND (0.12)	ND (0.12)	ND (0.13)	NT	NT	NT	NT	NT
2,4-DB	0.41	0.52	0.15	0.24	NT	NT	NT	NT	NT
2,4,5-TP (SILVEX)	ND (0.013)	ND (0.012)	ND (0.012)	ND (0.013)	NT	NT	NT	NT	NT
2,4,5-T	ND (0.013)	ND (0.012)	ND (0.012)	ND (0.013)	NT	NT	NT	NT	NT
DALAPON	ND (0.31)	ND (0.31)	ND (0.30)	ND (0.32)	NT	NT	NT	NT	NT
DICAMBA	ND (0.013)	ND (0.012)	ND (0.012)	ND (0.013)	NT	NT	NT	NT	NT
DICHLOROPROP	ND (0.13)	ND (0.12)	ND (0.12)	ND (0.13)	NT	NT	NT	NT	NT
DINOSEB	ND (0.063)	ND (0.062)	ND (0.059)	ND (0.063)	NT	NT	NT	NT	NT
MCPA	ND (13)	ND (12)	ND (12)	ND (13)	NT	NT	NT	NT	NT
MCPP	ND (13)	ND (12)	ND (12)	ND (13)	NT	NT	NT	NT	NT
SW-846 8260C (mg/Kg dry)					mg/kg wet	mg/kg wet	mg/kg wet	mg/kg wet	mg/kg wet
ACETONE	NT	NT	NT	NT	ND (23)	ND (31)	ND (28)	ND (4.6)	ND (26)
TERT-AMYLMETHYL ETHER	NT	NT	NT	NT	ND (0.23)	ND (0.31)	ND (0.28)	ND (0.046)	ND (0.26)
BENZENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
BROMOBENZENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
BROMOCHLOROMETHANE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
BROMODICHLOROMETHANE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
BROMOFORM	NT	NT	NT	NT	ND (0.91)	ND (1.2)	ND (1.1)	ND (0.19)	ND (1.0)
BROMOMETHANE	NT	NT	NT	NT	ND (2.3)	ND (3.1)	ND (2.8)	ND (0.46)	ND (2.6)
2-BUTANONE (MEK)	NT	NT	NT	NT	ND (9.1)	ND (12)	ND (11)	ND (1.9)	ND (10)
N-BUTYLBENZENE	NT	NT	NT	NT	0.93	1.1	2.4	ND (0.093)	1.3
SEC-BUTYLBENZENE	NT	NT	NT	NT	0.48	ND (0.61)	1.1	ND (0.093)	0.68
TERT-BUTYLBENZENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
TERT-BUTYLETHYL ETHER	NT	NT	NT	NT	ND (0.23)	ND (0.31)	ND (0.28)	ND (0.046)	ND (0.26)
CARBON DISULFIDE	NT	NT	NT	NT	ND (4.5)	ND (6.1)	ND (5.5)	ND (0.93)	ND (5.1)
CARBON TETRACHLORIDE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
CHLOROBENZENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
CHLORODIBROMOMETHANE	NT	NT	NT	NT	ND (0.91)	ND (1.2)	ND (1.1)	ND (0.19)	ND (1.0)
CHLOROETHANE	NT	NT	NT	NT	ND (0.91)	ND (1.2)	ND (1.1)	ND (0.19)	ND (1.0)
CHLOROFORM	NT	NT	NT	NT	ND (0.91)	ND (1.2)	ND (1.1)	ND (0.19)	ND (1.0)
CHLOROMETHANE	NT	NT	NT	NT	ND (0.91)	ND (1.2)	ND (1.1)	ND (0.19)	ND (1.0)
2-CHLOROTOLUENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
4-CHLOROTOLUENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
1,2-DIBROMO-3-CHLOROPROPANE	NT	NT	NT	NT	ND (2.3)	ND (3.1)	ND (2.8)	ND (0.46)	ND (2.6)
1,2-DIBROMOETHANE (EDB)	NT	NT	NT	NT	ND (0.23)	ND (0.31)	ND (0.28)	ND (0.046)	ND (0.26)
DIBROMOMETHANE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
1,2-DICHLOROBENZENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
1,3-DICHLOROBENZENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
1,4-DICHLOROBENZENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
DICHLORODIFLUOROMETHANE	NT	NT	NT	NT	ND (0.91)	ND (1.2)	ND (1.1)	ND (0.19)	ND (1.0)
1,1-DICHLOROETHANE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
1,2-DICHLOROETHANE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
1,1-DICHLOROETHYLENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
CIS-1,2-DICHLOROETHYLENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)

Table 4
Summary of Soil Analytical Data: Disposal Criteria Testing for Stockpiled Soils and *In-Situ* Soils

Parameter					SAMPLING LOCATION				
	Comp1	Comp2	Comp3	Comp4	B-14 (10-15)	B-14A (10-15)	B-26 (10-13)	B-27 (5-10)	B-28 (10-15)
TRANS-1,2-DICHLOROETHYLENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
1,2-DICHLOROPROPANE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
1,3-DICHLOROPROPANE	NT	NT	NT	NT	ND (0.23)	ND (0.31)	ND (0.28)	ND (0.046)	ND (0.26)
2,2-DICHLOROPROPANE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
1,1-DICHLOROPROPENE	NT	NT	NT	NT	ND (0.91)	ND (1.2)	ND (1.1)	ND (0.19)	ND (1.0)
CIS-1,3-DICHLOROPROPENE	NT	NT	NT	NT	ND (0.23)	ND (0.31)	ND (0.28)	ND (0.046)	ND (0.26)
TRANS-1,3-DICHLOROPROPENE	NT	NT	NT	NT	ND (0.23)	ND (0.31)	ND (0.28)	ND (0.046)	ND (0.26)
DIETHYL ETHER	NT	NT	NT	NT	ND (0.91)	ND (1.2)	ND (1.1)	ND (0.19)	ND (1.0)
DIISOPROPYL ETHER	NT	NT	NT	NT	ND (0.23)	ND (0.31)	ND (0.28)	ND (0.046)	ND (0.26)
1,4-DIOXANE	NT	NT	NT	NT	ND (23)	ND (31)	ND (28)	ND (4.6)	ND (26)
ETHYLBENZENE	NT	NT	NT	NT	0.46	ND (0.61)	0.62	ND (0.093)	0.97
HEXACHLOROBUTADIENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
2-HEXANONE	NT	NT	NT	NT	ND (4.5)	ND (6.1)	ND (5.5)	ND (0.93)	ND (5.1)
ISOPROPYLBENZENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	0.79	ND (0.093)	ND (0.51)
P-ISOPROPYLTOLUENE	NT	NT	NT	NT	0.90	1.2	2.5	ND (0.093)	3.2
METHYL TERT-BUTYL ETHER (MTBE)	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
METHYLENE CHLORIDE	NT	NT	NT	NT	ND (2.3)	ND (3.1)	ND (2.8)	ND (0.46)	ND (2.6)
4-METHYL-2-PENTANONE (MIBK)	NT	NT	NT	NT	ND (4.5)	ND (6.1)	ND (5.5)	ND (0.93)	ND (5.1)
NAPHTHALENE	NT	NT	NT	NT	13	19	20	ND (0.46)	6.7
N-PROPYLBENZENE	NT	NT	NT	NT	0.68	0.86	1.2	ND (0.093)	0.68
STYRENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
1,1,1,2-TETRACHLOROETHANE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
1,1,2,2-TETRACHLOROETHANE	NT	NT	NT	NT	ND (0.23)	ND (0.31)	ND (0.28)	ND (0.046)	ND (0.26)
TETRACHLOROETHYLENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
TETRAHYDROFURAN	NT	NT	NT	NT	ND (1.8)	ND (2.5)	ND (2.2)	ND (0.37)	ND (2.0)
TOLUENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	0.78	ND (0.093)	0.69
1,2,3-TRICHLOROBENZENE	NT	NT	NT	NT	ND (2.3)	ND (3.1)	ND (2.8)	ND (0.46)	ND (2.6)
1,2,4-TRICHLOROBENZENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
1,1,1-TRICHLOROETHANE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
1,1,2-TRICHLOROETHANE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
TRICHLOROETHYLENE	NT	NT	NT	NT	ND (0.45)	ND (0.61)	ND (0.55)	ND (0.093)	ND (0.51)
TRICHLOROFLUOROMETHANE	NT	NT	NT	NT	ND (0.91)	ND (1.2)	ND (1.1)	ND (0.19)	ND (1.0)
1,2,3-TRICHLOROPROPANE	NT	NT	NT	NT	ND (0.91)	ND (1.2)	ND (1.1)	ND (0.19)	ND (1.0)
1,2,4-TRIMETHYLBENZENE	NT	NT	NT	NT	8.3	11	12	ND (0.093)	9.0
1,3,5-TRIMETHYLBENZENE	NT	NT	NT	NT	2.9	3.8	5.4	ND (0.093)	6.2
VINYL CHLORIDE	NT	NT	NT	NT	ND (0.91)	ND (1.2)	ND (1.1)	ND (0.19)	ND (1.0)
M/P-XYLENE	NT	NT	NT	NT	1.7	2.4	2.4	ND (0.19)	2.7
O-XYLENE	NT	NT	NT	NT	1.4	1.9	4.4	ND (0.093)	1.8

Table 4
Summary of Soil Analytical Data: Disposal Criteria Testing for Stockpiled Soils and *In-Situ* Soils

Parameter					SAMPLING LOCATION				
	Comp1	Comp2	Comp3	Comp4	B-14 (10-15)	B-14A (10-15)	B-26 (10-13)	B-27 (5-10)	B-28 (10-15)
SW-846 8270D (mg/Kg dry)									
ACENAPHTHENE	ND (4.2) *	ND (4.2) *	ND (4.1) *	ND (8.4) *	NT	NT	NT	NT	NT
ACENAPHTHYLENE	ND (4.2) *	ND (4.2) *	ND (4.1) *	ND (8.4) *	NT	NT	NT	NT	NT
ACETOPHENONE	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
ANILINE	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
ANTHRACENE	ND (4.2)	ND (4.2)	ND (4.1)	ND (8.4)	NT	NT	NT	NT	NT
BENZO(A)ANTHRACENE	ND (4.2)	ND (4.2)	ND (4.1)	ND (8.4) *	NT	NT	NT	NT	NT
BENZO(A)PYRENE	ND (4.2) *	ND (4.2) *	ND (4.1) *	ND (8.4) *	NT	NT	NT	NT	NT
BENZO(B)FLUORANTHENE	ND (4.2)	ND (4.2)	ND (4.1)	ND (8.4) *	NT	NT	NT	NT	NT
BENZO(G,H,I)PERYLENE	ND (4.2)	ND (4.2)	ND (4.1)	ND (8.4)	NT	NT	NT	NT	NT
BENZO(K)FLUORANTHENE	ND (4.2)	ND (4.2)	ND (4.1)	ND (8.4)	NT	NT	NT	NT	NT
BIS(2-CHLOROETHOXY)METHANE	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
BIS(2-CHLOROETHYL)ETHER	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
BIS(2-CHLOROISOPROPYL)ETHER	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
BIS(2-ETHYLHEXYL)PHTHALATE	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
4-BROMOPHENYL PHENYL ETHER	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
BUTYLBENZYLPHTHALATE	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
4-CHLOROANILINE	ND (16) *	ND (16) *	ND (16) *	ND (33) *	NT	NT	NT	NT	NT
2-CHLORONAPHTHALENE	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
2-CHLOROPHENOL	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
CHRYSENE	ND (4.2)	ND (4.2)	ND (4.1)	ND (8.4)	NT	NT	NT	NT	NT
DIBENZ(A,H)ANTHRACENE	ND (4.2) *	ND (4.2) *	ND (4.1) *	ND (8.4) *	NT	NT	NT	NT	NT
DIBENZOFURAN	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
DI-N-BUTYLPHTHALATE	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
1,2-DICHLOROBENZENE	ND (8.4)	ND (8.5)	ND (8.3)	ND (17) *	NT	NT	NT	NT	NT
1,3-DICHLOROBENZENE	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
1,4-DICHLOROBENZENE	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
3,3'-DICHLOROBENZIDINE	ND (4.2) *	ND (4.2) *	ND (4.1) *	ND (8.4) *	NT	NT	NT	NT	NT
2,4-DICHLOROPHENOL	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
DIETHYLPHTHALATE	ND (8.4)	ND (8.5)	ND (8.3)	ND (17) *	NT	NT	NT	NT	NT
2,4-DIMETHYLPHENOL	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
DIMETHYLPHTHALATE	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
2,4-DINITROPHENOL	ND (16) *	ND (16) *	ND (16) *	ND (33) *	NT	NT	NT	NT	NT
2,4-DINITROTOLUENE	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
2,6-DINITROTOLUENE	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
DI-N-OCTYLPHTHALATE	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
1,2-DIPHENYLHYDRAZINE (AZOBENZENE)	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
FLUORANTHENE	ND (4.2)	ND (4.2)	ND (4.1)	ND (8.4)	NT	NT	NT	NT	NT
FLUORENE	ND (4.2)	ND (4.2)	ND (4.1)	ND (8.4)	NT	NT	NT	NT	NT
HEXACHLOROBENZENE	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
HEXACHLOROBUTADIENE	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
HEXACHLOROETHANE	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
INDENO(1,2,3-CD)PYRENE	ND (4.2)	ND (4.2)	ND (4.1)	ND (8.4) *	NT	NT	NT	NT	NT
ISOPHORONE	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
2-METHYLNAPHTHALENE	**15**	**18**	**12**	**12**	NT	NT	NT	NT	NT
O-CRESOL	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
M/P-CRESOL	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
NAPHTHALENE	**4.4**	**5.1**	ND (4.1) *	ND (8.4) *	NT	NT	NT	NT	NT
NITROBENZENE	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
2-NITROPHENOL	ND (8.4)	ND (8.5)	ND (8.3)	ND (17)	NT	NT	NT	NT	NT
4-NITROPHENOL	ND (16)	ND (16)	ND (16)	ND (33)	NT	NT	NT	NT	NT
PENTACHLOROPHENOL	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
PHENANTHRENE	**11**	**13**	10	**11**	NT	NT	NT	NT	NT
PHENOL	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
PYRENE	12	13	13	12	NT	NT	NT	NT	NT
PYRIDINE	NT	NT	NT	NT	NT	NT	NT	NT	NT
1,2,4-TRICHLOROBENZENE	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT

Table 4
Summary of Soil Analytical Data: Disposal Criteria Testing for Stockpiled Soils and *In-Situ* Soils

Parameter					SAMPLING LOCATION				
	Comp1	Comp2	Comp3	Comp4	B-14 (10-15)	B-14A (10-15)	B-26 (10-13)	B-27 (5-10)	B-28 (10-15)
2,4,5-TRICHLOROPHENOL	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
2,4,6-TRICHLOROPHENOL	ND (8.4) *	ND (8.5) *	ND (8.3) *	ND (17) *	NT	NT	NT	NT	NT
SW-846 9014 (mg/Kg)									
REACTIVE CYANIDE	ND (4.0)	ND (3.9)	ND (4.0)	ND (3.9)	NT	NT	NT	NT	NT
SW-846 9030A (mg/Kg)									
REACTIVE SULFIDE	ND (20)	ND (20)	ND (20)	ND (20)	NT	NT	NT	NT	NT
SW-846 9045C (pH Units)									
PH	9.0	9.6	9.0	8.6	NT	NT	NT	NT	NT
NOTES:									
1. An asterisk (*) following a detection limit									
indicates that the minimum laboratory reporting									
limit exceeds one or more of the regul. criteria.									
2. ND = Not detected above the lab reporting									
limits shown in parenthesis.									
3. NT = Not tested.									
4. ~ = No Method 1 Standard or UCL available									
5. Bolded values exceed the Method 1 Cleanup									
Standards.									

Table 5
Summary of Tank Water Analytical Data: Gasoline Tank Pull
169.2 Bridge St.
Lowell, MA

Parameter	Reportable Concentrations (RCs)	MCP - Method 1 Cleanup Standards		Upper Concentration Limit (UCL)	SAMPLING LOCATION	
	RCGW-2	GW-2	GW-3	UCL	GT-1	GT-2
Sampling Date					3/7/2016	3/7/2016
Sample Depth						
SW-846 8082A (µg/L)						
PCB 1016	5	5	10	100	ND (0.20)	ND (0.20)
PCB 1221	5	5	10	100	ND (0.20)	ND (0.20)
PCB 1232	5	5	10	100	ND (0.20)	ND (0.20)
PCB 1242	5	5	10	100	ND (0.20)	ND (0.20)
PCB 1248	5	5	10	100	ND (0.20)	ND (0.20)
PCB 1254	5	5	10	100	1.2	1.5
PCB 1260	5	5	10	100	ND (0.20)	ND (0.20)
PCB 1262	5	5	10	100	ND (0.20)	ND (0.20)
PCB 1268	5	5	10	100	ND (0.20)	ND (0.20)
NOTES:						
1. An asterisk (*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one						
or more of the regulatory criteria.						
2. ND = Not detected above the lab reporting limits shown in parenthesis.						
3. NT = Not tested.						
4. ~ = No Applicable Method 1 Standard or UCL available						
5. Bolded values exceed the Method 1 Cleanup Standards.						

Table 6.1
Summary of PCB Congener Data for Courtyard Soil Samples

Analyte	Units	B-5 (0-1')	B-7 (1-3')	B-9 (0-1')	B-11 (1-3)
Date Sampled		14-Mar-16	14-Mar-16	14-Mar-16	14-Mar-16
Sample Depth		0-1 Feet	1-3 Feet	0-1 Feet	1-3 Feet
SW846-8270M					
Cl1-BZ#1	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl1-BZ#2	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl1-BZ#3	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl2-BZ#4/#10	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl2-BZ#9	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl2-BZ#7	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl2-BZ#6	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl2-BZ#5	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl2-BZ#8	µg/kg	<1.9	3.5	<2.0	<0.38
Cl3-BZ#19	µg/kg	<1.9	2.4	4.5	<0.38
Cl2-BZ#14	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl3-BZ#30	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl3-BZ#18	µg/kg	3.5	12	16	<0.38
Cl2-BZ#11	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl3-BZ#17	µg/kg	1.9	4.6	6.2	<0.38
Cl2-BZ#12	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl3-BZ#27	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl2-BZ#13	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl3-BZ#24	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl3-BZ#16	µg/kg	<1.9	4.6	<2.0	<0.38
Cl3-BZ#32	µg/kg	<1.9	5.7	9.4	<0.38
Cl2-BZ#15	µg/kg	2.1	4.9	6.4	<0.38
Cl3-BZ#34	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl4-BZ#54	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl3-BZ#23	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl3-BZ#29	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl4-BZ#50	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl3-BZ#26	µg/kg	<1.9	2.5	<2.0	<0.38
Cl3-BZ#25	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl4-BZ#53	µg/kg	4.1	9	21	<0.75
Cl3-BZ#31	µg/kg	3.5	11	19	<0.38
Cl3-BZ#28	µg/kg	5.4	13	27	<0.38
Cl3-BZ#33/#21/#20	µg/kg	<5.6	<5.7	<5.9	<1.1
Cl4-BZ#51	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl4-BZ#45	µg/kg	<3.8	6.3	11	<0.75
Cl3-BZ#22	µg/kg	<1.9	4.3	9.9	<0.38
Cl4-BZ#46	µg/kg	<3.8	<3.8	6.5	<0.75
Cl4-BZ#73	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl4-BZ#69	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl4-BZ#43	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl3-BZ#36	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl4-BZ#52	µg/kg	91	240	820	1.2
Cl4-BZ#48	µg/kg	<3.8	5.1	14	<0.75
Cl4-BZ#49	µg/kg	19	52	130	<0.75
Cl5-BZ#104	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl4-BZ#47/#65/#62	µg/kg	<11	<11	23	<2.3
Cl4-BZ#75	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl3-BZ#39	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl3-BZ#38	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl4-BZ#44	µg/kg	42	120	310	<0.75
Cl4-BZ#59	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl4-BZ#42	µg/kg	5.4	13	31	<0.75
Cl4-BZ#71	µg/kg	4.7	13	29	<0.75
Cl3-BZ#35	µg/kg	<1.9	<1.9	<2.0	<0.38
Cl4-BZ#41	µg/kg	<3.8	<3.8	4.1	<0.75
Cl5-BZ#96	µg/kg	<3.8	<3.8	7.6	<0.75
Cl4-BZ#72	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl5-BZ#103	µg/kg	<3.8	<3.8	6.4	<0.75
Cl4-BZ#64	µg/kg	9.9	31	67	<0.75
Cl4-BZ#40/#68	µg/kg	<7.5	<7.6	13	<1.5
Cl3-BZ#37	µg/kg	<5.6	6.6	13	<1.1
Cl5-BZ#100	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl5-BZ#94	µg/kg	<3.8	<3.8	4.7	<0.75
Cl4-BZ#57	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl4-BZ#67/#58	µg/kg	<7.5	<7.6	<7.9	<1.5
Cl5-BZ#102	µg/kg	5.9	9.9	34	<0.75
Cl4-BZ#61	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl5-BZ#98	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl5-BZ#93	µg/kg	<19	<19	<20	<3.8

Table 6.1
Summary of PCB Congener Data for Courtyard Soil Samples

Analyte	Units	B-5 (0-1')	B-7 (1-3')	B-9 (0-1')	B-11 (1-3)
Date Sampled		14-Mar-16	14-Mar-16	14-Mar-16	14-Mar-16
Sample Depth		0-1 Feet	1-3 Feet	0-1 Feet	1-3 Feet
Cl4-BZ#76	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl4-BZ#63	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl5-BZ#88/#95	µg/kg	210	390	1600	2.1
Cl5-BZ#121	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl4-BZ#74	µg/kg	9.3	28	65	<0.75
Cl6-BZ#155	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl4-BZ#70	µg/kg	41	130	340	<0.75
Cl5-BZ#91	µg/kg	34	60	220	<0.75
Cl4-BZ#66	µg/kg	15	48	<3.9	<0.75
Cl4-BZ#80/#55	µg/kg	<7.5	<7.6	<7.9	<1.5
Cl5-BZ#92	µg/kg	53	100	330	<0.75
Cl5-BZ#89/#84	µg/kg	80	160	<7.9	<1.5
Cl4-BZ#56	µg/kg	8	24	75	<0.75
Cl5-BZ#90/#101	µg/kg	290	610	2000	2.5
Cl5-BZ#113	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl4-BZ#60	µg/kg	4.3	9.8	25	<0.75
Cl5-BZ#99	µg/kg	100	200	680	0.95
Cl6-BZ#150	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl6-BZ#152	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl5-BZ#119/#83	µg/kg	17	32	110	<1.5
Cl5-BZ#125/#112/#86	µg/kg	<11	<11	<12	<2.3
Cl5-BZ#109	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl6-BZ#145	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl5-BZ#97	µg/kg	99	200	670	0.91
Cl6-BZ#148	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl4-BZ#79	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl5-BZ#116	µg/kg	<3.8	4.3	<3.9	<0.75
Cl5-BZ#87	µg/kg	130	280	890	1.2
Cl4-BZ#78	µg/kg	<3.8	<3.8	32	<0.75
Cl6-BZ#154/#136	µg/kg	33	60	200	<1.5
Cl5-BZ#111/#117/#115	µg/kg	<11	20	61	<2.3
Cl5-BZ#85	µg/kg	42	79	290	<0.75
Cl5-BZ#120/#110	µg/kg	340	640	2200	3.1
Cl4-BZ#81	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl6-BZ#151	µg/kg	34	61	200	<0.75
Cl6-BZ#135	µg/kg	29	49	160	<0.75
Cl5-BZ#82	µg/kg	32	60	200	<0.75
Cl6-BZ#144	µg/kg	11	20	62	<0.75
Cl6-BZ#147/#149	µg/kg	180	320	1100	2
Cl4-BZ#77	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl6-BZ#143/#139	µg/kg	<7.5	11	36	<1.5
Cl6-BZ#140	µg/kg	<3.8	<3.8	6	<0.75
Cl5-BZ#124	µg/kg	11	21	70	<0.75
Cl5-BZ#108	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl5-BZ#123/#107	µg/kg	14	32	100	<1.5
Cl7-BZ#188	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl6-BZ#134	µg/kg	19	34	110	<0.75
Cl5-BZ#106	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl6-BZ#142	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl6-BZ#133/#131	µg/kg	10	16	59	<1.5
Cl5-BZ#118	µg/kg	210	450	1600	2.4
Cl7-BZ#184	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl6-BZ#165	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl6-BZ#146	µg/kg	32	53	170	<0.75
Cl5-BZ#122	µg/kg	<3.8	6.4	21	<0.75
Cl6-BZ#161	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl5-BZ#114	µg/kg	<3.8	8.8	19	<0.75
Cl6-BZ#168	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl6-BZ#153	µg/kg	190	340	1200	1.9
Cl6-BZ#132	µg/kg	110	190	700	1
Cl7-BZ#179	µg/kg	6.6	11	39	<0.75
Cl6-BZ#141	µg/kg	49	86	280	<0.75
Cl7-BZ#176	µg/kg	<3.8	4.7	16	<0.75
Cl5-BZ#105	µg/kg	59	150	440	0.79
Cl6-BZ#137	µg/kg	22	38	130	<0.75
Cl7-BZ#186	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl5-BZ#127	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl6-BZ#130/#164	µg/kg	40	69	230	<1.5
Cl7-BZ#178	µg/kg	<3.8	5.1	19	<0.75
Cl6-BZ#138	µg/kg	250	400	1600	2.5

Table 6.1
Summary of PCB Congener Data for Courtyard Soil Samples

Analyte	Units	B-5 (0-1')	B-7 (1-3')	B-9 (0-1')	B-11 (1-3)
Date Sampled		14-Mar-16	14-Mar-16	14-Mar-16	14-Mar-16
Sample Depth		0-1 Feet	1-3 Feet	0-1 Feet	1-3 Feet
Cl6-BZ#160/#129/#163	µg/kg	81	140	480	<2.3
Cl6-BZ#158	µg/kg	32	58	190	<0.75
Cl7-BZ#182/#175	µg/kg	<7.5	<7.6	<7.9	<1.5
Cl7-BZ#187	µg/kg	18	30	110	<0.75
Cl7-BZ#183	µg/kg	12	20	67	<0.75
Cl6-BZ#166	µg/kg	<3.8	<3.8	7.8	<0.75
Cl6-BZ#159	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl5-BZ#126	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl7-BZ#185	µg/kg	<3.8	<3.8	11	<0.75
Cl6-BZ#128/#162	µg/kg	58	100	360	<1.5
Cl7-BZ#174	µg/kg	19	34	110	<0.75
Cl8-BZ#202	µg/kg	<5.6	<5.7	7	<1.1
Cl6-BZ#167	µg/kg	13	22	69	<0.75
Cl7-BZ#181	µg/kg	<3.8	<3.8	4.4	<0.75
Cl7-BZ#177	µg/kg	13	22	74	<0.75
Cl8-BZ#200/#204	µg/kg	<11	<11	<12	<2.3
Cl7-BZ#171	µg/kg	8.4	14	47	<0.75
Cl7-BZ#173	µg/kg	<3.8	<3.8	5.3	<0.75
Cl8-BZ#197	µg/kg	<5.6	<5.7	<5.9	<1.1
Cl7-BZ#172	µg/kg	<11	<11	26	<2.3
Cl6-BZ#156	µg/kg	28	60	<3.9	<0.75
Cl7-BZ#192	µg/kg	<7.5	<7.6	<7.9	<1.5
Cl6-BZ#157	µg/kg	8.8	17	59	<0.75
Cl7-BZ#180	µg/kg	49	83	300	0.86
Cl7-BZ#193	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl8-BZ#199	µg/kg	<5.6	<5.7	<5.9	<1.1
Cl7-BZ#191	µg/kg	<3.8	<3.8	7	<0.75
Cl8-BZ#198	µg/kg	<5.6	<5.7	<5.9	<1.1
Cl8-BZ#201	µg/kg	<5.6	8.4	29	<1.1
Cl7-BZ#170	µg/kg	28	46	150	<0.75
Cl7-BZ#190	µg/kg	4.5	8.6	28	<0.75
Cl8-BZ#196	µg/kg	<5.6	<5.7	12	<1.1
Cl8-BZ#203	µg/kg	<5.6	<5.7	24	<1.1
Cl6-BZ#169	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl9-BZ#208	µg/kg	<5.6	<5.7	<5.9	<1.1
Cl9-BZ#207	µg/kg	<5.6	<5.7	<5.9	<1.1
Cl7-BZ#189	µg/kg	<3.8	<3.8	8.8	<0.75
Cl8-BZ#195	µg/kg	<5.6	<5.7	10	<1.1
Cl8-BZ#194	µg/kg	<5.6	6.6	25	<1.1
Cl8-BZ#205	µg/kg	<5.6	<5.7	<5.9	<1.1
Cl9-BZ#206	µg/kg	<5.6	<5.7	17	<1.1
Cl10-BZ#209	µg/kg	<5.6	<5.7	7.7	1.3
TOTAL CONGENERS	µg/kg	3385	6755	22245	25
SW-846 8082A					
Aroclor 1254	µg/kg	7000	6000	42000	160
SM 2540G (% Wt)					
% Solids	% Wt	88.6	86.7	84.1	88.2

PCB analysis via USEPA 8082A only detected Aroclor 1254. Refer to Table 6 for summary of data for 8082A analyses.

Table 6.2
Summary of Dioxin-Like PCB Congener Data for Courtyard Soil Samples

Analyte	Units	B-5 (0-1')	B-7 (1-3')	B-9 (0-1')	B-11 (1-3)
Date Sampled		14-Mar-16	14-Mar-16	14-Mar-16	14-Mar-16
Sample Depth		0-1 Feet	1-3 Feet	0-1 Feet	1-3 Feet
Cl4-BZ#81	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl4-BZ#77	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl5-BZ#123/#107	µg/kg	14	32	100	<1.5
Cl5-BZ#118	µg/kg	210	450	1600	2.4
Cl5-BZ#114	µg/kg	<3.8	8.8	19	<0.75
Cl5-BZ#105	µg/kg	59	150	440	0.79
Cl5-BZ#126	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl6-BZ#167	µg/kg	13	22	69	<0.75
Cl6-BZ#156	µg/kg	28	60	<3.9	<0.75
Cl6-BZ#157	µg/kg	8.8	17	59	<0.75
Cl6-BZ#169	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl7-BZ#189	µg/kg	<3.8	<3.8	8.8	<0.75

C14-BZ#77 = 3,3',4,4'-tetrachlorobiphenyl (TCB)
C14-BZ#81 = 3,4,4',5-TCB
C15-BZ#105 = 2,3,3',4,4'-pentachlorobiphenyl (PeCB)
C15-BZ#114 = 2,3,4,4',5-PeCB
C15-BZ#118 = 2,3',4,4',5-PeCB
C15-BZ#123 = 2',3,4,4',5-PeCB
C15-BZ#126 = 3,3',4,4',5-PeCB
C16-BZ#156 = 2,3,3',4,4',5-hexachlorobiphenyl (HxCB)
C16-BZ#157 = 2,3,3',4,4',5'-HxCB
C16-BZ#167 = 2,3',4,4',5,5'-HxCB
C16-BZ#169 = 3,3',4,4',5,5'-HxCB
C17-BZ#189 = 2,3,3',4,4',5,5'-heptachlorobiphenyl (HpCB)

List of Dioxin-Like Congeners obtained from Table 2 of USEPA's Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin & Dioxin-Like Compounds, (EPA/100/R 10/005/ December 2010)

Those Dioxin-Like Congeners shown in **bold text** were not detected in any sample, and therefore, were eliminated from further evaluation in Tables 16 and 17.

Table 6.3

Calculation of TCDD Toxic Equivalence for Soil Analytical Data: Dioxin-Like PCB Congeners

Analyte		Units	B-5 (0-1')	B-7 (1-3')	B-9 (0-1')	B-11 (1-3)
Date Sampled	TEF		14-Mar-16	14-Mar-16	14-Mar-16	14-Mar-16
Sample Depth			0-1 Feet	1-3 Feet	0-1 Feet	1-3 Feet
Cl5-BZ#123/#107	0.00003	µg/kg	14	32	100	0.75
Cl5-BZ#118	0.00003	µg/kg	210	450	1600	2.4
Cl5-BZ#114	0.00003	µg/kg	1.9	8.8	19	0.375
Cl5-BZ#105	0.00003	µg/kg	59	150	440	0.79
Cl6-BZ#167	0.00003	µg/kg	13	22	69	0.375
Cl6-BZ#156	0.00003	µg/kg	28	60	1.95	0.375
Cl6-BZ#157	0.00003	µg/kg	8.8	17	59	0.375
Cl7-BZ#189	0.00003	µg/kg	1.9	1.9	8.8	0.375
TEQ			1.01E-02	2.23E-02	6.89E-02	1.74E-04
Total Dioxin-Like Congeners		µg/kg	336.6	741.7	2297.75	5.815

C15-BZ#105 = 2,3,3',4,4'-pentachlorobiphenyl (PeCB)
C15-BZ#114 = 2,3,4,4',5-PeCB
C15-BZ#118 = 2,3',4,4',5-PeCB
C15-BZ#123 = 2',3,4,4',5-PeCB
C16-BZ#156 = 2,3,3',4,4',5-hexachlorobiphenyl (HxCB)
C16-BZ#157 = 2,3,3',4,4',5'-HxCB
C16-BZ#167 = 2,3',4,4',5,5'-HxCB
C17-BZ#189 = 2,3,3',4,4',5,5'-heptachlorobiphenyl (HpCB)

TEFs for Dioxin-Like Congeners obtained from Table 2 of USEPA's Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-*p* -dioxin & Dioxin-Like Compounds, (EPA/100/R 10/005/ December 2010)

TCDD = 2,3,7,8-Tetrachlorodibenzo-*p* -dioxin
TEF = TCDD Toxicity Equivalence Factor
TEQ = TCDD Toxic Equivalence (summation of products of congener concentration and TEF, for each congener *i*)

If no congener detected for a given sample, one-half the reported detection limit (<#) was used as a surrogate value.

Sample B-11 (1-3) contains a low level of PCB congeners and was not used for further analysis.

Table 6.4
Comparison of Total Dioxin-Like PCB Congeners to TCDD Equivalence and Total PCB Congeners

Analyte	**Units**	**B-5 (0-1')**	**B-7 (1-3')**	**B-9 (0-1')**
Date Sampled		14-Mar-16	14-Mar-16	14-Mar-16
Sample Depth		0-1 Feet	1-3 Feet	0-1 Feet
Total PCB-Congeners (Table 8)	mg/kg	3.3853	6.7551	22.2447
Total Dioxin-Like Congeners (Table 16)	mg/kg	0.3366	0.7417	2.29775
Dioxin-Like Congeners, as a percent of				
Total PCB-Congeners	%	9.9	11.0	10.3
TCDD Toxic Equivalence (Table 16)	mg/kg	1.01E-05	2.23E-05	6.89E-05
TCDD Toxic Equivalence as proportion		2.98E-06	3.30E-06	3.10E-06
of Total PCB-congeners				

Reference: USEPA's Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-*p* -dioxin & Dioxin-Like Compounds, (EPA/100/R 10/005/ December 2010)

TCDD = 2,3,7,8-Tetrachlorodibenzo-*p* -dioxin

TEF = TCDD Toxicity Equivalence Factor

TEQ = TCDD Toxic Equivalence (summation of products of congener concentration and TEF, for each congener *i*)

Table 7
Summary of Asbestos Analytical Data for Soils

Parameter	SAMPLING LOCATION								
	062316-45-01	**062316-45-02**	**062316-45-03**	**062316-45-04**	**062316-45-05**	**062316-45-06**	**062316-45-07**	**062316-45-08**	**062316-45-09**
Sampling Date	6/23/2016	6/23/2016	6/23/2016	6/23/2016	6/23/2016	6/23/2016	6/23/2016	6/23/2016	6/23/2016
Sample Depth	Stockpile: "HI Elevation"	Stockpile: "MID Elevation"	Stockpile: "LOW Elevation"	Courtyard Area 1 (Shallow)	Courtyard Area 2 (Shallow)	Courtyard Area 3 (Shallow)	Courtyard Area 4 (Shallow)	Courtyard Area 5 (Shallow)	Courtyard Area 6 (Shallow)
	not quantified	***not quantified***	***not quantified***	***not quantified***	***not quantified***	***not quantified***	***not quantified***	***not quantified***	***not quantified***
ASBESTOS - CHRYSOTILE	Detected	Detected	Detected	Detected		Detected	Detected	Detected	Detected
ASBESTOS - AMOSITE					Detected				
ASBESTOS - CROCIDOLITE									
ASBESTOS - ACTINOLITE									
ASBESTOS - TREMOLITE									
ASBESTOS - ANTHOPHYLLITE									
FIBERGLASS									
MINERAL WOOL									
CELLULOSE									
HAIR									
SYNTHETIC									
OTHER NON-ASBESTOS									
NON-FIBROUS MINERALS									
BINDER/FILLER									
NOTES:									
1. All sampling depths are relative to current conditions, following excavation of soils from the eastern courtyard.									

Table 7
Summary of Asbestos Analytical Data for Soils

Parameter	SAMPLING LOCATION										
	B-14A (0-5)	B-14A (10-15)	B-14A (15-16.5)	B-14A (5-10)	B-15 (5-10)	B-16 (5-10)	B-17 (5-7.5)	B-19 (5-10)	B-21 (0-5)	B-21 (10-13.5)	B-21 (5-10)
Sampling Date	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/16/2016	9/16/2016	9/16/2016
Sample Depth	0-5 Feet	10-15 Feet	15-16.5 Feet	5-10 Feet	5-10 Feet	5-10 Feet	5-7.5 Feet	5-10 Feet	0-5 Feet	10-13.5 Feet	5-10 Feet
	Unit, Percent (%)	*Unit, Percent (%)*	*Unit, Percent (%)*	*Unit, Percent (%)*	*Unit, Percent (%)*	*Unit, Percent (%)*	*Unit, Percent (%)*	*Unit, Percent (%)*	*Unit, Percent (%)*	*Unit, Percent (%)*	*Unit, Percent (%)*
ASBESTOS - CHRYSOTILE	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	2	ND ()	ND ()
ASBESTOS - AMOSITE	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()
ASBESTOS - CROCIDOLITE	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()
ASBESTOS - ACTINOLITE	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()
ASBESTOS - TREMOLITE	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()
ASBESTOS - ANTHOPHYLLITE	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()
FIBERGLASS	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()
MINERAL WOOL	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()
CELLULOSE	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()
HAIR	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()
SYNTHETIC	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()
OTHER NON-ASBESTOS	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()
NON-FIBROUS MINERALS	100	100	100	100	100	100	100	100	98	100	100
BINDER/FILLER	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()	ND ()
NOTES:											
1. All sampling depths are relati											

Table 7
Summary of Asbestos Analytical Data for Soils

Parameter	SAMPLING LOCATION			
	Comp 1	Comp 2	Comp 3	Comp 4
Sampling Date	9/16/2016	9/16/2016	9/16/2016	9/16/2016
Sample Depth				
	Unit, Percent (%)	*Unit, Percent (%)*	*Unit, Percent (%)*	*Unit, Percent (%)*
ASBESTOS - CHRYSOTILE	ND ()	ND ()	ND ()	ND ()
ASBESTOS - AMOSITE	ND ()	ND ()	ND ()	ND ()
ASBESTOS - CROCIDOLITE	ND ()	ND ()	ND ()	ND ()
ASBESTOS - ACTINOLITE	ND ()	ND ()	ND ()	ND ()
ASBESTOS - TREMOLITE	ND ()	ND ()	ND ()	ND ()
ASBESTOS - ANTHOPHYLLITE	ND ()	ND ()	ND ()	ND ()
FIBERGLASS	ND ()	ND ()	ND ()	ND ()
MINERAL WOOL	ND ()	ND ()	ND ()	ND ()
CELLULOSE	ND ()	ND ()	ND ()	ND ()
HAIR	ND ()	ND ()	ND ()	ND ()
SYNTHETIC	ND ()	ND ()	ND ()	ND ()
OTHER NON-ASBESTOS	ND ()	ND ()	ND ()	ND ()
NON-FIBROUS MINERALS	100	100	100	100
BINDER/FILLER	ND ()	ND ()	ND ()	ND ()
NOTES:				
1. All sampling depths are relat				

Table 8
Summary of Analytical Data for River Water in Containment

Parameter	SAMPLING LOCATION		
	Containment H20	Containment H20	River (Surface)
Sampling Date	9/27/2016	9/30/2016	10/3/2016
SW-846 6020A-B (µg/L) Metals Digestion			
ANTIMONY	ND (1.0)	NT	NT
ARSENIC	0.86	NT	NT
BARIUM	17	NT	NT
BERYLLIUM	ND (0.40)	NT	NT
CADMIUM	ND (0.50)	NT	NT
CHROMIUM	1.2	NT	NT
LEAD	1.8	NT	NT
NICKEL	ND (5.0)	NT	NT
SELENIUM	ND (5.0)	NT	NT
SILVER	ND (0.50)	NT	NT
THALLIUM	ND (0.20)	NT	NT
VANADIUM	ND (5.0)	NT	NT
ZINC	ND (10)	NT	NT
SW-846 7470A (mg/L) Metals Digestion			
MERCURY	ND (0.00010)	NT	NT
SW-846 8082A (µg/L)			
PCB 1016	ND (0.20)	NT	NT
PCB 1221	ND (0.20)	NT	NT
PCB 1232	ND (0.20)	NT	NT
PCB 1242	ND (0.20)	NT	NT
PCB 1248	ND (0.20)	NT	NT
PCB 1254	ND (0.20)	NT	NT
PCB 1260	ND (0.20)	NT	NT
PCB 1262	ND (0.20)	NT	NT
PCB 1268	ND (0.20)	NT	NT
SW-846 8260C (µg/L)			
ACETONE	ND (80)	NT	NT
TERT-AMYLMETHYL ETHER	ND (2.0)	NT	NT
BENZENE	ND (4.0)	NT	NT
BROMOBENZENE	ND (4.0)	NT	NT
BROMOCHLOROMETHANE	ND (4.0)	NT	NT
BROMODICHLOROMETHANE	ND (4.0)	NT	NT
BROMOFORM	ND (4.0)	NT	NT
BROMOMETHANE	ND (8.0)	NT	NT
2-BUTANONE (MEK)	ND (40)	NT	NT
N-BUTYLBENZENE	ND (4.0)	NT	NT
SEC-BUTYLBENZENE	ND (4.0)	NT	NT
TERT-BUTYLBENZENE	ND (4.0)	NT	NT
TERT-BUTYLETHYL ETHER	ND (2.0)	NT	NT
CARBON DISULFIDE	ND (20)	NT	NT
CARBON TETRACHLORIDE	ND (4.0)	NT	NT
CHLOROBENZENE	ND (4.0)	NT	NT
CHLORODIBROMOMETHANE	ND (2.0)	NT	NT
CHLOROETHANE	ND (8.0)	NT	NT
CHLOROFORM	ND (8.0)	NT	NT
CHLOROMETHANE	ND (20)	NT	NT
2-CHLOROTOLUENE	ND (4.0)	NT	NT
4-CHLOROTOLUENE	ND (4.0)	NT	NT
1,2-DIBROMO-3-CHLOROPROPANE	ND (8.0)	NT	NT
1,2-DIBROMOETHANE (EDB)	ND (2.0)	NT	NT
DIBROMOMETHANE	ND (4.0)	NT	NT
1,2-DICHLOROBENZENE	ND (4.0)	NT	NT
1,3-DICHLOROBENZENE	ND (4.0)	NT	NT
1,4-DICHLOROBENZENE	ND (4.0)	NT	NT
DICHLORODIFLUOROMETHANE	ND (8.0)	NT	NT
1,1-DICHLOROETHANE	ND (4.0)	NT	NT
1,2-DICHLOROETHANE	ND (4.0)	NT	NT
1,1-DICHLOROETHYLENE	ND (4.0)	NT	NT
CIS-1,2-DICHLOROETHYLENE	ND (4.0)	NT	NT

Table 8
Summary of Analytical Data for River Water in Containment

Parameter	SAMPLING LOCATION		
	Containment H20	**Containment H20**	**River (Surface)**
Sampling Date	9/27/2016	9/30/2016	10/3/2016
TRANS-1,2-DICHLOROETHYLENE	ND (4.0)	NT	NT
1,2-DICHLOROPROPANE	ND (4.0)	NT	NT
1,3-DICHLOROPROPANE	ND (2.0)	NT	NT
2,2-DICHLOROPROPANE	ND (4.0)	NT	NT
1,1-DICHLOROPROPENE	ND (2.0)	NT	NT
CIS-1,3-DICHLOROPROPENE	ND (1.6)	NT	NT
TRANS-1,3-DICHLOROPROPENE	ND (1.6)	NT	NT
DIETHYL ETHER	ND (8.0)	NT	NT
DIISOPROPYL ETHER	ND (2.0)	NT	NT
1,4-DIOXANE	ND (200)	NT	NT
ETHYLBENZENE	ND (4.0)	NT	NT
HEXACHLOROBUTADIENE	ND (4.0)	NT	NT
2-HEXANONE	ND (40)	NT	NT
ISOPROPYLBENZENE	ND (20)	NT	NT
P-ISOPROPYLTOLUENE	ND (4.0)	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	ND (4.0)	NT	NT
METHYLENE CHLORIDE	ND (20)	NT	NT
4-METHYL-2-PENTANONE (MIBK)	ND (40)	NT	NT
NAPHTHALENE	ND (8.0)	NT	NT
N-PROPYLBENZENE	ND (4.0)	NT	NT
STYRENE	ND (4.0)	NT	NT
1,1,1,2-TETRACHLOROETHANE	ND (4.0)	NT	NT
1,1,2,2-TETRACHLOROETHANE	ND (2.0)	NT	NT
TETRACHLOROETHYLENE	ND (4.0)	NT	NT
TETRAHYDROFURAN	ND (8.0)	NT	NT
TOLUENE	ND (4.0)	NT	NT
1,2,3-TRICHLOROBENZENE	ND (8.0)	NT	NT
1,2,4-TRICHLOROBENZENE	ND (4.0)	NT	NT
1,1,1-TRICHLOROETHANE	ND (4.0)	NT	NT
1,1,2-TRICHLOROETHANE	ND (4.0)	NT	NT
TRICHLOROETHYLENE	ND (4.0)	NT	NT
TRICHLOROFLUOROMETHANE	ND (8.0)	NT	NT
1,2,3-TRICHLOROPROPANE	ND (8.0)	NT	NT
1,2,4-TRIMETHYLBENZENE	ND (4.0)	NT	NT
1,3,5-TRIMETHYLBENZENE	ND (4.0)	NT	NT
VINYL CHLORIDE	ND (8.0)	NT	NT
M/P-XYLENE	ND (8.0)	NT	NT
O-XYLENE	ND (4.0)	NT	NT
SW-846 1010A (°F)			
FLASHPOINT	NT	> 212 °F	NT
SM21-22 4500 H B (pH Units)			
PH	NT	NT	7.0

NOTES:
1. ND = Not detected above the lab reporting limits shown in parenthesis.
2. NT = Not tested.

APPENDIX A:

Boring Logs

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (150 Massmills Drive), Lowell, MA GEC project 1785-5040 **Boring Log ID**: B-1/ GEC-1	**Date of Work**: 8-14-2015 **Sheet:** 1 **of** 1 **Weather:** High 70°F's, sunny, slight breeze **Boring Location** 3.5' from edge of Picker Building and 63' from concrete ledge along Concord River

Boring Contractor: New England Geotech, LLC

Foreman: Maynor/Kyle

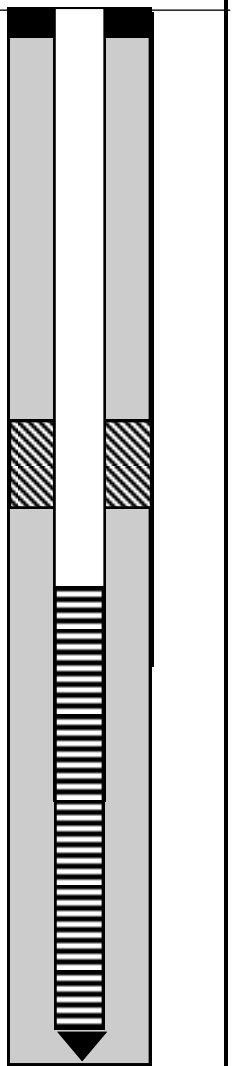
GEC Engineer: M. Bradley/A. Suding

Drilling Method: Geoprobe 6620DT Track mounted

Sampling: Continuous in five foot intervals with dedicated acetate Sleeves

Screening Equipment: Ion Science TIGER 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/34	0-5'	SILT	0-5' = 0.0 ppmv	**S-1: Dry** 0-34" Olive gray to light brown SILT containing urban fill material (brick, concrete pieces, roots, glass, coal ash), poorly sorted	Samples collected for laboratory analysis: **B-1 (15-20')** **EPH/VPH**	
5'	2	60/30	5-10'		5-10' = 0.0 ppmv	**S-2: Dry** 0-23" Light gray to yellowish orange SILT containing urban fill material (coal ash, brick, concrete) and some angular gravel shale pieces 23-25" Light gray CLAY, stiff 25-27" Yellowish-orange, fine to medium SAND, moderately sorted, subrounded 27-28" Olive gray to greenish gray CLAY, very stiff 28-30" Light gray fine to coarse SAND with fine to coarse gravel and urban fill material (ash, concrete), poorly sorted		
				CLAY/ SAND				
10'	3	60/13.5	10-15'	SILT	10-15'= 0.0 ppmv	**S-3: Wet @ ~13'** 0-3.5" Dark gray to yellowish-orange SILT containing urban fill material (brick, small (1-2") metal pieces, coal ash), poorly sorted, dry 3.5-8.5" Dark gray SILT with clay, little brick and coal ash, moist 8.5-11"Yellowish-orange SILT, well sorted, wet 11-13.5" Olive gray SILT with fine to coarse sand and clay, poorly sorted, wet		
15'	4	60/22	15-20'	SILT/ CLAY	15-20' = 0.0 PPMV	**S-4: Wet, petroleum stain/odor at ~19'** 0-1"Olive gray SILT with fine to coarse sand and clay, poorly sorted 1-3" Light gray to yellowish orange SILT and CLAY, well sorted 3-19" Dark gray to yellowish orange SILT and CLAY with fine to coarse sand and some angular cobbles interbedded toward the bottom of the sequence, petroleum staining and odor toward end of sequence 19-22" Light gray fine SAND, well sorted, medium dense, possible gleying		
				SAND				
20'								

B-1 completed as a 2" monitoring well to a depth of approximately 22' BSG with 10' of screen and ~15' of riser. Completed with 4" steel standpipe. Designated GEC-1.

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (150 Massmills Drive), Lowell, MA GEC project 1785-5040 **Boring Log ID**: B-2	**Date of Work**: 8-14-2015 **Sheet:** 1 **of** 1 **Weather:** High 70°F's, sunny, slight breeze **Boring Location** 3.5' from edge of Picker Building and 45' from concrete ledge along Concord River

Boring Contractor: New England Geotech, LLC

Foreman: Maynor/Kyle

GEC Engineer: M. Bradley/A. Suding

Drilling Method: Geoprobe 6620DT Track mounted

Sampling: Continuous in five foot intervals with dedicated acetate Sleeves

Screening Equipment: Ion Science TIGER 10.6 eV PID

KEY: = Interval sampled for analysis

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/34	0-5'	TOPSOIL	0-5' = 0.0 ppmv	**S-1: Dry** 0-10" TOPSOIL 10-31" Dark gray to light gray to red brown URBAN FILL consisting of crushed concrete with brick and silt layers 31-34" Yellowish orange SILT with fine sand and angular concrete pieces, moderately sorted	Refusal at ~11'. Four additional attempts in the vicinity also hit refusal.	N/A
				URBAN FILL				
				SILT				
5'	2	60/24	5-10'	URBAN FILL	5-10' = 0.0 ppmv	**S-2: Dry** 0-19" Light gray to olive gray to red brown URBAN FILL consisting of crushed concrete with brick and silt and fine to medium sand layers, poorly sorted 19-20.5" Light gray SILT, well sorted 20.5-24" Dark gray fine to medium SAND, some fine gravel, well sorted		
				SILT				
				SAND				
10'								

Goldman Environmental Consultants, Inc.
60 Brooks Drive
Braintree, MA

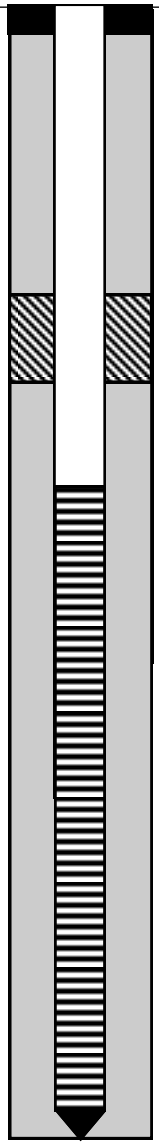
Project:
169.2 Bridge Street (150 Massmills Drive), Lowell, MA
GEC project 1785-5040
Boring Log ID: B-3/ GEC-2

Date of Work: 8-14-2015 **Sheet:** 1 **of** 1
Weather: High 70°F's, sunny, slight breeze
Boring Location: 8' south and 4' west of the southwest corner of the oil pump house

Boring Contractor: New England Geotech, LLC
Foreman: Maynor/Kyle
GEC Engineer: M. Bradley/A. Suding

Drilling Method: Geoprobe 6620DT Track mounted
Sampling: Continuous in five foot intervals with dedicated acetate Sleeves
Screening Equipment: Ion Science TIGER 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

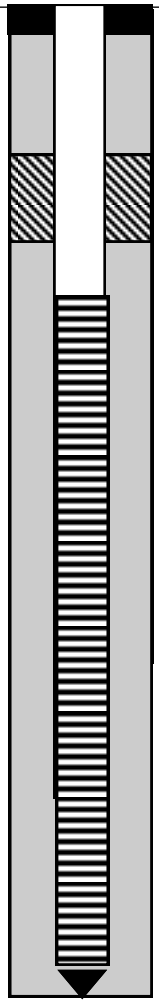
Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/45	0-5'	SILT	0-5' = 0.0 ppmv	**S-1: Dry** 0-13" Olive gray SILT containing urban fill material (brick, coal ash, concrete), moderately sorted 13-21" Light gray to yellowish orange fine SAND with little coarse sand, moderately sorted 21-45" Light gray to yellowish orange to dark gray URBAN FILL consisting of crushed concrete, coal ash, and brick and interbedded sand and clay	Samples collected for laboratory analysis: **B-3 (15-20') EPH/VPH** **&** **B-3 (15-20') (25-28") Petroleum Fingerprint TPH 8015**	
				SAND				
5'	2	60/31	5-10'	URBAN FILL	5-10' = 0.1 ppmv	**S-2: Dry** 0-31" Light gray to yellowish orange URBAN FILL consisting of crushed concrete and brick and interbedded silt, little clay		
10'	3	60/31.5	10-15'		10-15'= 0.1 ppmv	**S-3: Dry to moist** 0-5.5" Red brown crushed BRICK 5.5-24.5" Yellowish orange SILT, coarsening upward with clay at bottom of sequence, damp at 22" 24.5-31.5" Light gray crushed CONCRETE, moist		
				SILT				
				CON-CRETE				
15'	4	60/28	15-20'		15-20' = 0.1 PPMV	**S-4: Wet @ ~17.5', petroleum sheen/ product** 0-11.5" Light gray to yellowish orange SILT containing urban fill materials (crushed concrete, brick), stiff, moist 11.5-26" Olive gray to dark gray SILT, well sorted, stiff, wet at ~13", petroleum sheen and free product at 23-26" 26-28" Light gray SILT, well sorted, wet, possible gleying		
				SILT				
20'	5	60/43	20-25'		20-25' = 0.1 ppmv	**S-5: Wet** 0-43" Light gray SILT, well sorted, possible gleying		
25'								

B-3 completed as a 2" monitoring well to a depth of approximately 25' BSG with 13' of screen and ~15' of riser. Completed with 4" steel standpipe. Designated GEC-2.

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (150 Massmills Drive), Lowell, MA GEC project 1785-5040 **Boring Log ID**: B-4/ GEC-3	**Date of Work**: 8-14-2015 **Sheet:** 1 **of** 1 **Weather:** High 70°F's, sunny, slight breeze **Boring Location:** 13' south and 5' east of the southeast corner of the oil pump house

Boring Contractor: New England Geotech, LLC	**Drilling Method**: Geoprobe 6620DT Track mounted
Foreman: Maynor/Kyle	**Sampling:** Continuous in five foot intervals with dedicated acetate Sleeves
GEC Engineer: M. Bradley/A. Suding	**Screening Equipment:** Ion Science TIGER 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/39	0-5'	SILT	0-5' = 0.0 ppmv	**S-1: Dry** 0-39" Dark gray to olive gray to yellowish orange SILT containing urban fill materials (coal ash, brick, crushed concrete) with fine to coarse sand and fine gravel, poorly sorted	Samples collected for laboratory analysis: **B-4 (15-20') EPH/VPH & B-4 (15-20')(21-24") Petroleum Fingerprint TPH 8015**	
5'	2	60/38.5	5-10'	SAND / CONCRETE / SILT	5-10' = 0.0 ppmv	**S-2: Dry to moist** 0-3.5" Dark gray fine to medium SAND containing urban fill materials (crushed concrete, brick, coal ash) with fine gravel, poorly sorted, dry 3.5-11.5" Light gray crushed CONCRETE, dry 11.5-38.5" Light brown SILT with fine sand and angular gravel (possibly some metal pieces), moderately sorted, dry at top grading to moist at bottom		
10'	3	60/41.5	10-15'	URBAN FILL	10-15'= 0.0 ppmv	**S-3: Dry** 0-41.5" Light gray to olive gray to yellowish orange URBAN FILL consisting of crushed concrete, brick, and coal ash with interbedded silt		
15'	4	60/30	15-20'	SILT / SAND	15-20' = 0.0 PPMV	**S-4: Dry to moist, petroleum sheen/odor** 0-16" Light gray to yellowish orange SILT containing urban fill materials (crushed concrete, brick) 16-19" Olive gray to dark gray coarse SAND with fine subangular gravel and fine to medium sand, damp, petroleum sheen and odor 19-30" Light gray to dark gray to yellowish orange SILT, well sorted, moist		
20'	5	60/40	20-25'	SILT	20-25' = 0.0 ppmv	**S-5: Wet @ 20'** 0-40" Light gray SILT, well sorted, stiff, wet, possible gleying		
25'							B-4 completed as a 2" monitoring well to a depth of approximately 25' BSG with 14' of screen and ~14' of riser. Completed with 4" steel standpipe. Designated GEC-3.	

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (courtyard), Lowell, MA GEC project 1785-6080 **Boring Log ID**: B-5	**Date of Work**: 3-14-2016 **Sheet:** 1 **of** 1 **Weather:** 40°F's, overcast **Boring Location:** Eastern side of courtyard

Boring Contractor: New England Geotech, LLC	**Drilling Method:** Geoprobe 6620DT Track mounted
Foreman: Maynor	**Sampling:** Various intervals with dedicated acetate Sleeves
GEC Engineer: D. Foley	**Screening Equipment:** MiniRae 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	12/12	0-1'	URBAN FILL	Due to recovery no head-space was col-lected	**S-1: Dry** 0-12" Dark brown SAND & SILT & bits of Coal/ Ash/ Brick **S-2: Dry** 0-8" Dark brown SAND & SILT with Brick, Coal, Ash, tr organics 8-12"Gray GRAVEL w/ Sand, Silt, Ash, Coal, and Brick 12-16" Dark brown SAND & SILT w/ Ash, Coal, Brick **S-3: Dry** 0-26" Black COAL DUST w/ Ash and Brick, trace Sand, Silt **S-4: Dry to moist, petroleum sheen/odor** 0-36" Black COAL DUST w/ Sand , Silt, Ash, and Brick 36-44" Saturated Black Petroleum smeared Soils SAND, Silt, Coal, Ash, Brick	Samples collected for laboratory analysis: **B-5 (0-1') PCBs &cogeners** **B-5 (1-3') PCBs** **B-5 (0-3') MA14 Metals, EPH w/ PAHs, Pesticides/ Herbicides** **B-5 (3-6') PCBs** **B-5 (6-11') PCBs**	No wells were constructed during this event
	2	24/16	1-3'					
	3	36/26"	3-6'					
5'								
	4	60/44	6-11'					
10'								
15'								
20'								
25'								

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (courtyard), Lowell, MA GEC project 1785-6080 **Boring Log ID**: B-6	**Date of Work**: 3-14-2016 **Sheet:** 1 **of** 1 **Weather:** 40°F's, overcast **Boring Location:** Eastern side of courtyard, near fuel oil vaults, Refusal multiple times at around 3' BSG

Boring Contractor: New England Geotech, LLC
Foreman: Maynor
GEC Engineer: D. Foley

Drilling Method: Geoprobe 6620DT Track mounted
Sampling: Various intervals with dedicated acetate Sleeves
Screening Equipment: MiniRae 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	12/12	0-1'	URBAN FILL	Due to recovery no Headspace was collected	**S-1: Dry** 0-12" Dark brown SAND & SILT & bits of Coal/ Ash/ Brick **S-2: refusal at Three Foot** TEST PIT (0-1'), (1-2'), (2-3') All soils appear to be "URBAN FILL"	Samples collected for laboratory analysis: **Due to multiple refusals GEC moved on to B-7, GEC had collected samples from a test pitting event on 3/9/2016 from the (0-1'),(1-2'), (2-3') intervals for the following analysis MA14 metals, PCBs, Pest/Herbicides**	No wells were constructed during this event
5'								
10'								
15'								
20'								
25'								

Goldman Environmental Consultants, Inc.
60 Brooks Drive
Braintree, MA

Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6080
Boring Log ID: B-7

Date of Work: 3-14-2016 **Sheet:** 1 **of** 1
Weather: 40°F's, overcast
Boring Location: South west of the Pump House

Boring Contractor: New England Geotech, LLC
Foreman: Maynor
GEC Engineer: D. Foley

Drilling Method: Geoprobe 6620DT Track mounted
Sampling: Various intervals with dedicated acetate Sleeves
Screening Equipment: MiniRae 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	12/10	0-1'		Due to recovery no Headspace was collected	**S-1: Dry** 0-10" Dark brown SAND & SILT & bits of Coal/ Ash/ Brick	Samples collected for laboratory analysis: **B-7 (0-1') PCBs** **B-7 (1-3') PCBs & cogeners** **B-7 (0-3') MA14 Metals, Pesticides/ Herbicides** **B-7 (3-6') PCBs** **B-7 (6-11') PCBs and EPH w/ PAHs**	No wells were constructed during this event
	2	24/16"	1-3'			**S-2: Dry** 0-24" Dark brown SAND&SILT w/ Gravel, Coal, Ash, Brick		
	3	36/16"	3-6'	URBAN FILL		**S-3: Dry** 0-8" Dark brown COAL, ASH, Brick, Sand and Silt 8-10" White ASH 10-16" Brown SAND&SILT w/ trace Pebble, Coal, Ash, Brick		
5'								
	4	60/33"	6-11'			**S-4: Dry** 0-10" Dark brown SAND & SILT w/ Coal, Ash, Brick 10-21" Brown (mottled) F SAND & SILT Tr. Pebble, Coal, Ash, Brick 21-23" Black COAL DUST 23-33" Gray F SAND w/ Gravel, Bits of Coal, Ash		
10'								
15'								
20'								
25'								

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Braintree, MA

Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6080
Boring Log ID: B-8

Date of Work: 3-14-2016 **Sheet:** 1 **of** 1
Weather: 40°F's, overcast
Boring Location: Northwest of the Pump House

Boring Contractor: New England Geotech, LLC
Foreman: Maynor
GEC Engineer: D. Foley

Drilling Method: Geoprobe 6620DT Track mounted
Sampling: Various intervals with dedicated acetate Sleeves
Screening Equipment: MiniRae 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	12/12"	0-1'		Due to recovery no Headspace was collected	**S-1: Dry** 0-12" Dark brown SAND & SILT & Coal/ Ash/ Brick	Samples collected for laboratory analysis: **B-8 (0-1') PCBs** **B-8 (1-3') PCBs** **B-8 (3-6') PCBs** **B-8 (6-11') PCBs**	No wells were constructed during this event
	2	24/24"	1-3'			**S-2: Dry** 0-12" Brown/ dark brown F SAND& SILT w/ Brick, Coal, Ash 12-14" Black COAL, Ash, Brick 14-16" Brown w white BRICK, Coal, Ash w/ F Sand and Silt 16—24" Dark brown COAL w/ Brick, Ash, F Sand and Silt trace Pebble		
	3	36/30"	3-6'	URBAN FILL		**S-3: Dry** 0-12" Brown F SAND & SILT w/ Ash, Coal, Brick 12-36" Dark brown COAL, ASH, BRICK w/ F Sand and Silt		
5'	4	60/36"	6-11'			**S-4: Dry** 0-18" Brown F SAND w/ Silt Tr Brick, Coal, Ash 18-29" Tan-gray F SAND w/ Silt tr Brick and Coal 29-33 Gray-tan F SAND w/ tr Pebble and large pieces of Coal 33-36"Brown F-M Sand w/ tr Silt and tr Pebble		
10'								
15'								
20'								
25'								

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Braintree, MA

Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6080
Boring Log ID: B-9

Date of Work: 3-14-2016 **Sheet:** 1 **of** 1
Weather: 40°F's, overcast
Boring Location: Northwest of the Smoke Stack

Boring Contractor: New England Geotech, LLC
Foreman: Maynor
GEC Engineer: D. Foley

Drilling Method: Geoprobe 6620DT Track mounted
Sampling: Various intervals with dedicated acetate Sleeves
Screening Equipment: MiniRae 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	12/12"	0-1'		Due to recovery no Headspace was collected	**S-1: Dry** 0-12" Dark Brown F SAND & SILT w/ Shredded Plastic, Coal, Ash	Samples collected for laboratory analysis: **B-9 (0-1') PCBs and cogeners** **B-9 (1-3') PCBs** **B-9 (0-3') EPH with PAHs** **B-9 (3-6') PCBs** **MA14 Metals, Pesticide/ Herbicide** **B-9 (6-11') PCBs**	No wells were constructed during this event
	2	24/24"	1-3'			**S-2: Dry** 0-4" Black COAL DUST 4-12" Red pulverized BRICK w/ Ash 12-24" Dark brown COAL DUST, ASH BRICK w F-M Sand w/ tr Silt		
	3	36/26"	3-6'	URBAN FILL		**S-3: Dry** 0-6" Tan-orange weather ROCK, w/ f-m-c Sand tr Coal 6-26" Dark brown– black COAL DUST w/ Ash, tr Brick f-m Sand and Silt		
5'								
	4	60/24"	6-11'			**S-4: Dry** 0-8" Brown F SAND w/ tr Coal, Ash, Pebble, Coal Slag 8-16" orange (rusty) f-m SAND w/ Gravel 16-24" Brown F SAND w/ some Brick, Coal, Ash		
10'								
15'								
20'								
25'								

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Braintree, MA

Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6080
Boring Log ID: B-10

Date of Work: 3-14-2016 **Sheet:** 1 **of** 1
Weather: 40°F's, overcast
Boring Location: Northwest of the coal elevator

Boring Contractor: New England Geotech, LLC
Foreman: Maynor
GEC Engineer: D. Foley

Drilling Method: Geoprobe 6620DT Track mounted
Sampling: Various intervals with dedicated acetate Sleeves
Screening Equipment: MiniRae 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	12/unk	0-1'		Due to recovery no Headspace was collected	**S-1: Dry** Small Pile COAL DUST w/ Brick Ash, F Sand and Silt	Samples collected for laboratory analysis: **B-10 (0-1') PCBs** **B-10 (1-3') PCBs** **B-10 (0-3') MA14 Metals, Pesticide/ Herbicide** **B-10 (3-6') PCBs** **EPH w/PAHs** **B-10 (6-11') PCBs**	No wells were constructed during this event
	2	24/10"	1-3'			**S-2: Dry** 0-10" Black COAL DUST w/ Brick, Ash, w F-M Sand and Silt		
	3	36/6"	3-6'	URBAN FILL		**S-3: Dry** 0-6" Black COAL DUST, ASH, BRICK, Large piece of Slag		
5'								
	4	60/5"	6-11'			**S-4: Dry** Void Space encountered Small Pile of Black COAL DUST w/ Brick, Ash, Slag		
10'								
15'								
20'								
25'								

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (courtyard), Lowell, MA GEC project 1785-6080 **Boring Log ID**: B-11	**Date of Work**: 3-14-2016 **Sheet:** 1 **of** 1 **Weather:** 40°F's, overcast **Boring Location:** Norther portion of the courtyard, near convergence of picker and Boiler house

Boring Contractor: New England Geotech, LLC
Foreman: Maynor
GEC Engineer: D. Foley

Drilling Method: Geoprobe 6620DT Track mounted
Sampling: Various intervals with dedicated acetate Sleeves
Screening Equipment: MiniRae 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	12/6"	0-1'		Due to recovery no Headspace was collected	**S-1: Dry** 0-6" Dark brown COAL DUST, w Ash, Bits of Plastic	Samples collected for laboratory analysis: **B-11 (0-1') PCBs** **B-11 (1-3') PCBs and cogeners** **B-11 (3-6') PCBs** **MA14 Metals, Pesticide/ Herbicide** **B-11 (6-11') PCBs** **EPH w/PAHs**	No wells were constructed during this event
	2	24/12"	1-3'					
	3	36/30"	3-6'	URBAN FILL		**S-2: Dry** 0-4" Brown– dark brown COAL DUST, w/ Brick tr F Sand and Silt 4-8" Pulverized ROCK 8-12" Dark brown F SAND & SILT w/ Brick, Coal, Ash		
5'								
	4	60/20"	6-11'			**S-3: Dry** 0-16" Dark brown F SAND & SILT w/ Brick, Coal Dust, Ash 16-26" Brown-tan F SAND & SILT w/ Brick, Coal, Ash, Dust 26-30" Large Pulverized ROCK		
10'						**S-4: Moist** 0-20" Dark Brown F SAND & SILT w/ Coal, Brick, Ash, Dust		
15'								
20'								
25'								

Goldman Environmental Consultants, Inc.
60 Brooks Drive
Braintree, MA

Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6080
Boring Log ID: B-11-r5A

Date of Work: 3-30-2016 **Sheet:** 1 **of** 1
Weather: 40°F's, overcast
Boring Location: North of B-11 on a 5' radius

Boring Contractor: New England Geotech, LLC
Foreman: Maynor
GEC Engineer: D. Foley

Drilling Method: Hand Geoprobe
Sampling: Various intervals with dedicated acetate Sleeves
Screening Equipment: MiniRae 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	12/12"	0-1'		Due to recovery no Headspace was collected	**S-1: Dry** 0-6" Black, Coal, Ash, Brick, Bits of Plastic 6-12" Tan-brown F SAND & SILT w/ Ash, Coal, Brick	Samples collected for laboratory analysis: **B-11-r5A (0-1') PCBs** **B-11-r5A (1-3') PCBs** **B-11-r5A (0-3') EPH with target PAHs, vanadium**	No wells were constructed during this event
	2	24/4"	1-3'			**S-2: Dry** 0-4" Dark brown Coal, Ash, Brick, Glass		
				URBAN FILL				
5'								
10'								
15'								
20'								
25'								

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (courtyard), Lowell, MA GEC project 1785-6080 **Boring Log ID**: B-11-r5B	**Date of Work**: 3-30-2016 **Sheet:** 1 **of** 1 **Weather:** 40°F's, overcast **Boring Location:** North east of B-11 on a 5' radius

Boring Contractor: New England Geotech, LLC	**Drilling Method:** Hand Geoprobe
Foreman: Maynor	**Sampling:** Various intervals with dedicated acetate Sleeves
GEC Engineer: D. Foley	**Screening Equipment:** MiniRae 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	12/6"	0-1'		Due to recovery no Headspace was collected	**S-1: Dry** 0-6" Dark brown-black Coal, Ash, Brick, Bits of shredded plastic	Samples collected for laboratory analysis: **B-11-r5B (0-1') PCBs B-11-r5B (1-3') PCBs B-11-r5B (0-3') EPH with target PAHs, vanadium**	No wells were constructed during this event
	2	24/12"	1-3'					
				URBAN FILL		**S-2: Dry** 0-6" Dark brown Coal, Ash, Brick, Glass w/ f Sand and Silt 6-12" Tan-black F SAND & SILT w/ Ash, Coal, Brick		
5'								
10'								
15'								
20'								
25'								

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Braintree, MA

Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6080
Boring Log ID: B-11-r5C

Date of Work: 3-30-2016 **Sheet:** 1 **of** 1
Weather: 40°F's, overcast
Boring Location: Southwest of B-11 on a 5' radius

Boring Contractor: New England Geotech, LLC
Foreman: Maynor
GEC Engineer: D. Foley

Drilling Method: Hand Geoprobe
Sampling: Various intervals with dedicated acetate Sleeves
Screening Equipment: MiniRae 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	12/4"	0-1'		Due to recovery no Headspace was collected	**S-1: Dry** 0-4" Black Coal, Ash, Brick, Bits of Plastic, glass	Samples collected for laboratory analysis: **B-11-r5C (0-1') PCBs** **B-11-r5C (1-3') PCBs** **B-11-r5C (0-3') EPH with target PAHs, vanadium**	No wells were constructed during this event
	2	24/12"	1-3'					
				URBAN FILL		**S-2: Dry** 0-12" Dark brown-black Coal, Ash, Brick w/ some F Sand and Silt		
5'								
10'								
15'								
20'								
25'								

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Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6080
Boring Log ID: B-11-r10A

Date of Work: 3-30-2016 **Sheet:** 1 **of** 1
Weather: 40°F's, overcast
Boring Location: Northwest of B-11 on a 10' radius

Boring Contractor: New England Geotech, LLC
Foreman: Maynor
GEC Engineer: D. Foley

Drilling Method: Hand Geoprobe
Sampling: Various intervals with dedicated acetate Sleeves
Screening Equipment: MiniRae 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	6/0"	0-1'		Due to recovery no Headspace was collected	**S-1: Dry** 0-6" refusal X3- Due to presence of "flow -able" concrete on the ground surface	Samples collected for laboratory analysis: **No Samples were collected from this location**	No wells were constructed during this event
5'								
10'								
15'								
20'								
25'								

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Braintree, MA

Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6080
Boring Log ID: B-11-r10B

Date of Work: 3-30-2016 **Sheet:** 1 **of** 1
Weather: 40°F's, overcast
Boring Location: Southeast of B-11 on a 10' radius

Boring Contractor: New England Geotech, LLC
Foreman: Maynor
GEC Engineer: D. Foley

Drilling Method: Hand Geoprobe
Sampling: Various intervals with dedicated acetate Sleeves
Screening Equipment: MiniRae 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	12/6"	0-1'		Due to recovery no Headspace was collected	**S-1: Dry** 0-6" Black Coal, Brick, Ash, Bits of Plastic, w/ trace f Sand and Silt	Samples collected for laboratory analysis: **B-11-r10B (0-1') PCBs** **B-11-r10B (1-3') PCBs** **B-11-r10B (0-3') EPH with target PAHs, vanadium**	No wells were constructed during this event
	2	24/12"	1-3'			**S-2: Dry** 0-12" Black Coal, Coal Dust, Ash, Brick		
				URBAN FILL				
5'								
10'								
15'								
20'								
25'								

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (courtyard), Lowell, MA GEC project 1785-6080 **Boring Log ID**: B-12	**Date of Work**: 3-23-2016 **Sheet:** 1 **of** 1 **Weather:** 40°F's, overcast **Boring Location:** North-western portion of the courtyard, past the convergence of Picker and Boiler house, past the tin Shack

Boring Contractor: GEC

Foreman:

GEC Engineer: D. Foley

Drilling Method: Auger andHand-Geoprobe

Sampling: Various intervals with dedicated acetate Sleeves

Screening Equipment: MiniRae 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	12/pile	0-1'		Due to recovery no Headspace was collected	**S-1: Dry** Dark brown-black f SAND & SILT, w/ Coal, w Ash, ~ 2" layer of Bits of Plastic	Samples collected for laboratory analysis: **B-12 (0-1') PCBs** **B-12 (1-3') PCBs** **B-12 (0-3') EPH w/ PAHs, Arsenic, Lead, Vanadium** **B-12 (3-6') EPH w/PAHs , Arsenic, Lead, Vanadium**	No wells were constructed during this event
	2	24/pile"	1-3'			**S-2: Dry** Gray fine SAND w/ tr Pebble, (appears to be structural fill)		
	3	12/24"	3-5'	URBAN FILL				
5'	4	8/12"	5-6'			**S-3: Dry** 0-8" Gray f SAND w/ trace Gravel, Pebble 8-12" Urban fill, Sand and Silt, w/ Brick, Coal, Ash		
10'						**S-4: Moist** 0-8" Dark Brown F SAND & SILT w/ Coal, Brick, Ash, Dust		
15'								
20'								
25'								

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60 Brooks Drive
Braintree, MA

Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6080
Boring Log ID: B-13

Date of Work: 3-23-2016 **Sheet:** 1 **of** 1
Weather: 40°F's, overcast
Boring Location: North-western portion of the courtyard, past the convergence of Picker and Boiler house, past the tin Shack

Boring Contractor: GEC
Foreman:
GEC Engineer: D. Foley

Drilling Method: Auger and Hand-Geoprobe
Sampling: Various intervals with dedicated acetate Sleeves
Screening Equipment: MiniRae 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	12/pile	0-1'		Due to recovery no Headspace was collected	**S-1: Dry** Dark brown-black f SAND & SILT, w/ Coal, w Ash, Bits of Plastic	Samples collected for laboratory analysis: **B-13 (0-1') PCBs B-13 (1-3') PCBs B-13 (0-3') EPH w/ PAHs, Arsenic, Lead, Vanadium B-13 (3-6') EPH w/PAHs , Arsenic, Lead, Vanadium**	No wells were constructed during this event
	2	24/pile"	1-3'			**S-2: Dry** Brown-black fine SAND & SILT w/ Bits of plastic, Brick, Coal, Ash, Glass		
	3	8/24"	3-5'	URBAN FILL				
5'	4	6/12"	5-6'			**S-3: Dry** 0-8" Brown f-m-c SAND & SILT w/ Brick, Glass, Coal, Ash		
10'						**S-4: Moist** 0-6" Gray f-m-c SAND & SILT w/ Coal, Brick, Ash, Dust, trace Clay		
15'								
20'								
25'								

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (courtyard), Lowell, MA GEC project 1785-6100 **Boring Log ID**: B-14	**Date of Work**: 9-15-2016 **Sheet:** 1 **of** 1 **Weather:** 60°F's, mostly sunny **Boring Location** Eastern Side of the Courtyard near the fuel vaults

Boring Contractor: New England Geotech, LLC
Drilling Foreman: Ryan
GEC Staff: D. Foley

Drilling Method: Track-mounted Geoprobe
Sampling: Continuous in five foot intervals with dedicated acetate Sleeves
Screening Equipment: MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/24	0-5'	Urban Fill	0.0 ppm	**S-1: (dry)** 0-24" Coal, Ash, Brick 12-24" # 6 fuel oil Smear started	Samples collected for laboratory analysis: **B-14 (0-5') Comp** **B-14 (5-10') Comp** **B-14 (10-15') Comp** **B-14 (10-15') VOCs** **B-14 (15-16.5') Comp**	No wells were constructed during this event
5'	2	60/9	5-10'		0.0 ppm	**S-2: (dry)** 0-9" Dark black URBAN FILL saturated w/ #6 product		
10'	3	60/12	10-15'		6.9 ppm	**S-3: (dry)** 0-2" Light brown f powdered SILT 10-12" Saturated URBAN FILL material. Fuel oil odor		
15'	4	18/12	15-16.5'		5.1 ppm	**S-4: (dry)** 0-6" Pebble, oil & SAND & SILT 6-12" Very fine SILT, # 6 oil product, also exhibits "marine fishy" odor in center of gray silt		
				REFUSAL				

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60 Brooks Drive
Braintree, MA

Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6100

Boring Log ID: B-14A

Date of Work: 9-16-2016 **Sheet:** 1 **of** 1

Weather: 60°F's, partly sunny

Boring Location Eastern end of courtyard near fuel oil vaults

Boring Contractor: Crawford Drilling Services

Drilling Foreman: Ryan

GEC Staff: D. Foley

Drilling Method: Track-mounted Geoprobe

Sampling: Continuous in five foot intervals with dedicated acetate Sleeves

Screening Equipment: MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/33	0-5'	URBAN FILL	0.0 ppm	**S-1: (dry)** 0-15" Dry brown SAND & SILT & COAL & ASH, Brick, bits of Glass (Urban Fill) 17-33" #6 Oil saturated Sand, Silt, Coal, Ash, Brick, Slag	Samples collected for laboratory analysis: **B-14A (0-5') EPH, PAH, Asbestos, and PCBs** **B-14A (5-10') EPH, PAH, Asbestos, and PCBs** **B-14A (10-15') EPH, PAH, Asbestos, PCBs, and VOCs** **B-14A (15-16.5') EPH, PAH, Asbestos, and PCBs**	No wells were constructed during this event
5'	2	60/20	5-10'		2.9 ppm	**S-2: (Moist)** 0-9" Had H_2O & #6 Oil & Sheen 11-20" Tight URBAN FILL		
10'	3	60/20	10-15'		2.7 ppm	**S-3: (Moist)** #6 Oil Saturated, Black SAND & SILT, Coal and Ash and Brick (URBAN FILL)		
15'	4	18/9	15-16.5'	REFUSAL	3.4 ppm	**S-4: (Saturated)** 0-3" Black saturated w/ # 6 Oil and H_2O, URBAN FILL 3-9" Gray f SAND		

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60 Brooks Drive
Braintree, MA

Project:
169.2 Bridge Street (courtyard),
Lowell, MA
GEC project 1785-6100

Boring Log ID: B-15

Date of Work: 9-15-2016 **Sheet:** 1 **of** 1

Weather: 60°F's, mostly sunny

Boring Location Eastern end of courtyard near fuel oil vaults

Boring Contractor: Crawford Drilling Services

Drilling Foreman: Ryan

GEC Staff: D. Foley

Drilling Method: Track-mounted Geoprobe

Sampling: Continuous in five foot intervals with dedicated acetate Sleeves

Screening Equipment: MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/20	0-5'	SAND & SILT		**S-1: (dry)** 0-20" Dark brown f-m SAND & SILT w/ sm Gravel & Pebble & Coal Dust & bits of Brick & Slag. Uniform	Samples collected for laboratory analysis: **B-15 (0-5') PCBs** **B-15 (5-10') EPH and PAH and Asbestos, PCBs**	No wells were constructed during this event
5'	2	60/28	5-10'			**S-2: (dry)** 0-8" Black Coal Dust w/ SAND & SILT, tr Ground Stone, some Pebble and Brick, Coal, Ash, Slag, tr Organic 8-11" Brown gray, SAND & SILT & ASH, tr pebble 11-15" Gray tan, pulverized Rock 15-28" Black COAL DUST w/ SAND & Gravel, some Brick, Ash, Slag		
10'				REFUSAL				
15'								

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (courtyard), Lowell, MA GEC project 1785-6100 **Boring Log ID**: B-16	**Date of Work**: 9-15-2016 **Sheet:** 1 **of** 1 **Weather:** 60°F's, mostly sunny **Boring Location** Eastern end of courtyard near fuel vaults

Boring Contractor: Crawford Drilling Services	**Drilling Method:** Track-mounted Geoprobe
Drilling Foreman: Ryan	**Sampling:** Continuous in five foot intervals with dedicated acetate Sleeves
GEC Staff: D. Foley	**Screening Equipment:** MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/40	0-5'	SAND & SILT	0.0 ppm	**S-1: (dry)** 0-17" Brown SILT & SAND w/ Pebbles, Gravel, Brick, Coal, Ash 17-32" Black SAND & SILT w/ Pebble, Gravel, and coal Dust 32-33" Red powdered Sandstone 33-34" Yellow powdered Sandstone 34-40" Black Coal Dust w/ SAND & SILT, Pebble, Gravel	Samples collected for laboratory analysis: **B-16 (0-5') PCBs** **B-16 (5-10') Asbestos, Held for PCBs** **B-16 (10-15') EPH and PAH, Held for PCBs**	No wells were constructed during this event
5'	2	60/27	5-10'		2.2 ppm	**S-2: (dry)** 0-3" Black coal Dust 3-5" Yellow Sandstone 5-13" URBAN FILL, Coal, Brick, Gravel 13-15" Coal, Dust 15-22" Light gray SAND w/ Gravel/pebble, some Urban Fill 22-27" Brown tran f SAND & SILT w/ tr Pebble (moist)		
10'	3	60/28	10-15'		7.4 ppm	**S-3: (dry)** 0-7" Brown tan f SAND & SILT w/ tr Pebble (moist), tight 7-11" Brown f SAND & SILT w/ Gravel 11-23" Gray busted rock w/ SAND & SILT 23" Dark brown SAND & SILT, Busted Rock, exhibits petroleum odor 23-28" Broken		
15'	4	24/0	15-17'	REFUSAL		**S-4: (dry)** Refusal at 17', no recovery		

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (courtyard), Lowell, MA GEC project 1785-6100 **Boring Log ID**: B-17	**Date of Work**: 9-15-2016 **Sheet:** 1 **of** 1 **Weather:** 60°F's, mostly sunny **Boring Location** Eastern end of courtyard near fuel vaults

Boring Contractor: Crawford Drilling Services	**Drilling Method:** Track-mounted Geoprobe
Drilling Foreman: Ryan	**Sampling:** Continuous in five foot intervals with dedicated acetate Sleeves
GEC Staff: D. Foley	**Screening Equipment:** MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/24	0-5'	SAND & SILT	0.0 ppm	**S-1: (dry)** 0-6" Brown f SAND & SILT w/ Coal Dust and Pebbles 6-8" COAL & DUST 8-14" Brown f SAND & SILT w/ Gravel & Pebbles, tr Coal Dust 14-18" Black f SAND & SILT w/ Gravel & Pebbles and Coal Dust 18-21" Brown/black Gravel w/ Coal & Slag/Ash w/ SAND & Gravel	Samples collected for laboratory analysis: **B-17 (0-5') EPH and PAH** **B-17 (5-7.5') EPH and PAH**	No wells were constructed during this event
5'	2	60/20	5-7.5'		0.0 ppm	**S-2: (dry)** 0-5" Dark Brown Coal Dust, Brick, Ash, SAND & SILT 5-20" Gray pulverized Rock, SAND & SILT		
				REFUSAL				
10'					0.0 ppm			
15'					0.0 ppm			

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Project:
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GEC project 1785-6100

Boring Log ID: B-18

Date of Work: 9-15-2016 **Sheet:** 1 **of** 1

Weather: 60°F's, mostly sunny

Boring Location Eastern end of courtyard near fuel vaults

Boring Contractor: Crawford Drilling Services

Drilling Foreman: Ryan

GEC Staff: D. Foley

Drilling Method: Track-mounted Geoprobe

Sampling: Continuous in five foot intervals with dedicated acetate Sleeves

Screening Equipment: MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/31	0-5'	SAND & SILT	0.0 ppm	**S-1: (dry)** 0-4" Gray f SAND w/ Pebbles 4-11" Black Coal Dust w/ gravel, Pebbles, f SAND & SILT, bits of Plastic 11-13" Red brown black Brick & Coal Dust w/ f SAND & SILT, bits of Coal and Ash 13-17" Black Coal Dust & Ash, Brick, bits of Glass 17-22" Brown Coal Dust w/ f SAND & SILT, some Pebble, tr Organic (rock) 22-31" Black Coal Dust/Bits of Ash, Brick, tr Pebble	Samples collected for laboratory analysis: **B-18 (0-5') PCBs** **B-18 (5-10') EPH and PAH, PCBs** **B-18 (10-14') PCBs**	No wells were constructed during this event
5'	2	60/12	5-10'		0.0 ppm	**S-2: (dry)** 0-11" Black Coal Dust, Orange stripe, F SAND/ DUST w/ Ash, Brick, Slag 11-12" Brown f SAND & SILT w/ Pebbles		
10'	3	60/28	10-14		0.0 ppm	**S-3: (dry)** 0-5" Brown f SAND & SILT w/ pulverized rock, some COAL DUST, Brick, Ash 5-15" Brown/black COAL DUST w/ pulverized rock, SAND & SILT 15-28" Gray pulverized Rock w/ SAND, 1/2 inch roots at 25"		
15'				REFUSAL	0.0 ppm			

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Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6100

Boring Log ID: B-19

Date of Work: 9-15-2016 **Sheet:** 1 **of** 1

Weather: 60°F's, mostly sunny

Boring Location Eastern end of courtyard near fuel vaults

Boring Contractor: Crawford Drilling Services

Drilling Foreman: Ryan

GEC Staff: D. Foley

Drilling Method: Track-mounted Geoprobe

Sampling: Continuous in five foot intervals with dedicated acetate Sleeves

Screening Equipment: MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/39	0-5'	Urban Fill	0.0 ppm	**S-1: (dry)** 0-7" Black URBAN FILL , Brick, Coal, Ash 7-9" c SAND & SILT to Gravel 9-15" URBAN FILL Coal Dust w/ Brick, Ash tr Pebble/Gravel 15-19" Broken Brick 19-39" Black Coal Dust w/ Brick/Concrete, Pebble & Gravel, SAND & SILT	Samples collected for laboratory analysis: **B-19 (0-5') PCBs** **B-19 (5-10') Asbestos, EPH and PAH, PCBs** **B-19 (10-15') EPH and PAH, PCBs** **B-19 (15-17') EPH and PAH, PCBs**	No wells were constructed during this event
5'	2	60/15	5-10'	SAND & SILT	0.0 ppm	**S-2: (dry)** 0-3" Black Coal Dust w/ tr Gravel 3-8" Broken rock w/ tr Coal Dust, SAND & SILT 8-11" Black Coal Dust w/ tr Gravel 11-15" Broken rock w/ tr Coal Dust, SAND & SILT		
10'	3	60/26	10-15'		0.0 ppm	**S-3: (dry)** 0-5" Broken rock 5-9" Gray tan broken rock, tr Coal Dust 9-26" Tan brown f-m-c SAND & SILT w/ Broken rock, tr Coal Dust		
15'	4	24/12	15-17'		0.0 ppm	**S-4: (dry)** 0-1" Broken rock 1-4" Dark brown SILT & SAND w/ tr Organics 4-12" Brown f SAND & SILT w/ Gravel/pebbles and Coal		
				REFUSAL				

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (courtyard), Lowell, MA GEC project 1785-6100 **Boring Log ID**: B-20	**Date of Work**: 9-16-2016 **Sheet:** 1 **of** 1 **Weather:** 60°F's, partly sunny **Boring Location** Eastern end of courtyard near fuel vaults

Boring Contractor: Crawford Drilling Services
Drilling Foreman: Ryan
GEC Staff: D. Foley

Drilling Method: Track-mounted Geoprobe
Sampling: Continuous in five foot intervals with dedicated acetate Sleeves
Screening Equipment: MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/12	0-5'	SAND & SILT	0.0 ppm	**S-1: (dry)** 0-10" Black COAL dust, SAND & SILT & asbe & bits of Brick 10-12" pulverized Brick	Samples collected for laboratory analysis: **B-20 (0-5') PCBs** **B-20 (5-8') EPH and PAH, Held for PCBs**	No wells were constructed during this event
5'	2	36/13	5-8'		0.0 ppm	**S-2: (dry)** 0-4" Black Coal Dust & SAND & SILT & bits of Brick, Slag, Ash 4-6" brown f SAND 6-13" Black Coal Dust & Brick & SAND & SILT & ASH		
				REFUSAL				
10'								
15'								

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (courtyard), Lowell, MA GEC project 1785-6100 **Boring Log ID**: B-21	**Date of Work**: 9-16-2016 **Sheet:** 1 **of** 1 **Weather:** 60°F's, partly sunny **Boring Location** Eastern end of courtyard near fuel vaults

Boring Contractor: Crawford Drilling Services	**Drilling Method:** Track-mounted Geoprobe
Drilling Foreman: Ryan	**Sampling:** Continuous in five foot intervals with dedicated acetate Sleeves
GEC Staff: D. Foley	**Screening Equipment:** MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/19	0-5'	SAND & SILT	0.0 ppm	**S-1: (dry)** 0-19" URBAN FILL, Coal Dust, Ash, SAND & SILT & Bits of Brick/concrete	Samples collected for laboratory analysis: **B-21 (0-5') EPH and PAH, Asbestos, and PCBs** **B-21(5-10') EPH and PAH, Asbestos, and PCBs** **B-21 (10-13.5') EPH and PAH, Asbestos, and PCBs** **Extra Soil Added to Composite**	No wells were constructed during this event
5'	2	60/17	5-10'		0.8 ppm	**S-2: (dry)** 0-2" Brown SAND SILT, Coal Dust, Brick, Ash 2-4" pulverized Rock w/ SAND & SILT 4-8" Tan pulverized Sandstone & m-c SAND 8-11" Brown URBAN FILL, Coal, Dust, Brick, Slag, Ash 11-14" Brown Black, strong petrol odor, slight smearing, No # 6, SAND & SILT w/ Coal Dust, Brick, Ash		
10'	3	42/16	10-13.5'		0.6 ppm	14-17" Brown black SAND & SILT w/ Coal, Ash, Crick, Pebble, Gravel **S-3: (dry)** 0-11" Brown/black Coal Dust w/ Brick, Ash, SAND & SILT (strong petrol odor) 11-16" pulverized Rock		
				REFUSAL				
15'								

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Project:
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GEC project 1785-6100

Boring Log ID: B-22

Date of Work: 9-16-2016 **Sheet:** 1 **of** 1

Weather: 60°F's, partly sunny

Boring Location Eastern end of courtyard near fuel vaults

Boring Contractor: Crawford Drilling Services

Drilling Foreman: Ryan

GEC Staff: D. Foley

Drilling Method: Truck-mounted Geoprobe

Sampling: Continuous in five foot intervals with dedicated acetate Sleeves

Screening Equipment: MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/28	0-5'	SAND & SILT	0.0 ppm	**S-1: (dry)** 0-10" Brown Urban Fill, SAND & SILT w/ Coal, DUST, ASH, Concrete slag rock 11-14" Pulverized Brick 14-21" While yellow pulverized Sandstone and m-c SAND 21-25" pulverized Granite w/ m-c SAND & SILT 25-28" Brown SAND SILT Gravel w/ Brick, Coal	Samples collected for laboratory analysis: **B-22 (10-15') EPH and PAH** **B-22 (15-20') EPH and PAH**	No wells were constructed during this event
5'	2	60/24	5-10'		0.0 ppm	**S-2: (dry)** 0-2" Urban Fill SAND & SILT, Brick, Coal, Ash, Dust, Slag 2-4" Brick 4-24" Black COAL DUST w/ Brick, SAND & SILT, Ash, Slag		
10'	3	60/32	10-15'		0.0 ppm	**S-3: (moist)** 0-17" Dark brown Urban Fill, Coal, Ash, Brick, SAND & SILT 17-24" Brown gray fm-c SAND w/ Coal & Dust, tr Pebble 24-28" Wood 28-32" Brown gray fm-c SAND w/ Coal & Dust, tr Pebble		
15'	4	60/58	15-20'		17.3 ppm	**S-4: (moist)** 0-11" Brown black SAND SILT, Gravel, tr Organics, exhibits petrol odor (gasoline) 11-58" Uniform gray f-m-c SAND, tr Pebble (appears native), tr Rounded Riverstone		
				REFUSAL				

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (courtyard), Lowell, MA GEC project 1785-6100 **Boring Log ID**: B-23	**Date of Work**: 9-16-2016 **Sheet:** 1 **of** 1 **Weather:** 60°F's, partly sunny **Boring Location** Eastern end of courtyard near fuel vaults

Boring Contractor: Crawford Drilling Services	**Drilling Method:** Track-mounted Geoprobe
Drilling Foreman: Ryan	**Sampling:** Continuous in five foot intervals with dedicated acetate Sleeves
GEC Staff: D. Foley	**Screening Equipment:** MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/40	0-5'	SAND & SILT	0.0 ppm	**S-1: (dry)** 0-10" Brown Painted wood chips, Urban Fill, Coal, Dust, Ash, SAND & SILT, Brick, Gravel, Concrete 10-16" Brown Gray f-m-c SAND & Gravel 16-30" Black Coal, Ash, Brick, Dust, Slag 30-31"Tan brown f SAND 31-33" Black Coal, Dust, Brick, Slag, Ash 33-40" Tan brown f SAND w. some Gravel, tr Brick, Coal, Ash, Slag	Samples collected for laboratory analysis: **B-23(5-9') EPH and PAH**	No wells were constructed during this event
5'	2	48/40	5-9'		0.0 ppm	**S-2: (dry)** Tan brown f-m SAND w/ Gravel, tr Brick, Coal, Slag, Ash		
				REFUSAL				
10'								
15'								

Goldman Environmental Consultants, Inc. 60 Brooks Drive Braintree, MA	**Project:** 169.2 Bridge Street (courtyard), Lowell, MA GEC project 1785-6100 **Boring Log ID**: B-24	**Date of Work**: 9-16-2016 **Sheet:** 1 **of** 1 **Weather:** 60°F's, partly sunny **Boring Location** Eastern end of courtyard directly next to fuel vaults

Boring Contractor: Crawford Drilling Services	**Drilling Method:** Track-mounted Geoprobe
Drilling Foreman: Ryan	**Sampling:** Continuous in five foot intervals with dedicated acetate Sleeves
GEC Staff: D. Foley	**Screening Equipment:** MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/26	0-5'	URBAN FILL	0.0 ppm	**S-1: (dry)** 0-10" URBAN FILL– similar constituents to all other subsurface conditions 10-17" Brick 17-26" URBAN FILL	Samples collected for laboratory analysis: **Soil used in composite sample**	No wells were constructed during this event
5'	2	36/16	5-8'		0.0 ppm	**S-2: (dry)** 0-9" URBAN FILL 9-16" Gravel & Concrete		
				REFUSAL				
10'								
15'								

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Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6100

Boring Log ID: B-25

Date of Work: 9-16-2016 **Sheet:** 1 **of** 1

Weather: 60°F's, partly sunny

Boring Location Eastern end of courtyard near fuel oil vaults

Boring Contractor: Crawford Drilling Services

Drilling Foreman: Ryan

GEC Staff: D. Foley

Drilling Method: Track-mounted Geoprobe

Sampling: Continuous in five foot intervals with dedicated acetate Sleeves

Screening Equipment: MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/19	0-5'	URBAN FILL	0.0 ppm	**S-1: (dry)** 0-8" URBAN FILL-similar constituents to all other subsurface conditions 8-19" URBAN FILL evidence of smearing	Samples collected for laboratory analysis: **B-25 (0-5') comp** **B-25 (5-7.5') comp** **Soil included in Composite**	No wells were constructed during this event
5'	2	36/21	5-7.5'		0.0 ppm	**S-2: (dry)** 0-6" URBAN FILL w/ Sheen present 6-21" Pulverized Stone w/ SAND & SILT. No evidence of sheen/petrol		
				REFUSAL				
10'								
15'								

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Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6100

Boring Log ID: B-26

Date of Work: 9-16-2016 **Sheet:** 1 **of** 1

Weather: 60°F's, partly sunny

Boring Location Eastern end of courtyard near fuel oil vaults

Boring Contractor: Crawford Drilling Services

Drilling Foreman: Ryan

GEC Staff: D. Foley

Drilling Method: Track-mounted Geoprobe

Sampling: Continuous in five foot intervals with dedicated acetate Sleeves

Screening Equipment: MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/22	0-5'	URBAN FILL	0.0 ppm	**S-1: (dry)** 0-14" URBAN FILL- similar constituents to all other subsurface conditions 14-22" evidence of petroleum sheen	Samples collected for laboratory analysis: **B-26 (0-5') comp** **B-26 (5-10') comp** **B-26 (10-13') VOCs, comp** **Soil used in composite sample**	No wells were constructed during this event
5'	2	60/23	5-10'		0.0 ppm	**S-2: (dry)** 0-10" URBAN FILL, # 6 present 10-23" Concrete		
10'	3	36/0	10-13'		0.0 ppm	**S-3: (dry)** Moist URBAN FILL w/ petroleum		
				REFUSAL				
15'								

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Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6100

Boring Log ID: B-27

Date of Work: 9-16-2016 **Sheet:** 1 **of** 1

Weather: 60°F's, partly sunny

Boring Location Eastern end of courtyard near fuel oil vaults

Boring Contractor: Crawford Drilling Services

Drilling Foreman: Ryan

GEC Staff: D. Foley

Drilling Method: Track-mounted Geoprobe

Sampling: Continuous in five foot intervals with dedicated acetate Sleeves

Screening Equipment: MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/18	0-5'	URBAN FILL	0.0 ppm	**S-1: (dry)** 0-10" Dry URBAN FILL-similar constituents to all other subsurface conditions 10-18" URBAN FILL, exhibits 6 oil odor	Samples collected for laboratory analysis: **B-27 (0-5') comp** **B-27 (5-10') VOCs, comp** **B-27 (10-11') comp** **Soil used in composite sample**	No wells were constructed during this event
5'	2	60/18	5-10'		0.0 ppm	**S-2: (moist)** 0-10" URBAN FILL 10-18" URBAN FILL exhibits 6 oil odor		
10'	3	12/12	10-11'			**S-3: (moist)** 0-10" URBAN FILL 10-12" URBAN FILL, exhibits 6 oil odor		
				REFUSAL				
15'								

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Project:
169.2 Bridge Street (courtyard), Lowell, MA
GEC project 1785-6100

Boring Log ID: B-28

Date of Work: 9-16-2016 **Sheet:** 1 **of** 1

Weather: 60°F's, partly sunny

Boring Location Eastern end of courtyard near fuel oil vaults

Boring Contractor: Crawford Drilling Services

Drilling Foreman: Ryan

GEC Staff: D. Foley

Drilling Method: Track-mounted Geoprobe

Sampling: Continuous in five foot intervals with dedicated acetate Sleeves

Screening Equipment: MiniRAE 3000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Bentonite Seal: Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
	1	60/14	0-5'	URBAN FILL	0.0 ppm	**S-1: (dry)** URBAN FILL- similar constituents to all other subsurface conditions no #6 present	Samples collected for laboratory analysis: **B-28 (5-10') VOCs, comp** **B-28 (10-15') comp** **Soil used in composite sample**	No wells were constructed during this event
5'	2	60/24	5-10'		0.0 ppm	**S-2: (dry)** 0-18" URBAN FILL Dry, no #6 present 18-24" URBAN FILL, Fuel oil present		
10'	3	60/6	10-15'			**S-3: (dry)** 0-6" URBAN FILL, Saturated w/ #6 oil		
15'	4	36/24	15-18'			**S-4: (dry)** 0-16" URBAN FILL Fuel oil present 16-24" URBAN FILL, no sheen/ product observed		
				REFUSAL				

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60 Brooks Drive
Braintree, MA

Project:
J-M Developer, LSI Picker Basement, Lowell, MA
GEC project 1785-6070

Boring Log ID: HB-1/SVP-1

Dates of Work: 2-12-2016 **Sheet:** 1 **of** 1

Weather: 10s°F Mostly Sunny

Boring Location: Picker Basement ~ 8' from north wall, ~20' from eastern wall

Boring Contractor: New England Geotech

Foreman: Keith

GEC Engineer: Andrew Foley

Drilling Method: Hand GeoProbe

Sampling: Continuous in two foot intervals with dedicated acetate sleeves

Screening Equipment: Mini-Rae 2000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Gravel/Radon : Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
						Proposed 1st Floor Grade		
						Vapor Barrier Clean Gravel– Radon System		
						To be filled with flow able Gypcrete		
0'						Current basement Floor		
	1	24/12"	0-2'	SILT/ SAND/ FILL	0-2' = 1.6 ppm	**S-1: No odor, Moist** 0-8"Brown-tan SILT w/ fine Sand 8-12" Dark brown-tan SILT w / Ash, Coal		
	2	24/6"	2-4'		2-4'= 1.7 ppm	**S-2: No odor, Moist** 0-6" Brown SILT w/ fine Sand trace Pebble, trace Ash, coal	Sample collected for laboratory analysis: **B-1** (0-5') VOCs w/ Targets, EPH w/ Targets	
5'	3	24/0"	4-5'		4-5'= 1.5 ppm	**S-3: No odor, Moist** No recovery, Small Pile fine SAND		
10'					Assumed Water Table		B-1 completed as a 1" soil vapor well to an approximate depth of 15' BSG with 5' of screen and 10' of riser. Designated SVP-1	

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GEC project 1785-6070

Boring Log ID: HB-2/SVP-2

Dates of Work: 2-12-2016 **Sheet:** 1 **of** 1

Weather: 10s°F Mostly Sunny

Boring Location: Picker Basement ~ 35' from north wall, ~12' from eastern wall

Boring Contractor: New England Geotech

Foreman: Keith

GEC Engineer: Andrew Foley

Drilling Method: Hand GeoProbe

Sampling: Continuous in two foot intervals with dedicated acetate sleeves

Screening Equipment: Mini-Rae 2000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Gravel/Radon : Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
						Proposed 1st Floor Grade		
						Vapor Barrier Clean Gravel– Radon System		
						To be filled with flow able Gypcrete		
0'						Current basement Floor		
	1	24/8"	0-2'	SILT/ SAND/ FILL	0-2' = 2.1 ppm	**S-1: No odor, Moist** 0-4" Brown-tan fine SAND & SILT 4-6" Broken concrete 6-8" Tan-brown fine SAND w/ tr. Ash,/ bits of coal	Sample collected for laboratory analysis: **B-2** (2-5') VOCs w/ Targets, EPH w/ Targets	
	2	24/6"	2-4'		2-4'= 2.3 ppm	**S-2: No odor, Moist** 0-6" Dark brown/ black w/ white fine SAND & SILT w/ tr Pebble, ash, bits of coal		
5'	3	24/10"	4-5'		4-5'= 2.3 ppm	**S-3: No odor, Moist** 0-5" Brown-tan fine SAND w/ Silt trace Pebble 5-6" Black ASH w/ bits of coal 6-10" Brown fine SAND w/ Silt, trace pebble		
10'				Assumed Water Table			B-2 completed as a 1" soil vapor well to an approximate depth of 15' BSG with 5' of screen and 10' of riser. Designated SVP-2	

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GEC project 1785-6070

Boring Log ID:HB-3/SVP-3

Dates of Work: 2-12-2016 **Sheet:** 1 **of** 1

Weather: 10s°F Mostly Sunny

Boring Location: Picker Basement ~ 60' from north wall, ~7' from eastern wall

Boring Contractor: New England Geotech

Foreman: Keith

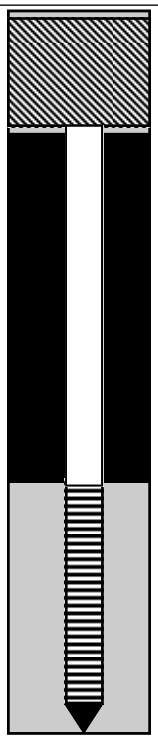
GEC Engineer: Andrew Foley

Drilling Method: Hand GeoProbe

Sampling: Continuous in two foot intervals with dedicated acetate sleeves

Screening Equipment: Mini-Rae 2000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Gravel/Radon : Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
						Proposed 1st Floor Grade		
						Vapor Barrier Clean Gravel– Radon System		
						To be filled with flow able Gypcrete		
0'						Current basement Floor		
	1	24/11"	0-2'	SILT/ SAND/ FILL	0-2' = 2.1 ppm	**S-1: No odor, Moist** 0-4" Tan fine SAND w/ trace Silt 4-8"Tan w/ black fine SAND w/ tr ash and coal 8-11" Brown fine SAND w/ Silt trace ash and coal	Sample collected for laboratory analysis: **B-3** (2-7') VOCs w/ Targets, EPH w/ Targets	
	2	24/14"	2-4'		2-4'= 2.3 ppm	**S-2: No odor, Moist** 0-4" Tan–brown fine SAND & BRICK w/ tr. Pebble, tr. Coal 4-14" Brown fine SAND & SILT w/ tr. Pebble		
5'	3	24/0"	4-6'		4-6'= 2.3 ppm	**S-3: No sleeve recovered** Small pile fine SAND w/ Silt tr. Pebble		
	4	24/6"	6-7.5'		6-7.5'= 3.0 ppm	**S-4: No odor, Moist** 0-4" Brown fine SAND w/ tr. Silt 4-5" Black fine SAND & SILT w/ coal 5-6" Brown fine SAND, saturated	B-3 completed as a 1" soil vapor well to an approximate depth of 17' BSG with 5' of screen and 12' of riser. Designated SVP-3	
10'				Assumed Water Table				

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Project:
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Boring Log ID:HB-4/SVP-4

Dates of Work: 2-12-2016 **Sheet:** 1 **of** 1

Weather: 10s°F Mostly Sunny

Boring Location: Picker Basement ~ 8' from north wall, ~8' from eastern divider wall

Boring Contractor: New England Geotech

Foreman: Keith

GEC Engineer: Andrew Foley

Drilling Method: Hand GeoProbe

Sampling: Continuous in two foot intervals with dedicated acetate sleeves

Screening Equipment: Mini-Rae 2000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Gravel/Radon : Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
						Proposed 1st Floor Grade		
						Vapor Barrier Clean Gravel– Radon System		
						To be filled with flow able Gypcrete		
0'						Current basement Floor		
	1	24/0"	0-2'	SILT/ SAND/ FILL	0-2' = N/A	**S-1: No recovery** "void space"		
	2	24/12"	2-4'		2-4'= 3.1 ppm	**S-2: No odor, Moist** 0-10" Brown-black fine SAND & COAL & ASH w/ tr. Pebble 10-12" Tan-gray SILT w/ fine Sand, w/ Clay	Sample collected for laboratory analysis: **B-4** (2-5') VOCs w/ Targets, EPH w/ Targets	
5'	3	24/0"	4-5'		4-5'= 3.3 ppm	**S-3: No sleeve recovered** Small pile of COAL & ASH, Rock, some fine Sand & Silt, tr. Clay		
10'					Assumed Water Table		B-4 completed as a 1" soil vapor well to an approximate depth of 15' BSG with 5' of screen and 10' of riser. Designated SVP-4	

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Project:
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GEC project 1785-6070

Boring Log ID:HB-5/SVP-5

Dates of Work: 2-12-2016 **Sheet:** 1 **of** 1

Weather: 10s°F Mostly Sunny

Boring Location: Picker Basement ~ 32' from north wall, ~40' from eastern divider wall

Boring Contractor: New England Geotech

Foreman: Keith

GEC Engineer: Andrew Foley

Drilling Method: Hand GeoProbe

Sampling: Continuous in two foot intervals with dedicated acetate sleeves

Screening Equipment: Mini-Rae 2000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Gravel/Radon : Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
						Proposed 1st Floor Grade		
						Vapor Barrier Clean Gravel– Radon System		
						To be filled with flow able Gypcrete		
0'						Current basement Floor		
	1	24/10"	0-2'	SILT/ SAND/ FILL	0-2' = 3.1 ppm	**S-1: No odor, Moist** 0-5" Brown-tan-gray fine SAND w/ Silt & pulverized concrete 5-10" Red-brown BRICK w/ fine Sand & Silt w/ tr. Coal	Sample collected for laboratory analysis: **B-5** (0-5') VOCs w/ Targets, EPH w/ Targets	
	2	24/0"	2-4'		2-4'= 3.2 ppm	**S-2: No sleeve recovered** Small pile brown fine SAND & SILT w/ tr. Brick tr. Clay		
5'	3	24/0"	4-5'		4-5'= 2.0 ppm	**S-3: No sleeve recovered** Small pile of COAL & ASH, Rock, some fine Sand & Silt		
10'				Assumed Water Table			B-5 completed as a 1" soil vapor well to an approximate depth of 15' BSG with 5' of screen and 10' of riser. Designated SVP-5	

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Project:
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GEC project 1785-6070

Boring Log ID: HB-6/SVP-6

Dates of Work: 2-12-2016 **Sheet:** 1 **of** 1

Weather: 10s°F Mostly Sunny

Boring Location: Picker Basement ~ 40' from north wall, ~26' from eastern divider wall

Boring Contractor: New England Geotech

Foreman: Keith

GEC Engineer: Andrew Foley

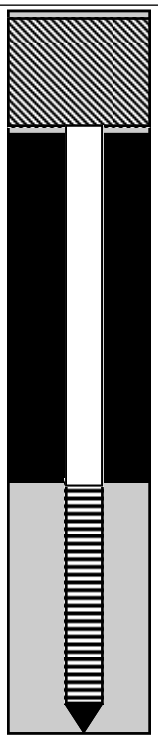
Drilling Method: Hand GeoProbe

Sampling: Continuous in two foot intervals with dedicated acetate sleeves

Screening Equipment: Mini-Rae 2000 10.6 eV PID

KEY: = Interval sampled for analysis Cement Seal: Gravel/Radon : Sand Pack: Slotted Screen:

Depth	SAMPLE No.	SAMPLE Pen./Rec.	SAMPLE Depth	Strata Change	Sample Screening	SAMPLE DESCRIPTION	ADDITIONAL NOTES	WELL CONSTRUCTION
						Proposed 1st Floor Grade		
						Vapor Barrier Clean Gravel– Radon System		
						To be filled with flow able Gypcrete		
						Current basement Floor		
0'	1	24/10"	0-2'	SILT/ SAND/ FILL	0-2' = 2.5 ppm	**S-1: No odor, Moist** 0-7" Tan fine SAND 7-10" Brown-gray fine SAND tr. Clay tr. Coal	Sample collected for laboratory analysis: **B-6** (0-4') VOCs w/ Targets, EPH w/ Targets	
	2	24/5"	2-4'		2-4'= 2.4 ppm	**S-2: No odor, Moist** 0-5" Tan-brown fine SAND w/ tr. Coal, Ash, tr. Silt, tr. Pebble		
5'								
10'					Assumed Water Table		B-6 completed as a 1" soil vapor well to an approximate depth of 15' BSG with 5' of screen and 10' of riser. Designated SVP-6	



APPENDIX B:

Laboratory Reports

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

October 20, 2016

Mike Bradley
Goldman Environmental
60 Brooks Drive
Braintree, MA 02184

Project Location: Lowell
Client Job Number:
Project Number: 1785-6080
Laboratory Work Order Number: 16J0632

Enclosed are results of analyses for samples received by the laboratory on October 13, 2016. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

James M. Georgantas
Project Manager

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con-test® ANALYTICAL LABORATORY
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Goldman Environmental
60 Brooks Drive
Braintree, MA 02184
ATTN: Mike Bradley

REPORT DATE: 10/20/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 1785-6080

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16J0632

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

PROJECT LOCATION: Lowell

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
B-19 (10-15')	16J0632-01	Soil		MADEP-EPH-04-1.1 SM 2540G SW-846 8082A	

con-test® ANALYTICAL LABORATORY

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CASE NARRATIVE SUMMARY

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

MADEP-EPH-04-1.1

Qualifications:

H-03

Sample received after recommended holding time was exceeded.

Analyte & Samples(s) Qualified:

16J0632-01[B-19 (10-15')]

SW-846 8082A

Qualifications:

O-32

A dilution was performed as part of the standard analytical procedure.

Analyte & Samples(s) Qualified:

16J0632-01[B-19 (10-15')]

V-06

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

Analyte & Samples(s) Qualified:

Aroclor-1016 [2C]
B160702-BS1, B160702-BSD1

Aroclor-1260 [2C]
B160702-BS1, B160702-BSD1

MADEP-EPH-04-1.1

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

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Project Manager

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

Project Location: Lowell | Sample Description: | Work Order: 16J0632

Date Received: 10/13/2016

Field Sample #: B-19 (10-15') | Sampled: 9/15/2016 13:15

Sample ID: 16J0632-01

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/14/16	10/20/16 4:50	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/14/16	10/20/16 4:50	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/14/16	10/20/16 4:50	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/14/16	10/20/16 4:50	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/14/16	10/20/16 4:50	KAL
Aroclor-1254 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/14/16	10/20/16 4:50	KAL
Aroclor-1260 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/14/16	10/20/16 4:50	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/14/16	10/20/16 4:50	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/14/16	10/20/16 4:50	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	56.4	30-150		10/20/16 4:50
Decachlorobiphenyl [2]	71.9	30-150		10/20/16 4:50
Tetrachloro-m-xylene [1]	63.4	30-150		10/20/16 4:50
Tetrachloro-m-xylene [2]	74.3	30-150		10/20/16 4:50

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

Project Location: Lowell | Sample Description: | Work Order: 16J0632

Date Received: 10/13/2016

Field Sample #: B-19 (10-15') | Sampled: 9/15/2016 13:15

Sample ID: 16J0632-01

Sample Matrix: Soil

Sample Flags: H-03

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	110	53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
C19-C36 Aliphatics	370	53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Unadjusted C11-C22 Aromatics	570	53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
C11-C22 Aromatics	570	53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Acenaphthene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Acenaphthylene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Anthracene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Benzo(a)anthracene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Benzo(a)pyrene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Benzo(b)fluoranthene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Benzo(g,h,i)perylene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Benzo(k)fluoranthene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Chrysene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Dibenz(a,h)anthracene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Fluoranthene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Fluorene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Indeno(1,2,3-cd)pyrene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
2-Methylnaphthalene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Naphthalene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Phenanthrene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS
Pyrene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	10/16/16	10/17/16 19:46	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	56.9	40-140		10/17/16 19:46
o-Terphenyl (OTP)	64.1	40-140		10/17/16 19:46
2-Bromonaphthalene	78.9	40-140		10/17/16 19:46
2-Fluorobiphenyl	92.1	40-140		10/17/16 19:46

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

Project Location: Lowell | Sample Description: | Work Order: 16J0632

Date Received: 10/13/2016

Field Sample #: B-19 (10-15') | Sampled: 9/15/2016 13:15

Sample ID: 16J0632-01

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	93.9		% Wt	1		SM 2540G	10/19/16	10/20/16 8:14	MRL

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Sample Extraction Data

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

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16J0632-01 [B-19 (10-15')]	B160837	20.2	2.00	10/16/16

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
16J0632-01 [B-19 (10-15')]	B161112	10/19/16

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16J0632-01 [B-19 (10-15')]	B160702	10.1	10.0	10/14/16

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B160702 - SW-846 3540C										
Blank (B160702-BLK1)				Prepared: 10/14/16 Analyzed: 10/20/16						
Aroclor-1016	ND	0.020	mg/Kg wet							
Aroclor-1016 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1221	ND	0.020	mg/Kg wet							
Aroclor-1221 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1232	ND	0.020	mg/Kg wet							
Aroclor-1232 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1242	ND	0.020	mg/Kg wet							
Aroclor-1242 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1248	ND	0.020	mg/Kg wet							
Aroclor-1248 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1254	ND	0.020	mg/Kg wet							
Aroclor-1254 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1260	ND	0.020	mg/Kg wet							
Aroclor-1260 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1262	ND	0.020	mg/Kg wet							
Aroclor-1262 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1268	ND	0.020	mg/Kg wet							
Aroclor-1268 [2C]	ND	0.020	mg/Kg wet							
Surrogate: Decachlorobiphenyl	*0.180*		mg/Kg wet	0.200		89.9	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.238*		mg/Kg wet	0.200		119	30-150			
Surrogate: Tetrachloro-m-xylene	*0.166*		mg/Kg wet	0.200		83.0	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.214*		mg/Kg wet	0.200		107	30-150			
LCS (B160702-BS1)				Prepared: 10/14/16 Analyzed: 10/20/16						
Aroclor-1016	0.17	0.020	mg/Kg wet	0.196		88.1	40-140			
Aroclor-1016 [2C]	0.20	0.020	mg/Kg wet	0.196		103	40-140			V-06
Aroclor-1260	0.17	0.020	mg/Kg wet	0.196		87.8	40-140			
Aroclor-1260 [2C]	0.20	0.020	mg/Kg wet	0.196		104	40-140			V-06
Surrogate: Decachlorobiphenyl	*0.186*		mg/Kg wet	0.196		94.9	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.233*		mg/Kg wet	0.196		119	30-150			
Surrogate: Tetrachloro-m-xylene	*0.178*		mg/Kg wet	0.196		90.8	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.222*		mg/Kg wet	0.196		113	30-150			
LCS Dup (B160702-BSD1)				Prepared: 10/14/16 Analyzed: 10/20/16						
Aroclor-1016	0.18	0.019	mg/Kg wet	0.192		92.8	40-140	3.27	30	
Aroclor-1016 [2C]	0.21	0.019	mg/Kg wet	0.192		112	40-140	5.89	30	V-06
Aroclor-1260	0.18	0.019	mg/Kg wet	0.192		94.3	40-140	5.27	30	
Aroclor-1260 [2C]	0.22	0.019	mg/Kg wet	0.192		112	40-140	5.62	30	V-06
Surrogate: Decachlorobiphenyl	*0.195*		mg/Kg wet	0.192		101	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.250*		mg/Kg wet	0.192		130	30-150			
Surrogate: Tetrachloro-m-xylene	*0.179*		mg/Kg wet	0.192		93.0	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.228*		mg/Kg wet	0.192		118	30-150			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B160837 - SW-846 3546										
Blank (B160837-BLK1)				Prepared: 10/16/16 Analyzed: 10/17/16						
C9-C18 Aliphatics	ND	10	mg/Kg wet							
C19-C36 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet							
C11-C22 Aromatics	ND	10	mg/Kg wet							
Acenaphthene	ND	0.10	mg/Kg wet							
Acenaphthylene	ND	0.10	mg/Kg wet							
Anthracene	ND	0.10	mg/Kg wet							
Benzo(a)anthracene	ND	0.10	mg/Kg wet							
Benzo(a)pyrene	ND	0.10	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet							
Chrysene	ND	0.10	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet							
Fluoranthene	ND	0.10	mg/Kg wet							
Fluorene	ND	0.10	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet							
2-Methylnaphthalene	ND	0.10	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							
Phenanthrene	ND	0.10	mg/Kg wet							
Pyrene	ND	0.10	mg/Kg wet							
n-Decane	ND	0.10	mg/Kg wet							
n-Docosane	ND	0.10	mg/Kg wet							
n-Dodecane	ND	0.10	mg/Kg wet							
n-Eicosane	ND	0.10	mg/Kg wet							
n-Hexacosane	ND	0.10	mg/Kg wet							
n-Hexadecane	ND	0.10	mg/Kg wet							
n-Hexatriacontane	ND	0.10	mg/Kg wet							
n-Nonadecane	ND	0.10	mg/Kg wet							
n-Nonane	ND	0.10	mg/Kg wet							
n-Octacosane	ND	0.10	mg/Kg wet							
n-Octadecane	ND	0.10	mg/Kg wet							
n-Tetracosane	ND	0.10	mg/Kg wet							
n-Tetradecane	ND	0.10	mg/Kg wet							
n-Triacontane	ND	0.10	mg/Kg wet							
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*2.78*		mg/Kg wet	5.00		55.5	40-140			
Surrogate: o-Terphenyl (OTP)	*3.05*		mg/Kg wet	5.00		61.1	40-140			
Surrogate: 2-Bromonaphthalene	*38.7*		µg/mL	50.0		77.3	40-140			
Surrogate: 2-Fluorobiphenyl	*45.2*		µg/mL	50.0		90.4	40-140			
LCS (B160837-BS1)				Prepared: 10/16/16 Analyzed: 10/17/16						
Acenaphthene	3.49	0.10	mg/Kg wet	5.00		69.8	40-140			
Acenaphthylene	3.28	0.10	mg/Kg wet	5.00		65.6	40-140			
Anthracene	3.39	0.10	mg/Kg wet	5.00		67.8	40-140			
Benzo(a)anthracene	3.25	0.10	mg/Kg wet	5.00		65.1	40-140			
Benzo(a)pyrene	3.26	0.10	mg/Kg wet	5.00		65.1	40-140			
Benzo(b)fluoranthene	3.28	0.10	mg/Kg wet	5.00		65.7	40-140			
Benzo(g,h,i)perylene	3.08	0.10	mg/Kg wet	5.00		61.5	40-140			
Benzo(k)fluoranthene	3.29	0.10	mg/Kg wet	5.00		65.8	40-140			
Chrysene	3.37	0.10	mg/Kg wet	5.00		67.5	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B160837 - SW-846 3546										
LCS (B160837-BS1)				Prepared: 10/16/16 Analyzed: 10/17/16						
Dibenz(a,h)anthracene	3.32	0.10	mg/Kg wet	5.00		66.3	40-140			
Fluoranthene	3.32	0.10	mg/Kg wet	5.00		66.4	40-140			
Fluorene	3.46	0.10	mg/Kg wet	5.00		69.2	40-140			
Indeno(1,2,3-cd)pyrene	2.94	0.10	mg/Kg wet	5.00		58.8	40-140			
2-Methylnaphthalene	3.08	0.10	mg/Kg wet	5.00		61.6	40-140			
Naphthalene	2.93	0.10	mg/Kg wet	5.00		58.6	40-140			
Phenanthrene	3.30	0.10	mg/Kg wet	5.00		65.9	40-140			
Pyrene	3.34	0.10	mg/Kg wet	5.00		66.8	40-140			
n-Decane	2.59	0.10	mg/Kg wet	5.00		51.7	40-140			
n-Docosane	3.52	0.10	mg/Kg wet	5.00		70.4	40-140			
n-Dodecane	3.03	0.10	mg/Kg wet	5.00		60.5	40-140			
n-Eicosane	3.60	0.10	mg/Kg wet	5.00		71.9	40-140			
n-Hexacosane	3.35	0.10	mg/Kg wet	5.00		66.9	40-140			
n-Hexadecane	3.58	0.10	mg/Kg wet	5.00		71.6	40-140			
n-Hexatriacontane	3.60	0.10	mg/Kg wet	5.00		71.9	40-140			
n-Nonadecane	3.54	0.10	mg/Kg wet	5.00		70.7	40-140			
n-Nonane	2.03	0.10	mg/Kg wet	5.00		40.6	30-140			
n-Octacosane	3.34	0.10	mg/Kg wet	5.00		66.8	40-140			
n-Octadecane	3.57	0.10	mg/Kg wet	5.00		71.4	40-140			
n-Tetracosane	3.66	0.10	mg/Kg wet	5.00		73.3	40-140			
n-Tetradecane	3.37	0.10	mg/Kg wet	5.00		67.5	40-140			
n-Triacontane	3.33	0.10	mg/Kg wet	5.00		66.7	40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.30*		mg/Kg wet	5.00		66.1	40-140			
Surrogate: o-Terphenyl (OTP)	*3.18*		mg/Kg wet	5.00		63.6	40-140			
Surrogate: 2-Bromonaphthalene	*35.1*		µg/mL	50.0		70.2	40-140			
Surrogate: 2-Fluorobiphenyl	*42.9*		µg/mL	50.0		85.9	40-140			
LCS Dup (B160837-BSD1)				Prepared: 10/16/16 Analyzed: 10/17/16						
Acenaphthene	4.05	0.10	mg/Kg wet	5.00		81.0	40-140	14.9	25	
Acenaphthylene	3.84	0.10	mg/Kg wet	5.00		76.9	40-140	15.8	25	
Anthracene	3.87	0.10	mg/Kg wet	5.00		77.5	40-140	13.4	25	
Benzo(a)anthracene	3.70	0.10	mg/Kg wet	5.00		74.0	40-140	12.8	25	
Benzo(a)pyrene	3.68	0.10	mg/Kg wet	5.00		73.7	40-140	12.4	25	
Benzo(b)fluoranthene	3.76	0.10	mg/Kg wet	5.00		75.1	40-140	13.4	25	
Benzo(g,h,i)perylene	3.51	0.10	mg/Kg wet	5.00		70.1	40-140	13.1	25	
Benzo(k)fluoranthene	3.72	0.10	mg/Kg wet	5.00		74.5	40-140	12.4	25	
Chrysene	3.80	0.10	mg/Kg wet	5.00		76.0	40-140	12.0	25	
Dibenz(a,h)anthracene	3.77	0.10	mg/Kg wet	5.00		75.4	40-140	12.8	25	
Fluoranthene	3.79	0.10	mg/Kg wet	5.00		75.8	40-140	13.3	25	
Fluorene	3.98	0.10	mg/Kg wet	5.00		79.5	40-140	13.9	25	
Indeno(1,2,3-cd)pyrene	3.36	0.10	mg/Kg wet	5.00		67.2	40-140	13.3	25	
2-Methylnaphthalene	3.68	0.10	mg/Kg wet	5.00		73.5	40-140	17.6	25	
Naphthalene	3.56	0.10	mg/Kg wet	5.00		71.2	40-140	19.5	25	
Phenanthrene	3.77	0.10	mg/Kg wet	5.00		75.3	40-140	13.4	25	
Pyrene	3.82	0.10	mg/Kg wet	5.00		76.4	40-140	13.4	25	
n-Decane	3.08	0.10	mg/Kg wet	5.00		61.6	40-140	17.3	25	
n-Docosane	3.96	0.10	mg/Kg wet	5.00		79.2	40-140	11.8	25	
n-Dodecane	3.57	0.10	mg/Kg wet	5.00		71.3	40-140	16.4	25	
n-Eicosane	4.03	0.10	mg/Kg wet	5.00		80.5	40-140	11.3	25	
n-Hexacosane	3.78	0.10	mg/Kg wet	5.00		75.7	40-140	12.3	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B160837 - SW-846 3546										
LCS Dup (B160837-BSD1)				Prepared: 10/16/16 Analyzed: 10/17/16						
n-Hexadecane	3.96	0.10	mg/Kg wet	5.00		79.3	40-140	10.2	25	
n-Hexatriacontane	4.01	0.10	mg/Kg wet	5.00		80.1	40-140	10.8	25	
n-Nonadecane	3.95	0.10	mg/Kg wet	5.00		79.0	40-140	11.1	25	
n-Nonane	2.40	0.10	mg/Kg wet	5.00		48.0	30-140	16.8	25	
n-Octacosane	3.77	0.10	mg/Kg wet	5.00		75.4	40-140	12.1	25	
n-Octadecane	3.98	0.10	mg/Kg wet	5.00		79.6	40-140	10.8	25	
n-Tetracosane	4.14	0.10	mg/Kg wet	5.00		82.8	40-140	12.2	25	
n-Tetradecane	3.82	0.10	mg/Kg wet	5.00		76.5	40-140	12.5	25	
n-Triacontane	3.75	0.10	mg/Kg wet	5.00		75.0	40-140	11.8	25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.62*		mg/Kg wet	5.00		72.5	40-140			
Surrogate: o-Terphenyl (OTP)	*3.58*		mg/Kg wet	5.00		71.5	40-140			
Surrogate: 2-Bromonaphthalene	*39.5*		µg/mL	50.0		79.1	40-140			
Surrogate: 2-Fluorobiphenyl	*46.0*		µg/mL	50.0		92.0	40-140			

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B160702-BS1 Date(s) Analyzed: 10/20/2016 10/20/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.17	
	2	0.00	-0.03	0.03	0.20	15
Aroclor-1260	1	0.00	-0.03	0.03	0.17	
	2	0.00	-0.03	0.03	0.20	15

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B160702-BSD1 Date(s) Analyzed: 10/20/2016 10/20/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.18	
	2	0.00	-0.03	0.03	0.21	17
Aroclor-1260	1	0.00	-0.03	0.03	0.18	
	2	0.00	-0.03	0.03	0.22	20

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit
DL	Method Detection Limit
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
H-03	Sample received after recommended holding time was exceeded.
O-32	A dilution was performed as part of the standard analytical procedure.
V-06	Continuing calibration did not meet method specifications and was biased on the high side for this compound. Increased uncertainty is associated with the reported value which is likely to be biased on the high side.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP-EPH-04-1.1 in Soil	
C9-C18 Aliphatics	CT,NC,ME,NH-P
C19-C36 Aliphatics	CT,NC,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,ME,NH-P
C11-C22 Aromatics	CT,NC,ME,NH-P
Acenaphthene	CT,NC,ME,NH-P
Acenaphthylene	CT,NC,ME,NH-P
Anthracene	CT,NC,ME,NH-P
Benzo(a)anthracene	CT,NC,ME,NH-P
Benzo(a)pyrene	CT,NC,ME,NH-P
Benzo(b)fluoranthene	CT,NC,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,ME,NH-P
Benzo(k)fluoranthene	CT,NC,ME,NH-P
Chrysene	CT,NC,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,ME,NH-P
Fluoranthene	CT,NC,ME,NH-P
Fluorene	CT,NC,ME
Indeno(1,2,3-cd)pyrene	CT,NC,ME,NH-P
2-Methylnaphthalene	CT,NC,ME
Naphthalene	CT,NC,ME,NH-P
Phenanthrene	CT,NC,ME,NH-P
Pyrene	CT,NC,ME,NH-P
SW-846 8082A in Soil	
Aroclor-1016	CT,NH,NY,ME,NC,VA
Aroclor-1016 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1221	CT,NH,NY,ME,NC,VA
Aroclor-1221 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1232	CT,NH,NY,ME,NC,VA
Aroclor-1232 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1242	CT,NH,NY,ME,NC,VA
Aroclor-1242 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1248	CT,NH,NY,ME,NC,VA
Aroclor-1248 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1254	CT,NH,NY,ME,NC,VA
Aroclor-1254 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1260	CT,NH,NY,ME,NC,VA
Aroclor-1260 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1262	NY,NC,VA
Aroclor-1262 [2C]	NY,NC,VA
Aroclor-1268	NY,NC,VA
Aroclor-1268 [2C]	NY,NC,VA

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

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	02/1/2018
MA	Massachusetts DEP	M-MA100	06/30/2017
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2017
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2017
RI	Rhode Island Department of Health	LAO00112	12/30/2016
NC	North Carolina Div. of Water Quality	652	12/31/2016
NJ	New Jersey DEP	MA007 NELAP	06/30/2017
FL	Florida Department of Health	E871027 NELAP	06/30/2017
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2017
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2016
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2017

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CHAIN OF CUSTODY RECORD

16J0632

Rev 04.05.12

39 Spruce Street
East longmeadow, MA 01028

Company Name: GEC
Address: 60 Brooks Drive
Telephone: 781-356-9140
Project # 1785-6080
Client PO#

Attention:
Project Location: Lowell
Sampled By: A Foley

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

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

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	8082 Soxlhet	EPH & Target PAHs	# of Containers	** Preservation	***Container Code
	B-15 (5-10') (16I0708-2)	9-15-2016	1030					✔				
	B-18 (5-10') (1610708-9)	9-15-2016	1100					✔	✔			
	B-18 (10-15') (16I0708-10)	9-15-2016	1115					✔				
	B-19 (5-10') (16I0708-12)	9-15-2016	1245					✔	✔			
1	B-19 (10-15') (For Pickup)	9-15-2016	1315					✔	✔			

ANALYSIS REQUESTED

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

Comments:
1 JAR TO BE PICKED UP.

Please use the following codes to let Con-Test know if a specific sample may be high in concentration in Matrix/Conc. Code Box:

H - High; M - Medium; L - Low; C - Clean; U - Unknown

Relinquished by: (signature)	Date/Time:	
Received by: (signature)	Date/Time:	
Relinquished by: (signature)	Date/Time:	
Received by: (signature)	Date/Time:	

Turnaround ††
☐ 7-Day
☐ 10-Day
◉ Other 3 DAY
RUSH †
☐ †24-Hr ☐ †48-Hr
☐ †72-Hr ☐ †4-Day
† Require lab approval

Detection Limit Requirements
Massachusetts: S 1
Connecticut:
Other:

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

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

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

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

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

con-test® ANALYTICAL LABORATORY

Sample Receipt Checklist

CLIENT NAME: GEC **RECEIVED BY:** JM **DATE:** 10/13/16

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

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

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

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

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

Temperature °C by Temp blank ____ Temperature °C by Temp gun 3.5

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

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

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

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

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

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

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

Containers received at Con-Test

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

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

Login Sample Receipt Checklist

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

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

Who notified of False statements? **Date/Time:**

Doc #277 Rev. 4 August 2013 **Log-In Technician Initials:** JM **Date/Time:** 10/13/16 1820

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 16J0632
Project Location: Lowell	RTN:

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

16J0632-01

Matrices: Soil

CAM Protocol (check all that below)

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

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

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

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

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

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

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

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

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

Signature: Position: Project Manager

Printed Name: Lisa A. Worthington Date: 10/20/16

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

October 20, 2016

Drew Foley
Goldman Environmental
60 Brooks Drive
Braintree, MA 02184

Project Location: Lowell
Client Job Number:
Project Number: 1785-6100
Laboratory Work Order Number: 16J0503

Enclosed are results of analyses for samples received by the laboratory on October 12, 2016. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

James M. Georgantas
Project Manager

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

Goldman Environmental
60 Brooks Drive
Braintree, MA 02184
ATTN: Drew Foley

REPORT DATE: 10/20/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 1785-6100

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16J0503

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

PROJECT LOCATION: Lowell

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
B-15 (5-10)	16J0503-01	Soil		SM 2540G	
				SW-846 8082A	
B-18 (5-10)	16J0503-02	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	
B-18 (10-15)	16J0503-03	Soil		SM 2540G	
				SW-846 8082A	
B-19 (5-10)	16J0503-04	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	

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CASE NARRATIVE SUMMARY

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

MADEP-EPH-04-1.1

Qualifications:

H-10

Analysis was requested after the recommended holding time had passed.

Analyte & Samples(s) Qualified:

16J0503-02[B-18 (5-10)], 16J0503-04[B-19 (5-10)]

SW-846 8082A

Qualifications:

O-32

A dilution was performed as part of the standard analytical procedure.

Analyte & Samples(s) Qualified:

16J0503-02[B-18 (5-10)], 16J0503-03[B-18 (10-15)]

MADEP-EPH-04-1.1

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

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Project Manager

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

Project Location: Lowell | Sample Description: | Work Order: 16J0503

Date Received: 10/12/2016

Field Sample #: B-15 (5-10) | Sampled: 9/15/2016 10:30

Sample ID: 16J0503-01

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 20:48	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 20:48	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 20:48	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 20:48	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 20:48	KAL
Aroclor-1254 [2]	0.30	0.11	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 20:48	KAL
Aroclor-1260 [2]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 20:48	KAL
Aroclor-1262 [2]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 20:48	KAL
Aroclor-1268 [2]	ND	0.11	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 20:48	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	64.4	30-150		10/17/16 20:48
Decachlorobiphenyl [2]	69.5	30-150		10/17/16 20:48
Tetrachloro-m-xylene [1]	84.0	30-150		10/17/16 20:48
Tetrachloro-m-xylene [2]	86.1	30-150		10/17/16 20:48

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

Project Location: Lowell | Sample Description: | Work Order: 16J0503

Date Received: 10/12/2016

Field Sample #: B-15 (5-10) | Sampled: 9/15/2016 10:30

Sample ID: 16J0503-01

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	92.3		% Wt	1		SM 2540G	10/19/16	10/19/16 7:20	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16J0503

Date Received: 10/12/2016

Field Sample #: B-18 (5-10) | Sampled: 9/15/2016 11:00

Sample ID: 16J0503-02

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:06	KAL
Aroclor-1221 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:06	KAL
Aroclor-1232 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:06	KAL
Aroclor-1242 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:06	KAL
Aroclor-1248 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:06	KAL
Aroclor-1254 [2]	ND	0.12	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:06	KAL
Aroclor-1260 [2]	ND	0.12	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:06	KAL
Aroclor-1262 [2]	ND	0.12	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:06	KAL
Aroclor-1268 [2]	ND	0.12	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:06	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	65.2	30-150		10/17/16 21:06
Decachlorobiphenyl [2]	73.7	30-150		10/17/16 21:06
Tetrachloro-m-xylene [1]	87.8	30-150		10/17/16 21:06
Tetrachloro-m-xylene [2]	83.1	30-150		10/17/16 21:06

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

Project Location: Lowell | Sample Description: | Work Order: 16J0503

Date Received: 10/12/2016

Field Sample #: B-18 (5-10) | Sampled: 9/15/2016 11:00

Sample ID: 16J0503-02

Sample Matrix: Soil

Sample Flags: H-10

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	28	12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
C19-C36 Aliphatics	33	12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Unadjusted C11-C22 Aromatics	92	12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
C11-C22 Aromatics	90	12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Acenaphthene	ND	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Acenaphthylene	ND	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Anthracene	ND	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Benzo(a)anthracene	ND	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Benzo(a)pyrene	ND	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Benzo(b)fluoranthene	0.15	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Benzo(g,h,i)perylene	ND	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Benzo(k)fluoranthene	ND	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Chrysene	0.25	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Dibenz(a,h)anthracene	ND	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Fluoranthene	0.15	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Fluorene	0.13	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Indeno(1,2,3-cd)pyrene	ND	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
2-Methylnaphthalene	0.16	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Naphthalene	0.31	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Phenanthrene	0.49	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS
Pyrene	0.18	0.12	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/17/16 23:48	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	54.4	40-140		10/17/16 23:48
o-Terphenyl (OTP)	56.0	40-140		10/17/16 23:48
2-Bromonaphthalene	75.2	40-140		10/17/16 23:48
2-Fluorobiphenyl	87.6	40-140		10/17/16 23:48

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

Project Location: Lowell | Sample Description: | Work Order: 16J0503

Date Received: 10/12/2016

Field Sample #: B-18 (5-10) | Sampled: 9/15/2016 11:00

Sample ID: 16J0503-02

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	86.9		% Wt	1		SM 2540G	10/19/16	10/19/16 14:13	MRL

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

Project Location: Lowell | Sample Description: | Work Order: 16J0503

Date Received: 10/12/2016

Field Sample #: B-18 (10-15) | Sampled: 9/15/2016 11:15

Sample ID: 16J0503-03

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.10	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:23	KAL
Aroclor-1221 [1]	ND	0.10	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:23	KAL
Aroclor-1232 [1]	ND	0.10	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:23	KAL
Aroclor-1242 [1]	ND	0.10	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:23	KAL
Aroclor-1248 [1]	ND	0.10	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:23	KAL
Aroclor-1254 [2]	ND	0.10	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:23	KAL
Aroclor-1260 [2]	ND	0.10	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:23	KAL
Aroclor-1262 [2]	ND	0.10	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:23	KAL
Aroclor-1268 [2]	ND	0.10	mg/Kg dry	5		SW-846 8082A	10/13/16	10/17/16 21:23	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	49.6	30-150		10/17/16 21:23
Decachlorobiphenyl [2]	54.6	30-150		10/17/16 21:23
Tetrachloro-m-xylene [1]	71.4	30-150		10/17/16 21:23
Tetrachloro-m-xylene [2]	68.6	30-150		10/17/16 21:23

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

Project Location: Lowell | Sample Description: | Work Order: 16J0503

Date Received: 10/12/2016

Field Sample #: B-18 (10-15) | Sampled: 9/15/2016 11:15

Sample ID: 16J0503-03

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	95.1		% Wt	1		SM 2540G	10/19/16	10/19/16 7:20	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16J0503

Date Received: 10/12/2016

Field Sample #: B-19 (5-10) | Sampled: 9/15/2016 12:45

Sample ID: 16J0503-04

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.42	mg/Kg dry	20		SW-846 8082A	10/13/16	10/18/16 15:34	PJG
Aroclor-1221 [1]	ND	0.42	mg/Kg dry	20		SW-846 8082A	10/13/16	10/18/16 15:34	PJG
Aroclor-1232 [1]	ND	0.42	mg/Kg dry	20		SW-846 8082A	10/13/16	10/18/16 15:34	PJG
Aroclor-1242 [1]	ND	0.42	mg/Kg dry	20		SW-846 8082A	10/13/16	10/18/16 15:34	PJG
Aroclor-1248 [1]	ND	0.42	mg/Kg dry	20		SW-846 8082A	10/13/16	10/18/16 15:34	PJG
Aroclor-1254 [1]	2.1	0.42	mg/Kg dry	20		SW-846 8082A	10/13/16	10/18/16 15:34	PJG
Aroclor-1260 [1]	ND	0.42	mg/Kg dry	20		SW-846 8082A	10/13/16	10/18/16 15:34	PJG
Aroclor-1262 [1]	ND	0.42	mg/Kg dry	20		SW-846 8082A	10/13/16	10/18/16 15:34	PJG
Aroclor-1268 [1]	ND	0.42	mg/Kg dry	20		SW-846 8082A	10/13/16	10/18/16 15:34	PJG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	78.7	30-150		10/18/16 15:34
Decachlorobiphenyl [2]	78.3	30-150		10/18/16 15:34
Tetrachloro-m-xylene [1]	82.7	30-150		10/18/16 15:34
Tetrachloro-m-xylene [2]	78.0	30-150		10/18/16 15:34

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Project Location: Lowell | Sample Description: | Work Order: 16J0503

Date Received: 10/12/2016

Field Sample #: B-19 (5-10) | Sampled: 9/15/2016 12:45

Sample ID: 16J0503-04

Sample Matrix: Soil

Sample Flags: H-10

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	20	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
C19-C36 Aliphatics	70	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Unadjusted C11-C22 Aromatics	300	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
C11-C22 Aromatics	220	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Acenaphthene	1.3	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Anthracene	2.5	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Benzo(a)anthracene	6.0	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Benzo(a)pyrene	5.1	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Benzo(b)fluoranthene	7.0	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Benzo(g,h,i)perylene	2.7	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Benzo(k)fluoranthene	2.6	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Chrysene	6.7	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Dibenz(a,h)anthracene	0.90	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Fluoranthene	14	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Fluorene	1.3	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Indeno(1,2,3-cd)pyrene	3.3	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
2-Methylnaphthalene	0.99	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Naphthalene	0.44	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Phenanthrene	11	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS
Pyrene	13	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/14/16	10/18/16 0:08	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	61.7	40-140		10/18/16 0:08
o-Terphenyl (OTP)	64.6	40-140		10/18/16 0:08
2-Bromonaphthalene	89.4	40-140		10/18/16 0:08
2-Fluorobiphenyl	102	40-140		10/18/16 0:08

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Project Location: Lowell | Sample Description: | Work Order: 16J0503

Date Received: 10/12/2016

Field Sample #: B-19 (5-10) | Sampled: 9/15/2016 12:45

Sample ID: 16J0503-04

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	94.3		% Wt	1		SM 2540G	10/19/16	10/19/16 14:13	MRL

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Sample Extraction Data

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

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16J0503-02 [B-18 (5-10)]	B160684	20.0	2.00	10/14/16
16J0503-04 [B-19 (5-10)]	B160684	20.0	2.00	10/14/16

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
16J0503-01 [B-15 (5-10)]	B158556	10/19/16
16J0503-03 [B-18 (10-15)]	B158556	10/19/16

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
16J0503-02 [B-18 (5-10)]	B161078	10/19/16
16J0503-04 [B-19 (5-10)]	B161078	10/19/16

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16J0503-01 [B-15 (5-10)]	B160549	10.1	10.0	10/13/16
16J0503-02 [B-18 (5-10)]	B160549	10.0	10.0	10/13/16
16J0503-03 [B-18 (10-15)]	B160549	10.1	10.0	10/13/16
16J0503-04 [B-19 (5-10)]	B160549	10.1	10.0	10/13/16

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B160549 - SW-846 3540C										
Blank (B160549-BLK1)				Prepared: 10/13/16 Analyzed: 10/17/16						
Aroclor-1016	ND	0.020	mg/Kg wet							
Aroclor-1016 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1221	ND	0.020	mg/Kg wet							
Aroclor-1221 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1232	ND	0.020	mg/Kg wet							
Aroclor-1232 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1242	ND	0.020	mg/Kg wet							
Aroclor-1242 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1248	ND	0.020	mg/Kg wet							
Aroclor-1248 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1254	ND	0.020	mg/Kg wet							
Aroclor-1254 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1260	ND	0.020	mg/Kg wet							
Aroclor-1260 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1262	ND	0.020	mg/Kg wet							
Aroclor-1262 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1268	ND	0.020	mg/Kg wet							
Aroclor-1268 [2C]	ND	0.020	mg/Kg wet							
Surrogate: Decachlorobiphenyl	*0.215*		mg/Kg wet	0.198		109	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.202*		mg/Kg wet	0.198		102	30-150			
Surrogate: Tetrachloro-m-xylene	*0.202*		mg/Kg wet	0.198		102	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.192*		mg/Kg wet	0.198		96.7	30-150			
LCS (B160549-BS1)				Prepared: 10/13/16 Analyzed: 10/17/16						
Aroclor-1016	0.21	0.020	mg/Kg wet	0.196		105	40-140			
Aroclor-1016 [2C]	0.19	0.020	mg/Kg wet	0.196		99.4	40-140			
Aroclor-1260	0.20	0.020	mg/Kg wet	0.196		104	40-140			
Aroclor-1260 [2C]	0.19	0.020	mg/Kg wet	0.196		94.6	40-140			
Surrogate: Decachlorobiphenyl	*0.219*		mg/Kg wet	0.196		112	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.206*		mg/Kg wet	0.196		105	30-150			
Surrogate: Tetrachloro-m-xylene	*0.206*		mg/Kg wet	0.196		105	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.196*		mg/Kg wet	0.196		99.8	30-150			
LCS Dup (B160549-BSD1)				Prepared: 10/13/16 Analyzed: 10/17/16						
Aroclor-1016	0.20	0.020	mg/Kg wet	0.200		102	40-140	0.460	30	
Aroclor-1016 [2C]	0.20	0.020	mg/Kg wet	0.200		97.6	40-140	0.188	30	
Aroclor-1260	0.20	0.020	mg/Kg wet	0.200		102	40-140	0.196	30	
Aroclor-1260 [2C]	0.19	0.020	mg/Kg wet	0.200		94.4	40-140	1.74	30	
Surrogate: Decachlorobiphenyl	*0.217*		mg/Kg wet	0.200		108	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.204*		mg/Kg wet	0.200		102	30-150			
Surrogate: Tetrachloro-m-xylene	*0.201*		mg/Kg wet	0.200		100	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.191*		mg/Kg wet	0.200		95.3	30-150			

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B160549 - SW-846 3540C										
Matrix Spike (B160549-MS1)	**Source: 16J0503-01**			Prepared: 10/13/16 Analyzed: 10/17/16						
Aroclor-1016	0.17	0.11	mg/Kg dry	0.215	ND	77.5	40-140			
Aroclor-1016 [2C]	0.17	0.11	mg/Kg dry	0.215	ND	80.7	40-140			
Aroclor-1260	0.20	0.11	mg/Kg dry	0.215	ND	94.8	40-140			
Aroclor-1260 [2C]	0.23	0.11	mg/Kg dry	0.215	ND	108	40-140			
Surrogate: Decachlorobiphenyl	*0.135*		mg/Kg dry	0.215		62.9	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.159*		mg/Kg dry	0.215		74.3	30-150			
Surrogate: Tetrachloro-m-xylene	*0.185*		mg/Kg dry	0.215		86.3	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.188*		mg/Kg dry	0.215		87.6	30-150			
Matrix Spike Dup (B160549-MSD1)	**Source: 16J0503-01**			Prepared: 10/13/16 Analyzed: 10/17/16						
Aroclor-1016	0.18	0.11	mg/Kg dry	0.212	ND	84.4	40-140	7.49	50	
Aroclor-1016 [2C]	0.17	0.11	mg/Kg dry	0.212	ND	82.2	40-140	0.924	50	
Aroclor-1260	0.25	0.11	mg/Kg dry	0.212	ND	119	40-140	21.2	50	
Aroclor-1260 [2C]	0.28	0.11	mg/Kg dry	0.212	ND	134	40-140	20.2	50	
Surrogate: Decachlorobiphenyl	*0.135*		mg/Kg dry	0.212		63.5	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.150*		mg/Kg dry	0.212		70.8	30-150			
Surrogate: Tetrachloro-m-xylene	*0.186*		mg/Kg dry	0.212		87.6	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.182*		mg/Kg dry	0.212		85.7	30-150			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B160684 - SW-846 3546										
Blank (B160684-BLK1)				Prepared: 10/14/16 Analyzed: 10/17/16						
C9-C18 Aliphatics	ND	10	mg/Kg wet							
C19-C36 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet							
C11-C22 Aromatics	ND	10	mg/Kg wet							
Acenaphthene	ND	0.10	mg/Kg wet							
Acenaphthylene	ND	0.10	mg/Kg wet							
Anthracene	ND	0.10	mg/Kg wet							
Benzo(a)anthracene	ND	0.10	mg/Kg wet							
Benzo(a)pyrene	ND	0.10	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet							
Chrysene	ND	0.10	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet							
Fluoranthene	ND	0.10	mg/Kg wet							
Fluorene	ND	0.10	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet							
2-Methylnaphthalene	ND	0.10	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							
Phenanthrene	ND	0.10	mg/Kg wet							
Pyrene	ND	0.10	mg/Kg wet							
n-Decane	ND	0.10	mg/Kg wet							
n-Docosane	ND	0.10	mg/Kg wet							
n-Dodecane	ND	0.10	mg/Kg wet							
n-Eicosane	ND	0.10	mg/Kg wet							
n-Hexacosane	ND	0.10	mg/Kg wet							
n-Hexadecane	ND	0.10	mg/Kg wet							
n-Hexatriacontane	ND	0.10	mg/Kg wet							
n-Nonadecane	ND	0.10	mg/Kg wet							
n-Nonane	ND	0.10	mg/Kg wet							
n-Octacosane	ND	0.10	mg/Kg wet							
n-Octadecane	ND	0.10	mg/Kg wet							
n-Tetracosane	ND	0.10	mg/Kg wet							
n-Tetradecane	ND	0.10	mg/Kg wet							
n-Triacontane	ND	0.10	mg/Kg wet							
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*3.57*		mg/Kg wet	5.00		71.3	40-140			
Surrogate: o-Terphenyl (OTP)	*3.67*		mg/Kg wet	5.00		73.4	40-140			
Surrogate: 2-Bromonaphthalene	*38.8*		µg/mL	50.0		77.5	40-140			
Surrogate: 2-Fluorobiphenyl	*43.0*		µg/mL	50.0		85.9	40-140			
LCS (B160684-BS1)				Prepared: 10/14/16 Analyzed: 10/17/16						
Acenaphthene	3.97	0.10	mg/Kg wet	5.00		79.4	40-140			
Acenaphthylene	3.76	0.10	mg/Kg wet	5.00		75.2	40-140			
Anthracene	3.96	0.10	mg/Kg wet	5.00		79.2	40-140			
Benzo(a)anthracene	3.80	0.10	mg/Kg wet	5.00		76.0	40-140			
Benzo(a)pyrene	3.77	0.10	mg/Kg wet	5.00		75.5	40-140			
Benzo(b)fluoranthene	3.83	0.10	mg/Kg wet	5.00		76.7	40-140			
Benzo(g,h,i)perylene	3.59	0.10	mg/Kg wet	5.00		71.9	40-140			
Benzo(k)fluoranthene	3.82	0.10	mg/Kg wet	5.00		76.4	40-140			
Chrysene	3.91	0.10	mg/Kg wet	5.00		78.2	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B160684 - SW-846 3546										
LCS (B160684-BS1)				Prepared: 10/14/16 Analyzed: 10/17/16						
Dibenz(a,h)anthracene	3.81	0.10	mg/Kg wet	5.00		76.2	40-140			
Fluoranthene	3.90	0.10	mg/Kg wet	5.00		78.0	40-140			
Fluorene	3.99	0.10	mg/Kg wet	5.00		79.7	40-140			
Indeno(1,2,3-cd)pyrene	3.41	0.10	mg/Kg wet	5.00		68.3	40-140			
2-Methylnaphthalene	3.48	0.10	mg/Kg wet	5.00		69.6	40-140			
Naphthalene	3.29	0.10	mg/Kg wet	5.00		65.7	40-140			
Phenanthrene	3.85	0.10	mg/Kg wet	5.00		77.0	40-140			
Pyrene	3.93	0.10	mg/Kg wet	5.00		78.5	40-140			
n-Decane	2.55	0.10	mg/Kg wet	5.00		51.0	40-140			
n-Docosane	4.02	0.10	mg/Kg wet	5.00		80.4	40-140			
n-Dodecane	3.31	0.10	mg/Kg wet	5.00		66.2	40-140			
n-Eicosane	4.13	0.10	mg/Kg wet	5.00		82.6	40-140			
n-Hexacosane	3.78	0.10	mg/Kg wet	5.00		75.6	40-140			
n-Hexadecane	4.13	0.10	mg/Kg wet	5.00		82.5	40-140			
n-Hexatriacontane	4.06	0.10	mg/Kg wet	5.00		81.1	40-140			
n-Nonadecane	4.06	0.10	mg/Kg wet	5.00		81.3	40-140			
n-Nonane	1.77	0.10	mg/Kg wet	5.00		35.3	30-140			
n-Octacosane	3.76	0.10	mg/Kg wet	5.00		75.2	40-140			
n-Octadecane	4.11	0.10	mg/Kg wet	5.00		82.1	40-140			
n-Tetracosane	4.16	0.10	mg/Kg wet	5.00		83.2	40-140			
n-Tetradecane	3.85	0.10	mg/Kg wet	5.00		76.9	40-140			
n-Triacontane	3.74	0.10	mg/Kg wet	5.00		74.8	40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.76*		mg/Kg wet	5.00		75.3	40-140			
Surrogate: o-Terphenyl (OTP)	*3.62*		mg/Kg wet	5.00		72.5	40-140			
Surrogate: 2-Bromonaphthalene	*37.1*		µg/mL	50.0		74.2	40-140			
Surrogate: 2-Fluorobiphenyl	*43.3*		µg/mL	50.0		86.5	40-140			
LCS Dup (B160684-BSD1)				Prepared: 10/14/16 Analyzed: 10/17/16						
Acenaphthene	4.21	0.10	mg/Kg wet	5.00		84.2	40-140	5.82	25	
Acenaphthylene	4.01	0.10	mg/Kg wet	5.00		80.3	40-140	6.55	25	
Anthracene	3.94	0.10	mg/Kg wet	5.00		78.8	40-140	0.539	25	
Benzo(a)anthracene	3.72	0.10	mg/Kg wet	5.00		74.4	40-140	2.11	25	
Benzo(a)pyrene	3.69	0.10	mg/Kg wet	5.00		73.8	40-140	2.29	25	
Benzo(b)fluoranthene	3.76	0.10	mg/Kg wet	5.00		75.3	40-140	1.78	25	
Benzo(g,h,i)perylene	3.58	0.10	mg/Kg wet	5.00		71.6	40-140	0.346	25	
Benzo(k)fluoranthene	3.74	0.10	mg/Kg wet	5.00		74.9	40-140	2.09	25	
Chrysene	3.85	0.10	mg/Kg wet	5.00		76.9	40-140	1.64	25	
Dibenz(a,h)anthracene	3.66	0.10	mg/Kg wet	5.00		73.3	40-140	3.95	25	
Fluoranthene	3.87	0.10	mg/Kg wet	5.00		77.3	40-140	0.804	25	
Fluorene	4.08	0.10	mg/Kg wet	5.00		81.6	40-140	2.28	25	
Indeno(1,2,3-cd)pyrene	3.36	0.10	mg/Kg wet	5.00		67.2	40-140	1.58	25	
2-Methylnaphthalene	3.85	0.10	mg/Kg wet	5.00		77.0	40-140	10.1	25	
Naphthalene	3.70	0.10	mg/Kg wet	5.00		73.9	40-140	11.8	25	
Phenanthrene	3.85	0.10	mg/Kg wet	5.00		77.0	40-140	0.0805	25	
Pyrene	3.89	0.10	mg/Kg wet	5.00		77.9	40-140	0.811	25	
n-Decane	2.79	0.10	mg/Kg wet	5.00		55.8	40-140	9.10	25	
n-Docosane	3.88	0.10	mg/Kg wet	5.00		77.6	40-140	3.55	25	
n-Dodecane	3.58	0.10	mg/Kg wet	5.00		71.6	40-140	7.81	25	
n-Eicosane	4.01	0.10	mg/Kg wet	5.00		80.3	40-140	2.85	25	
n-Hexacosane	3.64	0.10	mg/Kg wet	5.00		72.8	40-140	3.77	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B160684 - SW-846 3546										
LCS Dup (B160684-BSD1)				Prepared: 10/14/16 Analyzed: 10/17/16						
n-Hexadecane	4.03	0.10	mg/Kg wet	5.00		80.7	40-140	2.28	25	
n-Hexatriacontane	3.83	0.10	mg/Kg wet	5.00		76.7	40-140	5.61	25	
n-Nonadecane	3.93	0.10	mg/Kg wet	5.00		78.7	40-140	3.24	25	
n-Nonane	1.93	0.10	mg/Kg wet	5.00		38.6	30-140	8.77	25	
n-Octacosane	3.61	0.10	mg/Kg wet	5.00		72.2	40-140	4.04	25	
n-Octadecane	3.99	0.10	mg/Kg wet	5.00		79.9	40-140	2.75	25	
n-Tetracosane	4.02	0.10	mg/Kg wet	5.00		80.3	40-140	3.51	25	
n-Tetradecane	3.90	0.10	mg/Kg wet	5.00		77.9	40-140	1.30	25	
n-Triacontane	3.59	0.10	mg/Kg wet	5.00		71.7	40-140	4.16	25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.52*		mg/Kg wet	5.00		70.4	40-140			
Surrogate: o-Terphenyl (OTP)	*3.58*		mg/Kg wet	5.00		71.7	40-140			
Surrogate: 2-Bromonaphthalene	*39.6*		µg/mL	50.0		79.2	40-140			
Surrogate: 2-Fluorobiphenyl	*44.1*		µg/mL	50.0		88.3	40-140			

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QUALITY CONTROL

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B161078 - % Solids										
Duplicate (B161078-DUP1)	**Source: 16J0503-02**			Prepared & Analyzed: 10/19/16						
% Solids	87.5		% Wt		86.9			0.688	20	

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-15 (5-10)

Lab Sample ID: 16J0503-01 Date(s) Analyzed: 10/17/2016 10/17/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	0.27	
	2	0.00	-0.03	0.03	0.30	12.0

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-19 (5-10)

Lab Sample ID: 16J0503-04 Date(s) Analyzed: 10/18/2016 10/18/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	2.1	
	2	0.00	-0.03	0.03	2.0	3.0

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B160549-BS1 Date(s) Analyzed: 10/17/2016 10/17/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.21	
	2	0.00	-0.03	0.03	0.19	8
Aroclor-1260	1	0.00	-0.03	0.03	0.20	
	2	0.00	-0.03	0.03	0.19	7

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B160549-BSD1 Date(s) Analyzed: 10/17/2016 10/17/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.20	
	2	0.00	-0.03	0.03	0.20	2
Aroclor-1260	1	0.00	-0.03	0.03	0.20	
	2	0.00	-0.03	0.03	0.19	8

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

Matrix Spike

Lab Sample ID: B160549-MS1 Date(s) Analyzed: 10/17/2016 10/17/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.17	
	2	0.00	-0.03	0.03	0.17	2
Aroclor-1260	1	0.00	-0.03	0.03	0.20	
	2	0.00	-0.03	0.03	0.23	13

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

Matrix Spike Dup

Lab Sample ID: B160549-MSD1 Date(s) Analyzed: 10/17/2016 10/17/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.18	
	2	0.00	-0.03	0.03	0.17	5
Aroclor-1260	1	0.00	-0.03	0.03	0.25	
	2	0.00	-0.03	0.03	0.28	11

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit
DL	Method Detection Limit
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
H-10	Analysis was requested after the recommended holding time had passed.
O-32	A dilution was performed as part of the standard analytical procedure.

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

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP-EPH-04-1.1 in Soil	
C9-C18 Aliphatics	CT,NC,ME,NH-P
C19-C36 Aliphatics	CT,NC,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,ME,NH-P
C11-C22 Aromatics	CT,NC,ME,NH-P
Acenaphthene	CT,NC,ME,NH-P
Acenaphthylene	CT,NC,ME,NH-P
Anthracene	CT,NC,ME,NH-P
Benzo(a)anthracene	CT,NC,ME,NH-P
Benzo(a)pyrene	CT,NC,ME,NH-P
Benzo(b)fluoranthene	CT,NC,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,ME,NH-P
Benzo(k)fluoranthene	CT,NC,ME,NH-P
Chrysene	CT,NC,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,ME,NH-P
Fluoranthene	CT,NC,ME,NH-P
Fluorene	CT,NC,ME
Indeno(1,2,3-cd)pyrene	CT,NC,ME,NH-P
2-Methylnaphthalene	CT,NC,ME
Naphthalene	CT,NC,ME,NH-P
Phenanthrene	CT,NC,ME,NH-P
Pyrene	CT,NC,ME,NH-P
SW-846 8082A in Soil	
Aroclor-1016	CT,NH,NY,ME,NC,VA
Aroclor-1016 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1221	CT,NH,NY,ME,NC,VA
Aroclor-1221 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1232	CT,NH,NY,ME,NC,VA
Aroclor-1232 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1242	CT,NH,NY,ME,NC,VA
Aroclor-1242 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1248	CT,NH,NY,ME,NC,VA
Aroclor-1248 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1254	CT,NH,NY,ME,NC,VA
Aroclor-1254 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1260	CT,NH,NY,ME,NC,VA
Aroclor-1260 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1262	NY,NC,VA
Aroclor-1262 [2C]	NY,NC,VA
Aroclor-1268	NY,NC,VA
Aroclor-1268 [2C]	NY,NC,VA

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

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	02/1/2018
MA	Massachusetts DEP	M-MA100	06/30/2017
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2017
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2017
RI	Rhode Island Department of Health	LAO00112	12/30/2016
NC	North Carolina Div. of Water Quality	652	12/31/2016
NJ	New Jersey DEP	MA007 NELAP	06/30/2017
FL	Florida Department of Health	E871027 NELAP	06/30/2017
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2017
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2016
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2017

CHAIN OF CUSTODY RECORD

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Email: info@contestlabs.com
www.contestlabs.com
39 Spruce Street
East longmeadow, MA 01028

16I0708
Rev. 04.05.12
16J0503

Company Name: GEI
Address: 60 Brooks
Attention: A. Foley, E. Turley
Project Location: Lowell
Sampled By: A. Foley

Telephone:
Project #
Client PO# 1785-6100

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

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

analyses activated on 10/12/16 - 5 day TAT

Activate PCB testing (8082 Soxhlet)
1. B-15 (5-10') - **16I0708-2**
2. B-18 (5-10') - **16I0708-09**
3. B-18 (10-15')) - **16I0708-10**
4. B-19 (5-10'- **16I0708-12**

EPH and PAH testing done for the following samples.
1. B-19 (5-10') - **16I0708-12**
2. B-18 (5-10') - **16I0708-09**

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	EPH & PAHs	Asbestos	PCBs (Soxhlet)	Hold for PCBs	# of Containers	** Preservation	***Container Code
01	B-15 (0-5')	9/15	10:15		X	S	C			X				
02	B-15 (5-10')		10:30					X	X		X			
03	B-16 (0-5')		9:15							X				
04	B-16 (5-10)		9:30						X		X			
05	B-16 (10-15')		9:45					X			X			
06	B-17 (0-5')		11:30											
07	B-17 (5-7.5')		11:45					X	X		X			
08	B-18 (0-5)		10:45							X				
09	B-18 (5-10)		11:00								X			
10	B-18 (10-15)		11:15					X			X			

ANALYSIS REQUESTED

Dissolved Metals
○ Field Filtered
○ Lab to Filter

***Cont. Code:
A=amber glass
...a can
...bag
...vation
...hanol
...c Acid
...ric Acid
...um bisulfate
...ydroxide
...iosulfate
...r_____

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

Comments:
Please order Analysis ① EPH/PAH ② PCBs ③ Asbestos
④ Hold for PCBs

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

Relinquished by: (signature)	Date/Time:
A. Foley 9/16/16	15:00
Received by: (signature)	Date/Time:
[illegible] 9/16/16	1500
Relinquished by: (signature)	Date/Time:
[illegible] 9/16/16	1900
Received by: (signature)	Date/Time:
[illegible] 9/16/16	1900

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

Detection Limit Requirements
Massachusetts: S-1
Connecticut:
Other:

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

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

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

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CHAIN OF CUSTODY RECORD

16I0708

Rev 04.05.12

39 Spruce Street
East longmeadow, MA 01028

Company Name: GEC
Address: 60 Brooks
Attention:
Project Location: Lowell
Sampled By: A. Foley

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

Telephone:
Project #
Client PO# 1785-6100

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

ANALYSIS REQUESTED

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	EPH w PAHs	Asbestos	PCBs (soxhlet)	Hold for PCBs
11	B-19 (0-5')	9/15/16	12:30		X				X	X	
12	B-19 (5-10)	↓	12:45		↓				X		X
	~~B-19 (10-15) @ GEC~~		~~1:15~~								
13	B-19 (15-17.5)	↓	1:30		↓			X			
14	B-20 (0-5')	9/16/16	~~10:05~~ APF	9:59						X	
15	B-20 (5-8)	↓	~~10:40~~ APF	10:05				X			X
16	B-21 (0-5)	↓	10:30					X	X	X	
17	B-21 (5-10)	↓	10:40					X	X	X	
18	B-21 (10-13.5)	↓	10:56					X	X	X	
		↓									

# of Containers
** Preservation
***Container Code

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

Comments:
① EPH ② PCBS ③ ASBESTOS ④ HOLD
Please Analyse in order

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

Relinquished by: (signature)	Date/Time:
[signature] 9/16/16	1500
Received by: (signature) [signature] 9/16/16	1500
Relinquished by: (signature) [signature] 9/16/16	1900
Received by: (signature) [signature] 9/16/16	1900

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

Detection Limit Requirements
Massachusetts: S-1
Connecticut:
Other:

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

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

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

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CHAIN OF CUSTODY RECORD

16I0708

Rev 04.05.12

39 Spruce Street
East longmeadow, MA 01028

Company Name: GEC
Address: 60 Brooks
Attention: A. Foley
Project Location: Lowell
Sampled By: A. Foley, E. Furlong, B. Butler

Telephone:
Project #
Client PO# 1788-6100

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

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

ANALYSIS REQUESTED

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection: Beginning Date/Time	Collection: Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	EPH/PAHs	Asbestos	PCBs	Hold for PCBs
	B-22(0-5)@GEC	9/16/16			X	S	U				
	B-22(5-10)@GEC	↓			↓	↓	↓				
19	B-22(10-15)							X			
20	B-22(15-20)							X			
	B-23(0-5)@GEC										
21	B-23(5-9)	↓			↓	↓	↓	X			

# of Containers
** Preservation
***Container Code

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

Comments: ① EPH ② PCB ③ ASBESTOS ④ Hold

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

Relinquished by: (signature) [signature]	9/16/16	Date/Time: 15:00
Received by: (signature) [signature]	9/16/16	Date/Time: 15:00
Relinquished by: (signature) [signature]	9/16/16	Date/Time: 19:00
Received by: (signature) [signature] 3.1	9/16/16	Date/Time: 1900

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

Detection Limit Requirements
Massachusetts: S-1
Connecticut:
Other:

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

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

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

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

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con-test® ANALYTICAL LABORATORY
Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com
www.contestlabs.com

CHAIN OF CUSTODY RECORD

16I0708

Rev 04.05.12

39 Spruce Street
East longmeadow, MA 01028

Company Name: GEC
Address: 60 Brooks Dr
Attention: A. Foley, E. Furlong, B. Butler
Project Location: Lowell
Sampled By: A. Foley

Telephone:
Project #
Client PO# 1785-6100

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

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

ANALYSIS REQUESTED

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection: Beginning Date/Time	Collection: Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	EPH/PAHs	ASBESTOS	PCBs (soxhlet)	VOCs
22	B-14A (0-5)	9/16/16	8:55	X	X	APF		X	X	X	
23	B-14A (5-10)		9:00	X				X	X	X	
24	B-14A (10-15)		9:05	X				X	X	X	
25	B-14A (15-16.5)		9:20	X				X	X	X	
26	B-14 (10-15)	9/15/16	9:30		X						X
27	B-14A (10-15)	9/16/16	9:30		X						X
28	B-26 (10-13)				X						X
29	B-27 (5-10)				X						X
30	B-28 (10-15)				X						X

# of Containers
** Preservation
***Container Code

Dissolved Metals
○ Field Filtered
○ Lab to Filter

***Cont. Code:
A=amber glass
G=glass
P=plastic
ST=sterile
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O=Other

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GW= groundwater
WW= wastewater
DW= drinking water
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SL = sludge
O = other

Comments:

Please use the following codes to let Con-Test know if a specific sample may be high in concentration in Matrix/Conc. Code Box:
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Relinquished by: (signature)	Date/Time:
[signature] 9/16/16	15:00
Received by: (signature) [signature] 9/16/16	15:00
Relinquished by: (signature) [signature] 9/16/16	19:00
Received by: (signature) [signature] 3.1 9/16/16	1900

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

Detection Limit Requirements
Massachusetts: S-1
Connecticut:
Other:

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

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

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

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Table of Contents

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

con-test® ANALYTICAL LABORATORY

Sample Receipt Checklist

CLIENT NAME: GEC **RECEIVED BY:** JM **DATE:** 9/16/16

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

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

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

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

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

Temperature °C by Temp blank ____ Temperature °C by Temp gun 3.1

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

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

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

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

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

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

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

Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber		16 oz amber	
500 mL Amber		8 oz amber/clear jar	26
250 mL Amber (8oz amber)		4 oz amber/clear jar	
1 Liter Plastic		2 oz amber/clear jar	
500 mL Plastic		Plastic Bag / Ziploc	
250 mL plastic		SOC Kit	
40 mL Vial - type listed below	15	Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

☆ Recieved extra B-21(0-5) sample
- no analyses checked for B-17 (0-5)
- no % solids jars for any of the VOC analyses.

40 mL vials:	# HCl ____	# Methanol	5	Time and Date Frozen:
Doc# 277	# Bisulfate	10	# DI Water ____	
Rev. 4 August 2013	# Thiosulfate ____	Unpreserved		

Login Sample Receipt Checklist

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

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

Who notified of False statements? **Date/Time:**

Doc #277 Rev. 4 August 2013 **Log-In Technician Initials:** JM **Date/Time:** 9/16/16 1900

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 16J0503
Project Location: Lowell	RTN:

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

16J0503-01 thru 16J0503-04

Matrices: Soil

CAM Protocol (check all that below)

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

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

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

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

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

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

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

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

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

Signature: Position: Project Manager

Printed Name: Lisa A. Worthington Date: 10/20/16

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

September 23, 2016

Drew Foley
Goldman Environmental
60 Brooks Drive
Braintree, MA 02184

Project Location: Lowell
Client Job Number:
Project Number: 1785-6100
Laboratory Work Order Number: 16I0708

Enclosed are results of analyses for samples received by the laboratory on September 16, 2016. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

James M. Georgantas
Project Manager

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

Goldman Environmental
60 Brooks Drive
Braintree, MA 02184
ATTN: Drew Foley

REPORT DATE: 9/23/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 1785-6100

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16I0708

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

PROJECT LOCATION: Lowell

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
B-15 (0-5)	16I0708-01	Soil		SM 2540G	
				SW-846 8082A	
B-15 (5-10)	16I0708-02	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
B-16 (0-5)	16I0708-03	Soil		SM 2540G	
				SW-846 8082A	
B-16 (5-10)	16I0708-04	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
B-16 (10-15)	16I0708-05	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
B-17 (5-7.5)	16I0708-07	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
B-18 (0-5)	16I0708-08	Soil		SM 2540G	
				SW-846 8082A	
B-18 (10-15)	16I0708-10	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
B-19 (0-5)	16I0708-11	Soil		SM 2540G	
				SW-846 8082A	
B-19 (5-10)	16I0708-12	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
B-19 (15-17)	16I0708-13	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
B-20 (0-5)	16I0708-14	Soil		SM 2540G	
				SW-846 8082A	
B-20 (5-8)	16I0708-15	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
B-21 (0-5)	16I0708-16	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	

con-test® ANALYTICAL LABORATORY

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

Goldman Environmental
60 Brooks Drive
Braintree, MA 02184
ATTN: Drew Foley

REPORT DATE: 9/23/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 1785-6100

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16I0708

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

PROJECT LOCATION: Lowell

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
B-21 (5-10)	16I0708-17	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	
B-21 (10-13.5)	16I0708-18	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	
B-22 (10-15)	16I0708-19	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
B-22 (15-20)	16I0708-20	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
B-23 (5-9)	16I0708-21	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
B-14A (0-5)	16I0708-22	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	
B-14A (5-10)	16I0708-23	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	
B-14A (10-15)	16I0708-24	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	
B-14A (15-16.5)	16I0708-25	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	
B-14 (10-15)	16I0708-26	Soil		SW-846 8260C	
B-14A (10-15)	16I0708-27	Soil		SW-846 8260C	

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

Goldman Environmental
60 Brooks Drive
Braintree, MA 02184
ATTN: Drew Foley

REPORT DATE: 9/23/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 1785-6100

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16I0708

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

PROJECT LOCATION: Lowell

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
B-26 (10-13)	16I0708-28	Soil		SW-846 8260C	
B-27 (5-10)	16I0708-29	Soil		SW-846 8260C	
B-28 (10-15)	16I0708-30	Soil		SW-846 8260C	

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

CASE NARRATIVE SUMMARY

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

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

MADEP-EPH-04-1.1

Qualifications:

RL-08

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

Analyte & Samples(s) Qualified:

2-Methylnaphthalene
16I0708-02[B-15 (5-10)]

Acenaphthene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Acenaphthylene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Anthracene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-25[B-14A (15-16.5)]

Benzo(a)anthracene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Benzo(a)pyrene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Benzo(b)fluoranthene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Benzo(g,h,i)perylene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Benzo(k)fluoranthene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

C9-C18 Aliphatics
16I0708-22[B-14A (0-5)]

Chrysene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Dibenz(a,h)anthracene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Fluoranthene
16I0708-02[B-15 (5-10)], 16I0708-25[B-14A (15-16.5)]

Fluorene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)]

Indeno(1,2,3-cd)pyrene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Naphthalene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-25[B-14A (15-16.5)]

Phenanthrene
16I0708-02[B-15 (5-10)]

Pyrene
16I0708-02[B-15 (5-10)], 16I0708-25[B-14A (15-16.5)]

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

Chlorooctadecane (COD)
16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

o-Terphenyl (OTP)
16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)]

S-15

Surrogate recovery outside of control limits due to suspected sample matrix interference. Chromatogram(s) is attached.

Analyte & Samples(s) Qualified:

Chlorooctadecane (COD)
16I0708-23[B-14A (5-10)]

SW-846 8082A

Qualifications:

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

MS-21

Matrix spike and/or spike duplicate recovery bias high due to contribution of other Aroclors present in the source sample.

Analyte & Samples(s) Qualified:

Aroclor-1016 [2C]
B158646-MS1, B158646-MSD1

Aroclor-1260
B158646-MS1, B158646-MSD1

Aroclor-1260 [2C]
B158646-MS1, B158646-MSD1

O-32

A dilution was performed as part of the standard analytical procedure.

Analyte & Samples(s) Qualified:

16I0708-14[B-20 (0-5)], 16I0708-25[B-14A (15-16.5)]

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

Decachlorobiphenyl
16I0708-01[B-15 (0-5)], 16I0708-08[B-18 (0-5)], 16I0708-11[B-19 (0-5)], 16I0708-16[B-21 (0-5)]

Decachlorobiphenyl [2C]
16I0708-01[B-15 (0-5)], 16I0708-08[B-18 (0-5)], 16I0708-11[B-19 (0-5)], 16I0708-16[B-21 (0-5)]

Tetrachloro-m-xylene
16I0708-01[B-15 (0-5)], 16I0708-08[B-18 (0-5)], 16I0708-11[B-19 (0-5)], 16I0708-16[B-21 (0-5)]

Tetrachloro-m-xylene [2C]
16I0708-01[B-15 (0-5)], 16I0708-08[B-18 (0-5)], 16I0708-11[B-19 (0-5)], 16I0708-16[B-21 (0-5)]

SW-846 8260C

Qualifications:

L-06

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

Analyte & Samples(s) Qualified:

Isopropylbenzene (Cumene)
16I0708-28[B-26 (10-13)], B158583-BS1, B158583-BSD1

L-07

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

Analyte & Samples(s) Qualified:

Vinyl Chloride
B158583-BSD1

RL-05

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

Analyte & Samples(s) Qualified:

16I0708-26[B-14 (10-15)], 16I0708-27[B-14A (10-15)], 16I0708-28[B-26 (10-13)], 16I0708-30[B-28 (10-15)]

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RL-07

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

Analyte & Samples(s) Qualified:

1,2,3-Trichlorobenzene
16I0708-29[B-27 (5-10)]

1,2-Dibromo-3-chloropropane (DB
16I0708-29[B-27 (5-10)]

Bromomethane
16I0708-29[B-27 (5-10)]

Carbon Disulfide
16I0708-29[B-27 (5-10)]

Methylene Chloride
16I0708-29[B-27 (5-10)]

Naphthalene
16I0708-29[B-27 (5-10)]

V-05

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

Analyte & Samples(s) Qualified:

2,2-Dichloropropane
16I0708-26[B-14 (10-15)], 16I0708-27[B-14A (10-15)], 16I0708-28[B-26 (10-13)], 16I0708-29[B-27 (5-10)], 16I0708-30[B-28 (10-15)], B158583-BLK1, B158583-BS1, B158583-BSD1

Chloromethane
16I0708-26[B-14 (10-15)], 16I0708-27[B-14A (10-15)], 16I0708-28[B-26 (10-13)], 16I0708-29[B-27 (5-10)], 16I0708-30[B-28 (10-15)], B158583-BLK1, B158583-BS1, B158583-BSD1

V-16

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

Analyte & Samples(s) Qualified:

1,4-Dioxane
16I0708-26[B-14 (10-15)], 16I0708-27[B-14A (10-15)], 16I0708-28[B-26 (10-13)], 16I0708-29[B-27 (5-10)], 16I0708-30[B-28 (10-15)], B158583-BLK1, B158583-BS1, B158583-BSD1

V-20

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

Analyte & Samples(s) Qualified:

Bromomethane
B158583-BS1, B158583-BSD1

MADEP-EPH-04-1.1

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

SW-846 8260C

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

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Project Manager

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

Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-15 (0-5) | Sampled: 9/15/2016 10:15

Sample ID: 16I0708-01

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1221 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1232 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1242 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1248 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1254 [2]	12	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1260 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1262 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1268 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	9/22/16 9:49
Decachlorobiphenyl [2]	*	30-150	S-01	9/22/16 9:49
Tetrachloro-m-xylene [1]	*	30-150	S-01	9/22/16 9:49
Tetrachloro-m-xylene [2]	*	30-150	S-01	9/22/16 9:49

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-15 (0-5) | Sampled: 9/15/2016 10:15

Sample ID: 16I0708-01

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.1		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-15 (5-10) | Sampled: 9/15/2016 10:30

Sample ID: 16I0708-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	140	110	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
C19-C36 Aliphatics	4700	540	mg/Kg dry	50		MADEP-EPH-04-1.1	9/20/16	9/23/16 10:37	SCS
Unadjusted C11-C22 Aromatics	3700	540	mg/Kg dry	50		MADEP-EPH-04-1.1	9/20/16	9/23/16 10:37	SCS
C11-C22 Aromatics	3700	540	mg/Kg dry	50		MADEP-EPH-04-1.1	9/20/16	9/23/16 10:37	SCS
Acenaphthene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Acenaphthylene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Anthracene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Benzo(a)anthracene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Benzo(a)pyrene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Benzo(b)fluoranthene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Benzo(g,h,i)perylene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Benzo(k)fluoranthene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Chrysene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Dibenz(a,h)anthracene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Fluoranthene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Fluorene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Indeno(1,2,3-cd)pyrene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
2-Methylnaphthalene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Naphthalene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Phenanthrene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Pyrene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	61.4	40-140		9/22/16 23:29
o-Terphenyl (OTP)	60.7	40-140		9/22/16 23:29
2-Bromonaphthalene	67.0	40-140		9/22/16 23:29
2-Fluorobiphenyl	89.6	40-140		9/22/16 23:29

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-15 (5-10) | Sampled: 9/15/2016 10:30

Sample ID: 16I0708-02

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	92.3		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-15 (5-10) | Sampled: 9/15/2016 10:30

Sample ID: 16I0708-02

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-16 (0-5) | Sampled: 9/15/2016 09:15

Sample ID: 16I0708-03

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1254 [1]	0.90	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1260 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	83.4	30-150		9/21/16 21:34
Decachlorobiphenyl [2]	88.4	30-150		9/21/16 21:34
Tetrachloro-m-xylene [1]	89.2	30-150		9/21/16 21:34
Tetrachloro-m-xylene [2]	86.3	30-150		9/21/16 21:34

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-16 (0-5) | Sampled: 9/15/2016 09:15

Sample ID: 16I0708-03

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	92.5		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-16 (5-10) | Sampled: 9/15/2016 09:30

Sample ID: 16I0708-04

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-16 (10-15) | Sampled: 9/15/2016 09:45

Sample ID: 16I0708-05

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	150	20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
C19-C36 Aliphatics	380	100	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 10:57	SCS
Unadjusted C11-C22 Aromatics	850	100	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 10:57	SCS
C11-C22 Aromatics	850	100	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 10:57	SCS
Acenaphthene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Acenaphthylene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Anthracene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Benzo(a)anthracene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Benzo(a)pyrene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Benzo(b)fluoranthene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Benzo(g,h,i)perylene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Benzo(k)fluoranthene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Chrysene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Dibenz(a,h)anthracene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Fluoranthene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Fluorene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Indeno(1,2,3-cd)pyrene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
2-Methylnaphthalene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Naphthalene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Phenanthrene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Pyrene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	66.3	40-140		9/22/16 23:48
o-Terphenyl (OTP)	81.1	40-140		9/22/16 23:48
2-Bromonaphthalene	74.5	40-140		9/22/16 23:48
2-Fluorobiphenyl	96.8	40-140		9/22/16 23:48

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-16 (10-15) | Sampled: 9/15/2016 09:45

Sample ID: 16I0708-05

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	95.3		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-17 (5-7.5) | Sampled: 9/15/2016 11:45

Sample ID: 16I0708-07

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	85	21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
C19-C36 Aliphatics	670	110	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:17	SCS
Unadjusted C11-C22 Aromatics	660	21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
C11-C22 Aromatics	650	21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Acenaphthene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Acenaphthylene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Anthracene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Benzo(a)anthracene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Benzo(a)pyrene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Benzo(b)fluoranthene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Benzo(g,h,i)perylene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Benzo(k)fluoranthene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Chrysene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Dibenz(a,h)anthracene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Fluoranthene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Fluorene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Indeno(1,2,3-cd)pyrene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
2-Methylnaphthalene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Naphthalene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Phenanthrene	0.63	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Pyrene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	58.8	40-140		9/23/16 0:06
o-Terphenyl (OTP)	73.8	40-140		9/23/16 0:06
2-Bromonaphthalene	78.7	40-140		9/23/16 0:06
2-Fluorobiphenyl	105	40-140		9/23/16 0:06

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-17 (5-7.5) | Sampled: 9/15/2016 11:45

Sample ID: 16I0708-07

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.4		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-17 (5-7.5) | Sampled: 9/15/2016 11:45

Sample ID: 16I0708-07

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-18 (0-5) | Sampled: 9/15/2016 10:45

Sample ID: 16I0708-08

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1221 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1232 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1242 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1248 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1254 [2]	29	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1260 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1262 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1268 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	9/22/16 10:02
Decachlorobiphenyl [2]	*	30-150	S-01	9/22/16 10:02
Tetrachloro-m-xylene [1]	*	30-150	S-01	9/22/16 10:02
Tetrachloro-m-xylene [2]	*	30-150	S-01	9/22/16 10:02

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-18 (0-5) | Sampled: 9/15/2016 10:45

Sample ID: 16I0708-08

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.4		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-18 (10-15) | Sampled: 9/15/2016 11:15

Sample ID: 16I0708-10

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	59	52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
C19-C36 Aliphatics	310	52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Unadjusted C11-C22 Aromatics	530	52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
C11-C22 Aromatics	530	52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Acenaphthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Acenaphthylene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Anthracene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Benzo(a)anthracene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Benzo(a)pyrene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Benzo(b)fluoranthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Benzo(g,h,i)perylene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Benzo(k)fluoranthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Chrysene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Dibenz(a,h)anthracene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Fluoranthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Fluorene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Indeno(1,2,3-cd)pyrene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
2-Methylnaphthalene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Naphthalene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Phenanthrene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Pyrene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	58.7	40-140		9/23/16 0:25
o-Terphenyl (OTP)	70.4	40-140		9/23/16 0:25
2-Bromonaphthalene	87.6	40-140		9/23/16 0:25
2-Fluorobiphenyl	101	40-140		9/23/16 0:25

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-18 (10-15) | Sampled: 9/15/2016 11:15

Sample ID: 16I0708-10

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	95.1		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-19 (0-5) | Sampled: 9/15/2016 12:30

Sample ID: 16I0708-11

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1221 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1232 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1242 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1248 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1254 [2]	6.7	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1260 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1262 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1268 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	9/22/16 10:15
Decachlorobiphenyl [2]	*	30-150	S-01	9/22/16 10:15
Tetrachloro-m-xylene [1]	*	30-150	S-01	9/22/16 10:15
Tetrachloro-m-xylene [2]	*	30-150	S-01	9/22/16 10:15

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-19 (0-5) | Sampled: 9/15/2016 12:30

Sample ID: 16I0708-11

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	90.1		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-19 (5-10) | Sampled: 9/15/2016 12:45

Sample ID: 16I0708-12

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-19 (15-17) | Sampled: 9/15/2016 13:30

Sample ID: 16I0708-13

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	200	53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
C19-C36 Aliphatics	730	53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Unadjusted C11-C22 Aromatics	1600	53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
C11-C22 Aromatics	1600	53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Acenaphthene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Acenaphthylene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Anthracene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Benzo(a)anthracene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Benzo(a)pyrene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Benzo(b)fluoranthene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Benzo(g,h,i)perylene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Benzo(k)fluoranthene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Chrysene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Dibenz(a,h)anthracene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Fluoranthene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Fluorene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Indeno(1,2,3-cd)pyrene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
2-Methylnaphthalene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Naphthalene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Phenanthrene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Pyrene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	47.6	40-140		9/23/16 0:44
o-Terphenyl (OTP)	77.6	40-140		9/23/16 0:44
2-Bromonaphthalene	83.5	40-140		9/23/16 0:44
2-Fluorobiphenyl	102	40-140		9/23/16 0:44

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-19 (15-17) | Sampled: 9/15/2016 13:30

Sample ID: 16I0708-13

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	92.5		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-20 (0-5) | Sampled: 9/16/2016 09:59

Sample ID: 16I0708-14

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1254 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1260 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	110	30-150		9/21/16 23:58
Decachlorobiphenyl [2]	109	30-150		9/21/16 23:58
Tetrachloro-m-xylene [1]	101	30-150		9/21/16 23:58
Tetrachloro-m-xylene [2]	101	30-150		9/21/16 23:58

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-20 (0-5) | Sampled: 9/16/2016 09:59

Sample ID: 16I0708-14

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	88.1		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-20 (5-8) | Sampled: 9/16/2016 10:05

Sample ID: 16I0708-15

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
C19-C36 Aliphatics	32	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Unadjusted C11-C22 Aromatics	69	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
C11-C22 Aromatics	67	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Benzo(a)anthracene	0.14	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Benzo(a)pyrene	0.12	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Benzo(b)fluoranthene	0.23	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Benzo(g,h,i)perylene	0.13	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Chrysene	0.28	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Fluoranthene	0.30	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Fluorene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Phenanthrene	0.37	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Pyrene	0.37	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	59.9	40-140		9/23/16 1:03
o-Terphenyl (OTP)	71.6	40-140		9/23/16 1:03
2-Bromonaphthalene	94.3	40-140		9/23/16 1:03
2-Fluorobiphenyl	108	40-140		9/23/16 1:03

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-20 (5-8) | Sampled: 9/16/2016 10:05

Sample ID: 16I0708-15

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	86.2		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (0-5) | Sampled: 9/16/2016 10:30

Sample ID: 16I0708-16

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1221 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1232 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1242 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1248 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1254 [2]	11	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1260 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1262 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1268 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	9/22/16 10:27
Decachlorobiphenyl [2]	*	30-150	S-01	9/22/16 10:27
Tetrachloro-m-xylene [1]	*	30-150	S-01	9/22/16 10:27
Tetrachloro-m-xylene [2]	*	30-150	S-01	9/22/16 10:27

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (0-5) | Sampled: 9/16/2016 10:30

Sample ID: 16I0708-16

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	28	22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
C19-C36 Aliphatics	180	22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Unadjusted C11-C22 Aromatics	490	22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
C11-C22 Aromatics	390	22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Acenaphthene	1.6	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Acenaphthylene	ND	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Anthracene	3.0	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Benzo(a)anthracene	6.7	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Benzo(a)pyrene	6.3	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Benzo(b)fluoranthene	8.4	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Benzo(g,h,i)perylene	3.2	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Benzo(k)fluoranthene	3.2	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Chrysene	7.9	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Dibenz(a,h)anthracene	1.2	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Fluoranthene	18	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Fluorene	1.7	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Indeno(1,2,3-cd)pyrene	3.9	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
2-Methylnaphthalene	0.39	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Naphthalene	0.41	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Phenanthrene	14	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Pyrene	17	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	62.2	40-140		9/23/16 1:22
o-Terphenyl (OTP)	70.8	40-140		9/23/16 1:22
2-Bromonaphthalene	84.1	40-140		9/23/16 1:22
2-Fluorobiphenyl	102	40-140		9/23/16 1:22

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (0-5) | Sampled: 9/16/2016 10:30

Sample ID: 16I0708-16

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.0		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (0-5) | Sampled: 9/16/2016 10:30

Sample ID: 16I0708-16

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	2		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	98		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (5-10) | Sampled: 9/16/2016 10:40

Sample ID: 16I0708-17

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1254 [1]	0.63	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1260 [2]	0.12	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	88.7	30-150		9/22/16 0:34
Decachlorobiphenyl [2]	81.8	30-150		9/22/16 0:34
Tetrachloro-m-xylene [1]	84.5	30-150		9/22/16 0:34
Tetrachloro-m-xylene [2]	76.5	30-150		9/22/16 0:34

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (5-10) | Sampled: 9/16/2016 10:40

Sample ID: 16I0708-17

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	860	260	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:38	SCS
C19-C36 Aliphatics	1200	260	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:38	SCS
Unadjusted C11-C22 Aromatics	2400	260	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:38	SCS
C11-C22 Aromatics	2400	260	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:38	SCS
Acenaphthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Acenaphthylene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Anthracene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Benzo(a)anthracene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Benzo(a)pyrene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Benzo(b)fluoranthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Benzo(g,h,i)perylene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Benzo(k)fluoranthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Chrysene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Dibenz(a,h)anthracene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Fluoranthene	1.8	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Fluorene	1.5	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Indeno(1,2,3-cd)pyrene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
2-Methylnaphthalene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Naphthalene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Phenanthrene	3.3	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Pyrene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	48.5	40-140		9/23/16 1:40
o-Terphenyl (OTP)	82.4	40-140		9/23/16 1:40
2-Bromonaphthalene	84.7	40-140		9/23/16 1:40
2-Fluorobiphenyl	108	40-140		9/23/16 1:40

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (5-10) | Sampled: 9/16/2016 10:40

Sample ID: 16I0708-17

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	94.0		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (5-10) | Sampled: 9/16/2016 10:40

Sample ID: 16I0708-17

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (10-13.5) | Sampled: 9/16/2016 10:56

Sample ID: 16I0708-18

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1254 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1260 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
Decachlorobiphenyl [1]	93.0	30-150		9/22/16	0:52
Decachlorobiphenyl [2]	86.0	30-150		9/22/16	0:52
Tetrachloro-m-xylene [1]	95.6	30-150		9/22/16	0:52
Tetrachloro-m-xylene [2]	91.1	30-150		9/22/16	0:52

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (10-13.5) | Sampled: 9/16/2016 10:56

Sample ID: 16I0708-18

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	110	55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
C19-C36 Aliphatics	500	55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Unadjusted C11-C22 Aromatics	1000	55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
C11-C22 Aromatics	1000	55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Acenaphthene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Acenaphthylene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Anthracene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Benzo(a)anthracene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Benzo(a)pyrene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Benzo(b)fluoranthene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Benzo(g,h,i)perylene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Benzo(k)fluoranthene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Chrysene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Dibenz(a,h)anthracene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Fluoranthene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Fluorene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Indeno(1,2,3-cd)pyrene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
2-Methylnaphthalene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Naphthalene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Phenanthrene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Pyrene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	48.7	40-140		9/23/16 1:59
o-Terphenyl (OTP)	63.1	40-140		9/23/16 1:59
2-Bromonaphthalene	95.7	40-140		9/23/16 1:59
2-Fluorobiphenyl	110	40-140		9/23/16 1:59

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (10-13.5) | Sampled: 9/16/2016 10:56

Sample ID: 16I0708-18

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	89.3		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (10-13.5) | Sampled: 9/16/2016 10:56

Sample ID: 16I0708-18

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-22 (10-15) | Sampled: 9/16/2016 00:00

Sample ID: 16I0708-19

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	63	24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
C19-C36 Aliphatics	330	24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Unadjusted C11-C22 Aromatics	560	24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
C11-C22 Aromatics	560	24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Acenaphthene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Acenaphthylene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Anthracene	0.28	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Benzo(a)anthracene	0.53	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Benzo(a)pyrene	0.64	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Benzo(b)fluoranthene	0.85	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Benzo(g,h,i)perylene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Benzo(k)fluoranthene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Chrysene	0.74	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Dibenz(a,h)anthracene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Fluoranthene	1.8	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Fluorene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Indeno(1,2,3-cd)pyrene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
2-Methylnaphthalene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Naphthalene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Phenanthrene	0.41	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Pyrene	1.7	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	58.1	40-140		9/23/16 2:18
o-Terphenyl (OTP)	65.9	40-140		9/23/16 2:18
2-Bromonaphthalene	92.6	40-140		9/23/16 2:18
2-Fluorobiphenyl	117	40-140		9/23/16 2:18

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-22 (10-15) | Sampled: 9/16/2016 00:00

Sample ID: 16I0708-19

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	81.6		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-22 (15-20) | Sampled: 9/16/2016 00:00

Sample ID: 16I0708-20

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
C19-C36 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Unadjusted C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Benzo(g,h,i)perylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Chrysene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Fluorene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Phenanthrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	54.1	40-140		9/22/16 23:10
o-Terphenyl (OTP)	62.2	40-140		9/22/16 23:10
2-Bromonaphthalene	95.5	40-140		9/22/16 23:10
2-Fluorobiphenyl	102	40-140		9/22/16 23:10

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-22 (15-20) | Sampled: 9/16/2016 00:00

Sample ID: 16I0708-20

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.6		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-23 (5-9) | Sampled: 9/16/2016 00:00

Sample ID: 16I0708-21

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
C19-C36 Aliphatics	18	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Unadjusted C11-C22 Aromatics	64	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
C11-C22 Aromatics	48	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Acenaphthene	0.32	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Anthracene	0.32	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Benzo(a)anthracene	1.2	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Benzo(a)pyrene	1.3	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Benzo(b)fluoranthene	1.6	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Benzo(g,h,i)perylene	0.82	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Benzo(k)fluoranthene	0.57	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Chrysene	1.3	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Dibenz(a,h)anthracene	0.19	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Fluoranthene	2.8	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Fluorene	0.15	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Indeno(1,2,3-cd)pyrene	0.79	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Naphthalene	0.18	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Phenanthrene	1.9	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Pyrene	2.7	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	60.0	40-140		9/23/16 2:37
o-Terphenyl (OTP)	67.0	40-140		9/23/16 2:37
2-Bromonaphthalene	86.3	40-140		9/23/16 2:37
2-Fluorobiphenyl	100	40-140		9/23/16 2:37

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-23 (5-9) | Sampled: 9/16/2016 00:00

Sample ID: 16I0708-21

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	89.3		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (0-5) | Sampled: 9/16/2016 08:55

Sample ID: 16I0708-22

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1221 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1232 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1242 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1248 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1254 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1260 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1262 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1268 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
Decachlorobiphenyl [1]	91.1	30-150		9/22/16	1:10
Decachlorobiphenyl [2]	83.4	30-150		9/22/16	1:10
Tetrachloro-m-xylene [1]	80.8	30-150		9/22/16	1:10
Tetrachloro-m-xylene [2]	73.0	30-150		9/22/16	1:10

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (0-5) | Sampled: 9/16/2016 08:55

Sample ID: 16I0708-22

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	2400	290	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
C19-C36 Aliphatics	3400	290	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Unadjusted C11-C22 Aromatics	7300	290	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
C11-C22 Aromatics	7200	290	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Acenaphthene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Acenaphthylene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Anthracene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Benzo(a)anthracene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Benzo(a)pyrene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Benzo(b)fluoranthene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Benzo(g,h,i)perylene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Benzo(k)fluoranthene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Chrysene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Dibenz(a,h)anthracene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Fluoranthene	12	2.9	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Fluorene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Indeno(1,2,3-cd)pyrene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
2-Methylnaphthalene	12	2.9	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Naphthalene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Phenanthrene	12	2.9	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Pyrene	7.1	2.9	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	*	40-140	S-01	9/23/16 2:56
o-Terphenyl (OTP)	*	40-140	S-01	9/23/16 2:56
2-Bromonaphthalene	99.9	40-140		9/23/16 2:56
2-Fluorobiphenyl	112	40-140		9/23/16 2:56

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (0-5) | Sampled: 9/16/2016 08:55

Sample ID: 16I0708-22

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	68.0		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (0-5) | Sampled: 9/16/2016 08:55

Sample ID: 16I0708-22

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (5-10) | Sampled: 9/16/2016 09:00

Sample ID: 16I0708-23

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1254 [1]	0.14	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1260 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
Decachlorobiphenyl [1]	68.6	30-150		9/22/16	1:27
Decachlorobiphenyl [2]	69.1	30-150		9/22/16	1:27
Tetrachloro-m-xylene [1]	69.0	30-150		9/22/16	1:27
Tetrachloro-m-xylene [2]	62.7	30-150		9/22/16	1:27

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (5-10) | Sampled: 9/16/2016 09:00

Sample ID: 16I0708-23

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	1300	280	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:58	SCS
C19-C36 Aliphatics	2100	280	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:58	SCS
Unadjusted C11-C22 Aromatics	2600	280	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:58	SCS
C11-C22 Aromatics	2500	280	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:58	SCS
Acenaphthene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Acenaphthylene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Anthracene	1.4	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Benzo(a)anthracene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Benzo(a)pyrene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Benzo(b)fluoranthene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Benzo(g,h,i)perylene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Benzo(k)fluoranthene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Chrysene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Dibenz(a,h)anthracene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Fluoranthene	4.6	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Fluorene	3.1	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Indeno(1,2,3-cd)pyrene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
2-Methylnaphthalene	5.7	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Naphthalene	3.1	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Phenanthrene	4.0	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Pyrene	1.7	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	**18.5**	*	40-140	S-15	9/23/16 3:15
o-Terphenyl (OTP)	49.7		40-140		9/23/16 3:15
2-Bromonaphthalene	82.3		40-140		9/23/16 3:15
2-Fluorobiphenyl	110		40-140		9/23/16 3:15

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (5-10) | Sampled: 9/16/2016 09:00

Sample ID: 16I0708-23

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	88.8		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (5-10) | Sampled: 9/16/2016 09:00

Sample ID: 16I0708-23

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (10-15) | Sampled: 9/16/2016 09:05

Sample ID: 16I0708-24

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1221 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1232 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1242 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1248 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1254 [1]	0.14	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1260 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1262 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1268 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
Decachlorobiphenyl [1]	80.8	30-150		9/22/16	1:45
Decachlorobiphenyl [2]	83.0	30-150		9/22/16	1:45
Tetrachloro-m-xylene [1]	75.1	30-150		9/22/16	1:45
Tetrachloro-m-xylene [2]	67.4	30-150		9/22/16	1:45

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (10-15) | Sampled: 9/16/2016 09:05

Sample ID: 16I0708-24

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	8300	1200	mg/Kg dry	50		MADEP-EPH-04-1.1	9/20/16	9/23/16 12:18	SCS
C19-C36 Aliphatics	11000	1200	mg/Kg dry	50		MADEP-EPH-04-1.1	9/20/16	9/23/16 12:18	SCS
Unadjusted C11-C22 Aromatics	15000	1200	mg/Kg dry	50		MADEP-EPH-04-1.1	9/20/16	9/23/16 12:18	SCS
C11-C22 Aromatics	15000	1200	mg/Kg dry	50		MADEP-EPH-04-1.1	9/20/16	9/23/16 12:18	SCS
Acenaphthene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Acenaphthylene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Anthracene	11	2.4	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Benzo(a)anthracene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Benzo(a)pyrene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Benzo(b)fluoranthene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Benzo(g,h,i)perylene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Benzo(k)fluoranthene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Chrysene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Dibenz(a,h)anthracene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Fluoranthene	22	2.4	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Fluorene	29	2.4	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Indeno(1,2,3-cd)pyrene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
2-Methylnaphthalene	65	2.4	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Naphthalene	27	2.4	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Phenanthrene	35	2.4	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Pyrene	12	2.4	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	*	40-140	S-01	9/23/16 3:34
o-Terphenyl (OTP)	*	40-140	S-01	9/23/16 3:34
2-Bromonaphthalene	85.4	40-140		9/23/16 3:34
2-Fluorobiphenyl	114	40-140		9/23/16 3:34

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (10-15) | Sampled: 9/16/2016 09:05

Sample ID: 16I0708-24

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	81.7		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (10-15) | Sampled: 9/16/2016 09:05

Sample ID: 16I0708-24

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (15-16.5) | Sampled: 9/16/2016 09:20

Sample ID: 16I0708-25

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1221 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1232 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1242 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1248 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1254 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1260 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1262 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1268 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	91.7	30-150		9/22/16 2:03
Decachlorobiphenyl [2]	83.4	30-150		9/22/16 2:03
Tetrachloro-m-xylene [1]	90.5	30-150		9/22/16 2:03
Tetrachloro-m-xylene [2]	82.5	30-150		9/22/16 2:03

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (15-16.5) | Sampled: 9/16/2016 09:20

Sample ID: 16I0708-25

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	220	130	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
C19-C36 Aliphatics	420	130	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Unadjusted C11-C22 Aromatics	1600	130	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
C11-C22 Aromatics	1600	130	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Acenaphthene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Acenaphthylene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Anthracene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Benzo(a)anthracene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Benzo(a)pyrene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Benzo(b)fluoranthene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Benzo(g,h,i)perylene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Benzo(k)fluoranthene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Chrysene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Dibenz(a,h)anthracene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Fluoranthene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Fluorene	4.9	1.3	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Indeno(1,2,3-cd)pyrene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
2-Methylnaphthalene	1.9	1.3	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Naphthalene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Phenanthrene	4.6	1.3	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Pyrene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	*	40-140	S-01	9/23/16 3:52
o-Terphenyl (OTP)	44.2	40-140		9/23/16 3:52
2-Bromonaphthalene	69.5	40-140		9/23/16 3:52
2-Fluorobiphenyl	96.5	40-140		9/23/16 3:52

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (15-16.5) | Sampled: 9/16/2016 09:20

Sample ID: 16I0708-25

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	75.4		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (15-16.5) | Sampled: 9/16/2016 09:20

Sample ID: 16I0708-25

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14 (10-15) | Sampled: 9/15/2016 09:30

Sample ID: 16I0708-26

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Benzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Bromobenzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Bromochloromethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Bromodichloromethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Bromoform	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Bromomethane	ND	2.3	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
2-Butanone (MEK)	ND	9.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
n-Butylbenzene	0.93	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
sec-Butylbenzene	0.48	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
tert-Butylbenzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Carbon Disulfide	ND	4.5	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Carbon Tetrachloride	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Chlorobenzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Chlorodibromomethane	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Chloroethane	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Chloroform	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Chloromethane	ND	0.91	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 3:53	EEH
2-Chlorotoluene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
4-Chlorotoluene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.3	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2-Dibromoethane (EDB)	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Dibromomethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2-Dichlorobenzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,3-Dichlorobenzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,4-Dichlorobenzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Dichlorodifluoromethane (Freon 12)	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,1-Dichloroethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2-Dichloroethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,1-Dichloroethylene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
cis-1,2-Dichloroethylene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
trans-1,2-Dichloroethylene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2-Dichloropropane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,3-Dichloropropane	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
2,2-Dichloropropane	ND	0.45	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,1-Dichloropropene	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
cis-1,3-Dichloropropene	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
trans-1,3-Dichloropropene	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Diethyl Ether	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Diisopropyl Ether (DIPE)	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,4-Dioxane	ND	23	mg/Kg wet	10	V-16	SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Ethylbenzene	0.46	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14 (10-15) | Sampled: 9/15/2016 09:30

Sample ID: 16I0708-26

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
2-Hexanone (MBK)	ND	4.5	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Isopropylbenzene (Cumene)	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
p-Isopropyltoluene (p-Cymene)	0.90	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Methylene Chloride	ND	2.3	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
4-Methyl-2-pentanone (MIBK)	ND	4.5	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Naphthalene	13	2.3	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
n-Propylbenzene	0.68	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Styrene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,1,1,2-Tetrachloroethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,1,2,2-Tetrachloroethane	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Tetrachloroethylene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Tetrahydrofuran	ND	1.8	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Toluene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2,3-Trichlorobenzene	ND	2.3	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2,4-Trichlorobenzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,1,1-Trichloroethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,1,2-Trichloroethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Trichloroethylene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Trichlorofluoromethane (Freon 11)	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2,3-Trichloropropane	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2,4-Trimethylbenzene	8.3	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,3,5-Trimethylbenzene	2.9	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Vinyl Chloride	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
m+p Xylene	1.7	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
o-Xylene	1.4	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	94.5	70-130		9/22/16 3:53
Toluene-d8	101	70-130		9/22/16 3:53
4-Bromofluorobenzene	103	70-130		9/22/16 3:53

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (10-15) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-27

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Benzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Bromobenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Bromochloromethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Bromodichloromethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Bromoform	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Bromomethane	ND	3.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
2-Butanone (MEK)	ND	12	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
n-Butylbenzene	1.1	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
sec-Butylbenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
tert-Butylbenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Carbon Disulfide	ND	6.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Carbon Tetrachloride	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Chlorobenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Chlorodibromomethane	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Chloroethane	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Chloroform	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Chloromethane	ND	1.2	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 4:20	EEH
2-Chlorotoluene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
4-Chlorotoluene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	3.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2-Dibromoethane (EDB)	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Dibromomethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2-Dichlorobenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,3-Dichlorobenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,4-Dichlorobenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Dichlorodifluoromethane (Freon 12)	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,1-Dichloroethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2-Dichloroethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,1-Dichloroethylene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
cis-1,2-Dichloroethylene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
trans-1,2-Dichloroethylene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2-Dichloropropane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,3-Dichloropropane	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
2,2-Dichloropropane	ND	0.61	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,1-Dichloropropene	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
cis-1,3-Dichloropropene	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
trans-1,3-Dichloropropene	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Diethyl Ether	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Diisopropyl Ether (DIPE)	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,4-Dioxane	ND	31	mg/Kg wet	10	V-16	SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Ethylbenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH

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

Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (10-15) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-27

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
2-Hexanone (MBK)	ND	6.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Isopropylbenzene (Cumene)	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
p-Isopropyltoluene (p-Cymene)	1.2	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Methylene Chloride	ND	3.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
4-Methyl-2-pentanone (MIBK)	ND	6.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Naphthalene	19	3.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
n-Propylbenzene	0.86	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Styrene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,1,1,2-Tetrachloroethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,1,2,2-Tetrachloroethane	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Tetrachloroethylene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Tetrahydrofuran	ND	2.5	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Toluene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2,3-Trichlorobenzene	ND	3.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2,4-Trichlorobenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,1,1-Trichloroethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,1,2-Trichloroethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Trichloroethylene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Trichlorofluoromethane (Freon 11)	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2,3-Trichloropropane	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2,4-Trimethylbenzene	11	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,3,5-Trimethylbenzene	3.8	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Vinyl Chloride	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
m+p Xylene	2.4	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
o-Xylene	1.9	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	91.9	70-130		9/22/16 4:20
Toluene-d8	99.8	70-130		9/22/16 4:20
4-Bromofluorobenzene	101	70-130		9/22/16 4:20

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-26 (10-13) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-28

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Benzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Bromobenzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Bromochloromethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Bromodichloromethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Bromoform	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Bromomethane	ND	2.8	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
2-Butanone (MEK)	ND	11	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
n-Butylbenzene	2.4	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
sec-Butylbenzene	1.1	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
tert-Butylbenzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Carbon Disulfide	ND	5.5	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Carbon Tetrachloride	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Chlorobenzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Chlorodibromomethane	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Chloroethane	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Chloroform	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Chloromethane	ND	1.1	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 5:13	EEH
2-Chlorotoluene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
4-Chlorotoluene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.8	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2-Dibromoethane (EDB)	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Dibromomethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2-Dichlorobenzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,3-Dichlorobenzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,4-Dichlorobenzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Dichlorodifluoromethane (Freon 12)	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,1-Dichloroethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2-Dichloroethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,1-Dichloroethylene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
cis-1,2-Dichloroethylene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
trans-1,2-Dichloroethylene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2-Dichloropropane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,3-Dichloropropane	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
2,2-Dichloropropane	ND	0.55	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,1-Dichloropropene	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
cis-1,3-Dichloropropene	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
trans-1,3-Dichloropropene	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Diethyl Ether	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Diisopropyl Ether (DIPE)	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,4-Dioxane	ND	28	mg/Kg wet	10	V-16	SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Ethylbenzene	0.62	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-26 (10-13) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-28

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
2-Hexanone (MBK)	ND	5.5	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Isopropylbenzene (Cumene)	0.79	0.55	mg/Kg wet	10	L-06	SW-846 8260C	9/19/16	9/22/16 5:13	EEH
p-Isopropyltoluene (p-Cymene)	2.5	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Methylene Chloride	ND	2.8	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
4-Methyl-2-pentanone (MIBK)	ND	5.5	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Naphthalene	20	2.8	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
n-Propylbenzene	1.2	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Styrene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,1,1,2-Tetrachloroethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,1,2,2-Tetrachloroethane	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Tetrachloroethylene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Tetrahydrofuran	ND	2.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Toluene	0.78	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2,3-Trichlorobenzene	ND	2.8	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2,4-Trichlorobenzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,1,1-Trichloroethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,1,2-Trichloroethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Trichloroethylene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Trichlorofluoromethane (Freon 11)	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2,3-Trichloropropane	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2,4-Trimethylbenzene	12	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,3,5-Trimethylbenzene	5.4	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Vinyl Chloride	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
m+p Xylene	2.4	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
o-Xylene	4.4	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	98.2	70-130		9/22/16 5:13
Toluene-d8	103	70-130		9/22/16 5:13
4-Bromofluorobenzene	105	70-130		9/22/16 5:13

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-27 (5-10) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-29

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	4.6	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Benzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Bromobenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Bromochloromethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Bromodichloromethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Bromoform	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Bromomethane	ND	0.46	mg/Kg wet	1	RL-07	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
2-Butanone (MEK)	ND	1.9	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
n-Butylbenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
sec-Butylbenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
tert-Butylbenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Carbon Disulfide	ND	0.93	mg/Kg wet	1	RL-07	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Carbon Tetrachloride	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Chlorobenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Chlorodibromomethane	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Chloroethane	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Chloroform	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Chloromethane	ND	0.19	mg/Kg wet	1	V-05	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
2-Chlorotoluene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
4-Chlorotoluene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.46	mg/Kg wet	1	RL-07	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2-Dibromoethane (EDB)	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Dibromomethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2-Dichlorobenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,3-Dichlorobenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,4-Dichlorobenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Dichlorodifluoromethane (Freon 12)	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,1-Dichloroethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2-Dichloroethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,1-Dichloroethylene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
cis-1,2-Dichloroethylene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
trans-1,2-Dichloroethylene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2-Dichloropropane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,3-Dichloropropane	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
2,2-Dichloropropane	ND	0.093	mg/Kg wet	1	V-05	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,1-Dichloropropene	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
cis-1,3-Dichloropropene	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
trans-1,3-Dichloropropene	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Diethyl Ether	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Diisopropyl Ether (DIPE)	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,4-Dioxane	ND	4.6	mg/Kg wet	1	V-16	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Ethylbenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-27 (5-10) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-29

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
2-Hexanone (MBK)	ND	0.93	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Isopropylbenzene (Cumene)	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
p-Isopropyltoluene (p-Cymene)	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Methylene Chloride	ND	0.46	mg/Kg wet	1	RL-07	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
4-Methyl-2-pentanone (MIBK)	ND	0.93	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Naphthalene	ND	0.46	mg/Kg wet	1	RL-07	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
n-Propylbenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Styrene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,1,1,2-Tetrachloroethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,1,2,2-Tetrachloroethane	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Tetrachloroethylene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Tetrahydrofuran	ND	0.37	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Toluene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2,3-Trichlorobenzene	ND	0.46	mg/Kg wet	1	RL-07	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2,4-Trichlorobenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,1,1-Trichloroethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,1,2-Trichloroethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Trichloroethylene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Trichlorofluoromethane (Freon 11)	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2,3-Trichloropropane	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2,4-Trimethylbenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,3,5-Trimethylbenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Vinyl Chloride	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
m+p Xylene	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
o-Xylene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	93.4	70-130		9/22/16 8:46
Toluene-d8	101	70-130		9/22/16 8:46
4-Bromofluorobenzene	101	70-130		9/22/16 8:46

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-28 (10-15) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-30

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Benzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Bromobenzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Bromochloromethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Bromodichloromethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Bromoform	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Bromomethane	ND	2.6	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
2-Butanone (MEK)	ND	10	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
n-Butylbenzene	1.3	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
sec-Butylbenzene	0.68	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
tert-Butylbenzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Carbon Disulfide	ND	5.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Carbon Tetrachloride	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Chlorobenzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Chlorodibromomethane	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Chloroethane	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Chloroform	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Chloromethane	ND	1.0	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 5:40	EEH
2-Chlorotoluene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
4-Chlorotoluene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.6	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2-Dibromoethane (EDB)	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Dibromomethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2-Dichlorobenzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,3-Dichlorobenzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,4-Dichlorobenzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Dichlorodifluoromethane (Freon 12)	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,1-Dichloroethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2-Dichloroethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,1-Dichloroethylene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
cis-1,2-Dichloroethylene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
trans-1,2-Dichloroethylene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2-Dichloropropane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,3-Dichloropropane	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
2,2-Dichloropropane	ND	0.51	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,1-Dichloropropene	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
cis-1,3-Dichloropropene	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
trans-1,3-Dichloropropene	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Diethyl Ether	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Diisopropyl Ether (DIPE)	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,4-Dioxane	ND	26	mg/Kg wet	10	V-16	SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Ethylbenzene	0.97	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-28 (10-15) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-30

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
2-Hexanone (MBK)	ND	5.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Isopropylbenzene (Cumene)	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
p-Isopropyltoluene (p-Cymene)	3.2	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Methylene Chloride	ND	2.6	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
4-Methyl-2-pentanone (MIBK)	ND	5.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Naphthalene	6.7	2.6	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
n-Propylbenzene	0.68	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Styrene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,1,1,2-Tetrachloroethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,1,2,2-Tetrachloroethane	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Tetrachloroethylene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Tetrahydrofuran	ND	2.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Toluene	0.69	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2,3-Trichlorobenzene	ND	2.6	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2,4-Trichlorobenzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,1,1-Trichloroethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,1,2-Trichloroethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Trichloroethylene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Trichlorofluoromethane (Freon 11)	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2,3-Trichloropropane	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2,4-Trimethylbenzene	9.0	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,3,5-Trimethylbenzene	6.2	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Vinyl Chloride	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
m+p Xylene	2.7	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
o-Xylene	1.8	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	97.8	70-130		9/22/16 5:40
Toluene-d8	101	70-130		9/22/16 5:40
4-Bromofluorobenzene	106	70-130		9/22/16 5:40

con-test® ANALYTICAL LABORATORY

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Sample Extraction Data

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

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0708-02 [B-15 (5-10)]	B158642	20.1	2.00	09/20/16
16I0708-05 [B-16 (10-15)]	B158642	20.5	2.00	09/20/16
16I0708-07 [B-17 (5-7.5)]	B158642	20.5	2.00	09/20/16
16I0708-10 [B-18 (10-15)]	B158642	20.1	2.00	09/20/16
16I0708-13 [B-19 (15-17)]	B158642	20.3	2.00	09/20/16
16I0708-15 [B-20 (5-8)]	B158642	20.4	2.00	09/20/16
16I0708-16 [B-21 (0-5)]	B158642	20.3	2.00	09/20/16
16I0708-17 [B-21 (5-10)]	B158642	20.6	2.00	09/20/16
16I0708-18 [B-21 (10-13.5)]	B158642	20.2	2.00	09/20/16
16I0708-19 [B-22 (10-15)]	B158642	20.0	2.00	09/20/16
16I0708-20 [B-22 (15-20)]	B158642	20.1	2.00	09/20/16
16I0708-21 [B-23 (5-9)]	B158642	20.4	2.00	09/20/16
16I0708-22 [B-14A (0-5)]	B158642	20.3	4.00	09/20/16
16I0708-23 [B-14A (5-10)]	B158642	20.1	2.00	09/20/16
16I0708-24 [B-14A (10-15)]	B158642	20.4	4.00	09/20/16
16I0708-25 [B-14A (15-16.5)]	B158642	20.2	2.00	09/20/16

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
16I0708-01 [B-15 (0-5)]	B158556	09/19/16
16I0708-02 [B-15 (5-10)]	B158556	09/19/16
16I0708-03 [B-16 (0-5)]	B158556	09/19/16
16I0708-05 [B-16 (10-15)]	B158556	09/19/16
16I0708-07 [B-17 (5-7.5)]	B158556	09/19/16
16I0708-08 [B-18 (0-5)]	B158556	09/19/16
16I0708-10 [B-18 (10-15)]	B158556	09/19/16
16I0708-11 [B-19 (0-5)]	B158556	09/19/16
16I0708-13 [B-19 (15-17)]	B158556	09/19/16
16I0708-14 [B-20 (0-5)]	B158556	09/19/16
16I0708-15 [B-20 (5-8)]	B158556	09/19/16
16I0708-16 [B-21 (0-5)]	B158556	09/19/16
16I0708-17 [B-21 (5-10)]	B158556	09/19/16
16I0708-18 [B-21 (10-13.5)]	B158556	09/19/16
16I0708-19 [B-22 (10-15)]	B158556	09/19/16
16I0708-20 [B-22 (15-20)]	B158556	09/19/16
16I0708-21 [B-23 (5-9)]	B158556	09/19/16
16I0708-22 [B-14A (0-5)]	B158556	09/19/16
16I0708-23 [B-14A (5-10)]	B158556	09/19/16
16I0708-24 [B-14A (10-15)]	B158556	09/19/16
16I0708-25 [B-14A (15-16.5)]	B158556	09/19/16

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0708-01 [B-15 (0-5)]	B158646	10.0	10.0	09/20/16
16I0708-03 [B-16 (0-5)]	B158646	10.0	10.0	09/20/16
16I0708-08 [B-18 (0-5)]	B158646	10.0	10.0	09/20/16
16I0708-11 [B-19 (0-5)]	B158646	10.0	10.0	09/20/16
16I0708-14 [B-20 (0-5)]	B158646	10.0	10.0	09/20/16
16I0708-16 [B-21 (0-5)]	B158646	10.0	10.0	09/20/16
16I0708-17 [B-21 (5-10)]	B158646	10.1	10.0	09/20/16
16I0708-18 [B-21 (10-13.5)]	B158646	10.0	10.0	09/20/16

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Sample Extraction Data

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0708-22 [B-14A (0-5)]	B158646	10.1	10.0	09/20/16
16I0708-23 [B-14A (5-10)]	B158646	10.1	10.0	09/20/16
16I0708-24 [B-14A (10-15)]	B158646	10.2	10.0	09/20/16
16I0708-25 [B-14A (15-16.5)]	B158646	10.0	10.0	09/20/16

Prep Method: SW-846 5035-SW-846 8260C

Lab Number [Field ID]	Batch	Sample Amount(g)	Methanol Volume(mL)	Methanol Aliquot(mL)	Final Volume(mL)	Date
16I0708-26 [B-14 (10-15)]	B158583	5.52	5.00	0.1	50	09/19/16
16I0708-27 [B-14A (10-15)]	B158583	4.08	5.00	0.1	50	09/19/16
16I0708-28 [B-26 (10-13)]	B158583	4.51	5.00	0.1	50	09/19/16
16I0708-29 [B-27 (5-10)]	B158583	2.69	5.00	1	50	09/19/16
16I0708-30 [B-28 (10-15)]	B158583	4.89	5.00	0.1	50	09/19/16

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158583 - SW-846 5035										
Blank (B158583-BLK1)				Prepared: 09/19/16 Analyzed: 09/22/16						
Acetone	ND	2.5	mg/Kg wet							
tert-Amyl Methyl Ether (TAME)	ND	0.025	mg/Kg wet							
Benzene	ND	0.050	mg/Kg wet							
Bromobenzene	ND	0.050	mg/Kg wet							
Bromochloromethane	ND	0.050	mg/Kg wet							
Bromodichloromethane	ND	0.050	mg/Kg wet							
Bromoform	ND	0.10	mg/Kg wet							
Bromomethane	ND	0.25	mg/Kg wet							
2-Butanone (MEK)	ND	1.0	mg/Kg wet							
n-Butylbenzene	ND	0.050	mg/Kg wet							
sec-Butylbenzene	ND	0.050	mg/Kg wet							
tert-Butylbenzene	ND	0.050	mg/Kg wet							
tert-Butyl Ethyl Ether (TBEE)	ND	0.025	mg/Kg wet							
Carbon Disulfide	ND	0.50	mg/Kg wet							
Carbon Tetrachloride	ND	0.050	mg/Kg wet							
Chlorobenzene	ND	0.050	mg/Kg wet							
Chlorodibromomethane	ND	0.10	mg/Kg wet							
Chloroethane	ND	0.10	mg/Kg wet							
Chloroform	ND	0.10	mg/Kg wet							
Chloromethane	ND	0.10	mg/Kg wet							V-05
2-Chlorotoluene	ND	0.050	mg/Kg wet							
4-Chlorotoluene	ND	0.050	mg/Kg wet							
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.25	mg/Kg wet							
1,2-Dibromoethane (EDB)	ND	0.025	mg/Kg wet							
Dibromomethane	ND	0.050	mg/Kg wet							
1,2-Dichlorobenzene	ND	0.050	mg/Kg wet							
1,3-Dichlorobenzene	ND	0.050	mg/Kg wet							
1,4-Dichlorobenzene	ND	0.050	mg/Kg wet							
Dichlorodifluoromethane (Freon 12)	ND	0.10	mg/Kg wet							
1,1-Dichloroethane	ND	0.050	mg/Kg wet							
1,2-Dichloroethane	ND	0.050	mg/Kg wet							
1,1-Dichloroethylene	ND	0.050	mg/Kg wet							
cis-1,2-Dichloroethylene	ND	0.050	mg/Kg wet							
trans-1,2-Dichloroethylene	ND	0.050	mg/Kg wet							
1,2-Dichloropropane	ND	0.050	mg/Kg wet							
1,3-Dichloropropane	ND	0.025	mg/Kg wet							
2,2-Dichloropropane	ND	0.050	mg/Kg wet							V-05
1,1-Dichloropropene	ND	0.10	mg/Kg wet							
cis-1,3-Dichloropropene	ND	0.025	mg/Kg wet							
trans-1,3-Dichloropropene	ND	0.025	mg/Kg wet							
Diethyl Ether	ND	0.10	mg/Kg wet							
Diisopropyl Ether (DIPE)	ND	0.025	mg/Kg wet							
1,4-Dioxane	ND	2.5	mg/Kg wet							V-16
Ethylbenzene	ND	0.050	mg/Kg wet							
Hexachlorobutadiene	ND	0.050	mg/Kg wet							
2-Hexanone (MBK)	ND	0.50	mg/Kg wet							
Isopropylbenzene (Cumene)	ND	0.050	mg/Kg wet							
p-Isopropyltoluene (p-Cymene)	ND	0.050	mg/Kg wet							
Methyl tert-Butyl Ether (MTBE)	ND	0.050	mg/Kg wet							
Methylene Chloride	ND	0.25	mg/Kg wet							
4-Methyl-2-pentanone (MIBK)	ND	0.50	mg/Kg wet							
Naphthalene	ND	0.25	mg/Kg wet							

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B158583 - SW-846 5035											
Blank (B158583-BLK1)				Prepared: 09/19/16 Analyzed: 09/22/16							
n-Propylbenzene	ND	0.050	mg/Kg wet								
Styrene	ND	0.050	mg/Kg wet								
1,1,1,2-Tetrachloroethane	ND	0.050	mg/Kg wet								
1,1,2,2-Tetrachloroethane	ND	0.025	mg/Kg wet								
Tetrachloroethylene	ND	0.050	mg/Kg wet								
Tetrahydrofuran	ND	0.20	mg/Kg wet								
Toluene	ND	0.050	mg/Kg wet								
1,2,3-Trichlorobenzene	ND	0.25	mg/Kg wet								
1,2,4-Trichlorobenzene	ND	0.050	mg/Kg wet								
1,1,1-Trichloroethane	ND	0.050	mg/Kg wet								
1,1,2-Trichloroethane	ND	0.050	mg/Kg wet								
Trichloroethylene	ND	0.050	mg/Kg wet								
Trichlorofluoromethane (Freon 11)	ND	0.10	mg/Kg wet								
1,2,3-Trichloropropane	ND	0.10	mg/Kg wet								
1,2,4-Trimethylbenzene	ND	0.050	mg/Kg wet								
1,3,5-Trimethylbenzene	ND	0.050	mg/Kg wet								
Vinyl Chloride	ND	0.10	mg/Kg wet								
m+p Xylene	ND	0.10	mg/Kg wet								
o-Xylene	ND	0.050	mg/Kg wet								
Surrogate: 1,2-Dichloroethane-d4	*0.0227*		mg/Kg wet	0.0250		90.6	70-130				
Surrogate: Toluene-d8	*0.0248*		mg/Kg wet	0.0250		99.2	70-130				
Surrogate: 4-Bromofluorobenzene	*0.0248*		mg/Kg wet	0.0250		99.1	70-130				
LCS (B158583-BS1)				Prepared: 09/19/16 Analyzed: 09/21/16							
Acetone	0.0849	0.057	mg/Kg wet	0.113		74.9	40-160				†
tert-Amyl Methyl Ether (TAME)	0.0102	0.00057	mg/Kg wet	0.0113		90.3	70-130				
Benzene	0.0126	0.0011	mg/Kg wet	0.0113		111	70-130				
Bromobenzene	0.0129	0.0011	mg/Kg wet	0.0113		114	70-130				
Bromochloromethane	0.0125	0.0011	mg/Kg wet	0.0113		110	70-130				
Bromodichloromethane	0.0122	0.0011	mg/Kg wet	0.0113		108	70-130				
Bromoform	0.0110	0.0023	mg/Kg wet	0.0113		97.3	70-130				
Bromomethane	0.00647	0.0057	mg/Kg wet	0.0113		57.1	40-160			L-14, V-20	†
2-Butanone (MEK)	0.105	0.023	mg/Kg wet	0.113		92.8	40-160				†
n-Butylbenzene	0.0133	0.0011	mg/Kg wet	0.0113		117	70-130				
sec-Butylbenzene	0.0134	0.0011	mg/Kg wet	0.0113		118	70-130				
tert-Butylbenzene	0.0131	0.0011	mg/Kg wet	0.0113		116	70-130				
tert-Butyl Ethyl Ether (TBEE)	0.0107	0.00057	mg/Kg wet	0.0113		94.1	70-130				
Carbon Disulfide	0.0106	0.011	mg/Kg wet	0.0113		93.1	70-130				
Carbon Tetrachloride	0.0116	0.0011	mg/Kg wet	0.0113		102	70-130				
Chlorobenzene	0.0134	0.0011	mg/Kg wet	0.0113		118	70-130				
Chlorodibromomethane	0.0110	0.0023	mg/Kg wet	0.0113		97.0	70-130				
Chloroethane	0.00985	0.0023	mg/Kg wet	0.0113		86.9	70-130				
Chloroform	0.0123	0.0023	mg/Kg wet	0.0113		109	70-130				
Chloromethane	0.00522	0.0023	mg/Kg wet	0.0113		46.1	40-160			L-14, V-05	†
2-Chlorotoluene	0.0131	0.0011	mg/Kg wet	0.0113		116	70-130				
4-Chlorotoluene	0.0134	0.0011	mg/Kg wet	0.0113		118	70-130				
1,2-Dibromo-3-chloropropane (DBCP)	0.0116	0.0057	mg/Kg wet	0.0113		102	70-130				
1,2-Dibromoethane (EDB)	0.0123	0.00057	mg/Kg wet	0.0113		109	70-130				
Dibromomethane	0.0124	0.0011	mg/Kg wet	0.0113		110	70-130				
1,2-Dichlorobenzene	0.0128	0.0011	mg/Kg wet	0.0113		113	70-130				
1,3-Dichlorobenzene	0.0131	0.0011	mg/Kg wet	0.0113		115	70-130				
1,4-Dichlorobenzene	0.0123	0.0011	mg/Kg wet	0.0113		109	70-130				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B158583 - SW-846 5035											
LCS (B158583-BS1)				Prepared: 09/19/16 Analyzed: 09/21/16							
Dichlorodifluoromethane (Freon 12)	0.00537	0.0023	mg/Kg wet	0.0113		47.4	40-160			L-14	†
1,1-Dichloroethane	0.0126	0.0011	mg/Kg wet	0.0113		111	70-130				
1,2-Dichloroethane	0.0113	0.0011	mg/Kg wet	0.0113		99.3	70-130				
1,1-Dichloroethylene	0.0113	0.0011	mg/Kg wet	0.0113		99.6	70-130				
cis-1,2-Dichloroethylene	0.0122	0.0011	mg/Kg wet	0.0113		108	70-130				
trans-1,2-Dichloroethylene	0.0120	0.0011	mg/Kg wet	0.0113		106	70-130				
1,2-Dichloropropane	0.0121	0.0011	mg/Kg wet	0.0113		106	70-130				
1,3-Dichloropropane	0.0119	0.00057	mg/Kg wet	0.0113		105	70-130				
2,2-Dichloropropane	0.0107	0.0011	mg/Kg wet	0.0113		94.5	70-130			V-05	
1,1-Dichloropropene	0.0127	0.0023	mg/Kg wet	0.0113		112	70-130				
cis-1,3-Dichloropropene	0.0110	0.00057	mg/Kg wet	0.0113		96.8	70-130				
trans-1,3-Dichloropropene	0.0124	0.00057	mg/Kg wet	0.0113		109	70-130				
Diethyl Ether	0.0103	0.0023	mg/Kg wet	0.0113		91.3	70-130				
Diisopropyl Ether (DIPE)	0.0105	0.00057	mg/Kg wet	0.0113		92.6	70-130				
1,4-Dioxane	0.0795	0.057	mg/Kg wet	0.113		70.2	40-160			V-16	†
Ethylbenzene	0.0133	0.0011	mg/Kg wet	0.0113		117	70-130				
Hexachlorobutadiene	0.0137	0.0011	mg/Kg wet	0.0113		121	70-130				
2-Hexanone (MBK)	0.0991	0.011	mg/Kg wet	0.113		87.5	40-160				†
Isopropylbenzene (Cumene)	0.0157	0.0011	mg/Kg wet	0.0113		**139**	* 70-130			L-06	
p-Isopropyltoluene (p-Cymene)	0.0129	0.0011	mg/Kg wet	0.0113		114	70-130				
Methyl tert-Butyl Ether (MTBE)	0.0104	0.0011	mg/Kg wet	0.0113		91.6	70-130				
Methylene Chloride	0.0117	0.0057	mg/Kg wet	0.0113		103	70-130				
4-Methyl-2-pentanone (MIBK)	0.107	0.011	mg/Kg wet	0.113		94.0	40-160				†
Naphthalene	0.0131	0.0057	mg/Kg wet	0.0113		116	70-130				
n-Propylbenzene	0.0138	0.0011	mg/Kg wet	0.0113		122	70-130				
Styrene	0.0134	0.0011	mg/Kg wet	0.0113		118	70-130				
1,1,1,2-Tetrachloroethane	0.0120	0.0011	mg/Kg wet	0.0113		106	70-130				
1,1,2,2-Tetrachloroethane	0.0132	0.00057	mg/Kg wet	0.0113		116	70-130				
Tetrachloroethylene	0.0130	0.0011	mg/Kg wet	0.0113		115	70-130				
Tetrahydrofuran	0.0104	0.0045	mg/Kg wet	0.0113		91.4	70-130				
Toluene	0.0128	0.0011	mg/Kg wet	0.0113		113	70-130				
1,2,3-Trichlorobenzene	0.0124	0.0057	mg/Kg wet	0.0113		110	70-130				
1,2,4-Trichlorobenzene	0.0124	0.0011	mg/Kg wet	0.0113		110	70-130				
1,1,1-Trichloroethane	0.0117	0.0011	mg/Kg wet	0.0113		104	70-130				
1,1,2-Trichloroethane	0.0128	0.0011	mg/Kg wet	0.0113		113	70-130				
Trichloroethylene	0.0129	0.0011	mg/Kg wet	0.0113		114	70-130				
Trichlorofluoromethane (Freon 11)	0.0110	0.0023	mg/Kg wet	0.0113		97.2	70-130				
1,2,3-Trichloropropane	0.0127	0.0023	mg/Kg wet	0.0113		112	70-130				
1,2,4-Trimethylbenzene	0.0127	0.0011	mg/Kg wet	0.0113		112	70-130				
1,3,5-Trimethylbenzene	0.0135	0.0011	mg/Kg wet	0.0113		119	70-130				
Vinyl Chloride	0.00862	0.0023	mg/Kg wet	0.0113		76.1	70-130				
m+p Xylene	0.0266	0.0023	mg/Kg wet	0.0227		117	70-130				
o-Xylene	0.0132	0.0011	mg/Kg wet	0.0113		117	70-130				
Surrogate: 1,2-Dichloroethane-d4	*0.0260*		mg/Kg wet	0.0283		91.6	70-130				
Surrogate: Toluene-d8	*0.0284*		mg/Kg wet	0.0283		100	70-130				
Surrogate: 4-Bromofluorobenzene	*0.0286*		mg/Kg wet	0.0283		101	70-130				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B158583 - SW-846 5035												
LCS Dup (B158583-BSD1)				Prepared: 09/19/16 Analyzed: 09/22/16								
Acetone	0.0839	0.057	mg/Kg wet	0.113		74.1		40-160	1.14	20		†
tert-Amyl Methyl Ether (TAME)	0.0102	0.00057	mg/Kg wet	0.0113		90.3		70-130	0.00	20		
Benzene	0.0119	0.0011	mg/Kg wet	0.0113		105		70-130	5.27	20		
Bromobenzene	0.0124	0.0011	mg/Kg wet	0.0113		110		70-130	3.85	20		
Bromochloromethane	0.0121	0.0011	mg/Kg wet	0.0113		107		70-130	3.22	20		
Bromodichloromethane	0.0115	0.0011	mg/Kg wet	0.0113		101		70-130	6.23	20		
Bromoform	0.0110	0.0023	mg/Kg wet	0.0113		97.3		70-130	0.00	20		
Bromomethane	0.00689	0.0057	mg/Kg wet	0.0113		60.8		40-160	6.28	20	V-20, L-14	†
2-Butanone (MEK)	0.101	0.023	mg/Kg wet	0.113		89.1		40-160	4.06	20		†
n-Butylbenzene	0.0130	0.0011	mg/Kg wet	0.0113		115		70-130	2.24	20		
sec-Butylbenzene	0.0127	0.0011	mg/Kg wet	0.0113		112		70-130	5.57	20		
tert-Butylbenzene	0.0127	0.0011	mg/Kg wet	0.0113		112		70-130	3.60	20		
tert-Butyl Ethyl Ether (TBEE)	0.0107	0.00057	mg/Kg wet	0.0113		94.8		70-130	0.741	20		
Carbon Disulfide	0.00979	0.011	mg/Kg wet	0.0113		86.4		70-130	7.47	20		
Carbon Tetrachloride	0.0108	0.0011	mg/Kg wet	0.0113		95.0		70-130	7.11	20		
Chlorobenzene	0.0124	0.0011	mg/Kg wet	0.0113		109		70-130	7.48	20		
Chlorodibromomethane	0.0109	0.0023	mg/Kg wet	0.0113		96.2		70-130	0.828	20		
Chloroethane	0.00983	0.0023	mg/Kg wet	0.0113		86.7		70-130	0.230	20		
Chloroform	0.0116	0.0023	mg/Kg wet	0.0113		102		70-130	6.17	20		
Chloromethane	0.00526	0.0023	mg/Kg wet	0.0113		46.4		40-160	0.649	20	L-14, V-05	†
2-Chlorotoluene	0.0126	0.0011	mg/Kg wet	0.0113		111		70-130	4.05	20		
4-Chlorotoluene	0.0127	0.0011	mg/Kg wet	0.0113		112		70-130	5.82	20		
1,2-Dibromo-3-chloropropane (DBCP)	0.0115	0.0057	mg/Kg wet	0.0113		101		70-130	0.886	20		
1,2-Dibromoethane (EDB)	0.0123	0.00057	mg/Kg wet	0.0113		108		70-130	0.368	20		
Dibromomethane	0.0121	0.0011	mg/Kg wet	0.0113		107		70-130	2.40	20		
1,2-Dichlorobenzene	0.0125	0.0011	mg/Kg wet	0.0113		110		70-130	2.60	20		
1,3-Dichlorobenzene	0.0127	0.0011	mg/Kg wet	0.0113		112		70-130	3.26	20		
1,4-Dichlorobenzene	0.0118	0.0011	mg/Kg wet	0.0113		104		70-130	4.22	20		
Dichlorodifluoromethane (Freon 12)	0.00492	0.0023	mg/Kg wet	0.0113		43.4		40-160	8.81	20	L-14	†
1,1-Dichloroethane	0.0119	0.0011	mg/Kg wet	0.0113		105		70-130	5.37	20		
1,2-Dichloroethane	0.0108	0.0011	mg/Kg wet	0.0113		95.7		70-130	3.69	20		
1,1-Dichloroethylene	0.0107	0.0011	mg/Kg wet	0.0113		94.1		70-130	5.68	20		
cis-1,2-Dichloroethylene	0.0118	0.0011	mg/Kg wet	0.0113		104		70-130	3.59	20		
trans-1,2-Dichloroethylene	0.0116	0.0011	mg/Kg wet	0.0113		102		70-130	3.55	20		
1,2-Dichloropropane	0.0114	0.0011	mg/Kg wet	0.0113		101		70-130	5.50	20		
1,3-Dichloropropane	0.0117	0.00057	mg/Kg wet	0.0113		103		70-130	1.82	20		
2,2-Dichloropropane	0.0106	0.0011	mg/Kg wet	0.0113		93.1		70-130	1.49	20	V-05	
1,1-Dichloropropene	0.0118	0.0023	mg/Kg wet	0.0113		104		70-130	7.33	20		
cis-1,3-Dichloropropene	0.0105	0.00057	mg/Kg wet	0.0113		92.8		70-130	4.22	20		
trans-1,3-Dichloropropene	0.0124	0.00057	mg/Kg wet	0.0113		109		70-130	0.183	20		
Diethyl Ether	0.0102	0.0023	mg/Kg wet	0.0113		89.8		70-130	1.66	20		
Diisopropyl Ether (DIPE)	0.0102	0.00057	mg/Kg wet	0.0113		89.7		70-130	3.18	20		
1,4-Dioxane	0.0845	0.057	mg/Kg wet	0.113		74.6		40-160	6.08	20	V-16	†
Ethylbenzene	0.0125	0.0011	mg/Kg wet	0.0113		110		70-130	6.51	20		
Hexachlorobutadiene	0.0133	0.0011	mg/Kg wet	0.0113		117		70-130	3.27	20		
2-Hexanone (MBK)	0.0991	0.011	mg/Kg wet	0.113		87.5		40-160	0.0114	20		†
Isopropylbenzene (Cumene)	0.0151	0.0011	mg/Kg wet	0.0113		**133**	*	70-130	4.19	20	L-06	
p-Isopropyltoluene (p-Cymene)	0.0123	0.0011	mg/Kg wet	0.0113		109		70-130	4.75	20		
Methyl tert-Butyl Ether (MTBE)	0.0103	0.0011	mg/Kg wet	0.0113		90.7		70-130	0.987	20		
Methylene Chloride	0.0116	0.0057	mg/Kg wet	0.0113		102		70-130	1.07	20		
4-Methyl-2-pentanone (MIBK)	0.104	0.011	mg/Kg wet	0.113		91.4		40-160	2.86	20		†
Naphthalene	0.0131	0.0057	mg/Kg wet	0.0113		116		70-130	0.173	20		

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B158583 - SW-846 5035											
LCS Dup (B158583-BSD1)				Prepared: 09/19/16 Analyzed: 09/22/16							
n-Propylbenzene	0.0127	0.0011	mg/Kg wet	0.0113		112		70-130	8.40	20	
Styrene	0.0130	0.0011	mg/Kg wet	0.0113		114		70-130	3.61	20	
1,1,1,2-Tetrachloroethane	0.0118	0.0011	mg/Kg wet	0.0113		104		70-130	2.19	20	
1,1,2,2-Tetrachloroethane	0.0128	0.00057	mg/Kg wet	0.0113		113		70-130	2.79	20	
Tetrachloroethylene	0.0124	0.0011	mg/Kg wet	0.0113		110		70-130	4.46	20	
Tetrahydrofuran	0.0119	0.0045	mg/Kg wet	0.0113		105		70-130	14.1	20	
Toluene	0.0122	0.0011	mg/Kg wet	0.0113		108		70-130	4.35	20	
1,2,3-Trichlorobenzene	0.0125	0.0057	mg/Kg wet	0.0113		111		70-130	0.999	20	
1,2,4-Trichlorobenzene	0.0119	0.0011	mg/Kg wet	0.0113		105		70-130	4.01	20	
1,1,1-Trichloroethane	0.0112	0.0011	mg/Kg wet	0.0113		99.0		70-130	4.44	20	
1,1,2-Trichloroethane	0.0123	0.0011	mg/Kg wet	0.0113		109		70-130	3.78	20	
Trichloroethylene	0.0123	0.0011	mg/Kg wet	0.0113		109		70-130	4.94	20	
Trichlorofluoromethane (Freon 11)	0.0104	0.0023	mg/Kg wet	0.0113		92.2		70-130	5.28	20	
1,2,3-Trichloropropane	0.0123	0.0023	mg/Kg wet	0.0113		108		70-130	3.45	20	
1,2,4-Trimethylbenzene	0.0123	0.0011	mg/Kg wet	0.0113		109		70-130	3.53	20	
1,3,5-Trimethylbenzene	0.0129	0.0011	mg/Kg wet	0.0113		113		70-130	4.99	20	
Vinyl Chloride	0.00763	0.0023	mg/Kg wet	0.0113		**67.3**	*	70-130	12.3	20	L-07
m+p Xylene	0.0251	0.0023	mg/Kg wet	0.0227		111		70-130	5.48	20	
o-Xylene	0.0127	0.0011	mg/Kg wet	0.0113		112		70-130	4.29	20	
Surrogate: 1,2-Dichloroethane-d4	*0.0261*		mg/Kg wet	0.0283		92.0		70-130			
Surrogate: Toluene-d8	*0.0285*		mg/Kg wet	0.0283		100		70-130			
Surrogate: 4-Bromofluorobenzene	*0.0286*		mg/Kg wet	0.0283		101		70-130			

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158646 - SW-846 3540C										
Blank (B158646-BLK1)				Prepared: 09/20/16 Analyzed: 09/21/16						
Aroclor-1016	ND	0.020	mg/Kg wet							
Aroclor-1016 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1221	ND	0.020	mg/Kg wet							
Aroclor-1221 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1232	ND	0.020	mg/Kg wet							
Aroclor-1232 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1242	ND	0.020	mg/Kg wet							
Aroclor-1242 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1248	ND	0.020	mg/Kg wet							
Aroclor-1248 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1254	ND	0.020	mg/Kg wet							
Aroclor-1254 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1260	ND	0.020	mg/Kg wet							
Aroclor-1260 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1262	ND	0.020	mg/Kg wet							
Aroclor-1262 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1268	ND	0.020	mg/Kg wet							
Aroclor-1268 [2C]	ND	0.020	mg/Kg wet							
Surrogate: Decachlorobiphenyl	*0.206*		mg/Kg wet	0.200		103	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.202*		mg/Kg wet	0.200		101	30-150			
Surrogate: Tetrachloro-m-xylene	*0.189*		mg/Kg wet	0.200		94.3	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.184*		mg/Kg wet	0.200		92.0	30-150			
LCS (B158646-BS1)				Prepared: 09/20/16 Analyzed: 09/21/16						
Aroclor-1016	0.19	0.020	mg/Kg wet	0.200		92.9	40-140			
Aroclor-1016 [2C]	0.19	0.020	mg/Kg wet	0.200		93.9	40-140			
Aroclor-1260	0.17	0.020	mg/Kg wet	0.200		87.1	40-140			
Aroclor-1260 [2C]	0.16	0.020	mg/Kg wet	0.200		82.2	40-140			
Surrogate: Decachlorobiphenyl	*0.197*		mg/Kg wet	0.200		98.3	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.193*		mg/Kg wet	0.200		96.7	30-150			
Surrogate: Tetrachloro-m-xylene	*0.181*		mg/Kg wet	0.200		90.6	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.177*		mg/Kg wet	0.200		88.6	30-150			
LCS Dup (B158646-BSD1)				Prepared: 09/20/16 Analyzed: 09/21/16						
Aroclor-1016	0.19	0.020	mg/Kg wet	0.200		97.1	40-140	4.37	30	
Aroclor-1016 [2C]	0.20	0.020	mg/Kg wet	0.200		97.9	40-140	4.18	30	
Aroclor-1260	0.18	0.020	mg/Kg wet	0.200		92.3	40-140	5.77	30	
Aroclor-1260 [2C]	0.17	0.020	mg/Kg wet	0.200		87.3	40-140	6.08	30	
Surrogate: Decachlorobiphenyl	*0.207*		mg/Kg wet	0.200		103	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.203*		mg/Kg wet	0.200		102	30-150			
Surrogate: Tetrachloro-m-xylene	*0.188*		mg/Kg wet	0.200		93.9	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.183*		mg/Kg wet	0.200		91.6	30-150			

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B158646 - SW-846 3540C											
Matrix Spike (B158646-MS1)	**Source: 16I0708-01**			Prepared: 09/20/16 Analyzed: 09/22/16							
Aroclor-1016	0.28	0.11	mg/Kg dry	0.217	ND	129		40-140			
Aroclor-1016 [2C]	0.34	0.11	mg/Kg dry	0.217	ND	**155**	*	40-140			MS-21
Aroclor-1260	2.5	0.11	mg/Kg dry	0.217	ND	**1160**	*	40-140			MS-21
Aroclor-1260 [2C]	2.3	0.11	mg/Kg dry	0.217	ND	**1060**	*	40-140			MS-21
Surrogate: Decachlorobiphenyl	*0.177*		mg/Kg dry	0.217		81.3		30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.214*		mg/Kg dry	0.217		98.5		30-150			
Surrogate: Tetrachloro-m-xylene	*0.196*		mg/Kg dry	0.217		90.2		30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.188*		mg/Kg dry	0.217		86.3		30-150			
Matrix Spike Dup (B158646-MSD1)	**Source: 16I0708-01**			Prepared: 09/20/16 Analyzed: 09/22/16							
Aroclor-1016	0.28	0.11	mg/Kg dry	0.220	ND	128		40-140		50	
Aroclor-1016 [2C]	0.34	0.11	mg/Kg dry	0.220	ND	**155**	*	40-140		50	MS-21
Aroclor-1260	2.7	0.11	mg/Kg dry	0.220	ND	**1220**	*	40-140	5.81	50	MS-21
Aroclor-1260 [2C]	2.5	0.11	mg/Kg dry	0.220	ND	**1120**	*	40-140	6.39	50	MS-21
Surrogate: Decachlorobiphenyl	*0.181*		mg/Kg dry	0.220		82.4		30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.226*		mg/Kg dry	0.220		103		30-150			
Surrogate: Tetrachloro-m-xylene	*0.196*		mg/Kg dry	0.220		89.2		30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.186*		mg/Kg dry	0.220		84.9		30-150			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158642 - SW-846 3546										
Blank (B158642-BLK1)				Prepared: 09/20/16 Analyzed: 09/21/16						
C9-C18 Aliphatics	ND	10	mg/Kg wet							
C19-C36 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet							
C11-C22 Aromatics	ND	10	mg/Kg wet							
Acenaphthene	ND	0.10	mg/Kg wet							
Acenaphthylene	ND	0.10	mg/Kg wet							
Anthracene	ND	0.10	mg/Kg wet							
Benzo(a)anthracene	ND	0.10	mg/Kg wet							
Benzo(a)pyrene	ND	0.10	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet							
Chrysene	ND	0.10	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet							
Fluoranthene	ND	0.10	mg/Kg wet							
Fluorene	ND	0.10	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet							
2-Methylnaphthalene	ND	0.10	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							
Phenanthrene	ND	0.10	mg/Kg wet							
Pyrene	ND	0.10	mg/Kg wet							
n-Decane	ND	0.10	mg/Kg wet							
n-Docosane	ND	0.10	mg/Kg wet							
n-Dodecane	ND	0.10	mg/Kg wet							
n-Eicosane	ND	0.10	mg/Kg wet							
n-Hexacosane	ND	0.10	mg/Kg wet							
n-Hexadecane	ND	0.10	mg/Kg wet							
n-Hexatriacontane	ND	0.10	mg/Kg wet							
n-Nonadecane	ND	0.10	mg/Kg wet							
n-Nonane	ND	0.10	mg/Kg wet							
n-Octacosane	ND	0.10	mg/Kg wet							
n-Octadecane	ND	0.10	mg/Kg wet							
n-Tetracosane	ND	0.10	mg/Kg wet							
n-Tetradecane	ND	0.10	mg/Kg wet							
n-Triacontane	ND	0.10	mg/Kg wet							
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*3.07*		mg/Kg wet	5.00		61.5	40-140			
Surrogate: o-Terphenyl (OTP)	*3.63*		mg/Kg wet	5.00		72.6	40-140			
Surrogate: 2-Bromonaphthalene	*37.4*		µg/mL	50.0		74.8	40-140			
Surrogate: 2-Fluorobiphenyl	*43.2*		µg/mL	50.0		86.4	40-140			
LCS (B158642-BS1)				Prepared: 09/20/16 Analyzed: 09/21/16						
Acenaphthene	3.66	0.10	mg/Kg wet	5.00		73.3	40-140			
Acenaphthylene	3.52	0.10	mg/Kg wet	5.00		70.4	40-140			
Anthracene	3.63	0.10	mg/Kg wet	5.00		72.7	40-140			
Benzo(a)anthracene	3.49	0.10	mg/Kg wet	5.00		69.8	40-140			
Benzo(a)pyrene	3.46	0.10	mg/Kg wet	5.00		69.2	40-140			
Benzo(b)fluoranthene	3.52	0.10	mg/Kg wet	5.00		70.4	40-140			
Benzo(g,h,i)perylene	3.28	0.10	mg/Kg wet	5.00		65.7	40-140			
Benzo(k)fluoranthene	3.48	0.10	mg/Kg wet	5.00		69.7	40-140			
Chrysene	3.57	0.10	mg/Kg wet	5.00		71.4	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158642 - SW-846 3546										
LCS (B158642-BS1)				Prepared: 09/20/16 Analyzed: 09/21/16						
Dibenz(a,h)anthracene	3.42	0.10	mg/Kg wet	5.00		68.3	40-140			
Fluoranthene	3.57	0.10	mg/Kg wet	5.00		71.4	40-140			
Fluorene	3.66	0.10	mg/Kg wet	5.00		73.1	40-140			
Indeno(1,2,3-cd)pyrene	3.18	0.10	mg/Kg wet	5.00		63.6	40-140			
2-Methylnaphthalene	3.31	0.10	mg/Kg wet	5.00		66.1	40-140			
Naphthalene	3.15	0.10	mg/Kg wet	5.00		63.0	40-140			
Phenanthrene	3.55	0.10	mg/Kg wet	5.00		71.0	40-140			
Pyrene	3.58	0.10	mg/Kg wet	5.00		71.6	40-140			
n-Decane	2.32	0.10	mg/Kg wet	5.00		46.4	40-140			
n-Docosane	3.67	0.10	mg/Kg wet	5.00		73.5	40-140			
n-Dodecane	3.03	0.10	mg/Kg wet	5.00		60.7	40-140			
n-Eicosane	3.76	0.10	mg/Kg wet	5.00		75.2	40-140			
n-Hexacosane	3.45	0.10	mg/Kg wet	5.00		69.0	40-140			
n-Hexadecane	3.69	0.10	mg/Kg wet	5.00		73.7	40-140			
n-Hexatriacontane	3.27	0.10	mg/Kg wet	5.00		65.5	40-140			
n-Nonadecane	3.70	0.10	mg/Kg wet	5.00		74.1	40-140			
n-Nonane	1.51	0.10	mg/Kg wet	5.00		30.3	30-140			
n-Octacosane	3.41	0.10	mg/Kg wet	5.00		68.3	40-140			
n-Octadecane	3.73	0.10	mg/Kg wet	5.00		74.6	40-140			
n-Tetracosane	3.80	0.10	mg/Kg wet	5.00		76.1	40-140			
n-Tetradecane	3.42	0.10	mg/Kg wet	5.00		68.4	40-140			
n-Triacontane	3.36	0.10	mg/Kg wet	5.00		67.3	40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*2.91*		mg/Kg wet	5.00		58.1	40-140			
Surrogate: o-Terphenyl (OTP)	*3.46*		mg/Kg wet	5.00		69.3	40-140			
Surrogate: 2-Bromonaphthalene	*41.0*		µg/mL	50.0		82.0	40-140			
Surrogate: 2-Fluorobiphenyl	*46.1*		µg/mL	50.0		92.2	40-140			
LCS Dup (B158642-BSD1)				Prepared: 09/20/16 Analyzed: 09/21/16						
Acenaphthene	3.52	0.10	mg/Kg wet	5.00		70.4	40-140	4.02	25	
Acenaphthylene	3.40	0.10	mg/Kg wet	5.00		68.0	40-140	3.36	25	
Anthracene	3.52	0.10	mg/Kg wet	5.00		70.3	40-140	3.27	25	
Benzo(a)anthracene	3.38	0.10	mg/Kg wet	5.00		67.5	40-140	3.22	25	
Benzo(a)pyrene	3.36	0.10	mg/Kg wet	5.00		67.1	40-140	2.98	25	
Benzo(b)fluoranthene	3.38	0.10	mg/Kg wet	5.00		67.5	40-140	4.19	25	
Benzo(g,h,i)perylene	3.22	0.10	mg/Kg wet	5.00		64.3	40-140	2.07	25	
Benzo(k)fluoranthene	3.40	0.10	mg/Kg wet	5.00		68.0	40-140	2.41	25	
Chrysene	3.48	0.10	mg/Kg wet	5.00		69.6	40-140	2.57	25	
Dibenz(a,h)anthracene	3.34	0.10	mg/Kg wet	5.00		66.7	40-140	2.34	25	
Fluoranthene	3.43	0.10	mg/Kg wet	5.00		68.6	40-140	4.01	25	
Fluorene	3.34	0.10	mg/Kg wet	5.00		66.7	40-140	9.16	25	
Indeno(1,2,3-cd)pyrene	3.06	0.10	mg/Kg wet	5.00		61.2	40-140	3.76	25	
2-Methylnaphthalene	3.24	0.10	mg/Kg wet	5.00		64.8	40-140	2.03	25	
Naphthalene	3.14	0.10	mg/Kg wet	5.00		62.9	40-140	0.232	25	
Phenanthrene	3.40	0.10	mg/Kg wet	5.00		68.0	40-140	4.18	25	
Pyrene	3.44	0.10	mg/Kg wet	5.00		68.8	40-140	4.03	25	
n-Decane	2.43	0.10	mg/Kg wet	5.00		48.5	40-140	4.57	25	
n-Docosane	3.63	0.10	mg/Kg wet	5.00		72.6	40-140	1.24	25	
n-Dodecane	3.07	0.10	mg/Kg wet	5.00		61.5	40-140	1.30	25	
n-Eicosane	3.74	0.10	mg/Kg wet	5.00		74.7	40-140	0.667	25	
n-Hexacosane	3.38	0.10	mg/Kg wet	5.00		67.6	40-140	2.09	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158642 - SW-846 3546										
LCS Dup (B158642-BSD1)				Prepared: 09/20/16 Analyzed: 09/21/16						
n-Hexadecane	3.67	0.10	mg/Kg wet	5.00		73.5	40-140	0.359	25	
n-Hexatriacontane	3.22	0.10	mg/Kg wet	5.00		64.4	40-140	1.56	25	
n-Nonadecane	3.68	0.10	mg/Kg wet	5.00		73.5	40-140	0.753	25	
n-Nonane	1.59	0.10	mg/Kg wet	5.00		31.9	30-140	5.16	25	
n-Octacosane	3.34	0.10	mg/Kg wet	5.00		66.7	40-140	2.32	25	
n-Octadecane	3.71	0.10	mg/Kg wet	5.00		74.2	40-140	0.559	25	
n-Tetracosane	3.75	0.10	mg/Kg wet	5.00		74.9	40-140	1.53	25	
n-Tetradecane	3.40	0.10	mg/Kg wet	5.00		68.1	40-140	0.554	25	
n-Triacontane	3.28	0.10	mg/Kg wet	5.00		65.6	40-140	2.55	25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*2.87*		mg/Kg wet	5.00		57.4	40-140			
Surrogate: o-Terphenyl (OTP)	*3.22*		mg/Kg wet	5.00		64.4	40-140			
Surrogate: 2-Bromonaphthalene	*39.7*		µg/mL	50.0		79.5	40-140			
Surrogate: 2-Fluorobiphenyl	*46.0*		µg/mL	50.0		92.1	40-140			

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-15 (0-5)

Lab Sample ID: 16I0708-01 Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	11	
	2	0.00	-0.03	0.03	12	6.9

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-16 (0-5)

Lab Sample ID: 16I0708-03 Date(s) Analyzed: 09/21/2016 09/21/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	0.90	
	2	0.00	-0.03	0.03	0.87	3.6

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-18 (0-5)

Lab Sample ID: 16I0708-08

Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	26	
	2	0.00	-0.03	0.03	29	9.4

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-19 (0-5)

Lab Sample ID: 16I0708-11

Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	6.4	
	2	0.00	-0.03	0.03	6.7	4.9

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-21 (0-5)

Lab Sample ID: 16I0708-16

Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	10	
	2	0.00	-0.03	0.03	11	4.7

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-21 (5-10)

Lab Sample ID: 16I0708-17

Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	0.63	
	2	0.00	-0.03	0.03	0.55	13.4

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-14A (5-10)

Lab Sample ID: 16I0708-23

Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	0.14	
	2	0.00	-0.03	0.03	0.12	16.8

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B158646-BS1 Date(s) Analyzed: 09/21/2016 09/21/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.19	
	2	0.00	-0.03	0.03	0.19	2
Aroclor-1260	1	0.00	-0.03	0.03	0.17	
	2	0.00	-0.03	0.03	0.16	8

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B158646-BSD1 Date(s) Analyzed: 09/21/2016 09/21/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.19	
	2	0.00	-0.03	0.03	0.20	3
Aroclor-1260	1	0.00	-0.03	0.03	0.18	
	2	0.00	-0.03	0.03	0.17	8

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

Matrix Spike

Lab Sample ID: B158646-MS1 Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.28	
	2	0.00	-0.03	0.03	0.34	19
Aroclor-1260	1	0.00	-0.03	0.03	2.5	
	2	0.00	-0.03	0.03	2.3	10

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

Matrix Spike Dup

Lab Sample ID: B158646-MSD1 Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.28	
	2	0.00	-0.03	0.03	0.34	19
Aroclor-1260	1	0.00	-0.03	0.03	2.7	
	2	0.00	-0.03	0.03	2.5	7

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit
DL	Method Detection Limit
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.

L-06	Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the high side.
L-07	Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.
L-14	Compound classified by MA CAM as difficult with acceptable recoveries of 40-160%. Recovery does not meet 70-130% criteria but does meet difficult compound criteria.
MS-21	Matrix spike and/or spike duplicate recovery bias high due to contribution of other Aroclors present in the source sample.
O-32	A dilution was performed as part of the standard analytical procedure.
RL-05	Elevated reporting limit due to high concentration of target compounds. MA CAM reporting limit not met.
RL-07	Elevated reporting limit based on lowest point in calibration. MA CAM reporting limit not met.
RL-08	Elevated reporting limit due to sample matrix interference. MA CAM reporting limit not met.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.
S-15	Surrogate recovery outside of control limits due to suspected sample matrix interference. Chromatogram(s) is attached.
V-05	Continuing calibration did not meet method specifications and was biased on the low side for this compound. Increased uncertainty is associated with the reported value which is likely to be biased on the low side.
V-16	Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy may be associated with reported result.
V-20	Continuing calibration did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP-EPH-04-1.1 in Soil	
C9-C18 Aliphatics	CT,NC,ME,NH-P
C19-C36 Aliphatics	CT,NC,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,ME,NH-P
C11-C22 Aromatics	CT,NC,ME,NH-P
Acenaphthene	CT,NC,ME,NH-P
Acenaphthylene	CT,NC,ME,NH-P
Anthracene	CT,NC,ME,NH-P
Benzo(a)anthracene	CT,NC,ME,NH-P
Benzo(a)pyrene	CT,NC,ME,NH-P
Benzo(b)fluoranthene	CT,NC,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,ME,NH-P
Benzo(k)fluoranthene	CT,NC,ME,NH-P
Chrysene	CT,NC,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,ME,NH-P
Fluoranthene	CT,NC,ME,NH-P
Fluorene	CT,NC,ME
Indeno(1,2,3-cd)pyrene	CT,NC,ME,NH-P
2-Methylnaphthalene	CT,NC,ME
Naphthalene	CT,NC,ME,NH-P
Phenanthrene	CT,NC,ME,NH-P
Pyrene	CT,NC,ME,NH-P
SW-846 8082A in Soil	
Aroclor-1016	CT,NH,NY,ME,NC,VA
Aroclor-1016 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1221	CT,NH,NY,ME,NC,VA
Aroclor-1221 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1232	CT,NH,NY,ME,NC,VA
Aroclor-1232 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1242	CT,NH,NY,ME,NC,VA
Aroclor-1242 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1248	CT,NH,NY,ME,NC,VA
Aroclor-1248 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1254	CT,NH,NY,ME,NC,VA
Aroclor-1254 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1260	CT,NH,NY,ME,NC,VA
Aroclor-1260 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1262	NY,NC,VA
Aroclor-1262 [2C]	NY,NC,VA
Aroclor-1268	NY,NC,VA
Aroclor-1268 [2C]	NY,NC,VA
SW-846 8260C in Soil	
Acetone	CT,NH,NY,ME
Benzene	CT,NH,NY,ME
Bromobenzene	NH,NY,ME
Bromochloromethane	NH,NY,ME
Bromodichloromethane	CT,NH,NY,ME

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8260C in Soil	
Bromoform	CT,NH,NY,ME
Bromomethane	CT,NH,NY,ME
2-Butanone (MEK)	CT,NH,NY,ME
n-Butylbenzene	CT,NH,NY,ME
sec-Butylbenzene	CT,NH,NY,ME
tert-Butylbenzene	CT,NH,NY,ME
Carbon Disulfide	CT,NH,NY,ME
Carbon Tetrachloride	CT,NH,NY,ME
Chlorobenzene	CT,NH,NY,ME
Chlorodibromomethane	CT,NH,NY,ME
Chloroethane	CT,NH,NY,ME
Chloroform	CT,NH,NY,ME
Chloromethane	CT,NH,NY,ME
2-Chlorotoluene	CT,NH,NY,ME
4-Chlorotoluene	CT,NH,NY,ME
Dibromomethane	NH,NY,ME
1,2-Dichlorobenzene	CT,NH,NY,ME
1,3-Dichlorobenzene	CT,NH,NY,ME
1,4-Dichlorobenzene	CT,NH,NY,ME
Dichlorodifluoromethane (Freon 12)	NY,ME
1,1-Dichloroethane	CT,NH,NY,ME
1,2-Dichloroethane	CT,NH,NY,ME
1,1-Dichloroethylene	CT,NH,NY,ME
cis-1,2-Dichloroethylene	CT,NH,NY,ME
trans-1,2-Dichloroethylene	CT,NH,NY,ME
1,2-Dichloropropane	CT,NH,NY,ME
1,3-Dichloropropane	NH,NY,ME
2,2-Dichloropropane	NH,NY,ME
1,1-Dichloropropene	NH,NY,ME
cis-1,3-Dichloropropene	CT,NH,NY,ME
trans-1,3-Dichloropropene	CT,NH,NY,ME
Ethylbenzene	CT,NH,NY,ME
Hexachlorobutadiene	NH,NY,ME
2-Hexanone (MBK)	CT,NH,NY,ME
Isopropylbenzene (Cumene)	CT,NH,NY,ME
p-Isopropyltoluene (p-Cymene)	NH,NY
Methyl tert-Butyl Ether (MTBE)	NY
Methylene Chloride	CT,NH,NY,ME
4-Methyl-2-pentanone (MIBK)	CT,NH,NY
Naphthalene	NH,NY,ME
n-Propylbenzene	NH,NY
Styrene	CT,NH,NY,ME
1,1,1,2-Tetrachloroethane	CT,NH,NY,ME
1,1,2,2-Tetrachloroethane	CT,NH,NY,ME
Tetrachloroethylene	CT,NH,NY,ME
Toluene	CT,NH,NY,ME
1,2,3-Trichlorobenzene	ME

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

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8260C in Soil	
1,2,4-Trichlorobenzene	NH,NY,ME
1,1,1-Trichloroethane	CT,NH,NY,ME
1,1,2-Trichloroethane	CT,NH,NY,ME
Trichloroethylene	CT,NH,NY,ME
Trichlorofluoromethane (Freon 11)	CT,NH,NY,ME
1,2,3-Trichloropropane	NH,NY,ME
1,2,4-Trimethylbenzene	CT,NH,NY,ME
1,3,5-Trimethylbenzene	CT,NH,NY,ME
Vinyl Chloride	CT,NH,NY,ME
m+p Xylene	CT,NH,NY,ME
o-Xylene	CT,NH,NY,ME

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

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	02/1/2018
MA	Massachusetts DEP	M-MA100	06/30/2017
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2017
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2017
RI	Rhode Island Department of Health	LAO00112	12/30/2016
NC	North Carolina Div. of Water Quality	652	12/31/2016
NJ	New Jersey DEP	MA007 NELAP	06/30/2017
FL	Florida Department of Health	E871027 NELAP	06/30/2017
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2017
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2016
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2017

CHAIN OF CUSTODY RECORD

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39 Spruce Street
East longmeadow, MA 01028

16I0708

Rev 04.05.12

Company Name: GEI
Address: 60 Brooks
Attention: A. Foley, E. Turley
Project Location: Lowell
Sampled By: A. Foley

Telephone:
Project #
Client PO# 1785-6100

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

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

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	# of Containers	** Preservation	***Container Code	EPH & PAHs	Asbestos	PCBs (Soxhlet)	Hold for PCBs
01	B-15 (0-5')	9/15	10:15		X	S	C	1		G			X	
02	B-15 (5-10')		10:30					1		G	X	X		X
03	B-16 (0-5')		9:15					1		G			X	
04	B-16 (5-10)		9:30					1		G		X		X
05	B-16 (10-15')		9:45					1		G	X			X
06	B-17 (0-5')		11:30					1		G				
07	B-17 (5-7.5')		11:45					1		G	X	X		X
08	B-18 (0-5)		10:45					1		G			X	
09	B-18 (5-10)		11:00					1		G				X
10	B-18 (10-15)		11:15					1		G	X			X

ANALYSIS REQUESTED

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

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

Comments:
Please order Analysis ① EPH/PAH ② PCBs ③ Asbestos
④ Hold For PCBs

Relinquished by: (signature)	Date/Time:
[signature] 9/16/16	15:00
Received by: (signature) [signature] 9/16/16	1500
Relinquished by: (signature) [signature] 9/16/16	1900
Received by: (signature) [signature] 9/16/16	1900

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

Detection Limit Requirements
Massachusetts: S-1
Connecticut:
Other:

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

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

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

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East longmeadow, MA 01028

CHAIN OF CUSTODY RECORD

16I0708

Rev 04.05.12

Company Name: GEC
Address: 60 Brooks
Attention:
Project Location: Lowell
Sampled By: A. Foley

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

Telephone:
Project #
Client PO# 1785-6100

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

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code
11	B-19 (0-5')	9/15/16	12:30		X		
12	B-19 (5-10)	↓	12:45		↓		
~~13~~	~~B-19 (10-15) @ GEC~~		~~1:15~~				
13	B-19 (15-17.5')		1:30				
14	B-20 (0-5')	9/16/16	~~10:05~~ APP	9:59			
15	B-20 (5-8)		~~10:40~~ APP	10:05			
16	B-21 (0-5)		10:30				
17	B-21 (5-10)		10:40				
18	B-21 (10-13.5)		10:56				
		↓					

ANALYSIS REQUESTED

# of Containers	EPH w PAHs	Asbestos	PCBs (soil/wt)	Hold for PCBs								
** Preservation												
***Container Code												
11		X	X									
12		X		X								
~~13~~				~	~							
13	X											
14			X									
15	X			X								
16	X	X	X									
17	X	X	X									
18	X	X	X									

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

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

Comments:
① EPH ② PCBs ③ Asbestos ④ Hold
Please Analyse in order

Relinquished by: (signature)	Date/Time:
A. Foley 9/16/16	1500
Received by: (signature) 9/16/16	Date/Time: 1500
Relinquished by: (signature) 9/16/16	Date/Time: 1900
Received by: (signature) 9/16/16	Date/Time: 1900

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

Detection Limit Requirements
Massachusetts: S-1
Connecticut:
Other:

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

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www.contestlabs.com
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East longmeadow, MA 01028

CHAIN OF CUSTODY RECORD

16I0708

Rev 04.05.12

Company Name: GEC
Address: 60 Prescott
Telephone:
Project #
Client PO# 17685-6100

Attention: A. Foley
Project Location: Lowell
Sampled By: A. Foley, E. Furlong, B. Butler

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

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

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	# of Containers	** Preservation	***Container Code	ANALYSIS REQUESTED: EPH/PAHs	Asbestos	PCBs	Hold for PCBs
	B-22(0-5)@GEC	9/16/16			X	S	U							
	B-22(5-10)@GEC	↓			↓	↓	↓							
19	B-22(10-15)										X			
20	B-22(15-20)										X			
	B-23(0-5)@GEC													
21	B-23(5-9)	↓			✓	✓	✓				X			

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

Comments:
① EPH ③ PCB ③ Asbestos ④ Hold

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

Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Relinquished by: (signature)	9/16/16
Received by: (signature)	9/16/16
Relinquished by: (signature)	9/16/16
Received by: (signature)	9/16/16

Date/Time:	15:00
Date/Time:	15:00
Date/Time:	19:00
Date/Time:	1900

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

Detection Limit Requirements
Massachusetts: S-1
Connecticut:
Other:

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

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WBE/DBE Certified

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CHAIN OF CUSTODY RECORD

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39 Spruce Street
East longmeadow, MA 01028

16I0708

Rev. 04.05.12

Company Name: GEC
Address: 60 Brooks Dr
Attention: A. Foley, E. Furlong, B. Butler
Project Location: Lowell
Sampled By: A. Foley

Telephone:
Project #
Client PO# 1765-6100

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

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

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	# of Containers	** Preservation	***Container Code	EPH/PAH's	ASBESTOS	PCB's (soxhlet)	VOCs
22	B-14A (0-5)	9/16/16	8:55	X	X	SOIL					X	X	X	
23	B-14A (5-10)		9:00	X	X						X	X	X	
24	B-14A (10-15)		9:05	X	X						X	X	X	
25	B-14A (15-16.5)		9:20	X	X						X	X	X	
26	B-14 (10-15)	9/15/16	9:30		X									X
27	B-14A (10-15)	9/16/16	9:30		X									X
28	B-26 (10-13)				X									X
29	B-27 (5-10)				X									X
30	B-28 (10-15)				X									X

ANALYSIS REQUESTED

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

Comments:

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

Relinquished by: (signature)	Date/Time:
[signature] 9/16	15:50
Received by: (signature) [signature] 9/16/16	Date/Time: 15:50
Relinquished by: (signature) [signature] 9/16/16	Date/Time: 1900
Received by: (signature) [signature] 9/16/16	Date/Time: 1900

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

Detection Limit Requirements
Massachusetts: S-1
Connecticut:
Other:

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

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con-test® ANALYTICAL LABORATORY

Sample Receipt Checklist

CLIENT NAME: GEC **RECEIVED BY:** JM **DATE:** 9/16/16

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

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

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

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

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

Temperature °C by Temp blank ____ Temperature °C by Temp gun 3.1

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

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

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

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

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

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

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

Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber		16 oz amber	
500 mL Amber		8 oz amber/clear jar	26
250 mL Amber (8oz amber)		4 oz amber/clear jar	
1 Liter Plastic		2 oz amber/clear jar	
500 mL Plastic		Plastic Bag / Ziploc	
250 mL plastic		SOC Kit	
40 mL Vial - type listed below	15	Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

☆ Recieved extra B-21(0-5) sample
- no analyses checked for B-17 (0-5)
- no % solids jars for any of the VOC analyses.

40 mL vials:	# HCl		# Methanol	5	Time and Date Frozen:
	# Bisulfate	10	# DI Water		
	# Thiosulfate		Unpreserved		

Login Sample Receipt Checklist

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

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

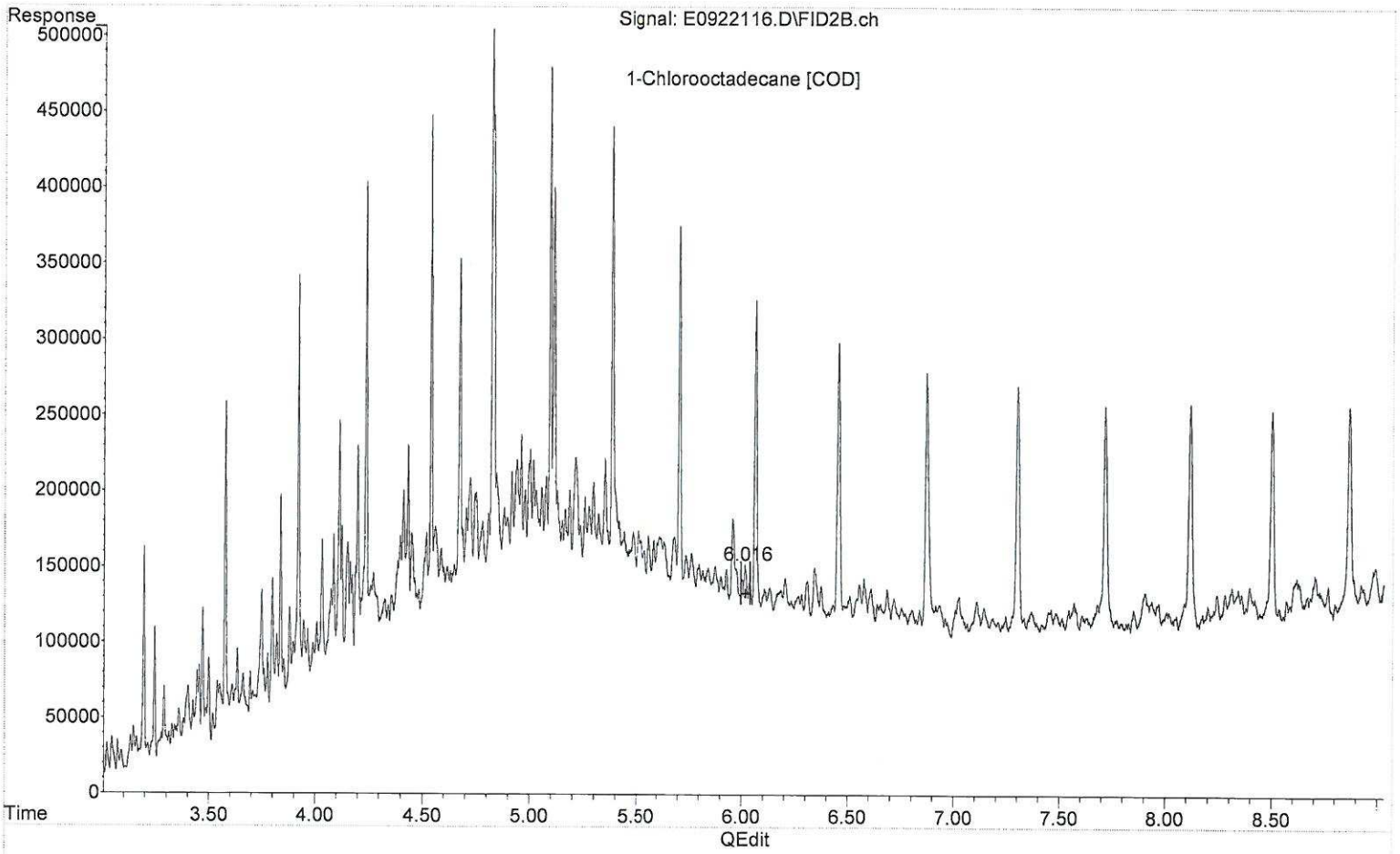
Who notified of False statements? **Date/Time:**

 Log-In Technician Initials: JM **Date/Time:** 9/16/16 1900

Quantitation Report (Qedit)

Data Path : C:\msdchem\1\data\E092216\
Data File : E0922116.D
Signal(s) : Signal #1: FID1A.ch Signal #2: FID2B.ch
Acq On : 23 Sep 2016 3:15 am
Operator : SCS
Sample : 16I0708-23@5X Inst : GCFID5
Misc :
ALS Vial : 82 (Sig #1); 81 (Sig #2) Sample Multiplier: 1

Integration File signal 1: events.e
Integration File signal 2: events2.e
Quant Time: Sep 23 09:41:57 2016
Quant Method : C:\msdchem\1\methods\EPH111815.M
Quant Title : EPH GCFID5
QLast Update : Mon Sep 19 16:42:25 2016
Response via : Initial Calibration
Integrator: ChemStation
Volume Inj. :
Signal #1 Phase : Signal #2 Phase:
Signal #1 Info : Signal #2 Info :



(34) Chlorooctadecane (COD) (S)

6.016min 1.849 ug/mL m

response 155451

(+) = Expected Retention Time

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 16I0708
Project Location: Lowell	RTN:

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

16I0708-01 thru 16I0708-30

Matrices: Soil

CAM Protocol (check all that below)

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

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

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

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

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

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

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

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

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

Signature: Lisa Worthington Position: Project Manager

Printed Name: Lisa A. Worthington Date: 09/23/16

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

October 5, 2016

Drew Foley
Goldman Environmental
60 Brooks Drive
Braintree, MA 02184

Project Location: Lowell, MA
Client Job Number:
Project Number: 1785-6100
Laboratory Work Order Number: 16I1233

Enclosed are results of analyses for samples received by the laboratory on September 28, 2016. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

James M. Georgantas
Project Manager

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

Goldman Environmental
60 Brooks Drive
Braintree, MA 02184
ATTN: Drew Foley

REPORT DATE: 10/5/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 1785-6100

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16I1233

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

PROJECT LOCATION: Lowell, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
Comp1	16I1233-01	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
Comp 2	16I1233-02	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
Comp 3	16I1233-03	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
Comp 4	16I1233-04	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754

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

CASE NARRATIVE SUMMARY

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

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Project Manager

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

Project Location: Lowell, MA
Sample Description:
Work Order: 16I1233
Date Received: 9/28/2016
Field Sample #: Comp1
Sampled: 9/16/2016 14:00
Sample ID: 16I1233-01
Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Fiberglass	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Cellulose	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Hair	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Synthetic	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Organic Material	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Gypsum	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I1233

Date Received: 9/28/2016

Field Sample #: Comp 2 | Sampled: 9/16/2016 14:05

Sample ID: 16I1233-02

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Fiberglass	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Cellulose	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Hair	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Synthetic	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Organic Material	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Gypsum	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I1233

Date Received: 9/28/2016

Field Sample #: Comp 3 | Sampled: 9/16/2016 14:10

Sample ID: 16I1233-03

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Fiberglass	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Cellulose	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Hair	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Synthetic	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Organic Material	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Gypsum	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I1233

Date Received: 9/28/2016

Field Sample #: Comp 4 | Sampled: 9/16/2016 14:15

Sample ID: 16I1233-04

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Fiberglass	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Cellulose	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Hair	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Synthetic	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Organic Material	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO
Gypsum	ND		%	1		EPA/600/R-93/116		10/5/16 0:00	PRO

con-test® ANALYTICAL LABORATORY

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

FLAG/QUALIFIER SUMMARY

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

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

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

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

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications

No certified Analyses included in this Report

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

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	02/1/2018
MA	Massachusetts DEP	M-MA100	06/30/2017
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2017
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2017
RI	Rhode Island Department of Health	LAO00112	12/30/2016
NC	North Carolina Div. of Water Quality	652	12/31/2016
NJ	New Jersey DEP	MA007 NELAP	06/30/2017
FL	Florida Department of Health	E871027 NELAP	06/30/2017
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2017
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2016
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2017

CHAIN OF CUSTODY RECORD

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

16I0760

Rev. 04.05.12

16I1233

Company Name: GEC
Address: 60 Brooks Drive
Telephone: 781 356 9140
Project #
Client PO#: 1785-6100

Attention: A. Foley / E Furlong / BB Butler
Project Location: Lowell
Sampled By: A. Foley

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

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

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code
01	Comp 1 9/18/16	9/16/16	200			S	
02	Comp 2		205				
03	Comp 3		210				
04	Comp 4		215				
	~~Comp 5~~						
	~~Comp 6~~						
	~~Comp 7~~						
	~~Comp 8~~						

ANALYSIS REQUESTED

# of Containers	Ignitability/Flashpoint	Corrosivity/Conductivity	TPH	EPH	SVOCs	MA 14 metals/TCLP 20	Reactive Sulfide/Cyanide	PCBs (Soxhlet)	Pest/Herb		
01	X	X	X		X	X	X	X	X		
02	X	X	X		X	X	X	X	X		
03	X	X	X		X	X	X	X	X		
04	X	X	X		X	X	X	X	X		

9-28-16
Run Asbestos on all samples
5 day TAT

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

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

Comments: Disposal Criteria

Relinquished by: (signature)	Date/Time:
Cindy Foley	9/14/16 15:00
Received by: (signature)	Date/Time:
[illegible]	9/16/16 1500
Relinquished by: (signature)	Date/Time:
[illegible]	9/16/16 1900
Received by: (signature)	Date/Time:
[illegible]	9/16/16 1900

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

Detection Limit Requirements
Massachusetts: S-1
Connecticut:
Other:

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

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

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

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

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

con-test® ANALYTICAL LABORATORY

Sample Receipt Checklist

CLIENT NAME: GEC **RECEIVED BY:** JM **DATE:** 9/16/16

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

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

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

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

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

Temperature °C by Temp blank ____ Temperature °C by Temp gun 3.2

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

6) **Are there any ~~RUSH~~ or SHORT HOLDING TIME samples?** **Yes** ✓ **No** ____
Who was notified Bre Date 9/16/16 Time 1900

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

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

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

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

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

Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber		16 oz amber	
500 mL Amber		8 oz amber/clear jar	12
250 mL Amber (8oz amber)		4 oz amber/clear jar	
1 Liter Plastic		2 oz amber/clear jar	
500 mL Plastic		Plastic Bag / Ziploc	
250 mL plastic		SOC Kit	
40 mL Vial - type listed below		Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

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

Login Sample Receipt Checklist

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

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

Who notified of False statements? **Date/Time:**

Doc #277 Rev. 4 August 2013 **Log-In Technician Initials:** JM **Date/Time:** 9/16/16 1900

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

September 22, 2016

Drew Foley
Goldman Environmental
60 Brooks Drive
Braintree, MA 02184

Project Location: Lowell, MA
Client Job Number:
Project Number: 1785-6100
Laboratory Work Order Number: 16I0700

Enclosed are results of analyses for samples received by the laboratory on September 16, 2016. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

James M. Georgantas
Project Manager

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

Goldman Environmental
60 Brooks Drive
Braintree, MA 02184
ATTN: Drew Foley

REPORT DATE: 9/22/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 1785-6100

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16I0700

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

PROJECT LOCATION: Lowell, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
Comp1	16I0700-01	Soil		SM 2540G	
				SM21-22 2510B Modified	
				SW-846 1030	
				SW-846 6010C-D	
				SW-846 7471B	
				SW-846 8081B	
				SW-846 8082A	
				SW-846 8100 Modified	
				SW-846 8151A	
				SW-846 8270D	
				SW-846 9014	
				SW-846 9030A	
				SW-846 9045C	
Comp 2	16I0700-02	Soil		SM 2540G	
				SM21-22 2510B Modified	
				SW-846 1030	
				SW-846 6010C-D	
				SW-846 7471B	
				SW-846 8081B	
				SW-846 8082A	
				SW-846 8100 Modified	
				SW-846 8151A	
				SW-846 8270D	
				SW-846 9014	
				SW-846 9030A	
				SW-846 9045C	
Comp 3	16I0700-03	Soil		SM 2540G	
				SM21-22 2510B Modified	
				SW-846 1030	
				SW-846 6010C-D	
				SW-846 7471B	
				SW-846 8081B	
				SW-846 8082A	
				SW-846 8100 Modified	
				SW-846 8151A	
				SW-846 8270D	
				SW-846 9014	
				SW-846 9030A	
				SW-846 9045C	

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

Goldman Environmental
60 Brooks Drive
Braintree, MA 02184
ATTN: Drew Foley

REPORT DATE: 9/22/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 1785-6100

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16I0700

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

PROJECT LOCATION: Lowell, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
Comp 4	16I0700-04	Soil		SM 2540G	
				SM21-22 2510B Modified	
				SW-846 1030	
				SW-846 6010C-D	
				SW-846 7471B	
				SW-846 8081B	
				SW-846 8082A	
				SW-846 8100 Modified	
				SW-846 8151A	
				SW-846 8270D	
				SW-846 9014	
				SW-846 9030A	
				SW-846 9045C	

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CASE NARRATIVE SUMMARY

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

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SW-846 8081B

Qualifications:

DL-03

Elevated reporting limit due to matrix.

Analyte & Samples(s) Qualified:

16I0700-01[Comp1], 16I0700-02[Comp 2], 16I0700-03[Comp 3], 16I0700-04[Comp 4]

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

Decachlorobiphenyl
16I0700-01[Comp1], 16I0700-02[Comp 2], 16I0700-03[Comp 3], 16I0700-04[Comp 4]

Decachlorobiphenyl [2C]
16I0700-01[Comp1], 16I0700-02[Comp 2], 16I0700-03[Comp 3], 16I0700-04[Comp 4]

Tetrachloro-m-xylene
16I0700-01[Comp1], 16I0700-02[Comp 2], 16I0700-03[Comp 3], 16I0700-04[Comp 4]

Tetrachloro-m-xylene [2C]
16I0700-01[Comp1], 16I0700-02[Comp 2], 16I0700-03[Comp 3], 16I0700-04[Comp 4]

SW-846 8100 Modified

Qualifications:

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

o-Terphenyl
16I0700-01[Comp1], 16I0700-02[Comp 2], 16I0700-03[Comp 3], 16I0700-04[Comp 4]

SW-846 8151A

Qualifications:

R-05

Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.

Analyte & Samples(s) Qualified:

Dinoseb
16I0700-01[Comp1], 16I0700-02[Comp 2], 16I0700-03[Comp 3], 16I0700-04[Comp 4], B158589-BLK1, B158589-BS1, B158589-BSD1

Dinoseb [2C]
16I0700-01[Comp1], 16I0700-02[Comp 2], 16I0700-03[Comp 3], 16I0700-04[Comp 4], B158589-BLK1, B158589-BS1, B158589-BSD1

V-06

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

Analyte & Samples(s) Qualified:

Dalapon
B158589-BS1, B158589-BSD1

Dalapon [2C]
B158589-BS1, B158589-BSD1

V-20

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

Analyte & Samples(s) Qualified:

Dalapon
16I0700-01[Comp1], 16I0700-02[Comp 2], 16I0700-03[Comp 3], 16I0700-04[Comp 4]

Dalapon [2C]
16I0700-01[Comp1], 16I0700-02[Comp 2], 16I0700-03[Comp 3], 16I0700-04[Comp 4]

SW-846 8270D

Qualifications:

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RL-08

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

Analyte & Samples(s) Qualified:

16I0700-01[Comp1], 16I0700-02[Comp 2], 16I0700-03[Comp 3], 16I0700-04[Comp 4]

V-20

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

Analyte & Samples(s) Qualified:

2,4-Dinitrophenol

16I0700-01[Comp1], 16I0700-02[Comp 2], 16I0700-03[Comp 3], 16I0700-04[Comp 4]

2,4-Dinitrotoluene

16I0700-01[Comp1], 16I0700-02[Comp 2], 16I0700-03[Comp 3], 16I0700-04[Comp 4]

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

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

SW-846 8100 Modified

TPH (C9-C36) is quantitated against a calibration made with a diesel standard.

SW-846 8270D

Laboratory control sample recoveries for required MCP Data Enhancement 8270 compounds were all within control limits specified by the method, 40-140% for base/neutrals and 30-130% for acids except for “difficult analytes” listed below and/or otherwise listed in this narrative. Difficult analytes limits are 15 and 140%: 2,4-dinitrophenol, 4-chloroaniline, 4-nitrophenol, and phenol.

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Project Manager

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp1 | Sampled: 9/16/2016 14:00

Sample ID: 16I0700-01

Sample Matrix: Soil

Sample Flags: RL-08

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Acenaphthylene	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Acetophenone	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Aniline	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Anthracene	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Benzo(a)anthracene	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Benzo(a)pyrene	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Benzo(b)fluoranthene	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Benzo(g,h,i)perylene	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Benzo(k)fluoranthene	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Bis(2-chloroethoxy)methane	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Bis(2-chloroethyl)ether	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Bis(2-chloroisopropyl)ether	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Bis(2-Ethylhexyl)phthalate	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
4-Bromophenylphenylether	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Butylbenzylphthalate	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
4-Chloroaniline	ND	33	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
2-Chloronaphthalene	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
2-Chlorophenol	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Chrysene	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Dibenz(a,h)anthracene	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Dibenzofuran	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Di-n-butylphthalate	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
1,2-Dichlorobenzene	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
1,3-Dichlorobenzene	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
1,4-Dichlorobenzene	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
3,3-Dichlorobenzidine	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
2,4-Dichlorophenol	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Diethylphthalate	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
2,4-Dimethylphenol	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Dimethylphthalate	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
2,4-Dinitrophenol	ND	33	mg/Kg dry	10	V-20	SW-846 8270D	9/19/16	9/20/16 9:57	BGL
2,4-Dinitrotoluene	ND	17	mg/Kg dry	10	V-20	SW-846 8270D	9/19/16	9/20/16 9:57	BGL
2,6-Dinitrotoluene	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Di-n-octylphthalate	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
1,2-Diphenylhydrazine (as Azobenzene)	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Fluoranthene	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Fluorene	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Hexachlorobenzene	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Hexachlorobutadiene	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Hexachloroethane	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Indeno(1,2,3-cd)pyrene	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Isophorone	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
2-Methylnaphthalene	12	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL

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Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp1 | Sampled: 9/16/2016 14:00

Sample ID: 16I0700-01

Sample Matrix: Soil

Sample Flags: RL-08

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
3/4-Methylphenol	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Naphthalene	ND	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Nitrobenzene	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
2-Nitrophenol	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
4-Nitrophenol	ND	33	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Pentachlorophenol	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Phenanthrene	11	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Phenol	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
Pyrene	12	8.4	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
1,2,4-Trichlorobenzene	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
2,4,5-Trichlorophenol	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL
2,4,6-Trichlorophenol	ND	17	mg/Kg dry	10		SW-846 8270D	9/19/16	9/20/16 9:57	BGL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	102	30-130		9/20/16 9:57
Phenol-d6	106	30-130		9/20/16 9:57
Nitrobenzene-d5	112	30-130		9/20/16 9:57
2-Fluorobiphenyl	106	30-130		9/20/16 9:57
2,4,6-Tribromophenol	96.6	30-130		9/20/16 9:57
p-Terphenyl-d14	125	30-130		9/20/16 9:57

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Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp1 | Sampled: 9/16/2016 14:00

Sample ID: 16I0700-01

Sample Matrix: Soil

Sample Flags: DL-03

Organochloride Pesticides by GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aldrin [1]	ND	0.31	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
alpha-BHC [1]	ND	0.31	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
beta-BHC [1]	ND	0.31	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
delta-BHC [1]	ND	0.31	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
gamma-BHC (Lindane) [1]	ND	0.13	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
Chlordane [1]	ND	1.3	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
4,4'-DDD [1]	ND	0.25	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
4,4'-DDE [1]	ND	0.25	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
4,4'-DDT [1]	ND	0.25	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
Dieldrin [1]	ND	0.25	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
Endosulfan I [1]	ND	0.31	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
Endosulfan II [1]	ND	0.50	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
Endosulfan sulfate [1]	ND	0.50	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
Endrin [1]	ND	0.50	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
Endrin ketone [1]	ND	0.50	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
Heptachlor [1]	ND	0.31	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
Heptachlor epoxide [1]	ND	0.31	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
Hexachlorobenzene [1]	ND	0.38	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB
Methoxychlor [1]	ND	3.1	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 21:44	JMB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	9/21/16 21:44
Decachlorobiphenyl [2]	*	30-150	S-01	9/21/16 21:44
Tetrachloro-m-xylene [1]	*	30-150	S-01	9/21/16 21:44
Tetrachloro-m-xylene [2]	*	30-150	S-01	9/21/16 21:44

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Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp1 | Sampled: 9/16/2016 14:00

Sample ID: 16I0700-01

Sample Matrix: Soil

Herbicides by GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2,4-D [1]	ND	130	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 12:49	JMB
2,4-DB [1]	240	130	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 12:49	JMB
2,4,5-TP (Silvex) [1]	ND	13	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 12:49	JMB
2,4,5-T [1]	ND	13	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 12:49	JMB
Dalalpon [1]	ND	320	µg/kg dry	1	V-20	SW-846 8151A	9/19/16	9/20/16 12:49	JMB
Dicamba [1]	ND	13	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 12:49	JMB
Dichloroprop [1]	ND	130	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 12:49	JMB
Dinoseb [1]	ND	63	µg/kg dry	1	R-05	SW-846 8151A	9/19/16	9/20/16 12:49	JMB
MCPA [1]	ND	13000	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 12:49	JMB
MCPP [1]	ND	13000	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 12:49	JMB

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
2,4-Dichlorophenylacetic acid [1]	84.9	30-150		9/20/16 12:49	
2,4-Dichlorophenylacetic acid [2]	90.4	30-150		9/20/16 12:49	

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp1 | Sampled: 9/16/2016 14:00

Sample ID: 16I0700-01

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:32	KAL
Aroclor-1221 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:32	KAL
Aroclor-1232 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:32	KAL
Aroclor-1242 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:32	KAL
Aroclor-1248 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:32	KAL
Aroclor-1254 [2]	0.34	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:32	KAL
Aroclor-1260 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:32	KAL
Aroclor-1262 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:32	KAL
Aroclor-1268 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:32	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	76.6	30-150		9/20/16 23:32
Decachlorobiphenyl [2]	91.2	30-150		9/20/16 23:32
Tetrachloro-m-xylene [1]	69.7	30-150		9/20/16 23:32
Tetrachloro-m-xylene [2]	71.5	30-150		9/20/16 23:32

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp1 | Sampled: 9/16/2016 14:00

Sample ID: 16I0700-01

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
TPH (C9-C36)	2100	530	mg/Kg dry	50		SW-846 8100 Modified	9/19/16	9/20/16 12:18	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual				
o-Terphenyl	*	40-140	S-01				9/20/16 12:18

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp1 | Sampled: 9/16/2016 14:00

Sample ID: 16I0700-01

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	3.1	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:00	AME
Arsenic	5.4	3.1	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:00	AME
Barium	53	3.1	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:00	AME
Beryllium	ND	0.31	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:00	AME
Cadmium	0.53	0.31	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:00	AME
Chromium	12	0.63	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:00	AME
Lead	22	0.94	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:00	AME
Mercury	ND	0.033	mg/Kg dry	1		SW-846 7471B	9/19/16	9/19/16 15:20	SHN
Nickel	16	0.63	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:00	AME
Selenium	ND	6.3	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:00	AME
Silver	ND	0.63	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:00	AME
Thallium	ND	3.1	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:00	AME
Vanadium	44	1.3	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:00	AME
Zinc	24	1.3	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:00	AME

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Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp1 | Sampled: 9/16/2016 14:00

Sample ID: 16I0700-01

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Ignitability	Present		present/absent	1		SW-846 1030	9/19/16	9/19/16 18:00	DJM
pH @20.8°C	8.6		pH Units	1		SW-846 9045C	9/17/16	9/17/16 9:00	IS
Reactive Cyanide	ND	3.9	mg/Kg	1		SW-846 9014	9/19/16	9/20/16 13:15	AG
Reactive Sulfide	ND	20	mg/Kg	1		SW-846 9030A	9/19/16	9/20/16 13:05	AG
Specific conductance	16	2.0	µmhos/cm	1		SM21-22 2510B Modified	9/20/16	9/20/16 11:45	AG
% Solids	77.9		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 2 | Sampled: 9/16/2016 14:05

Sample ID: 16I0700-02

Sample Matrix: Soil

Sample Flags: RL-08

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Acenaphthylene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Acetophenone	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Aniline	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Anthracene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Benzo(a)anthracene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Benzo(a)pyrene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Benzo(b)fluoranthene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Benzo(g,h,i)perylene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Benzo(k)fluoranthene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Bis(2-chloroethoxy)methane	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Bis(2-chloroethyl)ether	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Bis(2-chloroisopropyl)ether	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Bis(2-Ethylhexyl)phthalate	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
4-Bromophenylphenylether	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Butylbenzylphthalate	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
4-Chloroaniline	ND	16	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
2-Chloronaphthalene	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
2-Chlorophenol	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Chrysene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Dibenz(a,h)anthracene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Dibenzofuran	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Di-n-butylphthalate	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
1,2-Dichlorobenzene	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
1,3-Dichlorobenzene	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
1,4-Dichlorobenzene	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
3,3-Dichlorobenzidine	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
2,4-Dichlorophenol	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Diethylphthalate	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
2,4-Dimethylphenol	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Dimethylphthalate	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
2,4-Dinitrophenol	ND	16	mg/Kg dry	5	V-20	SW-846 8270D	9/19/16	9/20/16 10:20	BGL
2,4-Dinitrotoluene	ND	8.4	mg/Kg dry	5	V-20	SW-846 8270D	9/19/16	9/20/16 10:20	BGL
2,6-Dinitrotoluene	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Di-n-octylphthalate	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
1,2-Diphenylhydrazine (as Azobenzene)	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Fluoranthene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Fluorene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Hexachlorobenzene	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Hexachlorobutadiene	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Hexachloroethane	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Indeno(1,2,3-cd)pyrene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Isophorone	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
2-Methylnaphthalene	15	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 2 | Sampled: 9/16/2016 14:05

Sample ID: 16I0700-02

Sample Matrix: Soil

Sample Flags: RL-08

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
3/4-Methylphenol	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Naphthalene	4.4	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Nitrobenzene	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
2-Nitrophenol	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
4-Nitrophenol	ND	16	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Pentachlorophenol	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Phenanthrene	11	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Phenol	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
Pyrene	12	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
1,2,4-Trichlorobenzene	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
2,4,5-Trichlorophenol	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL
2,4,6-Trichlorophenol	ND	8.4	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:20	BGL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	71.8	30-130		9/20/16 10:20
Phenol-d6	76.4	30-130		9/20/16 10:20
Nitrobenzene-d5	77.9	30-130		9/20/16 10:20
2-Fluorobiphenyl	71.0	30-130		9/20/16 10:20
2,4,6-Tribromophenol	69.6	30-130		9/20/16 10:20
p-Terphenyl-d14	98.3	30-130		9/20/16 10:20

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Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 2 | Sampled: 9/16/2016 14:05

Sample ID: 16I0700-02

Sample Matrix: Soil

Sample Flags: DL-03

Organochloride Pesticides by GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aldrin [1]	ND	0.31	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
alpha-BHC [1]	ND	0.31	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
beta-BHC [1]	ND	0.31	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
delta-BHC [1]	ND	0.31	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
gamma-BHC (Lindane) [1]	ND	0.12	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
Chlordane [1]	ND	1.2	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
4,4'-DDD [1]	ND	0.25	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
4,4'-DDE [1]	ND	0.25	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
4,4'-DDT [1]	ND	0.25	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
Dieldrin [1]	ND	0.25	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
Endosulfan I [1]	ND	0.31	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
Endosulfan II [1]	ND	0.50	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
Endosulfan sulfate [1]	ND	0.50	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
Endrin [1]	ND	0.50	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
Endrin ketone [1]	ND	0.50	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
Heptachlor [1]	ND	0.31	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
Heptachlor epoxide [1]	ND	0.31	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
Hexachlorobenzene [1]	ND	0.37	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB
Methoxychlor [1]	ND	3.1	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:06	JMB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	9/21/16 22:06
Decachlorobiphenyl [2]	*	30-150	S-01	9/21/16 22:06
Tetrachloro-m-xylene [1]	*	30-150	S-01	9/21/16 22:06
Tetrachloro-m-xylene [2]	*	30-150	S-01	9/21/16 22:06

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Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 2 | Sampled: 9/16/2016 14:05

Sample ID: 16I0700-02

Sample Matrix: Soil

Herbicides by GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2,4-D [1]	ND	130	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 13:29	JMB
2,4-DB [2]	410	130	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 13:29	JMB
2,4,5-TP (Silvex) [1]	ND	13	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 13:29	JMB
2,4,5-T [1]	ND	13	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 13:29	JMB
Dalalpon [1]	ND	310	µg/kg dry	1	V-20	SW-846 8151A	9/19/16	9/20/16 13:29	JMB
Dicamba [1]	ND	13	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 13:29	JMB
Dichloroprop [1]	ND	130	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 13:29	JMB
Dinoseb [1]	ND	63	µg/kg dry	1	R-05	SW-846 8151A	9/19/16	9/20/16 13:29	JMB
MCPA [1]	ND	13000	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 13:29	JMB
MCPP [1]	ND	13000	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 13:29	JMB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,4-Dichlorophenylacetic acid [1]	84.6	30-150		9/20/16 13:29
2,4-Dichlorophenylacetic acid [2]	104	30-150		9/20/16 13:29

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Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 2 | Sampled: 9/16/2016 14:05

Sample ID: 16I0700-02

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:49	KAL
Aroclor-1221 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:49	KAL
Aroclor-1232 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:49	KAL
Aroclor-1242 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:49	KAL
Aroclor-1248 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:49	KAL
Aroclor-1254 [2]	0.26	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:49	KAL
Aroclor-1260 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:49	KAL
Aroclor-1262 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:49	KAL
Aroclor-1268 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/20/16 23:49	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	69.6	30-150		9/20/16 23:49
Decachlorobiphenyl [2]	83.8	30-150		9/20/16 23:49
Tetrachloro-m-xylene [1]	64.6	30-150		9/20/16 23:49
Tetrachloro-m-xylene [2]	66.0	30-150		9/20/16 23:49

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Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 2 | Sampled: 9/16/2016 14:05

Sample ID: 16I0700-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
TPH (C9-C36)	3200	530	mg/Kg dry	50		SW-846 8100 Modified	9/19/16	9/20/16 12:36	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
o-Terphenyl	*	40-140	S-01	9/20/16 12:36

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 2 | Sampled: 9/16/2016 14:05

Sample ID: 16I0700-02

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	3.2	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:06	AME
Arsenic	6.8	3.2	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:06	AME
Barium	67	3.2	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:06	AME
Beryllium	0.33	0.32	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:06	AME
Cadmium	0.48	0.32	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:06	AME
Chromium	11	0.64	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:06	AME
Lead	19	0.95	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:06	AME
Mercury	ND	0.031	mg/Kg dry	1		SW-846 7471B	9/19/16	9/19/16 15:22	SHN
Nickel	13	0.64	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:06	AME
Selenium	ND	6.4	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:06	AME
Silver	ND	0.64	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:06	AME
Thallium	ND	3.2	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:06	AME
Vanadium	42	1.3	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:06	AME
Zinc	17	1.3	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:06	AME

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 2 | Sampled: 9/16/2016 14:05

Sample ID: 16I0700-02

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Ignitability	Present		present/absent	1		SW-846 1030	9/19/16	9/19/16 18:00	DJM
pH @20.9°C	9.0		pH Units	1		SW-846 9045C	9/17/16	9/17/16 9:00	IS
Reactive Cyanide	ND	4.0	mg/Kg	1		SW-846 9014	9/19/16	9/20/16 13:15	AG
Reactive Sulfide	ND	20	mg/Kg	1		SW-846 9030A	9/19/16	9/20/16 13:05	AG
Specific conductance	27	2.0	µmhos/cm	1		SM21-22 2510B Modified	9/20/16	9/20/16 11:45	AG
% Solids	78.6		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 3 | Sampled: 9/16/2016 14:10

Sample ID: 16I0700-03

Sample Matrix: Soil

Sample Flags: RL-08

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Acenaphthylene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Acetophenone	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Aniline	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Anthracene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Benzo(a)anthracene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Benzo(a)pyrene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Benzo(b)fluoranthene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Benzo(g,h,i)perylene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Benzo(k)fluoranthene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Bis(2-chloroethoxy)methane	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Bis(2-chloroethyl)ether	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Bis(2-chloroisopropyl)ether	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Bis(2-Ethylhexyl)phthalate	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
4-Bromophenylphenylether	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Butylbenzylphthalate	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
4-Chloroaniline	ND	16	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
2-Chloronaphthalene	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
2-Chlorophenol	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Chrysene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Dibenz(a,h)anthracene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Dibenzofuran	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Di-n-butylphthalate	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
1,2-Dichlorobenzene	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
1,3-Dichlorobenzene	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
1,4-Dichlorobenzene	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
3,3-Dichlorobenzidine	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
2,4-Dichlorophenol	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Diethylphthalate	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
2,4-Dimethylphenol	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Dimethylphthalate	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
2,4-Dinitrophenol	ND	16	mg/Kg dry	5	V-20	SW-846 8270D	9/19/16	9/20/16 10:43	BGL
2,4-Dinitrotoluene	ND	8.5	mg/Kg dry	5	V-20	SW-846 8270D	9/19/16	9/20/16 10:43	BGL
2,6-Dinitrotoluene	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Di-n-octylphthalate	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
1,2-Diphenylhydrazine (as Azobenzene)	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Fluoranthene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Fluorene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Hexachlorobenzene	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Hexachlorobutadiene	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Hexachloroethane	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Indeno(1,2,3-cd)pyrene	ND	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Isophorone	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
2-Methylnaphthalene	18	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 3 | Sampled: 9/16/2016 14:10

Sample ID: 16I0700-03

Sample Matrix: Soil

Sample Flags: RL-08

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
3/4-Methylphenol	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Naphthalene	5.1	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Nitrobenzene	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
2-Nitrophenol	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
4-Nitrophenol	ND	16	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Pentachlorophenol	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Phenanthrene	13	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Phenol	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
Pyrene	13	4.2	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
1,2,4-Trichlorobenzene	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
2,4,5-Trichlorophenol	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL
2,4,6-Trichlorophenol	ND	8.5	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 10:43	BGL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	70.3	30-130		9/20/16 10:43
Phenol-d6	74.0	30-130		9/20/16 10:43
Nitrobenzene-d5	79.9	30-130		9/20/16 10:43
2-Fluorobiphenyl	71.4	30-130		9/20/16 10:43
2,4,6-Tribromophenol	68.2	30-130		9/20/16 10:43
p-Terphenyl-d14	108	30-130		9/20/16 10:43

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 3 | Sampled: 9/16/2016 14:10

Sample ID: 16I0700-03

Sample Matrix: Soil

Sample Flags: DL-03

Organochloride Pesticides by GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aldrin [1]	ND	0.32	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
alpha-BHC [1]	ND	0.32	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
beta-BHC [1]	ND	0.32	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
delta-BHC [1]	ND	0.32	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
gamma-BHC (Lindane) [1]	ND	0.13	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
Chlordane [1]	ND	1.3	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
4,4'-DDD [1]	ND	0.25	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
4,4'-DDE [1]	ND	0.25	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
4,4'-DDT [1]	ND	0.25	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
Dieldrin [1]	ND	0.25	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
Endosulfan I [1]	ND	0.32	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
Endosulfan II [1]	ND	0.51	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
Endosulfan sulfate [1]	ND	0.51	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
Endrin [1]	ND	0.51	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
Endrin ketone [1]	ND	0.51	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
Heptachlor [1]	ND	0.32	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
Heptachlor epoxide [1]	ND	0.32	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
Hexachlorobenzene [1]	ND	0.38	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB
Methoxychlor [1]	ND	3.2	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:28	JMB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	9/21/16 22:28
Decachlorobiphenyl [2]	*	30-150	S-01	9/21/16 22:28
Tetrachloro-m-xylene [1]	*	30-150	S-01	9/21/16 22:28
Tetrachloro-m-xylene [2]	*	30-150	S-01	9/21/16 22:28

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Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 3 | Sampled: 9/16/2016 14:10

Sample ID: 16I0700-03

Sample Matrix: Soil

Herbicides by GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2,4-D [1]	ND	120	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:09	JMB
2,4-DB [2]	520	120	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:09	JMB
2,4,5-TP (Silvex) [1]	ND	12	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:09	JMB
2,4,5-T [1]	ND	12	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:09	JMB
Dalalpon [1]	ND	310	µg/kg dry	1	V-20	SW-846 8151A	9/19/16	9/20/16 14:09	JMB
Dicamba [1]	ND	12	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:09	JMB
Dichloroprop [1]	ND	120	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:09	JMB
Dinoseb [1]	ND	62	µg/kg dry	1	R-05	SW-846 8151A	9/19/16	9/20/16 14:09	JMB
MCPA [1]	ND	12000	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:09	JMB
MCPP [1]	ND	12000	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:09	JMB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,4-Dichlorophenylacetic acid [1]	84.0	30-150		9/20/16 14:09
2,4-Dichlorophenylacetic acid [2]	88.3	30-150		9/20/16 14:09

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Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 3 | Sampled: 9/16/2016 14:10

Sample ID: 16I0700-03

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:06	KAL
Aroclor-1221 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:06	KAL
Aroclor-1232 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:06	KAL
Aroclor-1242 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:06	KAL
Aroclor-1248 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:06	KAL
Aroclor-1254 [2]	1.3	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:06	KAL
Aroclor-1260 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:06	KAL
Aroclor-1262 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:06	KAL
Aroclor-1268 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:06	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	60.3	30-150		9/21/16 0:06
Decachlorobiphenyl [2]	72.0	30-150		9/21/16 0:06
Tetrachloro-m-xylene [1]	56.0	30-150		9/21/16 0:06
Tetrachloro-m-xylene [2]	57.7	30-150		9/21/16 0:06

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Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 3 | Sampled: 9/16/2016 14:10

Sample ID: 16I0700-03

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
TPH (C9-C36)	3100	530	mg/Kg dry	50		SW-846 8100 Modified	9/19/16	9/20/16 12:54	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual				
o-Terphenyl	*	40-140	S-01				9/20/16 12:54

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Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 3 | Sampled: 9/16/2016 14:10

Sample ID: 16I0700-03

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	3.2	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:11	AME
Arsenic	5.3	3.2	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:11	AME
Barium	50	3.2	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:11	AME
Beryllium	ND	0.32	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:11	AME
Cadmium	0.51	0.32	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:11	AME
Chromium	13	0.63	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:11	AME
Lead	19	0.95	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:11	AME
Mercury	ND	0.032	mg/Kg dry	1		SW-846 7471B	9/19/16	9/19/16 15:23	SHN
Nickel	14	0.63	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:11	AME
Selenium	ND	6.3	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:11	AME
Silver	ND	0.63	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:11	AME
Thallium	ND	3.2	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:11	AME
Vanadium	43	1.3	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:11	AME
Zinc	34	1.3	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:11	AME

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 3 | Sampled: 9/16/2016 14:10

Sample ID: 16I0700-03

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Ignitability	Present		present/absent	1		SW-846 1030	9/19/16	9/19/16 18:00	DJM
pH @21.2°C	9.6		pH Units	1		SW-846 9045C	9/17/16	9/17/16 9:00	IS
Reactive Cyanide	ND	3.9	mg/Kg	1		SW-846 9014	9/19/16	9/20/16 13:15	AG
Reactive Sulfide	ND	20	mg/Kg	1		SW-846 9030A	9/19/16	9/20/16 13:05	AG
Specific conductance	18	2.0	µmhos/cm	1		SM21-22 2510B Modified	9/20/16	9/20/16 11:45	AG
% Solids	79.1		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 4 | Sampled: 9/16/2016 14:15

Sample ID: 16I0700-04

Sample Matrix: Soil

Sample Flags: RL-08

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Acenaphthylene	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Acetophenone	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Aniline	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Anthracene	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Benzo(a)anthracene	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Benzo(a)pyrene	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Benzo(b)fluoranthene	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Benzo(g,h,i)perylene	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Benzo(k)fluoranthene	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Bis(2-chloroethoxy)methane	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Bis(2-chloroethyl)ether	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Bis(2-chloroisopropyl)ether	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Bis(2-Ethylhexyl)phthalate	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
4-Bromophenylphenylether	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Butylbenzylphthalate	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
4-Chloroaniline	ND	16	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
2-Chloronaphthalene	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
2-Chlorophenol	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Chrysene	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Dibenz(a,h)anthracene	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Dibenzofuran	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Di-n-butylphthalate	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
1,2-Dichlorobenzene	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
1,3-Dichlorobenzene	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
1,4-Dichlorobenzene	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
3,3-Dichlorobenzidine	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
2,4-Dichlorophenol	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Diethylphthalate	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
2,4-Dimethylphenol	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Dimethylphthalate	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
2,4-Dinitrophenol	ND	16	mg/Kg dry	5	V-20	SW-846 8270D	9/19/16	9/20/16 11:06	BGL
2,4-Dinitrotoluene	ND	8.3	mg/Kg dry	5	V-20	SW-846 8270D	9/19/16	9/20/16 11:06	BGL
2,6-Dinitrotoluene	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Di-n-octylphthalate	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
1,2-Diphenylhydrazine (as Azobenzene)	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Fluoranthene	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Fluorene	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Hexachlorobenzene	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Hexachlorobutadiene	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Hexachloroethane	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Indeno(1,2,3-cd)pyrene	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Isophorone	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
2-Methylnaphthalene	12	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 4 | Sampled: 9/16/2016 14:15

Sample ID: 16I0700-04

Sample Matrix: Soil

Sample Flags: RL-08

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
3/4-Methylphenol	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Naphthalene	ND	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Nitrobenzene	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
2-Nitrophenol	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
4-Nitrophenol	ND	16	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Pentachlorophenol	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Phenanthrene	10	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Phenol	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
Pyrene	13	4.1	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
1,2,4-Trichlorobenzene	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
2,4,5-Trichlorophenol	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL
2,4,6-Trichlorophenol	ND	8.3	mg/Kg dry	5		SW-846 8270D	9/19/16	9/20/16 11:06	BGL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	54.2	30-130		9/20/16 11:06
Phenol-d6	59.1	30-130		9/20/16 11:06
Nitrobenzene-d5	61.9	30-130		9/20/16 11:06
2-Fluorobiphenyl	57.9	30-130		9/20/16 11:06
2,4,6-Tribromophenol	45.4	30-130		9/20/16 11:06
p-Terphenyl-d14	88.8	30-130		9/20/16 11:06

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 4 | Sampled: 9/16/2016 14:15

Sample ID: 16I0700-04

Sample Matrix: Soil

Sample Flags: DL-03

Organochloride Pesticides by GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aldrin [1]	ND	0.30	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
alpha-BHC [1]	ND	0.30	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
beta-BHC [1]	ND	0.30	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
delta-BHC [1]	ND	0.30	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
gamma-BHC (Lindane) [1]	ND	0.12	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
Chlordane [1]	ND	1.2	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
4,4'-DDD [1]	ND	0.24	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
4,4'-DDE [1]	ND	0.24	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
4,4'-DDT [1]	ND	0.24	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
Dieldrin [1]	ND	0.24	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
Endosulfan I [1]	ND	0.30	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
Endosulfan II [1]	ND	0.49	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
Endosulfan sulfate [1]	ND	0.49	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
Endrin [1]	ND	0.49	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
Endrin ketone [1]	ND	0.49	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
Heptachlor [1]	ND	0.30	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
Heptachlor epoxide [1]	ND	0.30	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
Hexachlorobenzene [1]	ND	0.36	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB
Methoxychlor [1]	ND	3.0	mg/Kg dry	50		SW-846 8081B	9/19/16	9/21/16 22:50	JMB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	9/21/16 22:50
Decachlorobiphenyl [2]	*	30-150	S-01	9/21/16 22:50
Tetrachloro-m-xylene [1]	*	30-150	S-01	9/21/16 22:50
Tetrachloro-m-xylene [2]	*	30-150	S-01	9/21/16 22:50

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 4 | Sampled: 9/16/2016 14:15

Sample ID: 16I0700-04

Sample Matrix: Soil

Herbicides by GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2,4-D [1]	ND	120	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:49	JMB
2,4-DB [2]	150	120	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:49	JMB
2,4,5-TP (Silvex) [1]	ND	12	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:49	JMB
2,4,5-T [1]	ND	12	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:49	JMB
Dalalpon [1]	ND	300	µg/kg dry	1	V-20	SW-846 8151A	9/19/16	9/20/16 14:49	JMB
Dicamba [1]	ND	12	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:49	JMB
Dichloroprop [1]	ND	120	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:49	JMB
Dinoseb [1]	ND	59	µg/kg dry	1	R-05	SW-846 8151A	9/19/16	9/20/16 14:49	JMB
MCPA [1]	ND	12000	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:49	JMB
MCPP [1]	ND	12000	µg/kg dry	1		SW-846 8151A	9/19/16	9/20/16 14:49	JMB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,4-Dichlorophenylacetic acid [1]	90.3	30-150		9/20/16 14:49
2,4-Dichlorophenylacetic acid [2]	92.8	30-150		9/20/16 14:49

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 4 | Sampled: 9/16/2016 14:15

Sample ID: 16I0700-04

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:24	KAL
Aroclor-1221 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:24	KAL
Aroclor-1232 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:24	KAL
Aroclor-1242 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:24	KAL
Aroclor-1248 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:24	KAL
Aroclor-1254 [2]	0.17	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:24	KAL
Aroclor-1260 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:24	KAL
Aroclor-1262 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:24	KAL
Aroclor-1268 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/19/16	9/21/16 0:24	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	65.3	30-150		9/21/16 0:24
Decachlorobiphenyl [2]	76.9	30-150		9/21/16 0:24
Tetrachloro-m-xylene [1]	61.5	30-150		9/21/16 0:24
Tetrachloro-m-xylene [2]	64.0	30-150		9/21/16 0:24

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 4 | Sampled: 9/16/2016 14:15

Sample ID: 16I0700-04

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
TPH (C9-C36)	2100	510	mg/Kg dry	50		SW-846 8100 Modified	9/19/16	9/20/16 13:12	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual				
o-Terphenyl	*	40-140	S-01				9/20/16 13:12

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 4 | Sampled: 9/16/2016 14:15

Sample ID: 16I0700-04

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	3.0	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:16	AME
Arsenic	6.8	3.0	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:16	AME
Barium	110	3.0	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:16	AME
Beryllium	0.31	0.30	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:16	AME
Cadmium	0.52	0.30	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:16	AME
Chromium	12	0.59	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:16	AME
Lead	14	0.89	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:16	AME
Mercury	ND	0.029	mg/Kg dry	1		SW-846 7471B	9/19/16	9/19/16 15:24	SHN
Nickel	13	0.59	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:16	AME
Selenium	ND	5.9	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:16	AME
Silver	ND	0.59	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:16	AME
Thallium	ND	3.0	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:16	AME
Vanadium	44	1.2	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:16	AME
Zinc	14	1.2	mg/Kg dry	1		SW-846 6010C-D	9/19/16	9/19/16 22:16	AME

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

Project Location: Lowell, MA | Sample Description: | Work Order: 16I0700

Date Received: 9/16/2016

Field Sample #: Comp 4 | Sampled: 9/16/2016 14:15

Sample ID: 16I0700-04

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Ignitability	Present		present/absent	1		SW-846 1030	9/19/16	9/19/16 18:00	DJM
pH @21.2°C	9.0		pH Units	1		SW-846 9045C	9/17/16	9/17/16 9:00	IS
Reactive Cyanide	ND	4.0	mg/Kg	1		SW-846 9014	9/19/16	9/20/16 13:15	AG
Reactive Sulfide	ND	20	mg/Kg	1		SW-846 9030A	9/19/16	9/20/16 13:05	AG
Specific conductance	20	2.0	µmhos/cm	1		SM21-22 2510B Modified	9/20/16	9/20/16 11:45	AG
% Solids	82.4		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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

Sample Extraction Data

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
16I0700-01 [Comp1]	B158556	09/19/16
16I0700-02 [Comp 2]	B158556	09/19/16
16I0700-03 [Comp 3]	B158556	09/19/16
16I0700-04 [Comp 4]	B158556	09/19/16

SM21-22 2510B Modified

Lab Number [Field ID]	Batch	Initial [g]	Date
16I0700-01 [Comp1]	B158670	1.00	09/20/16
16I0700-02 [Comp 2]	B158670	1.00	09/20/16
16I0700-03 [Comp 3]	B158670	1.00	09/20/16
16I0700-04 [Comp 4]	B158670	1.00	09/20/16

SW-846 1030

Lab Number [Field ID]	Batch	Initial [g]	Date
16I0700-01 [Comp1]	B158626	50.0	09/19/16
16I0700-02 [Comp 2]	B158626	50.0	09/19/16
16I0700-03 [Comp 3]	B158626	50.0	09/19/16
16I0700-04 [Comp 4]	B158626	50.0	09/19/16

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

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0700-01 [Comp1]	B158546	1.02	50.0	09/19/16
16I0700-02 [Comp 2]	B158546	1.00	50.0	09/19/16
16I0700-03 [Comp 3]	B158546	1.00	50.0	09/19/16
16I0700-04 [Comp 4]	B158546	1.03	50.0	09/19/16

Prep Method: SW-846 7471-SW-846 7471B

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0700-01 [Comp1]	B158547	0.587	50.0	09/19/16
16I0700-02 [Comp 2]	B158547	0.614	50.0	09/19/16
16I0700-03 [Comp 3]	B158547	0.586	50.0	09/19/16
16I0700-04 [Comp 4]	B158547	0.620	50.0	09/19/16

Prep Method: SW-846 3546-SW-846 8081B

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0700-01 [Comp1]	B158572	10.2	10.0	09/19/16
16I0700-02 [Comp 2]	B158572	10.2	10.0	09/19/16
16I0700-03 [Comp 3]	B158572	10.0	10.0	09/19/16
16I0700-04 [Comp 4]	B158572	10.0	10.0	09/19/16

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Sample Extraction Data

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0700-01 [Comp1]	B158594	10.0	10.0	09/19/16
16I0700-02 [Comp 2]	B158594	10.2	10.0	09/19/16
16I0700-03 [Comp 3]	B158594	10.0	10.0	09/19/16
16I0700-04 [Comp 4]	B158594	10.0	10.0	09/19/16

Prep Method: SW-846 3546-SW-846 8100 Modified

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0700-01 [Comp1]	B158620	30.0	1.00	09/19/16
16I0700-02 [Comp 2]	B158620	30.0	1.00	09/19/16
16I0700-03 [Comp 3]	B158620	30.0	1.00	09/19/16
16I0700-04 [Comp 4]	B158620	30.0	1.00	09/19/16

Prep Method: SW-846 8151-SW-846 8151A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0700-01 [Comp1]	B158589	5.07	5.00	09/19/16
16I0700-02 [Comp 2]	B158589	5.05	5.00	09/19/16
16I0700-03 [Comp 3]	B158589	5.13	5.00	09/19/16
16I0700-04 [Comp 4]	B158589	5.12	5.00	09/19/16

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

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0700-01 [Comp1]	B158576	15.5	2.00	09/19/16
16I0700-02 [Comp 2]	B158576	15.4	2.00	09/19/16
16I0700-03 [Comp 3]	B158576	15.2	2.00	09/19/16
16I0700-04 [Comp 4]	B158576	15.0	2.00	09/19/16

SW-846 9014

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0700-01 [Comp1]	B158590	25.5	250	09/19/16
16I0700-02 [Comp 2]	B158590	25.2	250	09/19/16
16I0700-03 [Comp 3]	B158590	25.3	250	09/19/16
16I0700-04 [Comp 4]	B158590	25.3	250	09/19/16

SW-846 9030A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0700-01 [Comp1]	B158591	25.5	250	09/19/16
16I0700-02 [Comp 2]	B158591	25.2	250	09/19/16
16I0700-03 [Comp 3]	B158591	25.3	250	09/19/16
16I0700-04 [Comp 4]	B158591	25.3	250	09/19/16

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Sample Extraction Data

SW-846 9045C

Lab Number [Field ID]	Batch	Initial [g]	Date
16I0700-01 [Comp1]	B158533	20.0	09/17/16
16I0700-02 [Comp 2]	B158533	20.0	09/17/16
16I0700-03 [Comp 3]	B158533	20.0	09/17/16
16I0700-04 [Comp 4]	B158533	20.0	09/17/16

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158576 - SW-846 3546										
Blank (B158576-BLK1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Acenaphthene	ND	0.17	mg/Kg wet							
Acenaphthylene	ND	0.17	mg/Kg wet							
Acetophenone	ND	0.34	mg/Kg wet							
Aniline	ND	0.34	mg/Kg wet							
Anthracene	ND	0.17	mg/Kg wet							
Benzo(a)anthracene	ND	0.17	mg/Kg wet							
Benzo(a)pyrene	ND	0.17	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.17	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.17	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.17	mg/Kg wet							
Bis(2-chloroethoxy)methane	ND	0.34	mg/Kg wet							
Bis(2-chloroethyl)ether	ND	0.34	mg/Kg wet							
Bis(2-chloroisopropyl)ether	ND	0.34	mg/Kg wet							
Bis(2-Ethylhexyl)phthalate	ND	0.34	mg/Kg wet							
4-Bromophenylphenylether	ND	0.34	mg/Kg wet							
Butylbenzylphthalate	ND	0.34	mg/Kg wet							
4-Chloroaniline	ND	0.66	mg/Kg wet							
2-Chloronaphthalene	ND	0.34	mg/Kg wet							
2-Chlorophenol	ND	0.34	mg/Kg wet							
Chrysene	ND	0.17	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.17	mg/Kg wet							
Dibenzofuran	ND	0.34	mg/Kg wet							
Di-n-butylphthalate	ND	0.34	mg/Kg wet							
1,2-Dichlorobenzene	ND	0.34	mg/Kg wet							
1,3-Dichlorobenzene	ND	0.34	mg/Kg wet							
1,4-Dichlorobenzene	ND	0.34	mg/Kg wet							
3,3-Dichlorobenzidine	ND	0.17	mg/Kg wet							
2,4-Dichlorophenol	ND	0.34	mg/Kg wet							
Diethylphthalate	ND	0.34	mg/Kg wet							
2,4-Dimethylphenol	ND	0.34	mg/Kg wet							
Dimethylphthalate	ND	0.34	mg/Kg wet							
2,4-Dinitrophenol	ND	0.66	mg/Kg wet							
2,4-Dinitrotoluene	ND	0.34	mg/Kg wet							
2,6-Dinitrotoluene	ND	0.34	mg/Kg wet							
Di-n-octylphthalate	ND	0.34	mg/Kg wet							
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.34	mg/Kg wet							
Fluoranthene	ND	0.17	mg/Kg wet							
Fluorene	ND	0.17	mg/Kg wet							
Hexachlorobenzene	ND	0.34	mg/Kg wet							
Hexachlorobutadiene	ND	0.34	mg/Kg wet							
Hexachloroethane	ND	0.34	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.17	mg/Kg wet							
Isophorone	ND	0.34	mg/Kg wet							
2-Methylnaphthalene	ND	0.17	mg/Kg wet							
2-Methylphenol	ND	0.34	mg/Kg wet							
3/4-Methylphenol	ND	0.34	mg/Kg wet							
Naphthalene	ND	0.17	mg/Kg wet							
Nitrobenzene	ND	0.34	mg/Kg wet							
2-Nitrophenol	ND	0.34	mg/Kg wet							
4-Nitrophenol	ND	0.66	mg/Kg wet							
Pentachlorophenol	ND	0.34	mg/Kg wet							
Phenanthrene	ND	0.17	mg/Kg wet							

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158576 - SW-846 3546										
Blank (B158576-BLK1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Phenol	ND	0.34	mg/Kg wet							
Pyrene	ND	0.17	mg/Kg wet							
1,2,4-Trichlorobenzene	ND	0.34	mg/Kg wet							
2,4,5-Trichlorophenol	ND	0.34	mg/Kg wet							
2,4,6-Trichlorophenol	ND	0.34	mg/Kg wet							
Surrogate: 2-Fluorophenol	*5.59*		mg/Kg wet	6.67		83.8	30-130			
Surrogate: Phenol-d6	*5.75*		mg/Kg wet	6.67		86.3	30-130			
Surrogate: Nitrobenzene-d5	*2.78*		mg/Kg wet	3.33		83.3	30-130			
Surrogate: 2-Fluorobiphenyl	*2.83*		mg/Kg wet	3.33		84.8	30-130			
Surrogate: 2,4,6-Tribromophenol	*5.61*		mg/Kg wet	6.67		84.1	30-130			
Surrogate: p-Terphenyl-d14	*3.94*		mg/Kg wet	3.33		118	30-130			
LCS (B158576-BS1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Acenaphthene	1.58	0.17	mg/Kg wet	1.67		94.5	40-140			
Acenaphthylene	1.50	0.17	mg/Kg wet	1.67		90.0	40-140			
Acetophenone	1.42	0.34	mg/Kg wet	1.67		84.9	40-140			
Aniline	1.19	0.34	mg/Kg wet	1.67		71.6	40-140			
Anthracene	1.61	0.17	mg/Kg wet	1.67		96.5	40-140			
Benzo(a)anthracene	1.61	0.17	mg/Kg wet	1.67		96.7	40-140			
Benzo(a)pyrene	1.68	0.17	mg/Kg wet	1.67		101	40-140			
Benzo(b)fluoranthene	1.59	0.17	mg/Kg wet	1.67		95.4	40-140			
Benzo(g,h,i)perylene	1.65	0.17	mg/Kg wet	1.67		99.2	40-140			
Benzo(k)fluoranthene	1.56	0.17	mg/Kg wet	1.67		93.5	40-140			
Bis(2-chloroethoxy)methane	1.60	0.34	mg/Kg wet	1.67		96.2	40-140			
Bis(2-chloroethyl)ether	1.50	0.34	mg/Kg wet	1.67		90.0	40-140			
Bis(2-chloroisopropyl)ether	1.38	0.34	mg/Kg wet	1.67		83.1	40-140			
Bis(2-Ethylhexyl)phthalate	1.82	0.34	mg/Kg wet	1.67		109	40-140			
4-Bromophenylphenylether	1.69	0.34	mg/Kg wet	1.67		102	40-140			
Butylbenzylphthalate	1.78	0.34	mg/Kg wet	1.67		107	40-140			
4-Chloroaniline	1.17	0.66	mg/Kg wet	1.67		70.0	15-140			†
2-Chloronaphthalene	1.44	0.34	mg/Kg wet	1.67		86.3	40-140			
2-Chlorophenol	1.46	0.34	mg/Kg wet	1.67		87.9	30-130			
Chrysene	1.50	0.17	mg/Kg wet	1.67		90.3	40-140			
Dibenz(a,h)anthracene	1.69	0.17	mg/Kg wet	1.67		101	40-140			
Dibenzofuran	1.59	0.34	mg/Kg wet	1.67		95.7	40-140			
Di-n-butylphthalate	1.59	0.34	mg/Kg wet	1.67		95.1	40-140			
1,2-Dichlorobenzene	1.34	0.34	mg/Kg wet	1.67		80.4	40-140			
1,3-Dichlorobenzene	1.28	0.34	mg/Kg wet	1.67		76.7	40-140			
1,4-Dichlorobenzene	1.32	0.34	mg/Kg wet	1.67		79.4	40-140			
3,3-Dichlorobenzidine	1.29	0.17	mg/Kg wet	1.67		77.4	40-140			
2,4-Dichlorophenol	1.50	0.34	mg/Kg wet	1.67		90.1	30-130			
Diethylphthalate	1.61	0.34	mg/Kg wet	1.67		96.4	40-140			
2,4-Dimethylphenol	1.51	0.34	mg/Kg wet	1.67		90.7	30-130			
Dimethylphthalate	1.62	0.34	mg/Kg wet	1.67		96.9	40-140			
2,4-Dinitrophenol	0.759	0.66	mg/Kg wet	1.67		45.5	15-140			†
2,4-Dinitrotoluene	1.58	0.34	mg/Kg wet	1.67		95.0	40-140			
2,6-Dinitrotoluene	1.59	0.34	mg/Kg wet	1.67		95.5	40-140			
Di-n-octylphthalate	1.70	0.34	mg/Kg wet	1.67		102	40-140			
1,2-Diphenylhydrazine (as Azobenzene)	1.66	0.34	mg/Kg wet	1.67		99.3	40-140			
Fluoranthene	1.48	0.17	mg/Kg wet	1.67		88.5	40-140			
Fluorene	1.53	0.17	mg/Kg wet	1.67		91.5	40-140			
Hexachlorobenzene	1.60	0.34	mg/Kg wet	1.67		95.8	40-140			

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158576 - SW-846 3546										
LCS (B158576-BS1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Hexachlorobutadiene	1.44	0.34	mg/Kg wet	1.67		86.3	40-140			
Hexachloroethane	1.34	0.34	mg/Kg wet	1.67		80.3	40-140			
Indeno(1,2,3-cd)pyrene	1.68	0.17	mg/Kg wet	1.67		101	40-140			
Isophorone	1.57	0.34	mg/Kg wet	1.67		94.4	40-140			
2-Methylnaphthalene	1.58	0.17	mg/Kg wet	1.67		94.5	40-140			
2-Methylphenol	1.39	0.34	mg/Kg wet	1.67		83.2	30-130			
3/4-Methylphenol	1.53	0.34	mg/Kg wet	1.67		91.5	30-130			
Naphthalene	1.43	0.17	mg/Kg wet	1.67		86.0	40-140			
Nitrobenzene	1.45	0.34	mg/Kg wet	1.67		87.2	40-140			
2-Nitrophenol	1.47	0.34	mg/Kg wet	1.67		88.0	30-130			
4-Nitrophenol	1.40	0.66	mg/Kg wet	1.67		84.0	15-140			†
Pentachlorophenol	1.14	0.34	mg/Kg wet	1.67		68.3	30-130			
Phenanthrene	1.57	0.17	mg/Kg wet	1.67		94.3	40-140			
Phenol	1.56	0.34	mg/Kg wet	1.67		93.7	15-140			†
Pyrene	1.63	0.17	mg/Kg wet	1.67		97.9	40-140			
1,2,4-Trichlorobenzene	1.44	0.34	mg/Kg wet	1.67		86.2	40-140			
2,4,5-Trichlorophenol	1.55	0.34	mg/Kg wet	1.67		93.1	30-130			
2,4,6-Trichlorophenol	1.59	0.34	mg/Kg wet	1.67		95.6	30-130			
Surrogate: 2-Fluorophenol	*6.25*		mg/Kg wet	6.67		93.8	30-130			
Surrogate: Phenol-d6	*6.50*		mg/Kg wet	6.67		97.4	30-130			
Surrogate: Nitrobenzene-d5	*3.10*		mg/Kg wet	3.33		93.1	30-130			
Surrogate: 2-Fluorobiphenyl	*3.14*		mg/Kg wet	3.33		94.3	30-130			
Surrogate: 2,4,6-Tribromophenol	*6.53*		mg/Kg wet	6.67		97.9	30-130			
Surrogate: p-Terphenyl-d14	*3.95*		mg/Kg wet	3.33		118	30-130			
LCS Dup (B158576-BSD1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Acenaphthene	1.69	0.17	mg/Kg wet	1.67		102	40-140	7.14	30	
Acenaphthylene	1.65	0.17	mg/Kg wet	1.67		99.1	40-140	9.64	30	
Acetophenone	1.45	0.34	mg/Kg wet	1.67		87.1	40-140	2.53	30	
Aniline	1.28	0.34	mg/Kg wet	1.67		76.9	40-140	7.11	30	
Anthracene	1.71	0.17	mg/Kg wet	1.67		103	40-140	6.15	30	
Benzo(a)anthracene	1.67	0.17	mg/Kg wet	1.67		100	40-140	3.52	30	
Benzo(a)pyrene	1.78	0.17	mg/Kg wet	1.67		107	40-140	5.59	30	
Benzo(b)fluoranthene	1.69	0.17	mg/Kg wet	1.67		101	40-140	6.02	30	
Benzo(g,h,i)perylene	1.75	0.17	mg/Kg wet	1.67		105	40-140	5.70	30	
Benzo(k)fluoranthene	1.64	0.17	mg/Kg wet	1.67		98.7	40-140	5.35	30	
Bis(2-chloroethoxy)methane	1.66	0.34	mg/Kg wet	1.67		99.5	40-140	3.35	30	
Bis(2-chloroethyl)ether	1.56	0.34	mg/Kg wet	1.67		93.8	40-140	4.16	30	
Bis(2-chloroisopropyl)ether	1.43	0.34	mg/Kg wet	1.67		85.8	40-140	3.27	30	
Bis(2-Ethylhexyl)phthalate	1.90	0.34	mg/Kg wet	1.67		114	40-140	4.36	30	
4-Bromophenylphenylether	1.72	0.34	mg/Kg wet	1.67		103	40-140	1.39	30	
Butylbenzylphthalate	1.81	0.34	mg/Kg wet	1.67		108	40-140	1.75	30	
4-Chloroaniline	1.27	0.66	mg/Kg wet	1.67		76.2	15-140	8.53	30	†
2-Chloronaphthalene	1.57	0.34	mg/Kg wet	1.67		94.2	40-140	8.66	30	
2-Chlorophenol	1.52	0.34	mg/Kg wet	1.67		91.3	30-130	3.86	30	
Chrysene	1.56	0.17	mg/Kg wet	1.67		93.7	40-140	3.68	30	
Dibenz(a,h)anthracene	1.73	0.17	mg/Kg wet	1.67		104	40-140	2.77	30	
Dibenzofuran	1.74	0.34	mg/Kg wet	1.67		104	40-140	8.49	30	
Di-n-butylphthalate	1.68	0.34	mg/Kg wet	1.67		101	40-140	5.52	30	
1,2-Dichlorobenzene	1.39	0.34	mg/Kg wet	1.67		83.6	40-140	3.85	30	
1,3-Dichlorobenzene	1.34	0.34	mg/Kg wet	1.67		80.1	40-140	4.41	30	
1,4-Dichlorobenzene	1.32	0.34	mg/Kg wet	1.67		79.4	40-140	0.0252	30	

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158576 - SW-846 3546										
LCS Dup (B158576-BSD1)				Prepared: 09/19/16 Analyzed: 09/20/16						
3,3-Dichlorobenzidine	1.37	0.17	mg/Kg wet	1.67		82.3	40-140	6.06	30	
2,4-Dichlorophenol	1.58	0.34	mg/Kg wet	1.67		95.0	30-130	5.29	30	
Diethylphthalate	1.73	0.34	mg/Kg wet	1.67		104	40-140	7.18	30	
2,4-Dimethylphenol	1.59	0.34	mg/Kg wet	1.67		95.7	30-130	5.37	30	
Dimethylphthalate	1.76	0.34	mg/Kg wet	1.67		106	40-140	8.65	30	
2,4-Dinitrophenol	0.650	0.66	mg/Kg wet	1.67		39.0	15-140	15.4	30	†
2,4-Dinitrotoluene	1.72	0.34	mg/Kg wet	1.67		103	40-140	8.39	30	
2,6-Dinitrotoluene	1.78	0.34	mg/Kg wet	1.67		107	40-140	11.0	30	
Di-n-octylphthalate	1.68	0.34	mg/Kg wet	1.67		101	40-140	1.20	30	
1,2-Diphenylhydrazine (as Azobenzene)	1.72	0.34	mg/Kg wet	1.67		103	40-140	3.87	30	
Fluoranthene	1.57	0.17	mg/Kg wet	1.67		94.2	40-140	6.28	30	
Fluorene	1.65	0.17	mg/Kg wet	1.67		99.2	40-140	8.03	30	
Hexachlorobenzene	1.70	0.34	mg/Kg wet	1.67		102	40-140	6.45	30	
Hexachlorobutadiene	1.51	0.34	mg/Kg wet	1.67		90.7	40-140	4.93	30	
Hexachloroethane	1.39	0.34	mg/Kg wet	1.67		83.1	40-140	3.40	30	
Indeno(1,2,3-cd)pyrene	1.81	0.17	mg/Kg wet	1.67		108	40-140	7.01	30	
Isophorone	1.65	0.34	mg/Kg wet	1.67		99.1	40-140	4.84	30	
2-Methylnaphthalene	1.68	0.17	mg/Kg wet	1.67		101	40-140	6.65	30	
2-Methylphenol	1.44	0.34	mg/Kg wet	1.67		86.2	30-130	3.54	30	
3/4-Methylphenol	1.56	0.34	mg/Kg wet	1.67		93.4	30-130	2.08	30	
Naphthalene	1.52	0.17	mg/Kg wet	1.67		91.3	40-140	5.96	30	
Nitrobenzene	1.56	0.34	mg/Kg wet	1.67		93.8	40-140	7.29	30	
2-Nitrophenol	1.55	0.34	mg/Kg wet	1.67		92.8	30-130	5.35	30	
4-Nitrophenol	1.61	0.66	mg/Kg wet	1.67		96.6	15-140	13.9	30	†
Pentachlorophenol	1.19	0.34	mg/Kg wet	1.67		71.4	30-130	4.44	30	
Phenanthrene	1.69	0.17	mg/Kg wet	1.67		102	40-140	7.41	30	
Phenol	1.61	0.34	mg/Kg wet	1.67		96.3	15-140	2.71	30	†
Pyrene	1.66	0.17	mg/Kg wet	1.67		99.4	40-140	1.58	30	
1,2,4-Trichlorobenzene	1.55	0.34	mg/Kg wet	1.67		93.3	40-140	7.82	30	
2,4,5-Trichlorophenol	1.67	0.34	mg/Kg wet	1.67		100	30-130	7.31	30	
2,4,6-Trichlorophenol	1.71	0.34	mg/Kg wet	1.67		103	30-130	7.12	30	
Surrogate: 2-Fluorophenol	*6.41*		mg/Kg wet	6.67		96.2	30-130			
Surrogate: Phenol-d6	*6.61*		mg/Kg wet	6.67		99.2	30-130			
Surrogate: Nitrobenzene-d5	*3.28*		mg/Kg wet	3.33		98.5	30-130			
Surrogate: 2-Fluorobiphenyl	*3.37*		mg/Kg wet	3.33		101	30-130			
Surrogate: 2,4,6-Tribromophenol	*6.91*		mg/Kg wet	6.67		104	30-130			
Surrogate: p-Terphenyl-d14	*3.89*		mg/Kg wet	3.33		117	30-130			

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QUALITY CONTROL

Organochloride Pesticides by GC/ECD - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158572 - SW-846 3546										
Blank (B158572-BLK1)				Prepared: 09/19/16 Analyzed: 09/21/16						
Aldrin	ND	0.0050	mg/Kg wet							
Aldrin [2C]	ND	0.0050	mg/Kg wet							
alpha-BHC	ND	0.0050	mg/Kg wet							
alpha-BHC [2C]	ND	0.0050	mg/Kg wet							
beta-BHC	ND	0.0050	mg/Kg wet							
beta-BHC [2C]	ND	0.0050	mg/Kg wet							
delta-BHC	ND	0.0050	mg/Kg wet							
delta-BHC [2C]	ND	0.0050	mg/Kg wet							
gamma-BHC (Lindane)	ND	0.0020	mg/Kg wet							
gamma-BHC (Lindane) [2C]	ND	0.0020	mg/Kg wet							
Chlordane	ND	0.020	mg/Kg wet							
Chlordane [2C]	ND	0.020	mg/Kg wet							
4,4'-DDD	ND	0.0040	mg/Kg wet							
4,4'-DDD [2C]	ND	0.0040	mg/Kg wet							
4,4'-DDE	ND	0.0040	mg/Kg wet							
4,4'-DDE [2C]	ND	0.0040	mg/Kg wet							
4,4'-DDT	ND	0.0040	mg/Kg wet							
4,4'-DDT [2C]	ND	0.0040	mg/Kg wet							
Dieldrin	ND	0.0040	mg/Kg wet							
Dieldrin [2C]	ND	0.0040	mg/Kg wet							
Endosulfan I	ND	0.0050	mg/Kg wet							
Endosulfan I [2C]	ND	0.0050	mg/Kg wet							
Endosulfan II	ND	0.0080	mg/Kg wet							
Endosulfan II [2C]	ND	0.0080	mg/Kg wet							
Endosulfan Sulfate	ND	0.0080	mg/Kg wet							
Endosulfan Sulfate [2C]	ND	0.0080	mg/Kg wet							
Endrin	ND	0.0080	mg/Kg wet							
Endrin [2C]	ND	0.0080	mg/Kg wet							
Endrin Aldehyde	ND	0.0080	mg/Kg wet							
Endrin Aldehyde [2C]	ND	0.0080	mg/Kg wet							
Endrin Ketone	ND	0.0080	mg/Kg wet							
Endrin Ketone [2C]	ND	0.0080	mg/Kg wet							
Heptachlor	ND	0.0050	mg/Kg wet							
Heptachlor [2C]	ND	0.0050	mg/Kg wet							
Heptachlor Epoxide	ND	0.0050	mg/Kg wet							
Heptachlor Epoxide [2C]	ND	0.0050	mg/Kg wet							
Hexachlorobenzene	ND	0.0060	mg/Kg wet							
Hexachlorobenzene [2C]	ND	0.0060	mg/Kg wet							
Methoxychlor	ND	0.050	mg/Kg wet							
Methoxychlor [2C]	ND	0.050	mg/Kg wet							
Toxaphene	ND	0.10	mg/Kg wet							
Toxaphene [2C]	ND	0.10	mg/Kg wet							
Surrogate: Decachlorobiphenyl	*0.188*		mg/Kg wet	0.200		94.0	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.205*		mg/Kg wet	0.200		102	30-150			
Surrogate: Tetrachloro-m-xylene	*0.181*		mg/Kg wet	0.200		90.4	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.182*		mg/Kg wet	0.200		90.9	30-150			

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QUALITY CONTROL

Organochloride Pesticides by GC/ECD - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158572 - SW-846 3546										
LCS (B158572-BS1)				Prepared: 09/19/16 Analyzed: 09/21/16						
Aldrin	0.094	0.0050	mg/Kg wet	0.100		94.1	40-140			
Aldrin [2C]	0.10	0.0050	mg/Kg wet	0.100		99.5	40-140			
alpha-BHC	0.091	0.0050	mg/Kg wet	0.100		90.8	40-140			
alpha-BHC [2C]	0.095	0.0050	mg/Kg wet	0.100		94.7	40-140			
beta-BHC	0.086	0.0050	mg/Kg wet	0.100		86.4	40-140			
beta-BHC [2C]	0.089	0.0050	mg/Kg wet	0.100		89.3	40-140			
delta-BHC	0.089	0.0050	mg/Kg wet	0.100		88.7	40-140			
delta-BHC [2C]	0.092	0.0050	mg/Kg wet	0.100		91.8	40-140			
gamma-BHC (Lindane)	0.093	0.0020	mg/Kg wet	0.100		93.2	40-140			
gamma-BHC (Lindane) [2C]	0.098	0.0020	mg/Kg wet	0.100		98.3	40-140			
4,4'-DDD	0.092	0.0040	mg/Kg wet	0.100		91.8	40-140			
4,4'-DDD [2C]	0.10	0.0040	mg/Kg wet	0.100		103	40-140			
4,4'-DDE	0.094	0.0040	mg/Kg wet	0.100		93.8	40-140			
4,4'-DDE [2C]	0.11	0.0040	mg/Kg wet	0.100		106	40-140			
4,4'-DDT	0.084	0.0040	mg/Kg wet	0.100		83.9	40-140			
4,4'-DDT [2C]	0.096	0.0040	mg/Kg wet	0.100		95.5	40-140			
Dieldrin	0.089	0.0040	mg/Kg wet	0.100		89.1	40-140			
Dieldrin [2C]	0.10	0.0040	mg/Kg wet	0.100		101	40-140			
Endosulfan I	0.085	0.0050	mg/Kg wet	0.100		84.8	40-140			
Endosulfan I [2C]	0.095	0.0050	mg/Kg wet	0.100		94.6	40-140			
Endosulfan II	0.085	0.0080	mg/Kg wet	0.100		85.0	40-140			
Endosulfan II [2C]	0.096	0.0080	mg/Kg wet	0.100		95.7	40-140			
Endosulfan Sulfate	0.084	0.0080	mg/Kg wet	0.100		83.9	40-140			
Endosulfan Sulfate [2C]	0.097	0.0080	mg/Kg wet	0.100		97.4	40-140			
Endrin	0.087	0.0080	mg/Kg wet	0.100		87.3	40-140			
Endrin [2C]	0.098	0.0080	mg/Kg wet	0.100		97.9	40-140			
Endrin Ketone	0.088	0.0080	mg/Kg wet	0.100		87.9	40-140			
Endrin Ketone [2C]	0.10	0.0080	mg/Kg wet	0.100		102	40-140			
Heptachlor	0.089	0.0050	mg/Kg wet	0.100		88.9	40-140			
Heptachlor [2C]	0.095	0.0050	mg/Kg wet	0.100		95.4	40-140			
Heptachlor Epoxide	0.090	0.0050	mg/Kg wet	0.100		90.5	40-140			
Heptachlor Epoxide [2C]	0.093	0.0050	mg/Kg wet	0.100		93.4	40-140			
Hexachlorobenzene	0.085	0.0060	mg/Kg wet	0.100		85.1	40-140			
Hexachlorobenzene [2C]	0.088	0.0060	mg/Kg wet	0.100		88.4	40-140			
Methoxychlor	0.081	0.050	mg/Kg wet	0.100		81.4	40-140			
Methoxychlor [2C]	0.095	0.050	mg/Kg wet	0.100		94.9	40-140			
Surrogate: Decachlorobiphenyl	*0.202*		mg/Kg wet	0.200		101	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.221*		mg/Kg wet	0.200		111	30-150			
Surrogate: Tetrachloro-m-xylene	*0.193*		mg/Kg wet	0.200		96.7	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.193*		mg/Kg wet	0.200		96.3	30-150			
LCS Dup (B158572-BSD1)				Prepared: 09/19/16 Analyzed: 09/21/16						
Aldrin	0.10	0.0050	mg/Kg wet	0.100		101	40-140	7.41	30	
Aldrin [2C]	0.11	0.0050	mg/Kg wet	0.100		108	40-140	8.34	30	
alpha-BHC	0.097	0.0050	mg/Kg wet	0.100		96.7	40-140	6.23	30	
alpha-BHC [2C]	0.10	0.0050	mg/Kg wet	0.100		102	40-140	7.86	30	
beta-BHC	0.093	0.0050	mg/Kg wet	0.100		93.2	40-140	7.51	30	
beta-BHC [2C]	0.098	0.0050	mg/Kg wet	0.100		97.6	40-140	8.85	30	
delta-BHC	0.096	0.0050	mg/Kg wet	0.100		95.5	40-140	7.40	30	
delta-BHC [2C]	0.10	0.0050	mg/Kg wet	0.100		100	40-140	8.86	30	
gamma-BHC (Lindane)	0.10	0.0020	mg/Kg wet	0.100		99.9	40-140	6.91	30	
gamma-BHC (Lindane) [2C]	0.11	0.0020	mg/Kg wet	0.100		107	40-140	8.02	30	

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QUALITY CONTROL

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158572 - SW-846 3546										
LCS Dup (B158572-BSD1)				Prepared: 09/19/16 Analyzed: 09/21/16						
4,4'-DDD	0.099	0.0040	mg/Kg wet	0.100		99.2	40-140	7.76	30	
4,4'-DDD [2C]	0.11	0.0040	mg/Kg wet	0.100		112	40-140	8.04	30	
4,4'-DDE	0.10	0.0040	mg/Kg wet	0.100		101	40-140	7.04	30	
4,4'-DDE [2C]	0.11	0.0040	mg/Kg wet	0.100		114	40-140	6.93	30	
4,4'-DDT	0.092	0.0040	mg/Kg wet	0.100		92.1	40-140	9.32	30	
4,4'-DDT [2C]	0.11	0.0040	mg/Kg wet	0.100		105	40-140	9.58	30	
Dieldrin	0.097	0.0040	mg/Kg wet	0.100		97.3	40-140	8.76	30	
Dieldrin [2C]	0.11	0.0040	mg/Kg wet	0.100		110	40-140	8.67	30	
Endosulfan I	0.091	0.0050	mg/Kg wet	0.100		91.4	40-140	7.51	30	
Endosulfan I [2C]	0.10	0.0050	mg/Kg wet	0.100		103	40-140	8.35	30	
Endosulfan II	0.093	0.0080	mg/Kg wet	0.100		92.7	40-140	8.65	30	
Endosulfan II [2C]	0.10	0.0080	mg/Kg wet	0.100		104	40-140	8.37	30	
Endosulfan Sulfate	0.092	0.0080	mg/Kg wet	0.100		91.7	40-140	8.95	30	
Endosulfan Sulfate [2C]	0.11	0.0080	mg/Kg wet	0.100		106	40-140	8.25	30	
Endrin	0.095	0.0080	mg/Kg wet	0.100		94.7	40-140	8.07	30	
Endrin [2C]	0.11	0.0080	mg/Kg wet	0.100		107	40-140	8.59	30	
Endrin Ketone	0.096	0.0080	mg/Kg wet	0.100		95.9	40-140	8.76	30	
Endrin Ketone [2C]	0.11	0.0080	mg/Kg wet	0.100		111	40-140	8.15	30	
Heptachlor	0.096	0.0050	mg/Kg wet	0.100		95.8	40-140	7.50	30	
Heptachlor [2C]	0.10	0.0050	mg/Kg wet	0.100		102	40-140	6.31	30	
Heptachlor Epoxide	0.098	0.0050	mg/Kg wet	0.100		97.7	40-140	7.69	30	
Heptachlor Epoxide [2C]	0.10	0.0050	mg/Kg wet	0.100		102	40-140	8.57	30	
Hexachlorobenzene	0.091	0.0060	mg/Kg wet	0.100		91.5	40-140	7.26	30	
Hexachlorobenzene [2C]	0.096	0.0060	mg/Kg wet	0.100		95.9	40-140	8.17	30	
Methoxychlor	0.090	0.050	mg/Kg wet	0.100		89.8	40-140	9.90	30	
Methoxychlor [2C]	0.10	0.050	mg/Kg wet	0.100		104	40-140	9.60	30	
Surrogate: Decachlorobiphenyl	*0.213*		mg/Kg wet	0.200		107	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.236*		mg/Kg wet	0.200		118	30-150			
Surrogate: Tetrachloro-m-xylene	*0.192*		mg/Kg wet	0.200		96.1	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.203*		mg/Kg wet	0.200		102	30-150			

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QUALITY CONTROL

Herbicides by GC/ECD - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158589 - SW-846 8151										
Blank (B158589-BLK1)			Prepared: 09/19/16 Analyzed: 09/20/16							
2,4-D	ND	24	µg/kg wet							
2,4-D [2C]	ND	24	µg/kg wet							
2,4-DB	ND	24	µg/kg wet							
2,4-DB [2C]	ND	24	µg/kg wet							
2,4,5-TP (Silvex)	ND	2.4	µg/kg wet							
2,4,5-TP (Silvex) [2C]	ND	2.4	µg/kg wet							
2,4,5-T	ND	2.4	µg/kg wet							
2,4,5-T [2C]	ND	2.4	µg/kg wet							
Dalapon	ND	59	µg/kg wet							
Dalapon [2C]	ND	59	µg/kg wet							
Dicamba	ND	2.4	µg/kg wet							
Dicamba [2C]	ND	2.4	µg/kg wet							
Dichloroprop	ND	24	µg/kg wet							
Dichloroprop [2C]	ND	24	µg/kg wet							
Dinoseb	ND	12	µg/kg wet							R-05
Dinoseb [2C]	ND	12	µg/kg wet							R-05
MCPA	ND	2400	µg/kg wet							
MCPA [2C]	ND	2400	µg/kg wet							
MCPP	ND	2400	µg/kg wet							
MCPP [2C]	ND	2400	µg/kg wet							
Surrogate: 2,4-Dichlorophenylacetic acid	*104*		µg/kg wet	94.8		110	30-150			
Surrogate: 2,4-Dichlorophenylacetic acid [2C]	*91.5*		µg/kg wet	94.8		96.5	30-150			
LCS (B158589-BS1)			Prepared: 09/19/16 Analyzed: 09/20/16							
2,4-D	118	25	µg/kg wet	125		94.5	40-140			
2,4-D [2C]	113	25	µg/kg wet	125		90.6	40-140			
2,4-DB	124	25	µg/kg wet	125		99.4	40-140			
2,4-DB [2C]	115	25	µg/kg wet	125		92.1	40-140			
2,4,5-TP (Silvex)	11.0	2.5	µg/kg wet	12.5		88.1	40-140			
2,4,5-TP (Silvex) [2C]	11.3	2.5	µg/kg wet	12.5		90.4	40-140			
2,4,5-T	10.9	2.5	µg/kg wet	12.5		87.3	40-140			
2,4,5-T [2C]	10.9	2.5	µg/kg wet	12.5		87.9	40-140			
Dalapon	211	62	µg/kg wet	311		67.8	40-140			V-06
Dalapon [2C]	202	62	µg/kg wet	311		64.8	40-140			V-06
Dicamba	13.4	2.5	µg/kg wet	12.5		107	40-140			
Dicamba [2C]	11.8	2.5	µg/kg wet	12.5		94.9	40-140			
Dichloroprop	130	25	µg/kg wet	125		104	40-140			
Dichloroprop [2C]	124	25	µg/kg wet	125		99.4	40-140			
Dinoseb	3.04	12	µg/kg wet	62.3		4.89	0-42.4			R-05
Dinoseb [2C]	3.24	12	µg/kg wet	62.3		5.20	0-41.1			R-05
MCPA	12100	2500	µg/kg wet	12500		97.6	40-140			
MCPA [2C]	12000	2500	µg/kg wet	12500		96.2	40-140			
MCPP	14800	2500	µg/kg wet	12500		119	40-140			
MCPP [2C]	12100	2500	µg/kg wet	12500		97.4	40-140			
Surrogate: 2,4-Dichlorophenylacetic acid	*115*		µg/kg wet	99.6		115	30-150			
Surrogate: 2,4-Dichlorophenylacetic acid [2C]	*96.2*		µg/kg wet	99.6		96.6	30-150			

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QUALITY CONTROL

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD		RPD Limit	Notes
Batch B158589 - SW-846 8151											
LCS Dup (B158589-BSD1)				Prepared: 09/19/16 Analyzed: 09/20/16							
2,4-D	113	25	µg/kg wet	125		90.3	40-140	4.38		30	
2,4-D [2C]	103	25	µg/kg wet	125		82.8	40-140	8.91		30	
2,4-DB	119	25	µg/kg wet	125		95.8	40-140	3.64		30	
2,4-DB [2C]	108	25	µg/kg wet	125		86.7	40-140	6.01		30	
2,4,5-TP (Silvex)	10.3	2.5	µg/kg wet	12.5		82.4	40-140	6.54		30	
2,4,5-TP (Silvex) [2C]	10.6	2.5	µg/kg wet	12.5		84.7	40-140	6.31		30	
2,4,5-T	10.2	2.5	µg/kg wet	12.5		82.2	40-140	5.99		30	
2,4,5-T [2C]	10.1	2.5	µg/kg wet	12.5		81.3	40-140	7.75		30	
Dalapon	188	62	µg/kg wet	312		60.3	40-140	11.6		30	V-06
Dalapon [2C]	173	62	µg/kg wet	312		55.5	40-140	15.3		30	V-06
Dicamba	12.8	2.5	µg/kg wet	12.5		103	40-140	3.99		30	
Dicamba [2C]	11.7	2.5	µg/kg wet	12.5		93.8	40-140	1.01		30	
Dichloroprop	120	25	µg/kg wet	125		96.1	40-140	8.12		30	
Dichloroprop [2C]	113	25	µg/kg wet	125		90.6	40-140	9.20		30	
Dinoseb	7.36	12	µg/kg wet	62.3		11.8	0-42.4	**82.9**	*	30	R-05
Dinoseb [2C]	8.07	12	µg/kg wet	62.3		13.0	0-41.1	**85.4**	*	30	R-05
MCPA	11600	2500	µg/kg wet	12500		92.8	40-140	4.89		30	
MCPA [2C]	11300	2500	µg/kg wet	12500		90.7	40-140	5.82		30	
MCPP	14100	2500	µg/kg wet	12500		113	40-140	4.79		30	
MCPP [2C]	11600	2500	µg/kg wet	12500		92.7	40-140	4.83		30	
Surrogate: 2,4-Dichlorophenylacetic acid	*104*		µg/kg wet	99.7		104	30-150				
Surrogate: 2,4-Dichlorophenylacetic acid [2C]	*92.5*		µg/kg wet	99.7		92.8	30-150				

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158594 - SW-846 3540C										
Blank (B158594-BLK1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Aroclor-1016	ND	0.020	mg/Kg wet							
Aroclor-1016 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1221	ND	0.020	mg/Kg wet							
Aroclor-1221 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1232	ND	0.020	mg/Kg wet							
Aroclor-1232 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1242	ND	0.020	mg/Kg wet							
Aroclor-1242 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1248	ND	0.020	mg/Kg wet							
Aroclor-1248 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1254	ND	0.020	mg/Kg wet							
Aroclor-1254 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1260	ND	0.020	mg/Kg wet							
Aroclor-1260 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1262	ND	0.020	mg/Kg wet							
Aroclor-1262 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1268	ND	0.020	mg/Kg wet							
Aroclor-1268 [2C]	ND	0.020	mg/Kg wet							
Surrogate: Decachlorobiphenyl	*0.199*		mg/Kg wet	0.200		99.4	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.193*		mg/Kg wet	0.200		96.4	30-150			
Surrogate: Tetrachloro-m-xylene	*0.202*		mg/Kg wet	0.200		101	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.196*		mg/Kg wet	0.200		98.1	30-150			
LCS (B158594-BS1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Aroclor-1016	0.20	0.020	mg/Kg wet	0.200		102	40-140			
Aroclor-1016 [2C]	0.20	0.020	mg/Kg wet	0.200		99.3	40-140			
Aroclor-1260	0.19	0.020	mg/Kg wet	0.200		95.4	40-140			
Aroclor-1260 [2C]	0.19	0.020	mg/Kg wet	0.200		94.3	40-140			
Surrogate: Decachlorobiphenyl	*0.202*		mg/Kg wet	0.200		101	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.194*		mg/Kg wet	0.200		96.8	30-150			
Surrogate: Tetrachloro-m-xylene	*0.205*		mg/Kg wet	0.200		102	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.198*		mg/Kg wet	0.200		99.1	30-150			
LCS Dup (B158594-BSD1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Aroclor-1016	0.21	0.020	mg/Kg wet	0.200		106	40-140	3.80	30	
Aroclor-1016 [2C]	0.20	0.020	mg/Kg wet	0.200		102	40-140	2.82	30	
Aroclor-1260	0.20	0.020	mg/Kg wet	0.200		99.5	40-140	4.13	30	
Aroclor-1260 [2C]	0.19	0.020	mg/Kg wet	0.200		96.7	40-140	2.52	30	
Surrogate: Decachlorobiphenyl	*0.204*		mg/Kg wet	0.200		102	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.195*		mg/Kg wet	0.200		97.5	30-150			
Surrogate: Tetrachloro-m-xylene	*0.212*		mg/Kg wet	0.200		106	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.206*		mg/Kg wet	0.200		103	30-150			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158620 - SW-846 3546										
Blank (B158620-BLK1)				Prepared: 09/19/16 Analyzed: 09/20/16						
TPH (C9-C36)	ND	8.3	mg/Kg wet							
Surrogate: o-Terphenyl	*1.95*		mg/Kg wet	3.33		58.4	40-140			
LCS (B158620-BS1)				Prepared: 09/19/16 Analyzed: 09/20/16						
TPH (C9-C36)	26.4	8.3	mg/Kg wet	33.3		79.1	40-140			
Surrogate: o-Terphenyl	*2.29*		mg/Kg wet	3.33		68.6	40-140			
LCS Dup (B158620-BSD1)				Prepared: 09/19/16 Analyzed: 09/20/16						
TPH (C9-C36)	20.6	8.3	mg/Kg wet	33.3		61.7	40-140	24.8	30	
Surrogate: o-Terphenyl	*1.95*		mg/Kg wet	3.33		58.5	40-140			

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158546 - SW-846 3051										
Blank (B158546-BLK1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Antimony	ND	2.5	mg/Kg wet							
Arsenic	ND	2.5	mg/Kg wet							
Barium	ND	2.5	mg/Kg wet							
Beryllium	ND	0.25	mg/Kg wet							
Cadmium	ND	0.25	mg/Kg wet							
Chromium	ND	0.50	mg/Kg wet							
Lead	ND	0.75	mg/Kg wet							
Nickel	ND	0.50	mg/Kg wet							
Selenium	ND	5.0	mg/Kg wet							
Silver	ND	0.50	mg/Kg wet							
Thallium	ND	2.5	mg/Kg wet							
Vanadium	ND	1.0	mg/Kg wet							
Zinc	ND	1.0	mg/Kg wet							
LCS (B158546-BS1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Antimony	135	5.0	mg/Kg wet	88.2		153	0-210.3			
Arsenic	50.4	5.0	mg/Kg wet	57.0		88.4	77.8-122.1			
Barium	97.3	5.0	mg/Kg wet	110		88.4	82-117.4			
Beryllium	67.2	0.50	mg/Kg wet	67.5		99.5	82.3-117.7			
Cadmium	69.5	0.50	mg/Kg wet	77.8		89.4	81.9-118.2			
Chromium	61.0	1.0	mg/Kg wet	65.0		93.8	78.7-120.6			
Lead	75.3	1.5	mg/Kg wet	85.6		88.0	82.4-117.8			
Nickel	55.3	1.0	mg/Kg wet	61.3		90.2	82.2-117.8			
Selenium	62.3	10	mg/Kg wet	78.9		79.0	77.1-122.3			
Silver	51.1	1.0	mg/Kg wet	54.2		94.3	74.3-125.4			
Thallium	164	5.0	mg/Kg wet	178		92.1	78.2-121.6			
Vanadium	51.6	2.0	mg/Kg wet	56.3		91.7	64.8-135.2			
Zinc	180	2.0	mg/Kg wet	198		90.9	79.7-120.8			
LCS Dup (B158546-BSD1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Antimony	142	5.0	mg/Kg wet	88.2		161	0-210.3	4.60	30	
Arsenic	52.8	5.0	mg/Kg wet	57.0		92.6	77.8-122.1	4.67	30	
Barium	101	5.0	mg/Kg wet	110		92.2	82-117.4	4.21	30	
Beryllium	70.2	0.50	mg/Kg wet	67.5		104	82.3-117.7	4.48	30	
Cadmium	71.9	0.50	mg/Kg wet	77.8		92.5	81.9-118.2	3.43	30	
Chromium	62.9	1.0	mg/Kg wet	65.0		96.7	78.7-120.6	3.06	30	
Lead	80.1	1.5	mg/Kg wet	85.6		93.6	82.4-117.8	6.26	30	
Nickel	56.7	1.0	mg/Kg wet	61.3		92.6	82.2-117.8	2.60	30	
Selenium	67.9	10	mg/Kg wet	78.9		86.1	77.1-122.3	8.62	30	
Silver	52.7	1.0	mg/Kg wet	54.2		97.2	74.3-125.4	3.08	30	
Thallium	167	5.0	mg/Kg wet	178		93.8	78.2-121.6	1.74	30	
Vanadium	53.0	2.0	mg/Kg wet	56.3		94.2	64.8-135.2	2.71	30	
Zinc	186	2.0	mg/Kg wet	198		93.9	79.7-120.8	3.22	30	

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158546 - SW-846 3051										
MRL Check (B158546-MRL1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Lead	0.631	0.75	mg/Kg wet	0.752		83.9	80-120			
Batch B158547 - SW-846 7471										
Blank (B158547-BLK1)				Prepared & Analyzed: 09/19/16						
Mercury	ND	0.025	mg/Kg wet							
LCS (B158547-BS1)				Prepared & Analyzed: 09/19/16						
Mercury	11.0	1.9	mg/Kg wet	12.3		89.7	73.7-126.3			
LCS Dup (B158547-BSD1)				Prepared & Analyzed: 09/19/16						
Mercury	11.8	2.0	mg/Kg wet	12.3		95.7	73.7-126.3	6.53	30	

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QUALITY CONTROL

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158533 - SW-846 9045C										
LCS (B158533-BS1)				Prepared & Analyzed: 09/17/16						
pH	6.03		pH Units	6.00		100	98.4-110			
LCS (B158533-BS2)				Prepared & Analyzed: 09/17/16						
pH	5.98		pH Units	6.00		99.7	98.4-110			
LCS (B158533-BS3)				Prepared & Analyzed: 09/17/16						
pH	6.00		pH Units	6.00		100	98.4-110			
Duplicate (B158533-DUP1)	**Source: 16I0700-01**			Prepared & Analyzed: 09/17/16						
pH	8.6		pH Units		8.6			0.580	5	
Batch B158590 - SW-846 9014										
Blank (B158590-BLK1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Reactive Cyanide	ND	0.40	mg/Kg							
LCS (B158590-BS1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Reactive Cyanide	9.5	0.40	mg/Kg	10.0		95.4	90.5-110			
Batch B158591 - SW-846 9030A										
Blank (B158591-BLK1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Reactive Sulfide	ND	2.0	mg/Kg							
LCS (B158591-BS1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Reactive Sulfide	11	2.0	mg/Kg	14.7		76.3	61.4-128			
Batch B158670 - SM21-22 2510B Modified										
Blank (B158670-BLK1)				Prepared & Analyzed: 09/20/16						
Specific conductance	ND	2.0	µmhos/cm							
LCS (B158670-BS1)				Prepared & Analyzed: 09/20/16						
Specific conductance	240		µmhos/cm	234		103	90.6-110			
Duplicate (B158670-DUP2)	**Source: 16I0700-01**			Prepared & Analyzed: 09/20/16						
Specific conductance	16	2.0	µmhos/cm		16			4.35	14.4	

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BREAKDOWN REPORT

Lab Sample ID:	S012088-PEM1	Analyzed:	09/21/2016

Column Number: 1

Analyte	% Breakdown
4,4'-DDT [1]	6.16
Endrin [1]	3.29

Column Number: 2

Analyte	% Breakdown
4,4'-DDT [2]	5.73
Endrin [2]	3.08

BREAKDOWN REPORT

Lab Sample ID:	S012088-PEM2	Analyzed:	09/21/2016

Column Number: 1

Analyte	% Breakdown
4,4'-DDT [1]	7.64
Endrin [1]	3.30

Column Number: 2

Analyte	% Breakdown
4,4'-DDT [2]	7.45
Endrin [2]	3.17

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8151A

Comp1

Lab Sample ID: 16I0700-01

Date(s) Analyzed: 09/20/2016 09/20/2016

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
2,4-DB	1	16.93	0.00	0.00	240	
	2	16.85	0.00	0.00	230	3.4
Aroclor-1254	1	0.00	-0.03	0.03	0.33	
	2	0.00	-0.03	0.03	0.34	4.5

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8151A

Comp 2

Lab Sample ID: 16I0700-02

Date(s) Analyzed: 09/20/2016 09/20/2016

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
2,4-DB	1	16.93	0.00	0.00	370	
	2	16.85	0.00	0.00	410	9.5
Aroclor-1254	1	0.00	-0.03	0.03	0.24	
	2	0.00	-0.03	0.03	0.26	6.4

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8151A

Comp 3

Lab Sample ID: 16I0700-03

Date(s) Analyzed: 09/20/2016 09/20/2016

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
2,4-DB	1	16.93	0.00	0.00	440	
	2	16.85	0.00	0.00	520	16.7
Aroclor-1254	1	0.00	-0.03	0.03	1.3	
	2	0.00	-0.03	0.03	1.3	3.9

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8151A

Comp 4

Lab Sample ID: 16I0700-04

Date(s) Analyzed: 09/20/2016 09/20/2016

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
2,4-DB	1	16.93	0.00	0.00	130	
	2	16.85	0.00	0.00	150	12.8
Aroclor-1254	1	0.00	-0.03	0.03	0.16	
	2	0.00	-0.03	0.03	0.17	6.1

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8081B

LCS

Lab Sample ID: B158572-BS1 Date(s) Analyzed: 09/21/2016 09/21/2016

Instrument ID (1): ECD6 Instrument ID (2): ECD6

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
4,4'-DDD	1	7.69	0.00	0.00	0.092	
	2	7.76	0.00	0.00	0.10	9
4,4'-DDE	1	7.23	0.00	0.00	0.094	
	2	7.31	0.00	0.00	0.11	16
4,4'-DDT	1	7.91	0.00	0.00	0.084	
	2	8.01	0.00	0.00	0.096	14
Aldrin	1	6.54	0.00	0.00	0.094	
	2	6.52	0.00	0.00	0.10	6
alpha-BHC	1	5.77	0.00	0.00	0.091	
	2	5.74	0.00	0.00	0.095	5
beta-BHC	1	6.04	0.00	0.00	0.086	
	2	6.03	0.00	0.00	0.089	3
delta-BHC	1	6.17	0.00	0.00	0.089	
	2	6.24	0.00	0.00	0.092	4
Dieldrin	1	7.47	0.00	0.00	0.089	
	2	7.44	0.00	0.00	0.10	12
Endosulfan I	1	7.29	0.00	0.00	0.085	
	2	7.23	0.00	0.00	0.095	11
Endosulfan II	1	7.83	0.00	0.00	0.085	
	2	7.85	0.00	0.00	0.096	12
Endosulfan Sulfate	1	8.43	0.00	0.00	0.084	
	2	8.29	0.00	0.00	0.097	15
Endrin	1	7.66	0.00	0.00	0.087	
	2	7.68	0.00	0.00	0.098	12
Endrin Ketone	1	8.61	0.00	0.00	0.088	
	2	8.63	0.00	0.00	0.10	13
gamma-BHC (Lindane)	1	5.99	0.00	0.00	0.093	
	2	5.98	0.00	0.00	0.098	5
Heptachlor	1	6.32	0.00	0.00	0.089	
	2	6.29	0.00	0.00	0.095	7
Heptachlor Epoxide	1	6.99	0.00	0.00	0.090	

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8081B

LCS

Lab Sample ID: B158572-BS1 Date(s) Analyzed: 09/21/2016 09/21/2016

Instrument ID (1): ECD6 Instrument ID (2): ECD6

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
	2	6.94	0.00	0.00	0.093	3
Hexachlorobenzene	1	5.65	0.00	0.00	0.085	
	2	5.65	0.00	0.00	0.088	3
Methoxychlor	1	8.25	0.00	0.00	0.081	
	2	8.48	0.00	0.00	0.095	15

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8081B

LCS Dup

Lab Sample ID: B158572-BSD1 Date(s) Analyzed: 09/21/2016 09/21/2016

Instrument ID (1): ECD6 Instrument ID (2): ECD6

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
4,4'-DDD	1	7.69	0.00	0.00	0.099	
	2	7.76	0.00	0.00	0.11	10
4,4'-DDE	1	7.23	0.00	0.00	0.10	
	2	7.31	0.00	0.00	0.11	9
4,4'-DDT	1	7.91	0.00	0.00	0.092	
	2	8.01	0.00	0.00	0.11	18
Aldrin	1	6.54	0.00	0.00	0.10	
	2	6.52	0.00	0.00	0.11	9
alpha-BHC	1	5.77	0.00	0.00	0.097	
	2	5.74	0.00	0.00	0.10	3
beta-BHC	1	6.04	0.00	0.00	0.093	
	2	6.03	0.00	0.00	0.098	5
delta-BHC	1	6.17	0.00	0.00	0.096	
	2	6.24	0.00	0.00	0.10	5
Dieldrin	1	7.47	0.00	0.00	0.097	
	2	7.44	0.00	0.00	0.11	12
Endosulfan I	1	7.29	0.00	0.00	0.091	
	2	7.23	0.00	0.00	0.10	9
Endosulfan II	1	7.83	0.00	0.00	0.093	
	2	7.85	0.00	0.00	0.10	8
Endosulfan Sulfate	1	8.43	0.00	0.00	0.092	
	2	8.29	0.00	0.00	0.11	18
Endrin	1	7.66	0.00	0.00	0.095	
	2	7.68	0.00	0.00	0.11	15
Endrin Ketone	1	8.61	0.00	0.00	0.096	
	2	8.63	0.00	0.00	0.11	14
gamma-BHC (Lindane)	1	5.99	0.00	0.00	0.10	
	2	5.98	0.00	0.00	0.11	10
Heptachlor	1	6.32	0.00	0.00	0.096	
	2	6.29	0.00	0.00	0.10	4
Heptachlor Epoxide	1	6.99	0.00	0.00	0.098	

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8081B

LCS Dup

Lab Sample ID: B158572-BSD1 Date(s) Analyzed: 09/21/2016 09/21/2016

Instrument ID (1): ECD6 Instrument ID (2): ECD6

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
	2	6.94	0.00	0.00	0.10	2
Hexachlorobenzene	1	5.65	0.00	0.00	0.091	
	2	5.65	0.00	0.00	0.096	5
Methoxychlor	1	8.25	0.00	0.00	0.090	
	2	8.48	0.00	0.00	0.10	11

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8151A

LCS

Lab Sample ID: B158589-BS1 Date(s) Analyzed: 09/20/2016 09/20/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
2,4,5-T	1	16.02	0.00	0.00	10.9	
	2	15.90	0.00	0.00	10.9	0
2,4,5-TP (Silvex)	1	15.40	0.00	0.00	11.0	
	2	15.05	0.00	0.00	11.3	3
2,4-D	1	13.55	0.00	0.00	118	
	2	13.32	0.00	0.00	113	4
2,4-DB	1	16.93	0.00	0.00	124	
	2	16.84	0.00	0.00	115	8
Dalapon	1	4.54	0.00	0.00	211	
	2	4.11	0.00	0.00	202	4
Dicamba	1	11.44	0.00	0.00	13.4	
	2	11.11	0.00	0.00	11.8	13
Dichloroprop	1	13.05	0.00	0.00	130	
	2	12.64	0.00	0.00	124	5
Dinoseb	1	17.61	0.00	0.00	3.04	
	2	17.09	0.00	0.00	3.24	6
MCPA	1	12.26	0.00	0.00	12100	
	2	11.95	0.00	0.00	12000	1
MCPP	1	11.93	0.00	0.00	14800	
	2	11.46	0.00	0.00	12100	20

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8151A

LCS Dup

Lab Sample ID: B158589-BSD1 Date(s) Analyzed: 09/20/2016 09/20/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
2,4,5-T	1	16.03	0.00	0.00	10.2	
	2	15.90	0.00	0.00	10.1	1
2,4,5-TP (Silvex)	1	15.40	0.00	0.00	10.3	
	2	15.05	0.00	0.00	10.6	3
2,4-D	1	13.56	0.00	0.00	113	
	2	13.32	0.00	0.00	103	9
2,4-DB	1	16.93	0.00	0.00	119	
	2	16.84	0.00	0.00	108	10
Dalapon	1	4.54	0.00	0.00	188	
	2	4.11	0.00	0.00	173	8
Dicamba	1	11.44	0.00	0.00	12.8	
	2	11.12	0.00	0.00	11.7	9
Dichloroprop	1	13.05	0.00	0.00	120	
	2	12.64	0.00	0.00	113	6
Dinoseb	1	17.61	0.00	0.00	7.36	
	2	17.09	0.00	0.00	8.07	9
MCPA	1	12.26	0.00	0.00	11600	
	2	11.95	0.00	0.00	11300	3
MCPP	1	11.93	0.00	0.00	14100	
	2	11.46	0.00	0.00	11600	20

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

IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B158594-BS1 Date(s) Analyzed: 09/20/2016 09/20/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.20	
	2	0.00	-0.03	0.03	0.20	2
Aroclor-1260	1	0.00	-0.03	0.03	0.19	
	2	0.00	-0.03	0.03	0.19	1

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

IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B158594-BSD1 Date(s) Analyzed: 09/20/2016 09/20/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.21	
	2	0.00	-0.03	0.03	0.20	6
Aroclor-1260	1	0.00	-0.03	0.03	0.20	
	2	0.00	-0.03	0.03	0.19	5

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit
DL	Method Detection Limit
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
DL-03	Elevated reporting limit due to matrix.
R-05	Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.
RL-08	Elevated reporting limit due to sample matrix interference. MA CAM reporting limit not met.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.
V-06	Continuing calibration did not meet method specifications and was biased on the high side for this compound. Increased uncertainty is associated with the reported value which is likely to be biased on the high side.
V-20	Continuing calibration did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

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

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 1030 in Soil	
Ignitability	NY,NH,CT,NC,ME,VA
SW-846 6010C-D in Soil	
Antimony	CT,NH,NY,ME,VA,NC
Arsenic	CT,NH,NY,ME,VA,NC
Barium	CT,NH,NY,ME,VA,NC
Beryllium	CT,NH,NY,ME,VA,NC
Cadmium	CT,NH,NY,ME,VA,NC
Chromium	CT,NH,NY,ME,VA,NC
Lead	CT,NH,NY,AIHA,ME,VA,NC
Nickel	CT,NH,NY,ME,VA,NC
Selenium	CT,NH,NY,ME,VA,NC
Silver	CT,NH,NY,ME,VA,NC
Thallium	CT,NH,NY,ME,VA,NC
Vanadium	CT,NH,NY,ME,VA,NC
Zinc	CT,NH,NY,ME,VA,NC
SW-846 7471B in Soil	
Mercury	CT,NH,NY,NC,ME,VA
SW-846 8081B in Soil	
Aldrin	CT,NC,NH,NY,ME,VA
Aldrin [2C]	CT,NC,NH,NY,ME,VA
alpha-BHC	CT,NC,NH,NY,ME,VA
alpha-BHC [2C]	CT,NC,NH,NY,ME,VA
beta-BHC	CT,NC,NH,NY,ME,VA
beta-BHC [2C]	CT,NC,NH,NY,ME,VA
delta-BHC	CT,NC,NH,NY,ME,VA
delta-BHC [2C]	CT,NC,NH,NY,ME,VA
gamma-BHC (Lindane)	CT,NC,NH,NY,ME,VA
gamma-BHC (Lindane) [2C]	CT,NC,NH,NY,ME,VA
Chlordane	CT,NC,NH,NY,ME,VA
Chlordane [2C]	CT,NC,NH,NY,ME,VA
4,4'-DDD	CT,NC,NH,NY,ME,VA
4,4'-DDD [2C]	CT,NC,NH,NY,ME,VA
4,4'-DDE	CT,NC,NH,NY,ME,VA
4,4'-DDE [2C]	CT,NC,NH,NY,ME,VA
4,4'-DDT	CT,NC,NH,NY,ME,VA
4,4'-DDT [2C]	CT,NC,NH,NY,ME,VA
Dieldrin	CT,NC,NH,NY,ME,VA
Dieldrin [2C]	CT,NC,NH,NY,ME,VA
Endosulfan I	CT,NC,NH,NY,ME,VA
Endosulfan I [2C]	CT,NC,NH,NY,ME,VA
Endosulfan II	CT,NC,NH,NY,ME,VA
Endosulfan II [2C]	CT,NC,NH,NY,ME,VA
Endosulfan Sulfate	CT,NC,NH,NY,ME,VA
Endosulfan Sulfate [2C]	CT,NC,NH,NY,ME,VA
Endrin	CT,NC,NH,NY,ME,VA
Endrin [2C]	CT,NC,NH,NY,ME,VA

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8081B in Soil	
Endrin Ketone	NC
Endrin Ketone [2C]	NC
Heptachlor	CT,NC,NH,NY,ME,VA
Heptachlor [2C]	CT,NC,NH,NY,ME,VA
Heptachlor Epoxide	CT,NC,NH,NY,ME,VA
Heptachlor Epoxide [2C]	CT,NC,NH,NY,ME,VA
Hexachlorobenzene	NC
Hexachlorobenzene [2C]	NC
Methoxychlor	CT,NC,NH,NY,ME,VA
Methoxychlor [2C]	CT,NC,NH,NY,ME,VA
SW-846 8082A in Soil	
Aroclor-1016	CT,NH,NY,ME,NC,VA
Aroclor-1016 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1221	CT,NH,NY,ME,NC,VA
Aroclor-1221 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1232	CT,NH,NY,ME,NC,VA
Aroclor-1232 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1242	CT,NH,NY,ME,NC,VA
Aroclor-1242 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1248	CT,NH,NY,ME,NC,VA
Aroclor-1248 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1254	CT,NH,NY,ME,NC,VA
Aroclor-1254 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1260	CT,NH,NY,ME,NC,VA
Aroclor-1260 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1262	NY,NC,VA
Aroclor-1262 [2C]	NY,NC,VA
Aroclor-1268	NY,NC,VA
Aroclor-1268 [2C]	NY,NC,VA
SW-846 8151A in Soil	
2,4-D	NY,ME,NC,NH,VA,CT
2,4-D [2C]	NY,ME,NC,NH,VA,CT
2,4-DB	NY,ME,NC,NH,VA,CT
2,4-DB [2C]	NY,ME,NC,NH,VA,CT
2,4,5-TP (Silvex)	NY,ME,NC,NH,VA,CT
2,4,5-TP (Silvex) [2C]	NY,ME,NC,NH,VA,CT
2,4,5-T	NY,ME,NC,NH,VA,CT
2,4,5-T [2C]	NY,ME,NC,NH,VA,CT
Dalapon	NY,ME,NC,NH,VA,CT
Dalapon [2C]	NY,ME,NC,NH,VA,CT
Dicamba	NY,ME,NC,NH,VA,CT
Dicamba [2C]	NY,ME,NC,NH,VA,CT
Dichloroprop	NY,ME,NC,NH,VA,CT
Dichloroprop [2C]	NY,ME,NC,NH,VA,CT
Dinoseb	NY,ME,NC,NH,VA,CT
Dinoseb [2C]	NY,ME,NC,NH,VA,CT

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8151A in Soil	
MCPA	NY,ME,NC,NH,VA,CT
MCPA [2C]	NY,ME,NC,NH,VA,CT
MCPP	NY,ME,NC,NH,VA,CT
MCPP [2C]	NY,ME,NC,NH,VA,CT
SW-846 8270D in Soil	
Acenaphthene	CT,NY,NH
Acenaphthylene	CT,NY,NH
Acetophenone	NY,NH
Aniline	NY,NH
Anthracene	CT,NY,NH
Benzo(a)anthracene	CT,NY,NH
Benzo(a)pyrene	CT,NY,NH
Benzo(b)fluoranthene	CT,NY,NH
Benzo(g,h,i)perylene	CT,NY,NH
Benzo(k)fluoranthene	CT,NY,NH
Bis(2-chloroethoxy)methane	CT,NY,NH
Bis(2-chloroethyl)ether	CT,NY,NH
Bis(2-chloroisopropyl)ether	CT,NY,NH
Bis(2-Ethylhexyl)phthalate	CT,NY,NH
4-Bromophenylphenylether	CT,NY,NH
Butylbenzylphthalate	CT,NY,NH
4-Chloroaniline	CT,NY,NH
2-Chloronaphthalene	CT,NY,NH
2-Chlorophenol	CT,NY,NH
Chrysene	CT,NY,NH
Dibenz(a,h)anthracene	CT,NY,NH
Dibenzofuran	CT,NY,NH
Di-n-butylphthalate	CT,NY,NH
1,2-Dichlorobenzene	NY,NH
1,3-Dichlorobenzene	NY,NH
1,4-Dichlorobenzene	NY,NH
3,3-Dichlorobenzidine	CT,NY,NH
2,4-Dichlorophenol	CT,NY,NH
Diethylphthalate	CT,NY,NH
2,4-Dimethylphenol	CT,NY,NH
Dimethylphthalate	CT,NY,NH
2,4-Dinitrophenol	CT,NY,NH
2,4-Dinitrotoluene	CT,NY,NH
2,6-Dinitrotoluene	CT,NY,NH
Di-n-octylphthalate	CT,NY,NH
1,2-Diphenylhydrazine (as Azobenzene)	NY,NH
Fluoranthene	CT,NY,NH
Fluorene	NY,NH
Hexachlorobenzene	CT,NY,NH
Hexachlorobutadiene	CT,NY,NH
Hexachloroethane	CT,NY,NH

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

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8270D in Soil	
Indeno(1,2,3-cd)pyrene	CT,NY,NH
Isophorone	CT,NY,NH
2-Methylnaphthalene	CT,NY,NH
2-Methylphenol	CT,NY,NH
3/4-Methylphenol	CT,NY,NH
Naphthalene	CT,NY,NH
Nitrobenzene	CT,NY,NH
2-Nitrophenol	CT,NY,NH
4-Nitrophenol	CT,NY,NH
Pentachlorophenol	CT,NY,NH
Phenanthrene	CT,NY,NH
Phenol	CT,NY,NH
Pyrene	CT,NY,NH
1,2,4-Trichlorobenzene	CT,NY,NH
2,4,5-Trichlorophenol	CT,NY,NH
2,4,6-Trichlorophenol	CT,NY,NH

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

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	02/1/2018
MA	Massachusetts DEP	M-MA100	06/30/2017
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2017
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2017
RI	Rhode Island Department of Health	LAO00112	12/30/2016
NC	North Carolina Div. of Water Quality	652	12/31/2016
NJ	New Jersey DEP	MA007 NELAP	06/30/2017
FL	Florida Department of Health	E871027 NELAP	06/30/2017
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2017
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2016
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2017

CHAIN OF CUSTODY RECORD

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

16I0760

Rev 04.05.12

Company Name: GEC
Address: 60 Brooks Drive
Telephone: 781 356 9140
Project #
Client PO#: 1785-6100

Attention: A. Foley / E Furlong / BB Butler
Project Location: Lowell
Sampled By: A. Foley

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

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

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	Ignitability/Formability	Corrosivity/Conductivity	TPH	EPH	SVOCs	MAINE metals/TCLP 20X	Reactive Sulfide/Cyanide	PCBs (Soxhlet)	Pest/Herb	# of Containers	** Preservation	***Container Code
01	Comp 1 9/18/16	9/16/16	200			S		X	X	X		X	X	X	X	X			
02	Comp 2		205					X	X	X		X	X	X	X	X			
03	Comp 3		210					X	X	X		X	X	X	X	X			
04	Comp 4		215					X	X	X		X	X	X	X	X			
	~~Comp 5~~																		
	~~Comp 6~~																		
	~~Comp 7~~																		
	~~Comp 8~~																		

ANALYSIS REQUESTED

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

Comments: Disposal Criteria

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

Relinquished by: (signature)	Date/Time:
Cindy Foley 9/14/16	15:00
Received by: (signature) 9/16/16	Date/Time: 1500
Relinquished by: (signature) 9/16/16	Date/Time: 1900
Received by: (signature) 9/16/16	Date/Time: 1900

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

Detection Limit Requirements
Massachusetts: S-1
Connecticut:
Other:

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

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

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

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

Table of Contents

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

con-test® ANALYTICAL LABORATORY

Sample Receipt Checklist

CLIENT NAME: GEC **RECEIVED BY:** JM **DATE:** 9/16/16

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

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

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

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

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

Temperature °C by Temp blank ____ Temperature °C by Temp gun 3.2

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

6) **Are there any ~~RUSH~~ or SHORT HOLDING TIME samples?** **Yes** ✓ **No** ____
Who was notified Bre Date 9/16/16 Time 1900

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

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

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

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

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

Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber		16 oz amber	
500 mL Amber		8 oz amber/clear jar	12
250 mL Amber (8oz amber)		4 oz amber/clear jar	
1 Liter Plastic		2 oz amber/clear jar	
500 mL Plastic		Plastic Bag / Ziploc	
250 mL plastic		SOC Kit	
40 mL Vial - type listed below		Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

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

Login Sample Receipt Checklist

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

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

Who notified of False statements? **Date/Time:**

Doc #277 Rev. 4 August 2013 **Log-In Technician Initials:** JM **Date/Time:** 9/16/16 1900

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 16I0700
Project Location: Lowell, MA	RTN:

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

16I0700-01 thru 16I0700-04

Matrices: Soil

CAM Protocol (check all that below)

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

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

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

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

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

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

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

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

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

Signature: Position: Project Manager

Printed Name: Lisa A. Worthington Date: 09/22/16

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

September 23, 2016

Drew Foley
Goldman Environmental
60 Brooks Drive
Braintree, MA 02184

Project Location: Lowell
Client Job Number:
Project Number: 1785-6100
Laboratory Work Order Number: 16I0708

Enclosed are results of analyses for samples received by the laboratory on September 16, 2016. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

James M. Georgantas
Project Manager

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

Goldman Environmental
60 Brooks Drive
Braintree, MA 02184
ATTN: Drew Foley

REPORT DATE: 9/23/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 1785-6100

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16I0708

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

PROJECT LOCATION: Lowell

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
B-15 (0-5)	16I0708-01	Soil		SM 2540G	
				SW-846 8082A	
B-15 (5-10)	16I0708-02	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
B-16 (0-5)	16I0708-03	Soil		SM 2540G	
				SW-846 8082A	
B-16 (5-10)	16I0708-04	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
B-16 (10-15)	16I0708-05	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
B-17 (5-7.5)	16I0708-07	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
B-18 (0-5)	16I0708-08	Soil		SM 2540G	
				SW-846 8082A	
B-18 (10-15)	16I0708-10	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
B-19 (0-5)	16I0708-11	Soil		SM 2540G	
				SW-846 8082A	
B-19 (5-10)	16I0708-12	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
B-19 (15-17)	16I0708-13	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
B-20 (0-5)	16I0708-14	Soil		SM 2540G	
				SW-846 8082A	
B-20 (5-8)	16I0708-15	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
B-21 (0-5)	16I0708-16	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	

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ATTN: Drew Foley

REPORT DATE: 9/23/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 1785-6100

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16I0708

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

PROJECT LOCATION: Lowell

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
B-21 (5-10)	16I0708-17	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	
B-21 (10-13.5)	16I0708-18	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	
B-22 (10-15)	16I0708-19	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
B-22 (15-20)	16I0708-20	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
B-23 (5-9)	16I0708-21	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
B-14A (0-5)	16I0708-22	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	
B-14A (5-10)	16I0708-23	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	
B-14A (10-15)	16I0708-24	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	
B-14A (15-16.5)	16I0708-25	Soil		EPA/600/R-93/116	M-MA1042/CT PH-0209/NY11632/AIHA 102754
				MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 8082A	
B-14 (10-15)	16I0708-26	Soil		SW-846 8260C	
B-14A (10-15)	16I0708-27	Soil		SW-846 8260C	

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Goldman Environmental
60 Brooks Drive
Braintree, MA 02184
ATTN: Drew Foley

REPORT DATE: 9/23/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 1785-6100

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16I0708

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

PROJECT LOCATION: Lowell

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
B-26 (10-13)	16I0708-28	Soil		SW-846 8260C	
B-27 (5-10)	16I0708-29	Soil		SW-846 8260C	
B-28 (10-15)	16I0708-30	Soil		SW-846 8260C	

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CASE NARRATIVE SUMMARY

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

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

MADEP-EPH-04-1.1

Qualifications:

RL-08

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

Analyte & Samples(s) Qualified:

2-Methylnaphthalene
16I0708-02[B-15 (5-10)]

Acenaphthene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Acenaphthylene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Anthracene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-25[B-14A (15-16.5)]

Benzo(a)anthracene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Benzo(a)pyrene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Benzo(b)fluoranthene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Benzo(g,h,i)perylene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Benzo(k)fluoranthene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

C9-C18 Aliphatics
16I0708-22[B-14A (0-5)]

Chrysene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Dibenz(a,h)anthracene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Fluoranthene
16I0708-02[B-15 (5-10)], 16I0708-25[B-14A (15-16.5)]

Fluorene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)]

Indeno(1,2,3-cd)pyrene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

Naphthalene
16I0708-02[B-15 (5-10)], 16I0708-22[B-14A (0-5)], 16I0708-25[B-14A (15-16.5)]

Phenanthrene
16I0708-02[B-15 (5-10)]

Pyrene
16I0708-02[B-15 (5-10)], 16I0708-25[B-14A (15-16.5)]

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

Chlorooctadecane (COD)
16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)], 16I0708-25[B-14A (15-16.5)]

o-Terphenyl (OTP)
16I0708-22[B-14A (0-5)], 16I0708-24[B-14A (10-15)]

S-15

Surrogate recovery outside of control limits due to suspected sample matrix interference. Chromatogram(s) is attached.

Analyte & Samples(s) Qualified:

Chlorooctadecane (COD)
16I0708-23[B-14A (5-10)]

SW-846 8082A

Qualifications:

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MS-21

Matrix spike and/or spike duplicate recovery bias high due to contribution of other Aroclors present in the source sample.

Analyte & Samples(s) Qualified:

Aroclor-1016 [2C]
B158646-MS1, B158646-MSD1

Aroclor-1260
B158646-MS1, B158646-MSD1

Aroclor-1260 [2C]
B158646-MS1, B158646-MSD1

O-32

A dilution was performed as part of the standard analytical procedure.

Analyte & Samples(s) Qualified:

16I0708-14[B-20 (0-5)], 16I0708-25[B-14A (15-16.5)]

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

Decachlorobiphenyl
16I0708-01[B-15 (0-5)], 16I0708-08[B-18 (0-5)], 16I0708-11[B-19 (0-5)], 16I0708-16[B-21 (0-5)]

Decachlorobiphenyl [2C]
16I0708-01[B-15 (0-5)], 16I0708-08[B-18 (0-5)], 16I0708-11[B-19 (0-5)], 16I0708-16[B-21 (0-5)]

Tetrachloro-m-xylene
16I0708-01[B-15 (0-5)], 16I0708-08[B-18 (0-5)], 16I0708-11[B-19 (0-5)], 16I0708-16[B-21 (0-5)]

Tetrachloro-m-xylene [2C]
16I0708-01[B-15 (0-5)], 16I0708-08[B-18 (0-5)], 16I0708-11[B-19 (0-5)], 16I0708-16[B-21 (0-5)]

SW-846 8260C

Qualifications:

L-06

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

Analyte & Samples(s) Qualified:

Isopropylbenzene (Cumene)
16I0708-28[B-26 (10-13)], B158583-BS1, B158583-BSD1

L-07

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

Analyte & Samples(s) Qualified:

Vinyl Chloride
B158583-BSD1

RL-05

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

Analyte & Samples(s) Qualified:

16I0708-26[B-14 (10-15)], 16I0708-27[B-14A (10-15)], 16I0708-28[B-26 (10-13)], 16I0708-30[B-28 (10-15)]

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RL-07

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

Analyte & Samples(s) Qualified:

1,2,3-Trichlorobenzene
16I0708-29[B-27 (5-10)]

1,2-Dibromo-3-chloropropane (DB
16I0708-29[B-27 (5-10)]

Bromomethane
16I0708-29[B-27 (5-10)]

Carbon Disulfide
16I0708-29[B-27 (5-10)]

Methylene Chloride
16I0708-29[B-27 (5-10)]

Naphthalene
16I0708-29[B-27 (5-10)]

V-05

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

Analyte & Samples(s) Qualified:

2,2-Dichloropropane
16I0708-26[B-14 (10-15)], 16I0708-27[B-14A (10-15)], 16I0708-28[B-26 (10-13)], 16I0708-29[B-27 (5-10)], 16I0708-30[B-28 (10-15)], B158583-BLK1, B158583-BS1, B158583-BSD1

Chloromethane
16I0708-26[B-14 (10-15)], 16I0708-27[B-14A (10-15)], 16I0708-28[B-26 (10-13)], 16I0708-29[B-27 (5-10)], 16I0708-30[B-28 (10-15)], B158583-BLK1, B158583-BS1, B158583-BSD1

V-16

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

Analyte & Samples(s) Qualified:

1,4-Dioxane
16I0708-26[B-14 (10-15)], 16I0708-27[B-14A (10-15)], 16I0708-28[B-26 (10-13)], 16I0708-29[B-27 (5-10)], 16I0708-30[B-28 (10-15)], B158583-BLK1, B158583-BS1, B158583-BSD1

V-20

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

Analyte & Samples(s) Qualified:

Bromomethane
B158583-BS1, B158583-BSD1

MADEP-EPH-04-1.1

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

SW-846 8260C

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

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Project Manager

con-test® ANALYTICAL LABORATORY
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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-15 (0-5) | Sampled: 9/15/2016 10:15

Sample ID: 16I0708-01

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1221 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1232 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1242 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1248 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1254 [2]	12	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1260 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1262 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL
Aroclor-1268 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 9:49	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	9/22/16 9:49
Decachlorobiphenyl [2]	*	30-150	S-01	9/22/16 9:49
Tetrachloro-m-xylene [1]	*	30-150	S-01	9/22/16 9:49
Tetrachloro-m-xylene [2]	*	30-150	S-01	9/22/16 9:49

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-15 (0-5) | Sampled: 9/15/2016 10:15

Sample ID: 16I0708-01

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.1		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-15 (5-10) | Sampled: 9/15/2016 10:30

Sample ID: 16I0708-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	140	110	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
C19-C36 Aliphatics	4700	540	mg/Kg dry	50		MADEP-EPH-04-1.1	9/20/16	9/23/16 10:37	SCS
Unadjusted C11-C22 Aromatics	3700	540	mg/Kg dry	50		MADEP-EPH-04-1.1	9/20/16	9/23/16 10:37	SCS
C11-C22 Aromatics	3700	540	mg/Kg dry	50		MADEP-EPH-04-1.1	9/20/16	9/23/16 10:37	SCS
Acenaphthene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Acenaphthylene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Anthracene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Benzo(a)anthracene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Benzo(a)pyrene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Benzo(b)fluoranthene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Benzo(g,h,i)perylene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Benzo(k)fluoranthene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Chrysene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Dibenz(a,h)anthracene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Fluoranthene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Fluorene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Indeno(1,2,3-cd)pyrene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
2-Methylnaphthalene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Naphthalene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Phenanthrene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS
Pyrene	ND	1.1	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/22/16 23:29	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	61.4	40-140		9/22/16 23:29
o-Terphenyl (OTP)	60.7	40-140		9/22/16 23:29
2-Bromonaphthalene	67.0	40-140		9/22/16 23:29
2-Fluorobiphenyl	89.6	40-140		9/22/16 23:29

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-15 (5-10) | Sampled: 9/15/2016 10:30

Sample ID: 16I0708-02

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	92.3		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-15 (5-10) | Sampled: 9/15/2016 10:30

Sample ID: 16I0708-02

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-16 (0-5) | Sampled: 9/15/2016 09:15

Sample ID: 16I0708-03

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1254 [1]	0.90	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1260 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 21:34	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	83.4	30-150		9/21/16 21:34
Decachlorobiphenyl [2]	88.4	30-150		9/21/16 21:34
Tetrachloro-m-xylene [1]	89.2	30-150		9/21/16 21:34
Tetrachloro-m-xylene [2]	86.3	30-150		9/21/16 21:34

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-16 (0-5) | Sampled: 9/15/2016 09:15

Sample ID: 16I0708-03

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	92.5		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-16 (5-10) | Sampled: 9/15/2016 09:30

Sample ID: 16I0708-04

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-16 (10-15) | Sampled: 9/15/2016 09:45

Sample ID: 16I0708-05

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	150	20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
C19-C36 Aliphatics	380	100	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 10:57	SCS
Unadjusted C11-C22 Aromatics	850	100	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 10:57	SCS
C11-C22 Aromatics	850	100	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 10:57	SCS
Acenaphthene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Acenaphthylene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Anthracene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Benzo(a)anthracene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Benzo(a)pyrene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Benzo(b)fluoranthene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Benzo(g,h,i)perylene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Benzo(k)fluoranthene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Chrysene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Dibenz(a,h)anthracene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Fluoranthene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Fluorene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Indeno(1,2,3-cd)pyrene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
2-Methylnaphthalene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Naphthalene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Phenanthrene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS
Pyrene	ND	0.20	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:48	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	66.3	40-140		9/22/16 23:48
o-Terphenyl (OTP)	81.1	40-140		9/22/16 23:48
2-Bromonaphthalene	74.5	40-140		9/22/16 23:48
2-Fluorobiphenyl	96.8	40-140		9/22/16 23:48

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-16 (10-15) | Sampled: 9/15/2016 09:45

Sample ID: 16I0708-05

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	95.3		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-17 (5-7.5) | Sampled: 9/15/2016 11:45

Sample ID: 16I0708-07

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	85	21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
C19-C36 Aliphatics	670	110	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:17	SCS
Unadjusted C11-C22 Aromatics	660	21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
C11-C22 Aromatics	650	21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Acenaphthene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Acenaphthylene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Anthracene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Benzo(a)anthracene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Benzo(a)pyrene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Benzo(b)fluoranthene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Benzo(g,h,i)perylene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Benzo(k)fluoranthene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Chrysene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Dibenz(a,h)anthracene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Fluoranthene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Fluorene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Indeno(1,2,3-cd)pyrene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
2-Methylnaphthalene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Naphthalene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Phenanthrene	0.63	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS
Pyrene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:06	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	58.8	40-140		9/23/16 0:06
o-Terphenyl (OTP)	73.8	40-140		9/23/16 0:06
2-Bromonaphthalene	78.7	40-140		9/23/16 0:06
2-Fluorobiphenyl	105	40-140		9/23/16 0:06

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-17 (5-7.5) | Sampled: 9/15/2016 11:45

Sample ID: 16I0708-07

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.4		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-17 (5-7.5) | Sampled: 9/15/2016 11:45

Sample ID: 16I0708-07

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-18 (0-5) | Sampled: 9/15/2016 10:45

Sample ID: 16I0708-08

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1221 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1232 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1242 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1248 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1254 [2]	29	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1260 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1262 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL
Aroclor-1268 [1]	ND	5.5	mg/Kg dry	250		SW-846 8082A	9/20/16	9/22/16 10:02	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	9/22/16 10:02
Decachlorobiphenyl [2]	*	30-150	S-01	9/22/16 10:02
Tetrachloro-m-xylene [1]	*	30-150	S-01	9/22/16 10:02
Tetrachloro-m-xylene [2]	*	30-150	S-01	9/22/16 10:02

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-18 (0-5) | Sampled: 9/15/2016 10:45

Sample ID: 16I0708-08

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.4		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-18 (10-15) | Sampled: 9/15/2016 11:15

Sample ID: 16I0708-10

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	59	52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
C19-C36 Aliphatics	310	52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Unadjusted C11-C22 Aromatics	530	52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
C11-C22 Aromatics	530	52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Acenaphthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Acenaphthylene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Anthracene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Benzo(a)anthracene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Benzo(a)pyrene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Benzo(b)fluoranthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Benzo(g,h,i)perylene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Benzo(k)fluoranthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Chrysene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Dibenz(a,h)anthracene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Fluoranthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Fluorene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Indeno(1,2,3-cd)pyrene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
2-Methylnaphthalene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Naphthalene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Phenanthrene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS
Pyrene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:25	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	58.7	40-140		9/23/16 0:25
o-Terphenyl (OTP)	70.4	40-140		9/23/16 0:25
2-Bromonaphthalene	87.6	40-140		9/23/16 0:25
2-Fluorobiphenyl	101	40-140		9/23/16 0:25

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-18 (10-15) | Sampled: 9/15/2016 11:15

Sample ID: 16I0708-10

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	95.1		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-19 (0-5) | Sampled: 9/15/2016 12:30

Sample ID: 16I0708-11

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1221 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1232 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1242 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1248 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1254 [2]	6.7	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1260 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1262 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL
Aroclor-1268 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/20/16	9/22/16 10:15	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	9/22/16 10:15
Decachlorobiphenyl [2]	*	30-150	S-01	9/22/16 10:15
Tetrachloro-m-xylene [1]	*	30-150	S-01	9/22/16 10:15
Tetrachloro-m-xylene [2]	*	30-150	S-01	9/22/16 10:15

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-19 (0-5) | Sampled: 9/15/2016 12:30

Sample ID: 16I0708-11

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	90.1		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-19 (5-10) | Sampled: 9/15/2016 12:45

Sample ID: 16I0708-12

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-19 (15-17) | Sampled: 9/15/2016 13:30

Sample ID: 16I0708-13

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	200	53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
C19-C36 Aliphatics	730	53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Unadjusted C11-C22 Aromatics	1600	53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
C11-C22 Aromatics	1600	53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Acenaphthene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Acenaphthylene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Anthracene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Benzo(a)anthracene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Benzo(a)pyrene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Benzo(b)fluoranthene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Benzo(g,h,i)perylene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Benzo(k)fluoranthene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Chrysene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Dibenz(a,h)anthracene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Fluoranthene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Fluorene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Indeno(1,2,3-cd)pyrene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
2-Methylnaphthalene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Naphthalene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Phenanthrene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS
Pyrene	ND	0.53	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 0:44	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	47.6	40-140		9/23/16 0:44
o-Terphenyl (OTP)	77.6	40-140		9/23/16 0:44
2-Bromonaphthalene	83.5	40-140		9/23/16 0:44
2-Fluorobiphenyl	102	40-140		9/23/16 0:44

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-19 (15-17) | Sampled: 9/15/2016 13:30

Sample ID: 16I0708-13

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	92.5		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-20 (0-5) | Sampled: 9/16/2016 09:59

Sample ID: 16I0708-14

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1254 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1260 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/21/16 23:58	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	110	30-150		9/21/16 23:58
Decachlorobiphenyl [2]	109	30-150		9/21/16 23:58
Tetrachloro-m-xylene [1]	101	30-150		9/21/16 23:58
Tetrachloro-m-xylene [2]	101	30-150		9/21/16 23:58

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-20 (0-5) | Sampled: 9/16/2016 09:59

Sample ID: 16I0708-14

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	88.1		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-20 (5-8) | Sampled: 9/16/2016 10:05

Sample ID: 16I0708-15

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
C19-C36 Aliphatics	32	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Unadjusted C11-C22 Aromatics	69	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
C11-C22 Aromatics	67	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Benzo(a)anthracene	0.14	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Benzo(a)pyrene	0.12	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Benzo(b)fluoranthene	0.23	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Benzo(g,h,i)perylene	0.13	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Chrysene	0.28	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Fluoranthene	0.30	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Fluorene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Phenanthrene	0.37	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS
Pyrene	0.37	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:03	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	59.9	40-140		9/23/16 1:03
o-Terphenyl (OTP)	71.6	40-140		9/23/16 1:03
2-Bromonaphthalene	94.3	40-140		9/23/16 1:03
2-Fluorobiphenyl	108	40-140		9/23/16 1:03

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-20 (5-8) | Sampled: 9/16/2016 10:05

Sample ID: 16I0708-15

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	86.2		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (0-5) | Sampled: 9/16/2016 10:30

Sample ID: 16I0708-16

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1221 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1232 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1242 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1248 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1254 [2]	11	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1260 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1262 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL
Aroclor-1268 [1]	ND	2.2	mg/Kg dry	100		SW-846 8082A	9/20/16	9/22/16 10:27	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	9/22/16 10:27
Decachlorobiphenyl [2]	*	30-150	S-01	9/22/16 10:27
Tetrachloro-m-xylene [1]	*	30-150	S-01	9/22/16 10:27
Tetrachloro-m-xylene [2]	*	30-150	S-01	9/22/16 10:27

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (0-5) | Sampled: 9/16/2016 10:30

Sample ID: 16I0708-16

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	28	22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
C19-C36 Aliphatics	180	22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Unadjusted C11-C22 Aromatics	490	22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
C11-C22 Aromatics	390	22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Acenaphthene	1.6	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Acenaphthylene	ND	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Anthracene	3.0	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Benzo(a)anthracene	6.7	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Benzo(a)pyrene	6.3	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Benzo(b)fluoranthene	8.4	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Benzo(g,h,i)perylene	3.2	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Benzo(k)fluoranthene	3.2	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Chrysene	7.9	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Dibenz(a,h)anthracene	1.2	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Fluoranthene	18	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Fluorene	1.7	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Indeno(1,2,3-cd)pyrene	3.9	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
2-Methylnaphthalene	0.39	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Naphthalene	0.41	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Phenanthrene	14	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS
Pyrene	17	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:22	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	62.2	40-140		9/23/16 1:22
o-Terphenyl (OTP)	70.8	40-140		9/23/16 1:22
2-Bromonaphthalene	84.1	40-140		9/23/16 1:22
2-Fluorobiphenyl	102	40-140		9/23/16 1:22

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (0-5) | Sampled: 9/16/2016 10:30

Sample ID: 16I0708-16

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.0		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (0-5) | Sampled: 9/16/2016 10:30

Sample ID: 16I0708-16

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	2		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	98		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (5-10) | Sampled: 9/16/2016 10:40

Sample ID: 16I0708-17

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1254 [1]	0.63	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1260 [2]	0.12	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:34	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	88.7	30-150		9/22/16 0:34
Decachlorobiphenyl [2]	81.8	30-150		9/22/16 0:34
Tetrachloro-m-xylene [1]	84.5	30-150		9/22/16 0:34
Tetrachloro-m-xylene [2]	76.5	30-150		9/22/16 0:34

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (5-10) | Sampled: 9/16/2016 10:40

Sample ID: 16I0708-17

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	860	260	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:38	SCS
C19-C36 Aliphatics	1200	260	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:38	SCS
Unadjusted C11-C22 Aromatics	2400	260	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:38	SCS
C11-C22 Aromatics	2400	260	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:38	SCS
Acenaphthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Acenaphthylene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Anthracene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Benzo(a)anthracene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Benzo(a)pyrene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Benzo(b)fluoranthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Benzo(g,h,i)perylene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Benzo(k)fluoranthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Chrysene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Dibenz(a,h)anthracene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Fluoranthene	1.8	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Fluorene	1.5	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Indeno(1,2,3-cd)pyrene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
2-Methylnaphthalene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Naphthalene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Phenanthrene	3.3	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS
Pyrene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:40	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	48.5	40-140		9/23/16 1:40
o-Terphenyl (OTP)	82.4	40-140		9/23/16 1:40
2-Bromonaphthalene	84.7	40-140		9/23/16 1:40
2-Fluorobiphenyl	108	40-140		9/23/16 1:40

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (5-10) | Sampled: 9/16/2016 10:40

Sample ID: 16I0708-17

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	94.0		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (5-10) | Sampled: 9/16/2016 10:40

Sample ID: 16I0708-17

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (10-13.5) | Sampled: 9/16/2016 10:56

Sample ID: 16I0708-18

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1254 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1260 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 0:52	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
Decachlorobiphenyl [1]	93.0	30-150		9/22/16	0:52
Decachlorobiphenyl [2]	86.0	30-150		9/22/16	0:52
Tetrachloro-m-xylene [1]	95.6	30-150		9/22/16	0:52
Tetrachloro-m-xylene [2]	91.1	30-150		9/22/16	0:52

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (10-13.5) | Sampled: 9/16/2016 10:56

Sample ID: 16I0708-18

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	110	55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
C19-C36 Aliphatics	500	55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Unadjusted C11-C22 Aromatics	1000	55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
C11-C22 Aromatics	1000	55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Acenaphthene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Acenaphthylene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Anthracene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Benzo(a)anthracene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Benzo(a)pyrene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Benzo(b)fluoranthene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Benzo(g,h,i)perylene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Benzo(k)fluoranthene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Chrysene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Dibenz(a,h)anthracene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Fluoranthene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Fluorene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Indeno(1,2,3-cd)pyrene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
2-Methylnaphthalene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Naphthalene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Phenanthrene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS
Pyrene	ND	0.55	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 1:59	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	48.7	40-140		9/23/16 1:59
o-Terphenyl (OTP)	63.1	40-140		9/23/16 1:59
2-Bromonaphthalene	95.7	40-140		9/23/16 1:59
2-Fluorobiphenyl	110	40-140		9/23/16 1:59

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (10-13.5) | Sampled: 9/16/2016 10:56

Sample ID: 16I0708-18

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	89.3		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-21 (10-13.5) | Sampled: 9/16/2016 10:56

Sample ID: 16I0708-18

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-22 (10-15) | Sampled: 9/16/2016 00:00

Sample ID: 16I0708-19

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	63	24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
C19-C36 Aliphatics	330	24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Unadjusted C11-C22 Aromatics	560	24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
C11-C22 Aromatics	560	24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Acenaphthene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Acenaphthylene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Anthracene	0.28	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Benzo(a)anthracene	0.53	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Benzo(a)pyrene	0.64	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Benzo(b)fluoranthene	0.85	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Benzo(g,h,i)perylene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Benzo(k)fluoranthene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Chrysene	0.74	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Dibenz(a,h)anthracene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Fluoranthene	1.8	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Fluorene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Indeno(1,2,3-cd)pyrene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
2-Methylnaphthalene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Naphthalene	ND	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Phenanthrene	0.41	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS
Pyrene	1.7	0.24	mg/Kg dry	2		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:18	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	58.1	40-140		9/23/16 2:18
o-Terphenyl (OTP)	65.9	40-140		9/23/16 2:18
2-Bromonaphthalene	92.6	40-140		9/23/16 2:18
2-Fluorobiphenyl	117	40-140		9/23/16 2:18

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-22 (10-15) | Sampled: 9/16/2016 00:00

Sample ID: 16I0708-19

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	81.6		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-22 (15-20) | Sampled: 9/16/2016 00:00

Sample ID: 16I0708-20

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
C19-C36 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Unadjusted C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Benzo(g,h,i)perylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Chrysene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Fluorene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Phenanthrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS
Pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/22/16 23:10	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	54.1	40-140		9/22/16 23:10
o-Terphenyl (OTP)	62.2	40-140		9/22/16 23:10
2-Bromonaphthalene	95.5	40-140		9/22/16 23:10
2-Fluorobiphenyl	102	40-140		9/22/16 23:10

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-22 (15-20) | Sampled: 9/16/2016 00:00

Sample ID: 16I0708-20

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.6		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-23 (5-9) | Sampled: 9/16/2016 00:00

Sample ID: 16I0708-21

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
C19-C36 Aliphatics	18	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Unadjusted C11-C22 Aromatics	64	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
C11-C22 Aromatics	48	11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Acenaphthene	0.32	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Anthracene	0.32	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Benzo(a)anthracene	1.2	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Benzo(a)pyrene	1.3	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Benzo(b)fluoranthene	1.6	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Benzo(g,h,i)perylene	0.82	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Benzo(k)fluoranthene	0.57	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Chrysene	1.3	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Dibenz(a,h)anthracene	0.19	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Fluoranthene	2.8	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Fluorene	0.15	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Indeno(1,2,3-cd)pyrene	0.79	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Naphthalene	0.18	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Phenanthrene	1.9	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS
Pyrene	2.7	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:37	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	60.0	40-140		9/23/16 2:37
o-Terphenyl (OTP)	67.0	40-140		9/23/16 2:37
2-Bromonaphthalene	86.3	40-140		9/23/16 2:37
2-Fluorobiphenyl	100	40-140		9/23/16 2:37

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-23 (5-9) | Sampled: 9/16/2016 00:00

Sample ID: 16I0708-21

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	89.3		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (0-5) | Sampled: 9/16/2016 08:55

Sample ID: 16I0708-22

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1221 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1232 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1242 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1248 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1254 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1260 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1262 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL
Aroclor-1268 [1]	ND	0.15	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:10	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
Decachlorobiphenyl [1]	91.1	30-150		9/22/16	1:10
Decachlorobiphenyl [2]	83.4	30-150		9/22/16	1:10
Tetrachloro-m-xylene [1]	80.8	30-150		9/22/16	1:10
Tetrachloro-m-xylene [2]	73.0	30-150		9/22/16	1:10

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (0-5) | Sampled: 9/16/2016 08:55

Sample ID: 16I0708-22

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	2400	290	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
C19-C36 Aliphatics	3400	290	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Unadjusted C11-C22 Aromatics	7300	290	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
C11-C22 Aromatics	7200	290	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Acenaphthene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Acenaphthylene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Anthracene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Benzo(a)anthracene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Benzo(a)pyrene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Benzo(b)fluoranthene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Benzo(g,h,i)perylene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Benzo(k)fluoranthene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Chrysene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Dibenz(a,h)anthracene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Fluoranthene	12	2.9	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Fluorene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Indeno(1,2,3-cd)pyrene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
2-Methylnaphthalene	12	2.9	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Naphthalene	ND	2.9	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Phenanthrene	12	2.9	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS
Pyrene	7.1	2.9	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 2:56	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	*	40-140	S-01	9/23/16 2:56
o-Terphenyl (OTP)	*	40-140	S-01	9/23/16 2:56
2-Bromonaphthalene	99.9	40-140		9/23/16 2:56
2-Fluorobiphenyl	112	40-140		9/23/16 2:56

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (0-5) | Sampled: 9/16/2016 08:55

Sample ID: 16I0708-22

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	68.0		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (0-5) | Sampled: 9/16/2016 08:55

Sample ID: 16I0708-22

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (5-10) | Sampled: 9/16/2016 09:00

Sample ID: 16I0708-23

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1254 [1]	0.14	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1260 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:27	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
Decachlorobiphenyl [1]	68.6	30-150		9/22/16	1:27
Decachlorobiphenyl [2]	69.1	30-150		9/22/16	1:27
Tetrachloro-m-xylene [1]	69.0	30-150		9/22/16	1:27
Tetrachloro-m-xylene [2]	62.7	30-150		9/22/16	1:27

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (5-10) | Sampled: 9/16/2016 09:00

Sample ID: 16I0708-23

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	1300	280	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:58	SCS
C19-C36 Aliphatics	2100	280	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:58	SCS
Unadjusted C11-C22 Aromatics	2600	280	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:58	SCS
C11-C22 Aromatics	2500	280	mg/Kg dry	25		MADEP-EPH-04-1.1	9/20/16	9/23/16 11:58	SCS
Acenaphthene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Acenaphthylene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Anthracene	1.4	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Benzo(a)anthracene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Benzo(a)pyrene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Benzo(b)fluoranthene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Benzo(g,h,i)perylene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Benzo(k)fluoranthene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Chrysene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Dibenz(a,h)anthracene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Fluoranthene	4.6	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Fluorene	3.1	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Indeno(1,2,3-cd)pyrene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
2-Methylnaphthalene	5.7	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Naphthalene	3.1	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Phenanthrene	4.0	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS
Pyrene	1.7	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:15	SCS

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	**18.5**	*	40-140	S-15	9/23/16 3:15
o-Terphenyl (OTP)	49.7		40-140		9/23/16 3:15
2-Bromonaphthalene	82.3		40-140		9/23/16 3:15
2-Fluorobiphenyl	110		40-140		9/23/16 3:15

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (5-10) | Sampled: 9/16/2016 09:00

Sample ID: 16I0708-23

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	88.8		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (5-10) | Sampled: 9/16/2016 09:00

Sample ID: 16I0708-23

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (10-15) | Sampled: 9/16/2016 09:05

Sample ID: 16I0708-24

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1221 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1232 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1242 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1248 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1254 [1]	0.14	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1260 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1262 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL
Aroclor-1268 [1]	ND	0.12	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 1:45	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
Decachlorobiphenyl [1]	80.8	30-150		9/22/16	1:45
Decachlorobiphenyl [2]	83.0	30-150		9/22/16	1:45
Tetrachloro-m-xylene [1]	75.1	30-150		9/22/16	1:45
Tetrachloro-m-xylene [2]	67.4	30-150		9/22/16	1:45

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (10-15) | Sampled: 9/16/2016 09:05

Sample ID: 16I0708-24

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	8300	1200	mg/Kg dry	50		MADEP-EPH-04-1.1	9/20/16	9/23/16 12:18	SCS
C19-C36 Aliphatics	11000	1200	mg/Kg dry	50		MADEP-EPH-04-1.1	9/20/16	9/23/16 12:18	SCS
Unadjusted C11-C22 Aromatics	15000	1200	mg/Kg dry	50		MADEP-EPH-04-1.1	9/20/16	9/23/16 12:18	SCS
C11-C22 Aromatics	15000	1200	mg/Kg dry	50		MADEP-EPH-04-1.1	9/20/16	9/23/16 12:18	SCS
Acenaphthene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Acenaphthylene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Anthracene	11	2.4	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Benzo(a)anthracene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Benzo(a)pyrene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Benzo(b)fluoranthene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Benzo(g,h,i)perylene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Benzo(k)fluoranthene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Chrysene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Dibenz(a,h)anthracene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Fluoranthene	22	2.4	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Fluorene	29	2.4	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Indeno(1,2,3-cd)pyrene	ND	2.4	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
2-Methylnaphthalene	65	2.4	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Naphthalene	27	2.4	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Phenanthrene	35	2.4	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS
Pyrene	12	2.4	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:34	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	*	40-140	S-01	9/23/16 3:34
o-Terphenyl (OTP)	*	40-140	S-01	9/23/16 3:34
2-Bromonaphthalene	85.4	40-140		9/23/16 3:34
2-Fluorobiphenyl	114	40-140		9/23/16 3:34

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (10-15) | Sampled: 9/16/2016 09:05

Sample ID: 16I0708-24

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	81.7		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (10-15) | Sampled: 9/16/2016 09:05

Sample ID: 16I0708-24

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (15-16.5) | Sampled: 9/16/2016 09:20

Sample ID: 16I0708-25

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1221 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1232 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1242 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1248 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1254 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1260 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1262 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL
Aroclor-1268 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	9/20/16	9/22/16 2:03	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	91.7	30-150		9/22/16 2:03
Decachlorobiphenyl [2]	83.4	30-150		9/22/16 2:03
Tetrachloro-m-xylene [1]	90.5	30-150		9/22/16 2:03
Tetrachloro-m-xylene [2]	82.5	30-150		9/22/16 2:03

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (15-16.5) | Sampled: 9/16/2016 09:20

Sample ID: 16I0708-25

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	220	130	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
C19-C36 Aliphatics	420	130	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Unadjusted C11-C22 Aromatics	1600	130	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
C11-C22 Aromatics	1600	130	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Acenaphthene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Acenaphthylene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Anthracene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Benzo(a)anthracene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Benzo(a)pyrene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Benzo(b)fluoranthene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Benzo(g,h,i)perylene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Benzo(k)fluoranthene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Chrysene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Dibenz(a,h)anthracene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Fluoranthene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Fluorene	4.9	1.3	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Indeno(1,2,3-cd)pyrene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
2-Methylnaphthalene	1.9	1.3	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Naphthalene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Phenanthrene	4.6	1.3	mg/Kg dry	10		MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS
Pyrene	ND	1.3	mg/Kg dry	10	RL-08	MADEP-EPH-04-1.1	9/20/16	9/23/16 3:52	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	*	40-140	S-01	9/23/16 3:52
o-Terphenyl (OTP)	44.2	40-140		9/23/16 3:52
2-Bromonaphthalene	69.5	40-140		9/23/16 3:52
2-Fluorobiphenyl	96.5	40-140		9/23/16 3:52

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (15-16.5) | Sampled: 9/16/2016 09:20

Sample ID: 16I0708-25

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	75.4		% Wt	1		SM 2540G	9/19/16	9/20/16 7:30	MRL

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (15-16.5) | Sampled: 9/16/2016 09:20

Sample ID: 16I0708-25

Sample Matrix: Soil

Inorganic Analyses - Asbestos

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Asbestos - Chrysotile	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Amosite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Crocidolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Actinolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Tremolite	ND		%	1		EPA/600/R-93/116			PRO
Asbestos - Anthophyllite	ND		%	1		EPA/600/R-93/116			PRO
Fiberglass	ND		%	1		EPA/600/R-93/116			PRO
Mineral Wool	ND		%	1		EPA/600/R-93/116			PRO
Cellulose	ND		%	1		EPA/600/R-93/116			PRO
Hair	ND		%	1		EPA/600/R-93/116			PRO
Synthetic	ND		%	1		EPA/600/R-93/116			PRO
Other Non-asbestos	ND		%	1		EPA/600/R-93/116			PRO
Non-Fibrous Minerals	100		%	1		EPA/600/R-93/116			PRO
Binder/Filler	ND		%	1		EPA/600/R-93/116			PRO
Organic Material	ND		%	1		EPA/600/R-93/116			PRO
Gypsum	ND		%	1		EPA/600/R-93/116			PRO

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14 (10-15) | Sampled: 9/15/2016 09:30

Sample ID: 16I0708-26

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Benzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Bromobenzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Bromochloromethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Bromodichloromethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Bromoform	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Bromomethane	ND	2.3	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
2-Butanone (MEK)	ND	9.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
n-Butylbenzene	0.93	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
sec-Butylbenzene	0.48	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
tert-Butylbenzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Carbon Disulfide	ND	4.5	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Carbon Tetrachloride	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Chlorobenzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Chlorodibromomethane	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Chloroethane	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Chloroform	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Chloromethane	ND	0.91	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 3:53	EEH
2-Chlorotoluene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
4-Chlorotoluene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.3	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2-Dibromoethane (EDB)	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Dibromomethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2-Dichlorobenzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,3-Dichlorobenzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,4-Dichlorobenzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Dichlorodifluoromethane (Freon 12)	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,1-Dichloroethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2-Dichloroethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,1-Dichloroethylene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
cis-1,2-Dichloroethylene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
trans-1,2-Dichloroethylene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2-Dichloropropane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,3-Dichloropropane	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
2,2-Dichloropropane	ND	0.45	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,1-Dichloropropene	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
cis-1,3-Dichloropropene	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
trans-1,3-Dichloropropene	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Diethyl Ether	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Diisopropyl Ether (DIPE)	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,4-Dioxane	ND	23	mg/Kg wet	10	V-16	SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Ethylbenzene	0.46	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14 (10-15) | Sampled: 9/15/2016 09:30

Sample ID: 16I0708-26

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
2-Hexanone (MBK)	ND	4.5	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Isopropylbenzene (Cumene)	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
p-Isopropyltoluene (p-Cymene)	0.90	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Methylene Chloride	ND	2.3	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
4-Methyl-2-pentanone (MIBK)	ND	4.5	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Naphthalene	13	2.3	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
n-Propylbenzene	0.68	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Styrene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,1,1,2-Tetrachloroethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,1,2,2-Tetrachloroethane	ND	0.23	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Tetrachloroethylene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Tetrahydrofuran	ND	1.8	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Toluene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2,3-Trichlorobenzene	ND	2.3	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2,4-Trichlorobenzene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,1,1-Trichloroethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,1,2-Trichloroethane	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Trichloroethylene	ND	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Trichlorofluoromethane (Freon 11)	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2,3-Trichloropropane	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,2,4-Trimethylbenzene	8.3	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
1,3,5-Trimethylbenzene	2.9	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
Vinyl Chloride	ND	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
m+p Xylene	1.7	0.91	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH
o-Xylene	1.4	0.45	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 3:53	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	94.5	70-130		9/22/16 3:53
Toluene-d8	101	70-130		9/22/16 3:53
4-Bromofluorobenzene	103	70-130		9/22/16 3:53

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (10-15) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-27

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Benzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Bromobenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Bromochloromethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Bromodichloromethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Bromoform	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Bromomethane	ND	3.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
2-Butanone (MEK)	ND	12	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
n-Butylbenzene	1.1	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
sec-Butylbenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
tert-Butylbenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Carbon Disulfide	ND	6.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Carbon Tetrachloride	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Chlorobenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Chlorodibromomethane	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Chloroethane	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Chloroform	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Chloromethane	ND	1.2	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 4:20	EEH
2-Chlorotoluene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
4-Chlorotoluene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	3.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2-Dibromoethane (EDB)	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Dibromomethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2-Dichlorobenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,3-Dichlorobenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,4-Dichlorobenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Dichlorodifluoromethane (Freon 12)	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,1-Dichloroethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2-Dichloroethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,1-Dichloroethylene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
cis-1,2-Dichloroethylene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
trans-1,2-Dichloroethylene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2-Dichloropropane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,3-Dichloropropane	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
2,2-Dichloropropane	ND	0.61	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,1-Dichloropropene	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
cis-1,3-Dichloropropene	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
trans-1,3-Dichloropropene	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Diethyl Ether	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Diisopropyl Ether (DIPE)	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,4-Dioxane	ND	31	mg/Kg wet	10	V-16	SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Ethylbenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-14A (10-15) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-27

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
2-Hexanone (MBK)	ND	6.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Isopropylbenzene (Cumene)	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
p-Isopropyltoluene (p-Cymene)	1.2	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Methylene Chloride	ND	3.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
4-Methyl-2-pentanone (MIBK)	ND	6.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Naphthalene	19	3.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
n-Propylbenzene	0.86	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Styrene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,1,1,2-Tetrachloroethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,1,2,2-Tetrachloroethane	ND	0.31	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Tetrachloroethylene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Tetrahydrofuran	ND	2.5	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Toluene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2,3-Trichlorobenzene	ND	3.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2,4-Trichlorobenzene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,1,1-Trichloroethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,1,2-Trichloroethane	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Trichloroethylene	ND	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Trichlorofluoromethane (Freon 11)	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2,3-Trichloropropane	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,2,4-Trimethylbenzene	11	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
1,3,5-Trimethylbenzene	3.8	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
Vinyl Chloride	ND	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
m+p Xylene	2.4	1.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH
o-Xylene	1.9	0.61	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 4:20	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	91.9	70-130		9/22/16 4:20
Toluene-d8	99.8	70-130		9/22/16 4:20
4-Bromofluorobenzene	101	70-130		9/22/16 4:20

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-26 (10-13) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-28

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Benzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Bromobenzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Bromochloromethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Bromodichloromethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Bromoform	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Bromomethane	ND	2.8	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
2-Butanone (MEK)	ND	11	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
n-Butylbenzene	2.4	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
sec-Butylbenzene	1.1	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
tert-Butylbenzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Carbon Disulfide	ND	5.5	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Carbon Tetrachloride	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Chlorobenzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Chlorodibromomethane	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Chloroethane	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Chloroform	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Chloromethane	ND	1.1	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 5:13	EEH
2-Chlorotoluene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
4-Chlorotoluene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.8	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2-Dibromoethane (EDB)	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Dibromomethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2-Dichlorobenzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,3-Dichlorobenzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,4-Dichlorobenzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Dichlorodifluoromethane (Freon 12)	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,1-Dichloroethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2-Dichloroethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,1-Dichloroethylene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
cis-1,2-Dichloroethylene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
trans-1,2-Dichloroethylene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2-Dichloropropane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,3-Dichloropropane	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
2,2-Dichloropropane	ND	0.55	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,1-Dichloropropene	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
cis-1,3-Dichloropropene	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
trans-1,3-Dichloropropene	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Diethyl Ether	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Diisopropyl Ether (DIPE)	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,4-Dioxane	ND	28	mg/Kg wet	10	V-16	SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Ethylbenzene	0.62	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-26 (10-13) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-28

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
2-Hexanone (MBK)	ND	5.5	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Isopropylbenzene (Cumene)	0.79	0.55	mg/Kg wet	10	L-06	SW-846 8260C	9/19/16	9/22/16 5:13	EEH
p-Isopropyltoluene (p-Cymene)	2.5	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Methylene Chloride	ND	2.8	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
4-Methyl-2-pentanone (MIBK)	ND	5.5	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Naphthalene	20	2.8	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
n-Propylbenzene	1.2	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Styrene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,1,1,2-Tetrachloroethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,1,2,2-Tetrachloroethane	ND	0.28	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Tetrachloroethylene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Tetrahydrofuran	ND	2.2	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Toluene	0.78	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2,3-Trichlorobenzene	ND	2.8	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2,4-Trichlorobenzene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,1,1-Trichloroethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,1,2-Trichloroethane	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Trichloroethylene	ND	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Trichlorofluoromethane (Freon 11)	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2,3-Trichloropropane	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,2,4-Trimethylbenzene	12	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
1,3,5-Trimethylbenzene	5.4	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
Vinyl Chloride	ND	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
m+p Xylene	2.4	1.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH
o-Xylene	4.4	0.55	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:13	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	98.2	70-130		9/22/16 5:13
Toluene-d8	103	70-130		9/22/16 5:13
4-Bromofluorobenzene	105	70-130		9/22/16 5:13

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-27 (5-10) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-29

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	4.6	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Benzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Bromobenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Bromochloromethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Bromodichloromethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Bromoform	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Bromomethane	ND	0.46	mg/Kg wet	1	RL-07	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
2-Butanone (MEK)	ND	1.9	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
n-Butylbenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
sec-Butylbenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
tert-Butylbenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Carbon Disulfide	ND	0.93	mg/Kg wet	1	RL-07	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Carbon Tetrachloride	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Chlorobenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Chlorodibromomethane	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Chloroethane	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Chloroform	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Chloromethane	ND	0.19	mg/Kg wet	1	V-05	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
2-Chlorotoluene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
4-Chlorotoluene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.46	mg/Kg wet	1	RL-07	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2-Dibromoethane (EDB)	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Dibromomethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2-Dichlorobenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,3-Dichlorobenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,4-Dichlorobenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Dichlorodifluoromethane (Freon 12)	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,1-Dichloroethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2-Dichloroethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,1-Dichloroethylene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
cis-1,2-Dichloroethylene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
trans-1,2-Dichloroethylene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2-Dichloropropane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,3-Dichloropropane	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
2,2-Dichloropropane	ND	0.093	mg/Kg wet	1	V-05	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,1-Dichloropropene	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
cis-1,3-Dichloropropene	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
trans-1,3-Dichloropropene	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Diethyl Ether	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Diisopropyl Ether (DIPE)	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,4-Dioxane	ND	4.6	mg/Kg wet	1	V-16	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Ethylbenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH

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

Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-27 (5-10) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-29

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
2-Hexanone (MBK)	ND	0.93	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Isopropylbenzene (Cumene)	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
p-Isopropyltoluene (p-Cymene)	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Methylene Chloride	ND	0.46	mg/Kg wet	1	RL-07	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
4-Methyl-2-pentanone (MIBK)	ND	0.93	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Naphthalene	ND	0.46	mg/Kg wet	1	RL-07	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
n-Propylbenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Styrene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,1,1,2-Tetrachloroethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,1,2,2-Tetrachloroethane	ND	0.046	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Tetrachloroethylene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Tetrahydrofuran	ND	0.37	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Toluene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2,3-Trichlorobenzene	ND	0.46	mg/Kg wet	1	RL-07	SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2,4-Trichlorobenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,1,1-Trichloroethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,1,2-Trichloroethane	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Trichloroethylene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Trichlorofluoromethane (Freon 11)	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2,3-Trichloropropane	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,2,4-Trimethylbenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
1,3,5-Trimethylbenzene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
Vinyl Chloride	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
m+p Xylene	ND	0.19	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH
o-Xylene	ND	0.093	mg/Kg wet	1		SW-846 8260C	9/19/16	9/22/16 8:46	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	93.4	70-130		9/22/16 8:46
Toluene-d8	101	70-130		9/22/16 8:46
4-Bromofluorobenzene	101	70-130		9/22/16 8:46

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Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-28 (10-15) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-30

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Benzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Bromobenzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Bromochloromethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Bromodichloromethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Bromoform	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Bromomethane	ND	2.6	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
2-Butanone (MEK)	ND	10	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
n-Butylbenzene	1.3	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
sec-Butylbenzene	0.68	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
tert-Butylbenzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Carbon Disulfide	ND	5.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Carbon Tetrachloride	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Chlorobenzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Chlorodibromomethane	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Chloroethane	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Chloroform	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Chloromethane	ND	1.0	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 5:40	EEH
2-Chlorotoluene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
4-Chlorotoluene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.6	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2-Dibromoethane (EDB)	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Dibromomethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2-Dichlorobenzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,3-Dichlorobenzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,4-Dichlorobenzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Dichlorodifluoromethane (Freon 12)	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,1-Dichloroethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2-Dichloroethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,1-Dichloroethylene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
cis-1,2-Dichloroethylene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
trans-1,2-Dichloroethylene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2-Dichloropropane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,3-Dichloropropane	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
2,2-Dichloropropane	ND	0.51	mg/Kg wet	10	V-05	SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,1-Dichloropropene	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
cis-1,3-Dichloropropene	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
trans-1,3-Dichloropropene	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Diethyl Ether	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Diisopropyl Ether (DIPE)	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,4-Dioxane	ND	26	mg/Kg wet	10	V-16	SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Ethylbenzene	0.97	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH

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

Project Location: Lowell | Sample Description: | Work Order: 16I0708

Date Received: 9/16/2016

Field Sample #: B-28 (10-15) | Sampled: 9/16/2016 09:30

Sample ID: 16I0708-30

Sample Matrix: Soil

Sample Flags: RL-05

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
2-Hexanone (MBK)	ND	5.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Isopropylbenzene (Cumene)	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
p-Isopropyltoluene (p-Cymene)	3.2	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Methylene Chloride	ND	2.6	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
4-Methyl-2-pentanone (MIBK)	ND	5.1	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Naphthalene	6.7	2.6	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
n-Propylbenzene	0.68	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Styrene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,1,1,2-Tetrachloroethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,1,2,2-Tetrachloroethane	ND	0.26	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Tetrachloroethylene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Tetrahydrofuran	ND	2.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Toluene	0.69	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2,3-Trichlorobenzene	ND	2.6	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2,4-Trichlorobenzene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,1,1-Trichloroethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,1,2-Trichloroethane	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Trichloroethylene	ND	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Trichlorofluoromethane (Freon 11)	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2,3-Trichloropropane	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,2,4-Trimethylbenzene	9.0	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
1,3,5-Trimethylbenzene	6.2	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
Vinyl Chloride	ND	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
m+p Xylene	2.7	1.0	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH
o-Xylene	1.8	0.51	mg/Kg wet	10		SW-846 8260C	9/19/16	9/22/16 5:40	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	97.8	70-130		9/22/16 5:40
Toluene-d8	101	70-130		9/22/16 5:40
4-Bromofluorobenzene	106	70-130		9/22/16 5:40

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

Sample Extraction Data

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

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0708-02 [B-15 (5-10)]	B158642	20.1	2.00	09/20/16
16I0708-05 [B-16 (10-15)]	B158642	20.5	2.00	09/20/16
16I0708-07 [B-17 (5-7.5)]	B158642	20.5	2.00	09/20/16
16I0708-10 [B-18 (10-15)]	B158642	20.1	2.00	09/20/16
16I0708-13 [B-19 (15-17)]	B158642	20.3	2.00	09/20/16
16I0708-15 [B-20 (5-8)]	B158642	20.4	2.00	09/20/16
16I0708-16 [B-21 (0-5)]	B158642	20.3	2.00	09/20/16
16I0708-17 [B-21 (5-10)]	B158642	20.6	2.00	09/20/16
16I0708-18 [B-21 (10-13.5)]	B158642	20.2	2.00	09/20/16
16I0708-19 [B-22 (10-15)]	B158642	20.0	2.00	09/20/16
16I0708-20 [B-22 (15-20)]	B158642	20.1	2.00	09/20/16
16I0708-21 [B-23 (5-9)]	B158642	20.4	2.00	09/20/16
16I0708-22 [B-14A (0-5)]	B158642	20.3	4.00	09/20/16
16I0708-23 [B-14A (5-10)]	B158642	20.1	2.00	09/20/16
16I0708-24 [B-14A (10-15)]	B158642	20.4	4.00	09/20/16
16I0708-25 [B-14A (15-16.5)]	B158642	20.2	2.00	09/20/16

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
16I0708-01 [B-15 (0-5)]	B158556	09/19/16
16I0708-02 [B-15 (5-10)]	B158556	09/19/16
16I0708-03 [B-16 (0-5)]	B158556	09/19/16
16I0708-05 [B-16 (10-15)]	B158556	09/19/16
16I0708-07 [B-17 (5-7.5)]	B158556	09/19/16
16I0708-08 [B-18 (0-5)]	B158556	09/19/16
16I0708-10 [B-18 (10-15)]	B158556	09/19/16
16I0708-11 [B-19 (0-5)]	B158556	09/19/16
16I0708-13 [B-19 (15-17)]	B158556	09/19/16
16I0708-14 [B-20 (0-5)]	B158556	09/19/16
16I0708-15 [B-20 (5-8)]	B158556	09/19/16
16I0708-16 [B-21 (0-5)]	B158556	09/19/16
16I0708-17 [B-21 (5-10)]	B158556	09/19/16
16I0708-18 [B-21 (10-13.5)]	B158556	09/19/16
16I0708-19 [B-22 (10-15)]	B158556	09/19/16
16I0708-20 [B-22 (15-20)]	B158556	09/19/16
16I0708-21 [B-23 (5-9)]	B158556	09/19/16
16I0708-22 [B-14A (0-5)]	B158556	09/19/16
16I0708-23 [B-14A (5-10)]	B158556	09/19/16
16I0708-24 [B-14A (10-15)]	B158556	09/19/16
16I0708-25 [B-14A (15-16.5)]	B158556	09/19/16

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0708-01 [B-15 (0-5)]	B158646	10.0	10.0	09/20/16
16I0708-03 [B-16 (0-5)]	B158646	10.0	10.0	09/20/16
16I0708-08 [B-18 (0-5)]	B158646	10.0	10.0	09/20/16
16I0708-11 [B-19 (0-5)]	B158646	10.0	10.0	09/20/16
16I0708-14 [B-20 (0-5)]	B158646	10.0	10.0	09/20/16
16I0708-16 [B-21 (0-5)]	B158646	10.0	10.0	09/20/16
16I0708-17 [B-21 (5-10)]	B158646	10.1	10.0	09/20/16
16I0708-18 [B-21 (10-13.5)]	B158646	10.0	10.0	09/20/16

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Sample Extraction Data

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I0708-22 [B-14A (0-5)]	B158646	10.1	10.0	09/20/16
16I0708-23 [B-14A (5-10)]	B158646	10.1	10.0	09/20/16
16I0708-24 [B-14A (10-15)]	B158646	10.2	10.0	09/20/16
16I0708-25 [B-14A (15-16.5)]	B158646	10.0	10.0	09/20/16

Prep Method: SW-846 5035-SW-846 8260C

Lab Number [Field ID]	Batch	Sample Amount(g)	Methanol Volume(mL)	Methanol Aliquot(mL)	Final Volume(mL)	Date
16I0708-26 [B-14 (10-15)]	B158583	5.52	5.00	0.1	50	09/19/16
16I0708-27 [B-14A (10-15)]	B158583	4.08	5.00	0.1	50	09/19/16
16I0708-28 [B-26 (10-13)]	B158583	4.51	5.00	0.1	50	09/19/16
16I0708-29 [B-27 (5-10)]	B158583	2.69	5.00	1	50	09/19/16
16I0708-30 [B-28 (10-15)]	B158583	4.89	5.00	0.1	50	09/19/16

con-test® ANALYTICAL LABORATORY

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158583 - SW-846 5035										
Blank (B158583-BLK1)				Prepared: 09/19/16 Analyzed: 09/22/16						
Acetone	ND	2.5	mg/Kg wet							
tert-Amyl Methyl Ether (TAME)	ND	0.025	mg/Kg wet							
Benzene	ND	0.050	mg/Kg wet							
Bromobenzene	ND	0.050	mg/Kg wet							
Bromochloromethane	ND	0.050	mg/Kg wet							
Bromodichloromethane	ND	0.050	mg/Kg wet							
Bromoform	ND	0.10	mg/Kg wet							
Bromomethane	ND	0.25	mg/Kg wet							
2-Butanone (MEK)	ND	1.0	mg/Kg wet							
n-Butylbenzene	ND	0.050	mg/Kg wet							
sec-Butylbenzene	ND	0.050	mg/Kg wet							
tert-Butylbenzene	ND	0.050	mg/Kg wet							
tert-Butyl Ethyl Ether (TBEE)	ND	0.025	mg/Kg wet							
Carbon Disulfide	ND	0.50	mg/Kg wet							
Carbon Tetrachloride	ND	0.050	mg/Kg wet							
Chlorobenzene	ND	0.050	mg/Kg wet							
Chlorodibromomethane	ND	0.10	mg/Kg wet							
Chloroethane	ND	0.10	mg/Kg wet							
Chloroform	ND	0.10	mg/Kg wet							
Chloromethane	ND	0.10	mg/Kg wet							V-05
2-Chlorotoluene	ND	0.050	mg/Kg wet							
4-Chlorotoluene	ND	0.050	mg/Kg wet							
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.25	mg/Kg wet							
1,2-Dibromoethane (EDB)	ND	0.025	mg/Kg wet							
Dibromomethane	ND	0.050	mg/Kg wet							
1,2-Dichlorobenzene	ND	0.050	mg/Kg wet							
1,3-Dichlorobenzene	ND	0.050	mg/Kg wet							
1,4-Dichlorobenzene	ND	0.050	mg/Kg wet							
Dichlorodifluoromethane (Freon 12)	ND	0.10	mg/Kg wet							
1,1-Dichloroethane	ND	0.050	mg/Kg wet							
1,2-Dichloroethane	ND	0.050	mg/Kg wet							
1,1-Dichloroethylene	ND	0.050	mg/Kg wet							
cis-1,2-Dichloroethylene	ND	0.050	mg/Kg wet							
trans-1,2-Dichloroethylene	ND	0.050	mg/Kg wet							
1,2-Dichloropropane	ND	0.050	mg/Kg wet							
1,3-Dichloropropane	ND	0.025	mg/Kg wet							
2,2-Dichloropropane	ND	0.050	mg/Kg wet							V-05
1,1-Dichloropropene	ND	0.10	mg/Kg wet							
cis-1,3-Dichloropropene	ND	0.025	mg/Kg wet							
trans-1,3-Dichloropropene	ND	0.025	mg/Kg wet							
Diethyl Ether	ND	0.10	mg/Kg wet							
Diisopropyl Ether (DIPE)	ND	0.025	mg/Kg wet							
1,4-Dioxane	ND	2.5	mg/Kg wet							V-16
Ethylbenzene	ND	0.050	mg/Kg wet							
Hexachlorobutadiene	ND	0.050	mg/Kg wet							
2-Hexanone (MBK)	ND	0.50	mg/Kg wet							
Isopropylbenzene (Cumene)	ND	0.050	mg/Kg wet							
p-Isopropyltoluene (p-Cymene)	ND	0.050	mg/Kg wet							
Methyl tert-Butyl Ether (MTBE)	ND	0.050	mg/Kg wet							
Methylene Chloride	ND	0.25	mg/Kg wet							
4-Methyl-2-pentanone (MIBK)	ND	0.50	mg/Kg wet							
Naphthalene	ND	0.25	mg/Kg wet							

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B158583 - SW-846 5035											
Blank (B158583-BLK1)				Prepared: 09/19/16 Analyzed: 09/22/16							
n-Propylbenzene	ND	0.050	mg/Kg wet								
Styrene	ND	0.050	mg/Kg wet								
1,1,1,2-Tetrachloroethane	ND	0.050	mg/Kg wet								
1,1,2,2-Tetrachloroethane	ND	0.025	mg/Kg wet								
Tetrachloroethylene	ND	0.050	mg/Kg wet								
Tetrahydrofuran	ND	0.20	mg/Kg wet								
Toluene	ND	0.050	mg/Kg wet								
1,2,3-Trichlorobenzene	ND	0.25	mg/Kg wet								
1,2,4-Trichlorobenzene	ND	0.050	mg/Kg wet								
1,1,1-Trichloroethane	ND	0.050	mg/Kg wet								
1,1,2-Trichloroethane	ND	0.050	mg/Kg wet								
Trichloroethylene	ND	0.050	mg/Kg wet								
Trichlorofluoromethane (Freon 11)	ND	0.10	mg/Kg wet								
1,2,3-Trichloropropane	ND	0.10	mg/Kg wet								
1,2,4-Trimethylbenzene	ND	0.050	mg/Kg wet								
1,3,5-Trimethylbenzene	ND	0.050	mg/Kg wet								
Vinyl Chloride	ND	0.10	mg/Kg wet								
m+p Xylene	ND	0.10	mg/Kg wet								
o-Xylene	ND	0.050	mg/Kg wet								
Surrogate: 1,2-Dichloroethane-d4	*0.0227*		mg/Kg wet	0.0250		90.6	70-130				
Surrogate: Toluene-d8	*0.0248*		mg/Kg wet	0.0250		99.2	70-130				
Surrogate: 4-Bromofluorobenzene	*0.0248*		mg/Kg wet	0.0250		99.1	70-130				
LCS (B158583-BS1)				Prepared: 09/19/16 Analyzed: 09/21/16							
Acetone	0.0849	0.057	mg/Kg wet	0.113		74.9	40-160				†
tert-Amyl Methyl Ether (TAME)	0.0102	0.00057	mg/Kg wet	0.0113		90.3	70-130				
Benzene	0.0126	0.0011	mg/Kg wet	0.0113		111	70-130				
Bromobenzene	0.0129	0.0011	mg/Kg wet	0.0113		114	70-130				
Bromochloromethane	0.0125	0.0011	mg/Kg wet	0.0113		110	70-130				
Bromodichloromethane	0.0122	0.0011	mg/Kg wet	0.0113		108	70-130				
Bromoform	0.0110	0.0023	mg/Kg wet	0.0113		97.3	70-130				
Bromomethane	0.00647	0.0057	mg/Kg wet	0.0113		57.1	40-160			L-14, V-20	†
2-Butanone (MEK)	0.105	0.023	mg/Kg wet	0.113		92.8	40-160				†
n-Butylbenzene	0.0133	0.0011	mg/Kg wet	0.0113		117	70-130				
sec-Butylbenzene	0.0134	0.0011	mg/Kg wet	0.0113		118	70-130				
tert-Butylbenzene	0.0131	0.0011	mg/Kg wet	0.0113		116	70-130				
tert-Butyl Ethyl Ether (TBEE)	0.0107	0.00057	mg/Kg wet	0.0113		94.1	70-130				
Carbon Disulfide	0.0106	0.011	mg/Kg wet	0.0113		93.1	70-130				
Carbon Tetrachloride	0.0116	0.0011	mg/Kg wet	0.0113		102	70-130				
Chlorobenzene	0.0134	0.0011	mg/Kg wet	0.0113		118	70-130				
Chlorodibromomethane	0.0110	0.0023	mg/Kg wet	0.0113		97.0	70-130				
Chloroethane	0.00985	0.0023	mg/Kg wet	0.0113		86.9	70-130				
Chloroform	0.0123	0.0023	mg/Kg wet	0.0113		109	70-130				
Chloromethane	0.00522	0.0023	mg/Kg wet	0.0113		46.1	40-160			L-14, V-05	†
2-Chlorotoluene	0.0131	0.0011	mg/Kg wet	0.0113		116	70-130				
4-Chlorotoluene	0.0134	0.0011	mg/Kg wet	0.0113		118	70-130				
1,2-Dibromo-3-chloropropane (DBCP)	0.0116	0.0057	mg/Kg wet	0.0113		102	70-130				
1,2-Dibromoethane (EDB)	0.0123	0.00057	mg/Kg wet	0.0113		109	70-130				
Dibromomethane	0.0124	0.0011	mg/Kg wet	0.0113		110	70-130				
1,2-Dichlorobenzene	0.0128	0.0011	mg/Kg wet	0.0113		113	70-130				
1,3-Dichlorobenzene	0.0131	0.0011	mg/Kg wet	0.0113		115	70-130				
1,4-Dichlorobenzene	0.0123	0.0011	mg/Kg wet	0.0113		109	70-130				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B158583 - SW-846 5035											
LCS (B158583-BS1)				Prepared: 09/19/16 Analyzed: 09/21/16							
Dichlorodifluoromethane (Freon 12)	0.00537	0.0023	mg/Kg wet	0.0113		47.4	40-160			L-14	†
1,1-Dichloroethane	0.0126	0.0011	mg/Kg wet	0.0113		111	70-130				
1,2-Dichloroethane	0.0113	0.0011	mg/Kg wet	0.0113		99.3	70-130				
1,1-Dichloroethylene	0.0113	0.0011	mg/Kg wet	0.0113		99.6	70-130				
cis-1,2-Dichloroethylene	0.0122	0.0011	mg/Kg wet	0.0113		108	70-130				
trans-1,2-Dichloroethylene	0.0120	0.0011	mg/Kg wet	0.0113		106	70-130				
1,2-Dichloropropane	0.0121	0.0011	mg/Kg wet	0.0113		106	70-130				
1,3-Dichloropropane	0.0119	0.00057	mg/Kg wet	0.0113		105	70-130				
2,2-Dichloropropane	0.0107	0.0011	mg/Kg wet	0.0113		94.5	70-130			V-05	
1,1-Dichloropropene	0.0127	0.0023	mg/Kg wet	0.0113		112	70-130				
cis-1,3-Dichloropropene	0.0110	0.00057	mg/Kg wet	0.0113		96.8	70-130				
trans-1,3-Dichloropropene	0.0124	0.00057	mg/Kg wet	0.0113		109	70-130				
Diethyl Ether	0.0103	0.0023	mg/Kg wet	0.0113		91.3	70-130				
Diisopropyl Ether (DIPE)	0.0105	0.00057	mg/Kg wet	0.0113		92.6	70-130				
1,4-Dioxane	0.0795	0.057	mg/Kg wet	0.113		70.2	40-160			V-16	†
Ethylbenzene	0.0133	0.0011	mg/Kg wet	0.0113		117	70-130				
Hexachlorobutadiene	0.0137	0.0011	mg/Kg wet	0.0113		121	70-130				
2-Hexanone (MBK)	0.0991	0.011	mg/Kg wet	0.113		87.5	40-160				†
Isopropylbenzene (Cumene)	0.0157	0.0011	mg/Kg wet	0.0113		**139**	* 70-130			L-06	
p-Isopropyltoluene (p-Cymene)	0.0129	0.0011	mg/Kg wet	0.0113		114	70-130				
Methyl tert-Butyl Ether (MTBE)	0.0104	0.0011	mg/Kg wet	0.0113		91.6	70-130				
Methylene Chloride	0.0117	0.0057	mg/Kg wet	0.0113		103	70-130				
4-Methyl-2-pentanone (MIBK)	0.107	0.011	mg/Kg wet	0.113		94.0	40-160				†
Naphthalene	0.0131	0.0057	mg/Kg wet	0.0113		116	70-130				
n-Propylbenzene	0.0138	0.0011	mg/Kg wet	0.0113		122	70-130				
Styrene	0.0134	0.0011	mg/Kg wet	0.0113		118	70-130				
1,1,1,2-Tetrachloroethane	0.0120	0.0011	mg/Kg wet	0.0113		106	70-130				
1,1,2,2-Tetrachloroethane	0.0132	0.00057	mg/Kg wet	0.0113		116	70-130				
Tetrachloroethylene	0.0130	0.0011	mg/Kg wet	0.0113		115	70-130				
Tetrahydrofuran	0.0104	0.0045	mg/Kg wet	0.0113		91.4	70-130				
Toluene	0.0128	0.0011	mg/Kg wet	0.0113		113	70-130				
1,2,3-Trichlorobenzene	0.0124	0.0057	mg/Kg wet	0.0113		110	70-130				
1,2,4-Trichlorobenzene	0.0124	0.0011	mg/Kg wet	0.0113		110	70-130				
1,1,1-Trichloroethane	0.0117	0.0011	mg/Kg wet	0.0113		104	70-130				
1,1,2-Trichloroethane	0.0128	0.0011	mg/Kg wet	0.0113		113	70-130				
Trichloroethylene	0.0129	0.0011	mg/Kg wet	0.0113		114	70-130				
Trichlorofluoromethane (Freon 11)	0.0110	0.0023	mg/Kg wet	0.0113		97.2	70-130				
1,2,3-Trichloropropane	0.0127	0.0023	mg/Kg wet	0.0113		112	70-130				
1,2,4-Trimethylbenzene	0.0127	0.0011	mg/Kg wet	0.0113		112	70-130				
1,3,5-Trimethylbenzene	0.0135	0.0011	mg/Kg wet	0.0113		119	70-130				
Vinyl Chloride	0.00862	0.0023	mg/Kg wet	0.0113		76.1	70-130				
m+p Xylene	0.0266	0.0023	mg/Kg wet	0.0227		117	70-130				
o-Xylene	0.0132	0.0011	mg/Kg wet	0.0113		117	70-130				
Surrogate: 1,2-Dichloroethane-d4	*0.0260*		mg/Kg wet	0.0283		91.6	70-130				
Surrogate: Toluene-d8	*0.0284*		mg/Kg wet	0.0283		100	70-130				
Surrogate: 4-Bromofluorobenzene	*0.0286*		mg/Kg wet	0.0283		101	70-130				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B158583 - SW-846 5035												
LCS Dup (B158583-BSD1)				Prepared: 09/19/16 Analyzed: 09/22/16								
Acetone	0.0839	0.057	mg/Kg wet	0.113		74.1		40-160	1.14	20		†
tert-Amyl Methyl Ether (TAME)	0.0102	0.00057	mg/Kg wet	0.0113		90.3		70-130	0.00	20		
Benzene	0.0119	0.0011	mg/Kg wet	0.0113		105		70-130	5.27	20		
Bromobenzene	0.0124	0.0011	mg/Kg wet	0.0113		110		70-130	3.85	20		
Bromochloromethane	0.0121	0.0011	mg/Kg wet	0.0113		107		70-130	3.22	20		
Bromodichloromethane	0.0115	0.0011	mg/Kg wet	0.0113		101		70-130	6.23	20		
Bromoform	0.0110	0.0023	mg/Kg wet	0.0113		97.3		70-130	0.00	20		
Bromomethane	0.00689	0.0057	mg/Kg wet	0.0113		60.8		40-160	6.28	20	V-20, L-14	†
2-Butanone (MEK)	0.101	0.023	mg/Kg wet	0.113		89.1		40-160	4.06	20		†
n-Butylbenzene	0.0130	0.0011	mg/Kg wet	0.0113		115		70-130	2.24	20		
sec-Butylbenzene	0.0127	0.0011	mg/Kg wet	0.0113		112		70-130	5.57	20		
tert-Butylbenzene	0.0127	0.0011	mg/Kg wet	0.0113		112		70-130	3.60	20		
tert-Butyl Ethyl Ether (TBEE)	0.0107	0.00057	mg/Kg wet	0.0113		94.8		70-130	0.741	20		
Carbon Disulfide	0.00979	0.011	mg/Kg wet	0.0113		86.4		70-130	7.47	20		
Carbon Tetrachloride	0.0108	0.0011	mg/Kg wet	0.0113		95.0		70-130	7.11	20		
Chlorobenzene	0.0124	0.0011	mg/Kg wet	0.0113		109		70-130	7.48	20		
Chlorodibromomethane	0.0109	0.0023	mg/Kg wet	0.0113		96.2		70-130	0.828	20		
Chloroethane	0.00983	0.0023	mg/Kg wet	0.0113		86.7		70-130	0.230	20		
Chloroform	0.0116	0.0023	mg/Kg wet	0.0113		102		70-130	6.17	20		
Chloromethane	0.00526	0.0023	mg/Kg wet	0.0113		46.4		40-160	0.649	20	L-14, V-05	†
2-Chlorotoluene	0.0126	0.0011	mg/Kg wet	0.0113		111		70-130	4.05	20		
4-Chlorotoluene	0.0127	0.0011	mg/Kg wet	0.0113		112		70-130	5.82	20		
1,2-Dibromo-3-chloropropane (DBCP)	0.0115	0.0057	mg/Kg wet	0.0113		101		70-130	0.886	20		
1,2-Dibromoethane (EDB)	0.0123	0.00057	mg/Kg wet	0.0113		108		70-130	0.368	20		
Dibromomethane	0.0121	0.0011	mg/Kg wet	0.0113		107		70-130	2.40	20		
1,2-Dichlorobenzene	0.0125	0.0011	mg/Kg wet	0.0113		110		70-130	2.60	20		
1,3-Dichlorobenzene	0.0127	0.0011	mg/Kg wet	0.0113		112		70-130	3.26	20		
1,4-Dichlorobenzene	0.0118	0.0011	mg/Kg wet	0.0113		104		70-130	4.22	20		
Dichlorodifluoromethane (Freon 12)	0.00492	0.0023	mg/Kg wet	0.0113		43.4		40-160	8.81	20	L-14	†
1,1-Dichloroethane	0.0119	0.0011	mg/Kg wet	0.0113		105		70-130	5.37	20		
1,2-Dichloroethane	0.0108	0.0011	mg/Kg wet	0.0113		95.7		70-130	3.69	20		
1,1-Dichloroethylene	0.0107	0.0011	mg/Kg wet	0.0113		94.1		70-130	5.68	20		
cis-1,2-Dichloroethylene	0.0118	0.0011	mg/Kg wet	0.0113		104		70-130	3.59	20		
trans-1,2-Dichloroethylene	0.0116	0.0011	mg/Kg wet	0.0113		102		70-130	3.55	20		
1,2-Dichloropropane	0.0114	0.0011	mg/Kg wet	0.0113		101		70-130	5.50	20		
1,3-Dichloropropane	0.0117	0.00057	mg/Kg wet	0.0113		103		70-130	1.82	20		
2,2-Dichloropropane	0.0106	0.0011	mg/Kg wet	0.0113		93.1		70-130	1.49	20	V-05	
1,1-Dichloropropene	0.0118	0.0023	mg/Kg wet	0.0113		104		70-130	7.33	20		
cis-1,3-Dichloropropene	0.0105	0.00057	mg/Kg wet	0.0113		92.8		70-130	4.22	20		
trans-1,3-Dichloropropene	0.0124	0.00057	mg/Kg wet	0.0113		109		70-130	0.183	20		
Diethyl Ether	0.0102	0.0023	mg/Kg wet	0.0113		89.8		70-130	1.66	20		
Diisopropyl Ether (DIPE)	0.0102	0.00057	mg/Kg wet	0.0113		89.7		70-130	3.18	20		
1,4-Dioxane	0.0845	0.057	mg/Kg wet	0.113		74.6		40-160	6.08	20	V-16	†
Ethylbenzene	0.0125	0.0011	mg/Kg wet	0.0113		110		70-130	6.51	20		
Hexachlorobutadiene	0.0133	0.0011	mg/Kg wet	0.0113		117		70-130	3.27	20		
2-Hexanone (MBK)	0.0991	0.011	mg/Kg wet	0.113		87.5		40-160	0.0114	20		†
Isopropylbenzene (Cumene)	0.0151	0.0011	mg/Kg wet	0.0113		**133**	*	70-130	4.19	20	L-06	
p-Isopropyltoluene (p-Cymene)	0.0123	0.0011	mg/Kg wet	0.0113		109		70-130	4.75	20		
Methyl tert-Butyl Ether (MTBE)	0.0103	0.0011	mg/Kg wet	0.0113		90.7		70-130	0.987	20		
Methylene Chloride	0.0116	0.0057	mg/Kg wet	0.0113		102		70-130	1.07	20		
4-Methyl-2-pentanone (MIBK)	0.104	0.011	mg/Kg wet	0.113		91.4		40-160	2.86	20		†
Naphthalene	0.0131	0.0057	mg/Kg wet	0.0113		116		70-130	0.173	20		

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B158583 - SW-846 5035											
LCS Dup (B158583-BSD1)				Prepared: 09/19/16 Analyzed: 09/22/16							
n-Propylbenzene	0.0127	0.0011	mg/Kg wet	0.0113		112		70-130	8.40	20	
Styrene	0.0130	0.0011	mg/Kg wet	0.0113		114		70-130	3.61	20	
1,1,1,2-Tetrachloroethane	0.0118	0.0011	mg/Kg wet	0.0113		104		70-130	2.19	20	
1,1,2,2-Tetrachloroethane	0.0128	0.00057	mg/Kg wet	0.0113		113		70-130	2.79	20	
Tetrachloroethylene	0.0124	0.0011	mg/Kg wet	0.0113		110		70-130	4.46	20	
Tetrahydrofuran	0.0119	0.0045	mg/Kg wet	0.0113		105		70-130	14.1	20	
Toluene	0.0122	0.0011	mg/Kg wet	0.0113		108		70-130	4.35	20	
1,2,3-Trichlorobenzene	0.0125	0.0057	mg/Kg wet	0.0113		111		70-130	0.999	20	
1,2,4-Trichlorobenzene	0.0119	0.0011	mg/Kg wet	0.0113		105		70-130	4.01	20	
1,1,1-Trichloroethane	0.0112	0.0011	mg/Kg wet	0.0113		99.0		70-130	4.44	20	
1,1,2-Trichloroethane	0.0123	0.0011	mg/Kg wet	0.0113		109		70-130	3.78	20	
Trichloroethylene	0.0123	0.0011	mg/Kg wet	0.0113		109		70-130	4.94	20	
Trichlorofluoromethane (Freon 11)	0.0104	0.0023	mg/Kg wet	0.0113		92.2		70-130	5.28	20	
1,2,3-Trichloropropane	0.0123	0.0023	mg/Kg wet	0.0113		108		70-130	3.45	20	
1,2,4-Trimethylbenzene	0.0123	0.0011	mg/Kg wet	0.0113		109		70-130	3.53	20	
1,3,5-Trimethylbenzene	0.0129	0.0011	mg/Kg wet	0.0113		113		70-130	4.99	20	
Vinyl Chloride	0.00763	0.0023	mg/Kg wet	0.0113		**67.3**	*	70-130	12.3	20	L-07
m+p Xylene	0.0251	0.0023	mg/Kg wet	0.0227		111		70-130	5.48	20	
o-Xylene	0.0127	0.0011	mg/Kg wet	0.0113		112		70-130	4.29	20	
Surrogate: 1,2-Dichloroethane-d4	*0.0261*		mg/Kg wet	0.0283		92.0		70-130			
Surrogate: Toluene-d8	*0.0285*		mg/Kg wet	0.0283		100		70-130			
Surrogate: 4-Bromofluorobenzene	*0.0286*		mg/Kg wet	0.0283		101		70-130			

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158646 - SW-846 3540C										
Blank (B158646-BLK1)				Prepared: 09/20/16 Analyzed: 09/21/16						
Aroclor-1016	ND	0.020	mg/Kg wet							
Aroclor-1016 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1221	ND	0.020	mg/Kg wet							
Aroclor-1221 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1232	ND	0.020	mg/Kg wet							
Aroclor-1232 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1242	ND	0.020	mg/Kg wet							
Aroclor-1242 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1248	ND	0.020	mg/Kg wet							
Aroclor-1248 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1254	ND	0.020	mg/Kg wet							
Aroclor-1254 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1260	ND	0.020	mg/Kg wet							
Aroclor-1260 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1262	ND	0.020	mg/Kg wet							
Aroclor-1262 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1268	ND	0.020	mg/Kg wet							
Aroclor-1268 [2C]	ND	0.020	mg/Kg wet							
Surrogate: Decachlorobiphenyl	*0.206*		mg/Kg wet	0.200		103	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.202*		mg/Kg wet	0.200		101	30-150			
Surrogate: Tetrachloro-m-xylene	*0.189*		mg/Kg wet	0.200		94.3	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.184*		mg/Kg wet	0.200		92.0	30-150			
LCS (B158646-BS1)				Prepared: 09/20/16 Analyzed: 09/21/16						
Aroclor-1016	0.19	0.020	mg/Kg wet	0.200		92.9	40-140			
Aroclor-1016 [2C]	0.19	0.020	mg/Kg wet	0.200		93.9	40-140			
Aroclor-1260	0.17	0.020	mg/Kg wet	0.200		87.1	40-140			
Aroclor-1260 [2C]	0.16	0.020	mg/Kg wet	0.200		82.2	40-140			
Surrogate: Decachlorobiphenyl	*0.197*		mg/Kg wet	0.200		98.3	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.193*		mg/Kg wet	0.200		96.7	30-150			
Surrogate: Tetrachloro-m-xylene	*0.181*		mg/Kg wet	0.200		90.6	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.177*		mg/Kg wet	0.200		88.6	30-150			
LCS Dup (B158646-BSD1)				Prepared: 09/20/16 Analyzed: 09/21/16						
Aroclor-1016	0.19	0.020	mg/Kg wet	0.200		97.1	40-140	4.37	30	
Aroclor-1016 [2C]	0.20	0.020	mg/Kg wet	0.200		97.9	40-140	4.18	30	
Aroclor-1260	0.18	0.020	mg/Kg wet	0.200		92.3	40-140	5.77	30	
Aroclor-1260 [2C]	0.17	0.020	mg/Kg wet	0.200		87.3	40-140	6.08	30	
Surrogate: Decachlorobiphenyl	*0.207*		mg/Kg wet	0.200		103	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.203*		mg/Kg wet	0.200		102	30-150			
Surrogate: Tetrachloro-m-xylene	*0.188*		mg/Kg wet	0.200		93.9	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.183*		mg/Kg wet	0.200		91.6	30-150			

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B158646 - SW-846 3540C											
Matrix Spike (B158646-MS1)	**Source: 16I0708-01**			Prepared: 09/20/16 Analyzed: 09/22/16							
Aroclor-1016	0.28	0.11	mg/Kg dry	0.217	ND	129		40-140			
Aroclor-1016 [2C]	0.34	0.11	mg/Kg dry	0.217	ND	**155**	*	40-140			MS-21
Aroclor-1260	2.5	0.11	mg/Kg dry	0.217	ND	**1160**	*	40-140			MS-21
Aroclor-1260 [2C]	2.3	0.11	mg/Kg dry	0.217	ND	**1060**	*	40-140			MS-21
Surrogate: Decachlorobiphenyl	*0.177*		mg/Kg dry	0.217		81.3		30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.214*		mg/Kg dry	0.217		98.5		30-150			
Surrogate: Tetrachloro-m-xylene	*0.196*		mg/Kg dry	0.217		90.2		30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.188*		mg/Kg dry	0.217		86.3		30-150			
Matrix Spike Dup (B158646-MSD1)	**Source: 16I0708-01**			Prepared: 09/20/16 Analyzed: 09/22/16							
Aroclor-1016	0.28	0.11	mg/Kg dry	0.220	ND	128		40-140		50	
Aroclor-1016 [2C]	0.34	0.11	mg/Kg dry	0.220	ND	**155**	*	40-140		50	MS-21
Aroclor-1260	2.7	0.11	mg/Kg dry	0.220	ND	**1220**	*	40-140	5.81	50	MS-21
Aroclor-1260 [2C]	2.5	0.11	mg/Kg dry	0.220	ND	**1120**	*	40-140	6.39	50	MS-21
Surrogate: Decachlorobiphenyl	*0.181*		mg/Kg dry	0.220		82.4		30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.226*		mg/Kg dry	0.220		103		30-150			
Surrogate: Tetrachloro-m-xylene	*0.196*		mg/Kg dry	0.220		89.2		30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.186*		mg/Kg dry	0.220		84.9		30-150			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158642 - SW-846 3546										
Blank (B158642-BLK1)				Prepared: 09/20/16 Analyzed: 09/21/16						
C9-C18 Aliphatics	ND	10	mg/Kg wet							
C19-C36 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet							
C11-C22 Aromatics	ND	10	mg/Kg wet							
Acenaphthene	ND	0.10	mg/Kg wet							
Acenaphthylene	ND	0.10	mg/Kg wet							
Anthracene	ND	0.10	mg/Kg wet							
Benzo(a)anthracene	ND	0.10	mg/Kg wet							
Benzo(a)pyrene	ND	0.10	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet							
Chrysene	ND	0.10	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet							
Fluoranthene	ND	0.10	mg/Kg wet							
Fluorene	ND	0.10	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet							
2-Methylnaphthalene	ND	0.10	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							
Phenanthrene	ND	0.10	mg/Kg wet							
Pyrene	ND	0.10	mg/Kg wet							
n-Decane	ND	0.10	mg/Kg wet							
n-Docosane	ND	0.10	mg/Kg wet							
n-Dodecane	ND	0.10	mg/Kg wet							
n-Eicosane	ND	0.10	mg/Kg wet							
n-Hexacosane	ND	0.10	mg/Kg wet							
n-Hexadecane	ND	0.10	mg/Kg wet							
n-Hexatriacontane	ND	0.10	mg/Kg wet							
n-Nonadecane	ND	0.10	mg/Kg wet							
n-Nonane	ND	0.10	mg/Kg wet							
n-Octacosane	ND	0.10	mg/Kg wet							
n-Octadecane	ND	0.10	mg/Kg wet							
n-Tetracosane	ND	0.10	mg/Kg wet							
n-Tetradecane	ND	0.10	mg/Kg wet							
n-Triacontane	ND	0.10	mg/Kg wet							
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*3.07*		mg/Kg wet	5.00		61.5	40-140			
Surrogate: o-Terphenyl (OTP)	*3.63*		mg/Kg wet	5.00		72.6	40-140			
Surrogate: 2-Bromonaphthalene	*37.4*		µg/mL	50.0		74.8	40-140			
Surrogate: 2-Fluorobiphenyl	*43.2*		µg/mL	50.0		86.4	40-140			
LCS (B158642-BS1)				Prepared: 09/20/16 Analyzed: 09/21/16						
Acenaphthene	3.66	0.10	mg/Kg wet	5.00		73.3	40-140			
Acenaphthylene	3.52	0.10	mg/Kg wet	5.00		70.4	40-140			
Anthracene	3.63	0.10	mg/Kg wet	5.00		72.7	40-140			
Benzo(a)anthracene	3.49	0.10	mg/Kg wet	5.00		69.8	40-140			
Benzo(a)pyrene	3.46	0.10	mg/Kg wet	5.00		69.2	40-140			
Benzo(b)fluoranthene	3.52	0.10	mg/Kg wet	5.00		70.4	40-140			
Benzo(g,h,i)perylene	3.28	0.10	mg/Kg wet	5.00		65.7	40-140			
Benzo(k)fluoranthene	3.48	0.10	mg/Kg wet	5.00		69.7	40-140			
Chrysene	3.57	0.10	mg/Kg wet	5.00		71.4	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158642 - SW-846 3546										
LCS (B158642-BS1)				Prepared: 09/20/16 Analyzed: 09/21/16						
Dibenz(a,h)anthracene	3.42	0.10	mg/Kg wet	5.00		68.3	40-140			
Fluoranthene	3.57	0.10	mg/Kg wet	5.00		71.4	40-140			
Fluorene	3.66	0.10	mg/Kg wet	5.00		73.1	40-140			
Indeno(1,2,3-cd)pyrene	3.18	0.10	mg/Kg wet	5.00		63.6	40-140			
2-Methylnaphthalene	3.31	0.10	mg/Kg wet	5.00		66.1	40-140			
Naphthalene	3.15	0.10	mg/Kg wet	5.00		63.0	40-140			
Phenanthrene	3.55	0.10	mg/Kg wet	5.00		71.0	40-140			
Pyrene	3.58	0.10	mg/Kg wet	5.00		71.6	40-140			
n-Decane	2.32	0.10	mg/Kg wet	5.00		46.4	40-140			
n-Docosane	3.67	0.10	mg/Kg wet	5.00		73.5	40-140			
n-Dodecane	3.03	0.10	mg/Kg wet	5.00		60.7	40-140			
n-Eicosane	3.76	0.10	mg/Kg wet	5.00		75.2	40-140			
n-Hexacosane	3.45	0.10	mg/Kg wet	5.00		69.0	40-140			
n-Hexadecane	3.69	0.10	mg/Kg wet	5.00		73.7	40-140			
n-Hexatriacontane	3.27	0.10	mg/Kg wet	5.00		65.5	40-140			
n-Nonadecane	3.70	0.10	mg/Kg wet	5.00		74.1	40-140			
n-Nonane	1.51	0.10	mg/Kg wet	5.00		30.3	30-140			
n-Octacosane	3.41	0.10	mg/Kg wet	5.00		68.3	40-140			
n-Octadecane	3.73	0.10	mg/Kg wet	5.00		74.6	40-140			
n-Tetracosane	3.80	0.10	mg/Kg wet	5.00		76.1	40-140			
n-Tetradecane	3.42	0.10	mg/Kg wet	5.00		68.4	40-140			
n-Triacontane	3.36	0.10	mg/Kg wet	5.00		67.3	40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*2.91*		mg/Kg wet	5.00		58.1	40-140			
Surrogate: o-Terphenyl (OTP)	*3.46*		mg/Kg wet	5.00		69.3	40-140			
Surrogate: 2-Bromonaphthalene	*41.0*		µg/mL	50.0		82.0	40-140			
Surrogate: 2-Fluorobiphenyl	*46.1*		µg/mL	50.0		92.2	40-140			
LCS Dup (B158642-BSD1)				Prepared: 09/20/16 Analyzed: 09/21/16						
Acenaphthene	3.52	0.10	mg/Kg wet	5.00		70.4	40-140	4.02	25	
Acenaphthylene	3.40	0.10	mg/Kg wet	5.00		68.0	40-140	3.36	25	
Anthracene	3.52	0.10	mg/Kg wet	5.00		70.3	40-140	3.27	25	
Benzo(a)anthracene	3.38	0.10	mg/Kg wet	5.00		67.5	40-140	3.22	25	
Benzo(a)pyrene	3.36	0.10	mg/Kg wet	5.00		67.1	40-140	2.98	25	
Benzo(b)fluoranthene	3.38	0.10	mg/Kg wet	5.00		67.5	40-140	4.19	25	
Benzo(g,h,i)perylene	3.22	0.10	mg/Kg wet	5.00		64.3	40-140	2.07	25	
Benzo(k)fluoranthene	3.40	0.10	mg/Kg wet	5.00		68.0	40-140	2.41	25	
Chrysene	3.48	0.10	mg/Kg wet	5.00		69.6	40-140	2.57	25	
Dibenz(a,h)anthracene	3.34	0.10	mg/Kg wet	5.00		66.7	40-140	2.34	25	
Fluoranthene	3.43	0.10	mg/Kg wet	5.00		68.6	40-140	4.01	25	
Fluorene	3.34	0.10	mg/Kg wet	5.00		66.7	40-140	9.16	25	
Indeno(1,2,3-cd)pyrene	3.06	0.10	mg/Kg wet	5.00		61.2	40-140	3.76	25	
2-Methylnaphthalene	3.24	0.10	mg/Kg wet	5.00		64.8	40-140	2.03	25	
Naphthalene	3.14	0.10	mg/Kg wet	5.00		62.9	40-140	0.232	25	
Phenanthrene	3.40	0.10	mg/Kg wet	5.00		68.0	40-140	4.18	25	
Pyrene	3.44	0.10	mg/Kg wet	5.00		68.8	40-140	4.03	25	
n-Decane	2.43	0.10	mg/Kg wet	5.00		48.5	40-140	4.57	25	
n-Docosane	3.63	0.10	mg/Kg wet	5.00		72.6	40-140	1.24	25	
n-Dodecane	3.07	0.10	mg/Kg wet	5.00		61.5	40-140	1.30	25	
n-Eicosane	3.74	0.10	mg/Kg wet	5.00		74.7	40-140	0.667	25	
n-Hexacosane	3.38	0.10	mg/Kg wet	5.00		67.6	40-140	2.09	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B158642 - SW-846 3546										
LCS Dup (B158642-BSD1)				Prepared: 09/20/16 Analyzed: 09/21/16						
n-Hexadecane	3.67	0.10	mg/Kg wet	5.00		73.5	40-140	0.359	25	
n-Hexatriacontane	3.22	0.10	mg/Kg wet	5.00		64.4	40-140	1.56	25	
n-Nonadecane	3.68	0.10	mg/Kg wet	5.00		73.5	40-140	0.753	25	
n-Nonane	1.59	0.10	mg/Kg wet	5.00		31.9	30-140	5.16	25	
n-Octacosane	3.34	0.10	mg/Kg wet	5.00		66.7	40-140	2.32	25	
n-Octadecane	3.71	0.10	mg/Kg wet	5.00		74.2	40-140	0.559	25	
n-Tetracosane	3.75	0.10	mg/Kg wet	5.00		74.9	40-140	1.53	25	
n-Tetradecane	3.40	0.10	mg/Kg wet	5.00		68.1	40-140	0.554	25	
n-Triacontane	3.28	0.10	mg/Kg wet	5.00		65.6	40-140	2.55	25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*2.87*		mg/Kg wet	5.00		57.4	40-140			
Surrogate: o-Terphenyl (OTP)	*3.22*		mg/Kg wet	5.00		64.4	40-140			
Surrogate: 2-Bromonaphthalene	*39.7*		µg/mL	50.0		79.5	40-140			
Surrogate: 2-Fluorobiphenyl	*46.0*		µg/mL	50.0		92.1	40-140			

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-15 (0-5)

Lab Sample ID: 16I0708-01 Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	11	
	2	0.00	-0.03	0.03	12	6.9

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-16 (0-5)

Lab Sample ID: 16I0708-03 Date(s) Analyzed: 09/21/2016 09/21/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	0.90	
	2	0.00	-0.03	0.03	0.87	3.6

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-18 (0-5)

Lab Sample ID: 16I0708-08

Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	26	
	2	0.00	-0.03	0.03	29	9.4

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-19 (0-5)

Lab Sample ID: 16I0708-11

Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	6.4	
	2	0.00	-0.03	0.03	6.7	4.9

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-21 (0-5)

Lab Sample ID: 16I0708-16

Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	10	
	2	0.00	-0.03	0.03	11	4.7

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-21 (5-10)

Lab Sample ID: 16I0708-17

Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	0.63	
	2	0.00	-0.03	0.03	0.55	13.4

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-14A (5-10)

Lab Sample ID: 16I0708-23

Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1):

Instrument ID (2):

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	0.14	
	2	0.00	-0.03	0.03	0.12	16.8

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B158646-BS1 Date(s) Analyzed: 09/21/2016 09/21/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.19	
	2	0.00	-0.03	0.03	0.19	2
Aroclor-1260	1	0.00	-0.03	0.03	0.17	
	2	0.00	-0.03	0.03	0.16	8

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B158646-BSD1 Date(s) Analyzed: 09/21/2016 09/21/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.19	
	2	0.00	-0.03	0.03	0.20	3
Aroclor-1260	1	0.00	-0.03	0.03	0.18	
	2	0.00	-0.03	0.03	0.17	8

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

Matrix Spike

Lab Sample ID: B158646-MS1 Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.28	
	2	0.00	-0.03	0.03	0.34	19
Aroclor-1260	1	0.00	-0.03	0.03	2.5	
	2	0.00	-0.03	0.03	2.3	10

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

Matrix Spike Dup

Lab Sample ID: B158646-MSD1 Date(s) Analyzed: 09/22/2016 09/22/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.28	
	2	0.00	-0.03	0.03	0.34	19
Aroclor-1260	1	0.00	-0.03	0.03	2.7	
	2	0.00	-0.03	0.03	2.5	7

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit
DL	Method Detection Limit
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.

L-06	Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the high side.
L-07	Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.
L-14	Compound classified by MA CAM as difficult with acceptable recoveries of 40-160%. Recovery does not meet 70-130% criteria but does meet difficult compound criteria.
MS-21	Matrix spike and/or spike duplicate recovery bias high due to contribution of other Aroclors present in the source sample.
O-32	A dilution was performed as part of the standard analytical procedure.
RL-05	Elevated reporting limit due to high concentration of target compounds. MA CAM reporting limit not met.
RL-07	Elevated reporting limit based on lowest point in calibration. MA CAM reporting limit not met.
RL-08	Elevated reporting limit due to sample matrix interference. MA CAM reporting limit not met.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.
S-15	Surrogate recovery outside of control limits due to suspected sample matrix interference. Chromatogram(s) is attached.
V-05	Continuing calibration did not meet method specifications and was biased on the low side for this compound. Increased uncertainty is associated with the reported value which is likely to be biased on the low side.
V-16	Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy may be associated with reported result.
V-20	Continuing calibration did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP-EPH-04-1.1 in Soil	
C9-C18 Aliphatics	CT,NC,ME,NH-P
C19-C36 Aliphatics	CT,NC,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,ME,NH-P
C11-C22 Aromatics	CT,NC,ME,NH-P
Acenaphthene	CT,NC,ME,NH-P
Acenaphthylene	CT,NC,ME,NH-P
Anthracene	CT,NC,ME,NH-P
Benzo(a)anthracene	CT,NC,ME,NH-P
Benzo(a)pyrene	CT,NC,ME,NH-P
Benzo(b)fluoranthene	CT,NC,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,ME,NH-P
Benzo(k)fluoranthene	CT,NC,ME,NH-P
Chrysene	CT,NC,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,ME,NH-P
Fluoranthene	CT,NC,ME,NH-P
Fluorene	CT,NC,ME
Indeno(1,2,3-cd)pyrene	CT,NC,ME,NH-P
2-Methylnaphthalene	CT,NC,ME
Naphthalene	CT,NC,ME,NH-P
Phenanthrene	CT,NC,ME,NH-P
Pyrene	CT,NC,ME,NH-P
SW-846 8082A in Soil	
Aroclor-1016	CT,NH,NY,ME,NC,VA
Aroclor-1016 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1221	CT,NH,NY,ME,NC,VA
Aroclor-1221 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1232	CT,NH,NY,ME,NC,VA
Aroclor-1232 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1242	CT,NH,NY,ME,NC,VA
Aroclor-1242 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1248	CT,NH,NY,ME,NC,VA
Aroclor-1248 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1254	CT,NH,NY,ME,NC,VA
Aroclor-1254 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1260	CT,NH,NY,ME,NC,VA
Aroclor-1260 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1262	NY,NC,VA
Aroclor-1262 [2C]	NY,NC,VA
Aroclor-1268	NY,NC,VA
Aroclor-1268 [2C]	NY,NC,VA
SW-846 8260C in Soil	
Acetone	CT,NH,NY,ME
Benzene	CT,NH,NY,ME
Bromobenzene	NH,NY,ME
Bromochloromethane	NH,NY,ME
Bromodichloromethane	CT,NH,NY,ME

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8260C in Soil	
Bromoform	CT,NH,NY,ME
Bromomethane	CT,NH,NY,ME
2-Butanone (MEK)	CT,NH,NY,ME
n-Butylbenzene	CT,NH,NY,ME
sec-Butylbenzene	CT,NH,NY,ME
tert-Butylbenzene	CT,NH,NY,ME
Carbon Disulfide	CT,NH,NY,ME
Carbon Tetrachloride	CT,NH,NY,ME
Chlorobenzene	CT,NH,NY,ME
Chlorodibromomethane	CT,NH,NY,ME
Chloroethane	CT,NH,NY,ME
Chloroform	CT,NH,NY,ME
Chloromethane	CT,NH,NY,ME
2-Chlorotoluene	CT,NH,NY,ME
4-Chlorotoluene	CT,NH,NY,ME
Dibromomethane	NH,NY,ME
1,2-Dichlorobenzene	CT,NH,NY,ME
1,3-Dichlorobenzene	CT,NH,NY,ME
1,4-Dichlorobenzene	CT,NH,NY,ME
Dichlorodifluoromethane (Freon 12)	NY,ME
1,1-Dichloroethane	CT,NH,NY,ME
1,2-Dichloroethane	CT,NH,NY,ME
1,1-Dichloroethylene	CT,NH,NY,ME
cis-1,2-Dichloroethylene	CT,NH,NY,ME
trans-1,2-Dichloroethylene	CT,NH,NY,ME
1,2-Dichloropropane	CT,NH,NY,ME
1,3-Dichloropropane	NH,NY,ME
2,2-Dichloropropane	NH,NY,ME
1,1-Dichloropropene	NH,NY,ME
cis-1,3-Dichloropropene	CT,NH,NY,ME
trans-1,3-Dichloropropene	CT,NH,NY,ME
Ethylbenzene	CT,NH,NY,ME
Hexachlorobutadiene	NH,NY,ME
2-Hexanone (MBK)	CT,NH,NY,ME
Isopropylbenzene (Cumene)	CT,NH,NY,ME
p-Isopropyltoluene (p-Cymene)	NH,NY
Methyl tert-Butyl Ether (MTBE)	NY
Methylene Chloride	CT,NH,NY,ME
4-Methyl-2-pentanone (MIBK)	CT,NH,NY
Naphthalene	NH,NY,ME
n-Propylbenzene	NH,NY
Styrene	CT,NH,NY,ME
1,1,1,2-Tetrachloroethane	CT,NH,NY,ME
1,1,2,2-Tetrachloroethane	CT,NH,NY,ME
Tetrachloroethylene	CT,NH,NY,ME
Toluene	CT,NH,NY,ME
1,2,3-Trichlorobenzene	ME

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8260C in Soil	
1,2,4-Trichlorobenzene	NH,NY,ME
1,1,1-Trichloroethane	CT,NH,NY,ME
1,1,2-Trichloroethane	CT,NH,NY,ME
Trichloroethylene	CT,NH,NY,ME
Trichlorofluoromethane (Freon 11)	CT,NH,NY,ME
1,2,3-Trichloropropane	NH,NY,ME
1,2,4-Trimethylbenzene	CT,NH,NY,ME
1,3,5-Trimethylbenzene	CT,NH,NY,ME
Vinyl Chloride	CT,NH,NY,ME
m+p Xylene	CT,NH,NY,ME
o-Xylene	CT,NH,NY,ME

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

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	02/1/2018
MA	Massachusetts DEP	M-MA100	06/30/2017
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2017
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2017
RI	Rhode Island Department of Health	LAO00112	12/30/2016
NC	North Carolina Div. of Water Quality	652	12/31/2016
NJ	New Jersey DEP	MA007 NELAP	06/30/2017
FL	Florida Department of Health	E871027 NELAP	06/30/2017
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2017
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2016
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2017

CHAIN OF CUSTODY RECORD

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

16I0708

Rev 04.05.12

Company Name: GEI
Address: 60 Brooks
Attention: A. Foley, E. Turley
Project Location: Lowell
Sampled By: A. Foley

Telephone:
Project #
Client PO# 1785-6100

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

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

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	# of Containers	** Preservation	***Container Code	EPH & PAHs	Asbestos	PCBs (Soxhlet)	Hold for PCBs
01	B-15 (0-5')	9/15	10:15		X	S	C	1		G			X	
02	B-15 (5-10')		10:30					1		G	X	X		X
03	B-16 (0-5')		9:15					1		G			X	
04	B-16 (5-10)		9:30					1		G		X		X
05	B-16 (10-15')		9:45					1		G	X			X
06	B-17 (0-5')		11:30					1		G				
07	B-17 (5-7.5')		11:45					1		G	X	X		X
08	B-18 (0-5)		10:45					1		G			X	
09	B-18 (5-10)		11:00					1		G				X
10	B-18 (10-15)		11:15					1		G	X			X

ANALYSIS REQUESTED

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

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

Comments:
Please order Analysis ① EPH/PAH ② PCBs ③ Asbestos
④ Hold For PCBs

Relinquished by: (signature)	Date/Time:
[signature] 9/16/16	15:00
Received by: (signature) [signature] 9/16/16	1500
Relinquished by: (signature) [signature] 9/16/16	1900
Received by: (signature) [signature] 9/16/16	1900

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

Detection Limit Requirements
Massachusetts: S-1
Connecticut:
Other:

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

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

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

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

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Email: info@contestlabs.com
www.contestlabs.com
39 Spruce Street
East longmeadow, MA 01028

CHAIN OF CUSTODY RECORD

16I0708

Rev 04.05.12

Company Name: GEC
Address: 60 Brooks
Attention:
Project Location: Lowell
Sampled By: A. Foley

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

Telephone:
Project #
Client PO# 1785-6100

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

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code
11	B-19 (0-5')	9/15/16	12:30		X		
12	B-19 (5-10)	↓	12:45		↓		
~~13~~	~~B-19 (10-15) @ GEC~~		~~1:15~~				
13	B-19 (15-17.5')		1:30				
14	B-20 (0-5')	9/16/16	~~10:05~~ APP	9:59			
15	B-20 (5-8)		~~10:40~~ APP	10:05			
16	B-21 (0-5)		10:30				
17	B-21 (5-10)		10:40				
18	B-21 (10-13.5)		10:56				
		↓					

ANALYSIS REQUESTED

# of Containers	EPH w PAHs	Asbestos	PCBs (soil/wt)	Hold for PCBs								
** Preservation												
***Container Code												
11		X	X									
12		X		X								
~~13~~				~	~							
13	X											
14			X									
15	X			X								
16	X	X	X									
17	X	X	X									
18	X	X	X									

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

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

Comments:
① EPH ② PCBs ③ Asbestos ④ Hold
Please Analyse in order

Relinquished by: (signature)	Date/Time:
A. Foley 9/16/16	1500
Received by: (signature) 9/16/16	Date/Time: 1500
Relinquished by: (signature) 9/16/16	Date/Time: 1900
Received by: (signature) 9/16/16	Date/Time: 1900

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

Detection Limit Requirements
Massachusetts: S-1
Connecticut:
Other:

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

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WBE/DBE Certified

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

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Fax: 413-525-6405
Email: info@contestlabs.com
www.contestlabs.com
39 Spruce Street
East longmeadow, MA 01028

CHAIN OF CUSTODY RECORD

16I0708

Rev 04.05.12

Company Name: GEC
Address: 60 Prescott
Telephone:
Project #
Client PO# 17685-6100

Attention: A. Foley
Project Location: Lowell
Sampled By: A. Foley, E. Furlong, B. Butler

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

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

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	# of Containers	** Preservation	***Container Code	ANALYSIS REQUESTED: EPH/PAHs	Asbestos	PCBs	Hold for PCBs
	B-22(0-5)@GEC	9/16/16			X	S	U							
	B-22(5-10)@GEC	↓			↓	↓	↓							
19	B-22(10-15)										X			
20	B-22(15-20)										X			
	B-23(0-5)@GEC													
21	B-23(5-9)	↓			✓	✓	✓				X			

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

Comments:
① EPH ③ PCB ③ Asbestos ④ Hold

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

Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Relinquished by: (signature)	9/16/16
Received by: (signature)	9/16/16
Relinquished by: (signature)	9/16/16
Received by: (signature)	9/16/16

Date/Time:	15:00
Date/Time:	15:00
Date/Time:	19:00
Date/Time:	1900

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

Detection Limit Requirements
Massachusetts: S-1
Connecticut:
Other:

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

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CHAIN OF CUSTODY RECORD

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39 Spruce Street
East longmeadow, MA 01028

16I0708

Rev. 04.05.12

Company Name: GEC
Address: 60 Brooks Dr
Attention: A. Foley, E. Furlong, B. Butler
Project Location: Lowell
Sampled By: A. Foley

Telephone:
Project #
Client PO# 1765-6100

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

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

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	# of Containers	** Preservation	***Container Code	EPH/PAH's	ASBESTOS	PCB's (soxhlet)	VOCs
22	B-14A (0-5)	9/16/16	8:55	X	X	SOIL					X	X	X	
23	B-14A (5-10)		9:00	X	X						X	X	X	
24	B-14A (10-15)		9:05	X	X						X	X	X	
25	B-14A (15-16.5)		9:20	X	X						X	X	X	
26	B-14 (10-15)	9/15/16	9:30		X									X
27	B-14A (10-15)	9/16/16	9:30		X									X
28	B-26 (10-13)				X									X
29	B-27 (5-10)				X									X
30	B-28 (10-15)				X									X

ANALYSIS REQUESTED

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

Comments:

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

Relinquished by: (signature)	Date/Time:
[signature] 9/16	15:50
Received by: (signature) [signature] 9/16/16	Date/Time: 15:50
Relinquished by: (signature) [signature] 9/16/16	Date/Time: 1900
Received by: (signature) [signature] 9/16/16	Date/Time: 1900

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

Detection Limit Requirements
Massachusetts: S-1
Connecticut:
Other:

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

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

con-test® ANALYTICAL LABORATORY

Sample Receipt Checklist

CLIENT NAME: GEC **RECEIVED BY:** JM **DATE:** 9/16/16

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

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

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

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

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

Temperature °C by Temp blank ____ Temperature °C by Temp gun 3.1

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

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

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

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

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

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

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

Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber		16 oz amber	
500 mL Amber		8 oz amber/clear jar	26
250 mL Amber (8oz amber)		4 oz amber/clear jar	
1 Liter Plastic		2 oz amber/clear jar	
500 mL Plastic		Plastic Bag / Ziploc	
250 mL plastic		SOC Kit	
40 mL Vial - type listed below	15	Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

☆ Recieved extra B-21(0-5) sample
- no analyses checked for B-17 (0-5)
- no % solids jars for any of the VOC analyses.

40 mL vials:	# HCl		# Methanol	5	Time and Date Frozen:
	# Bisulfate	10	# DI Water		
	# Thiosulfate		Unpreserved		

Login Sample Receipt Checklist

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

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

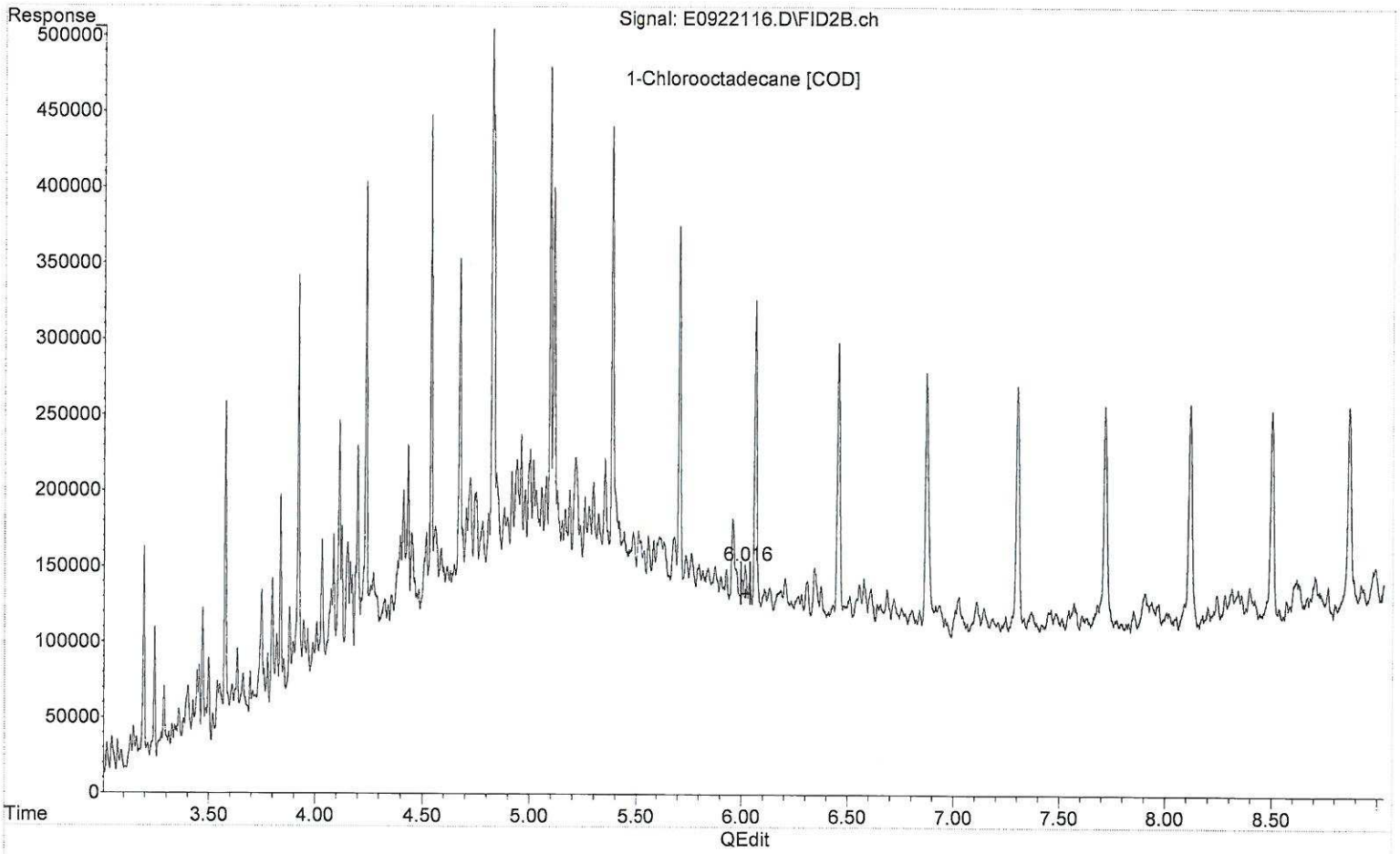
Who notified of False statements? **Date/Time:**

 Log-In Technician Initials: JM **Date/Time:** 9/16/16 1900

Quantitation Report (Qedit)

Data Path : C:\msdchem\1\data\E092216\
Data File : E0922116.D
Signal(s) : Signal #1: FID1A.ch Signal #2: FID2B.ch
Acq On : 23 Sep 2016 3:15 am
Operator : SCS
Sample : 16I0708-23@5X Inst : GCFID5
Misc :
ALS Vial : 82 (Sig #1); 81 (Sig #2) Sample Multiplier: 1

Integration File signal 1: events.e
Integration File signal 2: events2.e
Quant Time: Sep 23 09:41:57 2016
Quant Method : C:\msdchem\1\methods\EPH111815.M
Quant Title : EPH GCFID5
QLast Update : Mon Sep 19 16:42:25 2016
Response via : Initial Calibration
Integrator: ChemStation
Volume Inj. :
Signal #1 Phase : Signal #2 Phase:
Signal #1 Info : Signal #2 Info :



(34) Chlorooctadecane (COD) (S)

6.016min 1.849 ug/mL m

response 155451

(+) = Expected Retention Time

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 16I0708
Project Location: Lowell	RTN:

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

16I0708-01 thru 16I0708-30

Matrices: Soil

CAM Protocol (check all that below)

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

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

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

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

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

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

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

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

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

Signature: Lisa Worthington Position: Project Manager

Printed Name: Lisa A. Worthington Date: 09/23/16

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

October 5, 2016

Andrew Foley
Goldman Environmental
60 Brooks Drive
Braintree, MA 02184

Project Location: Lowell
Client Job Number:
Project Number: 1785-6100
Laboratory Work Order Number: 16I1257

Enclosed are results of analyses for samples received by the laboratory on September 28, 2016. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

James M. Georgantas
Project Manager

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

Goldman Environmental
60 Brooks Drive
Braintree, MA 02184
ATTN: Andrew Foley

REPORT DATE: 10/5/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 1785-6100

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16I1257

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

PROJECT LOCATION: Lowell

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
Containment H20	16I1257-01	Ground Water		SW-846 6020A-B	
				SW-846 7470A	
				SW-846 8082A	
				SW-846 8260C	

con-test® ANALYTICAL LABORATORY

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

CASE NARRATIVE SUMMARY

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

SW-846 8260C

Qualifications:

L-07

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

Analyte & Samples(s) Qualified:

Methylene Chloride
B159569-BSD1

R-05

Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.

Analyte & Samples(s) Qualified:

Tetrahydrofuran
16I1257-01[Containment H20], B159569-BLK1, B159569-BS1, B159569-BSD1

V-05

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

Analyte & Samples(s) Qualified:

Naphthalene
16I1257-01[Containment H20], B159569-BLK1, B159569-BS1, B159569-BSD1

V-16

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

Analyte & Samples(s) Qualified:

1,4-Dioxane
16I1257-01[Containment H20], B159569-BLK1, B159569-BS1, B159569-BSD1

V-20

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

Analyte & Samples(s) Qualified:

Acetone
B159569-BS1, B159569-BSD1

Bromomethane
B159569-BS1, B159569-BSD1

Carbon Disulfide
B159569-BS1, B159569-BSD1

Chloroethane
B159569-BS1, B159569-BSD1

Methylene Chloride
B159569-BS1, B159569-BSD1

Trichlorofluoromethane (Freon 11)
B159569-BS1, B159569-BSD1

Z-01

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

Analyte & Samples(s) Qualified:

16I1257-01[Containment H20]

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

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

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

SW-846 8260C

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

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Project Manager

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

Project Location: Lowell | Sample Description: | Work Order: 16I1257

Date Received: 9/28/2016

Field Sample #: Containment H20 | Sampled: 9/27/2016 08:00

Sample ID: 16I1257-01

Sample Matrix: Ground Water

Sample Flags: Z-01

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	80	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
tert-Amyl Methyl Ether (TAME)	ND	2.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Benzene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Bromobenzene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Bromochloromethane	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Bromodichloromethane	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Bromoform	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Bromomethane	ND	8.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
2-Butanone (MEK)	ND	40	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
n-Butylbenzene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
sec-Butylbenzene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
tert-Butylbenzene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
tert-Butyl Ethyl Ether (TBEE)	ND	2.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Carbon Disulfide	ND	20	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Carbon Tetrachloride	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Chlorobenzene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Chlorodibromomethane	ND	2.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Chloroethane	ND	8.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Chloroform	ND	8.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Chloromethane	ND	20	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
2-Chlorotoluene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
4-Chlorotoluene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,2-Dibromo-3-chloropropane (DBCP)	ND	8.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,2-Dibromoethane (EDB)	ND	2.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Dibromomethane	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,2-Dichlorobenzene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,3-Dichlorobenzene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,4-Dichlorobenzene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Dichlorodifluoromethane (Freon 12)	ND	8.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,1-Dichloroethane	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,2-Dichloroethane	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,1-Dichloroethylene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
cis-1,2-Dichloroethylene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
trans-1,2-Dichloroethylene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,2-Dichloropropane	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,3-Dichloropropane	ND	2.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
2,2-Dichloropropane	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,1-Dichloropropene	ND	2.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
cis-1,3-Dichloropropene	ND	1.6	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
trans-1,3-Dichloropropene	ND	1.6	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Diethyl Ether	ND	8.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Diisopropyl Ether (DIPE)	ND	2.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,4-Dioxane	ND	200	µg/L	4	V-16	SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Ethylbenzene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF

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

Project Location: Lowell | Sample Description: | Work Order: 16I1257

Date Received: 9/28/2016

Field Sample #: Containment H20 | Sampled: 9/27/2016 08:00

Sample ID: 16I1257-01

Sample Matrix: Ground Water

Sample Flags: Z-01

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
2-Hexanone (MBK)	ND	40	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Isopropylbenzene (Cumene)	ND	20	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
p-Isopropyltoluene (p-Cymene)	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Methyl tert-Butyl Ether (MTBE)	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Methylene Chloride	ND	20	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
4-Methyl-2-pentanone (MIBK)	ND	40	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Naphthalene	ND	8.0	µg/L	4	V-05	SW-846 8260C	9/30/16	9/30/16 15:36	MFF
n-Propylbenzene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Styrene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,1,1,2-Tetrachloroethane	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,1,2,2-Tetrachloroethane	ND	2.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Tetrachloroethylene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Tetrahydrofuran	ND	8.0	µg/L	4	R-05	SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Toluene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,2,3-Trichlorobenzene	ND	8.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,2,4-Trichlorobenzene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,1,1-Trichloroethane	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,1,2-Trichloroethane	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Trichloroethylene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Trichlorofluoromethane (Freon 11)	ND	8.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,2,3-Trichloropropane	ND	8.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,2,4-Trimethylbenzene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
1,3,5-Trimethylbenzene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
Vinyl Chloride	ND	8.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
m+p Xylene	ND	8.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF
o-Xylene	ND	4.0	µg/L	4		SW-846 8260C	9/30/16	9/30/16 15:36	MFF

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	119	70-130		9/30/16 15:36
Toluene-d8	91.8	70-130		9/30/16 15:36
4-Bromofluorobenzene	79.3	70-130		9/30/16 15:36

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

Project Location: Lowell | Sample Description: | Work Order: 16I1257

Date Received: 9/28/2016

Field Sample #: Containment H20 | Sampled: 9/27/2016 08:00

Sample ID: 16I1257-01

Sample Matrix: Ground Water

Polychlorinated Biphenyls By GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.20	µg/L	1		SW-846 8082A	9/30/16	10/4/16 14:43	JMB
Aroclor-1221 [1]	ND	0.20	µg/L	1		SW-846 8082A	9/30/16	10/4/16 14:43	JMB
Aroclor-1232 [1]	ND	0.20	µg/L	1		SW-846 8082A	9/30/16	10/4/16 14:43	JMB
Aroclor-1242 [1]	ND	0.20	µg/L	1		SW-846 8082A	9/30/16	10/4/16 14:43	JMB
Aroclor-1248 [1]	ND	0.20	µg/L	1		SW-846 8082A	9/30/16	10/4/16 14:43	JMB
Aroclor-1254 [1]	ND	0.20	µg/L	1		SW-846 8082A	9/30/16	10/4/16 14:43	JMB
Aroclor-1260 [1]	ND	0.20	µg/L	1		SW-846 8082A	9/30/16	10/4/16 14:43	JMB
Aroclor-1262 [1]	ND	0.20	µg/L	1		SW-846 8082A	9/30/16	10/4/16 14:43	JMB
Aroclor-1268 [1]	ND	0.20	µg/L	1		SW-846 8082A	9/30/16	10/4/16 14:43	JMB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	40.9	30-150		10/4/16 14:43
Decachlorobiphenyl [2]	53.2	30-150		10/4/16 14:43
Tetrachloro-m-xylene [1]	46.6	30-150		10/4/16 14:43
Tetrachloro-m-xylene [2]	51.3	30-150		10/4/16 14:43

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

Project Location: Lowell | Sample Description: | Work Order: 16I1257

Date Received: 9/28/2016

Field Sample #: Containment H20 | Sampled: 9/27/2016 08:00

Sample ID: 16I1257-01

Sample Matrix: Ground Water

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.0	µg/L	1		SW-846 6020A-B	9/29/16	9/30/16 6:48	MJH
Arsenic	0.86	0.40	µg/L	1		SW-846 6020A-B	9/29/16	9/30/16 6:48	MJH
Barium	17	10	µg/L	1		SW-846 6020A-B	9/29/16	9/30/16 6:48	MJH
Beryllium	ND	0.40	µg/L	1		SW-846 6020A-B	9/29/16	9/30/16 6:48	MJH
Cadmium	ND	0.50	µg/L	1		SW-846 6020A-B	9/29/16	9/30/16 6:48	MJH
Chromium	1.2	1.0	µg/L	1		SW-846 6020A-B	9/29/16	9/30/16 6:48	MJH
Lead	1.8	1.0	µg/L	1		SW-846 6020A-B	9/29/16	9/30/16 6:48	MJH
Mercury	ND	0.00010	mg/L	1		SW-846 7470A	9/29/16	9/30/16 10:07	SHN
Nickel	ND	5.0	µg/L	1		SW-846 6020A-B	9/29/16	9/30/16 6:48	MJH
Selenium	ND	5.0	µg/L	1		SW-846 6020A-B	9/29/16	9/30/16 6:48	MJH
Silver	ND	0.50	µg/L	1		SW-846 6020A-B	9/29/16	9/30/16 6:48	MJH
Thallium	ND	0.20	µg/L	1		SW-846 6020A-B	9/29/16	9/30/16 6:48	MJH
Vanadium	ND	5.0	µg/L	1		SW-846 6020A-B	9/29/16	9/30/16 6:48	MJH
Zinc	ND	10	µg/L	1		SW-846 6020A-B	9/29/16	9/30/16 6:48	MJH

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

Sample Extraction Data

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

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
16I1257-01 [Containment H20]	B159446	50.0	50.0	09/29/16

Prep Method: SW-846 7470A Prep-SW-846 7470A

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
16I1257-01 [Containment H20]	B159441	6.00	6.00	09/29/16

Prep Method: SW-846 3510C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
16I1257-01 [Containment H20]	B159603	1000	10.0	09/30/16

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

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
16I1257-01 [Containment H20]	B159569	1.25	5.00	09/30/16

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

QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B159569 - SW-846 5030B										
Blank (B159569-BLK1)				Prepared & Analyzed: 09/30/16						
Acetone	ND	20	µg/L							
tert-Amyl Methyl Ether (TAME)	ND	0.50	µg/L							
Benzene	ND	1.0	µg/L							
Bromobenzene	ND	1.0	µg/L							
Bromochloromethane	ND	1.0	µg/L							
Bromodichloromethane	ND	1.0	µg/L							
Bromoform	ND	1.0	µg/L							
Bromomethane	ND	2.0	µg/L							
2-Butanone (MEK)	ND	10	µg/L							
n-Butylbenzene	ND	1.0	µg/L							
sec-Butylbenzene	ND	1.0	µg/L							
tert-Butylbenzene	ND	1.0	µg/L							
tert-Butyl Ethyl Ether (TBEE)	ND	0.50	µg/L							
Carbon Disulfide	ND	5.0	µg/L							
Carbon Tetrachloride	ND	1.0	µg/L							
Chlorobenzene	ND	1.0	µg/L							
Chlorodibromomethane	ND	0.50	µg/L							
Chloroethane	ND	2.0	µg/L							
Chloroform	ND	2.0	µg/L							
Chloromethane	ND	5.0	µg/L							
2-Chlorotoluene	ND	1.0	µg/L							
4-Chlorotoluene	ND	1.0	µg/L							
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.0	µg/L							
1,2-Dibromoethane (EDB)	ND	0.50	µg/L							
Dibromomethane	ND	1.0	µg/L							
1,2-Dichlorobenzene	ND	1.0	µg/L							
1,3-Dichlorobenzene	ND	1.0	µg/L							
1,4-Dichlorobenzene	ND	1.0	µg/L							
Dichlorodifluoromethane (Freon 12)	ND	2.0	µg/L							
1,1-Dichloroethane	ND	1.0	µg/L							
1,2-Dichloroethane	ND	1.0	µg/L							
1,1-Dichloroethylene	ND	1.0	µg/L							
cis-1,2-Dichloroethylene	ND	1.0	µg/L							
trans-1,2-Dichloroethylene	ND	1.0	µg/L							
1,2-Dichloropropane	ND	1.0	µg/L							
1,3-Dichloropropane	ND	0.50	µg/L							
2,2-Dichloropropane	ND	1.0	µg/L							
1,1-Dichloropropene	ND	0.50	µg/L							
cis-1,3-Dichloropropene	ND	0.40	µg/L							
trans-1,3-Dichloropropene	ND	0.40	µg/L							
Diethyl Ether	ND	2.0	µg/L							
Diisopropyl Ether (DIPE)	ND	0.50	µg/L							
1,4-Dioxane	ND	50	µg/L							V-16
Ethylbenzene	ND	1.0	µg/L							
Hexachlorobutadiene	ND	1.0	µg/L							
2-Hexanone (MBK)	ND	10	µg/L							
Isopropylbenzene (Cumene)	ND	5.0	µg/L							
p-Isopropyltoluene (p-Cymene)	ND	1.0	µg/L							
Methyl tert-Butyl Ether (MTBE)	ND	1.0	µg/L							
Methylene Chloride	ND	5.0	µg/L							
4-Methyl-2-pentanone (MIBK)	ND	10	µg/L							
Naphthalene	ND	2.0	µg/L							V-05

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

QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B159569 - SW-846 5030B											
Blank (B159569-BLK1)				Prepared & Analyzed: 09/30/16							
n-Propylbenzene	ND	1.0	µg/L								
Styrene	ND	1.0	µg/L								
1,1,1,2-Tetrachloroethane	ND	1.0	µg/L								
1,1,2,2-Tetrachloroethane	ND	0.50	µg/L								
Tetrachloroethylene	ND	1.0	µg/L								
Tetrahydrofuran	ND	2.0	µg/L							R-05	
Toluene	ND	1.0	µg/L								
1,2,3-Trichlorobenzene	ND	2.0	µg/L								
1,2,4-Trichlorobenzene	ND	1.0	µg/L								
1,1,1-Trichloroethane	ND	1.0	µg/L								
1,1,2-Trichloroethane	ND	1.0	µg/L								
Trichloroethylene	ND	1.0	µg/L								
Trichlorofluoromethane (Freon 11)	ND	2.0	µg/L								
1,2,3-Trichloropropane	ND	2.0	µg/L								
1,2,4-Trimethylbenzene	ND	1.0	µg/L								
1,3,5-Trimethylbenzene	ND	1.0	µg/L								
Vinyl Chloride	ND	2.0	µg/L								
m+p Xylene	ND	2.0	µg/L								
o-Xylene	ND	1.0	µg/L								
Surrogate: 1,2-Dichloroethane-d4	*29.6*		µg/L	25.0		118	70-130				
Surrogate: Toluene-d8	*23.5*		µg/L	25.0		93.9	70-130				
Surrogate: 4-Bromofluorobenzene	*20.3*		µg/L	25.0		81.1	70-130				
LCS (B159569-BS1)				Prepared & Analyzed: 09/30/16							
Acetone	134	20	µg/L	100		134	40-160			L-14, V-20	†
tert-Amyl Methyl Ether (TAME)	8.98	0.50	µg/L	10.0		89.8	70-130				
Benzene	10.6	1.0	µg/L	10.0		106	70-130				
Bromobenzene	10.4	1.0	µg/L	10.0		104	70-130				
Bromochloromethane	11.6	1.0	µg/L	10.0		116	70-130				
Bromodichloromethane	11.3	1.0	µg/L	10.0		113	70-130				
Bromoform	9.71	1.0	µg/L	10.0		97.1	70-130				
Bromomethane	7.86	2.0	µg/L	10.0		78.6	40-160			V-20	†
2-Butanone (MEK)	108	10	µg/L	100		108	40-160				†
n-Butylbenzene	9.52	1.0	µg/L	10.0		95.2	70-130				
sec-Butylbenzene	9.59	1.0	µg/L	10.0		95.9	70-130				
tert-Butylbenzene	9.05	1.0	µg/L	10.0		90.5	70-130				
tert-Butyl Ethyl Ether (TBEE)	9.89	0.50	µg/L	10.0		98.9	70-130				
Carbon Disulfide	12.5	5.0	µg/L	10.0		125	70-130			V-20	
Carbon Tetrachloride	11.0	1.0	µg/L	10.0		110	70-130				
Chlorobenzene	10.3	1.0	µg/L	10.0		103	70-130				
Chlorodibromomethane	11.2	0.50	µg/L	10.0		112	70-130				
Chloroethane	11.6	2.0	µg/L	10.0		116	70-130			V-20	
Chloroform	10.8	2.0	µg/L	10.0		108	70-130				
Chloromethane	7.33	5.0	µg/L	10.0		73.3	40-160				†
2-Chlorotoluene	10.0	1.0	µg/L	10.0		100	70-130				
4-Chlorotoluene	10.2	1.0	µg/L	10.0		102	70-130				
1,2-Dibromo-3-chloropropane (DBCP)	8.76	2.0	µg/L	10.0		87.6	70-130				
1,2-Dibromoethane (EDB)	10.9	0.50	µg/L	10.0		109	70-130				
Dibromomethane	11.2	1.0	µg/L	10.0		112	70-130				
1,2-Dichlorobenzene	9.61	1.0	µg/L	10.0		96.1	70-130				
1,3-Dichlorobenzene	10.6	1.0	µg/L	10.0		106	70-130				
1,4-Dichlorobenzene	10.3	1.0	µg/L	10.0		103	70-130				

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

QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B159569 - SW-846 5030B											
LCS (B159569-BS1)				Prepared & Analyzed: 09/30/16							
Dichlorodifluoromethane (Freon 12)	7.59	2.0	µg/L	10.0		75.9	40-160				†
1,1-Dichloroethane	12.9	1.0	µg/L	10.0		129	70-130				
1,2-Dichloroethane	11.7	1.0	µg/L	10.0		117	70-130				
1,1-Dichloroethylene	12.3	1.0	µg/L	10.0		123	70-130				
cis-1,2-Dichloroethylene	10.8	1.0	µg/L	10.0		108	70-130				
trans-1,2-Dichloroethylene	10.8	1.0	µg/L	10.0		108	70-130				
1,2-Dichloropropane	11.4	1.0	µg/L	10.0		114	70-130				
1,3-Dichloropropane	10.7	0.50	µg/L	10.0		107	70-130				
2,2-Dichloropropane	11.1	1.0	µg/L	10.0		111	70-130				
1,1-Dichloropropene	10.0	0.50	µg/L	10.0		100	70-130				
cis-1,3-Dichloropropene	9.30	0.40	µg/L	10.0		93.0	70-130				
trans-1,3-Dichloropropene	10.8	0.40	µg/L	10.0		108	70-130				
Diethyl Ether	12.1	2.0	µg/L	10.0		121	70-130				
Diisopropyl Ether (DIPE)	10.2	0.50	µg/L	10.0		102	70-130				
1,4-Dioxane	97.5	50	µg/L	100		97.5	40-160			V-16	†
Ethylbenzene	9.24	1.0	µg/L	10.0		92.4	70-130				
Hexachlorobutadiene	10.1	1.0	µg/L	10.0		101	70-130				
2-Hexanone (MBK)	106	10	µg/L	100		106	40-160				†
Isopropylbenzene (Cumene)	11.1	5.0	µg/L	10.0		111	70-130				
p-Isopropyltoluene (p-Cymene)	9.29	1.0	µg/L	10.0		92.9	70-130				
Methyl tert-Butyl Ether (MTBE)	9.63	1.0	µg/L	10.0		96.3	70-130				
Methylene Chloride	11.8	5.0	µg/L	10.0		118	70-130			V-20	
4-Methyl-2-pentanone (MIBK)	105	10	µg/L	100		105	40-160				†
Naphthalene	7.72	2.0	µg/L	10.0		77.2	70-130			V-05	
n-Propylbenzene	9.69	1.0	µg/L	10.0		96.9	70-130				
Styrene	9.04	1.0	µg/L	10.0		90.4	70-130				
1,1,1,2-Tetrachloroethane	10.1	1.0	µg/L	10.0		101	70-130				
1,1,2,2-Tetrachloroethane	12.8	0.50	µg/L	10.0		128	70-130				
Tetrachloroethylene	10.3	1.0	µg/L	10.0		103	70-130				
Tetrahydrofuran	12.1	2.0	µg/L	10.0		121	70-130			R-05	
Toluene	10.9	1.0	µg/L	10.0		109	70-130				
1,2,3-Trichlorobenzene	9.14	2.0	µg/L	10.0		91.4	70-130				
1,2,4-Trichlorobenzene	9.02	1.0	µg/L	10.0		90.2	70-130				
1,1,1-Trichloroethane	10.5	1.0	µg/L	10.0		105	70-130				
1,1,2-Trichloroethane	11.4	1.0	µg/L	10.0		114	70-130				
Trichloroethylene	10.5	1.0	µg/L	10.0		105	70-130				
Trichlorofluoromethane (Freon 11)	12.0	2.0	µg/L	10.0		120	70-130			V-20	
1,2,3-Trichloropropane	10.3	2.0	µg/L	10.0		103	70-130				
1,2,4-Trimethylbenzene	9.55	1.0	µg/L	10.0		95.5	70-130				
1,3,5-Trimethylbenzene	8.92	1.0	µg/L	10.0		89.2	70-130				
Vinyl Chloride	8.28	2.0	µg/L	10.0		82.8	70-130				
m+p Xylene	19.6	2.0	µg/L	20.0		97.9	70-130				
o-Xylene	9.53	1.0	µg/L	10.0		95.3	70-130				
Surrogate: 1,2-Dichloroethane-d4	*27.8*		µg/L	25.0		111	70-130				
Surrogate: Toluene-d8	*27.1*		µg/L	25.0		109	70-130				
Surrogate: 4-Bromofluorobenzene	*23.0*		µg/L	25.0		92.1	70-130				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B159569 - SW-846 5030B												
LCS Dup (B159569-BSD1)				Prepared & Analyzed: 09/30/16								
Acetone	129	20	µg/L	100		129		40-160	4.42	20	V-20	†
tert-Amyl Methyl Ether (TAME)	8.86	0.50	µg/L	10.0		88.6		70-130	1.35	20		
Benzene	10.7	1.0	µg/L	10.0		107		70-130	0.564	20		
Bromobenzene	10.4	1.0	µg/L	10.0		104		70-130	0.192	20		
Bromochloromethane	12.7	1.0	µg/L	10.0		127		70-130	8.87	20		
Bromodichloromethane	11.8	1.0	µg/L	10.0		118		70-130	4.34	20		
Bromoform	10.8	1.0	µg/L	10.0		108		70-130	10.5	20		
Bromomethane	8.94	2.0	µg/L	10.0		89.4		40-160	12.9	20	V-20	†
2-Butanone (MEK)	100	10	µg/L	100		100		40-160	7.60	20		†
n-Butylbenzene	10.1	1.0	µg/L	10.0		101		70-130	6.11	20		
sec-Butylbenzene	10.7	1.0	µg/L	10.0		107		70-130	11.2	20		
tert-Butylbenzene	9.87	1.0	µg/L	10.0		98.7		70-130	8.67	20		
tert-Butyl Ethyl Ether (TBEE)	10.1	0.50	µg/L	10.0		101		70-130	1.70	20		
Carbon Disulfide	12.4	5.0	µg/L	10.0		124		70-130	0.562	20	V-20	
Carbon Tetrachloride	11.6	1.0	µg/L	10.0		116		70-130	5.84	20		
Chlorobenzene	11.1	1.0	µg/L	10.0		111		70-130	7.11	20		
Chlorodibromomethane	11.6	0.50	µg/L	10.0		116		70-130	3.08	20		
Chloroethane	12.0	2.0	µg/L	10.0		120		70-130	3.57	20	V-20	
Chloroform	11.2	2.0	µg/L	10.0		112		70-130	3.47	20		
Chloromethane	7.57	5.0	µg/L	10.0		75.7		40-160	3.22	20		†
2-Chlorotoluene	10.5	1.0	µg/L	10.0		105		70-130	4.57	20		
4-Chlorotoluene	10.9	1.0	µg/L	10.0		109		70-130	6.73	20		
1,2-Dibromo-3-chloropropane (DBCP)	9.58	2.0	µg/L	10.0		95.8		70-130	8.94	20		
1,2-Dibromoethane (EDB)	11.2	0.50	µg/L	10.0		112		70-130	2.44	20		
Dibromomethane	12.0	1.0	µg/L	10.0		120		70-130	6.80	20		
1,2-Dichlorobenzene	10.8	1.0	µg/L	10.0		108		70-130	12.1	20		
1,3-Dichlorobenzene	11.0	1.0	µg/L	10.0		110		70-130	3.61	20		
1,4-Dichlorobenzene	11.1	1.0	µg/L	10.0		111		70-130	7.69	20		
Dichlorodifluoromethane (Freon 12)	7.60	2.0	µg/L	10.0		76.0		40-160	0.132	20		†
1,1-Dichloroethane	12.3	1.0	µg/L	10.0		123		70-130	4.67	20		
1,2-Dichloroethane	11.8	1.0	µg/L	10.0		118		70-130	0.936	20		
1,1-Dichloroethylene	12.1	1.0	µg/L	10.0		121		70-130	1.63	20		
cis-1,2-Dichloroethylene	11.1	1.0	µg/L	10.0		111		70-130	3.29	20		
trans-1,2-Dichloroethylene	12.9	1.0	µg/L	10.0		129		70-130	17.9	20		
1,2-Dichloropropane	11.2	1.0	µg/L	10.0		112		70-130	2.13	20		
1,3-Dichloropropane	10.9	0.50	µg/L	10.0		109		70-130	2.13	20		
2,2-Dichloropropane	10.9	1.0	µg/L	10.0		109		70-130	2.46	20		
1,1-Dichloropropene	10.8	0.50	µg/L	10.0		108		70-130	7.02	20		
cis-1,3-Dichloropropene	9.67	0.40	µg/L	10.0		96.7		70-130	3.90	20		
trans-1,3-Dichloropropene	10.6	0.40	µg/L	10.0		106		70-130	1.86	20		
Diethyl Ether	11.4	2.0	µg/L	10.0		114		70-130	6.20	20		
Diisopropyl Ether (DIPE)	9.94	0.50	µg/L	10.0		99.4		70-130	2.48	20		
1,4-Dioxane	88.3	50	µg/L	100		88.3		40-160	9.90	20	V-16	†
Ethylbenzene	10.1	1.0	µg/L	10.0		101		70-130	9.09	20		
Hexachlorobutadiene	9.95	1.0	µg/L	10.0		99.5		70-130	1.60	20		
2-Hexanone (MBK)	103	10	µg/L	100		103		40-160	3.51	20		†
Isopropylbenzene (Cumene)	11.8	5.0	µg/L	10.0		118		70-130	6.36	20		
p-Isopropyltoluene (p-Cymene)	9.57	1.0	µg/L	10.0		95.7		70-130	2.97	20		
Methyl tert-Butyl Ether (MTBE)	11.5	1.0	µg/L	10.0		115		70-130	17.6	20		
Methylene Chloride	14.0	5.0	µg/L	10.0		**140**	*	70-130	16.7	20	L-07, V-20	
4-Methyl-2-pentanone (MIBK)	102	10	µg/L	100		102		40-160	2.55	20		†
Naphthalene	8.65	2.0	µg/L	10.0		86.5		70-130	11.4	20	V-05	

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD		RPD Limit	Notes
Batch B159569 - SW-846 5030B											
LCS Dup (B159569-BSD1)				Prepared & Analyzed: 09/30/16							
n-Propylbenzene	10.2	1.0	µg/L	10.0		102	70-130	5.32		20	
Styrene	9.48	1.0	µg/L	10.0		94.8	70-130	4.75		20	
1,1,1,2-Tetrachloroethane	11.0	1.0	µg/L	10.0		110	70-130	8.16		20	
1,1,2,2-Tetrachloroethane	12.5	0.50	µg/L	10.0		125	70-130	1.90		20	
Tetrachloroethylene	11.0	1.0	µg/L	10.0		110	70-130	6.59		20	
Tetrahydrofuran	9.81	2.0	µg/L	10.0		98.1	70-130	**20.7**	*	20	R-05
Toluene	11.5	1.0	µg/L	10.0		115	70-130	5.00		20	
1,2,3-Trichlorobenzene	9.83	2.0	µg/L	10.0		98.3	70-130	7.27		20	
1,2,4-Trichlorobenzene	9.35	1.0	µg/L	10.0		93.5	70-130	3.59		20	
1,1,1-Trichloroethane	10.9	1.0	µg/L	10.0		109	70-130	3.84		20	
1,1,2-Trichloroethane	11.8	1.0	µg/L	10.0		118	70-130	4.06		20	
Trichloroethylene	11.0	1.0	µg/L	10.0		110	70-130	4.72		20	
Trichlorofluoromethane (Freon 11)	12.1	2.0	µg/L	10.0		121	70-130	0.749		20	V-20
1,2,3-Trichloropropane	10.5	2.0	µg/L	10.0		105	70-130	2.02		20	
1,2,4-Trimethylbenzene	9.91	1.0	µg/L	10.0		99.1	70-130	3.70		20	
1,3,5-Trimethylbenzene	9.41	1.0	µg/L	10.0		94.1	70-130	5.35		20	
Vinyl Chloride	8.60	2.0	µg/L	10.0		86.0	70-130	3.79		20	
m+p Xylene	21.0	2.0	µg/L	20.0		105	70-130	6.81		20	
o-Xylene	9.86	1.0	µg/L	10.0		98.6	70-130	3.40		20	
Surrogate: 1,2-Dichloroethane-d4	*27.4*		µg/L	25.0		110	70-130				
Surrogate: Toluene-d8	*27.0*		µg/L	25.0		108	70-130				
Surrogate: 4-Bromofluorobenzene	*23.1*		µg/L	25.0		92.6	70-130				

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QUALITY CONTROL

Polychlorinated Biphenyls By GC/ECD - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B159603 - SW-846 3510C										
Blank (B159603-BLK1)				Prepared: 09/30/16 Analyzed: 10/04/16						
Aroclor-1016	ND	0.20	µg/L							
Aroclor-1016 [2C]	ND	0.20	µg/L							
Aroclor-1221	ND	0.20	µg/L							
Aroclor-1221 [2C]	ND	0.20	µg/L							
Aroclor-1232	ND	0.20	µg/L							
Aroclor-1232 [2C]	ND	0.20	µg/L							
Aroclor-1242	ND	0.20	µg/L							
Aroclor-1242 [2C]	ND	0.20	µg/L							
Aroclor-1248	ND	0.20	µg/L							
Aroclor-1248 [2C]	ND	0.20	µg/L							
Aroclor-1254	ND	0.20	µg/L							
Aroclor-1254 [2C]	ND	0.20	µg/L							
Aroclor-1260	ND	0.20	µg/L							
Aroclor-1260 [2C]	ND	0.20	µg/L							
Aroclor-1262	ND	0.20	µg/L							
Aroclor-1262 [2C]	ND	0.20	µg/L							
Aroclor-1268	ND	0.20	µg/L							
Aroclor-1268 [2C]	ND	0.20	µg/L							
Surrogate: Decachlorobiphenyl	*1.88*		µg/L	2.00		94.2	30-150			
Surrogate: Decachlorobiphenyl [2C]	*2.24*		µg/L	2.00		112	30-150			
Surrogate: Tetrachloro-m-xylene	*1.63*		µg/L	2.00		81.7	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*1.86*		µg/L	2.00		93.0	30-150			
LCS (B159603-BS1)				Prepared: 09/30/16 Analyzed: 10/04/16						
Aroclor-1016	0.44	0.20	µg/L	0.500		87.8	40-140			
Aroclor-1016 [2C]	0.49	0.20	µg/L	0.500		97.8	40-140			
Aroclor-1260	0.42	0.20	µg/L	0.500		84.9	40-140			
Aroclor-1260 [2C]	0.45	0.20	µg/L	0.500		89.9	40-140			
Surrogate: Decachlorobiphenyl	*1.90*		µg/L	2.00		95.0	30-150			
Surrogate: Decachlorobiphenyl [2C]	*2.29*		µg/L	2.00		114	30-150			
Surrogate: Tetrachloro-m-xylene	*1.71*		µg/L	2.00		85.7	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*1.94*		µg/L	2.00		97.2	30-150			
LCS Dup (B159603-BSD1)				Prepared: 09/30/16 Analyzed: 10/04/16						
Aroclor-1016	0.46	0.20	µg/L	0.500		92.2	40-140	4.85	20	
Aroclor-1016 [2C]	0.46	0.20	µg/L	0.500		92.8	40-140	5.30	20	
Aroclor-1260	0.41	0.20	µg/L	0.500		81.6	40-140	3.97	20	
Aroclor-1260 [2C]	0.44	0.20	µg/L	0.500		87.6	40-140	2.63	20	
Surrogate: Decachlorobiphenyl	*1.71*		µg/L	2.00		85.3	30-150			
Surrogate: Decachlorobiphenyl [2C]	*2.05*		µg/L	2.00		103	30-150			
Surrogate: Tetrachloro-m-xylene	*1.68*		µg/L	2.00		84.0	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*1.89*		µg/L	2.00		94.3	30-150			

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B159441 - SW-846 7470A Prep										
Blank (B159441-BLK1)				Prepared: 09/29/16 Analyzed: 09/30/16						
Mercury	ND	0.00010	mg/L							
LCS (B159441-BS1)				Prepared: 09/29/16 Analyzed: 09/30/16						
Mercury	0.00205	0.00010	mg/L	0.00200		103	80-120			
LCS Dup (B159441-BSD1)				Prepared: 09/29/16 Analyzed: 09/30/16						
Mercury	0.00204	0.00010	mg/L	0.00200		102	80-120	0.612	20	
Batch B159446 - SW-846 3005A										
Blank (B159446-BLK1)				Prepared: 09/29/16 Analyzed: 09/30/16						
Antimony	ND	1.0	µg/L							
Arsenic	ND	0.40	µg/L							
Barium	ND	10	µg/L							
Beryllium	ND	0.40	µg/L							
Cadmium	ND	0.50	µg/L							
Chromium	ND	1.0	µg/L							
Lead	ND	1.0	µg/L							
Nickel	ND	5.0	µg/L							
Selenium	ND	5.0	µg/L							
Silver	ND	0.50	µg/L							
Thallium	ND	0.20	µg/L							
Vanadium	ND	5.0	µg/L							
Zinc	ND	10	µg/L							
LCS (B159446-BS1)				Prepared: 09/29/16 Analyzed: 09/30/16						
Antimony	265	5.0	µg/L	250		106	80-120			
Arsenic	267	2.0	µg/L	250		107	80-120			
Barium	263	50	µg/L	250		105	80-120			
Beryllium	260	2.0	µg/L	250		104	80-120			
Cadmium	265	2.5	µg/L	250		106	80-120			
Chromium	267	5.0	µg/L	250		107	80-120			
Lead	264	5.0	µg/L	250		105	80-120			
Nickel	269	25	µg/L	250		107	80-120			
Selenium	279	25	µg/L	250		112	80-120			
Silver	253	2.5	µg/L	250		101	80-120			
Thallium	251	1.0	µg/L	250		100	80-120			
Vanadium	261	25	µg/L	250		105	80-120			
Zinc	286	50	µg/L	250		114	80-120			
LCS Dup (B159446-BSD1)				Prepared: 09/29/16 Analyzed: 09/30/16						
Antimony	273	5.0	µg/L	250		109	80-120	3.03	20	
Arsenic	265	2.0	µg/L	250		106	80-120	1.03	20	
Barium	260	50	µg/L	250		104	80-120	1.04	20	
Beryllium	274	2.0	µg/L	250		110	80-120	5.16	20	
Cadmium	264	2.5	µg/L	250		106	80-120	0.458	20	
Chromium	259	5.0	µg/L	250		104	80-120	3.01	20	
Lead	264	5.0	µg/L	250		106	80-120	0.170	20	
Nickel	258	25	µg/L	250		103	80-120	3.87	20	
Selenium	274	25	µg/L	250		109	80-120	2.01	20	
Silver	253	2.5	µg/L	250		101	80-120	0.280	20	
Thallium	251	1.0	µg/L	250		100	80-120	0.0176	20	
Vanadium	256	25	µg/L	250		102	80-120	2.26	20	
Zinc	276	50	µg/L	250		110	80-120	3.50	20	

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B159603-BS1 Date(s) Analyzed: 10/04/2016 10/04/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	0.00	0.00	0.44	
	2	0.00	0.00	0.00	0.49	11
Aroclor-1260	1	0.00	0.00	0.00	0.42	
	2	0.00	0.00	0.00	0.45	6

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B159603-BSD1 Date(s) Analyzed: 10/04/2016 10/04/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	0.00	0.00	0.46	
	2	0.00	0.00	0.00	0.46	0
Aroclor-1260	1	0.00	0.00	0.00	0.41	
	2	0.00	0.00	0.00	0.44	8

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit
DL	Method Detection Limit
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.

L-07	Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.
L-14	Compound classified by MA CAM as difficult with acceptable recoveries of 40-160%. Recovery does not meet 70-130% criteria but does meet difficult compound criteria.
R-05	Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.
V-05	Continuing calibration did not meet method specifications and was biased on the low side for this compound. Increased uncertainty is associated with the reported value which is likely to be biased on the low side.
V-16	Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy may be associated with reported result.
V-20	Continuing calibration did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.
Z-01	Elevated reporting limit due to sample matrix. MA CAM reporting limit not met.

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

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 6020A-B in Water	
Antimony	CT,NH,NY,ME,VA,NC
Arsenic	CT,NH,NY,ME,VA,NC
Barium	CT,NH,NY,ME,VA,NC
Beryllium	CT,NH,NY,ME,VA,NC
Cadmium	CT,NH,NY,RI,ME,VA,NC
Chromium	CT,NH,NY,ME,VA,NC
Lead	CT,NH,NY,ME,VA,NC
Nickel	CT,NH,NY,ME,VA,NC
Selenium	CT,NH,NY,ME,VA,NC
Silver	CT,NH,NY,ME,VA,NC
Thallium	CT,NH,NY,ME,VA,NC
Vanadium	CT,NH,NY,ME,VA,NC
Zinc	CT,NH,NY,ME,VA,NC
SW-846 7470A in Water	
Mercury	CT,NH,NY,NC,ME,VA
SW-846 8082A in Water	
Aroclor-1016	CT,NH,NY,NC,ME,VA
Aroclor-1016 [2C]	CT,NH,NY,NC,ME,VA
Aroclor-1221	CT,NH,NY,NC,ME,VA
Aroclor-1221 [2C]	CT,NH,NY,NC,ME,VA
Aroclor-1232	CT,NH,NY,NC,ME,VA
Aroclor-1232 [2C]	CT,NH,NY,NC,ME,VA
Aroclor-1242	CT,NH,NY,NC,ME,VA
Aroclor-1242 [2C]	CT,NH,NY,NC,ME,VA
Aroclor-1248	CT,NH,NY,NC,ME,VA
Aroclor-1248 [2C]	CT,NH,NY,NC,ME,VA
Aroclor-1254	CT,NH,NY,NC,ME,VA
Aroclor-1254 [2C]	CT,NH,NY,NC,ME,VA
Aroclor-1260	CT,NH,NY,NC,ME,VA
Aroclor-1260 [2C]	CT,NH,NY,NC,ME,VA
Aroclor-1262	NH,NY,NC,ME,VA
Aroclor-1262 [2C]	NH,NY,NC,ME,VA
Aroclor-1268	NH,NY,NC,ME,VA
Aroclor-1268 [2C]	NH,NY,NC,ME,VA
SW-846 8260C in Water	
Acetone	CT,NH,NY,ME
tert-Amyl Methyl Ether (TAME)	NH,NY,ME
Benzene	CT,NH,NY,ME
Bromobenzene	ME
Bromochloromethane	NH,NY,ME
Bromodichloromethane	CT,NH,NY,ME
Bromoform	CT,NH,NY,ME
Bromomethane	CT,NH,NY,ME
2-Butanone (MEK)	CT,NH,NY,ME
n-Butylbenzene	NY,ME
sec-Butylbenzene	NY,ME

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8260C in Water	
tert-Butylbenzene	NY,ME
tert-Butyl Ethyl Ether (TBEE)	NH,NY,ME
Carbon Disulfide	CT,NH,NY,ME
Carbon Tetrachloride	CT,NH,NY,ME
Chlorobenzene	CT,NH,NY,ME
Chlorodibromomethane	CT,NH,NY,ME
Chloroethane	CT,NH,NY,ME
Chloroform	CT,NH,NY,ME
Chloromethane	CT,NH,NY,ME
2-Chlorotoluene	NY,ME
4-Chlorotoluene	NY,ME
Dibromomethane	NH,NY,ME
1,2-Dichlorobenzene	CT,NY,ME
1,3-Dichlorobenzene	CT,NH,NY,ME
1,4-Dichlorobenzene	CT,NH,NY,ME
Dichlorodifluoromethane (Freon 12)	NH,NY,ME
1,1-Dichloroethane	CT,NH,NY,ME
1,2-Dichloroethane	CT,NH,NY,ME
1,1-Dichloroethylene	CT,NH,NY,ME
cis-1,2-Dichloroethylene	NY,ME
trans-1,2-Dichloroethylene	CT,NH,NY,ME
1,2-Dichloropropane	CT,NH,NY,ME
1,3-Dichloropropane	NY,ME
2,2-Dichloropropane	NH,NY,ME
1,1-Dichloropropene	NH,NY,ME
cis-1,3-Dichloropropene	CT,NH,NY,ME
trans-1,3-Dichloropropene	CT,NH,NY,ME
Diisopropyl Ether (DIPE)	NH,NY,ME
Ethylbenzene	CT,NH,NY,ME
Hexachlorobutadiene	CT,NH,NY,ME
2-Hexanone (MBK)	CT,NH,NY,ME
Isopropylbenzene (Cumene)	NY,ME
p-Isopropyltoluene (p-Cymene)	CT,NH,NY,ME
Methyl tert-Butyl Ether (MTBE)	CT,NH,NY,ME
Methylene Chloride	CT,NH,NY,ME
4-Methyl-2-pentanone (MIBK)	CT,NH,NY,ME
Naphthalene	NH,NY,ME
n-Propylbenzene	CT,NH,NY,ME
Styrene	CT,NH,NY,ME
1,1,1,2-Tetrachloroethane	CT,NH,NY,ME
1,1,2,2-Tetrachloroethane	CT,NH,NY,ME
Tetrachloroethylene	CT,NH,NY,ME
Toluene	CT,NH,NY,ME
1,2,3-Trichlorobenzene	NH,NY,ME
1,2,4-Trichlorobenzene	CT,NH,NY,ME
1,1,1-Trichloroethane	CT,NH,NY,ME
1,1,2-Trichloroethane	CT,NH,NY,ME

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

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8260C in Water	
Trichloroethylene	CT,NH,NY,ME
Trichlorofluoromethane (Freon 11)	CT,NH,NY,ME
1,2,3-Trichloropropane	NH,NY,ME
1,2,4-Trimethylbenzene	NY,ME
1,3,5-Trimethylbenzene	NY,ME
Vinyl Chloride	CT,NH,NY,ME
m+p Xylene	CT,NH,NY,ME
o-Xylene	CT,NH,NY,ME

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

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	02/1/2018
MA	Massachusetts DEP	M-MA100	06/30/2017
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2017
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2017
RI	Rhode Island Department of Health	LAO00112	12/30/2016
NC	North Carolina Div. of Water Quality	652	12/31/2016
NJ	New Jersey DEP	MA007 NELAP	06/30/2017
FL	Florida Department of Health	E871027 NELAP	06/30/2017
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2017
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2016
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2017

con-test® ANALYTICAL LABORATORY
Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com
www.contestlabs.com

CHAIN OF CUSTODY RECORD

16I 1257

Rev 04.05.12

39 Spruce Street
East longmeadow, MA 01028

Company Name: GEC
Address: 60 Brooks Dr
Attention: A. Foley, B. Butler, E. Furlong
Project Location: Lowell
Sampled By: A. Foley

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

Telephone:
Project # 1785-6100
Client PO# ~~[illegible]~~ 17APF

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

ANALYSIS REQUESTED

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	VOC	PCBs	Metals
01	Containment H2O	9/27/16	8:00		X	W	U	X	X	X

# of Containers
** Preservation
***Container Code

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

Comments:

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

Relinquished by: (signature)	Date/Time:
[signature] 9/28/16	2:25
Received by: (signature) [signature] 9/28/16	2:30
Relinquished by: (signature) [signature] 9/28/16	5:20
Received by: (signature) [signature] 3.9 9/28/16	1720

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

Detection Limit Requirements
Massachusetts: GW-1
Connecticut:
Other:

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

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

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

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

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

con-test® ANALYTICAL LABORATORY

Sample Receipt Checklist

CLIENT NAME: GEC **RECEIVED BY:** JM **DATE:** 9/28/16

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

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

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

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

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

Temperature °C by Temp blank ____ Temperature °C by Temp gun 3.9

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

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

7) **Location where samples are stored:** Log-in

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

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

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

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

Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber	2	16 oz amber	
500 mL Amber		8 oz amber/clear jar	
250 mL Amber (8oz amber)		4 oz amber/clear jar	
1 Liter Plastic		2 oz amber/clear jar	
500 mL Plastic		Plastic Bag / Ziploc	
250 mL plastic	1	SOC Kit	
40 mL Vial - type listed below	3	Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

40 mL vials: # HCl 3 # Methanol ____ **Time and Date Frozen:**
Bisulfate ____ # DI Water ____
Thiosulfate ____ Unpreserved ____

Login Sample Receipt Checklist

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

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

Who notified of False statements? **Date/Time:**

Doc #277 Rev. 4 August 2013 **Log-In Technician Initials:** JM **Date/Time:** 9/28/16 1720

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 16I1257
Project Location: Lowell	RTN:

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

16I1257-01

Matrices: Water

CAM Protocol (check all that below)

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

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

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

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

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

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

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

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

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

Signature: Position: Project Manager

Printed Name: Lisa A. Worthington Date: 10/05/16

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

October 7, 2016

Drew Foley
Goldman Environmental
60 Brooks Drive
Braintree, MA 02184

Project Location: Lowell
Client Job Number:
Project Number: 1785-6100
Laboratory Work Order Number: 16I1385

Enclosed are results of analyses for samples received by the laboratory on September 30, 2016. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

James M. Georgantas
Project Manager

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

Goldman Environmental
60 Brooks Drive
Braintree, MA 02184
ATTN: Drew Foley

REPORT DATE: 10/7/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 1785-6100

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16I1385

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

PROJECT LOCATION: Lowell

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
B-9 (5'E)(0-1)	16I1385-01	Soil		SM 2540G	
				SW-846 8082A	
B-9 (5'E)(1-3)	16I1385-02	Soil		SM 2540G	
				SW-846 8082A	
B-9 (5'N)(0-1)	16I1385-03	Soil		SM 2540G	
				SW-846 8082A	
B-9 (5'W)(0-1)	16I1385-04	Soil		SM 2540G	
				SW-846 8082A	
B-9 (5'S)(0-1)	16I1385-05	Soil		SM 2540G	
				SW-846 8082A	
Containment H2O	16I1385-06	Water		SW-846 1010A	

con-test® ANALYTICAL LABORATORY

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

CASE NARRATIVE SUMMARY

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

SW-846 8082A

Qualifications:

R-05

Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.

Analyte & Samples(s) Qualified:

Aroclor-1016
16I1385-01[B-9 (5'E)(0-1)], 16I1385-02[B-9 (5'E)(1-3)], 16I1385-03[B-9 (5'N)(0-1)], 16I1385-04[B-9 (5'W)(0-1)], 16I1385-05[B-9 (5'S)(0-1)], B159636-BLK1, B159636-BS1, B159636-BSD1

Aroclor-1016 [2C]
16I1385-01[B-9 (5'E)(0-1)], 16I1385-02[B-9 (5'E)(1-3)], 16I1385-03[B-9 (5'N)(0-1)], 16I1385-04[B-9 (5'W)(0-1)], 16I1385-05[B-9 (5'S)(0-1)], B159636-BLK1, B159636-BS1, B159636-BSD1

Aroclor-1260
16I1385-01[B-9 (5'E)(0-1)], 16I1385-02[B-9 (5'E)(1-3)], 16I1385-03[B-9 (5'N)(0-1)], 16I1385-04[B-9 (5'W)(0-1)], 16I1385-05[B-9 (5'S)(0-1)], B159636-BLK1, B159636-BS1, B159636-BSD1

Aroclor-1260 [2C]
16I1385-01[B-9 (5'E)(0-1)], 16I1385-02[B-9 (5'E)(1-3)], 16I1385-03[B-9 (5'N)(0-1)], 16I1385-04[B-9 (5'W)(0-1)], 16I1385-05[B-9 (5'S)(0-1)], B159636-BLK1, B159636-BS1, B159636-BSD1

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

Decachlorobiphenyl
16I1385-01[B-9 (5'E)(0-1)], 16I1385-02[B-9 (5'E)(1-3)], 16I1385-03[B-9 (5'N)(0-1)], 16I1385-04[B-9 (5'W)(0-1)], 16I1385-05[B-9 (5'S)(0-1)]

Decachlorobiphenyl [2C]
16I1385-01[B-9 (5'E)(0-1)], 16I1385-02[B-9 (5'E)(1-3)], 16I1385-03[B-9 (5'N)(0-1)], 16I1385-04[B-9 (5'W)(0-1)], 16I1385-05[B-9 (5'S)(0-1)]

Tetrachloro-m-xylene
16I1385-01[B-9 (5'E)(0-1)], 16I1385-02[B-9 (5'E)(1-3)], 16I1385-03[B-9 (5'N)(0-1)], 16I1385-04[B-9 (5'W)(0-1)], 16I1385-05[B-9 (5'S)(0-1)]

Tetrachloro-m-xylene [2C]
16I1385-01[B-9 (5'E)(0-1)], 16I1385-02[B-9 (5'E)(1-3)], 16I1385-03[B-9 (5'N)(0-1)], 16I1385-04[B-9 (5'W)(0-1)], 16I1385-05[B-9 (5'S)(0-1)]

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Project Manager

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

Project Location: Lowell | Sample Description: | Work Order: 16I1385

Date Received: 9/30/2016

Field Sample #: B-9 (5'E)(0-1) | Sampled: 9/30/2016 00:00

Sample ID: 16I1385-01

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	2.4	mg/Kg dry	100	R-05	SW-846 8082A	9/30/16	10/3/16 19:20	KAL
Aroclor-1221 [1]	ND	2.4	mg/Kg dry	100		SW-846 8082A	9/30/16	10/3/16 19:20	KAL
Aroclor-1232 [1]	ND	2.4	mg/Kg dry	100		SW-846 8082A	9/30/16	10/3/16 19:20	KAL
Aroclor-1242 [1]	ND	2.4	mg/Kg dry	100		SW-846 8082A	9/30/16	10/3/16 19:20	KAL
Aroclor-1248 [1]	ND	2.4	mg/Kg dry	100		SW-846 8082A	9/30/16	10/3/16 19:20	KAL
Aroclor-1254 [2]	18	2.4	mg/Kg dry	100		SW-846 8082A	9/30/16	10/3/16 19:20	KAL
Aroclor-1260 [2]	4.2	2.4	mg/Kg dry	100	R-05	SW-846 8082A	9/30/16	10/3/16 19:20	KAL
Aroclor-1262 [1]	ND	2.4	mg/Kg dry	100		SW-846 8082A	9/30/16	10/3/16 19:20	KAL
Aroclor-1268 [1]	ND	2.4	mg/Kg dry	100		SW-846 8082A	9/30/16	10/3/16 19:20	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	10/3/16 19:20
Decachlorobiphenyl [2]	*	30-150	S-01	10/3/16 19:20
Tetrachloro-m-xylene [1]	*	30-150	S-01	10/3/16 19:20
Tetrachloro-m-xylene [2]	*	30-150	S-01	10/3/16 19:20

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Project Location: Lowell | Sample Description: | Work Order: 16I1385

Date Received: 9/30/2016

Field Sample #: B-9 (5'E)(0-1) | Sampled: 9/30/2016 00:00

Sample ID: 16I1385-01

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	81.7		% Wt	1		SM 2540G	9/30/16	10/1/16 11:57	CTL

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Project Location: Lowell | Sample Description: | Work Order: 16I1385

Date Received: 9/30/2016

Field Sample #: B-9 (5'E)(1-3) | Sampled: 9/30/2016 00:00

Sample ID: 16I1385-02

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	1.1	mg/Kg dry	50	R-05	SW-846 8082A	9/30/16	10/3/16 19:37	KAL
Aroclor-1221 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/30/16	10/3/16 19:37	KAL
Aroclor-1232 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/30/16	10/3/16 19:37	KAL
Aroclor-1242 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/30/16	10/3/16 19:37	KAL
Aroclor-1248 [2]	2.5	1.1	mg/Kg dry	50		SW-846 8082A	9/30/16	10/3/16 19:37	KAL
Aroclor-1254 [2]	9.8	1.1	mg/Kg dry	50		SW-846 8082A	9/30/16	10/3/16 19:37	KAL
Aroclor-1260 [2]	5.4	1.1	mg/Kg dry	50	R-05	SW-846 8082A	9/30/16	10/3/16 19:37	KAL
Aroclor-1262 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/30/16	10/3/16 19:37	KAL
Aroclor-1268 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/30/16	10/3/16 19:37	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	10/3/16 19:37
Decachlorobiphenyl [2]	*	30-150	S-01	10/3/16 19:37
Tetrachloro-m-xylene [1]	*	30-150	S-01	10/3/16 19:37
Tetrachloro-m-xylene [2]	*	30-150	S-01	10/3/16 19:37

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Project Location: Lowell | Sample Description: | Work Order: 16I1385

Date Received: 9/30/2016

Field Sample #: B-9 (5'E)(1-3) | Sampled: 9/30/2016 00:00

Sample ID: 16I1385-02

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	86.7		% Wt	1		SM 2540G	9/30/16	10/1/16 11:57	CTL

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Project Location: Lowell | Sample Description: | Work Order: 16I1385

Date Received: 9/30/2016

Field Sample #: B-9 (5'N)(0-1) | Sampled: 9/30/2016 00:00

Sample ID: 16I1385-03

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	1.1	mg/Kg dry	50	R-05	SW-846 8082A	9/30/16	10/3/16 19:55	KAL
Aroclor-1221 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/30/16	10/3/16 19:55	KAL
Aroclor-1232 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/30/16	10/3/16 19:55	KAL
Aroclor-1242 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/30/16	10/3/16 19:55	KAL
Aroclor-1248 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/30/16	10/3/16 19:55	KAL
Aroclor-1254 [2]	7.4	1.1	mg/Kg dry	50		SW-846 8082A	9/30/16	10/3/16 19:55	KAL
Aroclor-1260 [2]	1.7	1.1	mg/Kg dry	50	R-05	SW-846 8082A	9/30/16	10/3/16 19:55	KAL
Aroclor-1262 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/30/16	10/3/16 19:55	KAL
Aroclor-1268 [1]	ND	1.1	mg/Kg dry	50		SW-846 8082A	9/30/16	10/3/16 19:55	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	10/3/16 19:55
Decachlorobiphenyl [2]	*	30-150	S-01	10/3/16 19:55
Tetrachloro-m-xylene [1]	*	30-150	S-01	10/3/16 19:55
Tetrachloro-m-xylene [2]	*	30-150	S-01	10/3/16 19:55

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Project Location: Lowell | Sample Description: | Work Order: 16I1385

Date Received: 9/30/2016

Field Sample #: B-9 (5'N)(0-1) | Sampled: 9/30/2016 00:00

Sample ID: 16I1385-03

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	88.9		% Wt	1		SM 2540G	9/30/16	10/1/16 11:57	CTL

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Project Location: Lowell | Sample Description: | Work Order: 16I1385

Date Received: 9/30/2016

Field Sample #: B-9 (5'W)(0-1) | Sampled: 9/30/2016 00:00

Sample ID: 16I1385-04

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	3.1	mg/Kg dry	100	R-05	SW-846 8082A	9/30/16	10/3/16 20:12	KAL
Aroclor-1221 [1]	ND	3.1	mg/Kg dry	100		SW-846 8082A	9/30/16	10/3/16 20:12	KAL
Aroclor-1232 [1]	ND	3.1	mg/Kg dry	100		SW-846 8082A	9/30/16	10/3/16 20:12	KAL
Aroclor-1242 [1]	ND	3.1	mg/Kg dry	100		SW-846 8082A	9/30/16	10/3/16 20:12	KAL
Aroclor-1248 [1]	ND	3.1	mg/Kg dry	100		SW-846 8082A	9/30/16	10/3/16 20:12	KAL
Aroclor-1254 [2]	20	3.1	mg/Kg dry	100		SW-846 8082A	9/30/16	10/3/16 20:12	KAL
Aroclor-1260 [2]	4.4	3.1	mg/Kg dry	100	R-05	SW-846 8082A	9/30/16	10/3/16 20:12	KAL
Aroclor-1262 [1]	ND	3.1	mg/Kg dry	100		SW-846 8082A	9/30/16	10/3/16 20:12	KAL
Aroclor-1268 [1]	ND	3.1	mg/Kg dry	100		SW-846 8082A	9/30/16	10/3/16 20:12	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	10/3/16 20:12
Decachlorobiphenyl [2]	*	30-150	S-01	10/3/16 20:12
Tetrachloro-m-xylene [1]	*	30-150	S-01	10/3/16 20:12
Tetrachloro-m-xylene [2]	*	30-150	S-01	10/3/16 20:12

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Project Location: Lowell | Sample Description: | Work Order: 16I1385

Date Received: 9/30/2016

Field Sample #: B-9 (5'W)(0-1) | Sampled: 9/30/2016 00:00

Sample ID: 16I1385-04

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	63.1		% Wt	1		SM 2540G	9/30/16	10/1/16 11:57	CTL

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Project Location: Lowell | Sample Description: | Work Order: 16I1385

Date Received: 9/30/2016

Field Sample #: B-9 (5'S)(0-1) | Sampled: 9/30/2016 00:00

Sample ID: 16I1385-05

Sample Matrix: Soil

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	4.6	mg/Kg dry	200	R-05	SW-846 8082A	9/30/16	10/3/16 20:29	KAL
Aroclor-1221 [1]	ND	4.6	mg/Kg dry	200		SW-846 8082A	9/30/16	10/3/16 20:29	KAL
Aroclor-1232 [1]	ND	4.6	mg/Kg dry	200		SW-846 8082A	9/30/16	10/3/16 20:29	KAL
Aroclor-1242 [1]	ND	4.6	mg/Kg dry	200		SW-846 8082A	9/30/16	10/3/16 20:29	KAL
Aroclor-1248 [1]	ND	4.6	mg/Kg dry	200		SW-846 8082A	9/30/16	10/3/16 20:29	KAL
Aroclor-1254 [2]	30	4.6	mg/Kg dry	200		SW-846 8082A	9/30/16	10/3/16 20:29	KAL
Aroclor-1260 [2]	6.5	4.6	mg/Kg dry	200	R-05	SW-846 8082A	9/30/16	10/3/16 20:29	KAL
Aroclor-1262 [1]	ND	4.6	mg/Kg dry	200		SW-846 8082A	9/30/16	10/3/16 20:29	KAL
Aroclor-1268 [1]	ND	4.6	mg/Kg dry	200		SW-846 8082A	9/30/16	10/3/16 20:29	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	10/3/16 20:29
Decachlorobiphenyl [2]	*	30-150	S-01	10/3/16 20:29
Tetrachloro-m-xylene [1]	*	30-150	S-01	10/3/16 20:29
Tetrachloro-m-xylene [2]	*	30-150	S-01	10/3/16 20:29

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Project Location: Lowell | Sample Description: | Work Order: 16I1385

Date Received: 9/30/2016

Field Sample #: B-9 (5'S)(0-1) | Sampled: 9/30/2016 00:00

Sample ID: 16I1385-05

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	85.2		% Wt	1		SM 2540G	9/30/16	10/1/16 11:57	CTL

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Project Location: Lowell | Sample Description: | Work Order: 16I1385

Date Received: 9/30/2016

Field Sample #: Containment H2O

Sample ID: 16I1385-06 | Start Date/Time: 9/30/2016 9:00:00AM

Sample Matrix: Water | Stop Date/Time: 9/30/2016 1:05:00PM

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Flashpoint	> 212 °F		°F	1		SW-846 1010A	10/3/16	10/3/16 17:55	AG

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Sample Extraction Data

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
16I1385-01 [B-9 (5'E)(0-1)]	B159628	09/30/16
16I1385-02 [B-9 (5'E)(1-3)]	B159628	09/30/16
16I1385-03 [B-9 (5'N)(0-1)]	B159628	09/30/16
16I1385-04 [B-9 (5'W)(0-1)]	B159628	09/30/16
16I1385-05 [B-9 (5'S)(0-1)]	B159628	09/30/16

SW-846 1010A

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
16I1385-06 [Containment H2O]	B159726	50.0	50.0	10/03/16

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16I1385-01 [B-9 (5'E)(0-1)]	B159636	10.0	10.0	09/30/16
16I1385-02 [B-9 (5'E)(1-3)]	B159636	10.1	10.0	09/30/16
16I1385-03 [B-9 (5'N)(0-1)]	B159636	10.0	10.0	09/30/16
16I1385-04 [B-9 (5'W)(0-1)]	B159636	10.2	10.0	09/30/16
16I1385-05 [B-9 (5'S)(0-1)]	B159636	10.1	10.0	09/30/16

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD		RPD Limit	Notes
Batch B159636 - SW-846 3540C											
Blank (B159636-BLK1)				Prepared: 09/30/16 Analyzed: 10/03/16							
Aroclor-1016	ND	0.020	mg/Kg wet								R-05
Aroclor-1016 [2C]	ND	0.020	mg/Kg wet								R-05
Aroclor-1221	ND	0.020	mg/Kg wet								
Aroclor-1221 [2C]	ND	0.020	mg/Kg wet								
Aroclor-1232	ND	0.020	mg/Kg wet								
Aroclor-1232 [2C]	ND	0.020	mg/Kg wet								
Aroclor-1242	ND	0.020	mg/Kg wet								
Aroclor-1242 [2C]	ND	0.020	mg/Kg wet								
Aroclor-1248	ND	0.020	mg/Kg wet								
Aroclor-1248 [2C]	ND	0.020	mg/Kg wet								
Aroclor-1254	ND	0.020	mg/Kg wet								
Aroclor-1254 [2C]	ND	0.020	mg/Kg wet								
Aroclor-1260	ND	0.020	mg/Kg wet								R-05
Aroclor-1260 [2C]	ND	0.020	mg/Kg wet								R-05
Aroclor-1262	ND	0.020	mg/Kg wet								
Aroclor-1262 [2C]	ND	0.020	mg/Kg wet								
Aroclor-1268	ND	0.020	mg/Kg wet								
Aroclor-1268 [2C]	ND	0.020	mg/Kg wet								
Surrogate: Decachlorobiphenyl	*0.189*		mg/Kg wet	0.200		94.7	30-150				
Surrogate: Decachlorobiphenyl [2C]	*0.220*		mg/Kg wet	0.200		110	30-150				
Surrogate: Tetrachloro-m-xylene	*0.155*		mg/Kg wet	0.200		77.5	30-150				
Surrogate: Tetrachloro-m-xylene [2C]	*0.184*		mg/Kg wet	0.200		92.0	30-150				
LCS (B159636-BS1)				Prepared: 09/30/16 Analyzed: 10/03/16							
Aroclor-1016	0.12	0.020	mg/Kg wet	0.200		60.9	40-140				R-05
Aroclor-1016 [2C]	0.13	0.020	mg/Kg wet	0.200		63.2	40-140				R-05
Aroclor-1260	0.12	0.020	mg/Kg wet	0.200		62.0	40-140				R-05
Aroclor-1260 [2C]	0.13	0.020	mg/Kg wet	0.200		64.7	40-140				R-05
Surrogate: Decachlorobiphenyl	*0.132*		mg/Kg wet	0.200		66.1	30-150				
Surrogate: Decachlorobiphenyl [2C]	*0.150*		mg/Kg wet	0.200		74.8	30-150				
Surrogate: Tetrachloro-m-xylene	*0.114*		mg/Kg wet	0.200		57.0	30-150				
Surrogate: Tetrachloro-m-xylene [2C]	*0.135*		mg/Kg wet	0.200		67.7	30-150				
LCS Dup (B159636-BSD1)				Prepared: 09/30/16 Analyzed: 10/03/16							
Aroclor-1016	0.17	0.020	mg/Kg wet	0.200		82.6	40-140	**30.3**	*	30	R-05
Aroclor-1016 [2C]	0.17	0.020	mg/Kg wet	0.200		85.8	40-140	**30.3**	*	30	R-05
Aroclor-1260	0.17	0.020	mg/Kg wet	0.200		85.1	40-140	**31.4**	*	30	R-05
Aroclor-1260 [2C]	0.18	0.020	mg/Kg wet	0.200		91.2	40-140	**34.0**	*	30	R-05
Surrogate: Decachlorobiphenyl	*0.183*		mg/Kg wet	0.200		91.5	30-150				
Surrogate: Decachlorobiphenyl [2C]	*0.212*		mg/Kg wet	0.200		106	30-150				
Surrogate: Tetrachloro-m-xylene	*0.157*		mg/Kg wet	0.200		78.6	30-150				
Surrogate: Tetrachloro-m-xylene [2C]	*0.186*		mg/Kg wet	0.200		93.0	30-150				

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QUALITY CONTROL

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B159726 - SW-846 1010A										
Blank (B159726-BLK1)				Prepared & Analyzed: 10/03/16						
Flashpoint	> 212 °F		°F							
LCS (B159726-BS1)				Prepared & Analyzed: 10/03/16						
Flashpoint	80		°F	81.0		98.8	98.8-101			
LCS Dup (B159726-BSD1)				Prepared & Analyzed: 10/03/16						
Flashpoint	80		°F	81.0		99.0	98.8-101	0.250	5	

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-9 (5'E)(0-1)

Lab Sample ID: 16I1385-01 Date(s) Analyzed 10/03/2016 10/03/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	17	
	2	0.00	-0.03	0.03	18	4.0
Aroclor-1260	1	0.00	-0.03	0.03	3.1	
	2	0.00	-0.03	0.03	4.2	28.6

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-9 (5'E)(1-3)

Lab Sample ID: 16I1385-02 Date(s) Analyzed 10/03/2016 10/03/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1248	1	0.00	-0.03	0.03	1.9	
	2	0.00	-0.03	0.03	2.5	27.8
Aroclor-1254	1	0.00	-0.03	0.03	9.4	
	2	0.00	-0.03	0.03	9.8	3.9
Aroclor-1260	1	0.00	-0.03	0.03	4.6	
	2	0.00	-0.03	0.03	5.4	15.4

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-9 (5'N)(0-1)

Lab Sample ID: 16I1385-03 Date(s) Analyzed 10/03/2016 10/03/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	6.7	
	2	0.00	-0.03	0.03	7.4	9.3
Aroclor-1260	1	0.00	-0.03	0.03	1.2	
	2	0.00	-0.03	0.03	1.7	35.3

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-9 (5'W)(0-1)

Lab Sample ID: 16I1385-04 Date(s) Analyzed 10/03/2016 10/03/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	19	
	2	0.00	-0.03	0.03	20	4.6
Aroclor-1260	1	0.00	-0.03	0.03	3.5	
	2	0.00	-0.03	0.03	4.4	23.1

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

B-9 (5'S)(0-1)

Lab Sample ID: 16I1385-05 Date(s) Analyzed 10/03/2016 10/03/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	-0.03	0.03	28	
	2	0.00	-0.03	0.03	30	8.0
Aroclor-1260	1	0.00	-0.03	0.03	5.2	
	2	0.00	-0.03	0.03	6.5	22.8

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B159636-BS1 Date(s) Analyzed 10/03/2016 10/03/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.12	
	2	0.00	-0.03	0.03	0.13	6
Aroclor-1260	1	0.00	-0.03	0.03	0.12	
	2	0.00	-0.03	0.03	0.13	5

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B159636-BSD1 Date(s) Analyzed 10/03/2016 10/03/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	-0.03	0.03	0.17	
	2	0.00	-0.03	0.03	0.17	3
Aroclor-1260	1	0.00	-0.03	0.03	0.17	
	2	0.00	-0.03	0.03	0.18	6

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit
DL	Method Detection Limit
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
R-05	Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

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

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8082A in Soil	
Aroclor-1016	CT,NH,NY,ME,NC,VA
Aroclor-1016 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1221	CT,NH,NY,ME,NC,VA
Aroclor-1221 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1232	CT,NH,NY,ME,NC,VA
Aroclor-1232 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1242	CT,NH,NY,ME,NC,VA
Aroclor-1242 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1248	CT,NH,NY,ME,NC,VA
Aroclor-1248 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1254	CT,NH,NY,ME,NC,VA
Aroclor-1254 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1260	CT,NH,NY,ME,NC,VA
Aroclor-1260 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1262	NY,NC,VA
Aroclor-1262 [2C]	NY,NC,VA
Aroclor-1268	NY,NC,VA
Aroclor-1268 [2C]	NY,NC,VA

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

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	02/1/2018
MA	Massachusetts DEP	M-MA100	06/30/2017
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2017
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2017
RI	Rhode Island Department of Health	LAO00112	12/30/2016
NC	North Carolina Div. of Water Quality	652	12/31/2016
NJ	New Jersey DEP	MA007 NELAP	06/30/2017
FL	Florida Department of Health	E871027 NELAP	06/30/2017
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2017
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2016
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2017

con-test ANALYTICAL LABORATORY

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

CHAIN OF CUSTODY RECORD

1CF1385

Rev 04.05.12

39 Spruce Street
East longmeadow, MA 01028

Page ____ of ____

Company Name: GEC
Address: 60 Brooks
Attention: A Foley, B Butler, E Furlong
Project Location: Lowell
Sampled By: A. Foley

Telephone:
Project #
Client PO# 1785-6100

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

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

ANALYSIS REQUESTED

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	PCBs Soxhlet	Flash
01	B-9(5'E)(0-1')	9/30/16			X	S	U	X	
02	B-9(5'E)(1-3)	↓			X	S	↓	X	
03	B-9(5'N)(0-1')	↓			X	S	↓	X	
04	B-9(5'W)(0-1')	↓			X	S	↓	X	
05	B-9(5'S)(0-1')	↓			X	S	↓	X	
06	~~River~~ Containment H_2O	9/30/16	9:00	1:05	X	W	U		X

# of Containers
** Preservation
***Container Code

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

Comments:

Please use the following codes to let Con-Test know if a specific sample may be high in concentration in Matrix/Conc. Code Box:

H - High; M - Medium; L - Low; C - Clean; U - Unknown

Relinquished by: (signature)	Date/Time:
[signature] 9/30/16	
Received by: (signature) [signature] 9-30-16	Date/Time: 1400
Relinquished by: (signature) [signature] 9-30-16	Date/Time: 1740
Received by: (signature) 4.1°C [signature] 9/30/16	Date/Time: 1740

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

Detection Limit Requirements
Massachusetts: ~~50~~ S-1/GW1
Connecticut:
Other:

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

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

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

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

Table of Contents

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

con-test® ANALYTICAL LABORATORY

Sample Receipt Checklist

CLIENT NAME: GEC **RECEIVED BY:** CM/C **DATE:** 9/30/16

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

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

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

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

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

Temperature °C by Temp blank ____ Temperature °C by Temp gun 4.1°C

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

6) **Are there any RUSH or SHORT HOLDING TIME samples?** **Yes** ✓ **No** ____
Who was notified Mac Date 9/30/16 Time 1750

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

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

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

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

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

Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber		16 oz amber	
500 mL Amber		8 oz amber/clear jar	5
250 mL Amber (8oz amber)		4 oz amber/clear jar	
1 Liter Plastic		2 oz amber/clear jar	
500 mL Plastic		Plastic Bag / Ziploc	
250 mL plastic		SOC Kit	
40 mL Vial - type listed below		Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	1
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

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

Login Sample Receipt Checklist

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

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

Who notified of False statements? **Date/Time:**

Doc #277 Rev. 4 August 2013 **Log-In Technician Initials:** CMC **Date/Time:** 9/30/12 1746

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 16I1385
Project Location: Lowell	RTN:

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

16I1385-01 thru 16I1385-06

Matrices: Soil Water

CAM Protocol (check all that below)

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

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

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

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

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

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

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

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

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

Signature: Position: Project Manager

Printed Name: Lisa A. Worthington Date: 10/04/16

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

October 21, 2016

Drew Foley
Goldman Environmental
60 Brooks Drive
Braintree, MA 02184

Project Location: Lowell
Client Job Number:
Project Number: 1785-6100
Laboratory Work Order Number: 16J0047

Enclosed are results of analyses for samples received by the laboratory on October 3, 2016. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

James M. Georgantas
Project Manager

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

Goldman Environmental
60 Brooks Drive
Braintree, MA 02184
ATTN: Drew Foley

REPORT DATE: 10/21/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 1785-6100

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16J0047

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

PROJECT LOCATION: Lowell

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
River (Surface)	16J0047-01	Surface Water		SM21-22 4500 H B	

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CASE NARRATIVE SUMMARY

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

SM21-22 4500 H B

Qualifications:

H-05

Holding time was exceeded. pH analysis should be performed immediately at time of sampling. Nominal 15 minute holding time was exceeded.

Analyte & Samples(s) Qualified:

pH

16J0047-01[River (Surface)]

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Project Manager

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

Project Location: Lowell | Sample Description: | Work Order: 16J0047

Date Received: 10/3/2016

Field Sample #: River (Surface) | Sampled: 10/3/2016 09:25

Sample ID: 16J0047-01

Sample Matrix: Surface Water

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

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
pH @21°C	7.0		pH Units	1	H-05	SM21-22 4500 H B	10/3/16	10/3/16 20:30	IS

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

Sample Extraction Data

SM21-22 4500 H B

Lab Number [Field ID]	Batch	Initial [mL]	Date
16J0047-01 [River (Surface)]	B159741	50.0	10/03/16

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QUALITY CONTROL

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B159741 - SM21-22 4500 H B										
LCS (B159741-BS1)				Prepared & Analyzed: 10/03/16						
pH	6.03		pH Units	6.00		100	98.5-110			

con-test® ANALYTICAL LABORATORY

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit
DL	Method Detection Limit
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
H-05	Holding time was exceeded. pH analysis should be performed immediately at time of sampling. Nominal 15 minute holding time was exceeded.

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

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SM21-22 4500 H B in Water	
pH	CT,MA,RI

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

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	02/1/2018
MA	Massachusetts DEP	M-MA100	06/30/2017
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2017
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2017
RI	Rhode Island Department of Health	LAO00112	12/30/2016
NC	North Carolina Div. of Water Quality	652	12/31/2016
NJ	New Jersey DEP	MA007 NELAP	06/30/2017
FL	Florida Department of Health	E871027 NELAP	06/30/2017
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2017
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2016
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2017

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CHAIN OF CUSTODY RECORD

16J0047

Rev 04.05.12

39 Spruce Street
East longmeadow, MA 01028

Company Name: GEC
Address: 60 Brooks Dr
Attention: A. Foley B Butler E Furlong
Project Location: Lowell
Sampled By: A. Foley

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

Telephone:
Project # ~~1785~~
Client PO# 1785-6100

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

ANALYSIS REQUESTED

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	Corrosivity	pH
1	River (Surface)	10/03	9:25		X	W	U	X	X

Comments:

Please use the following codes to let Con-Test know if a specific sample may be high in concentration in Matrix/Conc. Code Box:

H - High; M - Medium; L - Low; C - Clean; U - Unknown

Relinquished by: (signature)	10/3/16	Date/Time: 10:00
Received by: (signature)	10/3/16	Date/Time: 2:45
Relinquished by: (signature)	10/3/16	Date/Time: 4:40
Received by: (signature) 2.50	10/3/16	Date/Time: 1640

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

Detection Limit Requirements
Massachusetts: GW-1
Connecticut:
Other:

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

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

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

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

# of Containers
** Preservation
***Container Code

Dissolved Metals
○ Field Filtered
○ Lab to Filter

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

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

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

Table of Contents

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

con-test® ANALYTICAL LABORATORY

Sample Receipt Checklist

CLIENT NAME: C&E C **RECEIVED BY:** RJM **DATE:** 10/3/16

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

2) Does the chain agree with the samples? Yes X No ____

If not, explain:

3) Are all the samples in good condition? Yes X No ____

If not, explain:

4) How were the samples received:

On Ice X Direct from Sampling ____ Ambient ____ In Cooler(s) X

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

Temperature °C by Temp blank ____ Temperature °C by Temp gun 25°

5) Are there Dissolved samples for the lab to filter? Yes ____ No X

Who was notified ____ Date ____ Time ____

6) Are there any RUSH or SHORT HOLDING TIME samples? Yes ✓ No X (JM)

Who was notified Ismn Date 10/3/16 Time 17:00

7) Location where samples are stored: Log in

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

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

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

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

Containers received at Con-Test

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

40 mL vials: # HCl ____ # Methanol ____

Bisulfate ____ # DI Water ____

Thiosulfate ____ Unpreserved ____

Time and Date Frozen:

Login Sample Receipt Checklist

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

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

Who notified of False statements? **Date/Time:**

Doc #277 Rev. 4 August 2013 **Log-In Technician Initials:** RJM **Date/Time:** 10/3/16 1640

APPENDIX C:

Original Risk Assessment (Modified)

APPENDIX C

ORIGINAL RISK ASSESSMENT (Modified)
(from IRA Plan Modification for RTN 3-33101, submitted in April 2016)

Note: Subsequent to the submittal of the Original Risk Assessment: (1) additional potential repositories (four dry wells) were located in the courtyard and are identified in this revision, and (2) minor error (assumed exposure of 5 days per week instead of 7 days per week during construction period) was discovered in the residential risk assessment worksheet (cancer) and the error is corrected in this modified risk assessment.

The Immediate Response Action (IRA) was initiated entailing excavation of certain volumes of soil. Soils containing more than 50 mg/kg PCBs (i.e., SP-1 and B-11 PCB hot spot soils) have been excavated and transported to a hazardous waste facility permitted to accept soils containing >50 mg/kg PCBs. The soils from the SP-2 stockpile were placed in the coal chute repository. The 0-1 foot interval soils from the east portion of the courtyard were excavated and placed in the coal chute repository and/or dry wells. The 0-1 foot interval soils from the west portion of the courtyard were excavated and placed in the dry wells. Excavation of the 1-3 foot interval soils from the eastern courtyard, near the fuel oil vault, was started and approximately 2 to 2.5 feet was excavated before the IRA activities were temporarily stopped, due to the presence of asbestos in shallow soils. These soils (approximately 400 cubic yards) were placed in a stockpile on the west end of the courtyard. This risk assessment was not modified to reflect these changes.

Asbestos is present in shallow soils. This risk assessment does not address the risks associated with asbestos exposure. An assumption is made that all asbestos-contaminated soils will be excavated and either transported off-site for appropriate disposal or placed in an on-Site soil repository.

The following risk assessment was prepared in accordance with the Massachusetts Contingency Plan (MCP), guidance provided by MassDEP in *Guidance for Disposal Site Risk Characterization in Support of the Massachusetts Contingency Plan* (updated in 1996), and subsequent technical updates. This risk assessment is an element of a Risk Characterization described at 310 CMR 40.0900. The purpose of this risk assessment is to determine what soil volumes within the courtyard are consistent with a finding of No Significant Risk of Harm (either with or without assumptions that would limit future uses or activities at the Site); and what soil

volumes within the courtyard have a finding of Significant Risk of harm and must be remediated. This risk assessment is being conducted to determine what must be done with the PCB-contaminated soils of the courtyard, before continued IRA activities to address the no. 6 fuel oil contamination can be conducted.

This risk assessment entails a site-specific assessment of the risk of harm to human health from exposure to courtyard soils. Exposure to other media (i.e., indoor air or groundwater) is unlikely to be factors, because: (1) the contaminants detected in the courtyard soils are generally not volatile; and (2) the depth to groundwater is more than 15 feet below grade based on monitoring well gauging conducted as part of a limited site investigation in August 2015.

The characterization of risk of harm to safety, public welfare and the environment will be conducted at a later date. This risk assessment is the same as a MCP Method 3 Human Health Risk Characterization, and relies on detailed information about the Site, the nature, magnitude and extent of OHM in each affected media, migration pathways of the OHM, and potential exposures to human receptors under all current and reasonably foreseeable Site activities and uses. This risk assessment excludes the no. 6 fuel oil contamination located from the bottom of the no. 6 fuel oil vault(s) to at least 15-20 feet below grade (Table 1 of IRA Plan Modification No. 3) and that has impacted groundwater more than 15 feet below grade (Table 2 of IRA Plan Modification No. 3).

Site and Receptor Information

Identification of Contaminants of Concern

According to the *Guidance for Disposal Site Risk Characterization,* chemicals detected at a disposal site should be considered contaminants of concern (COC) and should be carried throughout the risk assessment process unless one of the following conditions is true: (1) the chemicals are present at a low frequency of detection and in low concentrations; (2) the chemicals are present at levels consistent with background concentrations for the area and there is no evidence that their presence is related to activities at the site, or; (3) the chemicals are field or laboratory contaminants. Based on the results of the investigations conducted at the Site, soil is the media known or suspected to be impacted by oils or hazardous materials (OHM).

For the 0-15 foot interval, laboratory analyses were conducted only for soils. No groundwater was encountered within the top 15 feet of overburden. No indoor air sampling and analysis was conducted, because the contamination detected within the top 15 feet are not volatile (only very low levels of aromatic VOCs were detected). The soil analytical data considered in this risk assessment are summarized in Table 1 of the IRA Plan Modification No. 3 for all OHM except PCB congeners and in Tables 6.1 to 6.4 of the IRA Plan Modification No. 3 for PCB congeners; the

data used in the risk characterization excludes that collected after April 2016. Soil is the only media of concern for this risk assessment.

For this risk characterization, the OHM detected in soils soil were evaluated and the soil COC were identified in Table C-1. PCBs, EPH subsets, PAHs, metals and insecticides were detected in soils. During soil boring, coal ash, gasified coal and coal pieces were observed in the soil throughout the courtyard area. For metals and PAHs detected in soils, the MassDEP's background concentrations for soils associated with fill containing wood or coal ash were identified as appropriate for the Site. No published background concentrations exist for PCBs, EPH subsets, VOCs and insecticides; therefore, the background concentrations for these OHM are identified as zero.

The OHM detected in soils were evaluated to identify soil COC for the risk assessment, as documented in Table C-1. For metals and PAHs, this entailed comparing the maximum level detected to the applicable published background concentration.

The following metals were detected in one or more soil samples: antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, thallium, vanadium and zinc. As documented in Table C-1, the following metals were always detected at levels consistent with or less than MassDEP's published background concentrations: antimony. Both arsenic and cadmium were detected in one of 24 and 22 samples, respectively, at levels above published background concentrations for fill associated with fill containing coal ash or wood ash. Arsenic and cadmium were detected at an elevated concentration in the sample collected from stockpile SP-1, which will be removed from the Site. Antimony, arsenic and cadmium were eliminated as soil COC. Mercury was detected in two of 20 soil samples, and only slightly above its published background concentration. Its presence is likely due to the prevalence of coal ash in the soils; mercury was eliminated as a soil COC. Thallium was only detected in one soil sample, which was collected from the sands in the FO-1 vault, at a level above its published background concentration. Thallium is eliminated as a soil COC for all exposure points and soil intervals, except for the FO-1 vault sands.

For chromium, the maximum concentration detected was 160 mg/kg in the soil sample from stockpile SP-1. No Cr VI was detected (<4.9 mg/kg) in the soil sample from SP-1; therefore, it is not a soil COC. The chromium species is presumed represented by Cr III.

SVOCs that were detected included 17 PAHs, 2 phthalates and dibenzofuran. The PAHs are likely associated with the presence of coal ash, even though 15 PAHs were detected at levels above their published background concentrations. They were retained as soil COCs because in some samples the levels of PAHs were substantially above the published background concentrations. Two of the PAHs (i.e., acenaphthylene and 2-methylnaphthalene) were detected at levels below their published background concentrations for fill associated with soils containing coal ash or wood ash. However, both PAHs were retained as soil COC, because they are related to the other PAHs.

Dibenzofuran is a constituent of the C11-C22 aromatic hydrocarbon subset of EPH; therefore, it is eliminated as a separate soil COC. Bis(2-ethylhexyl)phthalate and di-n-butylphthalate were detected in soils of SP-1, which are slated for removal from the Site. Therefore, the phthalates were eliminated as soil COC.

The three EPH subsets (C9-C18 aliphatic hydrocarbons, C19-C36 aliphatic hydrocarbons and C11-C22 aromatic hydrocarbons) were detected in the soil samples and are retained as soil COC. No VPH subsets were detected, and therefore no VPH subset is a soil COC. The only VOCs detected were benzene and toluene in soil samples collected from the gasoline UST tank grave. They were detected at very low concentrations (maximums of 0.15 and 0.60 mg/kg, respectively), but were retained as soil COC.

PCBs were detected in soils and are included as soil COC. Fifty-three soil samples were collected for analysis of PCBs, and PCBs were detected in 40 of the samples. The principal PCB mixture detected was Aroclor 1254. Only one sample contained another PCB mixture – Aroclor 1260. This sample (B-11-r10b 0-1') contained 6.2 mg/kg Aroclor 1254 and 0.75 mg/kg Aroclor 1260. PCBs are identified as soil COCs.

Four soil samples were collected for analysis of PCB congeners (Table 6.1 to 6.4 of this IRA Plan Modification No. 3). One soil sample contained a low concentration of total congener PCBs (0.025 mg/kg) and was eliminated from complete evaluation. USEPA's document, Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (TCDD) & Dioxin-Like Compounds (EPA/100/R 10/005/ December 2010), identifies twelve TCDD dioxin-like PCB congeners. Of these twelve TCDD dioxin-like congeners, eight were detected in the soil samples (Table C-7). Combined, these eight TCDD dioxin-like PCB congeners comprise between 9.9 and 11% of the total PCB congeners (Table C-9). The eight TCDD dioxin-like PCBs were retained as separate COCs.

Table C-1 provides a list of the soil COC. The soil COC are also identified as COC for dusts.

Identification of Groundwater and Soil Categories

During a Method 3 risk characterization, soil and groundwater categories are identified to aid in the development of potential receptor exposure profiles and to identify applicable or suitably analogous standards as described in 310 CMR 40.0933(3).

Groundwater Categories

MCP groundwater categories are established by MassDEP for the characterization of risk at disposal sites; these categories describe the potential for different types of exposure. Appropriate

groundwater categories are identified, based on site characteristics, site activity and use, and the nature and extent of the release, in accordance with the MCP (310 CMR 40.0932).

The groundwater categories describe the potential for three different types of exposure. Groundwater at all disposal sites shall be considered a potential source of discharge to surface water and shall be classified, at a minimum, as category GW-3 [310 CMR 40.0932(3)]. GW-2 groundwater is considered to be a potential source of vapors of OHM to indoor air [310 CMR 40.0932(6)]. GW-1 groundwater is considered a potential or actual supply of potable water [310 CMR 40.0932(4)].

A targeted file search was conducted to obtain information to assist in groundwater categorization. Based on a search of MassDEP's SearchWell Application database, fourteen domestic water supply wells exist in Lowell. They are identified below:

Lot 6 Dodge Road	35 Cannington Street	Lot 58 (address unknown)
537 School Street	62 Weston Avenue	Sheehan
346 Boylston Road	Route 133	358 Boylston Street
241 Pawtucket Boulevard (listed twice)	37 Second Avenue (listed twice)	1195 Varnum Avenue
Acropolis Road		

The only roads located within or slightly more than 500 feet from the Boiler House courtyard are the following: (1) Massmills Drive, (2) Bridge Street, (3) Stackpole Street, (4) Fayette Street, and (5) Brown Street. None of the active private potable drinking water wells are located on addressed on these roads, and, therefore, are not located within 500 feet of the Site. [http://public.dep.state.ma.us/searchwell/]

Based on the MassDEP Phase I Site Assessment Map (provided as Figure 3 in the original IRA Plan), the Site is not located within or near an Actual or Potential Drinking Water Source Area.

Based on monitoring well gauging conducted for courtyard monitoring wells in August 2015, depth to groundwater ranged between 19.9 and 22.7 feet below grade. This information is provided in the September 9, 2015 *Limited Site Investigation* report, prepared by GEC. Based on the available information, the following MCP groundwater categories are applicable to the site.

Groundwater Category	Yes	No	Criteria
1		**X**	Groundwater is within Zone II of a public water Supply well. If yes the groundwater is categorized as GW-1.
1		X	1a. Groundwater is within an Interim Wellhead Protection Area of a public water supply well.
			1b. A demonstration has been made that there is no hydrogeologic connection between the groundwater and the public water supply well.
		X	If the answer to 1a is yes, and to 1b is no, then the groundwater is categorized as GW-1.
1		X	1c. Groundwater is within an area designated by the MassDEP as a Potentially Productive Aquifer (PPA).
		X	1d. Groundwater is located within a medium or high yield aquifer, but has been designated by the MassDEP as a non-PPA, due to its urban or industrial character, but site inspection indicates that this assumption does not apply.
			1e. Site-specific information on the types/transmissivity of soils shows that the groundwater is not located within the true boundary of the medium or high yield aquifer.
			1f. The groundwater within the PPA is naturally brackish, or has naturally high levels of metals, such that the development of the aquifer is not technologically or economically feasible.
		X	If the answer to 1c or 1d is yes, and the answer to 1e or 1f is no, then groundwater is categorized GW-1.
1		**X**	Groundwater is within Zone A of Class A surface water body. If yes, the groundwater is classified as GW-1.
1		X	1g. Groundwater is located 500 feet or more from a public water system distribution pipeline.
	X		1h. The groundwater is located on a parcel of land or at a facility where any portion of that parcel or facility is located within 500 feet from a public water supply distribution pipeline.
		X	If the answer to 1g is yes, and to 1h is no, then groundwater is categorized GW-1.
1		X	1i. Groundwater is located within 500 feet of a private potable water supply well that was in use at the time of notification pursuant to 310 CMR 40.0300, and was installed in conformance with applicable laws, by-laws or regulations.
			1j. The private well(s) has been removed from service, and meets the conditions specified in 310 CMR 40.0932(d)(1).
			1k. It has been demonstrated that no hydrogeologic connection exists between the groundwater and private well(s).
		X	If the answer to 1i is yes, and to 1j or 1k is no, then the groundwater is classified as GW-1.
1		**X**	Groundwater is located within a locally designated Potential Drinking Water Source. If yes, then groundwater is categorized as GW-1.

Groundwater Category	Yes	No	Criteria
2	X		2a. Groundwater is located within 30 feet of an existing occupied building or structure
		X	2b. The annual average depth to groundwater in that area is 15 feet or less
		X	Do both 2a and 2b apply? If yes, the groundwater is categorized GW-2
3	**X**		Groundwater at all disposal sites is considered a potential source of discharge to surface water and is classified as GW-3

Soil Categories

MCP soil categories S-1, S-2, and S-3 describe a range of potential exposures to a particular volume of soil. Soil category S-1 is associated with the highest exposure potential, and category S-3 is associated with the lowest exposure potential. In this section, appropriate soil categories are identified for the site based on soil accessibility, intensity and frequency of use, and on the age groups of potential receptors.

The three soil categories describe a range of the potential for exposure to soil. Three criteria, defined below, are used to describe the exposure potential for the purposes of categorizing soil:

1) Frequency of use, which indicates how often a receptor makes use of, or has access to, the disposal site; high frequency for children is valid if children reside, attend school or attend day care at the disposal site, or if large numbers of children visit the disposal site; high frequency for adults is valid if adults reside at the disposal site, or work at the disposal site on a continuing basis;

2) Intensity of use, which describes the nature of the Site Activities and Uses that could potentially result in exposure to the receptor; high intensity activities include digging, gardening and recreational sports; passive activities, such as, walking, shopping and bird watching, are considered low intensity activities;

3) Accessibility of the soil to potential receptors, which is characterized as one of the following: "accessible"; "potentially accessible"; or "isolated" [310 CMR 40.0933].

Soil categories are assigned to specific volumes of soils. For current scenarios, the appropriate soil category for a specific soil volume is based on current site conditions, uses, and the age of the receptor. For future conditions, the soil category is assumed to be S-1 unless assumptions are used to limit future activities and uses. A matrix, which is used to select the appropriate current and future soil categories for each volume of soil on site, is provided below.

Receptor Characteristics

	Children Present				Adults Only Present			
	High Frequency		Low Frequency		High Frequency		Low Frequency	
Access. Of Soil	High Intensity	Low Intensity	High Intensity	Low Intensity	High Intensity	Low Intensity	High Intensity	Low Intensity
AS	Category S-1			S-2	S-1	Category S-2		
PAS		Category S-2			S-2	Category S-3		
ISS	Category S-3							
* Category S-1 also applies to any accessible soil where current or reasonably foreseeable use of the soil is for growing fruits and vegetables for human consumption								

AS = Accessible (Surficial) Soil (0 to 3 feet deep, unpaved)
PAS = Potentially Accessible Soil (3 to 15 feet, unpaved; 0 to 15 feet, paved)
ISS = Isolated Subsurface Soils (greater than 15 feet or under the footprint of a building or permanent structure)

Historically, the property on which the courtyard is located was used for industrial and commercial purposes. Currently, the Picker Building is being renovated into a multi-family residential complex. There are also similar plans to renovate the Boiler House into a multi-family residential complex in the future. The near-term plans for the courtyard include transforming it into a landscaped area to serve residents of both buildings. An assumption is made that a protective barrier (currently planned to be comprised of 3 feet of clean soils over a geotextile marker barrier) will be installed over the courtyard soils. This protective barrier will mitigate exposure by residents to contaminated soils, except potentially during a construction or utility repair project.

Based on the above criteria for soil classification and the current and future site uses described above, a soil category was assigned to each volume of soil for both future and current conditions, as documented below. The appropriate soil category depends on property use, the location of the exposure point where the soil volume resides, the depth interval of the soil volume, and whether the soil volume is covered by pavement, building or other barrier. Each exposure point / depth interval combination is evaluated in the charts below.

Soil Categories for Current and Future Conditions
Current and Future Conditions: Boiler House Courtyard
Location: 169.2 Bridge Street
(Residential Use: All Soil Intervals)

Soil Volume	Receptor	Criteria	Comment	Soil Category
Potentially accessible or isolated subsurface soils (all soils covered with protective barrier) *	Child – Residential	Frequency	High – presumed to live at site	S-2
		Intensity	Low – soil disturbance activities are presumed not to occur under current or future conditions, except for construction / utility work	
		Gardening	Is not and will not occur	
Potentially accessible or isolated subsurface soils (all soils covered with protective barrier) *	Adult – Residential	Frequency	High – presumed to live at site	S-3
		Intensity	Low – soil disturbance activities are presumed not to occur under current or future conditions, except for construction / utility work	
		Gardening	Is not and will not occur	
Potentially accessible or isolated subsurface soils (all soils covered with protective barrier)*	Adult – Commercial	Frequency	High – presumed to work at site	S-3
		Intensity	Low – soil disturbance activities are presumed not to occur under current or future conditions, except for construction / utility work	
		Gardening	Is not and will not occur	
Potentially accessible or isolated subsurface soils (all soils covered with protective barrier)*	Adult – Utility / Construction	Frequency	Low – presumed to work at site only during a construction or utility project	S-3
		Intensity	High – soil disturbance activities are presumed to occur	
		Gardening	Is not and will not occur	

Soil volume	Soil Category
Current	S-2
Future	S-2

* An assumption is made that all soils of the Site will be covered with one or more protective barrier(s).

Soil and Groundwater Categories

In summary, the following categories apply to the soil and groundwater of the Site:

Media	Category	Location, Depth Interval and Comment
Groundwater	GW-3	Entire aquifer beneath the courtyard
Courtyard Soils	S-2	Presumed Current and Future Residential Conditions: All Soil Volumes (All soils covered with a protective barrier)
	S-3	Presumed Current and Future Commercial Conditions: All Soil Volumes (All soils covered with a protective barrier)
	S-3	Construction / Utility Work: All Soil Volumes (All soils covered with a protective barrier), except during construction / utility work

Note: The lowest soil category applicable to a soil volume, after considering all receptors and current and foreseeable uses, is provided. An assumption is made that gardening of edible produce will not occur in the future in the soils of the courtyard, except under Best Management Practices. For the courtyard, an assumption is made that future use will include multi-family residential, child school, daycare, institution, playground, active recreational, commercial, industrial or passive recreational use, but will not include single-family residences. In addition, for the exterior courtyard, all soils are presumed covered by protective barriers, except during short-term construction or utility work, which will be conducted under Site-specific Soil Management Plan. These assumptions require the implementation of a Notice of Activity and Use Limitation (AUL).

Potential Human Receptor Exposure Profiles

Human populations located at the property or on nearby properties include the following: (1) on-Site residents of a multi-family residential complex; (2) on-Site commercial workers; (3) on-Site construction workers; (4) on-Site utility workers; (5) on-Site customers / visitors / trespassers; (6) nearby residents; (7) nearby commercial workers; and (8) nearby customers / visitors / trespassers. Risks to on-Site and nearby customers / visitors / trespassers / commercial workers and nearby residents are believed to be adequately represented by on-Site residents. Children are typically considered the more sensitive receptor group; therefore, when calculating non-cancer risk, risk estimates were calculated for child residents and residents were presumed present for 30 years from age 1 to 31 years. Adult on-Site utility workers are believed adequately represented by on-Site construction workers. Risk estimates were calculated for child / adult on-Site residents and adult on-Site construction workers.

Currently, the adjoining Picker House lot is being developed for multi-family residential use. The Boiler House is currently vacant, but will be similarly developed in the future. The subject courtyard between the two buildings will be developed into green space for the future residents.

These uses are assumed to occur into the future. The courtyard is presumed covered with one or more protective barriers (such as three feet of clean soil over a marker layer, hardscaping, pavement or a building foundation) and are assumed to remain so covered in the future.

During the risk characterization, assumptions were made that prohibit certain future uses and activities. For the exterior courtyard, future property use is presumed to not include single-family residences. It is also presumed to not include gardening of edible produce, except under Best Management Practices. A protective barrier is presumed to be maintained over the PCB-contaminated soils. During excavation activities or other soil disturbance activities, soil management plans to ensure proper handling of the soils. Following excavation or soil disturbance activities, soils will be returned to the excavation or transported off-site in accordance with federal, state and local regulations; and the protective barrier will be replaced.

The exposure pathways or profiles for each target receptor group for current and reasonably foreseeable conditions are described below.

Current and Future On-Site Residents, including Children: Courtyard

This receptor is presumed to be a 1-31 year old female, who resides at a multi-family residential complex. Exposure to soils is presumed not to occur, except during a 6-month construction project, which occurs sometime during the period when the receptor is aged between 1 and 2 years. The receptor is presumed to weigh 10.7 kilograms (kg) during this period.

Based on future conditions, this receptor may be exposed to soil contamination via dermal contact and incidental ingestion, 7 days per week, for 26 weeks. Dermal contact is presumed to occur to face, hands, forearms, lower legs and feet. Incidental ingestion of soil is presumed to occur at a rate of 100 mg/day. More frequent exposure to soils is presumed limited by implementation of a soil management plan. During the construction project, inhalation of dusts is conservatively presumed to occur 24 hours per day, 7 days per week for 26 weeks. During the construction period, no precautions are assumed implemented to limit the frequency of exposure.

No ingestion of home-grown edible produce is presumed to occur. Little to no volatile COC exist in the soils or groundwater is located more than 15 feet below grade; therefore, inhalation of vapors attributable to soil vapor intrusion is not an exposure pathway for the Site. No private or public water supply well is located near the Site or is likely to be located near the Site in the future; therefore, ingestion, dermal contact or inhalation of Site-related OHM in potable water is unlikely to occur.

Future On-Site Construction Workers: Courtyard

This receptor is presumed to be a 22 year old female, weighing 58 kg, who is a construction worker. She is presumed to work on-site during a future six-month construction project, for 8 hours per day, 5 days per week, for 26 weeks.

Under future conditions, the on-site construction worker may be exposed to soil contamination via dermal contact to face, hands, forearms, feet and lower legs, enhanced incidental ingestion at a rate of 100 mg/day, and inhalation of dusts presuming mild exertion. Following inhalation of dust, this receptor is presumed to cough up a portion of the inhaled dust and to then ingest the dust.

An excavation is presumed to extend to a depth of 15 feet below grade, which would not intercept the groundwater table. Therefore, no exposure to groundwater is expected to occur. Little to no volatile COC are present in the soils or groundwater; therefore, inhalation of vapors in a construction excavation is not an exposure pathway.

Identification of Exposure Points

An exposure point is a location of potential contact between a human or environmental receptor and a release of OHM. Exposure points for applicable environmental media are identified in accordance with MCP guidance and regulations [310 CMR 40.0924].

Groundwater, Indoor Air and Construction Excavation Air

No human exposure points exist for groundwater, indoor air and construction excavation air.

Soils

The following soil exposure point is presumed to exist: (1) the Boiler House courtyard. The soils of the courtyard were evaluated to determine if a hot spot of PCB contamination exists. The highest level of PCB was detected in the 0-1 foot interval of B-11. However, there was significantly variability throughout the courtyard, especially within the 0-1 foot interval, where the highest PCB levels were detected as depicted in Figure 6. Therefore, the 0-1 foot interval soils were identified as a separate soil interval requiring evaluation. Similarly, the 1-3 foot interval had higher levels of PCBs than the underlying soils; therefore, it was also evaluated separately. These soils are presumed to require remediation. Two other soil intervals, 3-6 and 3-11 foot intervals, were evaluated separately. The 3-6 foot interval is assumed to be located at utility depth, and the 3-11 foot interval is assumed located within construction depth. No soil data exists for the 11-15 foot interval; however, there was a clear trend in declining PCB, metal, insecticide and PAH levels with depth. A 3-foot layer of clean soils with a marker layer is presumed placed over the 3-6 / 3-11 foot interval soils. This clean layer of soils was not factored into deriving exposure point concentrations. The

vault sands were evaluated separately because they had soil COC concentrations that were different than the remaining soils. The soils of stockpile SP-1 contain high levels of PCBs and will be removed from the Site. The soils of SP-2 are presumed to contain elevated levels of PCBs, and will either be removed from the Site or placed in an on-Site soil depository subject to a Notice of AUL (more on soil depositories in Section 3.4). Similarly, the soils (i.e., some from the excavation of the gasoline USTs and some from the soils overlying the no. 6 fuel oil vaults) used to backfill the gasoline tank graves are presumed to contain PCBs. These soils are presumed to either be removed from the Site or placed in an on-Site soil depository.

Based on the foregoing, the following five exposure points / soil intervals were evaluated in the risk assessment: (1) 0-1 foot interval courtyard soils; (2) 1-3 foot interval courtyard soils; (3) 3-6 foot interval courtyard soils; (4) 3-11 foot interval courtyard soils; and (5) the vault sands (also called SP-3).

Dusts

For dusts in outdoor air, the exposure points are the on-Site exposure points. The soil samples, representative of exposure point concentrations at each soil exposure point, were used to calculate dust exposure point concentrations.

Identification of Exposure Point Concentrations

Except for TCDD dioxin-like PCB congeners, exposure point concentrations (EPCs) were calculated for each COC in soil for each exposure point and soil interval using measured values in collected samples (Tables C-2 to C-6). EPCs were calculated for TCDD dioxin-like PCB congeners, for input in the risk assessment as TCDD dioxin. The TCDD dioxin EPCs were calculated considering: (1) the EPCs for PCBs; (2) the portion of PCBs comprised of TCDD dioxin-like congeners (11%); and (3) the Toxicity Equivalence Factors (which was the same (3E-05) for all TCDD dioxin-like congeners detected at the Site), as documented in Tables C-7 to C-10. Note: Percent TCDD dioxin-like congener composition of PCBs was based on the congener PCB data. However, because congener PCB data was not available for most soil samples, the Aroclor PCB data was used to derive the TCDD dioxin-like PCB EPCs.

In addition, dust EPCs were estimated based on the use of a formula for air-borne particulates in ambient air. The approaches used to calculate EPCs for each COC in each environmental medium at each exposure point are described below.

The EPCs are determined consistent with Method 3 Risk Characterization, a chemical-specific approach, which estimates potential non-cancer and cancer risks for each receptor and compares these risks to MassDEP-identified risk limits. For soils and groundwater, the EPCs are the

mean, 95th percentile upper confidence limit on the mean concentration, or maximum concentrations, dependent on the type of exposure, data variability, and amount of available data. As a conservative measure, when calculating the mean or 95th percentile upper confidence limit, one-half the sample detection limit is used as a proxy concentration for samples in which a chemical was not detected.

For each COC in soils, the data sets were examined for each soil exposure point / exposure interval to determine the appropriate method to derive EPC, as documented in Tables C-2 to C-6. Except as identified below, for each OHM at each soil exposure point, the mean concentration was identified as the appropriate method to derive EPC for each COC, each exposure point and each soil interval.

Exposure Point	COC and EPC Method	Comment
All exposure points / soil intervals	PCB: 95th PUCL	human health risk assessment; 95th PUCL for PCB also used to derive TCDD dioxin EPC

Notes: 95th PUCL = 95th percentile upper confidence limit on the mean concentration

For dusts in outdoor air, EPCs are estimated assuming soil disturbance is occurring. The formula used is provided below. The soil EPCs are used to estimate dust EPCs. The soil EPCs are summarized in the tables of Appendices C-1 to C-6, and the dust EPCs are derived and summarized in the tables of Appendix C-6.

$$EPC_{air} = [OHM]_{soil} \times PF \times PM_{10} \times CF$$

Where:

EPC_{air}	=	Exposure Point Concentration for inhalation of particulates in air (mg/m^3_{air})
$[OHM]_{soil}$	=	Soil concentration ($mg_{contaminant}/kg_{soil}$)
PM_{10}	=	Respirable particulate concentration in air (60 $\mu g/m^3_{air}$)
PF	=	Proportion of respirable particulate concentrations attributable to the site (0.50, unitless)
CF	=	Conversion factor (10^{-6} kg/mg)

Characterization of Risk of Harm to Human Health

Hazard Assessment

Extent of Oil and/or Hazardous Material

The hazardous materials (comprised of PCBs, metals, PAHs and pesticides) were detected from ground surface to approximately 15 feet below grade. The highest levels of contamination were detected in the 0-1 foot interval soils, followed by 1-3 foot interval soils and gradually declined with depth. The contaminated soils are located throughout the entire courtyard. Migration pathways include those typical of hazardous materials that are relatively non-volatile and tend to bind to soils. Dust generation, surficial run-off and tracking of soils are principal migration pathways. Leaching of contaminants is not expected to be a significant migration pathway, as determined by the decline in contaminant levels with depth and, for some metals (lead and cadmium), the lack of significant leachability based on TCLP testing. Volatilization to vadose zone air, indoor air and outdoor air is not a significant migration pathway. The OHM identified as soil COC are identified in Table C-1. The background conditions are also identified in Table C-1, and Site conditions are compared to background in Table C-1.

Toxicity Profiles

A descriptive summary of human health effects associated with each COC is available from MassDEP's *Documentation for the Risk Assessment ShortForm - Residential Scenario*, or from USEPA's *Integrated Risk Information System* (IRIS).

Dose-Response Values

The dose-response assessment relates the likelihood or severity of an adverse effect to the level of exposure. Dose-response values are provided for the following three categories: non-carcinogenic (threshold) health effects; carcinogenic (non-threshold) health effects; and relative absorption factors (RAFs), which are used to relate toxicity information identified in the literature to exposure pathways of concern at the disposal Site. Dose-response information for each COC is obtained from published literature describing epidemiological or toxicological studies. For each COC, dose-response values were obtained primarily from sources published by MassDEP and the United States Environmental Protection Agency (USEPA), i.e., the Integrated Risk Information System (IRIS) or the Health Effects Assessment Summary Tables (HEAST). The first source of dose-response values is MassDEP (i.e., toxicity values used by the MassDEP to develop MCP Method 1 Numerical Standards or provided in MassDEP's Risk Assessment Shortforms). The second source of dose-response values is USEPA's IRIS followed by USEPA's HEAST. For COCs that do not have dose-response values available through MassDEP, HEAST or IRIS, values were obtained from the USEPA's Superfund Health Risk Technical Support Center in Cincinnati, Ohio. RAFs were obtained from published sources of the MassDEP.

Non-carcinogenic Effects

For non-carcinogenic effects, a threshold is believed to exist below which a dose level or exposure level for a given OHM is not expected to result in an adverse health effect. As a result, a sub-threshold dose-response value, set in a conservative manner, would be expected to be protective of human health. Two types of sub-threshold values are Reference Doses (RfD) and Reference Concentrations (RfC). RfD is a sub-threshold dose in milligrams per kilogram body weight per day (mg/kg/day), at which daily exposure of a human population is likely to be free of adverse effects during a lifetime. RfC is an inhalation exposure concentration in milligrams or micrograms per cubic meter of air (mg/m^3 or $\mu g/m^3$), to which daily exposure of a human population is likely to be free of adverse effects. Wherever subchronic non-cancer dose-response values are not available, chronic dose-response values are used as surrogates. If RfC values were not available, a surrogate value was calculated via route-to-route extrapolation using the RfD.

Subchronic and chronic oral RfD values are provided in Appendices C-1 to C-6. The sources of these values are identified on the same tables.

Carcinogenic Effects

For carcinogenic effects, no threshold dose is believed to exist which is associated with no risk. The USEPA evaluates available toxicity data and, based on this evaluation, chemicals are assigned to a weight-of-evidence class. The weight-of-evidence classification rates the likelihood that an agent is a human carcinogen. Three major factors are considered in characterizing the overall weight-of-evidence for carcinogenicity: (1) the quality of evidence from human studies; (2) the quality of evidence from animal studies; and (3) other supportive information, such as mutagenicity data and structure-activity data. Historically, the USEPA used Group A to E to identify weight-of-evidence carcinogenicity ratings. These groups are presented and defined below.

Weight-of-Evidence Category	Definition
Group A - Human Carcinogen	This category indicates there is sufficient evidence from epidemiological studies to support a causal association between an agent and human cancer
Group B - Probable Human Carcinogen	This category generally indicates there is at least limited evidence from epidemiologic studies of carcinogenicity to humans (Group B1) or that, in the absence of data on humans, there is sufficient evidence of carcinogenicity in animals (Group B2)
Group C - Possible Human Carcinogen	This category indicates that there is limited evidence of carcinogenicity in animals in the absence of data on humans
Group D – Not Classified	This category indicates that the evidence for carcinogenicity in animals is inadequate, or no data are available
Group E – No Evidence of Carcinogenicity to Humans	This category indicates that there is evidence of non-carcinogenicity in at least two adequate animal tests in different species or in both epidemiologic and animal studies

More recently, as carcinogenicity is re-evaluated for a chemical, USEPA has dropped the use of group ratings and uses descriptors instead. Gradually with time, more chemicals are receiving descriptor ratings. Some chemicals descriptors are dose or route dependent. The five descriptors are as follows: (1) carcinogenic to humans; (2) likely to be carcinogenic to humans; (3) suggestive evidence of carcinogenic potential; (4) inadequate information to assess carcinogenic potential; and (5) not likely to be carcinogenic to humans. The carcinogenic potential for each COC is described based on its current description within IRIS.

Cancer Slope Factors (CSFs) and Unit Risks (URs) are the relevant toxicity criteria for assessing cancer risks. CSFs and URs are typically calculated for chemicals in Groups A, B1, and B2, and occasionally calculated for chemicals in Group C. The oral CSF is the largest possible linear slope, within the upper 95% Confidence Limit, expressed as the risk per unit dose, and is typically given in units of $(mg/kg/day)^{-1}$. The inhalation UR is the upper 95% Confidence Limit of the mean incremental lifetime cancer risk estimated to result from lifetime exposure to an agent if it is in the air at a concentration of 1 $\mu g/m^3$ or in the drinking water at a concentration of 1 µg/L. Use of the CSF or UR assumes that the estimated dose received by a receptor is expressed as a lifetime average.

The following COC detected at the Site are listed as carcinogens: (1) nickel (inhalation only) and benzene, which are Class A carcinogens; (2) beryllium and cadmium, which are Class B1 carcinogens via the inhalation route; and (3) benzo(a)anthracene, benzo(a)pyrene,

benzo(b)fluoranthene, benzo(k)fluoranthene, chlordane, chrysene, DDD, DDE, DDT, dibenzo(a,h)anthracene, indeno(1,2,3-c,d)pyrene, dieldrin, dioxin (TCDD equivalents), lead and PCBs, which are Class B2 carcinogens. The TCDD toxicity equivalent PCBs are also carcinogens. The remaining COC are either listed as Class D or insufficient data is available on their carcinogenicity.

For nickel, beryllium and cadmium, inhalation URs are derived, but the oral CSFs are not available. For lead, too many uncertainties exist in the cancer studies to derive oral CSF or inhalation UR; therefore, lead was not included as a cancer COC. The oral CSFs and inhalation URs for each of the carcinogenic COC are provided in Appendices C-1 to C-6.

Relative Absorption Factors (RAFs)

The RAF is used to account for differences in the absorption efficiency under exposure conditions for the site compared to the absorption efficiency for the study used to develop the associated dose-response value. RAFs used in the Risk Characterization are values provided in MassDEP's excel Toxicity workbook for deriving MCP Method 1 Numerical Standards or in MassDEP's Risk Assessment ShortForms. RAF's for non-cancer and cancer COC are provided in Appendices C-1 to C-6.

Permeability Coefficients (K_p)

The K_p is a value used to estimate the rate of transfer of a chemical through the skin. K_p's used in the Risk Characterization are values provided in MassDEP's excel Toxicity workbook for deriving MCP Method 1 Numerical Standards or in MassDEP's Risk Assessment ShortForms.. No K_p were used for this risk characterization.

Exposure Assessment

Development of Exposure Profiles

Exposure profiles are provided in the section entitled "Potential Human Receptor Exposure Profiles," above. These profiles were developed considering current and reasonably foreseeable activities and uses of the Site.

Quantitative Estimation of Exposure

Once exposure profiles are developed describing the COC, exposure points, and the receptors of concern, the potential exposures experienced by the receptors are quantified. The quantitative exposure estimates are then used to estimate risk, as described below.

The types of exposure or dose used to characterize risk depend on the exposure pathway under evaluation and the nature of the toxicity information available for each chemical. The Average Daily Dose (ADD) and Lifetime Average Daily Dose (LADD), in units of mg/kg/day, are calculated to estimate non-cancer and cancer effects from exposure to COC via incidental ingestion and dermal contact pathways. The Average Daily Exposure (ADE) and Lifetime Average Daily Exposure (LADE) are calculated and used when estimating non-cancer and cancer effects from exposure to COC via inhalation.

Estimates of exposure are provided in tables contained within Appendices C-1 to C-5 for construction workers (using MassDEP's Construction Worker ShortForm) and within Appendix C-6 for Residents (using GEC's construction worker risk assessment workbook). These same appendices provide the equations and exposure factors used to calculate exposure estimates.

Calculation of Risks

Chronic and Subchronic Non-Cancer Risk: The measure used to describe the potential for non-cancer health effects is the Hazard Index (HI). For a given chemical the HI is the ratio of a receptor's exposure level (or dose) to the "allowable" exposure level. A Hazard Index of 1.0 or less indicates that the receptor's exposure is equal to or less than the allowable exposure level, and it is considered unlikely that adverse health effects will occur. For a given route of exposure HIs are calculated as follows:

$$HI_{route\text{-}specific} = (E_1/Rf_1) + (E_2/Rf_2) + \ldots + (E_i/Rf_i)$$

Where:

E_i = Non-cancer exposure intake or concentration for the ith chemical; and

Rf_i = RfD (oral) or RfC (inhalation) for the ith chemical.

Route-specific HIs are added to obtain a cumulative non-cancer HI for each receptor group and exposure point. The cumulative non-cancer HI for each receptor is compared to MassDEP's cumulative non-cancer risk limit, which is a Hazard Index of 1.0.

Subchronic HIs were calculated for both receptors, because exposure is presumed to occur for relatively short periods of time, such as during a one week utility repair project or during a six-

month construction project. For each COC-receptor-exposure point combination, HIs are calculated in tables provided in Appendices C-1 to C-6. For each receptor, the total cumulative HIs are compared to MassDEP's non-cancer risk limit of 1.0 in the same attachments.

Cancer Risk: The potential for carcinogenic (i.e., non-threshold) health effects is characterized as the Excess Lifetime Cancer Risk (ELCR). The ELCR represents the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the potential carcinogen. For a given chemical, the estimated ELCR is the product of the receptor's quantified exposure and a measure of carcinogenic potency (i.e., cancer slope factor or unit risk factor). For a given route of exposure, the ELCR is calculated as follows:

$$ELCR_{route\text{-}specific} = (EI_1 \times SF_1) + (EI_2 \times SF_2) + \ldots + (EI_i \times SF_i)$$

Where:

EI_i = Cancer exposure intake or concentration for the ith chemical; and

SF_i = Slope Factor for the ith chemical.

Route-specific ELCRs are added to obtain a cumulative ELCR for each receptor group and exposure point. The cumulative ELCR for each receptor will be compared to MassDEP's cumulative cancer risk limit, which is an ELCR equal to one-in-one hundred thousand (1×10^{-5}).

For each COC-receptor-exposure point combination, ELCRs are calculated in tables provided in Appendices C-1 to C-6. For each receptor, the total cumulative ELCR is compared to MassDEP's cancer risk of one-in-one hundred thousand (1×10^{-5}) in the same attachments.

Identification of Applicable and/or Suitably Analogous Public Health Standards

The MCP requires that the characterization of risk of harm to human health include a comparison of Site conditions to applicable or suitably analogous public health standards. No applicable or suitably analogous public health standards exist for the Site. This finding includes the USEPA's self-implementing or risk-based PCB clean-up regulations of TSCA, because the PCB release occurred before the effective date of TSCA.

Characterization of Risk of Harm to Human Health

Risk of Subchronic and Chronic Threshold (Non-Carcinogenic) Health Effects: For each receptor group, the total cumulative subchronic or chronic HI is compared to MassDEP's cumulative non-cancer risk limit of 1.0. Subchronic HI were calculated for resident and construction worker. Limits on future exposure to residents, entailing the maintenance of a protective barrier over soils were assumed. No chronic HI were calculated, because no chronic exposure exists under current and presumed conditions. The results of the non-cancer risk assessments are summarized in Appendices C-1 to C-5 for construction workers and Appendix C-6 for residents. The cumulative HIs are compared to the non-cancer risk limit in Table C-11.

Based on these findings, No Significant non-cancer Risk of harm exists for the 3-6 and 3-11 foot interval courtyard soils for both receptors, presuming that a protective barrier is maintained over the soils of the courtyard. For the 1-3 foot interval soils, Significant Risk of harm exists for residents, but not for construction workers (although it is close). For the 0-1 interval soils and the vault sands (SP-3), a Significant Risk of harm exists for both construction workers and residents. The principal drivers of the non-cancer risks are PCBs, dioxin (TCDD equivalence) and lead.

Risk of Non-Threshold (Carcinogenic) Health Effects: For each receptor group, the total cumulative ELCR is compared to MassDEP's cumulative cancer risk limit of 1E-05. ELCRs were calculated for resident, commercial worker and construction worker. Limits on future exposure to residents, entailing the maintenance of a protective barrier over soils and implementation of a soil management plan during future construction or utility work, were assumed. The results of the cancer risk assessments are summarized in Appendices C-1 to C-5 for construction workers and in Appendix C-6 for residents. A comparison of the cumulative ELCRs to the cancer risk limit is provided in Table C-11.

Based on these findings, No Significant cancer Risk of harm exists for construction workers for all exposure points/soil intervals, and exists for residents for all exposure point/soil intervals except for the 0-1 foot interval and the vault sands (SP-3). The principal driver of the cancer risk is PCBs, with significant contribution from dioxin (TCDD equivalence).

Comparison of Site Conditions to Applicable or Suitably Analogous Public Health Standards: No applicable or suitably analogous public health standards were identified for the Site.

Uncertainty Analysis

Uncertainty is inherent in the risk assessment process, which includes a variety of scientific judgments. In general, during the course of a risk characterization, conservative assumptions or decisions are made in order to minimize the possibility that uncertainty would result in a false indication of no significant risk of harm. Uncertainties specific to this risk assessment are provided below.

Site Characterization: Uncertainties relating to the adequacy of Site characterization, including the sampling plan and analytical data, always exist, but can be minimized with a carefully planned field investigation. In general, conservative assumptions were made throughout the risk characterization, to account for limitations in Site data.

No directly measured levels of particulate-bound OHM (dusts) in ambient air were obtained. It was not possible to obtain these data, because current site conditions are not consistent with the evaluated exposure pathway. Equations with conservative input values were used to provide estimates of OHM as dusts.

Assumptions concerning the frequency, duration, and magnitude of receptor exposures: Either means, 95th percentile upper confidence limits on the mean or mean concentrations were used to obtain estimates of EPCs. 95th Percentile upper confidence limits on the mean were used when significant data variability exists for a specific exposure point and media, or where a limited amount of data is available. Exposure factors were either provided in MassDEP's Construction Worker ShortForm or were generally consistent with those used in MassDEP's documentation for developing Method 1 Standards, or recommended by MassDEP in its *Guidance Document for Disposal Site Risk Characterization* and related Technical Updates. However, because a protective barrier is assumed to be present, some of the exposure factors for on-Site resident assumed exposure would not occur except during a six-month construction project.

Availability and accuracy of the toxicity data: The development of dose-response values and relative absorption factors has uncertainties dependent on the amount of quality toxicity data available for the chemical. However, dose-response values that were derived, recommended or provided by MassDEP were used in this risk characterization.

Risk Characterization Conclusions

Conclusions Regarding Risk of Harm to Human Health and Conditions for Notice of Activity and Use Limitation

Risk of harm to human health was characterized for the Site via a MCP Method 3 Human Health Risk Characterization. Assumptions limiting future activities or uses of the Site were considered during the course of the risk characterization.

The total cumulative HIs for all receptors were less than MCP's Method 3 non-cancer risk limit for the 3-6 and 3-11 foot intervals. The total cumulative HIs for one or both receptors were more than the MCP's Method 3 non-cancer risk limit for the 0-1 foot interval, 1-3 foot interval and vault soils (SP-3). Except for the 0-1 foot interval soils and the vault sands (SP-3) for residents, the total cumulative ELCR for all receptors, exposure points and soil intervals were less than the MCP's Method 3 cancer risk limit. These findings presume that a protective barrier is maintained over the soils of the courtyard.

Based on these findings the 0-1 foot interval soils, 1-3 foot interval soils and vault soils (SP-3) would need to be remediated to achieve No Significant Risk of harm. Assumptions were already made that the SP-1 and SP-2 stockpiles will be remediated, as well as the soils used to backfill the gasoline tank graves.

If the soils identified above are remediation, No Significant Risk of harm to human health will be achieved for the courtyard, assuming some limits on future activities and uses. Gardening of edible produce is presumed not to be conducted within the disposal site boundaries through Best Management Practices. A protective barrier is assumed to be maintained over the soils of the courtyard. This latter assumption will require the implementation of a Notice of AUL for the courtyard in order for the findings of the risk assessment to be valid. Requirements of the Notice of AUL will include: (1) periodic inspection and maintenance of the protective barrier over the soils; (2) during construction or utility repair projects, the use of a Soil Management Plan to properly manage soils; and (3) following the completion of the construction or utility repair project the placement of the soils at its original depth and reinstallation or repair of the protective barrier. If a clean utility corridor is installed to house live subsurface utility lines and structures, then a Soil Management Plan would not be needed during a utility repair project, but would still be needed for construction projects.

Soils slated for remediation that contain more than 50 mg/kg PCBs should be transported off-site to a facility that can accept high level PCBs. The remaining soils slated for remediation could be either sent to a low level PCB facility or could be placed in an on-Site soil repository, at a depth more than 3 feet below grade. Potential on-site soil repositories identified for the Site include a coal chute,

utility vault located in the northwest corner of the courtyard, four dry wells discovered in the western portion of the courtyard, and, following excavation, the FO-1 and FO-2 vault areas in the east portion of the courtyard. These areas would have separate Notice of AUL conditions, including: (1) physical separation from surrounding soils; (2) not allowing any excavation of these soils except by persons who are 40-hour HAZWOPER trained under OSHA and under the direction of an LSP; (3) either replacement of soils back into the repository or off-site transport of the soils following excavation; and (4) maintenance of the soil repositories.

The principal risk drivers for the human health risk characterization are PCB and, to a lesser extent, dioxin (TCDD equivalence) and lead. Site-specific cleanup standards could be derived prior to beginning clean up to help in evaluating whether to place specific soil volumes in repositories or to transport the soils off-Site. However, based on GEC's experience given the complex mixture of OHM present in the soils, a quick, volume-specific risk assessment using MassDEP's ShortForm or GEC's risk assessment workbook would provide greater flexibility.

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

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Tab	
EPCs	Table CW-1: Select chemicals and enter Exposure Point Concentrations (EPCs). Estimated risks are shown to the right.
C Eq	Table CW-2: Equations to calculate cancer risks
NC Eq	Table CW-3: Equations to calculate noncancer risks
Exp	Table CW-4: Definitions and exposure factors
Chem	Table CW-5: Chemical-specific data
Cyanide	Table CW-6: Cyanide Calculations

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

Courtyard: 0-1 Foot Interval (PCBs)
0-3 Foot Interval (Remainder)

ShortForm Version 10-12
Vlookup Version v0315

ELCR (all chemicals) = 2.1E-06
HI (all chemicals) = **3.2E+00**

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

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	$ELCR_{total}$	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{inh-GI}	Subchronic HQ_{inh}	HQ_{total}
POLYCHLORINATED BIPHENYLS (PCBs)	4.1E+01	7.2E-07	7.2E-07	1.9E-08	1.1E-09	1.5E-06	1.0E+00	1.0E+00	2.6E-02	7.6E-02	2.1E+00
ALIPHATICS C9 to C18	4.4E+01						5.4E-05	1.1E-04	1.4E-06	2.7E-06	1.7E-04
ALIPHATICS C19 to C36	1.8E+02						3.7E-05	7.4E-05	9.5E-07		1.1E-04
AROMATICS C11 to C22	3.0E+02						3.7E-04	1.2E-03	9.5E-06	2.2E-05	1.6E-03
ACENAPHTHENE	8.6E-01						1.6E-06	5.3E-06	4.1E-08	6.4E-08	7.0E-06
ACENAPHTHYLENE	2.3E-01						2.8E-07	9.5E-07	7.3E-09	1.7E-08	1.3E-06
ANTHRACENE	1.9E+00						7.0E-07	2.4E-06	1.8E-08	1.4E-07	3.2E-06
BENZO(a)ANTHRACENE	4.3E+00	8.3E-09	5.5E-09	2.1E-10	2.4E-10	1.4E-08	5.3E-06	3.6E-06	1.4E-07	3.2E-07	9.3E-06
BENZO(a)PYRENE	3.9E+00	7.5E-08	5.0E-08	1.9E-09	2.2E-09	1.3E-07	4.8E-06	3.2E-06	1.2E-07	2.9E-07	8.4E-06
BENZO(b)FLUORANTHENE	5.1E+00	9.8E-09	6.6E-09	2.5E-10	2.8E-10	1.7E-08	6.3E-06	4.2E-06	1.6E-07	3.8E-07	1.1E-05
BENZO(g,h,i)PERYLENE	2.2E+00						2.7E-06	9.1E-06	7.0E-08	1.6E-07	1.2E-05
BENZO(k)FLUORANTHENE	1.8E+00	3.5E-10	2.3E-10	9.0E-12	1.0E-11	6.0E-10	2.2E-06	1.5E-06	5.7E-08	1.3E-07	3.9E-06
CHRYSENE	4.8E+00	9.2E-10	6.2E-10	2.4E-11	2.7E-11	1.6E-09	5.9E-06	4.0E-06	1.5E-07	3.6E-07	1.0E-05
DIBENZO(a,h)ANTHRACENE	6.5E-01	1.2E-08	8.4E-09	3.2E-10	3.6E-10	2.2E-08	8.0E-07	5.4E-07	2.1E-08	4.8E-08	1.4E-06
FLUORANTHENE	9.9E+00						3.7E-05	1.2E-04	9.5E-07	7.4E-07	1.6E-04
FLUORENE	8.9E-01						8.2E-07	2.8E-06	2.1E-08	6.6E-08	3.7E-06
INDENO(1,2,3-cd)PYRENE	2.5E+00	4.8E-09	3.2E-09	1.2E-10	1.4E-10	8.3E-09	3.1E-06	2.1E-06	8.0E-08	1.9E-07	5.4E-06
METHYLNAPHTHALENE, 2-	3.3E-01						3.0E-05	1.0E-04	7.9E-07	2.5E-08	1.3E-04
NAPHTHALENE	7.5E-01						1.4E-06	4.7E-06	3.6E-08	9.3E-06	1.5E-05
PHENANTHRENE	7.9E+00						9.7E-06	3.3E-05	2.5E-07	5.9E-07	4.3E-05
PYRENE	9.6E+00						1.2E-05	4.0E-05	3.1E-07	7.2E-07	5.3E-05
BARIUM	1.1E+02						1.9E-03	1.9E-03	4.9E-05	8.0E-04	4.6E-03
BERYLLIUM	5.1E+00				3.2E-09	3.2E-09	1.3E-03	1.3E-03	3.3E-05	9.5E-03	1.2E-02
CHROMIUM(III)	3.6E+01						3.0E-05	3.0E-05	7.7E-07	4.5E-03	4.5E-03
LEAD	4.4E+02						3.6E-01	4.3E-02	9.3E-03	1.6E-02	4.3E-01
NICKEL	3.4E+01				4.3E-09	4.3E-09	2.1E-03	4.2E-03	5.4E-05	1.3E-03	7.6E-03
VANADIUM	3.7E+02						5.1E-02	5.1E-02	1.3E-03	1.4E-02	1.2E-01
ZINC	1.9E+02						7.7E-04	7.8E-04	2.0E-05	5.0E-03	6.6E-03
DICHLORODIPHENYLDICHLOROETHYLENE,P,P'- (DDI	5.4E-02	1.6E-10	4.9E-11	4.2E-12	1.4E-12	2.2E-10	1.3E-04	4.0E-05	3.4E-06	1.1E-06	1.8E-04
DICHLORODIPHENYLTRICHLOROETHANE, P,P'- (DDT	1.0E-01	3.0E-10	9.2E-11	7.9E-12	2.6E-12	4.1E-10	2.5E-04	7.6E-05	6.5E-06	2.1E-06	3.4E-04
DIELDRIN	1.1E-01	1.5E-08	1.5E-08	3.9E-10	1.3E-10	3.1E-08	2.7E-03	2.7E-03	6.9E-05	2.2E-05	5.4E-03
TCDD, 2,3,7,8- (equivalents)	1.4E-04	1.8E-07	1.8E-07	4.6E-09	1.2E-09	3.6E-07	2.4E-01	2.4E-01	6.2E-03	2.5E-03	4.9E-01

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Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0315

Cancer Risk from Ingestion

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

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

Cancer Risk from Dermal Absorption

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

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

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
CSF	OHM-specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{c\text{-}ing}$	OHM-specific	dimensionless
$RAF_{c\text{-}derm}$	OHM-specific	dimensionless
$RAF_{c\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{(lifetime)}$	25,550	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM_{10}	60	$\mu g/m^3$

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Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0315

Noncancer Risk from Ingestion

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

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

Noncancer Risk from Dermal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM-specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM-specific	dimensionless
$RAF_{nc\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{noncancer}$	182	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM10	60	$µg/m^3$

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

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	mg/kg	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF_{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
$ED_{ing,derm}$ - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED_{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
$AP_{(lifetime)}$ - Averaging Period for lifetime	25,550	days	Represents 70 years
$AP_{(noncancer)}$ - Averaging Period for noncancer	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
AF - Adherence Factor	0.29	mg/cm^2	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR_{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm^2/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
$IFAF_{inh\text{-}gi}$ - Ingestion Fraction Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
$IFAF_{inh}$ - Inhalation Fraction Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM_{10}	60	$\mu g/m^3$	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

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

Vlookup Version v0315

Oil or Hazardous Material	Oral CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	$RAF_{c\text{-}inh}$	Inhalation CSF $(mg/kg\text{-}day)^{-1}$	Subchronic Oral RfD mg/kg-day	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}inh}$	Subchronic Inhalation RfD
POLYCHLORINATED BIPHENYLS (PCBs)	2.0E+00	1	0.1	1	3.5E-01	5.0E-05	1	0.1	1	5.7E-06
ALIPHATICS C9 to C18						1.0E+00	1	0.2	1	1.7E-01
ALIPHATICS C19 to C36						6.0E+00	1	0.2		
AROMATICS C11 to C22						3.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHENE						2.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHYLENE						3.0E-01	0.3	0.1	1	1.4E-01
ANTHRACENE						1.0E+00	0.3	0.1	1	1.4E-01
BENZO(a)ANTHRACENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(a)PYRENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(b)FLUORANTHENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(g,h,i)PERYLENE						3.0E-01	0.3	0.1	1	1.4E-01
BENZO(k)FLUORANTHENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
CHRYSENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
DIBENZO(a,h)ANTHRACENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
FLUORANTHENE						1.0E-01	0.3	0.1	1	1.4E-01
FLUORENE						4.0E-01	0.3	0.1	1	1.4E-01
INDENO(1,2,3-cd)PYRENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
METHYLNAPHTHALENE, 2-						4.0E-03	0.3	0.1	1	1.4E-01
NAPHTHALENE						2.0E-01	0.3	0.1	1	8.6E-04
PHENANTHRENE						3.0E-01	0.3	0.1	1	1.4E-01
PYRENE						3.0E-01	0.3	0.1	1	1.4E-01
BARIUM						7.0E-02	1	0.1	1	1.4E-03
BERYLLIUM					8.4E+00	5.0E-03	1	0.1	1	5.7E-06
CHROMIUM(III)						1.5E+00	1	0.1	1	8.6E-05
LEAD						7.5E-04	0.5	0.006	1	2.9E-04
NICKEL					1.7E+00	2.0E-02	1	0.2	1	2.9E-04
VANADIUM						9.0E-03	1	0.1	1	2.9E-04
ZINC						3.0E-01	1	0.1	1	4.0E-04

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

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Exp	Table CW-4: Definitions and exposure factors
Chem	Table CW-5: Chemical-specific data
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Construction Worker - Soil: Table CW-1
Exposure Point Concentration (EPC) and Risk
Based on Construction Worker 18-25 years of age

Courtyard: 1-3 Foot Interval (PCBs)
0-3 Foot Interval (Remainder)

ShortForm Version 10-12
Vlookup Version v0315

ELCR (all chemicals) = 5.6E-07
HI (all chemicals) = 1.0E+00

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

Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	$ELCR_{total}$	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{inh-GI}	Subchronic HQ_{inh}	HQ_{total}
POLYCHLORINATED BIPHENYLS (PCBs)	7.6E+00	1.3E-07	1.3E-07	3.5E-09	2.0E-10	2.7E-07	1.9E-01	1.9E-01	4.9E-03	1.4E-02	3.9E-01
ALIPHATICS C9 to C18	4.4E+01						5.4E-05	1.1E-04	1.4E-06	2.7E-06	1.7E-04
ALIPHATICS C19 to C36	1.8E+02						3.7E-05	7.4E-05	9.5E-07		1.1E-04
AROMATICS C11 to C22	3.0E+02						3.7E-04	1.2E-03	9.5E-06	2.2E-05	1.6E-03
ACENAPHTHENE	8.6E-01						1.6E-06	5.3E-06	4.1E-08	6.4E-08	7.0E-06
ACENAPHTHYLENE	2.3E-01						2.8E-07	9.5E-07	7.3E-09	1.7E-08	1.3E-06
ANTHRACENE	1.9E+00						7.0E-07	2.4E-06	1.8E-08	1.4E-07	3.2E-06
BENZO(a)ANTHRACENE	4.3E+00	8.3E-09	5.5E-09	2.1E-10	2.4E-10	1.4E-08	5.3E-06	3.6E-06	1.4E-07	3.2E-07	9.3E-06
BENZO(a)PYRENE	3.9E+00	7.5E-08	5.0E-08	1.9E-09	2.2E-09	1.3E-07	4.8E-06	3.2E-06	1.2E-07	2.9E-07	8.4E-06
BENZO(b)FLUORANTHENE	5.1E+00	9.8E-09	6.6E-09	2.5E-10	2.8E-10	1.7E-08	6.3E-06	4.2E-06	1.6E-07	3.8E-07	1.1E-05
BENZO(g,h,i)PERYLENE	2.2E+00						2.7E-06	9.1E-06	7.0E-08	1.6E-07	1.2E-05
BENZO(k)FLUORANTHENE	1.8E+00	3.5E-10	2.3E-10	9.0E-12	1.0E-11	6.0E-10	2.2E-06	1.5E-06	5.7E-08	1.3E-07	3.9E-06
CHRYSENE	4.8E+00	9.2E-10	6.2E-10	2.4E-11	2.7E-11	1.6E-09	5.9E-06	4.0E-06	1.5E-07	3.6E-07	1.0E-05
DIBENZO(a,h)ANTHRACENE	6.5E-01	1.2E-08	8.4E-09	3.2E-10	3.6E-10	2.2E-08	8.0E-07	5.4E-07	2.1E-08	4.8E-08	1.4E-06
FLUORANTHENE	9.9E+00						3.7E-05	1.2E-04	9.5E-07	7.4E-07	1.6E-04
FLUORENE	8.9E-01						8.2E-07	2.8E-06	2.1E-08	6.6E-08	3.7E-06
INDENO(1,2,3-cd)PYRENE	2.5E+00	4.8E-09	3.2E-09	1.2E-10	1.4E-10	8.3E-09	3.1E-06	2.1E-06	8.0E-08	1.9E-07	5.4E-06
METHYLNAPHTHALENE, 2-	3.3E-01						3.0E-05	1.0E-04	7.9E-07	2.5E-08	1.3E-04
NAPHTHALENE	7.5E-01						1.4E-06	4.7E-06	3.6E-08	9.3E-06	1.5E-05
PHENANTHRENE	7.9E+00						9.7E-06	3.3E-05	2.5E-07	5.9E-07	4.3E-05
PYRENE	9.6E+00						1.2E-05	4.0E-05	3.1E-07	7.2E-07	5.3E-05
BARIUM	9.2E+01						1.6E-03	1.6E-03	4.2E-05	6.9E-04	4.0E-03
BERYLLIUM	9.2E+00				5.9E-09	5.9E-09	2.3E-03	2.3E-03	5.9E-05	1.7E-02	2.2E-02
CHROMIUM(III)	3.7E+01						3.0E-05	3.1E-05	7.9E-07	4.6E-03	4.7E-03
LEAD	3.7E+02						3.0E-01	3.6E-02	7.8E-03	1.4E-02	3.6E-01
NICKEL	4.0E+01				5.1E-09	5.1E-09	2.5E-03	5.0E-03	6.4E-05	1.5E-03	9.0E-03
VANADIUM	4.4E+02						6.1E-02	6.1E-02	1.6E-03	1.6E-02	1.4E-01
ZINC	1.8E+02						7.2E-04	7.2E-04	1.9E-05	4.7E-03	6.1E-03
DICHLORODIPHENYLDICHLOROETHYLENE,P,P'- (DDI	4.7E-02	1.4E-10	4.2E-11	3.6E-12	1.2E-12	1.9E-10	1.2E-04	3.5E-05	3.0E-06	9.7E-07	1.5E-04
DICHLORODIPHENYLTRICHLOROETHANE, P,P'- (DDT	6.8E-02	2.0E-10	6.1E-11	5.3E-12	1.7E-12	2.7E-10	1.7E-04	5.1E-05	4.3E-06	1.4E-06	2.2E-04
DIELDRIN	4.7E-02	6.6E-09	6.6E-09	1.7E-10	5.7E-11	1.3E-08	1.2E-03	1.2E-03	3.0E-05	9.7E-06	2.4E-03
TCDD, 2,3,7,8- (equivalents)	2.5E-05	3.3E-08	3.3E-08	8.6E-10	2.2E-10	6.7E-08	4.4E-02	4.4E-02	1.1E-03	4.7E-04	9.0E-02

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Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0315

Cancer Risk from Ingestion

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

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

Cancer Risk from Dermal Absorption

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

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

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
CSF	OHM-specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{c\text{-}ing}$	OHM-specific	dimensionless
$RAF_{c\text{-}derm}$	OHM-specific	dimensionless
$RAF_{c\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{(lifetime)}$	25,550	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM_{10}	60	$\mu g/m^3$

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Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

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Noncancer Risk from Ingestion

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

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

Noncancer Risk from Dermal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM-specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM-specific	dimensionless
$RAF_{nc\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{noncancer}$	182	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM10	60	$µg/m^3$

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

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	mg/kg	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF_{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
$ED_{ing,derm}$ - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED_{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
$AP_{(lifetime)}$ - Averaging Period for lifetime	25,550	days	Represents 70 years
$AP_{(noncancer)}$ - Averaging Period for noncancer	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
AF - Adherence Factor	0.29	mg/cm^2	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR_{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm^2/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
$IFAF_{inh\text{-}gi}$ - Ingestion Fraction Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
$IFAF_{inh}$ - Inhalation Fraction Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM_{10}	60	$\mu g/m^3$	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

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

Vlookup Version v0315

Oil or Hazardous Material	Oral CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	$RAF_{c\text{-}inh}$	Inhalation CSF $(mg/kg\text{-}day)^{-1}$	Subchronic Oral RfD mg/kg-day	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}inh}$	Subchronic Inhalation RfD
POLYCHLORINATED BIPHENYLS (PCBs)	2.0E+00	1	0.1	1	3.5E-01	5.0E-05	1	0.1	1	5.7E-06
ALIPHATICS C9 to C18						1.0E+00	1	0.2	1	1.7E-01
ALIPHATICS C19 to C36						6.0E+00	1	0.2		
AROMATICS C11 to C22						3.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHENE						2.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHYLENE						3.0E-01	0.3	0.1	1	1.4E-01
ANTHRACENE						1.0E+00	0.3	0.1	1	1.4E-01
BENZO(a)ANTHRACENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(a)PYRENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(b)FLUORANTHENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(g,h,i)PERYLENE						3.0E-01	0.3	0.1	1	1.4E-01
BENZO(k)FLUORANTHENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
CHRYSENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
DIBENZO(a,h)ANTHRACENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
FLUORANTHENE						1.0E-01	0.3	0.1	1	1.4E-01
FLUORENE						4.0E-01	0.3	0.1	1	1.4E-01
INDENO(1,2,3-cd)PYRENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
METHYLNAPHTHALENE, 2-						4.0E-03	0.3	0.1	1	1.4E-01
NAPHTHALENE						2.0E-01	0.3	0.1	1	8.6E-04
PHENANTHRENE						3.0E-01	0.3	0.1	1	1.4E-01
PYRENE						3.0E-01	0.3	0.1	1	1.4E-01
BARIUM						7.0E-02	1	0.1	1	1.4E-03
BERYLLIUM					8.4E+00	5.0E-03	1	0.1	1	5.7E-06
CHROMIUM(III)						1.5E+00	1	0.1	1	8.6E-05
LEAD						7.5E-04	0.5	0.006	1	2.9E-04
NICKEL					1.7E+00	2.0E-02	1	0.2	1	2.9E-04
VANADIUM						9.0E-03	1	0.1	1	2.9E-04
ZINC						3.0E-01	1	0.1	1	4.0E-04

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

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Exp	Table CW-4: Definitions and exposure factors
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Cyanide	Table CW-6: Cyanide Calculations

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

Courtyard: 3-6 Foot Interval (PCBs and Remainder)

ShortForm Version 10-12
Vlookup Version v0315

ELCR (all chemicals) = 1.8E-07
HI (all chemicals) = 2.9E-01

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

Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	$ELCR_{total}$	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{inh-GI}	Subchronic HQ_{inh}	HQ_{total}
POLYCHLORINATED BIPHENYLS (PCBs)	1.9E+00	3.3E-08	3.4E-08	8.6E-10	5.0E-11	6.8E-08	4.7E-02	4.7E-02	1.2E-03	3.5E-03	9.9E-02
ALIPHATICS C9 to C18	1.2E+01						1.5E-05	3.0E-05	3.8E-07	7.4E-07	4.6E-05
ALIPHATICS C19 to C36	4.7E+01						9.6E-06	1.9E-05	2.5E-07		2.9E-05
AROMATICS C11 to C22	9.8E+01						1.2E-04	4.1E-04	3.1E-06	7.3E-06	5.4E-04
ACENAPHTHENE	3.8E-01						7.0E-07	2.4E-06	1.8E-08	2.8E-08	3.1E-06
ACENAPHTHYLENE	8.4E-02						1.0E-07	3.5E-07	2.7E-09	6.3E-09	4.6E-07
ANTHRACENE	8.4E-01						3.1E-07	1.0E-06	8.0E-09	6.3E-08	1.4E-06
BENZO(a)ANTHRACENE	1.8E+00	3.5E-09	2.3E-09	9.0E-11	1.0E-10	6.0E-09	2.2E-06	1.5E-06	5.7E-08	1.3E-07	3.9E-06
BENZO(a)PYRENE	1.6E+00	3.1E-08	2.1E-08	8.0E-10	8.9E-10	5.3E-08	2.0E-06	1.3E-06	5.1E-08	1.2E-07	3.5E-06
BENZO(b)FLUORANTHENE	2.2E+00	4.2E-09	2.8E-09	1.1E-10	1.2E-10	7.3E-09	2.7E-06	1.8E-06	7.0E-08	1.6E-07	4.8E-06
BENZO(g,h,i)PERYLENE	9.1E-01						1.1E-06	3.8E-06	2.9E-08	6.8E-08	5.0E-06
BENZO(k)FLUORANTHENE	8.3E-01	1.6E-10	1.1E-10	4.1E-12	4.6E-12	2.8E-10	1.0E-06	6.9E-07	2.6E-08	6.2E-08	1.8E-06
CHRYSENE	1.9E+00	3.7E-10	2.5E-10	9.5E-12	1.1E-11	6.3E-10	2.3E-06	1.6E-06	6.1E-08	1.4E-07	4.1E-06
DIBENZO(a,h)ANTHRACENE	2.5E-01	4.8E-09	3.2E-09	1.2E-10	1.4E-10	8.3E-09	3.1E-07	2.1E-07	8.0E-09	1.9E-08	5.4E-07
FLUORANTHENE	4.0E+00						1.5E-05	5.0E-05	3.8E-07	3.0E-07	6.5E-05
FLUORENE	4.1E-01						3.8E-07	1.3E-06	9.8E-09	3.1E-08	1.7E-06
INDENO(1,2,3-cd)PYRENE	9.7E-01	1.9E-09	1.3E-09	4.8E-11	5.4E-11	3.2E-09	1.2E-06	8.0E-07	3.1E-08	7.2E-08	2.1E-06
METHYLNAPHTHALENE, 2-	1.3E-01						1.2E-05	4.0E-05	3.1E-07	9.7E-09	5.3E-05
NAPHTHALENE	1.8E-01						3.3E-07	1.1E-06	8.6E-09	2.2E-06	3.7E-06
PHENANTHRENE	3.4E+00						4.2E-06	1.4E-05	1.1E-07	2.5E-07	1.9E-05
PYRENE	3.7E+00						4.6E-06	1.5E-05	1.2E-07	2.8E-07	2.0E-05
BARIUM	4.9E+01						8.6E-04	8.7E-04	2.2E-05	3.6E-04	2.1E-03
BERYLLIUM	1.9E+00				1.2E-09	1.2E-09	4.7E-04	4.7E-04	1.2E-05	3.5E-03	4.5E-03
CHROMIUM(III)	1.7E+01						1.4E-05	1.4E-05	3.6E-07	2.1E-03	2.1E-03
LEAD	1.1E+02						8.6E-02	1.0E-02	2.2E-03	3.9E-03	1.0E-01
NICKEL	2.4E+01				3.1E-09	3.1E-09	1.5E-03	3.0E-03	3.8E-05	8.9E-04	5.4E-03
VANADIUM	1.5E+02						2.1E-02	2.1E-02	5.4E-04	5.6E-03	4.8E-02
ZINC	9.4E+01						3.9E-04	3.9E-04	1.0E-05	2.5E-03	3.3E-03
CHLORDANE	1.3E-01	4.0E-10	1.6E-10	1.0E-11	3.4E-12	5.7E-10	3.2E-04	1.3E-04	8.3E-06	6.9E-07	4.6E-04
DICHLORODIPHENYLTRICHLOROETHANE, P,P'- (DDT	3.7E-02	1.1E-10	3.3E-11	2.9E-12	9.5E-13	1.5E-10	9.1E-05	2.8E-05	2.4E-06	7.7E-07	1.2E-04
DIELDRIN	3.2E-02	4.5E-09	4.5E-09	1.2E-10	3.9E-11	9.2E-09	7.9E-04	7.9E-04	2.0E-05	6.6E-06	1.6E-03
BENZENE	5.3E-02	2.6E-11	7.7E-12	6.6E-13	1.1E-13	3.4E-11	6.5E-06	2.0E-06	1.7E-07	2.0E-07	8.9E-06

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Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0315

Cancer Risk from Ingestion

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

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

Cancer Risk from Dermal Absorption

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

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

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
CSF	OHM-specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{c\text{-}ing}$	OHM-specific	dimensionless
$RAF_{c\text{-}derm}$	OHM-specific	dimensionless
$RAF_{c\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{(lifetime)}$	25,550	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM_{10}	60	$\mu g/m^3$

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Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0315

Noncancer Risk from Ingestion

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

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

Noncancer Risk from Dermal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM-specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM-specific	dimensionless
$RAF_{nc\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{noncancer}$	182	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM10	60	$µg/m^3$

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

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	mg/kg	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF_{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
$ED_{ing,derm}$ - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED_{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
$AP_{(lifetime)}$ - Averaging Period for lifetime	25,550	days	Represents 70 years
$AP_{(noncancer)}$ - Averaging Period for noncancer	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
AF - Adherence Factor	0.29	mg/cm^2	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR_{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm^2/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
$IFAF_{inh\text{-}gi}$ - Ingestion Fraction Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
$IFAF_{inh}$ - Inhalation Fraction Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM_{10}	60	$\mu g/m^3$	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

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

Vlookup Version v0315

Oil or Hazardous Material	Oral CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	$RAF_{c\text{-}inh}$	Inhalation CSF $(mg/kg\text{-}day)^{-1}$	Subchronic Oral RfD mg/kg-day	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}inh}$	Subchronic Inhalation RfD
POLYCHLORINATED BIPHENYLS (PCBs)	2.0E+00	1	0.1	1	3.5E-01	5.0E-05	1	0.1	1	5.7E-06
ALIPHATICS C9 to C18						1.0E+00	1	0.2	1	1.7E-01
ALIPHATICS C19 to C36						6.0E+00	1	0.2		
AROMATICS C11 to C22						3.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHENE						2.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHYLENE						3.0E-01	0.3	0.1	1	1.4E-01
ANTHRACENE						1.0E+00	0.3	0.1	1	1.4E-01
BENZO(a)ANTHRACENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(a)PYRENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(b)FLUORANTHENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(g,h,i)PERYLENE						3.0E-01	0.3	0.1	1	1.4E-01
BENZO(k)FLUORANTHENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
CHRYSENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
DIBENZO(a,h)ANTHRACENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
FLUORANTHENE						1.0E-01	0.3	0.1	1	1.4E-01
FLUORENE						4.0E-01	0.3	0.1	1	1.4E-01
INDENO(1,2,3-cd)PYRENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
METHYLNAPHTHALENE, 2-						4.0E-03	0.3	0.1	1	1.4E-01
NAPHTHALENE						2.0E-01	0.3	0.1	1	8.6E-04
PHENANTHRENE						3.0E-01	0.3	0.1	1	1.4E-01
PYRENE						3.0E-01	0.3	0.1	1	1.4E-01
BARIUM						7.0E-02	1	0.1	1	1.4E-03
BERYLLIUM					8.4E+00	5.0E-03	1	0.1	1	5.7E-06
CHROMIUM(III)						1.5E+00	1	0.1	1	8.6E-05
LEAD						7.5E-04	0.5	0.006	1	2.9E-04
NICKEL					1.7E+00	2.0E-02	1	0.2	1	2.9E-04
VANADIUM						9.0E-03	1	0.1	1	2.9E-04
ZINC						3.0E-01	1	0.1	1	4.0E-04

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

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

Courtyard: 3-11 Foot Interval (PCBs and Remainder)

ShortForm Version 10-12
Vlookup Version v0315

ELCR (all chemicals) = 1.8E-07
HI (all chemicals) = 3.1E-01

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

Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	$ELCR_{total}$	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{inh-GI}	Subchronic HQ_{inh}	HQ_{total}
POLYCHLORINATED BIPHENYLS (PCBs)	2.0E+00	3.5E-08	3.5E-08	9.1E-10	5.3E-11	7.1E-08	4.9E-02	5.0E-02	1.3E-03	3.7E-03	1.0E-01
ALIPHATICS C9 to C18	3.1E+01						3.8E-05	7.7E-05	9.9E-07	1.9E-06	1.2E-04
ALIPHATICS C19 to C36	9.3E+01						1.9E-05	3.8E-05	4.9E-07		5.8E-05
AROMATICS C11 to C22	1.8E+02						2.2E-04	7.4E-04	5.7E-06	1.3E-05	9.8E-04
ACENAPHTHENE	3.3E-01						6.1E-07	2.0E-06	1.6E-08	2.5E-08	2.7E-06
ACENAPHTHYLENE	9.6E-02						1.2E-07	4.0E-07	3.1E-09	7.2E-09	5.3E-07
ANTHRACENE	7.5E-01						2.8E-07	9.3E-07	7.2E-09	5.6E-08	1.3E-06
BENZO(a)ANTHRACENE	1.6E+00	3.1E-09	2.1E-09	8.0E-11	8.9E-11	5.3E-09	2.0E-06	1.3E-06	5.1E-08	1.2E-07	3.5E-06
BENZO(a)PYRENE	1.5E+00	2.9E-08	1.9E-08	7.5E-10	8.3E-10	5.0E-08	1.8E-06	1.2E-06	4.8E-08	1.1E-07	3.2E-06
BENZO(b)FLUORANTHENE	2.0E+00	3.8E-09	2.6E-09	1.0E-10	1.1E-10	6.6E-09	2.5E-06	1.7E-06	6.4E-08	1.5E-07	4.3E-06
BENZO(g,h,i)PERYLENE	8.5E-01						1.0E-06	3.5E-06	2.7E-08	6.3E-08	4.7E-06
BENZO(k)FLUORANTHENE	7.7E-01	1.5E-10	9.9E-11	3.8E-12	4.3E-12	2.6E-10	9.5E-07	6.4E-07	2.5E-08	5.7E-08	1.7E-06
CHRYSENE	1.8E+00	3.5E-10	2.3E-10	9.0E-12	1.0E-11	6.0E-10	2.2E-06	1.5E-06	5.7E-08	1.3E-07	3.9E-06
DIBENZO(a,h)ANTHRACENE	2.4E-01	4.6E-09	3.1E-09	1.2E-10	1.3E-10	8.0E-09	3.0E-07	2.0E-07	7.7E-09	1.8E-08	5.2E-07
FLUORANTHENE	3.7E+00						1.4E-05	4.6E-05	3.5E-07	2.8E-07	6.0E-05
FLUORENE	3.7E-01						3.4E-07	1.1E-06	8.9E-09	2.8E-08	1.5E-06
INDENO(1,2,3-cd)PYRENE	8.9E-01	1.7E-09	1.1E-09	4.4E-11	4.9E-11	3.0E-09	1.1E-06	7.4E-07	2.8E-08	6.6E-08	1.9E-06
METHYLNAPHTHALENE, 2-	1.7E-01						1.6E-05	5.3E-05	4.1E-07	1.3E-08	6.9E-05
NAPHTHALENE	2.0E-01						3.7E-07	1.2E-06	9.6E-09	2.5E-06	4.1E-06
PHENANTHRENE	3.1E+00						3.8E-06	1.3E-05	9.9E-08	2.3E-07	1.7E-05
PYRENE	3.4E+00						4.2E-06	1.4E-05	1.1E-07	2.5E-07	1.9E-05
BARIUM	4.9E+01						8.6E-04	8.7E-04	2.2E-05	3.6E-04	2.1E-03
BERYLLIUM	1.9E+00				1.2E-09	1.2E-09	4.7E-04	4.7E-04	1.2E-05	3.5E-03	4.5E-03
CHROMIUM(III)	1.7E+01						1.4E-05	1.4E-05	3.6E-07	2.1E-03	2.1E-03
LEAD	1.0E+02						8.5E-02	1.0E-02	2.2E-03	3.9E-03	1.0E-01
NICKEL	2.4E+01				3.1E-09	3.1E-09	1.5E-03	3.0E-03	3.8E-05	8.9E-04	5.4E-03
VANADIUM	1.8E+02						2.4E-02	2.5E-02	6.3E-04	6.6E-03	5.6E-02
ZINC	9.4E+01						3.9E-04	3.9E-04	1.0E-05	2.5E-03	3.3E-03
CHLORDANE	1.3E-01	4.0E-10	1.6E-10	1.0E-11	3.4E-12	5.7E-10	3.2E-04	1.3E-04	8.3E-06	6.9E-07	4.6E-04
DICHLORODIPHENYLTRICHLOROETHANE, P,P'- (DDT	3.7E-02	1.1E-10	3.3E-11	2.9E-12	9.5E-13	1.5E-10	9.1E-05	2.8E-05	2.4E-06	7.7E-07	1.2E-04
DIELDRIN	3.2E-02	4.5E-09	4.5E-09	1.2E-10	3.9E-11	9.2E-09	7.9E-04	7.9E-04	2.0E-05	6.6E-06	1.6E-03
BENZENE	5.3E-02	2.6E-11	7.7E-12	6.6E-13	1.1E-13	3.4E-11	6.5E-06	2.0E-06	1.7E-07	2.0E-07	8.9E-06

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Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0315

Cancer Risk from Ingestion

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

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

Cancer Risk from Dermal Absorption

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

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

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
CSF	OHM-specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{c\text{-}ing}$	OHM-specific	dimensionless
$RAF_{c\text{-}derm}$	OHM-specific	dimensionless
$RAF_{c\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{(lifetime)}$	25,550	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM_{10}	60	$\mu g/m^3$

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Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0315

Noncancer Risk from Ingestion

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

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

Noncancer Risk from Dermal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM-specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM-specific	dimensionless
$RAF_{nc\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{noncancer}$	182	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM10	60	$µg/m^3$

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

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	mg/kg	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF_{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
$ED_{ing,derm}$ - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED_{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
$AP_{(lifetime)}$ - Averaging Period for lifetime	25,550	days	Represents 70 years
$AP_{(noncancer)}$ - Averaging Period for noncancer	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
AF - Adherence Factor	0.29	mg/cm^2	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR_{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm^2/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
$IFAF_{inh\text{-}gi}$ - Ingestion Fraction Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
$IFAF_{inh}$ - Inhalation Fraction Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM_{10}	60	$\mu g/m^3$	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

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

Vlookup Version v0315

Oil or Hazardous Material	Oral CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	$RAF_{c\text{-}inh}$	Inhalation CSF $(mg/kg\text{-}day)^{-1}$	Subchronic Oral RfD mg/kg-day	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}inh}$	Subchronic Inhalation RfD
POLYCHLORINATED BIPHENYLS (PCBs)	2.0E+00	1	0.1	1	3.5E-01	5.0E-05	1	0.1	1	5.7E-06
ALIPHATICS C9 to C18						1.0E+00	1	0.2	1	1.7E-01
ALIPHATICS C19 to C36						6.0E+00	1	0.2		
AROMATICS C11 to C22						3.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHENE						2.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHYLENE						3.0E-01	0.3	0.1	1	1.4E-01
ANTHRACENE						1.0E+00	0.3	0.1	1	1.4E-01
BENZO(a)ANTHRACENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(a)PYRENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(b)FLUORANTHENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(g,h,i)PERYLENE						3.0E-01	0.3	0.1	1	1.4E-01
BENZO(k)FLUORANTHENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
CHRYSENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
DIBENZO(a,h)ANTHRACENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
FLUORANTHENE						1.0E-01	0.3	0.1	1	1.4E-01
FLUORENE						4.0E-01	0.3	0.1	1	1.4E-01
INDENO(1,2,3-cd)PYRENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
METHYLNAPHTHALENE, 2-						4.0E-03	0.3	0.1	1	1.4E-01
NAPHTHALENE						2.0E-01	0.3	0.1	1	8.6E-04
PHENANTHRENE						3.0E-01	0.3	0.1	1	1.4E-01
PYRENE						3.0E-01	0.3	0.1	1	1.4E-01
BARIUM						7.0E-02	1	0.1	1	1.4E-03
BERYLLIUM					8.4E+00	5.0E-03	1	0.1	1	5.7E-06
CHROMIUM(III)						1.5E+00	1	0.1	1	8.6E-05
LEAD						7.5E-04	0.5	0.006	1	2.9E-04
NICKEL					1.7E+00	2.0E-02	1	0.2	1	2.9E-04
VANADIUM						9.0E-03	1	0.1	1	2.9E-04
ZINC						3.0E-01	1	0.1	1	4.0E-04

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

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

Courtyard: Fuel Oil Vault Sands /
Stockpile SP-3

ShortForm Version 10-12
Vlookup Version v0315

ELCR (all chemicals) = 7.7E-07
HI (all chemicals) = **1.3E+00**

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

Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	$ELCR_{total}$	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{inh-GI}	Subchronic HQ_{inh}	HQ_{total}
POLYCHLORINATED BIPHENYLS (PCBs)	1.3E+01	2.3E-07	2.3E-07	5.9E-09	3.4E-10	4.6E-07	3.2E-01	3.2E-01	8.3E-03	2.4E-02	6.8E-01
ALIPHATICS C9 to C18											
ALIPHATICS C19 to C36											
AROMATICS C11 to C22											
ACENAPHTHENE	7.0E-01						1.3E-06	4.3E-06	3.4E-08	5.2E-08	5.7E-06
ACENAPHTHYLENE	9.0E-02						1.1E-07	3.7E-07	2.9E-09	6.7E-09	4.9E-07
ANTHRACENE	1.5E+00						5.5E-07	1.9E-06	1.4E-08	1.1E-07	2.5E-06
BENZO(a)ANTHRACENE	3.0E+00	5.8E-09	3.9E-09	1.5E-10	1.7E-10	9.9E-09	3.7E-06	2.5E-06	9.6E-08	2.2E-07	6.5E-06
BENZO(a)PYRENE	2.6E+00	5.0E-08	3.4E-08	1.3E-09	1.4E-09	8.6E-08	3.2E-06	2.2E-06	8.3E-08	1.9E-07	5.6E-06
BENZO(b)FLUORANTHENE	3.5E+00	6.7E-09	4.5E-09	1.7E-10	1.9E-10	1.2E-08	4.3E-06	2.9E-06	1.1E-07	2.6E-07	7.6E-06
BENZO(g,h,i)PERYLENE	1.4E+00						1.7E-06	5.8E-06	4.5E-08	1.0E-07	7.7E-06
BENZO(k)FLUORANTHENE	1.4E+00	2.7E-10	1.8E-10	7.0E-12	7.7E-12	4.6E-10	1.7E-06	1.2E-06	4.5E-08	1.0E-07	3.0E-06
CHRYSENE	2.8E+00	5.4E-10	3.6E-10	1.4E-11	1.5E-11	9.3E-10	3.4E-06	2.3E-06	8.9E-08	2.1E-07	6.1E-06
DIBENZO(a,h)ANTHRACENE	5.9E-01	1.1E-08	7.6E-09	2.9E-10	3.3E-10	2.0E-08	7.3E-07	4.9E-07	1.9E-08	4.4E-08	1.3E-06
FLUORANTHENE	7.0E+00						2.6E-05	8.7E-05	6.7E-07	5.2E-07	1.1E-04
FLUORENE	9.3E-01						8.6E-07	2.9E-06	2.2E-08	6.9E-08	3.8E-06
INDENO(1,2,3-cd)PYRENE	1.4E+00	2.7E-09	1.8E-09	7.0E-11	7.7E-11	4.6E-09	1.7E-06	1.2E-06	4.5E-08	1.0E-07	3.0E-06
METHYLNAPHTHALENE, 2-	2.9E-01						2.7E-05	9.0E-05	6.9E-07	2.2E-08	1.2E-04
NAPHTHALENE	5.9E-01						1.1E-06	3.7E-06	2.8E-08	7.3E-06	1.2E-05
PHENANTHRENE	5.9E+00						7.3E-06	2.4E-05	1.9E-07	4.4E-07	3.2E-05
PYRENE	5.0E+00						6.2E-06	2.1E-05	1.6E-07	3.7E-07	2.7E-05
BARIUM	1.0E+02						1.8E-03	1.8E-03	4.7E-05	7.7E-04	4.5E-03
BERYLLIUM	9.3E-01				5.9E-10	5.9E-10	2.3E-04	2.3E-04	5.9E-06	1.7E-03	2.2E-03
CHROMIUM(III)	3.4E+01						2.8E-05	2.8E-05	7.2E-07	4.2E-03	4.3E-03
LEAD	4.2E+02						3.5E-01	4.2E-02	9.0E-03	1.6E-02	4.1E-01
NICKEL	2.5E+01				3.2E-09	3.2E-09	1.5E-03	3.1E-03	4.0E-05	9.3E-04	5.6E-03
THALLIUM	3.5E+00						5.4E-03	5.4E-04	1.4E-04	9.3E-03	1.5E-02
VANADIUM	1.1E+02						1.5E-02	1.5E-02	3.8E-04	4.0E-03	3.4E-02
ZINC	1.6E+02						6.6E-04	6.7E-04	1.7E-05	4.3E-03	5.6E-03
DICHLORODIPHENYLTRICHLOROETHANE, P,P'- (DDT	1.1E-01	3.3E-10	9.9E-11	8.5E-12	2.8E-12	4.4E-10	2.7E-04	8.2E-05	7.0E-06	2.3E-06	3.6E-04
DIELDRIN	1.7E-01	2.4E-08	2.4E-08	6.2E-10	2.1E-10	4.9E-08	4.2E-03	4.2E-03	1.1E-04	3.5E-05	8.5E-03
TCDD, 2,3,7,8- (equivalents)	4.3E-05	5.6E-08	5.7E-08	1.5E-09	3.8E-10	1.2E-07	7.5E-02	7.6E-02	2.0E-03	8.0E-04	1.5E-01

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Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0315

Cancer Risk from Ingestion

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

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

Cancer Risk from Dermal Absorption

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

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

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
CSF	OHM-specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{c\text{-}ing}$	OHM-specific	dimensionless
$RAF_{c\text{-}derm}$	OHM-specific	dimensionless
$RAF_{c\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{(lifetime)}$	25,550	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM_{10}	60	$\mu g/m^3$

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Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0315

Noncancer Risk from Ingestion

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

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

Noncancer Risk from Dermal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM-specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM-specific	dimensionless
$RAF_{nc\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{noncancer}$	182	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM10	60	$µg/m^3$

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

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	mg/kg	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF_{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
$ED_{ing,derm}$ - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED_{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
$AP_{(lifetime)}$ - Averaging Period for lifetime	25,550	days	Represents 70 years
$AP_{(noncancer)}$ - Averaging Period for noncancer	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
AF - Adherence Factor	0.29	mg/cm^2	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR_{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm^2/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
$IFAF_{inh\text{-}gi}$ - Ingestion Fraction Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
$IFAF_{inh}$ - Inhalation Fraction Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM_{10}	60	$\mu g/m^3$	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

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

Vlookup Version v0315

Oil or Hazardous Material	Oral CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	$RAF_{c\text{-}inh}$	Inhalation CSF $(mg/kg\text{-}day)^{-1}$	Subchronic Oral RfD mg/kg-day	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}inh}$	Subchronic Inhalation RfD
POLYCHLORINATED BIPHENYLS (PCBs)	2.0E+00	1	0.1	1	3.5E-01	5.0E-05	1	0.1	1	5.7E-06
ALIPHATICS C9 to C18						1.0E+00	1	0.2	1	1.7E-01
ALIPHATICS C19 to C36						6.0E+00	1	0.2		
AROMATICS C11 to C22						3.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHENE						2.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHYLENE						3.0E-01	0.3	0.1	1	1.4E-01
ANTHRACENE						1.0E+00	0.3	0.1	1	1.4E-01
BENZO(a)ANTHRACENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(a)PYRENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(b)FLUORANTHENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(g,h,i)PERYLENE						3.0E-01	0.3	0.1	1	1.4E-01
BENZO(k)FLUORANTHENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
CHRYSENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
DIBENZO(a,h)ANTHRACENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
FLUORANTHENE						1.0E-01	0.3	0.1	1	1.4E-01
FLUORENE						4.0E-01	0.3	0.1	1	1.4E-01
INDENO(1,2,3-cd)PYRENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
METHYLNAPHTHALENE, 2-						4.0E-03	0.3	0.1	1	1.4E-01
NAPHTHALENE						2.0E-01	0.3	0.1	1	8.6E-04
PHENANTHRENE						3.0E-01	0.3	0.1	1	1.4E-01
PYRENE						3.0E-01	0.3	0.1	1	1.4E-01
BARIUM						7.0E-02	1	0.1	1	1.4E-03
BERYLLIUM					8.4E+00	5.0E-03	1	0.1	1	5.7E-06
CHROMIUM(III)						1.5E+00	1	0.1	1	8.6E-05
LEAD						7.5E-04	0.5	0.006	1	2.9E-04
NICKEL					1.7E+00	2.0E-02	1	0.2	1	2.9E-04
THALLIUM						8.0E-04	1	0.01	1	4.0E-06
VANADIUM						9.0E-03	1	0.1	1	2.9E-04

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Table 2.4
Cancer Dose Response Values:
Oral Slope Factors

Chemical Name	CAS Number	Oral Slope Factor 1/(mg/kg/day)	Weight of Evidence Class	Source	Date Last Revised
acenaphthene	83-32-9			MADEP, 6/14	
acenaphthylene	208-96-8		D	MADEP, 6/14	
anthracene	120-12-7		D	MADEP, 6/14	
barium	7440-39-3			MADEP, 6/14	
benzene	71-43-2	5.5E-02	A	MADEP, 6/14	
benzo(a)anthracene	56-55-3	7.3E-01	B2	MADEP, 6/14	
benzo(a)pyrene	50-32-8	7.3E+00	B2	MADEP, 6/14	
benzo(b)fluoranthene	205-99-2	7.3E-01	B2	MADEP, 6/14	
benzo(k)fluoranthene	207-08-9	7.3E-02	B2	MADEP, 6/14	
benzo(ghi)perylene	191-24-2			MADEP, 6/14	
beryllium	7440-41-7		B1	MADEP, 6/14	
cadmium	7440-43-9		B1	MADEP, 6/14	
chlordane	57-74-9	3.5E-01	B2	MADEP, 6/14	
chromium (III)	16065-83-1			MADEP, 6/14	
chrysene	218-01-9	7.3E-02	B2	MADEP, 6/14	
dibenzo(a,h)anthracene	53-70-3	7.3E+00	B2	MADEP, 6/14	
DDE	72-55-9	3.4E-01	B2	MADEP, 6/14	
DDT	50-29-3	3.4E-01	B2	MADEP, 6/14	
dieldrin	60-57-1	1.6E+01	B2	MADEP, 6/14	
dioxin (TCDD equivalents)	1746-01-6	1.5E+05	B2	MADEP, 6/14	
fluoranthene	206-44-0		D	MADEP, 6/14	
fluorene	86-73-7			MADEP, 6/14	
indeno(123-cd)pyrene	193-39-5	7.3E-01	B2	MADEP, 6/14	
lead	7439-92-1		B2	MADEP, 6/14	
2-methylnaphthalene	91-57-6			MADEP, 6/14	
naphthalene	91-20-3			MADEP, 6/14	
nickel	7440-02-0		A	MADEP, 6/14	
phenanthrene	85-01-8		D	MADEP, 6/14	
polychlorinated biphenyls	1336-36-3	2.0E+00	B2	MADEP, 6/14	
pyrene	129-00-0		D	MADEP, 6/14	
thallium	7440-28-0			MADEP, 6/14	
toluene	108-88-3		D	MADEP, 6/14	
vanadium	7440-62-2			MADEP, 6/14	
zinc	7440-66-6		D	MADEP, 6/14	
C9-C18 Aliphatics	N/A			MADEP, 6/14	
C19-C36 Aliphatics	N/A			MADEP, 6/14	
C11-C22 Aromatics	N/A			MADEP, 6/14	

Notes: mg/kg/day = milligrams per kilogram body weight per day
N/A = not available

Weight of Evidence: A = Human carcinogen
B1 = Probable human carcinogen
B2 = Probable human carcinogen
C = Possible human carcinogen
D = Not classifiable as to human carcinogenicity
E = Evidence of noncarcinogenicity for humans

References: MADEP, 6/14. MCP Toxicity excel spreadsheet used for the development of the MCP Numerical Standards

Table 2.5
Cancer Dose Response Values:
Inhalation Unit Risks Factors

Chemical Name	CAS Number	Unit Risk Factor 1/(mg/cu. m)	Weight of Evidence Class	Source	Date Last Revised
acenaphthene	83-32-9			MADEP 6/14	
acenaphthylene	208-96-8		D	MADEP 6/14	
anthracene	120-12-7		D	MADEP 6/14	
barium	7440-39-3			MADEP 6/14	
benzene	71-43-2	7.8E-03	A	MADEP 6/14	
benzo(a)anthracene	56-55-3	2.1E-01	B2	MADEP 6/14	
benzo(a)pyrene	50-32-8	2.1E+00	B2	MADEP 6/14	
benzo(b)fluoranthene	205-99-2	2.1E-01	B2	MADEP 6/14	
benzo(k)fluoranthene	207-08-9	2.1E-02	B2	MADEP 6/14	
benzo(ghi)perylene	191-24-2			MADEP 6/14	
beryllium	7440-41-7	2.4E+00	B1	MADEP 6/14	
cadmium	7440-43-9	1.8E+00	B1	MADEP 6/14	
chlordane	57-74-9	1.0E-01	B2	MADEP 6/14	
chromium (III)	16065-83-1			MADEP 6/14	
chrysene	218-01-9	2.1E-02	B2	MADEP 6/14	
dibenzo(a,h)anthracene	53-70-3	2.1E+00	B2	MADEP 6/14	
DDE	72-55-9	9.7E-02	B2	MADEP 6/14	
DDT	50-29-3	9.7E-02	B2	MADEP 6/14	
dieldrin	60-57-1	4.6E+00	B2	MADEP 6/14	
dioxin (TCDD equivalents)	1746-01-6	3.3E+04	B2	MADEP 6/14	
fluoranthene	206-44-0		D	MADEP 6/14	
fluorene	86-73-7			MADEP 6/14	
indeno(123-cd)pyrene	193-39-5	2.1E-01	B2	MADEP 6/14	
lead	7439-92-1		B2	MADEP 6/14	
2-methylnaphthalene	91-57-6			MADEP 6/14	
naphthalene	91-20-3			MADEP 6/14	
nickel	7440-02-0	4.8E-01	A	MADEP 6/14	
phenanthrene	85-01-8		D	MADEP 6/14	
polychlorinated biphenyls	1336-36-3	1.0E-01	B2	MADEP 6/14	
pyrene	129-00-0		D	MADEP 6/14	
thallium	7440-28-0			MADEP 6/14	
toluene	108-88-3		D	MADEP 6/14	
vanadium	7440-62-2			MADEP 6/14	
zinc	7440-66-6		D	MADEP 6/14	
C9-C18 Aliphatics	N/A			MADEP 6/14	
C19-C36 Aliphatics	N/A			MADEP 6/14	
C11-C22 Aromatics	N/A			MADEP 6/14	

Notes: mg/cu. m. = milligrams per cubic meter

Weight of Evidence:
A = Human carcinogen
B1 = Probable human carcinogen
B2 = Probable human carcinogen
C = Possible human carcinogen
D = Not classifiable as to human carcinogenicity
E = Evidence of noncarcinogenicity for humans
N/A = Not available

References: MADEP, 6/14. MCP Toxicity excel spreadsheet used for the development of the MCP Numerical Standards

Table 2.6
Cancer Dose Response Values: Relative Absorption Factors (RAFs)

Chemical Name	CAS Number	Soil Ingestion RAF Cancer	Water Ingestion RAF Cancer	Soil Dermal RAF Cancer	Water Dermal RAF Cancer
acenaphthene	83-32-9	NC	NC	NC	NC
acenaphthylene	208-96-8	NC	NC	NC	NC
anthracene	120-12-7	NC	NC	NC	NC
barium	7440-39-3	NC	NC	NC	NC
benzene	71-43-2	1	1	0.03	1
benzo(a)anthracene	56-55-3	0.3	1	0.02	1
benzo(a)pyrene	50-32-8	0.3	1	0.02	1
benzo(b)fluoranthene	205-99-2	0.3	1	0.02	1
benzo(k)fluoranthene	207-08-9	0.3	1	0.02	1
benzo(ghi)perylene	191-24-2	NC	NC	NC	NC
beryllium	7440-41-7	1	1	0.03	1
cadmium	7440-43-9	NC	NC	NC	NC
chromium (III)	16065-83-1	NC	NC	NC	NC
chrysene	218-01-9	0.3	1	0.02	1
dibenzo(a,h)anthracene	53-70-3	0.3	1	0.02	1
DDE	72-55-9	1	1	0.03	1
DDT	50-29-3	1	1	0.03	1
dieldrin	60-57-1	1	1	0.1	1
dioxin (TCDD equivalents)	1746-01-6	1	1	0.1	1
ethylbenzene	100-41-4	NC	NC	NC	NC
fluoranthene	206-44-0	NC	NC	NC	NC
fluorene	86-73-7	NC	NC	NC	NC
indeno(123-cd)pyrene	193-39-5	0.3	1	0.02	1
lead	7439-92-1	NC	NC	NC	NC
2-methylnaphthalene	91-57-6	NC	NC	NC	NC
naphthalene	91-20-3	NC	NC	NC	NC
nickel	7440-02-0	NC	NC	NC	NC
phenanthrene	85-01-8	NC	NC	NC	NC
polychlorinated biphenyls	1336-36-3	1	1	0.1	1
pyrene	129-00-0	NC	NC	NC	NC
thallium	7440-28-0	NC	NC	NC	NC
toluene	108-88-3	NC	NC	NC	NC
vanadium	7440-62-2	NC	NC	NC	NC
zinc	7440-66-6	NC	NC	NC	NC
C9-C18 Aliphatics	N/A	NC	NC	NC	NC
C19-C36 Aliphatics	N/A	NC	NC	NC	NC
C11-C22 Aromatics	N/A	NC	NC	NC	NC

Notes: (1) RAF values from MADEP (1994). Default value of one (1) assigned to dermal contact with water.
NC = RAF not provided because compound is not a Class A, B1, B2 or, when applicable, C carcinogen
N/A = not available or because no oral cancer slope factor is available.

References: MADEP, 6/14. MCP Toxicity excel spreadsheet used for the development of the MCP Numerical Standards.

Table 3.3
Calculation of Lifetime Average Daily Dose for Soil Exposure: Resident, aged 1 to 2 Years

Receptor: Resident, aged 1-31 years

		Exposure Point:	Courtyard 0-1 Foot Interval		Courtyard 1-3 Foot Interval		Courtyard 3-6 Foot Interval		Courtyard 3-11 Foot Interval		Stockpiled Fuel Oil Vault Sands SP-3	
Chemical Name	**CAS Number**	**Weight of Evidence Class**	**Dermal Contact**	**Incidental Ingestion**	**Dermal Contact**	**Incidental Ingestion**	**Dermal Contact**	**Incidental Ingestion**	**Dermal Contact**	**Incidental Ingestion**	**Dermal Contact**	**Incidental Ingestion**
benzene	71-43-2	A					6.19E-10	1.20E-08	6.19E-10	1.20E-08		
benzo(a)anthracene	56-55-3		3.35E-08	2.92E-07	3.35E-08	2.92E-07	1.40E-08	1.22E-07	1.25E-08	1.09E-07	2.33E-08	2.04E-07
benzo(a)pyrene	50-32-8		3.04E-08	2.65E-07	3.04E-08	2.65E-07	1.25E-08	1.09E-07	1.17E-08	1.02E-07	2.02E-08	1.76E-07
benzo(b)fluoranthene	205-99-2		3.97E-08	3.46E-07	3.97E-08	3.46E-07	1.71E-08	1.49E-07	1.56E-08	1.36E-07	2.72E-08	2.37E-07
benzo(k)fluoranthene	207-08-9		1.40E-08	1.22E-07	1.40E-08	1.22E-07	6.46E-09	5.63E-08	5.99E-09	5.22E-08	1.09E-08	9.50E-08
beryllium	7440-41-7											
chlordane	57-74-9						2.53E-09	2.94E-08	2.53E-09	2.94E-08		
chrysene	218-01-9		3.74E-08	3.26E-07	3.74E-08	3.26E-07	1.48E-08	1.29E-07	1.40E-08	1.22E-07	2.18E-08	1.90E-07
dibenzo(a,h)anthracene	53-70-3		5.06E-09	4.41E-08	5.06E-09	4.41E-08	1.95E-09	1.70E-08	1.87E-09	1.63E-08	4.59E-09	4.00E-08
DDE	72-55-9		6.30E-10	1.22E-08	5.49E-10	1.06E-08						
DDT	50-29-3		1.19E-09	2.31E-08	7.94E-10	1.54E-08	4.32E-10	8.37E-09	4.32E-10	8.37E-09	1.28E-09	2.49E-08
dieldrin	60-57-1		4.20E-09	2.44E-08	1.83E-09	1.06E-08	1.25E-09	7.24E-09	1.25E-09	7.24E-09	6.62E-09	3.84E-08
dioxin (TCDD equivalents)	1746-01-6		5.25E-12	3.05E-11	9.77E-13	5.68E-12	2.44E-13	1.42E-12	2.57E-13	1.49E-12	1.67E-12	9.70E-12
indeno(123-cd)pyrene	193-39-5		1.95E-08	1.70E-07	1.95E-08	1.70E-07	7.55E-09	6.58E-08	6.93E-09	6.04E-08	1.09E-08	9.50E-08
nickel	7440-02-0											
polychlorinated biphenyls	1336-36-3		1.60E-06	9.27E-06	2.96E-07	1.72E-06	7.39E-08	4.30E-07	7.78E-08	4.52E-07	5.06E-07	2.94E-06

Formula: Lifetime Average Daily Dose (LADD) for exposure to soils via ingestion (ing) and dermal contact

$$\text{LADD-dermal} = \frac{[\text{OHM-soil}]*SA*AF*RAF*EF*ED*EP*C}{BW*AP}$$

$$\text{LADD-ing} = \frac{[\text{OHM-soil}]*IR*RAF*EF*ED*EP*C}{BW*AP}$$

Unit: LADD, mg/kg/day

Receptor: Resident, aged 1 to 31 years

Description	**Abbreviation**	**Unit**	**Default Value**	**Source**	**Site-Specific Value**	**Source / Description**	**Input Value**
Exposure point concentration	[OHM-soil]	mg/kg			See Soil EPC Table		See Soil EPC Table
Skin surface area in contact with soil on days exposed	SA	square centimeter/day	4427	[1], child, aged 8 to 15 years (face, hands, forearms, lower legs and feet)			0.00E+00
			5653	[1], adult, aged 15 to 31 years (face, hands, forearms, lower legs and feet)			0.00E+00
			2431	[1], child, aged 1-8 years (face, hands, forearms, lower legs and feet)	1670	child, aged 1 to 2 years (face, hands, forearms, lower legs and feet)	1.67E+03
Mass of soil adhered to the unit surface area of skin exposed	AF	mg/sq. cm.	0.35	[2], child, aged 1-8 years	3.50E-01	child, aged 1 to 2 years	3.50E-01
			0.13	[2], adult, aged 15-31 years			0.00E+00
			0.14	[2], older child, aged 8-15 years			0.00E+00
Relative Absorption Factor	RAF	unitless	See RAF Table				See RAF Table
Exposure frequency: # exposure events during EP / # days in EP	EF	events/year	150	[1] 5 days per week during the 30 warmest weather weeks of the year	182	Exposure presumed to occur seven days per week during a six month construction period	1.82E+02
Exposure duration: typical duration of each exposure event	ED	years/event	2.74E-03	1 day per event or 1/365 of a year per event			2.74E-03
Exposure period: period of time over which exposure may occur	EP	years	7	[1], child, aged 8 to 15 years			7.00E+00
			16	[1], adult, aged 15 to 31 years			1.60E+01
			7	[1], young child, aged 1-8 years	1.0	subchronic exposure of 1 year old boy or girl (Subchronic)	1.00E+00
Unit Conversion Factor	C	kg/mg	1.00E-06	for dermal contact			1.00E-06
Unit Conversion Factor	C	kg/mg	1.00E-06	for ingestion			1.00E-06
Body weight of the receptor during the AP	BW	kg	39.9	[1], child, aged 8-15 years			3.99E+01
			58.7	[1], adult, aged 15 to 31 years			5.87E+01
			17.0	[1], young child, aged 1-8 years	1.07E+01	subchronic exposure of 1 year old boy or girl	1.07E+01
Averaging Period	AP	years	70	[1]			7.00E+01
Ingestion rate	IR	mg/day	50	[1], age 8 or greater			5.00E+01
			100	[1], age 1-8 years			1.00E+02

References:

[1] MADEP's Guidance for Disposal Site Risk Characterization in Support of the Massachusetts Contingency Plan, Interim Final Policy BWSC/ORS-95-141 [Updated using exposure assumptions of MADEP's Method 1 Numerical Standard Development Workbook, 5/2009].

[2] MADEP's Technical Update, Weighted Skin-Soil Adherence Factors, April 2002.

Table 3.4
Calculation of Lifetime Average Daily Exposure from Inhalation of Dust: Resident, aged 1 to 2 Years

Receptor: Resident, aged 1 to 31 years

Chemical Name	CAS Number	Weight of Evidence Class	Courtyard 0-1 Foot Interval	Courtyard 1-3 Foot Interval	Courtyard 3-6 Foot Interval	Courtyard 3-11 Foot Interval	Stockpiled Fuel Oil Vault Sands SP-3		
benzene	71-43-2				2.3E-11	2.3E-11			
benzo(a)anthracene	56-55-3		1.8E-09	1.8E-09	7.7E-10	6.8E-10	1.3E-09		
benzo(a)pyrene	50-32-8		1.7E-09	1.7E-09	6.8E-10	6.4E-10	1.1E-09		
benzo(b)fluoranthene	205-99-2		2.2E-09	2.2E-09	9.4E-10	8.5E-10	1.5E-09		
benzo(k)fluoranthene	207-08-9		7.7E-10	7.7E-10	3.5E-10	3.3E-10	6.0E-10		
beryllium	7440-41-7		2.2E-09	3.9E-09	8.1E-10	8.1E-10	4.0E-10		
chlordane	57-74-9				5.6E-11	5.6E-11			
chrysene	218-01-9		2.1E-09	2.1E-09	8.1E-10	7.7E-10	1.2E-09		
dibenzo(a,h)anthracene	53-70-3		2.8E-10	2.8E-10	1.1E-10	1.0E-10	2.5E-10		
DDE	72-55-9		2.3E-11	2.0E-11					
DDT	50-29-3		4.4E-11	2.9E-11	1.6E-11	1.6E-11	4.7E-11		
dieldrin	60-57-1		4.6E-11	2.0E-11	1.4E-11	1.4E-11	7.3E-11		
dioxin (TCDD equivalents)	1746-01-6		5.8E-14	1.1E-14	2.7E-15	2.8E-15	1.8E-14		
indeno(123-cd)pyrene	193-39-5		1.1E-09	1.1E-09	4.1E-10	3.8E-10	6.0E-10		
nickel	7440-02-0		1.5E-08	1.7E-08	1.0E-08	1.0E-08	1.1E-08		
polychlorinated biphenyls	1336-36-3		1.8E-08	3.2E-09	8.1E-10	8.5E-10	5.6E-09		

A = USEPA Known Human Carcinogen
B1 or B2 = USEPA Probable Human Carcinogen
C = USEPA Possible Human Carcinogen
NC or blank space = Not a carcinogen or insufficient information

Formula: Lifetime Average Daily Exposure (LADE) via inhalation (ihl) of dusts

$$LADE\text{-}ihl = \frac{[OHM\text{-}dust]*EF*ED*EP*C}{AP}$$

Unit: LADE, mg/cu m

Receptor: Resident, aged 1 to 31 years

Description	Abbreviation	Unit	Default Value	Source	Site-Specific Value	Source / Description	Input Value
Exposure point concentration	[OHM-dust]	ug/cu. m.			See Dust EPC Table		See Dust EPC Table
Exposure frequency: # exposure events during EP / # days in EP	EF	events/year	150	[1] 5 days per week during the 30 warmest weather weeks of the year			0.00E+00
			150	[1] 5 days per week during the 30 warmest weather weeks of the year	182	Seven days per week during a six-month construction project, during age 1-2 years	1.82E+02
Exposure duration: typical duration of each exposure event	ED	years/event	2.74E-03	1 day per event or 1/365 of a year			2.74E-03
Exposure period: period of time over which exposure may occur	EP	years	23	[1], from age 8 to 31 years			2.30E+01
			7	[1], from age 1 to 8 years	1.00E+00	Presume exposure occurs during a construction project from age 1 to 2 years of age, to either a girl or boy.	1.00E+00
Unit Conversion Factor	C	mg/ug	1.00E-03	for inhalation			1.00E-03
Averaging Period	AP	years	70	[1]			7.00E+01

References:

[1] MADEP's Guidance for Disposal Site Risk Characterization in Support of the Massachusetts Contingency Plan, Interim Final Policy BWSC/ORS-95-141

Table 4.2
Calculation of Excess Lifetime Cancer Risk (ELCR) for Exposure to Soil and Dust: Resident, aged 1 to 2 Years

Receptor: Resident, aged 1 to 31 years																
		Exposure Point:	Courtyard 0-1 Foot Interval			Courtyard 1-3 Foot Interval			Courtyard 3-6 Foot Interval			Courtyard 3-11 Foot Interval			Stockpiled Fuel Oil Vault Sands SP-3		
Chemical Name	CAS Number	Weight of Evidence Class	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contact	Incidental Ingestion	Dust Inhalation
benzene	71-43-2								3.4E-11	6.6E-10	1.8E-13	3.4E-11	6.6E-10	1.8E-13			
benzo(a)anthracene	56-55-3		2.4E-08	2.1E-07	3.8E-10	2.4E-08	2.1E-07	3.8E-10	1.0E-08	8.9E-08	1.6E-10	9.1E-09	7.9E-08	1.4E-10	1.7E-08	1.5E-07	2.7E-10
benzo(a)pyrene	50-32-8		2.2E-07	1.9E-06	3.5E-09	2.2E-07	1.9E-06	3.5E-09	9.1E-08	7.9E-07	1.4E-09	8.5E-08	7.4E-07	1.3E-09	1.5E-07	1.3E-06	2.3E-09
benzo(b)fluoranthene	205-99-2		2.9E-08	2.5E-07	4.5E-10	2.9E-08	2.5E-07	4.5E-10	1.2E-08	1.1E-07	2.0E-10	1.1E-08	9.9E-08	1.8E-10	2.0E-08	1.7E-07	3.1E-10
benzo(k)fluoranthene	207-08-9		1.0E-09	8.9E-09	1.6E-11	1.0E-09	8.9E-09	1.6E-11	4.7E-10	4.1E-09	7.4E-12	4.4E-10	3.8E-09	6.9E-12	8.0E-10	6.9E-09	1.2E-11
beryllium	7440-41-7				5.2E-09			9.4E-09			1.9E-09			1.9E-09			9.5E-10
chlordane	57-74-9								8.9E-10	1.0E-08	5.6E-12	8.9E-10	1.0E-08	5.6E-12			
chrysene	218-01-9		2.7E-09	2.4E-08	4.3E-11	2.7E-09	2.4E-08	4.3E-11	1.1E-09	9.4E-09	1.7E-11	1.0E-09	8.9E-09	1.6E-11	1.6E-09	1.4E-08	2.5E-11
dibenzo(a,h)anthracene	53-70-3		3.7E-08	3.2E-07	5.8E-10	3.7E-08	3.2E-07	5.8E-10	1.4E-08	1.2E-07	2.2E-10	1.4E-08	1.2E-07	2.1E-10	3.4E-08	2.9E-07	5.3E-10
DDE	72-55-9		2.1E-10	4.2E-09	2.2E-12	1.9E-10	3.6E-09	2.0E-12									
DDT	50-29-3		4.0E-10	7.8E-09	4.2E-12	2.7E-10	5.2E-09	2.8E-12	1.5E-10	2.8E-09	1.5E-12	1.5E-10	2.8E-09	1.5E-12	4.4E-10	8.5E-09	4.6E-12
dieldrin	60-57-1		6.7E-08	3.9E-07	2.1E-10	2.9E-08	1.7E-07	9.2E-11	2.0E-08	1.2E-07	6.3E-11	2.0E-08	1.2E-07	6.3E-11	1.1E-07	6.2E-07	3.3E-10
dioxin (TCDD equivalents)	1746-01-6		7.9E-07	4.6E-06	1.9E-09	1.5E-07	8.5E-07	3.5E-10	3.7E-08	2.1E-07	8.8E-11	3.9E-08	2.2E-07	9.3E-11	2.5E-07	1.5E-06	6.1E-10
indeno(123-cd)pyrene	193-39-5		1.4E-08	1.2E-07	2.2E-10	1.4E-08	1.2E-07	2.2E-10	5.5E-09	4.8E-08	8.6E-11	5.1E-09	4.4E-08	7.9E-11	8.0E-09	6.9E-08	1.2E-10
nickel	7440-02-0				7.0E-09			8.2E-09			4.9E-09			4.9E-09			5.1E-09
polychlorinated biphenyls	1336-36-3		3.2E-06	1.9E-05	1.8E-09	5.9E-07	3.4E-06	3.2E-10	1.5E-07	8.6E-07	8.1E-11	1.6E-07	9.0E-07	8.5E-11	1.0E-06	5.9E-06	5.6E-10
Total ELCR: Route and Expos. Pt.			4.4E-06	2.6E-05	2.1E-08	1.1E-06	7.3E-06	2.4E-08	3.4E-07	2.4E-06	9.2E-09	3.4E-07	2.4E-06	9.1E-09	1.6E-06	1.0E-05	1.1E-08
Proportion of complete exposure point				1.0E+00			1.0E+00			1.0E+00			1.0E+00			1.0E+00	
Adjusted Total ELCR: Route and Expos. Pt.			4.4E-06	2.6E-05	2.1E-08	1.1E-06	7.3E-06	2.4E-08	3.4E-07	2.4E-06	9.2E-09	3.4E-07	2.4E-06	9.1E-09	1.6E-06	1.0E-05	1.1E-08
Total ELCR: Expos. Pt.				3.1E-05			8.5E-06			2.7E-06			2.7E-06			1.2E-05	

Formula:

Cumulative ELCR = $\sum ELCR_{ingestion\ -\ chemicalspecific} + \sum ELCRdermalcontact - chemicalspecific + \sum ELCR_{inhalation:chemical\ -\ specific}$

ELCR ingestion-chemical specific = LADD-ingestion-chemical specific x Oral Slope Factor-chemical specific
ELCR dermal contact-chemical specific = LADD-dermal contact-chemical specific x Oral Slope Factor-chemical specific
ELCR ingestion-chemical specific = LADE-inhalation-chemical specific x Unit Risk-inhalation-chemical specific

ELCR = Excess Lifetime Cancer Risk, unit less
LADD = Lifetime Average Daily Dose, mg/kg/day
LADE = Lifetime Average Daily Exposure, mg/cu m

Table 5.2
Calculation of Total Excess Lifetime Cancer Risk (ELCR): Resident, aged 1 to 2 Years

Receptor	Resident							Youth Trespasser or Visitor						
Exposure Point #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Pathway:														
Soil Exposure Point:														
Incidental ingestion of soil, normal	2.6E-05	7.3E-06	2.4E-06	2.4E-06	1.0E-05									
Inhalation of dusts from disturbed soil	2.1E-08	2.4E-08	9.2E-09	9.1E-09	1.1E-08									
Dermal contact with soil	4.4E-06	1.1E-06	3.4E-07	3.4E-07	1.6E-06									
Total ELCR	3.1E-05	8.5E-06	2.7E-06	2.7E-06	1.2E-05									
MCP Cancer Risk Limit	1.E-05	1.E-05	1.E-05	1.E-05	1.E-05									
Does Total ELCR exceed MCP Cancer Risk Limit?	Yes	No	No	No	Yes									
Significant Risk of Harm?	No	No	No	No	No									

Definition of exposure points	Resident						
Exposure Point #	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Soil Exposure Point:	Courtyard 0-1 Foot Interval	Courtyard 1-3 Foot Interval	Courtyard 3-6 Foot Interval	Courtyard 3-11 Foot Interval	Stockpiled Fuel Oil Vault Sands SP-3		

NO SINGLE FAMILY RESIDENCE. NO GARDENING OF EDIBLE PRODUCE.
EXPOSURE TO SOILS OCCURS ONLY DURING A SINGLE SIX-MONTH CONSTRUCTION PROJECT, AFTER WHICH TIME
THE SOILS ARE RETURNED TO EXCAVATION OR ARE TRANSPORTED OFF-SITE.
ASSUMES **NO** CONTROLS ARE USED TO LIMIT RESIDENTIAL EXPOSURE TO SOILS DURING CONSTRUCTION PROJECT.
PROTECTIVE COVER MUST REMAIN OVER SOILS EXCEPT DURING CONSTRUCTION OR UTILITY PROJECT, AFTER WHICH TIME THE PROTECTIVE COVER MUST BE RE-INSTALLED.

Table 2.1
Noncancer Dose-Response Values:
Oral Reference Dose

Chemical Name	CAS Number	Subchronic Oral RfD (mg/kg/day)	Uncertainty/ Modifying Factors	Source	Date Last Checked	Chronic Oral RfD (mg/kg/day)	Uncertainty/ Modifying Factors	Source	Date Last Checked
acenaphthene	83-32-9	2.0E-01		MADEP (6)		6.0E-02		MADEP (6)	
acenaphthylene	208-96-8	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
anthracene	120-12-7	1.0E+00		MADEP (6)		3.0E-01		MADEP (6)	
barium	7440-39-3	7.0E-02		MADEP (6)		2.0E-01		MADEP(6)	
benzene	71-43-2	1.0E-02		MADEP (6)		4.0E-03		MADEP (6)	
benzo(a)anthracene	56-55-3	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
benzo(a)pyrene	50-32-8	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
benzo(b)fluoranthene	205-99-2	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
benzo(k)fluoranthene	207-08-9	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
benzo(ghi)perylene	191-24-2	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
beryllium	7440-41-7	5.0E-03		MADEP (6)		2.0E-03		MADEP (6)	
cadmium	7440-43-9	5.0E-04		MADEP (6)		5.0E-04		MADEP (6)	
chlordane	57-74-9	5.0E-04		MADEP (6)		2.0E-03		MADEP (6)	
chromium (III)	16065-83-1	1.5E+00		MADEP (6)		1.5E+00		MADEP (6)	
chrysene	218-01-9	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
dibenzo(a,h)anthracene	53-70-3	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
DDE	72-55-9	5.0E-04		MADEP (6)		5.0E-04		MADEP (6)	
DDT	50-29-3	5.0E-04		MADEP (6)		5.0E-04		MADEP (6)	
dieldrin	60-57-1	5.0E-05		MADEP (6)		5.0E-05		MADEP (6)	
dioxin (TCDD equivalents)	1746-01-6	7.0E-10		MADEP (6)		7.0E-10		MADEP (6)	
fluoranthene	206-44-0	4.0E-01		MADEP (6)		4.0E-02		MADEP (6)	
fluorene	86-73-7	4.0E-01		MADEP (6)		4.0E-02		MADEP (6)	
indeno(123-cd)pyrene	193-39-5	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
lead	7439-92-1	7.5E-04		MADEP (6)		7.5E-04		MADEP (6)	
2-methylnaphthalene	91-57-6	4.0E-03		MADEP (6)		4.0E-03		MADEP (6)	
naphthalene	91-20-3	2.0E-01		MADEP (6)		2.0E-02		MADEP (6)	
nickel (soluble salts)	7440-02-0	2.0E-02		MADEP (6)		2.0E-02		MADEP (6)	
phenanthrene	85-01-8	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
polychlorinated biphenyls, as PCB-1254	1336-36-3	5.0E-05		MADEP (6)		2.0E-05		MADEP (6)	
pyrene	129-00-0	3.0E-01		MADEP (6)		3.0E-05		MADEP (6)	
thallium	7440-28-0	8.0E-04		MADEP (6)		8.0E-05		MADEP (6)	
toluene	108-88-3	8.0E-01		MADEP (6)		8.0E-02		MADEP (6)	
vanadium	7440-62-2	9.0E-03		MADEP (6)		9.0E-03		MADEP (6)	
zinc	7440-66-6	3.0E-01		MADEP (6)		3.0E-01		MADEP (6)	
C9-C18 Aliphatics	N/A	1.0E+00		MADEP (6)		1.0E-01		MADEP (6)	
C19-C36 Aliphatics	N/A	6.0E+00		MADEP (6)		2.0E+00		MADEP (6)	
C11-C22 Aromatics	N/A	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	

Notes:

Note 1: For all PAH with no subchronic or chronic RfD, the chronic RfD for naphthalene was used (MADEP(6))
Note 6: Conversion of the inhalation Reference Concentration to an oral Reference Dose, using the equation:

RfD = RfC x Ventilation Rate / BW = (RfC x V) / BW = (RfD x 20 m^3/day) / 70 kg
MADEP = Massachusetts Department of Environmental Protection
mg/kg/day = milligrams per kilogram body weight per day
N/A = Not available

Reference:

MADEP(6) = Dose response values updated from MADEP's Excel Workbook: Toxicity Values used to derive MCP Method 1 Numerical Standards (6/2014)
(C = SC) = the Chronic Oral RfD was adopted as the Subchronic Oral RfD

Table 2.2
Noncancer Dose-Response Values:
Inhalation Reference Concentrations

Chemical Name	CAS Number	Subchronic Inhalation RfC (mg/cu m)	Uncertainty/ Modifying Factors	Source	Date Last Checked	Chronic Inhalation RfC (mg/cu m)	Uncertainty/ Modifying Factors	Source	Date Last Checked
acenaphthene	83-32-9	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
acenaphthylene	208-96-8	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
anthracene	120-12-7	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
barium	7440-39-3	5.0E-03		MADEP(5)		5.0E-04		MADEP(5)	
benzene	71-43-2	1.0E-02		MADEP(5)		1.0E-02		MADEP(5)	
benzo(a)anthracene	56-55-3	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
benzo(a)pyrene	50-32-8	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
benzo(b)fluoranthene	205-99-2	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
benzo(k)fluoranthene	207-08-9	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
benzo(ghi)perylene	191-24-2	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
beryllium	7440-41-7	2.0E-05		MADEP(5)		2.0E-05		MADEP(5)	
cadmium	7440-43-9	2.0E-05		MADEP(5)		2.0E-05		MADEP(5)	
chlordane	57-74-9	7.0E-03		MADEP(5)		7.0E-04		MADEP(5)	
chromium (III) (as metal)	16065-83-1	3.0E-04		MADEP(5)		1.0E-04		MADEP(5)	
chrysene	218-01-9	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
dibenzo(a,h)anthracene	53-70-3	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
DDE	72-55-9	1.8E-03		MADEP(5)		1.8E-03		MADEP(5)	
DDT	50-29-3	1.8E-03		MADEP(5)		1.8E-03		MADEP(5)	
dieldrin	60-57-1	1.8E-04		MADEP(5)		1.8E-04		MADEP(5)	
dioxin (TCDD equivalents)	1746-01-6			MADEP(5)				MADEP(5)	
fluoranthene	206-44-0	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
fluorene	86-73-7	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
indeno(123-cd)pyrene	193-39-5	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
lead	7439-92-1	1.0E-03		MADEP(5)		1.0E-03		MADEP(5)	
2-methylnaphthalene	91-57-6	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
naphthalene	91-20-3	3.0E-03		MADEP(5)		3.0E-03		MADEP(5)	
nickel	7440-02-0	1.0E-03		MADEP(5)		1.0E-03		MADEP(5)	
phenanthrene	85-01-8	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
polychlorinated biphenyls	1336-36-3	2.0E-05		MADEP(5)		2.0E-05		MADEP(5)	
pyrene	129-00-0	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
thallium	7440-28-0	1.4E-05		MADEP(5)		1.4E-05		MADEP(5)	
toluene	108-88-3	5.0E+00		MADEP(5)		5.0E+00		MADEP(5)	
vanadium	7440-62-2	1.0E-03		MADEP(5)		1.0E-03		MADEP(5)	
zinc	7440-66-6	1.4E-03		MADEP(5)		1.4E-03		MADEP(5)	
C9-C18 Aliphatics	N/A	6.0E-01		MADEP(5)		2.0E-01		MADEP(5)	
C19-C36 Aliphatics	N/A	6.0E-01		Note 2		2.0E-01		Note 2	
C11-C22 Aromatics	N/A	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	

Notes:

Note 1: For PAHs with no RfCs, the chronic RfC for naphthalene was used as a surrogate
Note 2: For C19-C36 aliphatics, the chronic RfC for C9-C18 aliphatics was used as a surrogate
Note 3: Conversion of the oral Reference Dose to an inhalation Reference Concentration, using the equation:
RfC = RfD x BW / Ventilation Rate = (RfD x BW) /V = (RfD x 70 kg) / 20 m^3/day
MADEP = Massachusetts Department of Environmental Protection
mg/cu m = milligrams per cubic meter of air

References:

MADEP(5) = Toxicity Spreadsheet and reference page for in excel workbook "Development of MCP Risk-Based Levels for Soil and Groundwater" (6/2014)
(C = SC) = the Chronic Inhalation RfC was adopted as the Subchronic Inhalation RfC

Table 2.3
Relative Absorption Factors: Non-Cancer

Chemical Name	CAS Number	Soil Ingestion RAF	Water Ingestion RAF	Soil Dermal RAF	Water Dermal RAF
acenaphthene	83-32-9	0.3	1	0.1	1
acenaphthylene	208-96-8	0.3	1	0.1	1
anthracene	120-12-7	0.3	1	0.1	1
barium	7440-39-3	1	1	0.1	1
benzene	71-43-2	1	1	0.03	1
benzo(a)anthracene	56-55-3	0.3	1	0.02	1
benzo(a)pyrene	50-32-8	0.3	1	0.02	1
benzo(b)fluoranthene	205-99-2	0.3	1	0.02	1
benzo(k)fluoranthene	207-08-9	0.3	1	0.02	1
benzo(ghi)perylene	191-24-2	0.3	1	0.1	1
beryllium	7440-41-7	1	1	0.1	1
cadmium	7440-43-9	0.5	1	0.01	1
chlordane	57-74-9	1	1	0.04	1
chromium (III)	16065-83-1	1	1	0.1	1
chrysene	218-01-9	0.3	1	0.02	1
dibenzo(a,h)anthracene	53-70-3	0.3	1	0.02	1
DDD	72-54-8	1	1	0.2	1
DDE	72-55-9	1	1	0.03	1
DDT	50-29-3	1	1	0.03	1
dieldrin	60-57-1	1	1	0.1	1
dioxin (TCDD equivalent)	1746-01-6	1	1	0.1	1
fluoranthene	206-44-0	0.3	1	0.1	1
fluorene	86-73-7	0.3	1	0.1	1
indeno(123-cd)pyrene	193-39-5	0.3	1	0.02	1
lead	7439-92-1	0.5	1	0.006	1
2-methylnaphthalene	91-57-6	0.3	1	0.1	1
naphthalene	91-20-3	0.3	1	0.1	1
nickel	7440-02-0	1	1	0.2	1
phenanthrene	85-01-8	0.3	1	0.1	1
polychlorinated biphenyls	1336-36-3	1	1	0.1	1
pyrene	129-00-0	0.3	1	0.1	1
thallium	7440-28-0	1	1	0.01	1
toluene	108-88-3	1	1	0.03	1
vanadium	7440-62-2	1	1	0.1	1
zinc	7440-66-6	1	1	0.1	1
C9-C18 Aliphatics	N/A	1	1	0.2	1
C19-C36 Aliphatics	N/A	1	1	0.2	1
C11-C22 Aromatics	N/A	0.3	1	0.1	1

Notes: (1) A default value of one (1) was assigned to dermal contact with water.

References: MADEP, 2014. Dose response values updated from MADEP's Excel Workbook: Toxicity Values used to derive MCP Method 1 Numerical Standards (6/2014)

Table 1.1
Soil Exposure Point Concentrations and Soil Concentrations used to Derive Dust Exposure Point Concentrations

Chemical Name	CAS Number	Courtyard 0-1 Foot Interval	Courtyard 1-3 Foot Interval	Courtyard 3-6 Foot Interval	Courtyard 3-11 Foot Interval	Stockpiled Fuel Oil Vault Sands SP-3
acenaphthene	83-32-9	8.6E-01	8.6E-01	3.8E-01	3.3E-01	7.0E-01
acenaphthylene	208-96-8	2.3E-01	2.3E-01	8.4E-02	9.6E-02	9.0E-02
anthracene	120-12-7	1.9E+00	1.9E+00	8.4E-01	7.5E-01	1.5E+00
barium	7440-39-3	1.07E+02	9.20E+01	4.90E+01	4.90E+01	1.04E+02
benzene	71-43-2			5.3E-02	5.3E-02	
benzo(a)anthracene	56-55-3	4.3E+00	4.3E+00	1.8E+00	1.6E+00	3.0E+00
benzo(a)pyrene	50-32-8	3.9E+00	3.9E+00	1.6E+00	1.5E+00	2.6E+00
benzo(b)fluoranthene	205-99-2	5.1E+00	5.1E+00	2.2E+00	2.0E+00	3.5E+00
benzo(k)fluoranthene	207-08-9	1.8E+00	1.8E+00	8.3E-01	7.7E-01	1.4E+00
benzo(ghi)perylene	191-24-2	2.2E+00	2.2E+00	9.1E-01	8.5E-01	1.4E+00
beryllium	7440-41-7	5.1E+00	9.2E+00	1.9E+00	1.9E+00	9.3E-01
chlordane	57-74-9			1.3E-01	1.3E-01	
chromium (III)	16065-83-1	3.6E+01	3.7E+01	1.7E+01	1.7E+01	3.4E+01
chrysene	218-01-9	4.8E+00	4.8E+00	1.9E+00	1.8E+00	2.8E+00
dibenzo(a,h)anthracene	53-70-3	6.5E-01	6.5E-01	2.5E-01	2.4E-01	5.9E-01
DDE	72-55-9	5.4E-02	4.7E-02			
DDT	50-29-3	1.0E-01	6.8E-02	3.7E-02	3.7E-02	1.1E-01
dieldrin	60-57-1	1.1E-01	4.7E-02	3.2E-02	3.2E-02	1.7E-01
dioxin (TCDD equivalents)	1746-01-6	1.4E-04	2.5E-05	6.3E-06	6.6E-06	4.3E-05
fluoranthene	206-44-0	9.9E+00	9.9E+00	4.0E+00	3.7E+00	7.0E+00
fluorene	86-73-7	8.9E-01	8.9E-01	4.1E-01	3.7E-01	9.3E-01
indeno(123-cd)pyrene	193-39-5	2.5E+00	2.5E+00	9.7E-01	8.9E-01	1.4E+00
lead	7439-92-1	4.36E+02	3.66E+02	1.05E+02	1.04E+02	4.21E+02
2-methylnaphthalene	91-57-6	3.3E-01	3.3E-01	1.3E-01	1.7E-01	2.9E-01
naphthalene	91-20-3	7.5E-01	7.5E-01	1.8E-01	2.0E-01	5.9E-01
nickel (soluble salts)	7440-02-0	3.4E+01	4.0E+01	2.4E+01	2.4E+01	2.5E+01
phenanthrene	85-01-8	7.9E+00	7.9E+00	3.4E+00	3.1E+00	5.9E+00
polychlorinated biphenyls, as PCB-1254	1336-36-3	4.1E+01	7.6E+00	1.9E+00	2.0E+00	1.3E+01
pyrene	129-00-0	9.6E+00	9.6E+00	3.7E+00	3.4E+00	5.0E+00
thallium	7440-28-0					3.5E+00
toluene	108-88-3			2.1E-01	2.1E-01	
vanadium	7440-62-2	3.7E+02	4.4E+02	1.5E+02	1.8E+02	1.1E+02
zinc	7440-66-6	1.9E+02	1.8E+02	9.4E+01	9.4E+01	1.6E+02
C9-C18 Aliphatics	N/A	4.40E+01	4.40E+01	1.20E+01	3.10E+01	
C19-C36 Aliphatics	N/A	1.79E+02	1.79E+02	4.70E+01	9.30E+01	
C11-C22 Aromatics	N/A	2.97E+02	2.97E+02	9.80E+01	1.79E+02	

unit, milligram per kilogram (mg/kg), ppm
Abbreviations:

Table 1.2
Exposure Point Concentrations for Dust

Chemical Name	CAS Number	Courtyard 0-1 Foot Interval	Courtyard 1-3 Foot Interval	Courtyard 3-6 Foot Interval	Courtyard 3-11 Foot Interval	Stockpiled Fuel Oil Vault Sands SP-3	0.00	0.00
acenaphthene	83-32-9	5.16E-05	5.16E-05	2.28E-05	1.98E-05	4.20E-05		
acenaphthylene	208-96-8	1.38E-05	1.38E-05	5.04E-06	5.76E-06	5.40E-06		
anthracene	120-12-7	1.14E-04	1.14E-04	5.04E-05	4.50E-05	9.00E-05		
barium	7440-39-3	6.42E-03	5.52E-03	2.94E-03	2.94E-03	6.24E-03		
benzene	71-43-2			3.18E-06	3.18E-06			
benzo(a)anthracene	56-55-3	2.58E-04	2.58E-04	1.08E-04	9.60E-05	1.80E-04		
benzo(a)pyrene	50-32-8	2.34E-04	2.34E-04	9.60E-05	9.00E-05	1.56E-04		
benzo(b)fluoranthene	205-99-2	3.06E-04	3.06E-04	1.32E-04	1.20E-04	2.10E-04		
benzo(k)fluoranthene	207-08-9	1.08E-04	1.08E-04	4.98E-05	4.62E-05	8.40E-05		
benzo(ghi)perylene	191-24-2	1.32E-04	1.32E-04	5.46E-05	5.10E-05	8.40E-05		
beryllium	7440-41-7	3.06E-04	5.52E-04	1.14E-04	1.14E-04	5.58E-05		
chlordane	57-74-9			7.80E-06	7.80E-06			
chromium (III)	16065-83-1	2.16E-03	2.22E-03	1.02E-03	1.02E-03	2.04E-03		
chrysene	218-01-9	2.88E-04	2.88E-04	1.14E-04	1.08E-04	1.68E-04		
dibenzo(a,h)anthracene	53-70-3	3.90E-05	3.90E-05	1.50E-05	1.44E-05	3.54E-05		
DDE	72-55-9	3.24E-06	2.82E-06					
DDT	50-29-3	6.12E-06	4.08E-06	2.22E-06	2.22E-06	6.60E-06		
dieldrin	60-57-1	6.48E-06	2.82E-06	1.92E-06	1.92E-06	1.02E-05		
dioxin (TCDD equivalents)	1746-01-6	8.10E-09	1.51E-09	3.76E-10	3.96E-10	2.57E-09		
fluoranthene	206-44-0	5.94E-04	5.94E-04	2.40E-04	2.22E-04	4.20E-04		
fluorene	86-73-7	5.34E-05	5.34E-05	2.46E-05	2.22E-05	5.58E-05		
indeno(123-cd)pyrene	193-39-5	1.50E-04	1.50E-04	5.82E-05	5.34E-05	8.40E-05		
lead	7439-92-1	2.62E-02	2.20E-02	6.30E-03	6.24E-03	2.53E-02		
2-methylnaphthalene	91-57-6	1.98E-05	1.98E-05	7.80E-06	1.02E-05	1.74E-05		
naphthalene	91-20-3	4.50E-05	4.50E-05	1.08E-05	1.20E-05	3.54E-05		
nickel (soluble salts)	7440-02-0	2.04E-03	2.40E-03	1.44E-03	1.44E-03	1.50E-03		
phenanthrene	85-01-8	4.74E-04	4.74E-04	2.04E-04	1.86E-04	3.54E-04		
polychlorinated biphenyls, as PCB-1254	1336-36-3	2.46E-03	4.56E-04	1.14E-04	1.20E-04	7.80E-04		
pyrene	129-00-0	5.76E-04	5.76E-04	2.22E-04	2.04E-04	3.00E-04		
thallium	7440-28-0					2.10E-04		
toluene	108-88-3			1.26E-05	1.26E-05			
vanadium	7440-62-2	2.23E-02	2.66E-02	9.06E-03	1.07E-02	6.42E-03		
zinc	7440-66-6	1.13E-02	1.05E-02	5.64E-03	5.64E-03	9.66E-03		
C9-C18 Aliphatics	N/A	2.64E-03	2.64E-03	7.20E-04	1.86E-03			
C19-C36 Aliphatics	N/A	1.07E-02	1.07E-02	2.82E-03	5.58E-03			
C11-C22 Aromatics	N/A	1.78E-02	1.78E-02	5.88E-03	1.07E-02			

Formula: EPC-air = [OHM]-soil * PF * PM-10 * CF

where,
EPC-air = Exposure Point Concentration (ug/cu m)
[OHM]-soil = soil concentration (mg/kg)
PM-10 = respirable particulate concentration in air (60 ug/cu m)
PF = proportion of respirable particulate concentrations attributable to the site (1.0)
CF = conversion factor (1E-06 kg/ug)

Units: Soil EPC = mg/kg
Dust EPC = ug/cu m

Refer to Table 6.4 for Soil Concentrations used to derive Dust Exposure Point Concentrations

Table 3.1
Calculation of Average Daily Dose for Soil Exposure: Child Resident, aged 1 Year

Receptor: Child Resident, aged 1 year													
	Exposure Point:	Courtyard 0-1 Foot Interval		Courtyard 1-3 Foot Interval		Courtyard 3-6 Foot Interval		Courtyard 3-11 Foot Interval		Stockpiled Fuel Oil Vault Sands SP-3		0.00E+00	
Chemical Name	CAS Number	Dermal Contact	Incidental Ingestion	Dermal Contact	Incidental Ingestion	Dermal Contact	Incidental Ingestion	Dermal Contact	Incidental Ingestion	Dermal Contact	Incidental Ingestion	Dermal Contact	Incidental Ingestion
acenaphthene	83-32-9	2.34E-06	1.20E-06	2.34E-06	1.20E-06	1.04E-06	5.31E-07	8.99E-07	4.61E-07	1.91E-06	9.79E-07		
acenaphthylene	208-96-8	6.26E-07	3.22E-07	6.26E-07	3.22E-07	2.29E-07	1.17E-07	2.61E-07	1.34E-07	2.45E-07	1.26E-07		
anthracene	120-12-7	5.18E-06	2.66E-06	5.18E-06	2.66E-06	2.29E-06	1.17E-06	2.04E-06	1.05E-06	4.09E-06	2.10E-06		
barium	7440-39-3	2.91E-04	4.99E-04	2.51E-04	4.29E-04	1.33E-04	2.28E-04	1.33E-04	2.28E-04	2.83E-04	4.85E-04		
benzene	71-43-2					4.33E-08	2.47E-07	4.33E-08	2.47E-07				
benzo(a)anthracene	56-55-3	2.34E-06	6.01E-06	2.34E-06	6.01E-06	9.81E-07	2.52E-06	8.72E-07	2.24E-06	1.63E-06	4.19E-06		
benzo(a)pyrene	50-32-8	2.12E-06	5.45E-06	2.12E-06	5.45E-06	8.72E-07	2.24E-06	8.17E-07	2.10E-06	1.42E-06	3.63E-06		
benzo(b)fluoranthene	205-99-2	2.78E-06	7.13E-06	2.78E-06	7.13E-06	1.20E-06	3.08E-06	1.09E-06	2.80E-06	1.91E-06	4.89E-06		
benzo(k)fluoranthene	207-08-9	9.81E-07	2.52E-06	9.81E-07	2.52E-06	4.52E-07	1.16E-06	4.19E-07	1.08E-06	7.63E-07	1.96E-06		
benzo(ghi)perylene	191-24-2	5.99E-06	3.08E-06	5.99E-06	3.08E-06	2.48E-06	1.27E-06	2.32E-06	1.19E-06	3.81E-06	1.96E-06		
beryllium	7440-41-7	1.39E-05	2.38E-05	2.51E-05	4.29E-05	5.18E-06	8.85E-06	5.18E-06	8.85E-06	2.53E-06	4.33E-06		
chlordane	57-74-9					1.42E-07	6.06E-07	1.42E-07	6.06E-07				
chromium (III)	16065-83-1	9.81E-05	1.68E-04	1.01E-04	1.72E-04	4.63E-05	7.92E-05	4.63E-05	7.92E-05	9.26E-05	1.58E-04		
chrysene	218-01-9	2.61E-06	6.71E-06	2.61E-06	6.71E-06	1.04E-06	2.66E-06	9.81E-07	2.52E-06	1.53E-06	3.91E-06		
dibenzo(a,h)anthracene	53-70-3	3.54E-07	9.09E-07	3.54E-07	9.09E-07	1.36E-07	3.50E-07	1.31E-07	3.36E-07	3.21E-07	8.25E-07		
DDE	72-55-9	4.41E-08	2.52E-07	3.84E-08	2.19E-07								
DDT	50-29-3	8.33E-08	4.75E-07	5.56E-08	3.17E-07	3.02E-08	1.72E-07	3.02E-08	1.72E-07	8.99E-08	5.13E-07		
dieldrin	60-57-1	2.94E-07	5.03E-07	1.28E-07	2.19E-07	8.72E-08	1.49E-07	8.72E-08	1.49E-07	4.63E-07	7.92E-07		
dioxin (TCDD equivalents)	1746-01-6	3.68E-10	6.29E-10	6.84E-11	1.17E-10	1.71E-11	2.92E-11	1.80E-11	3.08E-11	1.17E-10	2.00E-10		
fluoranthene	206-44-0	2.70E-05	1.38E-05	2.70E-05	1.38E-05	1.09E-05	5.59E-06	1.01E-05	5.17E-06	1.91E-05	9.79E-06		
fluorene	86-73-7	2.42E-06	1.24E-06	2.42E-06	1.24E-06	1.12E-06	5.73E-07	1.01E-06	5.17E-07	2.53E-06	1.30E-06		
indeno(123-cd)pyrene	193-39-5	1.36E-06	3.50E-06	1.36E-06	3.50E-06	5.28E-07	1.36E-06	4.85E-07	1.24E-06	7.63E-07	1.96E-06		
lead	7439-92-1	7.13E-05	1.02E-03	5.98E-05	8.53E-04	1.72E-05	2.45E-04	1.70E-05	2.42E-04	6.88E-05	9.81E-04		
2-methylnaphthalene	91-57-6	8.99E-07	4.61E-07	8.99E-07	4.61E-07	3.54E-07	1.82E-07	4.63E-07	2.38E-07	7.90E-07	4.05E-07		
naphthalene	91-20-3	2.04E-06	1.05E-06	2.04E-06	1.05E-06	4.90E-07	2.52E-07	5.45E-07	2.80E-07	1.61E-06	8.25E-07		
nickel (soluble salts)	7440-02-0	1.85E-04	1.58E-04	2.18E-04	1.86E-04	1.31E-04	1.12E-04	1.31E-04	1.12E-04	1.36E-04	1.17E-04		
phenanthrene	85-01-8	2.15E-05	1.10E-05	2.15E-05	1.10E-05	9.26E-06	4.75E-06	8.44E-06	4.33E-06	1.61E-05	8.25E-06		
polychlorinated biphenyls, as PCB-1254	1336-36-3	1.12E-04	1.91E-04	2.07E-05	3.54E-05	5.18E-06	8.85E-06	5.45E-06	9.32E-06	3.54E-05	6.06E-05		
pyrene	129-00-0	2.61E-05	1.34E-05	2.61E-05	1.34E-05	1.01E-05	5.17E-06	9.26E-06	4.75E-06	1.36E-05	6.99E-06		
thallium	7440-28-0									9.53E-07	1.63E-05		
toluene	108-88-3					1.72E-07	9.79E-07	1.72E-07	9.79E-07				
vanadium	7440-62-2	1.01E-03	1.73E-03	1.21E-03	2.06E-03	4.11E-04	7.04E-04	4.85E-04	8.29E-04	2.91E-04	4.99E-04		
zinc	7440-66-6	5.12E-04	8.76E-04	4.77E-04	8.16E-04	2.56E-04	4.38E-04	2.56E-04	4.38E-04	4.39E-04	7.50E-04		
C9-C18 Aliphatics	N/A	2.40E-04	2.05E-04	2.40E-04	2.05E-04	6.54E-05	5.59E-05	1.69E-04	1.44E-04				
C19-C36 Aliphatics	N/A	9.75E-04	8.34E-04	9.75E-04	8.34E-04	2.56E-04	2.19E-04	5.07E-04	4.33E-04				
C11-C22 Aromatics	N/A	8.09E-04	4.15E-04	8.09E-04	4.15E-04	2.67E-04	1.37E-04	4.88E-04	2.50E-04				

Table 3.1
Calculation of Average Daily Dose for Soil Exposure: Child Resident, aged 1 Year

Formula: Daily Dose (ADD) for exposure to soils via ingestion (ing) and dermal contact

$$ADD\text{-}dermal = \frac{[OHM\text{-}soil]*SA*AF*RAF*EF*ED*EP*C}{BW*AP}$$

$$ADD\text{-}ing = \frac{[OHM\text{-}soil]*IR*RAF*EF*ED*EP*C}{BW*AP}$$

Unit: ADD, mg/kg/day

Receptor: Child Resident, aged 1 to 8 years (Chronic) and aged 1 year (Subchronic)

Description	Abbreviation	Unit	Default Value	Source	Site-Specific Value	Source / Description	Input Value
Exposure point concentration	[OHM-soil]	mg/kg			See Soil EPC Table		See Soil EPC Table
Skin surface area in contact with soil on days exposed	SA	square centimeter/day	2431	[2], child, aged 1 to 8 years (face, hands, forearms, lower legs and feet)	1670	child, aged 1 to 2 years (face, hands, forearms, lower legs and feet)	1.67E+03
Mass of soil adhered to the unit surface area of skin exposed	AF	mg/sq. cm.	0.35	[1], for child resident			3.50E-01
Relative Absorption Factor	RAF	unitless	See RAF Table				See RAF Table
# exposure events during EP / # days in EP	EF	events/year	150	[2], 5 days per week during the 30 warmest weeks of the year	182	Seven days per week during a six-month construction project	1.82E+02
Exposure duration: typical duration of each exposure event	ED	years/event	2.74E-03	1 day per event or 1/365 of a year per event			2.74E-03
Exposure period: period of time over which exposure may occur	EP	years	7	[2], child, aged 1 to 8 years	1.0	subchronic exposure of 1 year old boy or girl (Subchronic)	1.00E+00
Unit Conversion Factor	C	kg/mg	1.00E-06	for dermal contact			1.00E-06
Unit Conversion Factor	C	kg/mg	1.00E-06	for ingestion			1.00E-06
Body weight of the receptor during the AP	BW	kg	17	[2], child, aged 1 to 8 years	1.07E+01	subchronic exposure of 1 year old boy or girl	1.07E+01
Averaging Period	AP	years	7	[2]	1.0	subchronic exposure of 1 year old boy or girl	1.00E+00
Ingestion rate	IR	mg/day	100	[2]			1.00E+02

References:

[1] MADEP's Technical Update, Weighted Skin-Soil Adherence Factors, April 2002.
[2] MADEP's Guidance for Disposal Site Risk Characterization in Support of the Massachusetts Contingency Plan, Interim Final Policy BWSC/ORS-95-141

Table 3.2
Calculation of Average Daily Exposure for Dust: Child Resident, aged 1

Receptor: Child Resident, aged 1 year

Chemical Name	CAS Number	Courtyard 0-1 Foot Interval	Courtyard 1-3 Foot Interval	Courtyard 3-6 Foot Interval	Courtyard 3-11 Foot Interval	Stockpiled Fuel Oil Vault Sands SP-3	0.00	0.00
acenaphthene	83-32-9	2.6E-08	2.6E-08	1.1E-08	9.9E-09	2.1E-08		
acenaphthylene	208-96-8	6.9E-09	6.9E-09	2.5E-09	2.9E-09	2.7E-09		
anthracene	120-12-7	5.7E-08	5.7E-08	2.5E-08	2.2E-08	4.5E-08		
barium	7440-39-3	3.2E-06	2.8E-06	1.5E-06	1.5E-06	3.1E-06		
benzene	71-43-2			1.6E-09	1.6E-09			
benzo(a)anthracene	56-55-3	1.3E-07	1.3E-07	5.4E-08	4.8E-08	9.0E-08		
benzo(a)pyrene	50-32-8	1.2E-07	1.2E-07	4.8E-08	4.5E-08	7.8E-08		
benzo(b)fluoranthene	205-99-2	1.5E-07	1.5E-07	6.6E-08	6.0E-08	1.0E-07		
benzo(k)fluoranthene	207-08-9	5.4E-08	5.4E-08	2.5E-08	2.3E-08	4.2E-08		
benzo(ghi)perylene	191-24-2	6.6E-08	6.6E-08	2.7E-08	2.5E-08	4.2E-08		
beryllium	7440-41-7	1.5E-07	2.8E-07	5.7E-08	5.7E-08	2.8E-08		
chlordane	57-74-9			3.9E-09	3.9E-09			
chromium (III)	16065-83-1	1.1E-06	1.1E-06	5.1E-07	5.1E-07	1.0E-06		
chrysene	218-01-9	1.4E-07	1.4E-07	5.7E-08	5.4E-08	8.4E-08		
dibenzo(a,h)anthracene	53-70-3	1.9E-08	1.9E-08	7.5E-09	7.2E-09	1.8E-08		
DDE	72-55-9	1.6E-09	1.4E-09					
DDT	50-29-3	3.1E-09	2.0E-09	1.1E-09	1.1E-09	3.3E-09		
dieldrin	60-57-1	3.2E-09	1.4E-09	9.6E-10	9.6E-10	5.1E-09		
dioxin (TCDD equivalents)	1746-01-6	4.0E-12	7.5E-13	1.9E-13	2.0E-13	1.3E-12		
fluoranthene	206-44-0	3.0E-07	3.0E-07	1.2E-07	1.1E-07	2.1E-07		
fluorene	86-73-7	2.7E-08	2.7E-08	1.2E-08	1.1E-08	2.8E-08		
indeno(123-cd)pyrene	193-39-5	7.5E-08	7.5E-08	2.9E-08	2.7E-08	4.2E-08		
lead	7439-92-1	1.3E-05	1.1E-05	3.1E-06	3.1E-06	1.3E-05		
2-methylnaphthalene	91-57-6	9.9E-09	9.9E-09	3.9E-09	5.1E-09	8.7E-09		
naphthalene	91-20-3	2.2E-08	2.2E-08	5.4E-09	6.0E-09	1.8E-08		
nickel (soluble salts)	7440-02-0	1.0E-06	1.2E-06	7.2E-07	7.2E-07	7.5E-07		
phenanthrene	85-01-8	2.4E-07	2.4E-07	1.0E-07	9.3E-08	1.8E-07		
polychlorinated biphenyls, as PCB-1254	1336-36-3	1.2E-06	2.3E-07	5.7E-08	6.0E-08	3.9E-07		
pyrene	129-00-0	2.9E-07	2.9E-07	1.1E-07	1.0E-07	1.5E-07		
thallium	7440-28-0					1.0E-07		
toluene	108-88-3			6.3E-09	6.3E-09			
vanadium	7440-62-2	1.1E-05	1.3E-05	4.5E-06	5.3E-06	3.2E-06		
zinc	7440-66-6	5.6E-06	5.2E-06	2.8E-06	2.8E-06	4.8E-06		
C9-C18 Aliphatics	N/A	1.3E-06	1.3E-06	3.6E-07	9.3E-07			
C19-C36 Aliphatics	N/A	5.4E-06	5.4E-06	1.4E-06	2.8E-06			
C11-C22 Aromatics	N/A	8.9E-06	8.9E-06	2.9E-06	5.4E-06			

Table 3.2
Calculation of Average Daily Exposure for Dust: Child Resident, aged 1

Formula: Average Daily Exposure (ADE) via inhalation (ihl) of dusts

$$ADE\text{-}ihl = \frac{[OHM\text{-}dust]*EF*ED*EP*C}{AP}$$

Unit: ADE, mg/cu m

Receptor: Child Resident, aged 1 to 8 years (Chronic) and aged 1 year (Subchronic)

Description	Abbreviation	Unit	Default Value	Source	Site-Specific Value	Source / Description	Input Value
Exposure point concentration	[OHM-dust]	ug/cu. m.			See Dust EPC Table		See Dust EPC Table
Exposure frequency: # exposure events during EP / # days in EP	EF	events/year	150	[2], 5 days per week during the 30 warmest weeks of the year	182	Seven days per week during a six-month construction project	1.82E+02
Exposure duration: typical duration of each exposure event	ED	years/event	2.74E-03	1 day per event, or 1/365 of a year per event			2.74E-03
Exposure period: period of time over which exposure may occur	EP	years	7	[1], from age 1 to 8 years	1.00E+00	subchronic exposure of 1 year old boy or girl	1.00E+00
Unit Conversion Factor	C	mg/ug	1.00E-03	for inhalation			1.00E-03
Averaging Period	AP	years	7	[1]	1.00E+00	subchronic exposure of 1 year old boy or girl	1.00E+00

References:

[1] MADEP's Guidance for Disposal Site Risk Characterization in Support of the Massachusetts Contingency Plan, Interim Final Policy BWSC/ORS-95-141

Table 4.1
Calculation of Hazard Index (HI) for Exposure to Soil and Dust: Child Resident, aged 1 Year

Receptor: Child Resident, aged 1 year																	
	Exposure Point:	Courtyard 0-1 Foot Interval			Courtyard 1-3 Foot Interval			Courtyard 3-6 Foot Interval			Courtyard 3-11 Foot Interval			Stockpiled Fuel Oil Vault Sands SP-3		
Chemical Name	CAS Number	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contct	Incidental Ingestion	Dust Inhalation
acenaphthene	83-32-9	1.2E-05	6.0E-06	5.1E-08	1.2E-05	6.0E-06	5.1E-08	5.2E-06	2.7E-06	2.3E-08	4.5E-06	2.3E-06	2.0E-08	9.5E-06	4.9E-06	4.2E-08
acenaphthylene	208-96-8	2.1E-06	1.1E-06	1.4E-08	2.1E-06	1.1E-06	1.4E-08	7.6E-07	3.9E-07	5.0E-09	8.7E-07	4.5E-07	5.7E-09	8.2E-07	4.2E-07	5.4E-09
anthracene	120-12-7	5.2E-06	2.7E-06	1.1E-07	5.2E-06	2.7E-06	1.1E-07	2.3E-06	1.2E-06	5.0E-08	2.0E-06	1.0E-06	4.5E-08	4.1E-06	2.1E-06	9.0E-08
barium	7440-39-3	4.2E-03	7.1E-03	6.4E-04	3.6E-03	6.1E-03	5.5E-04	1.9E-03	3.3E-03	2.9E-04	1.9E-03	3.3E-03	2.9E-04	4.0E-03	6.9E-03	6.2E-04
benzene	71-43-2							4.3E-06	2.5E-05	1.6E-07	4.3E-06	2.5E-05	1.6E-07			
benzo(a)anthracene	56-55-3	7.8E-06	2.0E-05	2.6E-07	7.8E-06	2.0E-05	2.6E-07	3.3E-06	8.4E-06	1.1E-07	2.9E-06	7.5E-06	9.6E-08	5.4E-06	1.4E-05	1.8E-07
benzo(a)pyrene	50-32-8	7.1E-06	1.8E-05	2.3E-07	7.1E-06	1.8E-05	2.3E-07	2.9E-06	7.5E-06	9.6E-08	2.7E-06	7.0E-06	9.0E-08	4.7E-06	1.2E-05	1.6E-07
benzo(b)fluoranthene	205-99-2	9.3E-06	2.4E-05	3.1E-07	9.3E-06	2.4E-05	3.1E-07	4.0E-06	1.0E-05	1.3E-07	3.6E-06	9.3E-06	1.2E-07	6.4E-06	1.6E-05	2.1E-07
benzo(k)fluoranthene	207-08-9	3.3E-06	8.4E-06	1.1E-07	3.3E-06	8.4E-06	1.1E-07	1.5E-06	3.9E-06	5.0E-08	1.4E-06	3.6E-06	4.6E-08	2.5E-06	6.5E-06	8.4E-08
benzo(ghi)perylene	191-24-2	2.0E-05	1.0E-05	1.3E-07	2.0E-05	1.0E-05	1.3E-07	8.3E-06	4.2E-06	5.4E-08	7.7E-06	4.0E-06	5.1E-08	1.3E-05	6.5E-06	8.4E-08
beryllium	7440-41-7	2.8E-03	4.8E-03	7.6E-03	3.0E-03	8.6E-03	1.4E-02	1.0E-03	1.8E-03	2.8E-03	1.0E-03	1.8E-03	2.8E-03	5.1E-04	8.7E-04	1.4E-03
chlordane	57-74-9							2.8E-04	1.2E-03	5.6E-07	2.8E-04	1.2E-03	5.6E-07			
chromium (III)	16065-83-1	6.5E-05	1.1E-04	3.6E-03	6.7E-05	1.1E-04	3.7E-03	3.1E-05	5.3E-05	1.7E-03	3.1E-05	5.3E-05	1.7E-03	6.2E-05	1.1E-04	3.4E-03
chrysene	218-01-9	8.7E-06	2.2E-05	2.9E-07	8.7E-06	2.2E-05	2.9E-07	3.5E-06	8.9E-06	1.1E-07	3.3E-06	8.4E-06	1.1E-07	5.1E-06	1.3E-05	1.7E-07
dibenzo(a,h)anthracene	53-70-3	1.2E-06	3.0E-06	3.9E-08	1.2E-06	3.0E-06	3.9E-08	4.3E-07	1.2E-06	1.5E-08	4.4E-07	1.1E-06	1.4E-08	1.1E-06	2.7E-06	3.5E-08
DDD	72-54-8	8.8E-05	3.0E-04	9.2E-07	9.0E-05	4.4E-04	8.0E-07									
DDE	72-55-9	8.8E-05	3.0E-04	9.2E-07	9.0E-05	4.4E-04	8.0E-07									
DDT	50-29-3	1.7E-04	9.5E-04	1.7E-06	1.1E-04	6.3E-04	1.2E-06	6.0E-05	3.4E-04	6.3E-07	6.0E-05	3.4E-04	6.3E-07	1.8E-04	1.0E-03	1.9E-06
dieldrin	60-57-1	5.9E-03	1.0E-02	1.8E-05	2.6E-03	4.4E-03	8.0E-06	1.7E-03	3.0E-03	5.5E-06	1.7E-03	3.0E-03	5.5E-06	9.3E-03	1.6E-02	2.9E-05
dioxin (TCDD equivalents)	1746-01-6	5.3E-01	9.0E-01		9.8E-02	1.7E-01		2.4E-02	4.2E-02		2.6E-02	4.4E-02		1.7E-01	2.9E-01	
fluoranthene	206-44-0	6.7E-05	3.5E-05	5.9E-07	6.7E-05	3.5E-05	5.9E-07	2.7E-05	1.4E-05	2.4E-07	2.5E-05	1.3E-05	2.2E-07	4.8E-05	2.4E-05	4.2E-07
fluorene	86-73-7	6.1E-06	3.1E-06	5.3E-08	6.1E-06	3.1E-06	5.3E-08	2.8E-06	1.4E-06	2.5E-08	2.5E-06	1.3E-06	2.2E-08	6.3E-06	3.3E-06	5.6E-08
indeno(123-cd)pyrene	193-39-5	4.5E-06	1.2E-05	1.3E-07	4.5E-06	1.2E-05	1.3E-07	1.8E-06	4.5E-06	5.8E-08	1.6E-06	4.1E-06	5.3E-08	2.5E-06	6.5E-06	8.4E-08
lead	7439-92-1	9.5E-02	1.4E+00	1.3E-02	8.0E-02	1.1E+00	1.1E-02	2.3E-02	3.3E-01	3.1E-03	2.3E-02	3.2E-01	3.1E-03	9.2E-02	1.3E+00	1.3E-02
2-methylnaphthalene	91-57-6	2.2E-04	1.2E-04	2.0E-08	2.2E-04	1.2E-04	2.0E-08	8.9E-05	4.5E-05	7.8E-09	1.2E-04	5.9E-05	1.0E-08	2.0E-04	1.0E-04	1.7E-08
naphthalene	91-20-3	1.0E-05	5.2E-06	7.5E-06	1.0E-05	5.2E-06	7.5E-06	2.5E-06	1.3E-06	1.8E-06	2.7E-06	1.4E-06	2.0E-06	8.0E-06	4.1E-06	5.9E-06
nickel (soluble salts)	7440-02-0	9.3E-03	7.9E-03	1.0E-03	1.1E-02	9.3E-03	1.2E-03	6.5E-03	5.6E-03	7.2E-04	6.5E-03	5.6E-03	7.2E-04	6.8E-03	5.8E-03	7.5E-04
phenanthrene	85-01-8	7.2E-05	3.7E-05	4.7E-07	7.2E-05	3.7E-05	4.7E-07	3.1E-05	1.6E-05	2.0E-07	2.8E-05	1.4E-05	1.9E-07	3.4E-05	2.7E-05	3.5E-07
polychlorinated biphenyls, as PCB-1254	1336-36-3	2.2E+00	3.8E+00	6.1E-02	4.1E-01	7.1E-01	1.1E-02	1.0E-01	1.8E-01	2.8E-03	1.1E-01	1.9E-01	3.0E-03	7.1E-01	1.2E+00	1.9E-02
pyrene	129-00-0	8.7E-05	4.5E-05	5.7E-07	8.7E-05	4.5E-05	5.7E-07	3.4E-05	1.7E-05	2.2E-07	3.1E-05	1.6E-05	2.0E-07	4.5E-05	2.3E-05	3.0E-07
thallium	7440-28-0													1.2E-03	2.0E-02	7.5E-03
toluene	108-88-3							2.1E-07	1.2E-06	1.3E-09	2.1E-07	1.2E-06	1.3E-09			
vanadium	7440-62-2	1.1E-01	1.9E-01	1.1E-02	1.3E-01	2.3E-01	1.3E-02	4.6E-02	7.8E-02	4.5E-03	5.4E-02	9.2E-02	5.3E-03	3.2E-02	5.5E-02	3.2E-03
zinc	7440-66-6	1.7E-03	2.9E-03	4.0E-03	1.6E-03	2.7E-03	3.7E-03	8.3E-04	1.5E-03	2.0E-03	8.3E-04	1.5E-03	2.0E-03	1.5E-03	2.5E-03	3.4E-03
C9-C18 Aliphatics	N/A	2.4E-04	2.1E-04	2.2E-06	2.4E-04	2.1E-04	2.2E-06	6.5E-05	5.6E-05	6.0E-07	1.7E-04	1.4E-04	1.5E-06			
C19-C36 Aliphatics	N/A	1.6E-04	1.4E-04	8.9E-06	1.6E-04	1.4E-04	8.9E-06	4.3E-05	3.7E-05	2.3E-06	8.4E-05	7.2E-05	4.6E-06			
C11-C22 Aromatics	N/A	2.7E-03	1.4E-03	1.8E-05	2.7E-03	1.4E-03	1.8E-05	8.9E-04	4.6E-04	5.9E-06	1.6E-03	8.3E-04	1.1E-05			
Total HI: Route and Expos. Pt.		3.0E+00	6.3E+00	1.0E-01	7.5E-01	2.3E+00	5.9E-02	2.1E-01	6.4E-01	1.8E-02	2.3E-01	6.6E-01	1.9E-02	1.0E+00	2.9E+00	5.2E-02
Proportion of complete exposure point			1.0E+00			1.0E+00			1.0E+00			1.0E+00			1.0E+00	
Adjusted Total HI: Route and Expos. Pt.		3.0E+00	6.3E+00	1.0E-01	7.5E-01	2.3E+00	5.9E-02	2.1E-01	6.4E-01	1.8E-02	2.3E-01	6.6E-01	1.9E-02	1.0E+00	2.9E+00	5.2E-02
Total HI: Expos. Pt.			9.4E+00			3.1E+00			8.7E-01			9.1E-01			4.0E+00	

Formula:

Cumulative HI = $\sum HI_{ingestion\ -\ chemicalspecific} + \sum HI_{dermalcontact\ -\ chemicalspecific} + \sum HI_{inhalation:chemical\ -\ specific}$

HI ingestion-chemical specific = ADD-ingestion-chemical specific x Oral Slope Factor-chemical specific
HI dermal contact-chemical specific = ADD-dermal contact-chemical specific x Oral Slope Factor-chemical specific
HI inhalation-chemical specific = ADE-inhalation-chemical specific x Unit Risk-inhalation-chemical specific

HI = Hazard Index, unitless
ADD = Average Daily Dose, mg/kg/day
ADE = Average Daily Exposure, mg/cu m

Subchronic Oral Reference Dose		X
Chronic Oral Reference Dose		
Subchronic Inhalation Reference Concentration		X
Chronic Inhalation Reference Concentration		

Use capital X to indicate selection

Table 5.1
Calculation of Total Hazard Index (HI): Child Resident, aged 1 Year

Receptor	Child Resident, aged 1 year							Child Resident, aged 1-8 years						
Exposure Point #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Pathway:														
Soil Exposure Point:														
Incidental ingestion of soil, normal	6.3E+00	2.3E+00	6.4E-01	6.6E-01	2.9E+00									
Inhalation of dusts from disturbed soil	1.0E-01	5.9E-02	1.8E-02	1.9E-02	5.2E-02									
Dermal contact with soil	3.0E+00	7.5E-01	2.1E-01	2.3E-01	1.0E+00									
Total HI	9.4E+00 Subchronic	3.1E+00 Subchronic	8.7E-01 Subchronic	9.1E-01 Subchronic	4.0E+00 Subchronic									
MCP Non-Cancer Risk Limit	1.E+00	1.E+00	1.E+00	1.E+00	1.E+00									
Does Total HI exceed MCP Non-Cancer Risk Limit?	Yes	Yes	No	No	Yes									
Significant Risk of Harm?	No	No	No	No	No									

Definintion of exposure points							
Exposure Point #	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Soil Exposure Point:	Courtyard 0-1 Foot Interval	Courtyard 1-3 Foot Interval	Courtyard 3-6 Foot Interval	Courtyard 3-11 Foot Interval	Stockpiled Fuel Oil Vault Sands SP-3		

NO SINGLE FAMILY RESIDENCE. NO GARDENING OF EDIBLE PRODUCE.
EXPOSURE TO SOILS OCCURS ONLY DURING A SINGLE SIX-MONTH CONSTRUCTION PROJECT, AFTER WHICH TIME
THE SOILS ARE RETURNED TO EXCAVATION OR ARE TRANSPORTED OFF-SITE.
ASSUMES **NO** CONTROLS ARE USED TO LIMIT RESIDENTIAL EXPOSURE TO SOILS DURING CONSTRUCTION PROJECT.
PROTECTIVE COVER MUST REMAIN OVER SOILS EXCEPT DURING CONSTRUCTION OR UTILITY PROJECT, AFTER WHICH TIME THE PROTECTIVE COVER MUST BE RE-INSTALLED.

Table C-1
Comparison of Soil Analytical Data to Published Background Concentrations Identification of Soil Contaminants of Concern
(April 2016)

Parameter	Background	SAMPLING LOCATIONS														
	Soils assoc. with Fill	B-5 (0-1')	B-5 (1-3')	B-5 (0-3')	B-5 (3-6')	B-5 (6-11')	B-7 (0-1')	B-7 (1-3')	B-7 (0-3')	B-7 (3-6')	B-7 (6-11')	B-8 (0-1')	B-8 (1-3')	B-8 (3-6')	B-8 (6-11')	B-9 (0-1')
Sampling Date	Containing	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016
Sample Depth	Coal Ash or Wood Ash	0-1 Feet	1-3 Feet	0-3 Feet	3-6 Feet	6-11 Feet	0-1 Feet	1-3 Feet	0-3 Feet	3-6 Feet	6-11 Feet	0-1 Feet	1-3 Feet	3-6 Feet	6-11 Feet	0-1 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)																
C9-C18 ALIPHATICS				24	26	300			61	ND (11)	ND (22)					
C19-C36 ALIPHATICS				160	64	750			140	28	48					
C11-C22 AROMATICS				310	220	**1400**			180	83	83					
ACENAPHTHENE	2			1.4	0.76	ND (0.49)			*2.6*	0.54	ND (0.22)					
ACENAPHTHYLENE	1			0.37	0.11	ND (0.49)			0.38	ND (0.11)	ND (0.22)					
ANTHRACENE	4			3.4	1.8	ND (0.49)			*5.4*	1.4	0.29					
BENZO(A)ANTHRACENE	9			**7.4**	4.1	ND (0.49)			***11***	2.9	1.2					
BENZO(A)PYRENE	7			**6.5**	**3.7**	ND (0.49)			***9.3***	**2.4**	1.1					
BENZO(B)FLUORANTHENE	8			***9.1***	5.3	ND (0.49)			***12***	3.3	1.3					
BENZO(G,H,I)PERYLENE	3			*3.4*	1.7	ND (0.49)			*5.0*	1.2	0.66					
BENZO(K)FLUORANTHENE	4			3.0	2.0	ND (0.49)			*4.6*	1.2	0.52					
CHRYSENE	7			*8.5*	5.0	ND (0.49)			*12*	3.2	1.3					
DIBENZ(A,H)ANTHRACENE	1			***1.1***	0.65	ND (0.49)			***1.7***	0.41	ND (0.22)					
FLUORANTHENE	10			*18*	9.5	1.2			*26*	6.6	2.3					
FLUORENE	2			1.9	0.90	ND (0.49)			*3.4*	0.78	ND (0.22)					
INDENO(1,2,3-CD)PYRENE	3			*4.1*	2.1	ND (0.49)			*5.1*	1.3	0.56					
2-METHYLNAPHTHALENE	1			0.67	0.29	0.70			0.96	0.22	ND (0.22)					
NAPHTHALENE	1			*1.7*	0.44	0.79			*1.5*	0.32	ND (0.22)					
PHENANTHRENE	20			15	7.4	1.6			*23*	6.1	1.2					
PYRENE	20			17	8.8	ND (0.49)			*22*	5.9	2.4					
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)																
DIBENZOFURAN (see notes 7, 9)																
DI-N-BUTYLPHTHALATE (see note 7)																
MADEP-VPH-04-1.1 (mg/Kg dry)																
C5-C8 ALIPHATICS																
C9-C12 ALIPHATICS																
C9-C10 AROMATICS																
BENZENE																
ETHYLBENZENE																
METHYL TERT-BUTYL ETHER (MTBE)																
NAPHTHALENE	1															
TOLUENE																
M/P-XYLENE																
O-XYLENE																

Table C-1
Comparison of Soil Analytical Data to Published Background Concentrations Identification of Soil Contaminants of Concern
(April 2016)

Parameter	Background	SAMPLING LOCATIONS														
	Soils assoc. with Fill	B-5 (0-1')	B-5 (1-3')	B-5 (0-3')	B-5 (3-6')	B-5 (6-11')	B-7 (0-1')	B-7 (1-3')	B-7 (0-3')	B-7 (3-6')	B-7 (6-11')	B-8 (0-1')	B-8 (1-3')	B-8 (3-6')	B-8 (6-11')	B-9 (0-1')
SW-846 6010C/D (mg/Kg dry) Metals Digestion																
ANTIMONY	7			ND (2.7)					ND (2.8)							
ARSENIC	20			11					13							
BARIUM	50			*120*					*91*							
BERYLLIUM	0.9			*1.4*					*1.3*							
CADMIUM	3			0.89					1.2							
CHROMIUM (as +3)	40			34					*50*							
LEAD	600			100					150							
NICKEL	30			29					26							
SELENIUM	1			ND (5.4)					ND (5.7)							
SILVER	5			ND (0.54)					ND (0.57)							
THALLIUM	5			ND (2.7)					ND (2.8)							
VANADIUM	30			*110*	*55*	30			*66*	*31*	14			*39*	*41*	
ZINC	300			200					260							
SW-846 7471B (mg/Kg dry) Metals Digestion																
MERCURY	1			0.16					0.38							
SW-846 7196A (mg/Kg dry)																
CHROMIUM +6	40															
SW-846 8082A (mg/Kg dry)																
PCB 1016		ND (1.1) *	ND (0.56)		ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *		ND (0.55)	ND (0.11)	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *
PCB 1221		ND (1.1) *	ND (0.56)		ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *		ND (0.55)	ND (0.11)	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *
PCB 1232		ND (1.1) *	ND (0.56)		ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *		ND (0.55)	ND (0.11)	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *
PCB 1242		ND (1.1) *	ND (0.56)		ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *		ND (0.55)	ND (0.11)	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *
PCB 1248		ND (1.1) *	ND (0.56)		ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *		ND (0.55)	ND (0.11)	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *
PCB 1254		**7.0**	**3.7**		**3.8**	0.29	**8.5**	**6.0**		**2.2**	ND (0.11)	**39**	ND (0.10)	ND (0.11)	ND (0.11)	**42**
PCB 1260		ND (1.1) *	ND (0.56)		ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *		ND (0.55)	ND (0.11)	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *
PCB 1262		ND (1.1) *	ND (0.56)		ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *		ND (0.55)	ND (0.11)	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *
PCB 1268		ND (1.1) *	ND (0.56)		ND (0.57)	ND (0.12)	ND (1.1) *	ND (1.1) *		ND (0.55)	ND (0.11)	ND (6.0) *	ND (0.10)	ND (0.11)	ND (0.11)	ND (5.8) *
TOTAL PCBs		**7.0**	**3.7**		**3.8**	0.29	**8.5**	**6.0**		**2.2**	ND (0.11)	**39**	ND (0.10)	ND (0.11)	ND (0.11)	**42**

Table C-1
Comparison of Soil Analytical Data to Published Background Concentrations Identification of Soil Contaminants of Concern
(April 2016)

Parameter	Background	SAMPLING LOCATIONS														
	Soils assoc. with Fill	B-5 (0-1')	B-5 (1-3')	B-5 (0-3')	B-5 (3-6')	B-5 (6-11')	B-7 (0-1')	B-7 (1-3')	B-7 (0-3')	B-7 (3-6')	B-7 (6-11')	B-8 (0-1')	B-8 (1-3')	B-8 (3-6')	B-8 (6-11')	B-9 (0-1')
SW-846 8081B (mg/Kg dry)																
ALDRIN				ND (0.12) *					ND (0.12) *							
ALPHA-BHC				ND (0.12)					ND (0.12)							
BETA-BHC				ND (0.12)					ND (0.12)							
DELTA-BHC				ND (0.12)					ND (0.12)							
GAMMA-BHC (LINDANE)				ND (0.047) *					ND (0.047) *							
CHLORDANE				ND (0.47)					ND (0.47)							
4,4'-DDD				ND (0.094)					ND (0.094)							
4,4'-DDE				ND (0.094)					ND (0.094)							
4,4'-DDT				ND (0.094)					0.11							
DIELDRIN				ND (0.094) *					ND (0.094) *							
ENDOSULFAN I				ND (0.12)					ND (0.12)							
ENDOSULFAN II				ND (0.19)					ND (0.19)							
ENDOSULFAN SULFATE				ND (0.19)					ND (0.19)							
ENDRIN				ND (0.19)					ND (0.19)							
ENDRIN KETONE				ND (0.19)					ND (0.19)							
HEPTACHLOR				ND (0.12)					ND (0.12)							
HEPTACHLOR EPOXIDE				ND (0.12) *					ND (0.12) *							
HEXACHLOROBENZENE				ND (0.14)					ND (0.14)							
METHOXYCHLOR				ND (1.2)					ND (1.2)							
SW-846 8151A (mg/kg dry)																
2,4-D				ND (0.029)					ND (0.029)							
2,4-DB				ND (0.029)					ND (0.029)							
2,4,5-TP (SILVEX)				ND (0.0029)					ND (0.0029)							
2,4,5-T				ND (0.0029)					ND (0.0029)							
DALAPON				ND (0.073)					ND (0.073)							
DICAMBA				ND (0.0029)					ND (0.0029)							
DICHLOROPROP				ND (0.029)					ND (0.029)							
DINOSEB				ND (0.015)					ND (0.015)							
MCPA				ND (2.9)					ND (2.9)							
MCPP				ND (2.9)					ND (2.9)							

NOTES:

1. An asterisk (*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regul. criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Bolded values exceed the Method 1 Cleanup Standards (exclusive of S-x/GW-1).
6. Italic values exceed MassDEP published background conc. for soils assoc. with fill containing coal ash or wood ash.
9. B-7 (03') and B-10 (0-3') were analyzed for PAHs via both MassDEP's Method and USEPA Method 8270D. For each PAH, the highest detected value for both methods is provided in this table.

Table C-1
Comparison of Soil Analytical Data to Published Background Concentrations Identification of Soil Contaminants of Concern
(April 2016)

Parameter	SAMPLING LOCATION															
	B-9 (1-3')	**B-9 (0-3')**	**B-9 (3-6')**	**B-9 (6-9')**	**B-10 (0-1')**	**B-10 (1-3')**	**B-10 (0-3')**	**B-10 (3-6')**	**B-10 (6-11')**	**B-11 (0-1')**	**B-11 (1-3')**	**B-11 (3-6')**	**B-11 (6-11')**	**B-11-r10B (0-1')**	**B-11-r10B (0-3')**	**B-11-r10B (1-3')**
Sampling Date	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/30/2016	3/30/2016	3/30/2016
Sample Depth	1-3 Feet	0-3 Feet	3-6 Feet	6-9 Feet	0-1 Feet	1-3 Feet	0-3 Feet	3-6 Feet	6-11 Feet	0-1 Feet	1-3 Feet	3-6 Feet	6-11 Feet	0-1 Feet	0-3 Feet	1-3 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)																
C9-C18 ALIPHATICS		ND (12)	ND (11)				18	ND (11)					ND (12)		180	
C19-C36 ALIPHATICS		ND (12)	ND (11)				150	19					46		530	
C11-C22 AROMATICS		37	46				190	31					51		**1100**	
ACENAPHTHENE		ND (0.12)	ND (0.11)				0.49	ND (0.11)					ND (0.12)		ND (0.23)	
ACENAPHTHYLENE		ND (0.12)	ND (0.11)				ND (0.46)	ND (0.11)					ND (0.12)		ND (0.23)	
ANTHRACENE		0.12	0.38				1.1	ND (0.11)					0.24		0.38	
BENZO(A)ANTHRACENE		0.21	1.2				2.1	0.28					0.54		0.74	
BENZO(A)PYRENE		0.22	1.0				1.4	0.29					0.54		0.68	
BENZO(B)FLUORANTHENE		0.35	1.3				2.4	0.38					0.68		ND (0.23)	
BENZO(G,H,I)PERYLENE		0.13	0.54				1.1	0.18					0.24		0.89	
BENZO(K)FLUORANTHENE		ND (0.12)	0.50				0.67	0.15					0.25		ND (0.23)	
CHRYSENE		0.30	1.3				2.4	0.37					0.61		1.3	
DIBENZ(A,H)ANTHRACENE		ND (0.12)	ND (0.11)				ND (0.46)	ND (0.11)					ND (0.12)		ND (0.23)	
FLUORANTHENE		0.44	2.4				4.1	0.61					1.3		1.7	
FLUORENE		ND (0.12)	ND (0.11)				0.57	ND (0.11)					ND (0.12)		ND (0.23)	
INDENO(1,2,3-CD)PYRENE		0.12	0.59				1.1	0.18					0.32		ND (0.23)	
2-METHYLNAPHTHALENE		ND (0.12)	ND (0.11)				ND (0.46)	ND (0.11)					ND (0.12)		ND (0.23)	
NAPHTHALENE		ND (0.12)	ND (0.11)				ND (0.46)	ND (0.11)					ND (0.12)		ND (0.23)	
PHENANTHRENE		0.51	1.4				4.7	0.55					1.1		1.7	
PYRENE		0.49	2.3				4.1	0.71					1.4		1.2	
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)																
DIBENZOFURAN (see notes 7, 9)																
DI-N-BUTYLPHTHALATE (see note 7)																
MADEP-VPH-04-1.1 (mg/Kg dry)																
C5-C8 ALIPHATICS																
C9-C12 ALIPHATICS																
C9-C10 AROMATICS																
BENZENE																
ETHYLBENZENE																
METHYL TERT-BUTYL ETHER (MTBE)																
NAPHTHALENE																
TOLUENE																
M/P-XYLENE																
O-XYLENE																

Table C-1
Comparison of Soil Analytical Data to Published Background Concentrations Identification of Soil Contaminants of Concern
(April 2016)

Parameter	SAMPLING LOCATION															
	B-9 (1-3')	B-9 (0-3')	B-9 (3-6')	B-9 (6-9')	B-10 (0-1')	B-10 (1-3')	B-10 (0-3')	B-10 (3-6')	B-10 (6-11')	B-11 (0-1')	B-11 (1-3')	B-11 (3-6')	B-11 (6-11')	B-11-r10B (0-1')	B-11-r10B (0-3')	B-11-r10B (1-3')
SW-846 6010C/D (mg/Kg dry) Metals Digestion																
ANTIMONY			ND (2.7)				ND (2.7)					ND (2.8)				
ARSENIC			11				10					9.2				
BARIUM			30				*64*					*160*				
BERYLLIUM			*6.7*				*25*					*11*				
CADMIUM			0.97				0.82					1.3				
CHROMIUM (as +3)			14				26					33				
LEAD			26				68					200				
NICKEL			*42*				*64*					*85*				
SELENIUM			ND (5.4)				ND (5.4)					ND (5.6)				
SILVER			ND (0.54)				ND (0.54)					ND (0.56)				
THALLIUM			ND (2.7)				ND (2.7)					ND (2.8)				
VANADIUM		*390*	***510***	*120*			***2100***	***560***	*260*			***900***	***870***		*380*	
ZINC			81				65					180				
SW-846 7471B (mg/Kg dry) Metals Digestion																
MERCURY			0.19				0.13					1.2				
SW-846 7196A (mg/Kg dry)																
CHROMIUM +6																
SW-846 8082A (mg/Kg dry)																
PCB 1016	ND (0.11)		ND (0.11)	ND (0.11)	ND (2.5) *	ND (0.12)		ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	ND (0.59)		ND (0.11)
PCB 1221	ND (0.11)		ND (0.11)	ND (0.11)	ND (2.5) *	ND (0.12)		ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	ND (0.59)		ND (0.11)
PCB 1232	ND (0.11)		ND (0.11)	ND (0.11)	ND (2.5) *	ND (0.12)		ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	ND (0.59)		ND (0.11)
PCB 1242	ND (0.11)		ND (0.11)	ND (0.11)	ND (2.5) *	ND (0.12)		ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	ND (0.59)		ND (0.11)
PCB 1248	ND (0.11)		ND (0.11)	ND (0.11)	ND (2.5) *	ND (0.12)		ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	ND (0.59)		ND (0.11)
PCB 1254	**1.1**		ND (0.11)	ND (0.11)	**21**	0.29		0.79	0.22	**100**	0.16	**2**	**6.2**	**6.2**		0.48
PCB 1260	ND (0.11)		ND (0.11)	ND (0.11)	ND (2.5) *	ND (0.12)		ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	0.75		ND (0.11)
PCB 1262	ND (0.11)		ND (0.11)	ND (0.11)	ND (2.5) *	ND (0.12)		ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	ND (0.59)		ND (0.11)
PCB 1268	ND (0.11)		ND (0.11)	ND (0.11)	ND (2.5) *	ND (0.12)		ND (0.11)	ND (0.11)	ND (13) *	ND (0.11)	ND (0.23)	ND (1.2) *	ND (0.59)		ND (0.11)
TOTAL PCBs	**1.1**		ND (0.11)	ND (0.11)	**21**	0.29		0.79	0.22	**100**	0.16	**2.0**	**6.2**	**7.0**		0.48

Table C-1
Comparison of Soil Analytical Data to Published Background Concentrations Identification of Soil Contaminants of Concern
(April 2016)

Parameter	SAMPLING LOCATION															
	B-9 (1-3')	B-9 (0-3')	B-9 (3-6')	B-9 (6-9')	B-10 (0-1')	B-10 (1-3')	B-10 (0-3')	B-10 (3-6')	B-10 (6-11')	B-11 (0-1')	B-11 (1-3')	B-11 (3-6')	B-11 (6-11')	B-11-r10B (0-1')	B-11-r10B (0-3')	B-11-r10B (1-3')
SW-846 8081B (mg/Kg dry)																
ALDRIN			ND (0.11) *				ND (0.12) *					ND (0.12) *				
ALPHA-BHC			ND (0.11)				ND (0.12)					ND (0.12)				
BETA-BHC			ND (0.11)				ND (0.12)					ND (0.12)				
DELTA-BHC			ND (0.11)				ND (0.12)					ND (0.12)				
GAMMA-BHC (LINDANE)			ND (0.046) *				ND (0.046) *					ND (0.047) *				
CHLORDANE			ND (0.46)				ND (0.46)					ND (0.47)				
4,4'-DDD			ND (0.091)				ND (0.092)					ND (0.094)				
4,4'-DDE			ND (0.091)				ND (0.092)					ND (0.094)				
4,4'-DDT			ND (0.091)				ND (0.092)					0.16				
DIELDRIN			ND (0.091) *				ND (0.092) *					ND (0.094) *				
ENDOSULFAN I			ND (0.11)				ND (0.12)					ND (0.12)				
ENDOSULFAN II			ND (0.18)				ND (0.18)					ND (0.19)				
ENDOSULFAN SULFATE			ND (0.18)				ND (0.18)					ND (0.19)				
ENDRIN			ND (0.18)				ND (0.18)					ND (0.19)				
ENDRIN KETONE			ND (0.18)				ND (0.18)					ND (0.19)				
HEPTACHLOR			ND (0.11)				ND (0.12)					ND (0.12)				
HEPTACHLOR EPOXIDE			ND (0.11) *				ND (0.12) *					ND (0.12) *				
HEXACHLOROBENZENE			ND (0.14)				ND (0.14)					ND (0.14)				
METHOXYCHLOR			ND (1.1)				ND (1.2)					ND (1.2)				
SW-846 8151A (mg/kg dry)																
2,4-D			ND (0.028)				ND (0.029)					ND (0.029)				
2,4-DB			ND (0.028)				ND (0.029)					ND (0.029)				
2,4,5-TP (SILVEX)			ND (0.0028)				ND (0.0029)					ND (0.0029)				
2,4,5-T			ND (0.0028)				ND (0.0029)					ND (0.0029)				
DALAPON			ND (0.071)				ND (0.072)					ND (0.073)				
DICAMBA			ND (0.0028)				ND (0.0029)					ND (0.0029)				
DICHLOROPROP			ND (0.028)				ND (0.029)					ND (0.029)				
DINOSEB			ND (0.014)				ND (0.014)					ND (0.015)				
MCPA			ND (2.8)				ND (2.9)					ND (2.9)				
MCPP			ND (2.8)				ND (2.9)					ND (2.9)				
NOTES:																
1. An asterisk (*) following a detection limit																
indicates that the minimum laboratory reporting																
limit exceeds one or more of the regul. criteria.																
2. ND = Not detected above the lab reporting																
limits shown in parenthesis.																
3. NT = Not tested.																
4. ~ = No Method 1 Standard or UCL available																
5. Bolded values exceed the Method 1 Cleanup																
Standards (exclusive of S-x/GW-1).																
6. Italic values exceed MassDEP published																
background conc. for soils assoc. with fill																
containing coal ash or wood ash.																

Table C-1
Comparison of Soil Analytical Data to Published Background Concentrations Identification of Soil Contaminants of Concern
(April 2016)

Parameter	SAMPLING LOCATIONS																
	B-11-r5A (0-1')	B-11-r5A (0-3')	B-11-r5A (1-3')	B-11-r5B (0-1')	B-11-r5B (0-3')	B-11-r5B (1-3')	B-11-r5C (0-1')	B-11-r5C (0-3')	B-11-r5C (1-3')	B-12 (0-1')	B-12 (1-3')	B-12 (0-3')	B-12 (3-6')	B-13 (0-1')	B-13 (1-3')	B-13 (0-3')
Sampling Date	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016
Sample Depth	0-1 Feet	0-3 Feet	1-3 Feet	0-1 Feet	0-3 Feet	1-3 Feet	0-1 Feet	0-3 Feet	1-3 Feet	0-1 Feet	1-3 Feet	0-3 Feet	3-6 Feet	0-1 Feet	1-3 Feet	0-3 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)																
C9-C18 ALIPHATICS		42			24			57				ND (31)	ND (11)			17
C19-C36 ALIPHATICS		230			120			310				65	16			80
C11-C22 AROMATICS		400			97			290				130	34			240
ACENAPHTHENE		0.46			0.58			0.49				1.3	0.39			1.1
ACENAPHTHYLENE		0.77			ND (0.23)			ND (0.24)				ND (0.15)	ND (0.11)			ND (0.14)
ANTHRACENE		4			0.86			0.88				2.3	0.52			0.42
BENZO(A)ANTHRACENE		**15**			1.4			1.5				2.8	0.70			0.60
BENZO(A)PYRENE		**15**			1.2			1.6				**2.2**	0.67			1.0
BENZO(B)FLUORANTHENE		**19**			1.5			2				3.4	0.85			0.84
BENZO(G,H,I)PERYLENE		8.7			0.58			0.98				0.93	0.36			0.32
BENZO(K)FLUORANTHENE		7			0.53			0.78				1.4	0.33			0.28
CHRYSENE		15			1.6			1.8				2.8	0.68			2.6
DIBENZ(A,H)ANTHRACENE		**2.3**			ND (0.23)			ND (0.24)				0.41	ND (0.11)			0.35
FLUORANTHENE		31			3.3			5.1				7.8	1.9			1.8
FLUORENE		0.6			0.41			0.42				1.3	0.22			0.17
INDENO(1,2,3-CD)PYRENE		**10**			0.7			1				1.2	0.41			1.5
2-METHYLNAPHTHALENE		0.31			ND (0.23)			0.28				0.45	ND (0.11)			ND (0.14)
NAPHTHALENE		1.2			ND (0.23)			0.88				0.98	0.16			0.68
PHENANTHRENE		**11**			4			3.2				8.8	1.8			6.9
PYRENE		31			3.5			3.7				7.1	1.7			6.4
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)																
DIBENZOFURAN (see notes 7, 9)																
DI-N-BUTYLPHTHALATE (see note 7)																
MADEP-VPH-04-1.1 (mg/Kg dry)																
C5-C8 ALIPHATICS																
C9-C12 ALIPHATICS																
C9-C10 AROMATICS																
BENZENE																
ETHYLBENZENE																
METHYL TERT-BUTYL ETHER (MTBE)																
NAPHTHALENE																
TOLUENE																
M/P-XYLENE																
O-XYLENE																

Table C-1
Comparison of Soil Analytical Data to Published Background Concentrations Identification of Soil Contaminants of Concern
(April 2016)

Parameter	SAMPLING LOCATIONS															
	B-11-r5A (0-1')	B-11-r5A (0-3')	B-11-r5A (1-3')	B-11-r5B (0-1')	B-11-r5B (0-3')	B-11-r5B (1-3')	B-11-r5C (0-1')	B-11-r5C (0-3')	B-11-r5C (1-3')	B-12 (0-1')	B-12 (1-3')	B-12 (0-3')	B-12 (3-6')	B-13 (0-1')	B-13 (1-3')	B-13 (0-3')
SW-846 6010C/D (mg/Kg dry) Metals Digestion																
ANTIMONY																
ARSENIC												4.4	4.1			8.3
BARIUM																
BERYLLIUM																
CADMIUM																
CHROMIUM (as +3)																
LEAD												**210**	120			***1300***
NICKEL																
SELENIUM																
SILVER																
THALLIUM																
VANADIUM		*140*			***550***			***640***				20	13			*35*
ZINC																
SW-846 7471B (mg/Kg dry) Metals Digestion																
MERCURY																
SW-846 7196A (mg/Kg dry)																
CHROMIUM +6																
SW-846 8082A (mg/Kg dry)																
PCB 1016	ND (1.2) *		ND (0.59)	ND (0.59)		ND (0.11)	ND (13) *		ND (0.57)	ND (2.5) *	ND (0.10)		ND (0.11)	ND (3.2) *	ND (6.3) *	
PCB 1221	ND (1.2) *		ND (0.59)	ND (0.59)		ND (0.11)	ND (13) *		ND (0.57)	ND (2.5) *	ND (0.10)		ND (0.11)	ND (3.2) *	ND (6.3) *	
PCB 1232	ND (1.2) *		ND (0.59)	ND (0.59)		ND (0.11)	ND (13) *		ND (0.57)	ND (2.5) *	ND (0.10)		ND (0.11)	ND (3.2) *	ND (6.3) *	
PCB 1242	ND (1.2) *		ND (0.59)	ND (0.59)		ND (0.11)	ND (13) *		ND (0.57)	ND (2.5) *	ND (0.10)		ND (0.11)	ND (3.2) *	ND (6.3) *	
PCB 1248	ND (1.2) *		ND (0.59)	ND (0.59)		ND (0.11)	ND (13) *		ND (0.57)	ND (2.5) *	ND (0.10)		ND (0.11)	ND (3.2) *	ND (6.3) *	
PCB 1254	**7.6**		**5.4**	**4.0**		0.19	**97**		**2.9**	**11**	0.26		0.37	**12**	**25**	
PCB 1260	ND (1.2) *		ND (0.59)	ND (0.59)		ND (0.11)	ND (13) *		ND (0.57)	ND (2.5) *	ND (0.10)		ND (0.11)	ND (3.2) *	ND (6.3) *	
PCB 1262	ND (1.2) *		ND (0.59)	ND (0.59)		ND (0.11)	ND (13) *		ND (0.57)	ND (2.5) *	ND (0.10)		ND (0.11)	ND (3.2) *	ND (6.3) *	
PCB 1268	ND (1.2) *		ND (0.59)	ND (0.59)		ND (0.11)	ND (13) *		ND (0.57)	ND (2.5) *	ND (0.10)		ND (0.11)	ND (3.2) *	ND (6.3) *	
TOTAL PCBs	**7.6**		**5.4**	**4.0**		0.19	**97**		**2.9**	**11**	0.26		0.37	**12**	**25**	

Table C-1
Comparison of Soil Analytical Data to Published Background Concentrations Identification of Soil Contaminants of Concern
(April 2016)

Parameter	SAMPLING LOCATIONS															
	B-11-r5A (0-1')	B-11-r5A (0-3')	B-11-r5A (1-3')	B-11-r5B (0-1')	B-11-r5B (0-3')	B-11-r5B (1-3')	B-11-r5C (0-1')	B-11-r5C (0-3')	B-11-r5C (1-3')	B-12 (0-1')	B-12 (1-3')	B-12 (0-3')	B-12 (3-6')	B-13 (0-1')	B-13 (1-3')	B-13 (0-3')
SW-846 8081B (mg/Kg dry)																
ALDRIN																
ALPHA-BHC																
BETA-BHC																
DELTA-BHC																
GAMMA-BHC (LINDANE)																
CHLORDANE																
4,4'-DDD																
4,4'-DDE																
4,4'-DDT																
DIELDRIN																
ENDOSULFAN I																
ENDOSULFAN II																
ENDOSULFAN SULFATE																
ENDRIN																
ENDRIN KETONE																
HEPTACHLOR																
HEPTACHLOR EPOXIDE																
HEXACHLOROBENZENE																
METHOXYCHLOR																
SW-846 8151A (mg/kg dry)																
2,4-D																
2,4-DB																
2,4,5-TP (SILVEX)																
2,4,5-T																
DALAPON																
DICAMBA																
DICHLOROPROP																
DINOSEB																
MCPA																
MCPP																
NOTES:																
1. An asterisk (*) following a detection limit																
indicates that the minimum laboratory reporting																
limit exceeds one or more of the regul. criteria.																
2. ND = Not detected above the lab reporting																
limits shown in parenthesis.																
3. NT = Not tested.																
4. ~ = No Method 1 Standard or UCL available																
5. Bolded values exceed the Method 1 Cleanup																
Standards (exclusive of S-x/GW-1).																
6. Italic values exceed MassDEP published																
background conc. for soils assoc. with fill																
containing coal ash or wood ash.																

Table C-1
Comparison of Soil Analytical Data to Published Background Concentrations Identification of Soil Contaminants of Concern
(April 2016)

Parameter	SAMPLING LOCATIONS															
	B-13 (3-6')	**BTM-GT-1**	**BTM-GT-2**	**ESW-GT-1**	**NSW-GT-1**	**NSW-GT-2**	**SSW-GT-1**	**SSW-GT-2**	**WSW-GT-2**	**SP-1**	**FO-1 (3')**	**SP-3**	**FO-1-TP (0-1')**	**FO-1-TP (1-2')**	**FO-1-TP (2-3')**	**FO-1-BTM**
Sampling Date	3/23/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	2/29/2016	3/9/2016	3/29/2016	3/9/2016	3/9/2016	3/9/2016	3/10/2016
Sample Depth	3-6 Feet	6 Feet	8 Feet	3-4 Feet	3-4 Feet	5-6 Feet	3-4 Feet	5-6 Feet	5-6 Feet	Stockpile / Top Soils	3.5 Feet (just in vault)	Stockpile / Sands in vault	0-1 Feet (below grade /	1-2 Feet (below grade /	2-3 Feet (below grade /	Bottom of vault (5.5 feet below
MADEP-EPH-04-1.1 (mg/Kg dry)																
C9-C18 ALIPHATICS	ND (12)	ND (12)	ND (11)	13	34	ND (22)	ND (11)	37	ND (11)		ND (10)					
C19-C36 ALIPHATICS	19	ND (12)	31	29	140	77	17	200	ND (11)		ND (10)					
C11-C22 AROMATICS	26	25	45	41	420	120	31	210	33		ND (10)					
ACENAPHTHENE	0.93	ND (0.12)	ND (0.11)	ND (0.11)	1.7	0.37	ND (0.11)	ND (0.43)	ND (0.11)	*2.4*	ND (0.10)	0.70				
ACENAPHTHYLENE	ND (0.24)	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.23)	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	ND (0.85)	ND (0.10)	ND (0.18)				
ANTHRACENE	1.5	ND (0.12)	ND (0.11)	ND (0.11)	*4.7*	0.73	ND (0.11)	ND (0.43)	0.18	*5.3*	ND (0.10)	1.5				
BENZO(A)ANTHRACENE	2.3	ND (0.12)	ND (0.11)	ND (0.11)	***10***	1.7	ND (0.11)	0.78	0.5	***10***	ND (0.10)	3.0				
BENZO(A)PYRENE	1.9	0.27	0.11	ND (0.11)	***9.3***	0.69	0.24	0.94	0.52	***8.0***	ND (0.10)	**2.6**				
BENZO(B)FLUORANTHENE	2.5	0.32	0.15	ND (0.11)	***13***	2	0.31	1.1	0.67	***9.8***	ND (0.10)	3.5				
BENZO(G,H,I)PERYLENE	0.96	0.38	ND (0.11)	ND (0.11)	*4.9*	0.96	0.33	0.77	0.41	*4.5*	ND (0.10)	1.4				
BENZO(K)FLUORANTHENE	0.92	ND (0.12)	ND (0.11)	ND (0.11)	*4.8*	0.73	ND (0.11)	0.44	0.26	3.9	ND (0.10)	1.4				
CHRYSENE	0.25	0.15	0.11	ND (0.11)	*12*	1.8	0.17	1.0	0.59	*9.7*	ND (0.10)	2.8				
DIBENZ(A,H)ANTHRACENE	ND (0.24)	ND (0.12)	ND (0.11)	ND (0.11)	***1.5***	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	***1.4***	ND (0.10)	0.59				
FLUORANTHENE	0.56	0.15	0.17	0.14	*27*	3.7	0.19	1.6	1.1	*22*	ND (0.10)	7.0				
FLUORENE	0.74	ND (0.12)	ND (0.11)	ND (0.11)	*2.1*	0.37	ND (0.11)	ND (0.43)	ND (0.11)	*2.8*	ND (0.10)	0.93				
INDENO(1,2,3-CD)PYRENE	1.2	0.36	ND (0.11)	ND (0.11)	*5.2*	0.93	0.25	0.56	0.36	*5.1*	ND (0.10)	1.4				
2-METHYLNAPHTHALENE	ND (0.24)	ND (0.12)	ND (0.11)	ND (0.11)	0.48	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	0.93	ND (0.10)	0.29				
NAPHTHALENE	ND (0.24)	ND (0.12)	ND (0.11)	ND (0.11)	0.70	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	*1.6*	ND (0.10)	0.59				
PHENANTHRENE	5.9	0.34	ND (0.11)	0.4	19	3	0.24	1.2	0.74	*24*	ND (0.10)	5.9				
PYRENE	0.51	ND (0.12)	0.18	0.13	*25*	3.4	0.19	1.6	1	*23*	ND (0.10)	5.0				
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)										30		ND (0.36)				
DIBENZOFURAN (see notes 7, 9)										1.9		0.37				
DI-N-BUTYLPHTHALATE (see note 7)										5.6		ND (0.36)				
MADEP-VPH-04-1.1 (mg/Kg dry)																
C5-C8 ALIPHATICS		ND (9.6)	ND (9.9)	ND (9.5)	ND (8.6)	ND (8.3)	ND (10)	ND (11)	ND (8.2)		ND (7.9)	ND (8.9)				ND (8.3)
C9-C12 ALIPHATICS		ND (9.6)	ND (9.9)	ND (9.5)	ND (8.6)	ND (8.3)	ND (10)	ND (11)	ND (8.2)		ND (7.9)	ND (8.9)				ND (8.3)
C9-C10 AROMATICS		ND (9.6)	ND (9.9)	ND (9.5)	ND (8.6)	ND (8.3)	ND (10)	ND (11)	ND (8.2)		ND (7.9)	ND (8.9)				ND (8.3)
BENZENE		0.10	0.058	0.15	ND (0.043)	ND (0.042)	ND (0.052)	ND (0.053)	ND (0.041)		ND (0.040)	ND (0.044)				ND (0.042)
ETHYLBENZENE		ND (0.048)	ND (0.050)	ND (0.047)	ND (0.043)	ND (0.042)	ND (0.052)	ND (0.053)	ND (0.041)		ND (0.040)	ND (0.044)				ND (0.042)
METHYL TERT-BUTYL ETHER (MTBE)		ND (0.048)	ND (0.050)	ND (0.047)	ND (0.043)	ND (0.042)	ND (0.052)	ND (0.053)	ND (0.041)		ND (0.040)	ND (0.044)				ND (0.042)
NAPHTHALENE		ND (0.24)	ND (0.25)	ND (0.24)	ND (0.22)	ND (0.21)	ND (0.26)	ND (0.26)	ND (0.20)		ND (0.20)	ND (0.22)				ND (0.21)
TOLUENE		0.60	0.32	0.23	0.14	ND (0.042)	0.25	0.087	ND (0.041)		ND (0.040)	ND (0.044)				ND (0.042)
M/P-XYLENE		ND (0.096)	ND (0.099)	ND (0.095)	ND (0.086)	ND (0.083)	ND (0.10)	ND (0.11)	ND (0.082)		ND (0.079)	ND (0.089)				ND (0.083)
O-XYLENE		ND (0.048)	ND (0.050)	ND (0.047)	ND (0.043)	ND (0.042)	ND (0.052)	ND (0.053)	ND (0.041)		ND (0.040)	ND (0.044)				ND (0.042)

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Comparison of Soil Analytical Data to Published Background Concentrations Identification of Soil Contaminants of Concern
(April 2016)

Parameter	SAMPLING LOCATIONS															
	B-13 (3-6')	BTM-GT-1	BTM-GT-2	ESW-GT-1	NSW-GT-1	NSW-GT-2	SSW-GT-1	SSW-GT-2	WSW-GT-2	SP-1	FO-1 (3')	SP-3	FO-1-TP (0-1')	FO-1-TP (1-2')	FO-1-TP (2-3')	FO-1-BTM
SW-846 6010C/D (mg/Kg dry) Metals Digestion																
ANTIMONY		ND (2.9)	ND (2.7)	ND (2.8)	ND (2.6)	ND (2.8)	ND (2.8)	ND (2.8)	ND (2.7)	ND (3.1)	ND (2.6)	ND (2.4)	3	ND (2.9)	ND (2.9)	ND (2.5)
ARSENIC	5.1	7.4	ND (2.7)	14	9.8	6	3.1	5.7	4.4	***23***	15	8.8	19	14	18	7
BARIUM		34	27	43	*72*	42	27	31	28	*800*	32	50	*140*	*95*	*130*	30
BERYLLIUM		ND (0.29)	ND (0.27)	ND (0.28)	ND (0.26)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.27)	*14*	0.63	0.73	0.68	0.39	*1.9*	ND (0.25)
CADMIUM		0.36	0.34	1.0	0.81	0.61	ND (0.28)	0.60	0.33	*3.9*	0.51	0.44	1.4	0.98	1.3	0.26
CHROMIUM (as +3)		11	10	14	26	19	12	18	11	*160*	25	30	36	31	37	20
LEAD	34	100	41	**290**	**230**	64	58	59	40	***2400***	7	25	**340**	***1100***	**220**	6.3
NICKEL		11	8.9	23	22	14	9.0	18	8.8	*240*	20	18	*32*	22	29	14
SELENIUM		ND (5.9)	ND (5.4)	ND (5.6)	ND (5.3)	ND (5.6)	ND (5.6)	ND (5.5)	ND (5.5)	ND (6.2)	ND (5.2)	ND (4.8)	ND (5.7)	ND (5.9)	ND (5.7)	ND (5.0)
SILVER		ND (0.59)	ND (0.54)	ND (0.56)	ND (0.53)	ND (0.56)	ND (0.56)	ND (0.55)	ND (0.55)	ND (0.62)	ND (0.52)	ND (0.48)	ND (1.1)	ND (0.59)	ND (0.57)	ND (0.50)
THALLIUM		ND (2.9)	ND (2.7)	ND (2.8)	ND (2.6)	ND (2.8)	ND (2.8)	ND (2.8)	ND (2.7)	ND (3.1)	ND (2.6)	**9.8**	ND (2.8)	ND (2.9)	ND (2.9)	ND (2.5)
VANADIUM	22	27	14	*36*	*100*	*32*	14	*50*	15	***3500***	*32*	33	*160*	*96*	*140*	29
ZINC		37	43	210	140	89	42	79	35	**1100**	23	43	250	160	190	29
SW-846 7471B (mg/Kg dry) Metals Digestion																
MERCURY		0.14	0.095	0.63	*1.3*	0.25	0.10	0.51	0.099	0.43	ND (0.025)	0.050	0.68	0.93	0.84	ND (0.026)
SW-846 7196A (mg/Kg dry)																
CHROMIUM +6										ND (4.9)						
SW-846 8082A (mg/Kg dry)																
PCB 1016	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.11)
PCB 1221	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.11)
PCB 1232	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.11)
PCB 1242	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.11)
PCB 1248	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.11)
PCB 1254	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.11)	**6.3**	**1.2**	ND (0.11)	0.35	0.16	**63**	ND (0.10)	**2.6**	**13**	**12**	**7.8**	ND (0.11)
PCB 1260	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.11)
PCB 1262	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.11)
PCB 1268	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.11)	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (12) *	ND (0.10)	ND (0.53)	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (0.11)
TOTAL PCBs	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.11)	**6.3**	**1.2**	ND (0.11)	0.35	0.16	**63**	ND (0.10)	**2.6**	**13**	**12**	**7.8**	ND (0.11)

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(April 2016)

Parameter	SAMPLING LOCATIONS															
	B-13 (3-6')	BTM-GT-1	BTM-GT-2	ESW-GT-1	NSW-GT-1	NSW-GT-2	SSW-GT-1	SSW-GT-2	WSW-GT-2	SP-1	FO-1 (3')	SP-3	FO-1-TP (0-1')	FO-1-TP (1-2')	FO-1-TP (2-3')	FO-1-BTM
SW-846 8081B (mg/Kg dry)																
ALDRIN		ND (0.0058)	ND (0.055)	ND (0.0056)	ND (0.11) *	ND (0.11) *	ND (0.0056)	ND (0.11) *	ND (0.0055)	ND (0.12) *	ND (0.0051)	ND (0.0053)	ND (0.11) *	ND (0.12) *	ND (0.11) *	ND (0.0054)
ALPHA-BHC		ND (0.0058)	ND (0.055)	ND (0.0056)	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.12)	ND (0.0051)	ND (0.0053)	ND (0.11)	ND (0.12)	ND (0.11)	ND (0.0054)
BETA-BHC		ND (0.0058)	ND (0.055)	ND (0.0056)	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.12)	ND (0.0051)	ND (0.0053)	ND (0.11)	ND (0.12)	ND (0.11)	ND (0.0054)
DELTA-BHC		ND (0.0058)	ND (0.055)	ND (0.0056)	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.12)	ND (0.0051)	ND (0.0053)	ND (0.11)	ND (0.12)	ND (0.11)	ND (0.0054)
GAMMA-BHC (LINDANE)		ND (0.0023)	ND (0.022) *	ND (0.0022)	ND (0.045) *	ND (0.044) *	ND (0.0022)	ND (0.043) *	ND (0.0022)	ND (0.049) *	ND (0.0021)	ND (0.0021)	ND (0.046) *	ND (0.046) *	ND (0.045) *	ND (0.0022)
CHLORDANE		ND (0.023)	ND (0.22)	ND (0.022)	ND (0.45)	ND (0.44)	ND (0.022)	ND (0.43)	0.045	ND (0.49)	ND (0.021)	ND (0.021)	ND (0.46)	ND (0.46)	ND (0.45)	ND (0.022)
4,4'-DDD		ND (0.0046)	ND (0.044)	ND (0.0045)	ND (0.090)	ND (0.088)	ND (0.0045)	ND (0.087)	ND (0.0044)	ND (0.099)	ND (0.0041)	ND (0.0042)	ND (0.092)	ND (0.093)	ND (0.090)	ND (0.0043)
4,4'-DDE		ND (0.0046)	ND (0.044)	ND (0.0045)	ND (0.090)	ND (0.088)	ND (0.0045)	ND (0.087)	ND (0.0044)	ND (0.099)	ND (0.0041)	ND (0.0042)	ND (0.092)	0.093	ND (0.090)	ND (0.0043)
4,4'-DDT		ND (0.0046)	ND (0.044)	ND (0.0045)	ND (0.090)	ND (0.088)	ND (0.0045)	ND (0.087)	ND (0.0044)	ND (0.099)	ND (0.0041)	0.019	0.15	0.13	0.13	ND (0.0043)
DIELDRIN		ND (0.0046)	ND (0.044)	ND (0.0045)	**0.11**	ND (0.088) *	ND (0.0045)	ND (0.087) *	ND (0.0044)	ND (0.099) *	ND (0.0041)	ND (0.0042)	**0.16**	**0.19**	**0.16**	ND (0.0043)
ENDOSULFAN I		ND (0.0058)	ND (0.055)	ND (0.0056)	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.12)	ND (0.0051)	ND (0.0053)	ND (0.11)	ND (0.12)	ND (0.11)	ND (0.0054)
ENDOSULFAN II		ND (0.0092)	ND (0.088)	ND (0.0089)	ND (0.18)	ND (0.18)	ND (0.0089)	ND (0.17)	ND (0.0088)	ND (0.20)	ND (0.0082)	ND (0.0085)	ND (0.18)	ND (0.19)	ND (0.18)	ND (0.0086)
ENDOSULFAN SULFATE		ND (0.0092)	ND (0.088)	ND (0.0089)	ND (0.18)	ND (0.18)	ND (0.0089)	ND (0.17)	ND (0.0088)	ND (0.20)	ND (0.0082)	ND (0.0085)	ND (0.18)	ND (0.19)	ND (0.18)	ND (0.0086)
ENDRIN		ND (0.0092)	ND (0.088)	ND (0.0089)	ND (0.18)	ND (0.18)	ND (0.0089)	ND (0.17)	ND (0.0088)	ND (0.20)	ND (0.0082)	ND (0.0085)	ND (0.18)	ND (0.19)	ND (0.18)	ND (0.0086)
ENDRIN KETONE		ND (0.0092)	ND (0.088)	ND (0.0089)	ND (0.18)	ND (0.18)	ND (0.0089)	ND (0.17)	ND (0.0088)	ND (0.20)	ND (0.0082)	ND (0.0085)	ND (0.18)	ND (0.19)	ND (0.18)	ND (0.0086)
HEPTACHLOR		ND (0.0058)	ND (0.055)	ND (0.0056)	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.12)	ND (0.0051)	ND (0.0053)	ND (0.11)	ND (0.12)	ND (0.11)	ND (0.0054)
HEPTACHLOR EPOXIDE		ND (0.0058)	ND (0.055)	ND (0.0056)	ND (0.11) *	ND (0.11) *	ND (0.0056)	ND (0.11) *	ND (0.0055)	**0.29**	ND (0.0051)	ND (0.0053)	ND (0.11) *	ND (0.12) *	ND (0.11) *	ND (0.0054)
HEXACHLOROBENZENE		ND (0.0069)	ND (0.066)	ND (0.0067)	ND (0.14)	ND (0.13)	ND (0.0067)	ND (0.13)	ND (0.0066)	ND (0.15)	ND (0.0062)	ND (0.0064)	ND (0.14)	ND (0.14)	ND (0.14)	ND (0.0065)
METHOXYCHLOR		ND (0.058)	ND (0.55)	ND (0.056)	ND (1.1)	ND (1.1)	ND (0.056)	ND (1.1)	ND (0.055)	ND (1.2)	ND (0.051)	ND (0.053)	ND (1.1)	ND (1.2)	ND (1.1)	ND (0.054)
SW-846 8151A (mg/kg dry)																
2,4-D										ND (0.31)		ND (0.026)				ND (0.027)
2,4-DB										ND (0.31)		ND (0.026)				ND (0.027)
2,4,5-TP (SILVEX)										ND (0.031)		ND (0.026)				ND (0.0027)
2,4,5-T										ND (0.031)		ND (0.026)				ND (0.0027)
DALAPON										ND (0.77)		ND (0.066)				ND (0.068)
DICAMBA										ND (0.031)		ND (0.0026)				ND (0.0027)
DICHLOROPROP										ND (0.31)		ND (0.026)				ND (0.027)
DINOSEB										ND (0.15)		ND (0.013)				ND (0.014)
MCPA										ND (31)		ND (2.6)				ND (2.7)
MCPP										ND (31)		ND (2.6)				ND (2.7)

NOTES:

1. An asterisk (*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regul. criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Bolded values exceed the Method 1 Cleanup Standards (exclusive of S-x/GW-1).
6. Italic values exceed MassDEP published background conc. for soils assoc. with fill containing coal ash or wood ash.
7. SP-1 is a sample from stockpile of surficial soil samples. It was analyzed for VOCs via USEPA Method 8260C. None were detected. It was also analyzed for SVOCs via USEPA Method 8270. PAHs, 2 phthalates and dibenzofuran were detected. These data are summarized with the EPH/PAH data. Analysis for TPH via USEPA Method 8100M was also conducted. TPH was detected at 3800 mg/kg.
8. FO-1 (3') and FO-1-BTM are samples inside and beneath vault. They were analyzed for VOCs via USEPA Method 8260C and SVOCs via USEPA Method 8270. No VOCs or SVOCs were detected. Analysis for TPH via USEPA Method 8100M was also conducted. No TPH was detected in FO-1 (3') and 31 mg/kg TPH was detected in FO-1-BTM.
9. SP-3 was analyzed for VPH via MADEP's Method and for VOCs via USEPA Method 8260C. No VPH or VOCs were detected. It was also analyzed for SVOCs via USEPA Method 8270. Only PAHs and dibenzofuran were detected and they are reported with the EPH data.

f. These compounds were only detected in soils at depths more than 3 feet below grade or in stockpiled soils slated for off-site removal. Therefore, these compounds are contaminants of concern for depths greater than 3 feet.

g. These compounds not detected below 3 feet.

Table C-1
Comparison of Soil Analytical Data to Published Background Concentrations Identification of Soil Contaminants of Concern
(April 2016)

Parameter	SUMMARY STATISTICS			EVALUATION	
	Number	Number	Maximum Concentration	Does Maximum	Soil
Sampling Date	Analyzed	Detected	Detected	Concentration	Contaminant
Sample Depth				Exceed Background Concentration for Fill?	of Concern
MADEP-EPH-04-1.1 (mg/Kg dry)					
C9-C18 ALIPHATICS	28	13	300	Not applicable	Yes
C19-C36 ALIPHATICS	28	23	750	Not applicable	Yes
C11-C22 AROMATICS	28	27	1400	Not applicable	Yes
ACENAPHTHENE	30	16	2.6	Yes	Yes
ACENAPHTHYLENE	30	4	0.77	No	Yes - a
ANTHRACENE	30	22	5.4	Yes	Yes
BENZO(A)ANTHRACENE	30	24	15	Yes	Yes
BENZO(A)PYRENE	30	27	15	Yes	Yes
BENZO(B)FLUORANTHENE	30	26	19	Yes	Yes
BENZO(G,H,I)PERYLENE	30	26	8.7	Yes	Yes
BENZO(K)FLUORANTHENE	30	22	7.0	Yes	Yes
CHRYSENE	30	27	15	Yes	Yes
DIBENZ(A,H)ANTHRACENE	30	10	2.3	Yes	Yes
FLUORANTHENE	30	29	31	Yes	Yes
FLUORENE	30	16	3.4	Yes	Yes
INDENO(1,2,3-CD)PYRENE	30	25	10	Yes	Yes
2-METHYLNAPHTHALENE	30	11	0.96	No	Yes - a
NAPHTHALENE	30	13	1.7	Yes	Yes
PHENANTHRENE	30	28	24	Yes	Yes
PYRENE	30	27	31	Yes	Yes
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)	2	1	30	Not applicable	Yes - f
DIBENZOFURAN (see notes 7, 9)	2	2	1.9	Not applicable	No - b
DI-N-BUTYLPHTHALATE (see note 7)	2	1	5.6	Not applicable	Yes - f
MADEP-VPH-04-1.1 (mg/Kg dry)					
C5-C8 ALIPHATICS	11	0			
C9-C12 ALIPHATICS	11	0			
C9-C10 AROMATICS	11	0			
BENZENE	11	3	0.15	Not applicable	Yes - f
ETHYLBENZENE	11	0			
METHYL TERT-BUTYL ETHER (MTBE)	11	0			
NAPHTHALENE	11	0			
TOLUENE	11	6	0.60	Not applicable	Yes - f
M/P-XYLENE	11	0			
O-XYLENE	11	0			

Table C-1
Comparison of Soil Analytical Data to Published Background Concentrations Identification of Soil Contaminants of Concern
(April 2016)

Parameter	SUMMARY STATISTICS			EVALUATION	
	Number	Number	Maximum Concentration	Does Maximum	Soil
SW-846 6010C/D (mg/Kg dry) Metals Digestion					
ANTIMONY	20	1	3	No	No
ARSENIC	24	23	23	Yes	No - c
BARIUM	20	20	800	Yes	Yes
BERYLLIUM	20	11	25	Yes	Yes
CADMIUM	20	19	3.9	Yes	No - c
CHROMIUM (as +3)	20	20	160	Yes	Yes
LEAD	24	24	2400	Yes	Yes
NICKEL	20	20	240	Yes	Yes
SELENIUM	20	0			
SILVER	20	0			
THALLIUM	20	1	9.8	Yes	Yes - d
VANADIUM	39	39	3500	Yes	Yes
ZINC	20	20	1100	Yes	Yes
SW-846 7471B (mg/Kg dry) Metals Digestion					
MERCURY	20	18	1.3	Yes	No - e
SW-846 7196A (mg/Kg dry)					
CHROMIUM +6	1	0			
SW-846 8082A (mg/Kg dry)					
PCB 1016					
PCB 1221					
PCB 1232					
PCB 1242					
PCB 1248					
PCB 1254					
PCB 1260					
PCB 1262					
PCB 1268					
TOTAL PCBs	53	40	100	Not applicable	Yes

Table C-1
Comparison of Soil Analytical Data to Published Background Concentrations Identification of Soil Contaminants of Concern
(April 2016)

Parameter	SUMMARY STATISTICS			EVALUATION	
	Number	Number	Maximum Concentration	Does Maximum	Soil
SW-846 8081B (mg/Kg dry)					
ALDRIN	20	0			
ALPHA-BHC	20	0			
BETA-BHC	20	0			
DELTA-BHC	20	0			
GAMMA-BHC (LINDANE)	20	0			
CHLORDANE	20	1	0.045	Not applicable	Yes - f
4,4'-DDD	20	0			
4,4'-DDE	20	1	0.093	Not applicable	Yes - g
4,4'-DDT	20	6	0.16	Not applicable	Yes
DIELDRIN	20	4	0.19	Not applicable	Yes
ENDOSULFAN I	20	0			
ENDOSULFAN II	20	0			
ENDOSULFAN SULFATE	20	0			
ENDRIN	20	0			
ENDRIN KETONE	20	0			
HEPTACHLOR	20	0			
HEPTACHLOR EPOXIDE	20	1	0.29	Not applicable	Yes - f, g
HEXACHLOROBENZENE	20	0			
METHOXYCHLOR	20	0			
SW-846 8151A (mg/kg dry)					
2,4-D	8	0			
2,4-DB	8	0			
2,4,5-TP (SILVEX)	8	0			
2,4,5-T	8	0			
DALAPON	8	0			
DICAMBA	8	0			
DICHLOROPROP	8	0			
DINOSEB	8	0			
MCPA	8	0			
MCPP	8	0			

NOTES:

1. An asterisk (*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regul. criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Bolded values exceed the Method 1 Cleanup Standards (exclusive of S-x/GW-1).
6. Italic values exceed MassDEP published background conc. for soils assoc. with fill containing coal ash or wood ash.

a. This PAH is a contaminant of concern, because most related PAHs are contaminants of concern.

b. Dibenzofuran is a component of EPH; therefore, its risk is not evaluated separately.

c. Both arsenic and cadmium were only detected in one soil sample at levels above there published background concentration for soils associated with fill containing coal ash or wood ash. This soil sample was collected from stockpile SP-1 (shallow soils scraped from courtyard) and are going to be removed from the property. Therefore, these metals are not soil contaminants of concern.

d. Thallium was detected at a level above its published background concentration in only one soil sample, collected from the stockpile of soils originating from the fuel oil vault sands. Thallium is a contaminant of concern only for SP-3 (to determine whether these soils can be re-used on-Site.

e. Mercury is not a contaminant of concern, because it was detected in only 2 of 20 soil samples, and only slightly above its background concentration.

Table C-2
Identification of Method to Derive Soil Exposure Point Concentrations and Calculation of Soil Exposure Point Concentrations: 0-1 Foot Interval (PCBs) / 0-3 Foot Interval (Remainder)
(April 2016)

Parameter	MCP - Method 2 Direct Contact Standards			Upper Concentration Limit	SAMPLING LOCATIONS										
	S-1	S-2	S-3	UCL	B-5 (0-1')	B-5 (0-3')	B-7 (0-1')	B-7 (0-3')	B-8 (0-1')	B-9 (0-1')	B-9 (0-3')	B-10 (0-1')	B-10 (0-3')	B-11 (0-1')	B-11-r10B (0-1')
Sampling Date					3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/30/2016
Sample Depth					0-1 Feet	0-3 Feet	0-1 Feet	0-3 Feet	0-1 Feet	0-1 Feet	0-3 Feet	0-1 Feet	0-3 Feet	0-1 Feet	0-1 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)															
C9-C18 ALIPHATICS	1000	3000	5000	20000		24		61			6		18		
C19-C36 ALIPHATICS	3000	5000	5000	20000		160		140			6		150		
C11-C22 AROMATICS	1000	3000	5000	10000		310		180			37		190		
ACENAPHTHENE	1000	3000	5000	10000		1.4		2.6			0.06		0.49		
ACENAPHTHYLENE				10000		0.37		0.38			0.06		0.23		
ANTHRACENE	1000	3000	5000	10000		3.4		5.4			0.12		1.1		
BENZO(A)ANTHRACENE	7	40	300	3000		7.4		11			0.21		2.1		
BENZO(A)PYRENE	2	7	30	300		6.5		9.3			0.22		1.4		
BENZO(B)FLUORANTHENE	7	40	300	3000		9.1		12			0.35		2.4		
BENZO(G,H,I)PERYLENE	1000	3000	5000	10000		3.4		5.0			0.13		1.1		
BENZO(K)FLUORANTHENE	70	400	3000	10000		3.0		4.6			0.06		0.67		
CHRYSENE	70	400	3000	10000		8.5		12			0.30		2.4		
DIBENZ(A,H)ANTHRACENE	0.7	4	30	300		1.1		1.7			0.06		0.23		
FLUORANTHENE	1000	3000	5000	10000		18		26			0.44		4.1		
FLUORENE	1000	3000	5000	10000		1.9		3.4			0.06		0.57		
INDENO(1,2,3-CD)PYRENE	7	40	300	3000		4.1		5.1			0.12		1.1		
2-METHYLNAPHTHALENE	300	500	500	5000		0.67		0.96			0.06		0.23		
NAPHTHALENE	500	1000	3000	10000		1.7		1.5			0.06		0.23		
PHENANTHRENE	500	1000	3000	10000		15		23			0.51		4.7		
PYRENE	1000	3000	5000	10000		17		22			0.49		4.1		
SW-846 6010C/D (mg/Kg dry) Metals Digestion															
BARIUM	1000	3000	5000	10000		120		91					64		
BERYLLIUM	90	200	200	2000		1.4		1.3					25		
CHROMIUM (as +3)	1000	3000	5000	10000		34		50					26		
LEAD	200	600	600	6000		100		150					68		
NICKEL	600	1000	1000	10000		29		26					64		
VANADIUM	400	700	700	7000		110		66			390		2100		
ZINC	1000	3000	5000	10000		200		260					65		
SW-846 8082A (mg/Kg dry)															
TOTAL PCBs	1	4	4	100	7.0		8.5		39	42		21		100	7.0
SW-846 8081B (mg/Kg dry)															
4,4'-DDE	6	30	60	600		0.047		0.047					0.046		
4,4'-DDT	6	30	60	600		0.047		0.11					0.046		
DIELDRIN	0.08	0.5	3	30		0.047		0.047					0.046		
NOTES:															
When no analyte detected, one-half reported															
detection limit used to calculate exposure															
point concentration.															

Table C-2
Identification of Method to Derive Soil Exposure Point Concentrations and Calculation of Soil Exposure Point Concentrations: 0-1 Foot Interval (PCBs) / 0-3 Foot Interval (Remainder)
(April 2016)

Parameter	SAMPLING LOCATIONS													
	B-11-r10B (0-3')	B-11-r5A (0-1')	B-11-r5A (0-3')	B-11-r5B (0-1')	B-11-r5B (0-3')	B-11-r5C (0-1')	B-11-r5C (0-3')	B-12 (0-1')	B-12 (0-3')	B-13 (0-1')	B-13 (0-3')	FO-1-TP (0-1') **	FO-1-TP (1-2') **	FO-1-TP (2-3') **
Sampling Date	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016	3/9/2016	3/9/2016	3/9/2016
Sample Depth	0-3 Feet	0-1 Feet	0-3 Feet	0-1 Feet	0-3 Feet	0-1 Feet	0-3 Feet	0-1 Feet	0-3 Feet	0-1 Feet	0-3 Feet	0-1 Feet (below grade /	1-2 Feet (below grade /	2-3 Feet (below grade /
MADEP-EPH-04-1.1 (mg/Kg dry)														
C9-C18 ALIPHATICS	180		42		24		57		15.5		17			
C19-C36 ALIPHATICS	530		230		120		310		65		80			
C11-C22 AROMATICS	1100		400		97		290		130		240			
ACENAPHTHENE	0.115		0.46		0.58		0.49		1.3		1.1			
ACENAPHTHYLENE	0.115		0.77		0.115		0.12		0.075		0.07			
ANTHRACENE	0.38		4		0.86		0.88		2.3		0.42			
BENZO(A)ANTHRACENE	0.74		15		1.4		1.5		2.8		0.60			
BENZO(A)PYRENE	0.68		15		1.2		1.6		2.2		1.0			
BENZO(B)FLUORANTHENE	0.115		19		1.5		2		3.4		0.84			
BENZO(G,H,I)PERYLENE	0.89		8.7		0.58		0.98		0.93		0.32			
BENZO(K)FLUORANTHENE	0.115		7		0.53		0.78		1.4		0.28			
CHRYSENE	1.3		15		1.6		1.8		2.8		2.6			
DIBENZ(A,H)ANTHRACENE	0.115		2.3		0.115		0.12		0.41		0.35			
FLUORANTHENE	1.7		31		3.3		5.1		7.8		1.8			
FLUORENE	0.115		0.6		0.41		0.42		1.3		0.17			
INDENO(1,2,3-CD)PYRENE	0.115		10		0.7		1		1.2		1.5			
2-METHYLNAPHTHALENE	0.115		0.31		0.115		0.28		0.45		0.07			
NAPHTHALENE	0.115		1.2		0.115		0.88		0.98		0.68			
PHENANTHRENE	1.7		11		4		3.2		8.8		6.9			
PYRENE	1.2		31		3.5		3.7		7.1		6.4			
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
BARIUM												140	95	130
BERYLLIUM												0.68	0.39	1.9
CHROMIUM (as +3)												36	31	37
LEAD									210		1300	340	1100	220
NICKEL												32	22	29
VANADIUM	380		140		550		640		20		35	160	96	140
ZINC												250	160	190
SW-846 8082A (mg/Kg dry)														
TOTAL PCBs		7.6		4.0		97		11		12		13	12	7.8
SW-846 8081B (mg/Kg dry)														
4,4'-DDE												0.046	0.093	0.045
4,4'-DDT												0.15	0.13	0.13
DIELDRIN												0.16	0.19	0.16
NOTES:														
When no analyte detected, one-half reported												** soils excavated and moved to		
detection limit used to calculate exposure												SP-2. They will be removed from		
point concentration.												the Site.		

Table C-2
Identification of Method to Derive Soil Exposure Point Concentrations and Calculation of Soil Exposure Point Concentrations: 0-1 Foot Interval (PCBs) / 0-3 Foot Interval (Remainder)
(April 2016)

Parameter	Evaluation: S-2 Soils					Derivation of Exposure Point Concentration				
Sampling Date / Sample Depth	Number Analyzed	Number Detected > S-2 Standard	% > S-2 Standard	Maximum Concentration	Method to Derive EPC for S-2 Soils	Mean Concentration	Standard Deviation (Population)	95th Percentile Confidence Interval	Upper 95th Percentile Confidence Limit on the Mean	Exposure Point Concentration
MADEP-EPH-04-1.1 (mg/Kg dry)										
C9-C18 ALIPHATICS	10	0	0	180	Mean	44				44
C19-C36 ALIPHATICS	10	0	0	530	Mean	179				179
C11-C22 AROMATICS	10	0	0	1100	Mean	297				297
ACENAPHTHENE	10	0	0	2.6	Mean	0.86				0.86
ACENAPHTHYLENE	10	0	0	0.77	Mean	0.23				0.23
ANTHRACENE	10	0	0	5.4	Mean	1.9				1.9
BENZO(A)ANTHRACENE	10	0	0	15	Mean	4.3				4.3
BENZO(A)PYRENE	10	2	20.0	15	Mean	3.9				3.9
BENZO(B)FLUORANTHENE	10	0	0	19	Mean	5.1				5.1
BENZO(G,H,I)PERYLENE	10	0	0	8.7	Mean	2.2				2.2
BENZO(K)FLUORANTHENE	10	0	0	7.0	Mean	1.8				1.8
CHRYSENE	10	0	0	15	Mean	4.8				4.8
DIBENZ(A,H)ANTHRACENE	10	0	0	2.3	Mean	0.65				0.65
FLUORANTHENE	10	0	0	31	Mean	9.9				9.9
FLUORENE	10	0	0	3.4	Mean	0.89				0.89
INDENO(1,2,3-CD)PYRENE	10	0	0	10	Mean	2.5				2.5
2-METHYLNAPHTHALENE	10	0	0	0.96	Mean	0.33				0.33
NAPHTHALENE	10	0	0	1.7	Mean	0.75				0.75
PHENANTHRENE	10	0	0	23	Mean	7.9				7.9
PYRENE	10	0	0	31	Mean	9.6				9.6
SW-846 6010C/D (mg/Kg dry) Metals Digestion										
BARIUM	6	0		140	Mean	107				107
BERYLLIUM	6	0		25	Mean	5.1				5.1
CHROMIUM (as +3)	6	0		50	Mean	36				36
LEAD	8	2	25.0	1300	Mean	436				436
NICKEL	6	0		64	Mean	34				34
VANADIUM	13	1	7.7	2100	Mean	371				371
ZINC	6	0		260	Mean	188				188
SW-846 8082A (mg/Kg dry)										
TOTAL PCBs	15	14	93.3	100	95th % UCL	25.92	30.48	15.43	41.35	41
SW-846 8081B (mg/Kg dry)										
4,4'-DDE	6	0		0.093	Mean	0.054				0.054
4,4'-DDT	6	0		0.15	Mean	0.102				0.102
DIELDRIN	6	0		0.19	Mean	0.108				0.108
NOTES:										
When no analyte detected, one-half reported										
detection limit used to calculate exposure										
point concentration.										

Table C-3
Identification of Method to Derive Soil Exposure Point Concentrations and Derivation of Soil Exposure Point Concentrations: 1-3 Foot Interval (PCBs) / 0-3 Foot Interval (Remainder)
(April 2016)

Parameter	MCP - Method 2 Direct Contact Standards			Upper Concentration Limit	SAMPLING LOCATIONS										
	S-1	S-2	S-3	UCL	B-5 (1-3')	B-5 (0-3')	B-7 (1-3')	B-7 (0-3')	B-8 (1-3')	B-9 (1-3')	B-9 (0-3')	B-10 (1-3')	B-10 (0-3')	B-11 (1-3')	B-11-r10B (0-3')
Sampling Date					3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/30/2016
Sample Depth					1-3 Feet	0-3 Feet	1-3 Feet	0-3 Feet	1-3 Feet	1-3 Feet	0-3 Feet	1-3 Feet	0-3 Feet	1-3 Feet	0-3 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)															
C9-C18 ALIPHATICS	1000	3000	5000	20000		24		61			6.0		18		180
C19-C36 ALIPHATICS	3000	5000	5000	20000		160		140			6.0		150		530
C11-C22 AROMATICS	1000	3000	5000	10000		310		180			37		190		1100
ACENAPHTHENE	1000	3000	5000	10000		1.4		2.6			0.06		0.49		0.115
ACENAPHTHYLENE				10000		0.37		0.38			0.06		0.23		0.115
ANTHRACENE	1000	3000	5000	10000		3.4		5.4			0.12		1.1		0.38
BENZO(A)ANTHRACENE	7	40	300	3000		7.4		11			0.21		2.1		0.74
BENZO(A)PYRENE	2	7	30	300		6.5		9.3			0.22		1.4		0.68
BENZO(B)FLUORANTHENE	7	40	300	3000		9.1		12			0.35		2.4		0.115
BENZO(G,H,I)PERYLENE	1000	3000	5000	10000		3.4		5.0			0.13		1.1		0.89
BENZO(K)FLUORANTHENE	70	400	3000	10000		3.0		4.6			0.06		0.67		0.115
CHRYSENE	70	400	3000	10000		8.5		12			0.30		2.4		1.3
DIBENZ(A,H)ANTHRACENE	0.7	4	30	300		1.1		1.7			0.06		0.23		0.115
FLUORANTHENE	1000	3000	5000	10000		18		26			0.44		4.1		1.7
FLUORENE	1000	3000	5000	10000		1.9		3.4			0.06		0.57		0.115
INDENO(1,2,3-CD)PYRENE	7	40	300	3000		4.1		5.1			0.12		1.1		0.115
2-METHYLNAPHTHALENE	300	500	500	5000		0.67		0.96			0.06		0.23		0.115
NAPHTHALENE	500	1000	3000	10000		1.7		1.5			0.06		0.23		0.115
PHENANTHRENE	500	1000	3000	10000		15		23			0.51		4.7		1.7
PYRENE	1000	3000	5000	10000		17		22			0.49		4.1		1.2
SW-846 6010C/D (mg/Kg dry) Metals Digestion															
BARIUM	1000	3000	5000	10000		120		91					64		
BERYLLIUM	90	200	200	2000		1.4		1.3					25		
CHROMIUM (as +3)	1000	3000	5000	10000		34		50					26		
LEAD	200	600	600	6000		100		150					68		
NICKEL	600	1000	1000	10000		29		26					64		
VANADIUM	400	700	700	7000		110		66			390		2100		380
ZINC	1000	3000	5000	10000		200		260					65		
SW-846 8082A (mg/Kg dry)															
TOTAL PCBs	1	4	4	100	3.7		6.0		0.05	1.1		0.29		0.16	
SW-846 8081B (mg/Kg dry)															
4,4'-DDE	6	30	60	600		0.047		0.047					0.046		
4,4'-DDT	6	30	60	600		0.047		0.11					0.046		
DIELDRIN	0.08	0.5	3	30		0.047		0.047					0.046		
NOTES:															
When no analyte detected, one-half reported															
detection limit used to calculate exposure															
point concentration.															

Table C-3
Identification of Method to Derive Soil Exposure Point Concentrations and Derivation of Soil Exposure Point Concentrations: 1-3 Foot Interval (PCBs) / 0-3 Foot Interval (Remainder)
(April 2016)

Parameter	SAMPLING LOCATIONS										
	B-11-r10B (1-3')	B-11-r5A (0-3')	B-11-r5A (1-3')	B-11-r5B (0-3')	B-11-r5B (1-3')	B-11-r5C (0-3')	B-11-r5C (1-3')	B-12 (1-3')	B-12 (0-3')	B-13 (1-3')	B-13 (0-3')
Sampling Date	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016
Sample Depth	1-3 Feet	0-3 Feet	1-3 Feet	0-3 Feet	1-3 Feet	0-3 Feet	1-3 Feet	1-3 Feet	0-3 Feet	1-3 Feet	0-3 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)											
C9-C18 ALIPHATICS		42		24		57			15.5		17
C19-C36 ALIPHATICS		230		120		310			65		80
C11-C22 AROMATICS		400		97		290			130		240
ACENAPHTHENE		0.46		0.58		0.49			1.3		1.1
ACENAPHTHYLENE		0.77		0.115		0.12			0.075		0.07
ANTHRACENE		4.0		0.86		0.88			2.3		0.42
BENZO(A)ANTHRACENE		15		1.4		1.5			2.8		0.60
BENZO(A)PYRENE		15		1.2		1.6			2.2		1.0
BENZO(B)FLUORANTHENE		19		1.5		2.0			3.4		0.84
BENZO(G,H,I)PERYLENE		8.7		0.58		0.98			0.93		0.32
BENZO(K)FLUORANTHENE		7.0		0.53		0.78			1.4		0.28
CHRYSENE		15		1.6		1.8			2.8		2.6
DIBENZ(A,H)ANTHRACENE		2.3		0.115		0.12			0.41		0.35
FLUORANTHENE		31		3.3		5.1			7.8		1.8
FLUORENE		0.60		0.41		0.42			1.3		0.17
INDENO(1,2,3-CD)PYRENE		10		0.70		1.0			1.2		1.5
2-METHYLNAPHTHALENE		0.31		0.115		0.28			0.45		0.07
NAPHTHALENE		1.2		0.115		0.88			0.98		0.68
PHENANTHRENE		11		4.0		3.2			8.8		6.9
PYRENE		31		3.5		3.7			7.1		6.4
SW-846 6010C/D (mg/Kg dry) Metals Digestion											
BARIUM											
BERYLLIUM											
CHROMIUM (as +3)											
LEAD									210		1300
NICKEL											
VANADIUM		140		550		640			20		35
ZINC											
SW-846 8082A (mg/Kg dry)											
TOTAL PCBs	0.48		5.4		0.19		2.9	0.26		25	
SW-846 8081B (mg/Kg dry)											
4,4'-DDE											
4,4'-DDT											
DIELDRIN											
NOTES:											
When no analyte detected, one-half reported											
detection limit used to calculate exposure											
point concentration.											

Table C-3
Identification of Method to Derive Soil Exposure Point Concentrations and Derivation of Soil Exposure Point Concentrations: 1-3 Foot Interval (PCBs) / 0-3 Foot Interval (Remainder)
(April 2016)

Parameter	Evaluation: S-2 Soils					Derivation of Exposure Point Concentration				
Sampling Date / Sample Depth	Number Analyzed	Number Detected > S-2 Standard	% > S-2 Standard	Maximum Concentration	Method to Derive EPC for S-2 Soils	Mean Concentration	Standard Deviation (Population)	95th Percentile Confidence Interval	Upper 95th Percentile Confidence Limit on the Mean	Exposure Point Concentration
MADEP-EPH-04-1.1 (mg/Kg dry)										
C9-C18 ALIPHATICS	10	0	0	180	Mean	44				44
C19-C36 ALIPHATICS	10	0	0	530	Mean	179				179
C11-C22 AROMATICS	10	0	0	1100	Mean	297				297
ACENAPHTHENE	10	0	0	2.6	Mean	0.9				0.86
ACENAPHTHYLENE	10	0	0	0.77	Mean	0.23				0.23
ANTHRACENE	10	0	0	5.4	Mean	1.9				1.9
BENZO(A)ANTHRACENE	10	0	0	15	Mean	4.3				4.3
BENZO(A)PYRENE	10	2	20.0	15	Mean	3.9				3.9
BENZO(B)FLUORANTHENE	10	0	0	19	Mean	5.1				5.1
BENZO(G,H,I)PERYLENE	10	0	0	8.7	Mean	2.2				2.2
BENZO(K)FLUORANTHENE	10	0	0	7.0	Mean	1.8				1.8
CHRYSENE	10	0	0	15	Mean	4.8				4.8
DIBENZ(A,H)ANTHRACENE	10	0	0	2.3	Mean	0.65				0.65
FLUORANTHENE	10	0	0	31	Mean	9.9				9.9
FLUORENE	10	0	0	3.4	Mean	0.89				0.89
INDENO(1,2,3-CD)PYRENE	10	0	0	10	Mean	2.5				2.5
2-METHYLNAPHTHALENE	10	0	0	0.96	Mean	0.33				0.33
NAPHTHALENE	10	0	0	1.7	Mean	0.75				0.75
PHENANTHRENE	10	0	0	23	Mean	7.9				7.9
PYRENE	10	0	0	31	Mean	9.6				9.6
SW-846 6010C/D (mg/Kg dry) Metals Digestion										
BARIUM	3	0		120	Mean	92				92
BERYLLIUM	3	0		25	Mean	9.2				9.2
CHROMIUM (as +3)	3	0		50	Mean	37				37
LEAD	5	1	20.0	1300	Mean	366				366
NICKEL	3	0		64	Mean	40				40
VANADIUM	10	1	10.0	2100	Mean	443				443
ZINC	3	0		260	Mean	175				175
SW-846 8082A (mg/Kg dry)										
TOTAL PCBs	12	3	25	25	95th % UCL	3.8	6.72	3.80	7.59	7.6
SW-846 8081B (mg/Kg dry)										
4,4'-DDE	3	0		0.047	Mean	0.047				0.047
4,4'-DDT	3	0		0.11	Mean	0.068				0.068
DIELDRIN	3	0		0.047	Mean	0.047				0.047
NOTES:										
When no analyte detected, one-half reported										
detection limit used to calculate exposure										
point concentration.										

Table C-4
Identification of Method to Derive Soil Exposure Point Concentrations and Derivation of Soil Exposure Point Concentrations: 3-6 Foot Interval (PCBs and Remainder)
(April 2016)

Parameter	MCP - Method 2 Direct Contact Standards			Upper Concentration Limit	SAMPLING LOCATIONS											
	S-1	S-2	S-3	UCL	B-5 (3-6')	B-7 (3-6')	B-8 (3-6')	B-9 (3-6')	B-10 (3-6')	B-11 (3-6')	B-12 (3-6')	B-13 (3-6')	BTM-GT-1	BTM-GT-2	ESW-GT-1	NSW-GT-1
Sampling Date					3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/23/2016	3/23/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016
Sample Depth					3-6 Feet	3-6 Feet	3-6 Feet	3-6 Feet	3-6 Feet	3-6 Feet	3-6 Feet	3-6 Feet	6 Feet	8 Feet	3-4 Feet	3-4 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)																
C9-C18 ALIPHATICS	1000	3000	5000	20000	26	5.5		5.5	5.5		5.5	6.0	6.0	5.5	13	34
C19-C36 ALIPHATICS	3000	5000	5000	20000	64	28		5.5	19		16	19	6.0	31	29	140
C11-C22 AROMATICS	1000	3000	5000	10000	220	83		46	31		34	26	25	45	41	420
ACENAPHTHENE	1000	3000	5000	10000	0.76	0.54		0.055	0.055		0.39	0.93	0.060	0.055	0.055	1.7
ACENAPHTHYLENE				10000	0.11	0.055		0.055	0.055		0.055	0.12	0.060	0.055	0.055	0.115
ANTHRACENE	1000	3000	5000	10000	1.8	1.4		0.38	0.055		0.52	1.5	0.060	0.055	0.055	4.7
BENZO(A)ANTHRACENE	7	40	300	3000	4.1	2.9		1.2	0.28		0.70	2.3	0.060	0.055	0.055	10
BENZO(A)PYRENE	2	7	30	300	3.7	2.4		1.0	0.29		0.67	1.9	0.27	0.11	0.055	9.3
BENZO(B)FLUORANTHENE	7	40	300	3000	5.3	3.3		1.3	0.38		0.85	2.5	0.32	0.15	0.055	13
BENZO(G,H,I)PERYLENE	1000	3000	5000	10000	1.7	1.2		0.54	0.18		0.36	0.96	0.38	0.055	0.055	4.9
BENZO(K)FLUORANTHENE	70	400	3000	10000	2.0	1.2		0.50	0.15		0.33	0.92	0.060	0.055	0.055	4.8
CHRYSENE	70	400	3000	10000	5.0	3.2		1.3	0.37		0.68	0.25	0.15	0.11	0.055	12
DIBENZ(A,H)ANTHRACENE	0.7	4	30	300	0.65	0.41		0.055	0.055		0.055	0.12	0.060	0.055	0.055	1.5
FLUORANTHENE	1000	3000	5000	10000	9.5	6.6		2.4	0.61		1.9	0.56	0.15	0.17	0.14	27
FLUORENE	1000	3000	5000	10000	0.90	0.78		0.055	0.055		0.22	0.74	0.060	0.055	0.055	2.1
INDENO(1,2,3-CD)PYRENE	7	40	300	3000	2.1	1.3		0.59	0.18		0.41	1.2	0.36	0.055	0.055	5.2
2-METHYLNAPHTHALENE	300	500	500	5000	0.29	0.22		0.055	0.055		0.055	0.12	0.060	0.055	0.055	0.48
NAPHTHALENE	500	1000	3000	10000	0.44	0.32		0.055	0.055		0.16	0.12	0.060	0.055	0.055	0.70
PHENANTHRENE	500	1000	3000	10000	7.4	6.1		1.4	0.55		1.8	5.9	0.34	0.055	0.4	19
PYRENE	1000	3000	5000	10000	8.8	5.9		2.3	0.71		1.7	0.51	0.060	0.18	0.13	25
MADEP-VPH-04-1.1 (mg/Kg dry)																
BENZENE	2	40	40	10000									0.10	0.058	0.15	0.0215
TOLUENE	30	500	500	10000									0.60	0.32	0.23	0.14
SW-846 6010C/D (mg/Kg dry) Metals Digestion																
BARIUM	1000	3000	5000	10000				30		160			34	27	43	72
BERYLLIUM	90	200	200	2000				6.7		11			0.145	0.135	0.14	0.13
CHROMIUM (as +3)	1000	3000	5000	10000				14		33			11	10	14	26
LEAD	200	600	600	6000				26		200	120	34	100	41	290	230
NICKEL	600	1000	1000	10000				42		85			11	8.9	23	22
VANADIUM	400	700	700	7000	55	31	39	510	560	900	13	22	27	14	36	100
ZINC	1000	3000	5000	10000				81		180			37	43	210	140
SW-846 8082A (mg/Kg dry)																
TOTAL PCBs	1	4	4	100	3.8	2.2	0.055	0.055	0.79	2.0	0.37	0.060	0.055	0.055	0.055	6.3
SW-846 8081B (mg/Kg dry)																
CHLORDANE	5	5	5	600				0.23		0.235			0.0115	0.11	0.011	0.225
4,4'-DDT	6	30	60	600				0.0455		0.16			0.0023	0.022	0.00225	0.045
DIELDRIN	0.08	0.5	3	30				0.0455		0.047			0.0023	0.022	0.00225	0.11
NOTES:																
When no analyte detected, one-half reported																
detection limit used to calculate exposure																
point concentration.																

Table C-4
Identification of Method to Derive Soil Exposure Point Concentrations and Derivation of Soil Exposure Point Concentrations: 3-6 Foot Interval (PCBs and Remainder)
(April 2016)

Parameter		SAMPLING LOCATIONS			Evaluation: S-2 Soils					Derivation of Exposure Point Concentration				
	NSW-GT-2	SSW-GT-1	SSW-GT-2	WSW-GT-2	Number	Number	%	Maximum	Method to	Mean	Standard	95th	Upper 95th	Exposure
Sampling Date	3/8/2016	3/8/2016	3/8/2016	3/8/2016	Analyzed	Detected	> S-2	Concentration	Derive	Concentration	Deviation	Percentile	Confidence	Point
Sample Depth	5-6 Feet	3-4 Feet	5-6 Feet	5-6 Feet		> S-2 Standard	Standard		EPC for S-2 Soils		(Population)	Confidence Interval	Limit on the Mean	Concentration
MADEP-EPH-04-1.1 (mg/Kg dry)														
C9-C18 ALIPHATICS	11	5.5	37	5.5	14	0		37	Mean	12				12
C19-C36 ALIPHATICS	77	17	200	5.5	14	0		200	Mean	47				47
C11-C22 AROMATICS	120	31	210	33	14	0		420	Mean	98				98
ACENAPHTHENE	0.37	0.055	0.215	0.055	14	0		1.7	Mean	0.38				0.38
ACENAPHTHYLENE	0.11	0.055	0.215	0.055	14	0		0.215	Mean	0.084				0.084
ANTHRACENE	0.73	0.055	0.215	0.18	14	0		4.7	Mean	0.84				0.84
BENZO(A)ANTHRACENE	1.7	0.055	0.78	0.5	14	0		10	Mean	1.8				1.8
BENZO(A)PYRENE	0.69	0.24	0.94	0.52	14	1	7.1	9.3	Mean	1.6				1.6
BENZO(B)FLUORANTHENE	2	0.31	1.1	0.67	14	0		13	Mean	2.2				2.2
BENZO(G,H,I)PERYLENE	0.96	0.33	0.77	0.41	14	0		4.9	Mean	0.91				0.91
BENZO(K)FLUORANTHENE	0.73	0.055	0.44	0.26	14	0		4.8	Mean	0.83				0.83
CHRYSENE	1.8	0.17	1.0	0.59	14	0		12	Mean	1.9				1.9
DIBENZ(A,H)ANTHRACENE	0.11	0.055	0.215	0.055	14	0		1.5	Mean	0.25				0.25
FLUORANTHENE	3.7	0.19	1.6	1.1	14	0		27	Mean	4.0				4.0
FLUORENE	0.37	0.055	0.215	0.055	14	0		2.1	Mean	0.41				0.41
INDENO(1,2,3-CD)PYRENE	0.93	0.25	0.56	0.36	14	0		5.2	Mean	0.97				0.97
2-METHYLNAPHTHALENE	0.11	0.055	0.215	0.055	14	0		0.48	Mean	0.13				0.13
NAPHTHALENE	0.11	0.055	0.215	0.055	14	0		0.70	Mean	0.18				0.18
PHENANTHRENE	3.0	0.24	1.2	0.74	14	0		19	Mean	3.4				3.4
PYRENE	3.4	0.19	1.6	1.0	14	0		25	Mean	3.7				3.7
MADEP-VPH-04-1.1 (mg/Kg dry)														
BENZENE	0.021	0.026	0.0265	0.0205	8	0		0.15	Mean	0.053				0.053
TOLUENE	0.021	0.25	0.087	0.0205	8	0		0.60	Mean	0.21				0.21
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
BARIUM	42	27	31	28	10	0		160	Mean	49				49
BERYLLIUM	0.14	0.14	0.14	0.135	10	0		11	Mean	1.9				1.9
CHROMIUM (as +3)	19	12	18	11	10	0		33	Mean	17				17
LEAD	64	58	59	40	12	0		290	Mean	105				105
NICKEL	14	9.0	18	8.8	10	0		85	Mean	24				24
VANADIUM	32	14	50	15	16	1	6.3	900	Mean	151				151
ZINC	89	42	79	35	10	0		210	Mean	94				94
SW-846 8082A (mg/Kg dry)														
TOTAL PCBs	1.2	0.055	0.35	0.16	16	1	6.3	6.3	95th % UCL	1.1	1.70	0.83	1.93	1.9
SW-846 8081B (mg/Kg dry)														
CHLORDANE	0.22	0.011	0.215	0.045	10	0		0.235	Mean	0.13				0.13
4,4'-DDT	0.044	0.00225	0.0435	0.0022	10	0		0.16	Mean	0.037				0.037
DIELDRIN	0.044	0.00225	0.0435	0.0022	10	0		0.11	Mean	0.032				0.032

NOTES:
When no analyte detected, one-half reported detection limit used to calculate exposure point concentration.

Table C-5
Identification of Method to Derive Soil Exposure Point Concentrations and Derivation of Soil Exposure Point Concentrations: 3-11 Foot Interval (PCBs and Remainder)
(April 2016)

Parameter	MCP - Method 2 Direct Contact Standards			Upper Concentration Limit	SAMPLING LOCATION											
	S-1	S-2	S-3	UCL	B-5 (3-6')	B-5 (6-11')	B-7 (3-6')	B-7 (6-11')	B-8 (3-6')	B-8 (6-11')	B-9 (3-6')	B-9 (6-9')	B-10 (3-6')	B-10 (6-11')	B-11 (3-6')	B-11 (6-11')
Sampling Date					3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016
Sample Depth					3-6 Feet	6-11 Feet	3-6 Feet	6-11 Feet	3-6 Feet	6-11 Feet	3-6 Feet	6-9 Feet	3-6 Feet	6-11 Feet	3-6 Feet	6-11 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)																
C9-C18 ALIPHATICS	1000	3000	5000	20000	26	300	5.5	11			11		11			6.0
C19-C36 ALIPHATICS	3000	5000	5000	20000	64	750	28	48			11		19			46
C11-C22 AROMATICS	1000	3000	5000	10000	220	1400	83	83			46		31			51
ACENAPHTHENE	1000	3000	5000	10000	0.76	0.245	0.54	0.11			0.055		0.055			0.06
ACENAPHTHYLENE				10000	0.11	0.245	0.055	0.11			0.055		0.055			0.06
ANTHRACENE	1000	3000	5000	10000	1.8	0.245	1.4	0.29			0.38		0.055			0.24
BENZO(A)ANTHRACENE	7	40	300	3000	4.1	0.245	2.9	1.2			1.2		0.28			0.54
BENZO(A)PYRENE	2	7	30	300	3.7	0.245	2.4	1.1			1.0		0.29			0.54
BENZO(B)FLUORANTHENE	7	40	300	3000	5.3	0.245	3.3	1.3			1.3		0.38			0.68
BENZO(G,H,I)PERYLENE	1000	3000	5000	10000	1.7	0.245	1.2	0.66			0.54		0.18			0.24
BENZO(K)FLUORANTHENE	70	400	3000	10000	2.0	0.245	1.2	0.52			0.50		0.15			0.25
CHRYSENE	70	400	3000	10000	5.0	0.245	3.2	1.3			1.3		0.37			0.61
DIBENZ(A,H)ANTHRACENE	0.7	4	30	300	0.65	0.245	0.41	0.11			0.055		0.055			0.06
FLUORANTHENE	1000	3000	5000	10000	9.5	1.2	6.6	2.3			2.4		0.61			1.3
FLUORENE	1000	3000	5000	10000	0.90	0.245	0.78	0.11			0.055		0.055			0.06
INDENO(1,2,3-CD)PYRENE	7	40	300	3000	2.1	0.245	1.3	0.56			0.59		0.18			0.32
2-METHYLNAPHTHALENE	300	500	500	5000	0.29	0.70	0.22	0.11			0.055		0.055			0.06
NAPHTHALENE	500	1000	3000	10000	0.44	0.79	0.32	0.11			0.055		0.055			0.06
PHENANTHRENE	500	1000	3000	10000	7.4	1.6	6.1	1.2			1.4		0.55			1.1
PYRENE	1000	3000	5000	10000	8.8	0.245	5.9	2.4			2.3		0.71			1.4
MADEP-VPH-04-1.1 (mg/Kg dry)																
BENZENE	2	40	40	10000												
TOLUENE	30	500	500	10000												
SW-846 6010C/D (mg/Kg dry) Metals Digestion																
BARIUM	1000	3000	5000	10000							30				160	
BERYLLIUM	90	200	200	2000							6.7				11	
CHROMIUM (as +3)	1000	3000	5000	10000							14				33	
LEAD	200	600	600	6000							26				200	
NICKEL	600	1000	1000	10000							42				85	
VANADIUM	400	700	700	7000	55	30	31	14	39	41	510	120	560	260	900	870
ZINC	1000	3000	5000	10000							81				180	
SW-846 8082A (mg/Kg dry)																
TOTAL PCBs	1	4	4	100	3.8	0.29	2.2	0.055	0.055	0.055	0.055	0.055	0.79	0.22	2.0	6.2
SW-846 8081B (mg/Kg dry)																
CHLORDANE	5	5	5	600							0.23				0.235	
4,4'-DDT	6	30	60	600							0.0455				0.16	
DIELDRIN	0.08	0.5	3	30							0.0455				0.047	
NOTES:																
When no analyte detected, one-half reported																
detection limit used to calculate exposure																
point concentration.																

Table C-5
Identification of Method to Derive Soil Exposure Point Concentrations and Derivation of Soil Exposure Point Concentrations: 3-11 Foot Interval (PCBs and Remainder)
(April 2016)

Parameter	SAMPLING LOCATIONS								
	B-13 (3-6')	BTM-GT-1	BTM-GT-2	ESW-GT-1	NSW-GT-1	NSW-GT-2	SSW-GT-1	SSW-GT-2	WSW-GT-2
Sampling Date	3/23/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016
Sample Depth	3-6 Feet	6 Feet	8 Feet	3-4 Feet	3-4 Feet	5-6 Feet	3-4 Feet	5-6 Feet	5-6 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)									
C9-C18 ALIPHATICS	6.0	6.0	5.5	13	34	11	5.5	37	5.5
C19-C36 ALIPHATICS	19	6.0	31	29	140	77	17	200	5.5
C11-C22 AROMATICS	26	25	45	41	420	120	31	210	33
ACENAPHTHENE	0.93	0.060	0.055	0.055	1.7	0.37	0.055	0.215	0.055
ACENAPHTHYLENE	0.12	0.060	0.055	0.055	0.115	0.11	0.055	0.215	0.055
ANTHRACENE	1.5	0.060	0.055	0.055	4.7	0.73	0.055	0.215	0.18
BENZO(A)ANTHRACENE	2.3	0.060	0.055	0.055	10	1.7	0.055	0.78	0.5
BENZO(A)PYRENE	1.9	0.27	0.11	0.055	9.3	0.69	0.24	0.94	0.52
BENZO(B)FLUORANTHENE	2.5	0.32	0.15	0.055	13	2	0.31	1.1	0.67
BENZO(G,H,I)PERYLENE	0.96	0.38	0.055	0.055	4.9	0.96	0.33	0.77	0.41
BENZO(K)FLUORANTHENE	0.92	0.060	0.055	0.055	4.8	0.73	0.055	0.44	0.26
CHRYSENE	0.25	0.15	0.11	0.055	12	1.8	0.17	1.0	0.59
DIBENZ(A,H)ANTHRACENE	0.12	0.060	0.055	0.055	1.5	0.11	0.055	0.215	0.055
FLUORANTHENE	0.56	0.15	0.17	0.14	27	3.7	0.19	1.6	1.1
FLUORENE	0.74	0.060	0.055	0.055	2.1	0.37	0.055	0.215	0.055
INDENO(1,2,3-CD)PYRENE	1.2	0.36	0.055	0.055	5.2	0.93	0.25	0.56	0.36
2-METHYLNAPHTHALENE	0.12	0.060	0.055	0.055	0.48	0.11	0.055	0.215	0.055
NAPHTHALENE	0.12	0.060	0.055	0.055	0.70	0.11	0.055	0.215	0.055
PHENANTHRENE	5.9	0.34	0.055	0.4	19	3.0	0.24	1.2	0.74
PYRENE	0.51	0.060	0.18	0.13	25	3.4	0.19	1.6	1.0
MADEP-VPH-04-1.1 (mg/Kg dry)									
BENZENE		0.10	0.058	0.15	0.0215	0.021	0.026	0.0265	0.0205
TOLUENE		0.60	0.32	0.23	0.14	0.021	0.25	0.087	0.0205
SW-846 6010C/D (mg/Kg dry) Metals Digestion									
BARIUM		34	27	43	72	42	27	31	28
BERYLLIUM		0.145	0.135	0.14	0.13	0.14	0.14	0.14	0.135
CHROMIUM (as +3)		11	10	14	26	19	12	18	11
LEAD	34	100	41	290	230	64	58	59	40
NICKEL		11	8.9	23	22	14	9.0	18	8.8
VANADIUM	22	27	14	36	100	32	14	50	15
ZINC		37	43	210	140	89	42	79	35
SW-846 8082A (mg/Kg dry)									
TOTAL PCBs	0.060	0.055	0.055	0.055	6.3	1.2	0.055	0.35	0.16
SW-846 8081B (mg/Kg dry)									
CHLORDANE		0.0115	0.11	0.011	0.225	0.22	0.011	0.215	0.045
4,4'-DDT		0.0023	0.022	0.00225	0.045	0.044	0.00225	0.0435	0.0022
DIELDRIN		0.0023	0.022	0.00225	0.11	0.044	0.00225	0.0435	0.0022
NOTES:									
When no analyte detected, one-half reported									
detection limit used to calculate exposure									
point concentration.									

Table C-5
Identification of Method to Derive Soil Exposure Point Concentrations and Derivation of Soil Exposure Point Concentrations: 3-11 Foot Interval (PCBs and Remainder)
(April 2016)

Parameter	Evaluation: S-2 Soils					Derivation of Exposure Point Concentration				
Sampling Date / Sample Depth	Number Analyzed	Number Detected > S-2 Standard	% > S-2 Standard	Maximum Concentration	Method to Derive EPC for S-2 Soils	Mean Concentration	Standard Deviation (Population)	95th Percentile Confidence Interval	Upper 95th Percentile Confidence Limit on the Mean	Exposure Point Concentration
MADEP-EPH-04-1.1 (mg/Kg dry)										
C9-C18 ALIPHATICS	16	0		300	Mean	31				31
C19-C36 ALIPHATICS	16	0		750	Mean	93				93
C11-C22 AROMATICS	16	0		1400	Mean	179				179
ACENAPHTHENE	16	0		1.7	Mean	0.33				0.33
ACENAPHTHYLENE	16	0		0.245	Mean	0.096				0.096
ANTHRACENE	16	0		4.7	Mean	0.75				0.75
BENZO(A)ANTHRACENE	16	0		10	Mean	1.6				1.6
BENZO(A)PYRENE	16	1	6.3	9.3	Mean	1.5				1.5
BENZO(B)FLUORANTHENE	16	0		13	Mean	2.0				2.0
BENZO(G,H,I)PERYLENE	16	0		4.9	Mean	0.85				0.85
BENZO(K)FLUORANTHENE	16	0		4.8	Mean	0.77				0.77
CHRYSENE	16	0		12	Mean	1.8				1.8
DIBENZ(A,H)ANTHRACENE	16	0		1.5	Mean	0.24				0.24
FLUORANTHENE	16	0		27	Mean	3.7				3.7
FLUORENE	16	0		2.1	Mean	0.37				0.37
INDENO(1,2,3-CD)PYRENE	16	0		5.2	Mean	0.89				0.89
2-METHYLNAPHTHALENE	16	0		0.7	Mean	0.17				0.17
NAPHTHALENE	16	0		0.79	Mean	0.20				0.20
PHENANTHRENE	16	0		19	Mean	3.1				3.1
PYRENE	16	0		25	Mean	3.4				3.4
MADEP-VPH-04-1.1 (mg/Kg dry)										
BENZENE	8	0		0.15	Mean	0.053				0.053
TOLUENE	8	0		0.6	Mean	0.21				0.21
SW-846 6010C/D (mg/Kg dry) Metals Digestion										
BARIUM	10	0		160	Mean	49				49
BERYLLIUM	10	0		11	Mean	1.9				1.9
CHROMIUM (as +3)	10	0		33	Mean	17				17
LEAD	11	0		290	Mean	104				104
NICKEL	10	0		85	Mean	24				24
VANADIUM	21	1	4.8	900	Mean	178				178
ZINC	10	0		210	Mean	94				94
SW-846 8082A (mg/Kg dry)										
TOTAL PCBs	21	2	9.5	6.3	95th % UCL	1.1	1.90	0.81	1.96	2.0
SW-846 8081B (mg/Kg dry)										
CHLORDANE	10	0		0.235	Mean	0.13				0.13
4,4'-DDT	10	0		0.16	Mean	0.037				0.037
DIELDRIN	10	0		0.11	Mean	0.032				0.032
NOTES:										
When no analyte detected, one-half reported										
detection limit used to calculate exposure										
point concentration.										

Table C-6
Identification of Method to Derive Soil Exposure Point Concentrations and Derivation of Soil Exposure Point Concentrations: Fuel Oil Vault Sands (SP-3)
(April 2016)

Parameter	MCP - Method 2 Direct Contact Standards			Upper Concentration Limit				
	S-1	S-2	S-3	UCL	SP-3	FO-1-TP (0-1')	FO-1-TP (1-2')	FO-1-TP (2-3')
Sampling Date					3/29/2016	3/9/2016	3/9/2016	3/9/2016
Sample Depth					Stockpile / Sands in vault	0-1 Feet (below grade /	1-2 Feet (below grade /	2-3 Feet (below grade /
MADEP-EPH-04-1.1 (mg/Kg dry)								
ACENAPHTHENE	1000	3000	5000	10000	0.70			
ACENAPHTHYLENE				10000	0.090			
ANTHRACENE	1000	3000	5000	10000	1.5			
BENZO(A)ANTHRACENE	7	40	300	3000	3.0			
BENZO(A)PYRENE	2	7	30	300	2.6			
BENZO(B)FLUORANTHENE	7	40	300	3000	3.5			
BENZO(G,H,I)PERYLENE	1000	3000	5000	10000	1.4			
BENZO(K)FLUORANTHENE	70	400	3000	10000	1.4			
CHRYSENE	70	400	3000	10000	2.8			
DIBENZ(A,H)ANTHRACENE	0.7	4	30	300	0.59			
FLUORANTHENE	1000	3000	5000	10000	7.0			
FLUORENE	1000	3000	5000	10000	0.93			
INDENO(1,2,3-CD)PYRENE	7	40	300	3000	1.4			
2-METHYLNAPHTHALENE	300	500	500	5000	0.29			
NAPHTHALENE	500	1000	3000	10000	0.59			
PHENANTHRENE	500	1000	3000	10000	5.9			
PYRENE	1000	3000	5000	10000	5.0			
SW-846 6010C/D (mg/Kg dry) Metals Digestion								
BARIUM	1000	3000	5000	10000	50	140	95	130
BERYLLIUM	90	200	200	2000	0.73	0.68	0.39	1.9
CHROMIUM (as +3)	1000	3000	5000	10000	30	36	31	37
LEAD	200	600	600	6000	25	340	1100	220
NICKEL	600	1000	1000	10000	18	32	22	29
THALLIUM	8	8	8	800	9.8	1.4	1.45	1.45
VANADIUM	400	700	700	7000	33	160	96	140
ZINC	1000	3000	5000	10000	43	250	160	190
SW-846 8082A (mg/Kg dry)								
TOTAL PCBs	1	4	4	100	2.6	13	12	7.8
SW-846 8081B (mg/Kg dry)								
4,4'-DDT	6	30	60	600	0.019	0.15	0.13	0.13
DIELDRIN	0.08	0.5	3	30	ND (0.0042)	0.16	0.19	0.16
NOTES:								
When no analyte detected, one-half reported								
detection limit used to calculate exposure								
point concentration.								

Table C-6
Identification of Method to Derive Soil Exposure Point Concentrations and Derivation of Soil Exposure Point Concentrations: Fuel Oil Vault Sands (SP-3)
(April 2016)

Parameter	Evaluation: S-2 Soils					Derivation of Exposure Point Concentration				
Sampling Date / Sample Depth	Number Analyzed	Number Detected > S-2 Standard	% > S-2 Standard	Maximum Concentration	Method to Derive EPC for S-2 Soils	Mean Concentration	Standard Deviation (Population)	95th Percentile Confidence Interval	Upper 95th Percentile Confidence Limit on the Mean	Exposure Point Concentration
MADEP-EPH-04-1.1 (mg/Kg dry)										
ACENAPHTHENE	1	0		0.70	Conc. Det'd					0.70
ACENAPHTHYLENE	1	0		0.090	Conc. Det'd					0.090
ANTHRACENE	1	0		1.5	Conc. Det'd					1.5
BENZO(A)ANTHRACENE	1	0		3.0	Conc. Det'd					3.0
BENZO(A)PYRENE	1	0		2.6	Conc. Det'd					2.6
BENZO(B)FLUORANTHENE	1	0		3.5	Conc. Det'd					3.5
BENZO(G,H,I)PERYLENE	1	0		1.4	Conc. Det'd					1.4
BENZO(K)FLUORANTHENE	1	0		1.4	Conc. Det'd					1.4
CHRYSENE	1	0		2.8	Conc. Det'd					2.8
DIBENZ(A,H)ANTHRACENE	1	0		0.59	Conc. Det'd					0.59
FLUORANTHENE	1	0		7.0	Conc. Det'd					7.0
FLUORENE	1	0		0.93	Conc. Det'd					0.93
INDENO(1,2,3-CD)PYRENE	1	0		1.4	Conc. Det'd					1.4
2-METHYLNAPHTHALENE	1	0		0.29	Conc. Det'd					0.29
NAPHTHALENE	1	0		0.59	Conc. Det'd					0.59
PHENANTHRENE	1	0		5.9	Conc. Det'd					5.9
PYRENE	1	0		5.0	Conc. Det'd					5.0
SW-846 6010C/D (mg/Kg dry) Metals Digestion										
BARIUM	4	0		140	Mean	104				104
BERYLLIUM	4	0		1.9	Mean	0.93				0.93
CHROMIUM (as +3)	4	0		37	Mean	34				34
LEAD	4	1	25.0	1100	Mean	421				421
NICKEL	4	0		32	Mean	25				25
THALLIUM	4	0		9.8	Mean	3.5				3.5
VANADIUM	4	0		160	Mean	107				107
ZINC	4	0		250	Mean	161				161
SW-846 8082A (mg/Kg dry)										
TOTAL PCBs	4	3	75.0	13	95th % UCL	8.9	4.10	4.02	12.87	13
SW-846 8081B (mg/Kg dry)										
4,4'-DDT	4	0		0.15	Mean	0.11				0.11
DIELDRIN	4	0		0.19	Mean	0.17				0.17
NOTES:										
When no analyte detected, one-half reported										
detection limit used to calculate exposure										
point concentration.										

Table C-7
Summary of Dioxin-Like PCB Congener Data for Courtyard Soil Samples
(April 2016)

Analyte	Units	B-5 (0-1')	B-7 (1-3')	B-9 (0-1')	B-11 (1-3)
Date Sampled		14-Mar-16	14-Mar-16	14-Mar-16	14-Mar-16
Sample Depth		0-1 Feet	1-3 Feet	0-1 Feet	1-3 Feet
Cl4-BZ#81	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl4-BZ#77	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl5-BZ#123/#107	µg/kg	14	32	100	<1.5
Cl5-BZ#118	µg/kg	210	450	1600	2.4
Cl5-BZ#114	µg/kg	<3.8	8.8	19	<0.75
Cl5-BZ#105	µg/kg	59	150	440	0.79
Cl5-BZ#126	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl6-BZ#167	µg/kg	13	22	69	<0.75
Cl6-BZ#156	µg/kg	28	60	<3.9	<0.75
Cl6-BZ#157	µg/kg	8.8	17	59	<0.75
Cl6-BZ#169	µg/kg	<3.8	<3.8	<3.9	<0.75
Cl7-BZ#189	µg/kg	<3.8	<3.8	8.8	<0.75

C14-BZ#77 = 3,3',4,4'-tetrachlorobiphenyl (TCB)
C14-BZ#81 = 3,4,4',5-TCB
C15-BZ#105 = 2,3,3',4,4'-pentachlorobiphenyl (PeCB)
C15-BZ#114 = 2,3,4,4',5-PeCB
C15-BZ#118 = 2,3',4,4',5-PeCB
C15-BZ#123 = 2',3,4,4',5-PeCB
C15-BZ#126 = 3,3',4,4',5-PeCB
C16-BZ#156 = 2,3,3',4,4',5-hexachlorobiphenyl (HxCB)
C16-BZ#157 = 2,3,3',4,4',5'-HxCB
C16-BZ#167 = 2,3',4,4',5,5'-HxCB
C16-BZ#169 = 3,3',4,4',5,5'-HxCB
C17-BZ#189 = 2,3,3',4,4',5,5'-heptachlorobiphenyl (HpCB)

List of Dioxin-Like Congeners obtained from Table 2 of USEPA's Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin & Dioxin-Like Compounds, (EPA/100/R 10/005/ December 2010)

Those Dioxin-Like Congeners shown in **bold text** were not detected in any sample, and therefore, were eliminated from further evaluation in Tables 16 and 17.

Table C-8
Calculation of TCDD Toxic Equivalence for Soil Analytical Data: Dioxin-Like PCB Congeners
(April 2016)

Analyte		Units	B-5 (0-1')	B-7 (1-3')	B-9 (0-1')	B-11 (1-3)
Date Sampled	TEF		14-Mar-16	14-Mar-16	14-Mar-16	14-Mar-16
Sample Depth			0-1 Feet	1-3 Feet	0-1 Feet	1-3 Feet
Cl5-BZ#123/#107	0.00003	µg/kg	14	32	100	0.75
Cl5-BZ#118	0.00003	µg/kg	210	450	1600	2.4
Cl5-BZ#114	0.00003	µg/kg	1.9	8.8	19	0.375
Cl5-BZ#105	0.00003	µg/kg	59	150	440	0.79
Cl6-BZ#167	0.00003	µg/kg	13	22	69	0.375
Cl6-BZ#156	0.00003	µg/kg	28	60	1.95	0.375
Cl6-BZ#157	0.00003	µg/kg	8.8	17	59	0.375
Cl7-BZ#189	0.00003	µg/kg	1.9	1.9	8.8	0.375
TEQ			1.01E-02	2.23E-02	6.89E-02	1.74E-04
Total Dioxin-Like Congeners		µg/kg	336.6	741.7	2297.75	5.815

C15-BZ#105 = 2,3,3',4,4'-pentachlorobiphenyl (PeCB)
C15-BZ#114 = 2,3,4,4',5-PeCB
C15-BZ#118 = 2,3',4,4',5-PeCB
C15-BZ#123 = 2',3,4,4',5-PeCB
C16-BZ#156 = 2,3,3',4,4',5-hexachlorobiphenyl (HxCB)
C16-BZ#157 = 2,3,3',4,4',5'-HxCB
C16-BZ#167 = 2,3',4,4',5,5'-HxCB
C17-BZ#189 = 2,3,3',4,4',5,5'-heptachlorobiphenyl (HpCB)

TEFs for Dioxin-Like Congeners obtained from Table 2 of USEPA's Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-*p* -dioxin & Dioxin-Like Compounds, (EPA/100/R 10/005/ December 2010)

TCDD = 2,3,7,8-Tetrachlorodibenzo-*p* -dioxin
TEF = TCDD Toxicity Equivalence Factor
TEQ = TCDD Toxic Equivalence (summation of products of congener concentration and TEF, for each congener *i*)

If no congener detected for a given sample, one-half the reported detection limit (<#) was used as a surrogate value.

Sample B-11 (1-3) contains a low level of PCB congeners and was not used for further analysis.

Table C-9
Comparison of Total Dioxin-Like PCB Congeners to TCDD Equivalence and Total PCB Congeners
(April 2016)

Analyte	**Units**	**B-5 (0-1')**	**B-7 (1-3')**	**B-9 (0-1')**
Date Sampled		14-Mar-16	14-Mar-16	14-Mar-16
Sample Depth		0-1 Feet	1-3 Feet	0-1 Feet
Total PCB-Congeners (Table 8)	mg/kg	3.3853	6.7551	22.2447
Total Dioxin-Like Congeners (Table 16)	mg/kg	0.3366	0.7417	2.29775
Dioxin-Like Congeners, as a percent of				
Total PCB-Congeners	%	9.9	11.0	10.3
TCDD Toxic Equivalence (Table 16)	mg/kg	1.01E-05	2.23E-05	6.89E-05
TCDD Toxic Equivalence as proportion		2.98E-06	3.30E-06	3.10E-06
of Total PCB-congeners				

Reference: USEPA's Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-*p* -dioxin & Dioxin-Like Compounds, (EPA/100/R 10/005/ December 2010)

TCDD = 2,3,7,8-Tetrachlorodibenzo-*p* -dioxin

TEF = TCDD Toxicity Equivalence Factor

TEQ = TCDD Toxic Equivalence (summation of products of congener concentration and TEF, for each congener *i*)

Table C-10
Calculation of Dioxin-Like PCB Congener Exposure Point Concentrations, as TCDD Equivalence
(April 2016)

Exposure Point	Units	PCB Exposure Point Concentration	Fraction as TCDD-Like PCBs	TCDD-Like PCB Concentration	TEF for all dioxin-like congeners*	TCDD-Like PCB Exposure Point Concentration
			unitless		unitless	
0-1 Foot Interval	mg/kg	41	0.11	4.51	3.00E-05	1.35E-04
1-3 Foot Interval	mg/kg	7.6	0.11	0.836	3.00E-05	2.51E-05
3-6 Foot Interval	mg/kg	1.9	0.11	0.209	3.00E-05	6.27E-06
3-11 Foot Interval	mg/kg	2.0	0.11	0.22	3.00E-05	6.60E-06
Fuel Oil Vault Sands (SP-3)	mg/kg	13	0.11	1.43	3.00E-05	4.29E-05

Reference: USEPA's Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-*p* -dioxin & Dioxin-Like Compounds, (EPA/100/R 10/005/ December 2010)

* All detected TCDD-like PCB congeners had the same TEF value of 0.00003 (3.00E-05), which simplified the calculation of EPCs for dioxin-like PCBs.

EPC = Exposure Point Concentration

TCDD = 2,3,7,8-Tetrachlorodibenzo-*p* -dioxin

TEF = TCDD Toxicity Equivalence Factor

TEQ = TCDD Toxic Equivalence (summation of products of congener concentration and TEF, for each congener *i*)

Table C-11
Comparison of Risk Estimates to MCP Risk Limits
(April 2016)

Receptor	Exposure Point	Soil Interval (feet)	ELCR	Cancer Risk Limit	Significant Risk of Harm?	HI	Non-Cancer Risk Limit	Significant Risk of Harm?
Construction / Utility Worker	Courtyard	0 - 1	2.1E-06	1.E-05	No	3.2	1	**Yes**
	Courtyard	1 - 3	5.6E-07	1.E-05	No	1.0	1	No, but close
	Courtyard	3 - 6	1.8E-07	1.E-05	No	0.29	1	No
	Courtyard	3 - 11	1.8E-07	1.E-05	No	0.31	1	No
	Fuel Oil Vault Sands	Stockpile SP-3	7.7E-07	1.E-05	No	1.3	1	**Yes**
Resident	Courtyard	0 - 1	3.1E-05	1.E-05	**Yes**	9.4	1	**Yes**
	Courtyard	1 - 3	8.5E-06	1.E-05	No	3.1	1	**Yes**
	Courtyard	3 - 6	2.7E-06	1.E-05	No	0.87	1	No
	Courtyard	3 - 11	2.7E-06	1.E-05	No	0.91	1	No
	Fuel Oil Vault Sands	Stockpile SP-3	1.2E-05	1.E-05	**Yes**	4.0	1	**Yes**

ASSUMPTIONS:
NO SINGLE FAMILY RESIDENCE. NO GARDENING OF EDIBLE PRODUCE.
EXPOSURE TO SOILS OCCURS ONLY DURING A SINGLE SIX-MONTH CONSTRUCTION PROJECT, AFTER WHICH TIME THE SOILS ARE RETURNED TO EXCAVATION OR ARE TRANSPORTED OFF-SITE.
ASSUME **NO** CONTROLS ARE USED TO LIMIT RESIDENTIAL EXPOSURE TO SOILS DURING CONSTRUCTION PROJECT.
PROTECTIVE COVER MUST REMAIN OVER SOILS EXCEPT DURING CONSTRUCTION OR UTILITY PROJECT, AFTER WHICH TIME THE PROTECTIVE COVER MUST BE RE-INSTALLED.
IF CONTROLS ARE USED TO LIMIT RESIDENTIAL EXPOSURE TO SOILS DURING CONSTRUCTION PROJECT, THERE WOULD BE NO SIGNIFICANT RISK OF HARM FOR 1-3 FOOT INTERVAL, BUT IT WOULD BE CLOSE TO NON-CANCER MCP RISK LIMIT.

APPENDIX D:

Risk Assessment (East End of Courtyard)

APPENDIX D

UPDATED RISK ASSESSMENT (EAST PORTION OF COURTYARD)
(Based on conditions on October 2016)

Note: This risk assessment is conducted for the east portion of the courtyard where petroleum contamination is located, mostly at depths below the shallower PCB, metal, pesticide and asbestos contamination; and is based on current conditions, following the excavation of the 0-1 foot interval soils and partial excavation of the 1-3 foot interval soils. Supplemental field investigation was conducted during September 2016 to determine the horizontal and vertical extent of petroleum contamination, and to provide updated information on PCB levels in soils following excavation. This risk assessment was conducted following the same procedures as the original risk assessment (documented in Appendix C).

Asbestos is present in shallow soils. This risk assessment does not address the risks associated with asbestos exposure. An assumption is made that all asbestos-contaminated soils will be excavated and either transported off-site for appropriate disposal or placed in an on-Site soil repository.

Unique elements to this risk assessment are provided below.

Exposure Point, Soil Intervals for Exposure Point, Receptors and Human Exposure Profiles

The exposure point is the east side of courtyard in the vicinity of the FO-1 fuel oil bunker. The exposure point extends from the east side of the smoke stack eastward to the retaining wall bordering the Concord River, and from the Picker Building north to the Boiler House. Soil intervals for this risk assessment are based on current grade, following the excavation of 0-1 feet of soils west of the FO-1 fuel oil bunker and 0-2.5 feet of soils over, north, south and east of the FO-1 fuel oil bunker. The soil intervals are 0-3 foot interval, 3-6 foot interval and 6-20 foot interval. The 6-20 foot soil interval is deeper than typical for a risk assessment conducted under the Massachusetts Contingency Plan (MCP); however, the higher levels of petroleum contamination are present more than 15 feet below current grade and is included only to give context to the contamination present at depth.

The receptors are the same as for the original risk assessment (i.e., residents and construction workers). The exposure profiles for the receptors are the same as specified in the original risk

assessment, provided in Appendix C, with one exception. For the resident, direct contact and incidental ingestion exposure is presumed limited to three days a week during the six-month construction project.

Identification of Contaminants of Concern

The representative analytical data for the eastern portion of the courtyard were evaluated to identify soil contaminants of concern for the risk assessment, as documented in Table D-1. Specific oils or hazardous materials (OHM) were eliminated as contaminants of concern because: (1) they were not detected in any of the representative soil samples; or (2) they were always detected in the representative soil samples at levels less than MassDEP's published background concentrations for soils associated with fill containing coal ash or wood ash (i.e., arsenic, cadmium, chromium, lead, nickel and zinc). Acenaphthylene was always detected at a level less than its background concentration; however, it was retained as a contaminant of concern, because all other polycyclic aromatic hydrocarbons (PAHs) were detected at levels exceeding their background concentrations.

Soil contaminants of concerns include the following: (1) each extractable petroleum hydrocarbon (EPH) subset; (2) seventeen PAHs; (3) one volatile petroleum hydrocarbon (VPH) subset – C9-C10 aromatic hydrocarbons; (4) two aromatic volatile organic compounds (VOCs) – benzene and toluene; (5) two pesticides – chlordane and dieldrin; (6) three metals – barium, mercury and vanadium; and (7) PCBs.

As documented in Table 6.1 to 6.4 of this IRA Plan Modification No. 3, four soil samples were collected for analysis of PCB congeners. One soil sample contained a low concentration of total congener PCBs (0.025 mg/kg) and was eliminated from complete evaluation. USEPA's document, Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (TCDD) & Dioxin-Like Compounds (EPA/100/R 10/005/ December 2010), identifies twelve TCDD dioxin-like PCB congeners. Of these twelve TCDD dioxin-like congeners, eight were detected in the soil samples (Appendix C Table C-7). Combined, these eight TCDD dioxin-like PCB congeners comprise between 9.9 and 11% of the total PCB congeners (Appendix C Table C-9). The eight TCDD dioxin-like PCBs were retained as separate soil contaminants of concern.

The soil contaminants of concern are also the dust contaminants of concern.

Derivation of Exposure Point Concentrations

The representative analytical data for the 0-3, 3-6 and 6-11 foot intervals were evaluated in Tables D-2, D-3 and D-4, respectively, to determine the appropriate method to derive exposure point concentrations. For all contaminants of concern, except PCBs (and its dioxin-like congeners), the

appropriate exposure point concentrations are the mean concentrations. For PCBs, for the 0-3 and 3-6 foot intervals, more than 25% of the data exceeded the Method 1 S-2 Direct Contact standard for PCBs. Therefore, for PCBs, the 95th % Upper Confidence Limit on the mean is identified as the appropriate exposure point concentration for the 0-3 and 3-6 foot intervals. The 95th % Upper Confidence Limit on the mean was also selected as the appropriate exposure point concentration for PCBs in the 6-11 foot interval soils, to be consistent with required method under the federal Toxic Substances Control Act.

The exposure point concentrations for the 0-3, 3-6 and 6-11 foot intervals are calculated in Tables D-5, D-6 and D-7, respectively. Whenever, a contaminant of concern was not detected in a specific sample, one-half the sample detection limit was used when calculating the exposure point concentration.

Exposure point concentrations were calculated for TCDD dioxin-like PCB congeners, for input in the risk assessment as TCDD dioxin. The TCDD dioxin exposure point concentrations were calculated considering: (1) the exposure point concentrations for PCBs; (2) the portion of PCBs comprised of TCDD dioxin-like congeners (11%); and (3) the Toxicity Equivalence Factors (which was the same (3E-05) for all TCDD dioxin-like congeners detected at the Site), as documented in Appendix C Tables C-7 to C-9 and Appendix D Table D-8. Note: Percent TCDD dioxin-like congener composition of PCBs was based on the congener PCB data. However, because congener PCB data was not available for most soil samples, the Aroclor PCB data was used to derive the TCDD dioxin-like PCB exposure point concentrations.

In addition, dust exposure point concentrations were estimated following the same procedure as in Appendix C. The exposure point concentrations are calculated and documented in Appendix D-4 Tables 1.1 and 1.2.

Identification of Groundwater and Soil Categories

The soil and groundwater categories are the same as identified in the original risk assessment, provided in Appendix C.

Media	Category	Location, Depth Interval and Comment
Groundwater	GW-3	Entire aquifer beneath the courtyard
Courtyard Soils	S-2	Presumed Current and Future Residential Conditions: All Soil Volumes (All soils covered with a protective barrier)
	S-3	Presumed Current and Future Commercial Conditions: All Soil Volumes (All soils covered with a protective barrier)
	S-3	Construction / Utility Work: All Soil Volumes (All soils covered with a protective barrier), except during construction / utility work

Note: The lowest soil category applicable to a soil volume, after considering all receptors and current and foreseeable uses, is provided. An assumption is made that gardening of edible produce will not occur in the future in the soils of the courtyard, except under Best Management Practices. For the courtyard, an assumption is made that future use will include multi-family residential, child school, daycare, institution, playground, active recreational, commercial, industrial or passive recreational use, but will not include single-family residences. In addition, for the exterior courtyard, all soils are presumed covered by protective barriers, except during short-term construction or utility work, which will be conducted under Site-specific Soil Management Plan. These assumptions require the implementation of a Notice of Activity and Use Limitation (AUL).

Characterization of Risk of Harm to Human Health

The characterization of risk of harm to human health was calculated in the same was in the original risk assessment, provided in Appendix C. For this risk assessment, the construction worker risk assessments are provided in Appendices D-1 to D-3, and the resident risk assessments are provided in Appendix D-4. Dose-response values, exposure point concentrations and receptor exposure calculations are also provided in these same appendices.

Results of Human Health Risk Characterization

Risk of Subchronic and Chronic Threshold (Non-Carcinogenic) Health Effects: For each receptor group, the total cumulative subchronic or chronic HI is compared to MassDEP's cumulative non-cancer risk limit of 1.0. Subchronic HI were calculated for resident and construction worker. Limits on future exposure to residents, entailing the maintenance of a protective barrier over soils were assumed. No chronic HI were calculated, because no chronic exposure exists under current and presumed conditions. The results of the non-cancer risk assessments are summarized in Appendices D-1 to D-3 for construction workers and Appendix D-4 for residents. The cumulative HIs are compared to the non-cancer risk limit in Table D-9.

Based on these findings, No Significant non-cancer Risk of harm exists for the 0-3, 3-6 and 3-11 foot interval courtyard soils for both receptors, presuming that a protective barrier is maintained over the soils of the courtyard. For the 0-3 and 3-6 foot interval soils, No Significant Risk of harm exists for residents; however, an additional assumption is made that the frequency of exposure to these soils would be limited during a construction project, through the implementation of specific provisions in a Soil Management Plan. The principal contributors of the non-cancer risk estimates are PCBs and dioxin (TCDD equivalence).

Risk of Non-Threshold (Carcinogenic) Health Effects: For each receptor group, the total cumulative ELCR is compared to MassDEP's cumulative cancer risk limit of 1E-05. ELCRs were calculated for resident, commercial worker and construction worker. Limits on future exposure to residents, entailing the maintenance of a protective barrier over soils and implementation of a soil

management plan during future construction or utility work, were assumed. The results of the cancer risk assessments are summarized in Appendices D-1 to C-3 for construction workers and in Appendix D-4 for residents. A comparison of the cumulative ELCRs to the cancer risk limit is provided in Table D-9.

Based on these findings, No Significant cancer Risk of harm exists for construction workers for all soil intervals, and exists for residents for all soil intervals. The principal contributor to the cancer risk estimate is PCBs, followed by dioxin (TCDD equivalence), specific PAHs and dieldrin.

Comparison of Site Conditions to Applicable or Suitably Analogous Public Health Standards: No applicable or suitably analogous public health standards were identified for the Site.

Uncertainty Analysis

The uncertainty analysis is the same as that in the original risk assessment, provided in Appendix C.

Risk Characterization Conclusions

Conclusions Regarding Risk of Harm to Human Health and Conditions for Notice of Activity and Use Limitation

Risk of harm to human health was characterized for the east portion of the courtyard via a MCP Method 3 Human Health Risk Characterization. Assumptions limiting future activities or uses of the Site were considered during the course of the risk characterization.

The total cumulative HIs for all receptors were less than MCP's Method 3 cancer and non-cancer risk limits for the 0-3, 3-6 and 3-11 foot intervals. However, exposure was presumed limited to a six-month construction period, and, residential exposure to 0-3 and 3-6 foot interval soils was presumed limited in frequency via implementation of specific provisions in a Soil Management Plan. These specific provisions in the Soil Management Plan can be eliminated by placing the 0-3 and 3-6 foot interval soils of the eastern courtyard in an on-site isolated soil repository or by transporting the soils off-site to an appropriate facility. These risk assessment findings presume that a protective barrier is maintained over the soils of the courtyard. Gardening of edible produce is presumed not to be conducted within the disposal site boundaries through Best Management Practices.

These risk assessment findings require that a protective barrier be maintained over the soils of the courtyard, any subsurface utilities be placed in a clean utility corridor, and perhaps special provisions to reduce frequency of residential exposure during a construction project or placement of the 0-3 and 3-6 foot interval soils in a soil repository. These assumptions would require the implementation of a Notice of AUL for the courtyard in order for the findings of the risk assessment

to be valid. Requirements of the Notice of AUL would include: (1) periodic inspection and maintenance of the protective barrier over the soils; (2) inspection and maintenance of the clean utility corridor, following each utility project; (3) during construction projects, the use of a Soil Management Plan to properly manage soils (and to perhaps minimize potential residential exposure to soils); and (4) following the completion of the construction project the placement of the soils at its original depth and reinstallation or repair of the protective barrier.

The slated for remediation could be either sent to a low level (<50 mg/kg) PCB facility or could be placed in an on-Site soil repository, at a depth more than 3 feet below grade. Potential on-site soil repositories identified for the Site include a coal chute, utility vault located in the northwest corner of the courtyard, four dry wells discovered in the western portion of the courtyard, and, following excavation, the FO-1 and FO-2 vault areas in the east portion of the courtyard. These areas would have separate Notice of AUL conditions, including: (1) physical separation from surrounding soils; (2) not allowing any excavation of these soils except by persons who are 40-hour HAZWOPER trained under OSHA and under the direction of an LSP; (3) either replacement of soils back into the repository or off-site transport of the soils following excavation; and (4) maintenance of the soil repositories.

The shallow soils of the courtyard are contaminated with asbestos. Soils contaminated with asbestos are presumed to constitute a Significant Risk of harm to human health, even following short-term exposure. Therefore, the asbestos-contaminated soils should be either transported off-site to a facility authorized to receive asbestos-contaminated and low-level PCB-contaminated soils or should be placed in an on-Site soil repository. Additional provisions of the Notice of AUL for the repositories relative to the asbestos include the following: (1) not allowing excavation of these soils except by persons who are trained to work with asbestos contamination and under the oversight of a certified asbestos monitor and/or abatement contractor; and (2) the Soil Management Plan must include requirements for asbestos monitoring and decontamination procedures.

The principal risk drivers for the human health risk characterization are PCB and, to a lesser extent, dioxin (TCDD equivalence). Site-specific cleanup standards could be derived prior to beginning clean up to help in evaluating whether to place specific soil volumes in repositories or to transport the soils off-Site. However, based on GEC's experience given the complex mixture of OHM present in the soils, a quick, volume-specific risk assessment using MassDEP's ShortForm or GEC's risk assessment workbook would provide greater flexibility.

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

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EPCs	Table CW-1: Select chemicals and enter Exposure Point Concentrations (EPCs). Estimated risks are shown to the right.
C Eq	Table CW-2: Equations to calculate cancer risks
NC Eq	Table CW-3: Equations to calculate noncancer risks
Exp	Table CW-4: Definitions and exposure factors
Chem	Table CW-5: Chemical-specific data
Cyanide	Table CW-6: Cyanide Calculations

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

Courtyard: 0-3 Foot Interval
East End of Courtyard: 10/26/2016

ShortForm Version 10-12
Vlookup Version v0315

ELCR (all chemicals) = 4.6E-07
HI (all chemicals) = 5.0E-01

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

Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	$ELCR_{total}$	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{inh-GI}	Subchronic HQ_{inh}	HQ_{total}
POLYCHLORINATED BIPHENYLS (PCBs)	7.39E+00	1.3E-07	1.3E-07	3.4E-09	2.0E-10	2.6E-07	1.8E-01	1.8E-01	4.7E-03	1.4E-02	3.8E-01
ALIPHATICS C9 to C18	2.34E+02						2.9E-04	5.8E-04	7.5E-06	1.5E-05	8.9E-04
ALIPHATICS C19 to C36	3.77E+02						7.7E-05	1.6E-04	2.0E-06		2.4E-04
AROMATICS C11 to C22	7.98E+02						9.8E-04	3.3E-03	2.5E-05	5.9E-05	4.4E-03
ACENAPHTHENE	6.24E-01						1.2E-06	3.9E-06	3.0E-08	4.6E-08	5.1E-06
ACENAPHTHYLENE	2.17E-01						2.7E-07	9.0E-07	6.9E-09	1.6E-08	1.2E-06
ANTHRACENE	1.24E+00						4.6E-07	1.5E-06	1.2E-08	9.2E-08	2.1E-06
BENZO(a)ANTHRACENE	2.57E+00	4.9E-09	3.3E-09	1.3E-10	1.4E-10	8.5E-09	3.2E-06	2.1E-06	8.2E-08	1.9E-07	5.6E-06
BENZO(a)PYRENE	2.35E+00	4.5E-08	3.0E-08	1.2E-09	1.3E-09	7.8E-08	2.9E-06	1.9E-06	7.5E-08	1.8E-07	5.1E-06
BENZO(b)FLUORANTHENE	3.26E+00	6.3E-09	4.2E-09	1.6E-10	1.8E-10	1.1E-08	4.0E-06	2.7E-06	1.0E-07	2.4E-07	7.1E-06
BENZO(g,h,i)PERYLENE	1.40E+00						1.7E-06	5.8E-06	4.5E-08	1.0E-07	7.7E-06
BENZO(k)FLUORANTHENE	1.30E+00	2.5E-10	1.7E-10	6.5E-12	7.2E-12	4.3E-10	1.6E-06	1.1E-06	4.1E-08	9.7E-08	2.8E-06
CHRYSENE	3.03E+00	5.8E-10	3.9E-10	1.5E-11	1.7E-11	1.0E-09	3.7E-06	2.5E-06	9.7E-08	2.3E-07	6.6E-06
DIBENZO(a,h)ANTHRACENE	5.24E-01	1.0E-08	6.8E-09	2.6E-10	2.9E-10	1.7E-08	6.5E-07	4.3E-07	1.7E-08	3.9E-08	1.1E-06
FLUORANTHENE	7.27E+00						2.7E-05	9.0E-05	7.0E-07	5.4E-07	1.2E-04
FLUORENE	7.04E-01						6.5E-07	2.2E-06	1.7E-08	5.2E-08	2.9E-06
INDENO(1,2,3-cd)PYRENE	1.50E+00	2.9E-09	1.9E-09	7.5E-11	8.3E-11	5.0E-09	1.8E-06	1.2E-06	4.8E-08	1.1E-07	3.2E-06
METHYLNAPHTHALENE, 2-	1.27E+00						1.2E-04	3.9E-04	3.0E-06	9.5E-08	5.1E-04
NAPHTHALENE	3.52E-01						6.5E-07	2.2E-06	1.7E-08	4.4E-06	7.2E-06
PHENANTHRENE	5.86E+00						7.2E-06	2.4E-05	1.9E-07	4.4E-07	3.2E-05
PYRENE	6.38E+00						7.9E-06	2.6E-05	2.0E-07	4.8E-07	3.5E-05
BARIUM	3.84E+01						6.8E-04	6.8E-04	1.8E-05	2.9E-04	1.7E-03
MERCURY	3.80E-01						7.8E-04	1.6E-03	2.0E-05	4.7E-05	2.4E-03
VANADIUM	3.89E+01						5.3E-03	5.4E-03	1.4E-04	1.4E-03	1.2E-02
AROMATICS C9 to C10	4.59E+00						1.9E-05	3.8E-05	4.9E-07	3.4E-07	5.8E-05
BENZENE	4.83E-02	2.3E-11	7.0E-12	6.0E-13	1.0E-13	3.1E-11	5.9E-06	1.8E-06	1.5E-07	1.8E-07	8.1E-06
TOLUENE	1.71E-01						2.6E-07	8.0E-08	6.8E-09	1.3E-09	3.5E-07
CHLORDANE	9.40E-02	2.9E-10	1.2E-10	7.5E-12	2.5E-12	4.1E-10	2.3E-04	9.3E-05	6.0E-06	5.0E-07	3.3E-04
DIELDRIN	2.90E-02	4.1E-09	4.1E-09	1.1E-10	3.5E-11	8.3E-09	7.1E-04	7.2E-04	1.9E-05	6.0E-06	1.5E-03
TCDD, 2,3,7,8- (equivalents)	2.44E-05	3.2E-08	3.2E-08	8.3E-10	2.1E-10	6.5E-08	4.3E-02	4.3E-02	1.1E-03	4.5E-04	8.8E-02

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Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0315

Cancer Risk from Ingestion

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

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

Cancer Risk from Dermal Absorption

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

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

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
CSF	OHM-specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{c\text{-}ing}$	OHM-specific	dimensionless
$RAF_{c\text{-}derm}$	OHM-specific	dimensionless
$RAF_{c\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{(lifetime)}$	25,550	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM_{10}	60	$\mu g/m^3$

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Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0315

Noncancer Risk from Ingestion

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

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

Noncancer Risk from Dermal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM-specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM-specific	dimensionless
$RAF_{nc\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{noncancer}$	182	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM10	60	$µg/m^3$

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

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Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	mg/kg	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF_{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
$ED_{ing,derm}$ - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED_{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
$AP_{(lifetime)}$ - Averaging Period for lifetime	25,550	days	Represents 70 years
$AP_{(noncancer)}$ - Averaging Period for noncancer	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
AF - Adherence Factor	0.29	mg/cm^2	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR_{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm^2/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
$IFAF_{inh\text{-}gi}$ - Ingestion Fraction Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
$IFAF_{inh}$ - Inhalation Fraction Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM_{10}	60	$\mu g/m^3$	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

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

Vlookup Version v0315

Oil or Hazardous Material	Oral CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	$RAF_{c\text{-}inh}$	Inhalation CSF $(mg/kg\text{-}day)^{-1}$	Subchronic Oral RfD mg/kg-day	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}inh}$	Subchronic Inhalation RfD
POLYCHLORINATED BIPHENYLS (PCBs)	2.0E+00	1	0.1	1	3.5E-01	5.0E-05	1	0.1	1	5.7E-06
ALIPHATICS C9 to C18						1.0E+00	1	0.2	1	1.7E-01
ALIPHATICS C19 to C36						6.0E+00	1	0.2		
AROMATICS C11 to C22						3.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHENE						2.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHYLENE						3.0E-01	0.3	0.1	1	1.4E-01
ANTHRACENE						1.0E+00	0.3	0.1	1	1.4E-01
BENZO(a)ANTHRACENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(a)PYRENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(b)FLUORANTHENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(g,h,i)PERYLENE						3.0E-01	0.3	0.1	1	1.4E-01
BENZO(k)FLUORANTHENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
CHRYSENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
DIBENZO(a,h)ANTHRACENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
FLUORANTHENE						1.0E-01	0.3	0.1	1	1.4E-01
FLUORENE						4.0E-01	0.3	0.1	1	1.4E-01
INDENO(1,2,3-cd)PYRENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
METHYLNAPHTHALENE, 2-						4.0E-03	0.3	0.1	1	1.4E-01
NAPHTHALENE						2.0E-01	0.3	0.1	1	8.6E-04
PHENANTHRENE						3.0E-01	0.3	0.1	1	1.4E-01
PYRENE						3.0E-01	0.3	0.1	1	1.4E-01
BARIUM						7.0E-02	1	0.1	1	1.4E-03
MERCURY						3.0E-04	0.5	0.1	1	8.6E-05
VANADIUM						9.0E-03	1	0.1	1	2.9E-04
AROMATICS C9 to C10						3.0E-01	1	0.2	1	1.4E-01
BENZENE	5.5E-02	1	0.03	1	2.7E-02	1.0E-02	1	0.03	1	2.9E-03
TOLUENE						8.0E-01	1	0.03	1	1.4E+00
CHLORDANE	3.5E-01	1	0.04	1	3.5E-01	5.0E-04	1	0.04	1	2.0E-03

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

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Exp	Table CW-4: Definitions and exposure factors
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Construction Worker - Soil: Table CW-1
Exposure Point Concentration (EPC) and Risk
Based on Construction Worker 18-25 years of age

Courtyard: 3-6 Foot Interval
East End of Courtyard: 10/26/2016

ShortForm Version 10-12
Vlookup Version v0315

ELCR (all chemicals) = 5.8E-07
HI (all chemicals) = 6.5E-01

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

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	$ELCR_{total}$	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{inh-GI}	Subchronic HQ_{inh}	HQ_{total}
POLYCHLORINATED BIPHENYLS (PCBs)	9.80E+00	1.7E-07	1.7E-07	4.5E-09	2.6E-10	3.5E-07	2.4E-01	2.4E-01	6.3E-03	1.8E-02	5.1E-01
ALIPHATICS C9 to C18	4.72E+02						5.8E-04	1.2E-03	1.5E-05	2.9E-05	1.8E-03
ALIPHATICS C19 to C36	8.47E+02						1.7E-04	3.5E-04	4.5E-06		5.3E-04
AROMATICS C11 to C22	1.44E+00						1.8E-06	6.0E-06	4.6E-08	1.1E-07	7.9E-06
ACENAPHTHENE	1.21E+00						2.2E-06	7.5E-06	5.8E-08	9.0E-08	9.9E-06
ACENAPHTHYLENE	5.68E-01						7.0E-07	2.3E-06	1.8E-08	4.2E-08	3.1E-06
ANTHRACENE	1.44E+00						5.3E-07	1.8E-06	1.4E-08	1.1E-07	2.4E-06
BENZO(a)ANTHRACENE	2.08E+00	4.0E-09	2.7E-09	1.0E-10	1.2E-10	6.9E-09	2.6E-06	1.7E-06	6.6E-08	1.5E-07	4.5E-06
BENZO(a)PYRENE	1.60E+00	3.1E-08	2.1E-08	8.0E-10	8.9E-10	5.3E-08	2.0E-06	1.3E-06	5.1E-08	1.2E-07	3.5E-06
BENZO(b)FLUORANTHENE	1.92E+00	3.7E-09	2.5E-09	9.6E-11	1.1E-10	6.4E-09	2.4E-06	1.6E-06	6.1E-08	1.4E-07	4.2E-06
BENZO(g,h,i)PERYLENE	1.09E+00						1.3E-06	4.5E-06	3.5E-08	8.1E-08	6.0E-06
BENZO(k)FLUORANTHENE	1.07E+00	2.1E-10	1.4E-10	5.3E-12	5.9E-12	3.5E-10	1.3E-06	8.8E-07	3.4E-08	8.0E-08	2.3E-06
CHRYSENE	2.53E+00	4.9E-10	3.3E-10	1.3E-11	1.4E-11	8.4E-10	3.1E-06	2.1E-06	8.1E-08	1.9E-07	5.5E-06
DIBENZO(a,h)ANTHRACENE	7.24E-01	1.4E-08	9.3E-09	3.6E-10	4.0E-10	2.4E-08	8.9E-07	6.0E-07	2.3E-08	5.4E-08	1.6E-06
FLUORANTHENE	5.74E+00						2.1E-05	7.1E-05	5.5E-07	4.3E-07	9.3E-05
FLUORENE	2.10E+00						1.9E-06	6.5E-06	5.0E-08	1.6E-07	8.7E-06
INDENO(1,2,3-cd)PYRENE	1.17E+00	2.2E-09	1.5E-09	5.8E-11	6.5E-11	3.9E-09	1.4E-06	9.7E-07	3.7E-08	8.7E-08	2.5E-06
METHYLNAPHTHALENE, 2-	6.62E+00						6.1E-04	2.1E-03	1.6E-05	4.9E-07	2.7E-03
NAPHTHALENE	1.60E+00						3.0E-06	9.9E-06	7.7E-08	2.0E-05	3.3E-05
PHENANTHRENE	8.78E+00						1.1E-05	3.6E-05	2.8E-07	6.5E-07	4.8E-05
PYRENE	8.58E+00						1.1E-05	3.5E-05	2.7E-07	6.4E-07	4.7E-05
BARIUM	2.70E+01						4.8E-04	4.8E-04	1.2E-05	2.0E-04	1.2E-03
MERCURY	5.60E-02						1.1E-04	2.3E-04	3.0E-06	7.0E-06	3.6E-04
VANADIUM	2.43E+01						3.3E-03	3.3E-03	8.6E-05	9.0E-04	7.7E-03
AROMATICS C9 to C10	4.95E+00						2.0E-05	4.1E-05	5.3E-07	3.7E-07	6.2E-05
BENZENE	5.80E-02	2.8E-11	8.5E-12	7.3E-13	1.2E-13	3.7E-11	7.1E-06	2.2E-06	1.9E-07	2.2E-07	9.7E-06
TOLUENE	3.20E-01						4.9E-07	1.5E-07	1.3E-08	2.4E-09	6.6E-07
CHLORDANE	7.55E-01	2.3E-09	9.3E-10	6.0E-11	2.0E-11	3.3E-09	1.9E-03	7.5E-04	4.8E-05	4.0E-06	2.7E-03
DIELDRIN	1.51E-01	2.1E-08	2.1E-08	5.5E-10	1.8E-10	4.3E-08	3.7E-03	3.7E-03	9.6E-05	3.1E-05	7.6E-03
TCDD, 2,3,7,8- (equivalents)	3.23E-05	4.3E-08	4.3E-08	1.1E-09	2.8E-10	8.7E-08	5.7E-02	5.7E-02	1.5E-03	6.0E-04	1.2E-01

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Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0315

Cancer Risk from Ingestion

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

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

Cancer Risk from Dermal Absorption

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

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

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
CSF	OHM-specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{c\text{-}ing}$	OHM-specific	dimensionless
$RAF_{c\text{-}derm}$	OHM-specific	dimensionless
$RAF_{c\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{(lifetime)}$	25,550	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM_{10}	60	$\mu g/m^3$

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Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0315

Noncancer Risk from Ingestion

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

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

Noncancer Risk from Dermal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM-specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM-specific	dimensionless
$RAF_{nc\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{noncancer}$	182	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM10	60	$µg/m^3$

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

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	mg/kg	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF_{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
$ED_{ing,derm}$ - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED_{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
$AP_{(lifetime)}$ - Averaging Period for lifetime	25,550	days	Represents 70 years
$AP_{(noncancer)}$ - Averaging Period for noncancer	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
AF - Adherence Factor	0.29	mg/cm^2	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR_{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm^2/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
$IFAF_{inh\text{-}gi}$ - Ingestion Fraction Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
$IFAF_{inh}$ - Inhalation Fraction Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM_{10}	60	$\mu g/m^3$	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

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

Vlookup Version v0315

Oil or Hazardous Material	Oral CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	$RAF_{c\text{-}inh}$	Inhalation CSF $(mg/kg\text{-}day)^{-1}$	Subchronic Oral RfD mg/kg-day	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}inh}$	Subchronic Inhalation RfD
POLYCHLORINATED BIPHENYLS (PCBs)	2.0E+00	1	0.1	1	3.5E-01	5.0E-05	1	0.1	1	5.7E-06
ALIPHATICS C9 to C18						1.0E+00	1	0.2	1	1.7E-01
ALIPHATICS C19 to C36						6.0E+00	1	0.2		
AROMATICS C11 to C22						3.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHENE						2.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHYLENE						3.0E-01	0.3	0.1	1	1.4E-01
ANTHRACENE						1.0E+00	0.3	0.1	1	1.4E-01
BENZO(a)ANTHRACENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(a)PYRENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(b)FLUORANTHENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(g,h,i)PERYLENE						3.0E-01	0.3	0.1	1	1.4E-01
BENZO(k)FLUORANTHENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
CHRYSENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
DIBENZO(a,h)ANTHRACENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
FLUORANTHENE						1.0E-01	0.3	0.1	1	1.4E-01
FLUORENE						4.0E-01	0.3	0.1	1	1.4E-01
INDENO(1,2,3-cd)PYRENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
METHYLNAPHTHALENE, 2-						4.0E-03	0.3	0.1	1	1.4E-01
NAPHTHALENE						2.0E-01	0.3	0.1	1	8.6E-04
PHENANTHRENE						3.0E-01	0.3	0.1	1	1.4E-01
PYRENE						3.0E-01	0.3	0.1	1	1.4E-01
BARIUM						7.0E-02	1	0.1	1	1.4E-03
MERCURY						3.0E-04	0.5	0.1	1	8.6E-05
VANADIUM						9.0E-03	1	0.1	1	2.9E-04
AROMATICS C9 to C10						3.0E-01	1	0.2	1	1.4E-01
BENZENE	5.5E-02	1	0.03	1	2.7E-02	1.0E-02	1	0.03	1	2.9E-03
TOLUENE						8.0E-01	1	0.03	1	1.4E+00
CHLORDANE	3.5E-01	1	0.04	1	3.5E-01	5.0E-04	1	0.04	1	2.0E-03

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

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

Courtyard: 6-20 Foot Interval
East End of Courtyard: 10/26/2016

ShortForm Version 10-12
Vlookup Version v0315

ELCR (all chemicals) = 1.4E-07
HI (all chemicals) = 2.5E-01

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

Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	$ELCR_{total}$	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{inh-GI}	Subchronic HQ_{inh}	HQ_{total}
POLYCHLORINATED BIPHENYLS (PCBs)	9.97E-01	1.7E-08	1.8E-08	4.5E-10	2.6E-11	3.6E-08	2.5E-02	2.5E-02	6.4E-04	1.9E-03	5.2E-02
ALIPHATICS C9 to C18	6.38E+02						7.9E-04	1.6E-03	2.0E-05	4.0E-05	2.4E-03
ALIPHATICS C19 to C36	1.21E+03						2.5E-04	5.0E-04	6.4E-06		7.6E-04
AROMATICS C11 to C22	1.80E+03						2.2E-03	7.4E-03	5.7E-05	1.3E-04	9.8E-03
ACENAPHTHENE	3.14E-01						5.8E-07	1.9E-06	1.5E-08	2.3E-08	2.6E-06
ACENAPHTHYLENE	2.38E-01						2.9E-07	9.8E-07	7.6E-09	1.8E-08	1.3E-06
ANTHRACENE	1.22E+00						4.5E-07	1.5E-06	1.2E-08	9.1E-08	2.1E-06
BENZO(a)ANTHRACENE	1.14E+00	2.2E-09	1.5E-09	5.7E-11	6.3E-11	3.8E-09	1.4E-06	9.4E-07	3.6E-08	8.5E-08	2.5E-06
BENZO(a)PYRENE	8.78E-01	1.7E-08	1.1E-08	4.4E-10	4.9E-10	2.9E-08	1.1E-06	7.3E-07	2.8E-08	6.5E-08	1.9E-06
BENZO(b)FLUORANTHENE	1.09E+00	2.1E-09	1.4E-09	5.4E-11	6.0E-11	3.6E-09	1.3E-06	9.0E-07	3.5E-08	8.1E-08	2.4E-06
BENZO(g,h,i)PERYLENE	5.09E-01						6.3E-07	2.1E-06	1.6E-08	3.8E-08	2.8E-06
BENZO(k)FLUORANTHENE	5.22E-01	1.0E-10	6.7E-11	2.6E-12	2.9E-12	1.7E-10	6.4E-07	4.3E-07	1.7E-08	3.9E-08	1.1E-06
CHRYSENE	1.27E+00	2.4E-10	1.6E-10	6.3E-12	7.0E-12	4.2E-10	1.6E-06	1.1E-06	4.1E-08	9.5E-08	2.7E-06
DIBENZO(a,h)ANTHRACENE	2.83E-01	5.4E-09	3.7E-09	1.4E-10	1.6E-10	9.4E-09	3.5E-07	2.3E-07	9.0E-09	2.1E-08	6.1E-07
FLUORANTHENE	3.38E+00						1.2E-05	4.2E-05	3.2E-07	2.5E-07	5.5E-05
FLUORENE	2.31E+00						2.1E-06	7.2E-06	5.5E-08	1.7E-07	9.5E-06
INDENO(1,2,3-cd)PYRENE	5.70E-01	1.1E-09	7.4E-10	2.8E-11	3.2E-11	1.9E-09	7.0E-07	4.7E-07	1.8E-08	4.2E-08	1.2E-06
METHYLNAPHTHALENE, 2-	3.75E+00						3.5E-04	1.2E-03	9.0E-06	2.8E-07	1.5E-03
NAPHTHALENE	1.75E+00						3.2E-06	1.1E-05	8.4E-08	2.2E-05	3.6E-05
PHENANTHRENE	4.28E+00						5.3E-06	1.8E-05	1.4E-07	3.2E-07	2.3E-05
PYRENE	2.50E+00						3.1E-06	1.0E-05	8.0E-08	1.9E-07	1.4E-05
BARIUM	2.70E+01						4.8E-04	4.8E-04	1.2E-05	2.0E-04	1.2E-03
MERCURY	2.43E+01						5.0E-02	1.0E-01	1.3E-03	3.0E-03	1.5E-01
VANADIUM	2.83E+01						3.9E-03	3.9E-03	1.0E-04	1.1E-03	8.9E-03
AROMATICS C9 to C10	7.83E+01						3.2E-04	6.5E-04	8.3E-06	5.8E-06	9.8E-04
BENZENE	2.70E-01	1.3E-10	3.9E-11	3.4E-12	5.6E-13	1.7E-10	3.3E-05	1.0E-05	8.6E-07	1.0E-06	4.5E-05
TOLUENE	1.40E-01						2.2E-07	6.5E-08	5.6E-09	1.0E-09	2.9E-07
CHLORDANE	7.55E-01	2.3E-09	9.3E-10	6.0E-11	2.0E-11	3.3E-09	1.9E-03	7.5E-04	4.8E-05	4.0E-06	2.7E-03
DIELDRIN	1.51E-01	2.1E-08	2.1E-08	5.5E-10	1.8E-10	4.3E-08	3.7E-03	3.7E-03	9.6E-05	3.1E-05	7.6E-03
TCDD, 2,3,7,8- (equivalents)	3.29E-06	4.3E-09	4.4E-09	1.1E-10	2.9E-11	8.8E-09	5.8E-03	5.8E-03	1.5E-04	6.1E-05	1.2E-02

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Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0315

Cancer Risk from Ingestion

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

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

Cancer Risk from Dermal Absorption

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

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

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
CSF	OHM-specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{c\text{-}ing}$	OHM-specific	dimensionless
$RAF_{c\text{-}derm}$	OHM-specific	dimensionless
$RAF_{c\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{(lifetime)}$	25,550	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM_{10}	60	$\mu g/m^3$

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Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0315

Noncancer Risk from Ingestion

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

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

Noncancer Risk from Dermal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

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

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

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

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

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

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM-specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM-specific	dimensionless
$RAF_{nc\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{noncancer}$	182	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM10	60	$µg/m^3$

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

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	mg/kg	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF_{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
$ED_{ing,derm}$ - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED_{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
$AP_{(lifetime)}$ - Averaging Period for lifetime	25,550	days	Represents 70 years
$AP_{(noncancer)}$ - Averaging Period for noncancer	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
AF - Adherence Factor	0.29	mg/cm^2	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR_{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm^2/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
$IFAF_{inh\text{-}gi}$ - Ingestion Fraction Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
$IFAF_{inh}$ - Inhalation Fraction Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM_{10}	60	$\mu g/m^3$	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

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

Vlookup Version v0315

Oil or Hazardous Material	Oral CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	$RAF_{c\text{-}inh}$	Inhalation CSF $(mg/kg\text{-}day)^{-1}$	Subchronic Oral RfD mg/kg-day	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}inh}$	Subchronic Inhalation RfD
POLYCHLORINATED BIPHENYLS (PCBs)	2.0E+00	1	0.1	1	3.5E-01	5.0E-05	1	0.1	1	5.7E-06
ALIPHATICS C9 to C18						1.0E+00	1	0.2	1	1.7E-01
ALIPHATICS C19 to C36						6.0E+00	1	0.2		
AROMATICS C11 to C22						3.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHENE						2.0E-01	0.3	0.1	1	1.4E-01
ACENAPHTHYLENE						3.0E-01	0.3	0.1	1	1.4E-01
ANTHRACENE						1.0E+00	0.3	0.1	1	1.4E-01
BENZO(a)ANTHRACENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(a)PYRENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(b)FLUORANTHENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
BENZO(g,h,i)PERYLENE						3.0E-01	0.3	0.1	1	1.4E-01
BENZO(k)FLUORANTHENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
CHRYSENE	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
DIBENZO(a,h)ANTHRACENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
FLUORANTHENE						1.0E-01	0.3	0.1	1	1.4E-01
FLUORENE						4.0E-01	0.3	0.1	1	1.4E-01
INDENO(1,2,3-cd)PYRENE	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
METHYLNAPHTHALENE, 2-						4.0E-03	0.3	0.1	1	1.4E-01
NAPHTHALENE						2.0E-01	0.3	0.1	1	8.6E-04
PHENANTHRENE						3.0E-01	0.3	0.1	1	1.4E-01
PYRENE						3.0E-01	0.3	0.1	1	1.4E-01
BARIUM						7.0E-02	1	0.1	1	1.4E-03
MERCURY						3.0E-04	0.5	0.1	1	8.6E-05
VANADIUM						9.0E-03	1	0.1	1	2.9E-04
AROMATICS C9 to C10						3.0E-01	1	0.2	1	1.4E-01
BENZENE	5.5E-02	1	0.03	1	2.7E-02	1.0E-02	1	0.03	1	2.9E-03
TOLUENE						8.0E-01	1	0.03	1	1.4E+00
CHLORDANE	3.5E-01	1	0.04	1	3.5E-01	5.0E-04	1	0.04	1	2.0E-03

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Table 2.4
Cancer Dose Response Values:
Oral Slope Factors

Chemical Name	CAS Number	Oral Slope Factor 1/(mg/kg/day)	Weight of Evidence Class	Source	Date Last Revised
acenaphthene	83-32-9			MADEP, 6/14	
acenaphthylene	208-96-8		D	MADEP, 6/14	
anthracene	120-12-7		D	MADEP, 6/14	
barium	7440-39-3			MADEP, 6/14	
benzene	71-43-2	5.5E-02	A	MADEP, 6/14	
benzo(a)anthracene	56-55-3	7.3E-01	B2	MADEP, 6/14	
benzo(a)pyrene	50-32-8	7.3E+00	B2	MADEP, 6/14	
benzo(b)fluoranthene	205-99-2	7.3E-01	B2	MADEP, 6/14	
benzo(k)fluoranthene	207-08-9	7.3E-02	B2	MADEP, 6/14	
benzo(ghi)perylene	191-24-2			MADEP, 6/14	
beryllium	7440-41-7		B1	MADEP, 6/14	
cadmium	7440-43-9		B1	MADEP, 6/14	
chlordane	57-74-9	3.5E-01	B2	MADEP, 6/14	
chromium (III)	16065-83-1			MADEP, 6/14	
chrysene	218-01-9	7.3E-02	B2	MADEP, 6/14	
dibenzo(a,h)anthracene	53-70-3	7.3E+00	B2	MADEP, 6/14	
DDE	72-55-9	3.4E-01	B2	MADEP, 6/14	
DDT	50-29-3	3.4E-01	B2	MADEP, 6/14	
dieldrin	60-57-1	1.6E+01	B2	MADEP, 6/14	
dioxin (TCDD equivalents)	1746-01-6	1.5E+05	B2	MADEP, 6/14	
fluoranthene	206-44-0		D	MADEP, 6/14	
fluorene	86-73-7			MADEP, 6/14	
indeno(123-cd)pyrene	193-39-5	7.3E-01	B2	MADEP, 6/14	
lead	7439-92-1		B2	MADEP, 6/14	
mercury	7439-97-6		D	MADEP, 12/09	
2-methylnaphthalene	91-57-6			MADEP, 6/14	
naphthalene	91-20-3			MADEP, 6/14	
nickel	7440-02-0		A	MADEP, 6/14	
phenanthrene	85-01-8		D	MADEP, 6/14	
polychlorinated biphenyls	1336-36-3	2.0E+00	B2	MADEP, 6/14	
pyrene	129-00-0		D	MADEP, 6/14	
thallium	7440-28-0			MADEP, 6/14	
toluene	108-88-3		D	MADEP, 6/14	
vanadium	7440-62-2			MADEP, 6/14	
zinc	7440-66-6		D	MADEP, 6/14	
C9-C18 Aliphatics	N/A			MADEP, 6/14	
C19-C36 Aliphatics	N/A			MADEP, 6/14	
C9-C10 Aromatics	N/A		No Data	MADEP, 5/09	
C11-C22 Aromatics	N/A			MADEP, 6/14	

Notes: mg/kg/day = milligrams per kilogram body weight per day
N/A = not available

Weight of Evidence:
A = Human carcinogen
B1 = Probable human carcinogen
B2 = Probable human carcinogen
C = Possible human carcinogen
D = Not classifiable as to human carcinogenicity
E = Evidence of noncarcinogenicity for humans

References: MADEP, 6/14. MCP Toxicity excel spreadsheet used for the development of the MCP Numerical Standards

Table 2.5
Cancer Dose Response Values:
Inhalation Unit Risks Factors

Chemical Name	CAS Number	Unit Risk Factor 1/(mg/cu. m)	Weight of Evidence Class	Source	Date Last Revised
acenaphthene	83-32-9			MADEP 6/14	
acenaphthylene	208-96-8		D	MADEP 6/14	
anthracene	120-12-7		D	MADEP 6/14	
barium	7440-39-3			MADEP 6/14	
benzene	71-43-2	7.8E-03	A	MADEP 6/14	
benzo(a)anthracene	56-55-3	2.1E-01	B2	MADEP 6/14	
benzo(a)pyrene	50-32-8	2.1E+00	B2	MADEP 6/14	
benzo(b)fluoranthene	205-99-2	2.1E-01	B2	MADEP 6/14	
benzo(k)fluoranthene	207-08-9	2.1E-02	B2	MADEP 6/14	
benzo(ghi)perylene	191-24-2			MADEP 6/14	
beryllium	7440-41-7	2.4E+00	B1	MADEP 6/14	
cadmium	7440-43-9	1.8E+00	B1	MADEP 6/14	
chlordane	57-74-9	1.0E-01	B2	MADEP 6/14	
chromium (III)	16065-83-1			MADEP 6/14	
chrysene	218-01-9	2.1E-02	B2	MADEP 6/14	
dibenzo(a,h)anthracene	53-70-3	2.1E+00	B2	MADEP 6/14	
DDE	72-55-9	9.7E-02	B2	MADEP 6/14	
DDT	50-29-3	9.7E-02	B2	MADEP 6/14	
dieldrin	60-57-1	4.6E+00	B2	MADEP 6/14	
dioxin (TCDD equivalents)	1746-01-6	3.3E+04	B2	MADEP 6/14	
fluoranthene	206-44-0		D	MADEP 6/14	
fluorene	86-73-7			MADEP 6/14	
indeno(123-cd)pyrene	193-39-5	2.1E-01	B2	MADEP 6/14	
lead	7439-92-1		B2	MADEP 6/14	
mercury	7439-97-6		D	MADEP 12/09	
2-methylnaphthalene	91-57-6			MADEP 6/14	
naphthalene	91-20-3			MADEP 6/14	
nickel	7440-02-0	4.8E-01	A	MADEP 6/14	
phenanthrene	85-01-8		D	MADEP 6/14	
polychlorinated biphenyls	1336-36-3	1.0E-01	B2	MADEP 6/14	
pyrene	129-00-0		D	MADEP 6/14	
thallium	7440-28-0			MADEP 6/14	
toluene	108-88-3		D	MADEP 6/14	
vanadium	7440-62-2			MADEP 6/14	
zinc	7440-66-6		D	MADEP 6/14	
C9-C18 Aliphatics	N/A			MADEP 6/14	
C19-C36 Aliphatics	N/A			MADEP 6/14	
C9-C10 Aromatics	N/A			MADEP 5/09	
C11-C22 Aromatics	N/A			MADEP 6/14	

Notes: mg/cu. m. = milligrams per cubic meter

Weight of Evidence:
A = Human carcinogen
B1 = Probable human carcinogen
B2 = Probable human carcinogen
C = Possible human carcinogen
D = Not classifiable as to human carcinogenicity
E = Evidence of noncarcinogenicity for humans
N/A = Not available

References: MADEP, 6/14. MCP Toxicity excel spreadsheet used for the development of the MCP Numerical Standards

Table 2.6
Cancer Dose Response Values: Relative Absorption Factors (RAFs)

Chemical Name	CAS Number	Soil Ingestion RAF Cancer	Water Ingestion RAF Cancer	Soil Dermal RAF Cancer	Water Dermal RAF Cancer
acenaphthene	83-32-9	NC	NC	NC	NC
acenaphthylene	208-96-8	NC	NC	NC	NC
anthracene	120-12-7	NC	NC	NC	NC
barium	7440-39-3	NC	NC	NC	NC
benzene	71-43-2	1	1	0.03	1
benzo(a)anthracene	56-55-3	0.3	1	0.02	1
benzo(a)pyrene	50-32-8	0.3	1	0.02	1
benzo(b)fluoranthene	205-99-2	0.3	1	0.02	1
benzo(k)fluoranthene	207-08-9	0.3	1	0.02	1
benzo(ghi)perylene	191-24-2	NC	NC	NC	NC
beryllium	7440-41-7	1	1	0.03	1
cadmium	7440-43-9	NC	NC	NC	NC
chromium (III)	16065-83-1	NC	NC	NC	NC
chrysene	218-01-9	0.3	1	0.02	1
dibenzo(a,h)anthracene	53-70-3	0.3	1	0.02	1
DDE	72-55-9	1	1	0.03	1
DDT	50-29-3	1	1	0.03	1
dieldrin	60-57-1	1	1	0.1	1
dioxin (TCDD equivalents)	1746-01-6	1	1	0.1	1
ethylbenzene	100-41-4	NC	NC	NC	NC
fluoranthene	206-44-0	NC	NC	NC	NC
fluorene	86-73-7	NC	NC	NC	NC
indeno(123-cd)pyrene	193-39-5	0.3	1	0.02	1
lead	7439-92-1	NC	NC	NC	NC
mercury	7439-97-6	NC	NC	NC	NC
2-methylnaphthalene	91-57-6	NC	NC	NC	NC
naphthalene	91-20-3	NC	NC	NC	NC
nickel	7440-02-0	NC	NC	NC	NC
phenanthrene	85-01-8	NC	NC	NC	NC
polychlorinated biphenyls	1336-36-3	1	1	0.1	1
pyrene	129-00-0	NC	NC	NC	NC
thallium	7440-28-0	NC	NC	NC	NC
toluene	108-88-3	NC	NC	NC	NC
vanadium	7440-62-2	NC	NC	NC	NC
zinc	7440-66-6	NC	NC	NC	NC
C9-C18 Aliphatics	N/A	NC	NC	NC	NC
C19-C36 Aliphatics	N/A	NC	NC	NC	NC
C9-C10 Aromatics	N/A	NC	NC	NC	NC
C11-C22 Aromatics	N/A	NC	NC	NC	NC

Notes: (1) RAF values from MADEP (1994). Default value of one (1) assigned to dermal contact with water.
NC = RAF not provided because compound is not a Class A, B1, B2 or, when applicable, C carcinogen
N/A = not available or because no oral cancer slope factor is available.

References: MADEP, 6/14. MCP Toxicity excel spreadsheet used for the development of the MCP Numerical Standards.

Table 3.3
Calculation of Lifetime Average Daily Dose for Soil Exposure: Resident, aged 1 to 2 Years (East End of Courtyard: 10/26/2016)

Receptor: Resident, aged 1-31 years

		Exposure Point:	East End of Courtyard: 0-3 Foot Interval		East End of Courtyard: 3-6 Foot Interval		East End of Courtyard: 6-20 Foot Interval		0.00E+00		0.00E+00	
Chemical Name	**CAS Number**	**Weight of Evidence Class**	**Dermal Contact**	**Incidental Ingestion**	**Dermal Contact**	**Incidental Ingestion**	**Dermal Contact**	**Incidental Ingestion**	**Dermal Contact**	**Incidental Ingestion**	**Dermal Contact**	**Incidental Ingestion**
benzene	71-43-2	A	2.42E-10	4.68E-09	2.90E-10	5.62E-09	3.15E-09	6.11E-08				
benzo(a)anthracene	56-55-3		8.57E-09	7.47E-08	6.94E-09	6.05E-08	8.87E-09	7.73E-08				
benzo(a)pyrene	50-32-8		7.84E-09	6.83E-08	5.34E-09	4.65E-08	6.83E-09	5.96E-08				
benzo(b)fluoranthene	205-99-2		1.09E-08	9.48E-08	6.40E-09	5.58E-08	8.48E-09	7.39E-08				
benzo(k)fluoranthene	207-08-9		4.67E-09	4.07E-08	3.64E-09	3.17E-08	4.06E-09	3.54E-08				
chlordane	57-74-9		7.84E-10	9.11E-09	6.30E-09	7.32E-08	1.47E-08	1.71E-07				
chrysene	218-01-9		1.01E-08	8.81E-08	8.44E-09	7.36E-08	9.88E-09	8.62E-08				
dibenzo(a,h)anthracene	53-70-3		1.75E-09	1.52E-08	2.41E-09	2.11E-08	2.20E-09	1.92E-08				
dieldrin	60-57-1		4.84E-10	2.81E-09	2.52E-09	1.46E-08	5.88E-09	3.41E-08				
dioxin (TCDD equivalents)	1746-01-6		4.07E-13	2.36E-12	5.39E-13	3.13E-12	1.28E-13	7.44E-13				
indeno(123-cd)pyrene	193-39-5		5.00E-09	4.36E-08	3.90E-09	3.40E-08	4.46E-09	3.89E-08				
polychlorinated biphenyls	1336-36-3		1.23E-07	7.16E-07	1.63E-07	9.50E-07	3.88E-08	2.25E-07				

Formula: Lifetime Average Daily Dose (LADD) for exposure to soils via ingestion (ing) and dermal contact

$$\text{LADD-dermal} = \frac{[\text{OHM-soil}]*SA*AF*RAF*EF*ED*EP*C}{BW*AP}$$

$$\text{LADD-ing} = \frac{[\text{OHM-soil}]*IR*RAF*EF*ED*EP*C}{BW*AP}$$

Unit: LADD, mg/kg/day

Receptor: Resident, aged 1 to 31 years

Description	**Abbreviation**	**Unit**	**Default Value**	**Source**	**Site-Specific Value**	**Source / Description**	**Input Value**
Exposure point concentration	[OHM-soil]	mg/kg			See Soil EPC Table		See Soil EPC Table
Skin surface area in contact with soil on days exposed	SA	square centimeter/day	4427	[1], child, aged 8 to 15 years (face, hands, forearms, lower legs and feet)			0.00E+00
			5653	[1], adult, aged 15 to 31 years (face, hands, forearms, lower legs and feet)			0.00E+00
			2431	[1], child, aged 1-8 years (face, hands, forearms, lower legs and feet)	1670	child, aged 1 to 2 years (face, hands, forearms, lower legs and feet)	1.67E+03
Mass of soil adhered to the unit surface area of skin exposed	AF	mg/sq. cm.	0.35	[2], child, aged 1-8 years	3.50E-01	child, aged 1 to 2 years	3.50E-01
			0.13	[2], adult, aged 15-31 years			0.00E+00
			0.14	[2], older child, aged 8-15 years			0.00E+00
Relative Absorption Factor	RAF	unitless	See RAF Table				See RAF Table
Exposure frequency: # exposure events during EP / # days in EP	EF	events/year	150	[1] 5 days per week during the 30 warmest weather weeks of the year	78	For 0-3 and 3-6 foot interval soils, exposure presumed to occur three days per week during a six month construction period (F170); and for 6-11 foot interval soils, exposure presumed to occur seven days per week during a six month construction period (J170).	1.82E+02
Exposure duration: typical duration of each exposure event	ED	years/event	2.74E-03	1 day per event or 1/365 of a year per event			2.74E-03
Exposure period: period of time over which exposure may occur	EP	years	7	[1], child, aged 8 to 15 years			7.00E+00
			16	[1], adult, aged 15 to 31 years			1.60E+01
			7	[1], young child, aged 1-8 years	1.0	subchronic exposure of 1 year old boy or girl (Subchronic)	1.00E+00
Unit Conversion Factor	C	kg/mg	1.00E-06	for dermal contact			1.00E-06
Unit Conversion Factor	C	kg/mg	1.00E-06	for ingestion			1.00E-06
Body weight of the receptor during the AP	BW	kg	39.9	[1], child, aged 8-15 years			3.99E+01
			58.7	[1], adult, aged 15 to 31 years			5.87E+01
			17.0	[1], young child, aged 1-8 years	1.07E+01	subchronic exposure of 1 year old boy or girl	1.07E+01
Averaging Period	AP	years	70	[1]			7.00E+01
Ingestion rate	IR	mg/day	50	[1], age 8 or greater			5.00E+01
			100	[1], age 1-8 years			1.00E+02

References:

[1] MADEP's Guidance for Disposal Site Risk Characterization in Support of the Massachusetts Contingency Plan, Interim Final Policy BWSC/ORS-95-141 [Updated using exposure assumptions of MADEP's Method 1 Numerical Standard Development Workbook, 5/2009].

[2] MADEP's Technical Update, Weighted Skin-Soil Adherence Factors, April 2002.

Table 3.4
Calculation of Lifetime Average Daily Exposure from Inhalation of Dust: Resident, aged 1 to 2 Years (East End of Courtyard: 10/26/2016)

Receptor: Resident, aged 1 to 31 years

Chemical Name	CAS Number	Weight of Evidence Class	East End of Courtyard: 0-3 Foot Interval	East End of Courtyard: 3-6 Foot Interval	East End of Courtyard: 6-20 Foot Interval				
benzene	71-43-2		2.1E-11	2.5E-11	1.2E-10				
benzo(a)anthracene	56-55-3		1.1E-09	8.9E-10	4.9E-10				
benzo(a)pyrene	50-32-8		1.0E-09	6.8E-10	3.8E-10				
benzo(b)fluoranthene	205-99-2		1.4E-09	8.2E-10	4.7E-10				
benzo(k)fluoranthene	207-08-9		6.0E-10	4.7E-10	2.2E-10				
chlordane	57-74-9		4.0E-11	3.2E-10	3.2E-10				
chrysene	218-01-9		1.3E-09	1.1E-09	5.4E-10				
dibenzo(a,h)anthracene	53-70-3		2.2E-10	3.1E-10	1.2E-10				
dieldrin	60-57-1		1.2E-11	6.5E-11	6.5E-11				
dioxin (TCDD equivalents)	1746-01-6		1.0E-14	1.4E-14	1.4E-15				
indeno(123-cd)pyrene	193-39-5		6.4E-10	5.0E-10	2.4E-10				
polychlorinated biphenyls	1336-36-3		3.2E-09	4.2E-09	4.3E-10				

A = USEPA Known Human Carcinogen
B1 or B2 = USEPA Probable Human Carcinogen
C = USEPA Possible Human Carcinogen
NC or blank space = Not a carcinogen or insufficient information

Formula: Lifetime Average Daily Exposure (LADE) via inhalation (ihl) of dusts

$$LADE\text{-}ihl = \frac{[OHM\text{-}dust]*EF*ED*EP*C}{AP}$$

Unit: LADE, mg/cu m

Receptor: Resident, aged 1 to 31 years

Description	Abbreviation	Unit	Default Value	Source	Site-Specific Value	Source / Description	Input Value
Exposure point concentration	[OHM-dust]	ug/cu. m.			See Dust EPC Table		See Dust EPC Table
Exposure frequency: # exposure events during EP / # days in EP	EF	events/year	150	[1] 5 days per week during the 30 warmest weather weeks of the year			0.00E+00
			150	[1] 5 days per week during the 30 warmest weather weeks of the year	182	Seven days per week during a six-month construction project, during age 1-2 years	1.82E+02
Exposure duration: typical duration of each exposure event	ED	years/event	2.74E-03	1 day per event or 1/365 of a year			2.74E-03
Exposure period: period of time over which exposure may occur	EP	years	23	[1], from age 8 to 31 years			2.30E+01
			7	[1], from age 1 to 8 years	1.00E+00	Presume exposure occurs during a construction project from age 1 to 2 years of age, to either a girl or boy.	1.00E+00
Unit Conversion Factor	C	mg/ug	1.00E-03	for inhalation			1.00E-03
Averaging Period	AP	years	70	[1]			7.00E+01

References:

[1] MADEP's Guidance for Disposal Site Risk Characterization in Support of the Massachusetts Contingency Plan, Interim Final Policy BWSC/ORS-95-141

Table 4.2
Calculation of Excess Lifetime Cancer Risk (ELCR) for Exposure to Soil and Dust: Resident, aged 1 to 2 Years (East End of Courtyard: 10/26/2016)

Receptor: Resident, aged 1 to 31 years																	
		Exposure Point:	East End of Courtyard: 0-3 Foot Interval			East End of Courtyard: 3-6 Foot Interval			East End of Courtyard: 6-20 Foot Interval			0.00E+00			0.00E+00		
Chemical Name	CAS Number	Weight of Evidence Class	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contact	Incidental Ingestion	Dust Inhalation
benzene	71-43-2		1.3E-11	2.6E-10	1.6E-13	1.6E-11	3.1E-10	1.9E-13	1.7E-10	3.4E-09	9.0E-13						
benzo(a)anthracene	56-55-3		6.3E-09	5.5E-08	2.3E-10	5.1E-09	4.4E-08	1.9E-10	6.5E-09	5.6E-08	1.0E-10						
benzo(a)pyrene	50-32-8		5.7E-08	5.0E-07	2.1E-09	3.9E-08	3.4E-07	1.4E-09	5.0E-08	4.3E-07	7.8E-10						
benzo(b)fluoranthene	205-99-2		7.9E-09	6.9E-08	2.9E-10	4.7E-09	4.1E-08	1.7E-10	6.2E-09	5.4E-08	9.7E-11						
benzo(k)fluoranthene	207-08-9		3.4E-10	3.0E-09	1.2E-11	2.7E-10	2.3E-09	9.7E-12	3.0E-10	2.6E-09	4.7E-12						
chlordane	57-74-9		2.7E-10	3.2E-09	4.0E-12	2.2E-09	2.6E-08	3.2E-11	5.1E-09	6.0E-08	3.2E-11						
chrysene	218-01-9		7.4E-10	6.4E-09	2.7E-11	6.2E-10	5.4E-09	2.3E-11	7.2E-10	6.3E-09	1.1E-11						
dibenzo(a,h)anthracene	53-70-3		1.3E-08	1.1E-07	4.7E-10	1.8E-08	1.5E-07	6.5E-10	1.6E-08	1.4E-07	2.5E-10						
dieldrin	60-57-1		7.7E-09	4.5E-08	5.7E-11	4.0E-08	2.3E-07	3.0E-10	9.4E-08	5.5E-07	3.0E-10						
dioxin (TCDD equivalents)	1746-01-6		6.1E-08	3.5E-07	3.4E-10	8.1E-08	4.7E-07	4.6E-10	1.9E-08	1.1E-07	4.6E-11						
indeno(123-cd)pyrene	193-39-5		3.7E-09	3.2E-08	1.3E-10	2.8E-09	2.5E-08	1.0E-10	3.3E-09	2.8E-08	5.1E-11						
polychlorinated biphenyls	1336-36-3		2.5E-07	1.4E-06	3.2E-10	3.3E-07	1.9E-06	4.2E-10	7.8E-08	4.5E-07	4.3E-11						
Total ELCR: Route and Expos. Pt.			4.0E-07	2.6E-06	4.0E-09	5.2E-07	3.2E-06	3.8E-09	2.8E-07	1.9E-06	1.7E-09	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Proportion of complete exposure point				1.0E+00			1.0E+00			1.0E+00			1.0E+00			1.0E+00	
Adjusted Total ELCR: Route and Expos. Pt.			4.0E-07	2.6E-06	4.0E-09	5.2E-07	3.2E-06	3.8E-09	2.8E-07	1.9E-06	1.7E-09	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Total ELCR: Expos. Pt.				3.0E-06			3.8E-06			2.2E-06			0.0E+00			0.0E+00	

Formula:

Cumulative ELCR = $\sum ELCR_{ingestion\ -\ chemicalspecific} + \sum ELCRdermalcontact - chemicalspecific + \sum ELCR_{inhalation:chemical\ -\ specific}$

ELCR ingestion-chemical specific = LADD-ingestion-chemical specific x Oral Slope Factor-chemical specific
ELCR dermal contact-chemical specific = LADD-dermal contact-chemical specific x Oral Slope Factor-chemical specific
ELCR ingestion-chemical specific = LADE-inhalation-chemical specific x Unit Risk-inhalation-chemical specific

ELCR = Excess Lifetime Cancer Risk, unit less
LADD = Lifetime Average Daily Dose, mg/kg/day
LADE = Lifetime Average Daily Exposure, mg/cu m

Table 5.2
Calculation of Total Excess Lifetime Cancer Risk (ELCR): Resident, aged 1 to 2 Years (East End of Courtyard: 10/26/2016)

Receptor	Resident							Youth Trespasser or Visitor						
Exposure Point #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Pathway:														
Soil Exposure Point:														
Incidental ingestion of soil, normal	2.6E-06	3.2E-06	1.9E-06											
Inhalation of dusts from disturbed soil	4.0E-09	3.8E-09	1.7E-09											
Dermal contact with soil	4.0E-07	5.2E-07	2.8E-07											
Total ELCR	3.0E-06	3.8E-06	2.2E-06											
MCP Cancer Risk Limit	1.E-05	1.E-05	1.E-05											
Does Total ELCR exceed MCP Cancer Risk Limit?	No	No	No											
Significant Risk of Harm?	No	No	No											

Definition of exposure points	Resident						
Exposure Point #	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Soil Exposure Point:	East End of Courtyard: 0-3 Foot Interval	East End of Courtyard: 3-6 Foot Interval	East End of Courtyard: 6-20 Foot Interval	0.00E+00	0.00E+00		

NO SINGLE FAMILY RESIDENCE. NO GARDENING OF EDIBLE PRODUCE.
EXPOSURE TO SOILS OCCURS ONLY DURING A SINGLE SIX-MONTH CONSTRUCTION PROJECT, AFTER WHICH TIME
THE SOILS ARE RETURNED TO EXCAVATION OR ARE TRANSPORTED OFF-SITE.
FOR 0-3 AND 3-6 FOOT INTERVAL SOILS, ASSUMES CONTROLS ARE USED TO LIMIT RESIDENTIAL EXPOSURE TO SOILS DURING CONSTRUCTION PROJECT.
PROTECTIVE COVER MUST REMAIN OVER SOILS EXCEPT DURING CONSTRUCTION OR UTILITY PROJECT, AFTER WHICH TIME THE PROTECTIVE COVER MUST BE RE-INSTALLED.

Table 2.1
Noncancer Dose-Response Values:
Oral Reference Dose

Chemical Name	CAS Number	Subchronic Oral RfD (mg/kg/day)	Uncertainty/ Modifying Factors	Source	Date Last Checked	Chronic Oral RfD (mg/kg/day)	Uncertainty/ Modifying Factors	Source	Date Last Checked
acenaphthene	83-32-9	2.0E-01		MADEP (6)		6.0E-02		MADEP (6)	
acenaphthylene	208-96-8	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
anthracene	120-12-7	1.0E+00		MADEP (6)		3.0E-01		MADEP (6)	
barium	7440-39-3	7.0E-02		MADEP (6)		2.0E-01		MADEP(6)	
benzene	71-43-2	1.0E-02		MADEP (6)		4.0E-03		MADEP (6)	
benzo(a)anthracene	56-55-3	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
benzo(a)pyrene	50-32-8	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
benzo(b)fluoranthene	205-99-2	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
benzo(k)fluoranthene	207-08-9	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
benzo(ghi)perylene	191-24-2	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
beryllium	7440-41-7	5.0E-03		MADEP (6)		2.0E-03		MADEP (6)	
cadmium	7440-43-9	5.0E-04		MADEP (6)		5.0E-04		MADEP (6)	
chlordane	57-74-9	5.0E-04		MADEP (6)		2.0E-03		MADEP (6)	
chromium (III)	16065-83-1	1.5E+00		MADEP (6)		1.5E+00		MADEP (6)	
chrysene	218-01-9	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
dibenzo(a,h)anthracene	53-70-3	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
DDE	72-55-9	5.0E-04		MADEP (6)		5.0E-04		MADEP (6)	
DDT	50-29-3	5.0E-04		MADEP (6)		5.0E-04		MADEP (6)	
dieldrin	60-57-1	5.0E-05		MADEP (6)		5.0E-05		MADEP (6)	
dioxin (TCDD equivalents)	1746-01-6	7.0E-10		MADEP (6)		7.0E-10		MADEP (6)	
fluoranthene	206-44-0	4.0E-01		MADEP (6)		4.0E-02		MADEP (6)	
fluorene	86-73-7	4.0E-01		MADEP (6)		4.0E-02		MADEP (6)	
indeno(123-cd)pyrene	193-39-5	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
lead	7439-92-1	7.5E-04		MADEP (6)		7.5E-04		MADEP (6)	
mercury (from mercuric chloride)	7439-97-6	3.0E-04		MADEP (6)	02/13	3.0E-04		MADEP (6)	02/13
2-methylnaphthalene	91-57-6	4.0E-03		MADEP (6)		4.0E-03		MADEP (6)	
naphthalene	91-20-3	2.0E-01		MADEP (6)		2.0E-02		MADEP (6)	
nickel (soluble salts)	7440-02-0	2.0E-02		MADEP (6)		2.0E-02		MADEP (6)	
phenanthrene	85-01-8	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
polychlorinated biphenyls, as PCB-1254	1336-36-3	5.0E-05		MADEP (6)		2.0E-05		MADEP (6)	
pyrene	129-00-0	3.0E-01		MADEP (6)		3.0E-05		MADEP (6)	
thallium	7440-28-0	8.0E-04		MADEP (6)		8.0E-05		MADEP (6)	
toluene	108-88-3	8.0E-01		MADEP (6)		8.0E-02		MADEP (6)	
vanadium	7440-62-2	9.0E-03		MADEP (6)		9.0E-03		MADEP (6)	
zinc	7440-66-6	3.0E-01		MADEP (6)		3.0E-01		MADEP (6)	
C9-C18 Aliphatics	N/A	1.0E+00		MADEP (6)		1.0E-01		MADEP (6)	
C19-C36 Aliphatics	N/A	6.0E+00		MADEP (6)		2.0E+00		MADEP (6)	
C9-C10 Aromatics	N/A	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	
C11-C22 Aromatics	N/A	3.0E-01		MADEP (6)		3.0E-02		MADEP (6)	

Notes:

Note 1: For all PAH with no subchronic or chronic RfD, the chronic RfD for naphthalene was used (MADEP(6))
Note 6: Conversion of the inhalation Reference Concentration to an oral Reference Dose, using the equation:
RfD = RfC x Ventilation Rate / BW = (RfC x V) / BW = (RfD x 20 m^3/day) / 70 kg
MADEP = Massachusetts Department of Environmental Protection
mg/kg/day = milligrams per kilogram body weight per day
N/A = Not available

Reference:

MADEP(6) = Dose response values updated from MADEP's Excel Workbook: Toxicity Values used to derive MCP Method 1 Numerical Standards (6/2014)
(C = SC) = the Chronic Oral RfD was adopted as the Subchronic Oral RfD

Table 2.1
Noncancer Dose-Response Values:
Oral Reference Dose

Chemical Name	CAS Number	Subchronic Oral RfD (mg/kg/day)	Uncertainty/ Modifying Factors	Source	Date Last Checked	Chronic Oral RfD (mg/kg/day)	Uncertainty/ Modifying Factors	Source	Date Last Checked

Table 2.2
Noncancer Dose-Response Values:
Inhalation Reference Concentrations

Chemical Name	CAS Number	Subchronic Inhalation RfC (mg/cu m)	Uncertainty/ Modifying Factors	Source	Date Last Checked	Chronic Inhalation RfC (mg/cu m)	Uncertainty/ Modifying Factors	Source	Date Last Checked
acenaphthene	83-32-9	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
acenaphthylene	208-96-8	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
anthracene	120-12-7	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
barium	7440-39-3	5.0E-03		MADEP(5)		5.0E-04		MADEP(5)	
benzene	71-43-2	1.0E-02		MADEP(5)		1.0E-02		MADEP(5)	
benzo(a)anthracene	56-55-3	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
benzo(a)pyrene	50-32-8	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
benzo(b)fluoranthene	205-99-2	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
benzo(k)fluoranthene	207-08-9	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
benzo(ghi)perylene	191-24-2	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
beryllium	7440-41-7	2.0E-05		MADEP(5)		2.0E-05		MADEP(5)	
cadmium	7440-43-9	2.0E-05		MADEP(5)		2.0E-05		MADEP(5)	
chlordane	57-74-9	7.0E-03		MADEP(5)		7.0E-04		MADEP(5)	
chromium (III) (as metal)	16065-83-1	3.0E-04		MADEP(5)		1.0E-04		MADEP(5)	
chrysene	218-01-9	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
dibenzo(a,h)anthracene	53-70-3	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
DDE	72-55-9	1.8E-03		MADEP(5)		1.8E-03		MADEP(5)	
DDT	50-29-3	1.8E-03		MADEP(5)		1.8E-03		MADEP(5)	
dieldrin	60-57-1	1.8E-04		MADEP(5)		1.8E-04		MADEP(5)	
dioxin (TCDD equivalents)	1746-01-6			MADEP(5)				MADEP(5)	
fluoranthene	206-44-0	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
fluorene	86-73-7	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
indeno(123-cd)pyrene	193-39-5	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
lead	7439-92-1	1.0E-03		MADEP(5)		1.0E-03		MADEP(5)	
mercury	7439-97-6	3.0E-04		MADEP(5)	02/13	3.0E-04		MADEP(5)	02/13
2-methylnaphthalene	91-57-6	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
naphthalene	91-20-3	3.0E-03		MADEP(5)		3.0E-03		MADEP(5)	
nickel	7440-02-0	1.0E-03		MADEP(5)		1.0E-03		MADEP(5)	
phenanthrene	85-01-8	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
polychlorinated biphenyls	1336-36-3	2.0E-05		MADEP(5)		2.0E-05		MADEP(5)	
pyrene	129-00-0	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	
thallium	7440-28-0	1.4E-05		MADEP(5)		1.4E-05		MADEP(5)	
toluene	108-88-3	5.0E+00		MADEP(5)		5.0E+00		MADEP(5)	
vanadium	7440-62-2	1.0E-03		MADEP(5)		1.0E-03		MADEP(5)	
zinc	7440-66-6	1.4E-03		MADEP(5)		1.4E-03		MADEP(5)	
C9-C18 Aliphatics	N/A	6.0E-01		MADEP(5)		2.0E-01		MADEP(5)	
C19-C36 Aliphatics	N/A	6.0E-01		Note 2		2.0E-01		Note 2	
C9-C10 Aromatics	N/A	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	10/02
C11-C22 Aromatics	N/A	5.0E-01		MADEP(5)		5.0E-02		MADEP(5)	

Notes:

Note 1: For PAHs with no RfCs, the chronic RfC for naphthalene was used as a surrogate
Note 2: For C19-C36 aliphatics, the chronic RfC for C9-C18 aliphatics was used as a surrogate
Note 3: Conversion of the oral Reference Dose to an inhalation Reference Concentration, using the equation:
RfC = RfD x BW / Ventilation Rate = (RfD x BW) /V = (RfD x 70 kg) / 20 m^3/day
MADEP = Massachusetts Department of Environmental Protection
mg/cu m = milligrams per cubic meter of air

References:

MADEP(5) = Toxicity Spreadsheet and reference page for in excel workbook "Development of MCP Risk-Based Levels for Soil and Groundwater" (6/2014)
(C = SC) = the Chronic Inhalation RfC was adopted as the Subchronic Inhalation RfC

Table 2.3
Relative Absorption Factors: Non-Cancer

Chemical Name	CAS Number	Soil Ingestion RAF	Water Ingestion RAF	Soil Dermal RAF	Water Dermal RAF
acenaphthene	83-32-9	0.3	1	0.1	1
acenaphthylene	208-96-8	0.3	1	0.1	1
anthracene	120-12-7	0.3	1	0.1	1
barium	7440-39-3	1	1	0.1	1
benzene	71-43-2	1	1	0.03	1
benzo(a)anthracene	56-55-3	0.3	1	0.02	1
benzo(a)pyrene	50-32-8	0.3	1	0.02	1
benzo(b)fluoranthene	205-99-2	0.3	1	0.02	1
benzo(k)fluoranthene	207-08-9	0.3	1	0.02	1
benzo(ghi)perylene	191-24-2	0.3	1	0.1	1
beryllium	7440-41-7	1	1	0.1	1
cadmium	7440-43-9	0.5	1	0.01	1
chlordane	57-74-9	1	1	0.04	1
chromium (III)	16065-83-1	1	1	0.1	1
chrysene	218-01-9	0.3	1	0.02	1
dibenzo(a,h)anthracene	53-70-3	0.3	1	0.02	1
DDD	72-54-8	1	1	0.2	1
DDE	72-55-9	1	1	0.03	1
DDT	50-29-3	1	1	0.03	1
dieldrin	60-57-1	1	1	0.1	1
dioxin (TCDD equivalent)	1746-01-6	1	1	0.1	1
fluoranthene	206-44-0	0.3	1	0.1	1
fluorene	86-73-7	0.3	1	0.1	1
indeno(123-cd)pyrene	193-39-5	0.3	1	0.02	1
lead	7439-92-1	0.5	1	0.006	1
mercury	7439-97-6	1	1	0.05	1
2-methylnaphthalene	91-57-6	0.3	1	0.1	1
naphthalene	91-20-3	0.3	1	0.1	1
nickel	7440-02-0	1	1	0.2	1
phenanthrene	85-01-8	0.3	1	0.1	1
polychlorinated biphenyls	1336-36-3	1	1	0.1	1
pyrene	129-00-0	0.3	1	0.1	1
thallium	7440-28-0	1	1	0.01	1
toluene	108-88-3	1	1	0.03	1
vanadium	7440-62-2	1	1	0.1	1
zinc	7440-66-6	1	1	0.1	1
C9-C18 Aliphatics	N/A	1	1	0.2	1
C19-C36 Aliphatics	N/A	1	1	0.2	1
C9-C10 Aromatics	N/A	1	0.91	0.5	1
C11-C22 Aromatics	N/A	0.3	1	0.1	1

Notes: (1) A default value of one (1) was assigned to dermal contact with water.

References: MADEP, 2014. Dose response values updated from MADEP's Excel Workbook: Toxicity Values used to derive MCP Method 1 Numerical Standards (6/2014)

Table 1.1
Soil Exposure Point Concentrations and Soil Concentrations used to Derive Dust Exposure Point Concentrations (East End of Courtyard: 10/26/2016)

Chemical Name	CAS Number	East End of Courtyard: 0-3 Foot Interval	East End of Courtyard: 3-6 Foot Interval	East End of Courtyard: 6-20 Foot Interval		
acenaphthene	83-32-9	6.24E-01	1.21E+00	3.14E-01		
acenaphthylene	208-96-8	2.17E-01	5.68E-01	2.38E-01		
anthracene	120-12-7	1.24E+00	1.44E+00	1.22E+00		
barium	7440-39-3	3.84E+01	2.70E+01	2.70E+01		
benzene	71-43-2	4.83E-02	5.80E-02	2.70E-01		
benzo(a)anthracene	56-55-3	2.57E+00	2.08E+00	1.14E+00		
benzo(a)pyrene	50-32-8	2.35E+00	1.60E+00	8.78E-01		
benzo(b)fluoranthene	205-99-2	3.26E+00	1.92E+00	1.09E+00		
benzo(k)fluoranthene	207-08-9	1.40E+00	1.09E+00	5.22E-01		
benzo(ghi)perylene	191-24-2	1.30E+00	1.07E+00	5.09E-01		
beryllium	7440-41-7					
chlordane	57-74-9	9.40E-02	7.55E-01	7.55E-01		
chromium (III)	16065-83-1					
chrysene	218-01-9	3.03E+00	2.53E+00	1.27E+00		
dibenzo(a,h)anthracene	53-70-3	5.24E-01	7.24E-01	2.83E-01		
DDE	72-55-9					
DDT	50-29-3					
dieldrin	60-57-1	2.90E-02	1.51E-01	1.51E-01		
dioxin (TCDD equivalents)	1746-01-6	2.44E-05	3.23E-05	3.29E-06		
fluoranthene	206-44-0	7.27E+00	5.74E+00	3.38E+00		
fluorene	86-73-7	7.04E-01	2.10E+00	2.31E+00		
indeno(123-cd)pyrene	193-39-5	1.50E+00	1.17E+00	5.73E-01		
lead	7439-92-1					
mercury (from mercuric chloride)	7439-97-6	3.80E-01	5.60E-02	5.60E-02		
2-methylnaphthalene	91-57-6	1.27E+00	6.62E+00	3.75E+00		
naphthalene	91-20-3	3.52E-01	1.60E+00	1.75E+00		
nickel (soluble salts)	7440-02-0					
phenanthrene	85-01-8	5.86E+00	8.78E+00	4.28E+00		
polychlorinated biphenyls, as PCB-1254	1336-36-3	7.39E+00	9.80E+00	9.97E-01		
pyrene	129-00-0	6.38E+00	8.58E+00	2.50E+00		
thallium	7440-28-0					
toluene	108-88-3	1.71E-01		1.40E-01		
vanadium	7440-62-2	3.89E+01	2.43E+01	2.83E+01		
zinc	7440-66-6					
C9-C18 Aliphatics	N/A	2.34E+02	4.72E+02	6.38E+02		
C19-C36 Aliphatics	N/A	3.77E+02	8.47E+02	1.21E+03		
C9-C10 Aromatics	N/A	4.59E+00	4.95E+00	7.83E+01		
C11-C22 Aromatics	N/A	7.98E+02	1.63E+03	1.80E+03		

unit, milligram per kilogram (mg/kg), ppm
Abbreviations:

Table 1.2
Exposure Point Concentrations for Dust (East End of Courtyard: 10/26/2016)

Chemical Name	CAS Number	East End of Courtyard: 0-3 Foot Interval	East End of Courtyard: 3-6 Foot Interval	East End of Courtyard: 6-20 Foot Interval	0.00	0.00	0.00	0.00
acenaphthene	83-32-9	3.74E-05	7.26E-05	1.88E-05				
acenaphthylene	208-96-8	1.30E-05	3.41E-05	1.43E-05				
anthracene	120-12-7	7.44E-05	8.64E-05	7.32E-05				
barium	7440-39-3	2.30E-03	1.62E-03	1.62E-03				
benzene	71-43-2	2.90E-06	3.48E-06	1.62E-05				
benzo(a)anthracene	56-55-3	1.54E-04	1.25E-04	6.84E-05				
benzo(a)pyrene	50-32-8	1.41E-04	9.60E-05	5.27E-05				
benzo(b)fluoranthene	205-99-2	1.96E-04	1.15E-04	6.54E-05				
benzo(k)fluoranthene	207-08-9	8.40E-05	6.54E-05	3.13E-05				
benzo(ghi)perylene	191-24-2	7.80E-05	6.42E-05	3.05E-05				
beryllium	7440-41-7							
chlordane	57-74-9	5.64E-06	4.53E-05	4.53E-05				
chromium (III)	16065-83-1							
chrysene	218-01-9	1.82E-04	1.52E-04	7.62E-05				
dibenzo(a,h)anthracene	53-70-3	3.14E-05	4.34E-05	1.70E-05				
DDE	72-55-9							
DDT	50-29-3							
dieldrin	60-57-1	1.74E-06	9.06E-06	9.06E-06				
dioxin (TCDD equivalents)	1746-01-6	1.46E-09	1.94E-09	1.97E-10				
fluoranthene	206-44-0	4.36E-04	3.44E-04	2.03E-04				
fluorene	86-73-7	4.22E-05	1.26E-04	1.39E-04				
indeno(123-cd)pyrene	193-39-5	9.00E-05	7.02E-05	3.44E-05				
lead	7439-92-1							
mercury (from mercuric chloride)	7439-97-6	2.28E-05	3.36E-06	3.36E-06				
2-methylnaphthalene	91-57-6	7.62E-05	3.97E-04	2.25E-04				
naphthalene	91-20-3	2.11E-05	9.60E-05	1.05E-04				
nickel (soluble salts)	7440-02-0							
phenanthrene	85-01-8	3.52E-04	5.27E-04	2.57E-04				
polychlorinated biphenyls, as PCB-1254	1336-36-3	4.43E-04	5.88E-04	5.98E-05				
pyrene	129-00-0	3.83E-04	5.15E-04	1.50E-04				
thallium	7440-28-0							
toluene	108-88-3	1.03E-05		8.40E-06				
vanadium	7440-62-2	2.33E-03	1.46E-03	1.70E-03				
zinc	7440-66-6							
C9-C18 Aliphatics	N/A	1.40E-02	2.83E-02	3.83E-02				
C19-C36 Aliphatics	N/A	2.26E-02	5.08E-02	7.27E-02				
C9-C10 Aromatics	N/A	2.75E-04	2.97E-04	4.70E-03				
C11-C22 Aromatics	N/A	4.79E-02	9.77E-02	1.08E-01				

Formula: EPC-air = [OHM]-soil * PF * PM-10 * CF

where, EPC-air = Exposure Point Concentration (ug/cu m)
[OHM]-soil = soil concentration (mg/kg)
PM-10 = respirable particulate concentration in air (60 ug/cu m)
PF = proportion of respirable particulate concentrations attributable to the site (1.0)
CF = conversion factor (1E-06 kg/ug)

Units: Soil EPC = mg/kg
Dust EPC = ug/cu m

Refer to Table 6.4 for Soil Concentrations used to derive Dust Exposure Point Concentrations

Table 3.1
Calculation of Average Daily Dose for Soil Exposure: Child Resident, aged 1 Year (East End of Courtyard: 10/26/2016)

Receptor: Child Resident, aged 1 year													
	Exposure Point:	East End of Courtyard: 0-3 Foot Interval		East End of Courtyard: 3-6 Foot Interval		East End of Courtyard: 6-20 Foot Interval		0.00E+00		0.00E+00		0.00E+00	
Chemical Name	CAS Number	Dermal Contact	Incidental Ingestion	Dermal Contact	Incidental Ingestion	Dermal Contact	Incidental Ingestion	Dermal Contact	Incidental Ingestion	Dermal Contact	Incidental Ingestion	Dermal Contact	Incidental Ingestion
acenaphthene	83-32-9	7.28E-07	3.74E-07	1.41E-06	7.25E-07	8.55E-07	4.39E-07						
acenaphthylene	208-96-8	2.53E-07	1.30E-07	6.63E-07	3.40E-07	6.48E-07	3.33E-07						
anthracene	120-12-7	1.45E-06	7.43E-07	1.68E-06	8.63E-07	3.32E-06	1.71E-06						
barium	7440-39-3	4.48E-05	7.67E-05	3.15E-05	5.39E-05	7.35E-05	1.26E-04						
benzene	71-43-2	1.69E-08	9.65E-08	2.03E-08	1.16E-07	2.21E-07	1.26E-06						
benzo(a)anthracene	56-55-3	6.00E-07	1.54E-06	4.86E-07	1.25E-06	6.21E-07	1.59E-06						
benzo(a)pyrene	50-32-8	5.49E-07	1.41E-06	3.74E-07	9.59E-07	4.78E-07	1.23E-06						
benzo(b)fluoranthene	205-99-2	7.61E-07	1.95E-06	4.48E-07	1.15E-06	5.94E-07	1.52E-06						
benzo(k)fluoranthene	207-08-9	3.27E-07	8.39E-07	2.54E-07	6.53E-07	2.84E-07	7.30E-07						
benzo(ghi)perylene	191-24-2	1.52E-06	7.79E-07	1.25E-06	6.41E-07	1.39E-06	7.12E-07						
beryllium	7440-41-7												
chlordane	57-74-9	4.39E-08	1.88E-07	3.53E-07	1.51E-06	8.23E-07	3.52E-06						
chromium (III)	16065-83-1												
chrysene	218-01-9	7.07E-07	1.82E-06	5.91E-07	1.52E-06	6.92E-07	1.78E-06						
dibenzo(a,h)anthracene	53-70-3	1.22E-07	3.14E-07	1.69E-07	4.34E-07	1.54E-07	3.96E-07						
DDE	72-55-9												
DDT	50-29-3												
dieldrin	60-57-1	3.39E-08	5.79E-08	1.76E-07	3.02E-07	4.11E-07	7.04E-07						
dioxin (TCDD equivalents)	1746-01-6	2.85E-11	4.87E-11	3.77E-11	6.45E-11	8.96E-12	1.53E-11						
fluoranthene	206-44-0	8.49E-06	4.36E-06	6.70E-06	3.44E-06	9.21E-06	4.73E-06						
fluorene	86-73-7	8.22E-07	4.22E-07	2.45E-06	1.26E-06	6.29E-06	3.23E-06						
indeno(123-cd)pyrene	193-39-5	3.50E-07	8.99E-07	2.73E-07	7.01E-07	3.12E-07	8.01E-07						
lead	7439-92-1												
mercury (from mercuric chloride)	7439-97-6	2.22E-07	7.59E-07	3.27E-08	1.12E-07	7.63E-08	2.61E-07						
2-methylnaphthalene	91-57-6	1.48E-06	7.61E-07	7.73E-06	3.97E-06	1.02E-05	5.24E-06						
naphthalene	91-20-3	4.11E-07	2.11E-07	1.87E-06	9.59E-07	4.77E-06	2.45E-06						
nickel (soluble salts)	7440-02-0												
phenanthrene	85-01-8	6.84E-06	3.51E-06	1.02E-05	5.26E-06	1.17E-05	5.98E-06						
polychlorinated biphenyls, as PCB-1254	1336-36-3	8.63E-06	1.48E-05	1.14E-05	1.96E-05	2.72E-06	4.65E-06						
pyrene	129-00-0	7.45E-06	3.82E-06	1.00E-05	5.14E-06	6.81E-06	3.50E-06						
thallium	7440-28-0												
toluene	108-88-3	5.99E-08	3.42E-07			1.14E-07	6.52E-07						
vanadium	7440-62-2	4.54E-05	7.77E-05	2.84E-05	4.85E-05	7.71E-05	1.32E-04						
zinc	7440-66-6												
C9-C18 Aliphatics	N/A	5.46E-04	4.67E-04	1.10E-03	9.43E-04	3.48E-03	2.97E-03						
C19-C36 Aliphatics	N/A	8.80E-04	7.53E-04	1.98E-03	1.69E-03	6.60E-03	5.64E-03						
C9-C10 Aromatics	N/A	2.68E-05	9.17E-06	2.89E-05	9.89E-06	1.07E-03	3.65E-04						
C11-C22 Aromatics	N/A	9.32E-04	4.78E-04	1.90E-03	9.75E-04	4.89E-03	2.51E-03						

Table 3.1
Calculation of Average Daily Dose for Soil Exposure: Child Resident, aged 1 Year (East End of Courtyard: 10/26/2016)

Formula: Daily Dose (ADD) for exposure to soils via ingestion (ing) and dermal contact

$$\text{ADD-dermal} = \frac{[\text{OHM-soil}]*SA*AF*RAF*EF*ED*EP*C}{BW*AP}$$

$$\text{ADD-ing} = \frac{[\text{OHM-soil}]*IR*RAF*EF*ED*EP*C}{BW*AP}$$

Unit: ADD, mg/kg/day

Receptor: Child Resident, aged 1 to 8 years (Chronic) and aged 1 year (Subchronic)

Description	Abbreviation	Unit	Default Value	Source	Site-Specific Value	Source / Description	Input Value
Exposure point concentration	[OHM-soil]	mg/kg			See Soil EPC Table		See Soil EPC Table
Skin surface area in contact with soil on days exposed	SA	square centimeter/day	2431	[2], child, aged 1 to 8 years (face, hands, forearms, lower legs and feet)	1670	child, aged 1 to 2 years (face, hands, forearms, lower legs and feet)	1.67E+03
Mass of soil adhered to the unit surface area of skin exposed	AF	mg/sq. cm.	0.35	[1], for child resident			3.50E-01
Relative Absorption Factor	RAF	unitless	See RAF Table				See RAF Table
# exposure events during EP / # days in EP	EF	events/year	150	[2], 5 days per week during the 30 warmest weeks of the year	78	Three days per week during a six-month construction project for 0-3 and 3-6 foot interval soils (F166); and seven days per week during six-month construction project for 6-11 foot interval soils (J166).	1.82E+02
Exposure duration: typical duration of each exposure event	ED	years/event	2.74E-03	1 day per event or 1/365 of a year per event			2.74E-03
Exposure period: period of time over which exposure may occur	EP	years	7	[2], child, aged 1 to 8 years	1.0	subchronic exposure of 1 year old boy or girl (Subchronic)	1.00E+00
Unit Conversion Factor	C	kg/mg	1.00E-06	for dermal contact			1.00E-06
Unit Conversion Factor	C	kg/mg	1.00E-06	for ingestion			1.00E-06
Body weight of the receptor during the AP	BW	kg	17	[2], child, aged 1 to 8 years	1.07E+01	subchronic exposure of 1 year old boy or girl	1.07E+01
Averaging Period	AP	years	7	[2]	1.0	subchronic exposure of 1 year old boy or girl	1.00E+00
Ingestion rate	IR	mg/day	100	[2]			1.00E+02

References:

[1] MADEP's Technical Update, Weighted Skin-Soil Adherence Factors, April 2002.
[2] MADEP's Guidance for Disposal Site Risk Characterization in Support of the Massachusetts Contingency Plan, Interim Final Policy BWSC/ORS-95-141

Table 3.2
Calculation of Average Daily Exposure for Dust: Child Resident, aged 1 (East End of Courtyard: 10/26/2016)

Receptor: Child Resident, aged 1 year

Chemical Name	CAS Number	East End of Courtyard: 0-3 Foot Interval	East End of Courtyard: 3-6 Foot Interval	East End of Courtyard: 6-20 Foot Interval	0.00	0.00	0.00	0.00
acenaphthene	83-32-9	1.9E-08	3.6E-08	9.4E-09				
acenaphthylene	208-96-8	6.5E-09	1.7E-08	7.1E-09				
anthracene	120-12-7	3.7E-08	4.3E-08	3.6E-08				
barium	7440-39-3	1.1E-06	8.1E-07	8.1E-07				
benzene	71-43-2	1.4E-09	1.7E-09	8.1E-09				
benzo(a)anthracene	56-55-3	7.7E-08	6.2E-08	3.4E-08				
benzo(a)pyrene	50-32-8	7.0E-08	4.8E-08	2.6E-08				
benzo(b)fluoranthene	205-99-2	9.8E-08	5.7E-08	3.3E-08				
benzo(k)fluoranthene	207-08-9	4.2E-08	3.3E-08	1.6E-08				
benzo(ghi)perylene	191-24-2	3.9E-08	3.2E-08	1.5E-08				
beryllium	7440-41-7							
chlordane	57-74-9	2.8E-09	2.3E-08	2.3E-08				
chromium (III)	16065-83-1							
chrysene	218-01-9	9.1E-08	7.6E-08	3.8E-08				
dibenzo(a,h)anthracene	53-70-3	1.6E-08	2.2E-08	8.5E-09				
DDE	72-55-9							
DDT	50-29-3							
dieldrin	60-57-1	8.7E-10	4.5E-09	4.5E-09				
dioxin (TCDD equivalents)	1746-01-6	7.3E-13	9.7E-13	9.8E-14				
fluoranthene	206-44-0	2.2E-07	1.7E-07	1.0E-07				
fluorene	86-73-7	2.1E-08	6.3E-08	6.9E-08				
indeno(123-cd)pyrene	193-39-5	4.5E-08	3.5E-08	1.7E-08				
lead	7439-92-1							
mercury (from mercuric chloride)	7439-97-6	1.1E-08	1.7E-09	1.7E-09				
2-methylnaphthalene	91-57-6	3.8E-08	2.0E-07	1.1E-07				
naphthalene	91-20-3	1.1E-08	4.8E-08	5.2E-08				
nickel (soluble salts)	7440-02-0							
phenanthrene	85-01-8	1.8E-07	2.6E-07	1.3E-07				
polychlorinated biphenyls, as PCB-1254	1336-36-3	2.2E-07	2.9E-07	3.0E-08				
pyrene	129-00-0	1.9E-07	2.6E-07	7.5E-08				
thallium	7440-28-0							
toluene	108-88-3	5.1E-09		4.2E-09				
vanadium	7440-62-2	1.2E-06	7.3E-07	8.5E-07				
zinc	7440-66-6							
C9-C18 Aliphatics	N/A	7.0E-06	1.4E-05	1.9E-05				
C19-C36 Aliphatics	N/A	1.1E-05	2.5E-05	3.6E-05				
C9-C10 Aromatics	N/A	1.4E-07	1.5E-07	2.3E-06				
C11-C22 Aromatics	N/A	2.4E-05	4.9E-05	5.4E-05				

Table 3.2
Calculation of Average Daily Exposure for Dust: Child Resident, aged 1 (East End of Courtyard: 10/26/2016)

Formula: Average Daily Exposure (ADE) via inhalation (ihl) of dusts

$$ADE\text{-}ihl = \frac{[OHM\text{-}dust]*EF*ED*EP*C}{AP}$$

Unit: ADE, mg/cu m

Receptor: Child Resident, aged 1 to 8 years (Chronic) and aged 1 year (Subchronic)

Description	Abbreviation	Unit	Default Value	Source	Site-Specific Value	Source / Description	Input Value
Exposure point concentration	[OHM-dust]	ug/cu. m.			See Dust EPC Table		See Dust EPC Table
Exposure frequency: # exposure events during EP / # days in EP	EF	events/year	150	[2], 5 days per week during the 30 warmest weeks of the year	182	Seven days per week during a six-month construction project	1.82E+02
Exposure duration: typical duration of each exposure event	ED	years/event	2.74E-03	1 day per event, or 1/365 of a year per event			2.74E-03
Exposure period: period of time over which exposure may occur	EP	years	7	[1], from age 1 to 8 years	1.00E+00	subchronic exposure of 1 year old boy or girl	1.00E+00
Unit Conversion Factor	C	mg/ug	1.00E-03	for inhalation			1.00E-03
Averaging Period	AP	years	7	[1]	1.00E+00	subchronic exposure of 1 year old boy or girl	1.00E+00

References:

[1] MADEP's Guidance for Disposal Site Risk Characterization in Support of the Massachusetts Contingency Plan, Interim Final Policy BWSC/ORS-95-141

Table 4.1
Calculation of Hazard Index (HI) for Exposure to Soil and Dust: Child Resident, aged 1 Year (East End of Courtard: 10/26/2016)

Receptor: Child Resident, aged 1 year																	
Exposure Point:		East End of Courtyard: 0-3 Foot Interval			East End of Courtyard: 3-6 Foot Interval			East End of Courtyard: 6-20 Foot Interval			0.0E+00			0.0E+00		
Chemical Name	CAS Number	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contact	Incidental Ingestion	Dust Inhalation	Dermal Contct	Incidental Ingestion	Dust Inhalation
acenaphthene	83-32-9	3.6E-06	1.9E-06	3.7E-08	7.1E-06	3.6E-06	7.2E-08	4.3E-06	2.2E-06	1.9E-08						
acenaphthylene	208-96-8	8.4E-07	4.3E-07	1.3E-08	2.2E-06	1.1E-06	3.4E-08	2.2E-06	1.1E-06	1.4E-08						
anthracene	120-12-7	1.4E-06	7.4E-07	7.4E-08	1.7E-06	8.6E-07	8.6E-08	3.5E-06	1.7E-06	7.3E-08						
barium	7440-39-3	6.4E-04	1.1E-03	2.3E-04	4.5E-04	7.7E-04	1.6E-04	1.1E-03	1.8E-03	1.6E-04						
benzene	71-43-2	1.7E-06	9.6E-06	1.4E-07	2.0E-06	1.2E-05	1.7E-07	2.2E-05	1.3E-04	8.1E-07						
benzo(a)anthracene	56-55-3	2.0E-06	5.1E-06	1.5E-07	1.6E-06	4.2E-06	1.2E-07	2.1E-06	5.3E-06	6.8E-08						
benzo(a)pyrene	50-32-8	1.8E-06	4.7E-06	1.4E-07	1.2E-06	3.2E-06	9.6E-08	1.6E-06	4.1E-06	5.3E-08						
benzo(b)fluoranthene	205-99-2	2.5E-06	6.5E-06	2.0E-07	1.5E-06	3.8E-06	1.1E-07	2.0E-06	5.1E-06	6.5E-08						
benzo(k)fluoranthene	207-08-9	1.1E-06	2.8E-06	8.4E-08	8.5E-07	2.2E-06	6.5E-08	9.5E-07	2.4E-06	3.1E-08						
benzo(ghi)perylene	191-24-2	5.1E-06	2.6E-06	7.8E-08	4.2E-06	2.1E-06	6.4E-08	4.6E-06	2.4E-06	3.0E-08						
beryllium	7440-41-7															
chlordane	57-74-9	8.8E-05	3.8E-04	4.0E-07	7.1E-04	3.0E-03	3.2E-06	1.6E-03	7.0E-03	3.2E-06						
chromium (III)	16065-83-1															
chrysene	218-01-9	2.4E-06	2.0E-06	1.5E-07	2.0E-06	5.1E-06	1.5E-07	2.3E-06	2.9E-06	7.6E-08						
dibenzo(a,h)anthracene	53-70-3	4.1E-07	1.0E-06	3.1E-08	5.6E-07	1.4E-06	4.3E-08	5.1E-07	1.3E-06	1.7E-08						
DDE	72-55-9															
DDT	50-29-3															
dieldrin	60-57-1	6.8E-04	1.2E-03	5.0E-06	3.5E-03	6.0E-03	2.6E-05	8.2E-03	1.4E-02	2.6E-05						
dioxin (TCDD equivalents)	1746-01-6	4.1E-02	7.0E-02		5.4E-02	9.2E-02		1.3E-02	2.2E-02							
fluoranthene	206-44-0	2.1E-05	1.1E-05	4.4E-07	1.7E-05	8.6E-06	3.4E-07	2.3E-05	1.2E-05	2.0E-07						
fluorene	86-73-7	2.1E-06	1.1E-06	4.2E-08	6.1E-06	3.1E-06	1.3E-07	1.6E-05	8.1E-06	1.4E-07						
indeno(123-cd)pyrene	193-39-5	1.2E-06	3.0E-06	9.0E-08	9.1E-07	2.3E-06	7.0E-08	1.0E-06	2.7E-06	3.4E-08						
lead	7439-92-1															
mercury (from mercuric chloride)	7439-97-6	7.4E-04	2.5E-03	3.8E-05	1.1E-04	3.7E-04	5.6E-06	2.5E-04	8.7E-04	5.6E-06						
2-methylnaphthalene	91-57-6	3.7E-04	1.9E-04	7.6E-08	1.9E-03	9.9E-04	4.0E-07	2.6E-03	1.3E-03	2.2E-07						
naphthalene	91-20-3	2.1E-06	1.1E-06	3.5E-06	9.3E-06	4.8E-06	1.6E-05	2.4E-05	1.2E-05	1.7E-05						
nickel (soluble salts)	7440-02-0															
phenanthrene	85-01-8	2.3E-05	1.2E-05	3.5E-07	3.4E-05	1.8E-05	5.3E-07	3.9E-05	2.0E-05	2.6E-07						
polychlorinated biphenyls, as PCB-1254	1336-36-3	1.7E-01	3.0E-01	1.1E-02	2.3E-01	3.9E-01	1.5E-02	5.4E-02	9.3E-02	1.5E-03						
pyrene	129-00-0	2.5E-05	1.3E-05	3.8E-07	3.3E-05	1.7E-05	5.1E-07	2.3E-05	1.2E-05	1.5E-07						
thallium	7440-28-0															
toluene	108-88-3	7.5E-08	4.3E-07	1.0E-09				1.4E-07	8.2E-07	8.4E-10						
vanadium	7440-62-2	5.0E-03	8.6E-03	1.2E-03	3.2E-03	5.4E-03	7.3E-04	8.6E-03	1.5E-02	8.5E-04						
zinc	7440-66-6															
C9-C18 Aliphatics	N/A	5.5E-04	4.7E-04	1.2E-05	1.1E-03	9.4E-04	2.4E-05	3.5E-03	3.0E-03	3.2E-05						
C19-C36 Aliphatics	N/A	1.5E-04	1.3E-04	1.9E-05	3.3E-04	2.8E-04	4.2E-05	1.1E-03	9.4E-04	6.0E-05						
C9-C10 Aromatics	N/A	8.9E-05	3.1E-05	2.7E-07	9.6E-05	3.3E-05	3.0E-07	3.6E-03	1.2E-03	4.7E-06						
C11-C22 Aromatics	N/A	3.1E-03	1.6E-03	4.8E-05	6.3E-03	3.3E-03	9.7E-05	1.6E-02	8.4E-03	1.1E-04						
Total HI: Route and Expos. Pt.		2.2E-01	3.8E-01	1.3E-02	3.0E-01	5.0E-01	1.6E-02	1.1E-01	1.7E-01	2.8E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Proportion of complete exposure point			1.0E+00			1.0E+00			1.0E+00			1.0E+00			1.0E+00	
Adjusted Total HI: Route and Expos. Pt.		2.2E-01	3.8E-01	1.3E-02	3.0E-01	5.0E-01	1.6E-02	1.1E-01	1.7E-01	2.8E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Total HI: Expos. Pt.			6.2E-01			8.2E-01			2.9E-01			0.0E+00			0.0E+00	

Formula:

Cumulative HI = $\sum HI_{ingestion\ -\ chemicalspecific} + \sum HI_{dermalcontact\ -\ chemicalspecific} + \sum HI_{inhalation:chemical\ -\ specific}$

HI ingestion-chemical specific = ADD-ingestion-chemical specific x Oral Slope Factor-chemical specific
HI dermal contact-chemical specific = ADD-dermal contact-chemical specific x Oral Slope Factor-chemical specific
HI inhalation-chemical specific = ADE-inhalation-chemical specific x Unit Risk-inhalation-chemical specific

HI = Hazard Index, unitless
ADD = Average Daily Dose, mg/kg/day
ADE = Average Daily Exposure, mg/cu m

Subchronic Oral Reference Dose		X
Chronic Oral Reference Dose		
Subchronic Inhalation Reference Concentration		X
Chronic Inhalation Reference Concentration		

Use capital X to indicate selection

Table 5.1
Calculation of Total Hazard Index (HI): Child Resident, aged 1 Year (East End of Courtyard: 10/26/2016)

Receptor	Child Resident, aged 1 year							Child Resident, aged 1-8 years						
Exposure Point #	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Pathway:														
Soil Exposure Point:														
Incidental ingestion of soil, normal	3.8E-01	5.0E-01	1.7E-01											
Inhalation of dusts from disturbed soil	1.3E-02	1.6E-02	2.8E-03											
Dermal contact with soil	2.2E-01	3.0E-01	1.1E-01											
Total HI	6.2E-01 Subchronic	8.2E-01 Subchronic	2.9E-01 Subchronic											
MCP Non-Cancer Risk Limit	1.E+00	1.E+00	1.E+00	1.E+00	1.E+00									
Does Total HI exceed MCP Non-Cancer Risk Limit?	No	No	No	No	No									
Significant Risk of Harm?	No	No	No	No	No									

Definition of exposure points							
Exposure Point #	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Soil Exposure Point:	East End of Courtyard: 0-3 Foot Interval	East End of Courtyard: 3-6 Foot Interval	East End of Courtyard: 6-20 Foot Interval				

NO SINGLE FAMILY RESIDENCE. NO GARDENING OF EDIBLE PRODUCE.
EXPOSURE TO SOILS OCCURS ONLY DURING A SINGLE SIX-MONTH CONSTRUCTION PROJECT, AFTER WHICH TIME
THE SOILS ARE RETURNED TO EXCAVATION OR ARE TRANSPORTED OFF-SITE.
ASSUMES CONTROLS ARE USED TO LIMIT RESIDENTIAL EXPOSURE TO SOILS DURING CONSTRUCTION PROJECT FOR 0-3 AND 3-6 FOOT INTERVAL SOILS.
ASSUMES **NO** CONTROLS ARE USED TO LIMIT RESIDENTIAL EXPOSURE TO SOILS DURING CONSTRUCTION PROJECT FOR 6-11 FOOT INTERVAL SOILS.
PROTECTIVE COVER MUST REMAIN OVER SOILS EXCEPT DURING CONSTRUCTION OR UTILITY PROJECT, AFTER WHICH TIME THE PROTECTIVE COVER MUST BE RE-INSTALLED.

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	MassDEP Published Background		SAMPLES NOT REPRESENTATIVE OF EASTERN PORTION OF COURTYARD												
	Natural Soils	Soils assoc. Fill	B-5 (0-1')	B-5 (1-3')	B-5 (0-3')	B-7 (0-1')	B-7 (1-3')	B-7 (0-3')	FO-1-TP (0-1')	FO-1-TP (1-2')	FO-1-TP (2-3')	B-8 (0-1')	SP-1	FO-1 (3')	SP-3
Sampling Date			3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/9/2016	3/9/2016	3/9/2016	3/14/2016	2/29/2016	3/9/2016	3/29/2016
Sample Depth During Investigative Event			0-1 Feet	1-3 Feet	0-3 Feet	0-1 Feet	1-3 Feet	0-3 Feet	0-1 Feet (below grade / above vault)	1-2 Feet (below grade / above vault)	2-3 Feet (below grade / above vault)	0-1 Feet	Stockpile / Top Soils	3.5 Feet (just in vault)	Stockpile / Sands in vault
Sample Depth Relative to October 1, 2016			Excavated and Stockpiled	Excavated and Stockpiled	Excavated and Stockpiled	Excavated and Stockpiled	Excavated and Stockpiled	Excavated and Stockpiled	Excavated and Stockpiled	Excavated and Stockpiled	Excavated and Stockpiled	Excavated and Stockpiled	Stockpile / Transported Off-Site	0.5 Feet (just in vault)	Stockpile / Sands in vault
NOTES:			11	11	11	11	11	10, 11				11	7	8	9
MADEP-EPH-04-1.1 (mg/Kg dry)															
C9-C18 ALIPHATICS			NT	NT	24	NT	NT	61	NT	NT	NT	NT	NT	ND (10)	NT
C19-C36 ALIPHATICS			NT	NT	160	NT	NT	140	NT	NT	NT	NT	NT	ND (10)	NT
C11-C22 AROMATICS			NT	NT	310	NT	NT	180	NT	NT	NT	NT	NT	ND (10)	NT
ACENAPHTHENE	0.5	2	NT	NT	1.4	NT	NT	*2.6*	NT	NT	NT	NT	*2.4*	ND (0.10)	0.70
ACENAPHTHYLENE	0.5	1	NT	NT	0.37	NT	NT	0.38	NT	NT	NT	NT	ND (0.85)	ND (0.10)	ND (0.18)
ANTHRACENE	1	4	NT	NT	3.4	NT	NT	*5.4*	NT	NT	NT	NT	*5.3*	ND (0.10)	1.5
BENZO(A)ANTHRACENE	2	9	NT	NT	**7.4**	NT	NT	***11***	NT	NT	NT	NT	***10***	ND (0.10)	3.0
BENZO(A)PYRENE	2	7	NT	NT	**6.5**	NT	NT	***9.3***	NT	NT	NT	NT	***8.0***	ND (0.10)	**2.6**
BENZO(B)FLUORANTHENE	2	8	NT	NT	***9.1***	NT	NT	***12***	NT	NT	NT	NT	***9.8***	ND (0.10)	3.5
BENZO(G,H,I)PERYLENE	1	3	NT	NT	*3.4*	NT	NT	*5.0*	NT	NT	NT	NT	*4.5*	ND (0.10)	1.4
BENZO(K)FLUORANTHENE	1	4	NT	NT	3.0	NT	NT	*4.6*	NT	NT	NT	NT	3.9	ND (0.10)	1.4
CHRYSENE	2	7	NT	NT	*8.5*	NT	NT	*12*	NT	NT	NT	NT	*9.7*	ND (0.10)	2.8
DIBENZ(A,H)ANTHRACENE	0.5	1	NT	NT	***1.1***	NT	NT	***1.7***	NT	NT	NT	NT	***1.4***	ND (0.10)	0.59
FLUORANTHENE	4	10	NT	NT	*18*	NT	NT	*26*	NT	NT	NT	NT	*22*	ND (0.10)	7.0
FLUORENE	1	2	NT	NT	1.9	NT	NT	*3.4*	NT	NT	NT	NT	*2.8*	ND (0.10)	0.93
INDENO(1,2,3-CD)PYRENE	1	3	NT	NT	*4.1*	NT	NT	*5.1*	NT	NT	NT	NT	*5.1*	ND (0.10)	1.4
2-METHYLNAPHTHALENE	0.5	1	NT	NT	0.67	NT	NT	0.96	NT	NT	NT	NT	0.93	ND (0.10)	0.29
NAPHTHALENE	0.5	1	NT	NT	*1.7*	NT	NT	*1.5*	NT	NT	NT	NT	*1.6*	ND (0.10)	0.59
PHENANTHRENE	3	20	NT	NT	15	NT	NT	*23*	NT	NT	NT	NT	*24*	ND (0.10)	5.9
PYRENE	4	20	NT	NT	17	NT	NT	*22*	NT	NT	NT	NT	*23*	ND (0.10)	5.0
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	30	NT	ND (0.36)
DIBENZOFURAN (see notes 7, 9)			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	1.9	NT	0.37
DI-N-BUTYLPHTHALATE (see note 7)			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	5.6	NT	ND (0.36)
MADEP-VPH-04-1.1 (mg/Kg dry)															
C5-C8 ALIPHATICS			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	ND (7.9)	ND (8.9)
C9-C12 ALIPHATICS			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	ND (7.9)	ND (8.9)
C9-C10 AROMATICS			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	ND (7.9)	ND (8.9)
BENZENE			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.040)	ND (0.044)
ETHYLBENZENE			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.040)	ND (0.044)
METHYL TERT-BUTYL ETHER (MTBE)			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.040)	ND (0.044)
NAPHTHALENE	0.5	1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.20)	ND (0.22)
TOLUENE			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.040)	ND (0.044)
M/P-XYLENE			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.079)	ND (0.089)
O-XYLENE			NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	ND (0.040)	ND (0.044)

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	MassDEP Published Background		SAMPLES NOT REPRESENTATIVE OF EASTERN PORTION OF COURTYARD												
	Natural Soils	Soils assoc. Fill	B-5 (0-1')	B-5 (1-3')	B-5 (0-3')	B-7 (0-1')	B-7 (1-3')	B-7 (0-3')	FO-1-TP (0-1')	FO-1-TP (1-2')	FO-1-TP (2-3')	B-8 (0-1')	SP-1	FO-1 (3')	SP-3
SW-846 6010C/D (mg/Kg dry) Metals Digestion															
ANTIMONY	1	7	NT	NT	ND (2.7)	NT	NT	ND (2.8)	3.0	ND (2.9)	ND (2.9)	NT	ND (3.1)	ND (2.6)	ND (2.4)
ARSENIC	20	20	NT	NT	11	NT	NT	13	19	14	18	NT	***23***	15	8.8
BARIUM	50	50	NT	NT	*120*	NT	NT	*91*	*140*	*95*	*130*	NT	*800*	32	50
BERYLLIUM	0.4	0.9	NT	NT	*1.4*	NT	NT	*1.3*	0.68	0.39	*1.9*	NT	*14*	0.63	0.73
CADMIUM	2	3	NT	NT	0.89	NT	NT	1.2	1.4	0.98	1.3	NT	*3.9*	0.51	0.44
CHROMIUM (as +3)	30	40	NT	NT	34	NT	NT	*50*	36	31	37	NT	*160*	25	30
LEAD	100	600	NT	NT	100	NT	NT	150	**340**	***1100***	**220**	NT	***2400***	7	25
NICKEL	20	30	NT	NT	29	NT	NT	26	*32*	22	29	NT	*240*	20	18
SELENIUM	0.5	1	NT	NT	ND (5.4)	NT	NT	ND (5.7)	ND (5.7)	ND (5.9)	ND (5.7)	NT	ND (6.2)	ND (5.2)	ND (4.8)
SILVER	0.6	5	NT	NT	ND (0.54)	NT	NT	ND (0.57)	ND (1.1)	ND (0.59)	ND (0.57)	NT	ND (0.62)	ND (0.52)	ND (0.48)
THALLIUM	0.6	5	NT	NT	ND (2.7)	NT	NT	ND (2.8)	ND (2.8)	ND (2.9)	ND (2.9)	NT	ND (3.1)	ND (2.6)	***9.8***
VANADIUM	30	30	NT	NT	*110*	NT	NT	*66*	*160*	*96*	*140*	NT	***3500***	*32*	33
ZINC	100	300	NT	NT	200	NT	NT	260	250	160	190	NT	***1100***	23	43
SW-846 7471B (mg/Kg dry) Metals Digestion															
MERCURY	0.3	1	NT	NT	0.16	NT	NT	0.38	0.68	0.93	0.84	NT	0.43	ND (0.025)	0.050
SW-846 8082A (mg/Kg dry)															
PCB 1016			ND (1.1) *	ND (0.56)	NT	ND (1.1) *	ND (1.1) *	NT	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (6.0) *	ND (12) *	ND (0.10)	ND (0.53)
PCB 1221			ND (1.1) *	ND (0.56)	NT	ND (1.1) *	ND (1.1) *	NT	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (6.0) *	ND (12) *	ND (0.10)	ND (0.53)
PCB 1232			ND (1.1) *	ND (0.56)	NT	ND (1.1) *	ND (1.1) *	NT	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (6.0) *	ND (12) *	ND (0.10)	ND (0.53)
PCB 1242			ND (1.1) *	ND (0.56)	NT	ND (1.1) *	ND (1.1) *	NT	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (6.0) *	ND (12) *	ND (0.10)	ND (0.53)
PCB 1248			ND (1.1) *	ND (0.56)	NT	ND (1.1) *	ND (1.1) *	NT	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (6.0) *	ND (12) *	ND (0.10)	ND (0.53)
PCB 1254			**7.0**	**3.7**	NT	**8.5**	**6.0**	NT	**13**	**12**	**7.8**	**39**	**63**	ND (0.10)	**2.6**
PCB 1260			ND (1.1) *	ND (0.56)	NT	ND (1.1) *	ND (1.1) *	NT	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (6.0) *	ND (12) *	ND (0.10)	ND (0.53)
PCB 1262			ND (1.1) *	ND (0.56)	NT	ND (1.1) *	ND (1.1) *	NT	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (6.0) *	ND (12) *	ND (0.10)	ND (0.53)
PCB 1268			ND (1.1) *	ND (0.56)	NT	ND (1.1) *	ND (1.1) *	NT	ND (2.3) *	ND (2.3) *	ND (1.1) *	ND (6.0) *	ND (12) *	ND (0.10)	ND (0.53)
TOTAL PCBs			**7.0**	**3.7**	NT	**8.5**	**6.0**	NT	**13**	**12**	**7.8**	**39**	**63**	ND (0.10)	**2.6**

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	MassDEP Published Background		SAMPLES NOT REPRESENTATIVE OF EASTERN PORTION OF COURTYARD												
	Natural Soils	Soils assoc. Fill	B-5 (0-1')	B-5 (1-3')	B-5 (0-3')	B-7 (0-1')	B-7 (1-3')	B-7 (0-3')	FO-1-TP (0-1')	FO-1-TP (1-2')	FO-1-TP (2-3')	B-8 (0-1')	SP-1	FO-1 (3')	SP-3
SW-846 8081B (mg/Kg dry)															
ALDRIN			NT	NT	ND (0.12) *	NT	NT	ND (0.12) *	ND (0.11) *	ND (0.12) *	ND (0.11) *	NT	ND (0.12) *	ND (0.0051)	ND (0.0053)
ALPHA-BHC			NT	NT	ND (0.12)	NT	NT	ND (0.12)	ND (0.11)	ND (0.12)	ND (0.11)	NT	ND (0.12)	ND (0.0051)	ND (0.0053)
BETA-BHC			NT	NT	ND (0.12)	NT	NT	ND (0.12)	ND (0.11)	ND (0.12)	ND (0.11)	NT	ND (0.12)	ND (0.0051)	ND (0.0053)
DELTA-BHC			NT	NT	ND (0.12)	NT	NT	ND (0.12)	ND (0.11)	ND (0.12)	ND (0.11)	NT	ND (0.12)	ND (0.0051)	ND (0.0053)
GAMMA-BHC (LINDANE)			NT	NT	ND (0.047) *	NT	NT	ND (0.047) *	ND (0.046) *	ND (0.046) *	ND (0.045) *	NT	ND (0.049) *	ND (0.0021)	ND (0.0021)
CHLORDANE			NT	NT	ND (0.47)	NT	NT	ND (0.47)	ND (0.46)	ND (0.46)	ND (0.45)	NT	ND (0.49)	ND (0.021)	ND (0.021)
4,4'-DDD			NT	NT	ND (0.094)	NT	NT	ND (0.094)	ND (0.092)	ND (0.093)	ND (0.090)	NT	ND (0.099)	ND (0.0041)	ND (0.0042)
4,4'-DDE			NT	NT	ND (0.094)	NT	NT	ND (0.094)	ND (0.092)	0.093	ND (0.090)	NT	ND (0.099)	ND (0.0041)	ND (0.0042)
4,4'-DDT			NT	NT	ND (0.094)	NT	NT	0.11	0.15	0.13	0.13	NT	ND (0.099)	ND (0.0041)	0.019
DIELDRIN			NT	NT	ND (0.094) *	NT	NT	ND (0.094) *	**0.16**	**0.19**	**0.16**	NT	ND (0.099) *	ND (0.0041)	ND (0.0042)
ENDOSULFAN I			NT	NT	ND (0.12)	NT	NT	ND (0.12)	ND (0.11)	ND (0.12)	ND (0.11)	NT	ND (0.12)	ND (0.0051)	ND (0.0053)
ENDOSULFAN II			NT	NT	ND (0.19)	NT	NT	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)	NT	ND (0.20)	ND (0.0082)	ND (0.0085)
ENDOSULFAN SULFATE			NT	NT	ND (0.19)	NT	NT	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)	NT	ND (0.20)	ND (0.0082)	ND (0.0085)
ENDRIN			NT	NT	ND (0.19)	NT	NT	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)	NT	ND (0.20)	ND (0.0082)	ND (0.0085)
ENDRIN KETONE			NT	NT	ND (0.19)	NT	NT	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)	NT	ND (0.20)	ND (0.0082)	ND (0.0085)
HEPTACHLOR			NT	NT	ND (0.12)	NT	NT	ND (0.12)	ND (0.11)	ND (0.12)	ND (0.11)	NT	ND (0.12)	ND (0.0051)	ND (0.0053)
HEPTACHLOR EPOXIDE			NT	NT	ND (0.12) *	NT	NT	ND (0.12) *	ND (0.11) *	ND (0.12) *	ND (0.11) *	NT	**0.29**	ND (0.0051)	ND (0.0053)
HEXACHLOROBENZENE			NT	NT	ND (0.14)	NT	NT	ND (0.14)	ND (0.14)	ND (0.14)	ND (0.14)	NT	ND (0.15)	ND (0.0062)	ND (0.0064)
METHOXYCHLOR			NT	NT	ND (1.2)	NT	NT	ND (1.2)	ND (1.1)	ND (1.2)	ND (1.1)	NT	ND (1.2)	ND (0.051)	ND (0.053)
SW-846 8151A (mg/kg dry)															
2,4-D			NT	NT	ND (0.029)	NT	NT	ND (0.029)	NT	NT	NT	NT	ND (0.31)	NT	ND (0.026)
2,4-DB			NT	NT	ND (0.029)	NT	NT	ND (0.029)	NT	NT	NT	NT	ND (0.31)	NT	ND (0.026)
2,4,5-TP (SILVEX)			NT	NT	ND (0.0029)	NT	NT	ND (0.0029)	NT	NT	NT	NT	ND (0.031)	NT	ND (0.026)
2,4,5-T			NT	NT	ND (0.0029)	NT	NT	ND (0.0029)	NT	NT	NT	NT	ND (0.031)	NT	ND (0.026)
DALAPON			NT	NT	ND (0.073)	NT	NT	ND (0.073)	NT	NT	NT	NT	ND (0.77)	NT	ND (0.066)
DICAMBA			NT	NT	ND (0.0029)	NT	NT	ND (0.0029)	NT	NT	NT	NT	ND (0.031)	NT	ND (0.0026)
DICHLOROPROP			NT	NT	ND (0.029)	NT	NT	ND (0.029)	NT	NT	NT	NT	ND (0.31)	NT	ND (0.026)
DINOSEB			NT	NT	ND (0.015)	NT	NT	ND (0.015)	NT	NT	NT	NT	ND (0.15)	NT	ND (0.013)
MCPA			NT	NT	ND (2.9)	NT	NT	ND (2.9)	NT	NT	NT	NT	ND (31)	NT	ND (2.6)
MCPP			NT	NT	ND (2.9)	NT	NT	ND (2.9)	NT	NT	NT	NT	ND (31)	NT	ND (2.6)

NOTES:

1. An asterisk (*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regul. criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Bolded values exceed the Method 1 Cleanup Standards (exclusive of S-x/GW-1).
6. Italic values exceed MassDEP published background conc. for soils assoc. with fill containing coal ash or wood ash.

7. SP-1 is a s via USEPA M via USEPA M These data a Method 810 Soils from B approved to 8. FO-1, FO- via USEPA M detected ex detected in
9. SP-3 was analyzed for VPH via MADEP's Method and for VOCs via USEPA Method 8260C. No VPH or VOCs were detected. It was also analyzed for SVOCs via USEPA Method 8270. Only PAHs and dibenzofuran were detected and they are reported with the EPH data.
10. B-7 (03') and B-10 (0-3') were analyzed for PAHs via both MassDEP's Method and USEPA Method 8270D. For each PAH, the highest detected value for both methods is provided in this table.
11. Soils were excavated and some were placed in the coal chute, which was modified to be a soil repository. SP-2 stockpile soils were placed in the coal chute first, then the remainder of the coal chute was backfilled with excavated soils from east section of courtyard. Soil soils were also placed in dry wells no. 2 to 4, located between B-11 and the utility void. The remaining soils from the east end excavation were stockpiled in the west end of the courtyard. Approximately 300 to 400 cubic yards of soils are located in the stockpile.

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	SAMPLING LOCATIONS														
	B-1 (15'-20')	B-3 (15'-20')	B-3 (15'-20') (25-28'')	B-4 (15'-20')	B-4 (15'-20') (21-24'')	B-5 (3-6')	B-5 (6-11')	B-7 (3-6')	B-7 (6-11')	B-8 (1-3')	B-8 (3-6')	B-8 (6-11')	BTM-GT-1	BTM-GT-2	ESW-GT-1
Sampling Date	8/14/2015	8/14/2015	8/14/2015	8/14/2015	8/14/2015	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/8/2016	3/8/2016	3/8/2016
Sample Depth During Investigative Event	15-20 Feet	15-20 Feet	15-20 Feet	15-20 Feet	15-20 Feet	3-6 Feet	6-11 Feet	3-6 Feet	6-11 Feet	1-3 Feet	3-6 Feet	6-11 Feet	6 Feet	8 Feet	3-4 Feet
Sample Depth Relative to October 1, 2016	12-17 Feet	14-19 Feet	14-19 Feet	12-17 Feet	12-17 Feet	0-3 Feet	3-8 Feet	0-3 Feet	3-8 Feet	0-2 Feet	2-5 Feet	5-10 Feet	3 Feet	5 Feet	0-1 Feet
NOTES:			13		13										
MADEP-EPH-04-1.1 (mg/Kg dry)															
C9-C18 ALIPHATICS	810	48		570		26	300	ND (11)	ND (22)				ND (12)	ND (11)	13
C19-C36 ALIPHATICS	1700	77		1200		64	750	28	48				ND (12)	31	29
C11-C22 AROMATICS	**3400**	200		**3600**		220	**1400**	83	83				25	45	41
ACENAPHTHENE	ND (0.22)	0.22		ND (0.22)		0.76	ND (0.49)	0.54	ND (0.22)				ND (0.12)	ND (0.11)	ND (0.11)
ACENAPHTHYLENE	ND (0.22)	ND (0.11)		ND (0.22)		0.11	ND (0.49)	ND (0.11)	ND (0.22)				ND (0.12)	ND (0.11)	ND (0.11)
ANTHRACENE	1.9	0.65		5.4		1.8	ND (0.49)	1.4	0.29				ND (0.12)	ND (0.11)	ND (0.11)
BENZO(A)ANTHRACENE	3.0	1.1		**7.4**		4.1	ND (0.49)	2.9	1.2				ND (0.12)	ND (0.11)	ND (0.11)
BENZO(A)PYRENE	ND (0.22)	0.88		**5.5**		**3.7**	ND (0.49)	**2.4**	1.1				0.27	0.11	ND (0.11)
BENZO(B)FLUORANTHENE	ND (0.22)	1.2		**7.1**		5.3	ND (0.49)	3.3	1.3				0.32	0.15	ND (0.11)
BENZO(G,H,I)PERYLENE	ND (0.22)	0.58		1.5		1.7	ND (0.49)	1.2	0.66				0.38	ND (0.11)	ND (0.11)
BENZO(K)FLUORANTHENE	ND (0.22)	0.43		2.5		2.0	ND (0.49)	1.2	0.52				ND (0.12)	ND (0.11)	ND (0.11)
CHRYSENE	3.8	1.2		*7.8*		5.0	ND (0.49)	3.2	1.3				0.15	0.11	ND (0.11)
DIBENZ(A,H)ANTHRACENE	ND (0.22)	ND (0.11)		ND (0.22)		0.65	ND (0.49)	0.41	ND (0.22)				ND (0.12)	ND (0.11)	ND (0.11)
FLUORANTHENE	3.5	2.3		*15*		9.5	1.2	6.6	2.3				0.15	0.17	0.14
FLUORENE	*3.5*	0.44		*6.9*		0.90	ND (0.49)	0.78	ND (0.22)				ND (0.12)	ND (0.11)	ND (0.11)
INDENO(1,2,3-CD)PYRENE	ND (0.22)	0.51		2.6		2.1	ND (0.49)	1.3	0.56				0.36	ND (0.11)	ND (0.11)
2-METHYLNAPHTHALENE	0.49	ND (0.11)		***3.1***		0.29	0.70	0.22	ND (0.22)				ND (0.12)	ND (0.11)	ND (0.11)
NAPHTHALENE	*1.3*	0.12		*2.1*		0.44	0.79	0.32	ND (0.22)				ND (0.12)	ND (0.11)	ND (0.11)
PHENANTHRENE	5.3	1.9		***21***		7.4	1.6	6.1	1.2				0.34	ND (0.11)	0.4
PYRENE	2.6	2.3		13		8.8	ND (0.49)	5.9	2.4				ND (0.12)	0.18	0.13
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)															
DIBENZOFURAN (see notes 7, 9)															
DI-N-BUTYLPHTHALATE (see note 7)															
MADEP-VPH-04-1.1 (mg/Kg dry)															
C5-C8 ALIPHATICS	ND (29)	ND (12)		ND (44)									ND (9.6)	ND (9.9)	ND (9.5)
C9-C12 ALIPHATICS	ND (29)	ND (12)		ND (44)									ND (9.6)	ND (9.9)	ND (9.5)
C9-C10 AROMATICS	84	51		100									ND (9.6)	ND (9.9)	ND (9.5)
BENZENE	0.26	ND (0.062)		0.52									0.10	0.058	0.15
ETHYLBENZENE	ND (0.14)	ND (0.062)		ND (0.22)									ND (0.048)	ND (0.050)	ND (0.047)
METHYL TERT-BUTYL ETHER (MTBE)	ND (0.14)	ND (0.062)		ND (0.22)									ND (0.048)	ND (0.050)	ND (0.047)
NAPHTHALENE	ND (0.72)	ND (0.31)		ND (1.1)									ND (0.24)	ND (0.25)	ND (0.24)
TOLUENE	ND (0.14)	ND (0.062)		0.32									0.60	0.32	0.23
M/P-XYLENE	ND (0.29)	ND (0.12)		ND (0.44)									ND (0.096)	ND (0.099)	ND (0.095)
O-XYLENE	ND (0.14)	ND (0.062)		ND (0.22)									ND (0.048)	ND (0.050)	ND (0.047)

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	SAMPLING LOCATIONS														
	B-1 (15'-20')	B-3 (15'-20')	B-3 (15'-20') (25-28'')	B-4 (15'-20')	B-4 (15'-20') (21-24'')	B-5 (3-6')	B-5 (6-11')	B-7 (3-6')	B-7 (6-11')	B-8 (1-3')	B-8 (3-6')	B-8 (6-11')	BTM-GT-1	BTM-GT-2	ESW-GT-1
SW-846 6010C/D (mg/Kg dry) Metals Digestion															
ANTIMONY													ND (2.9)	ND (2.7)	ND (2.8)
ARSENIC													7.4	ND (2.7)	14
BARIUM													34	27	43
BERYLLIUM													ND (0.29)	ND (0.27)	ND (0.28)
CADMIUM													0.36	0.34	1.0
CHROMIUM (as +3)													11	10	14
LEAD													100	41	**290**
NICKEL													11	8.9	23
SELENIUM													ND (5.9)	ND (5.4)	ND (5.6)
SILVER													ND (0.59)	ND (0.54)	ND (0.56)
THALLIUM													ND (2.9)	ND (2.7)	ND (2.8)
VANADIUM						*55*	30	*31*	14		*39*	*41*	27	14	*36*
ZINC													37	43	210
SW-846 7471B (mg/Kg dry) Metals Digestion															
MERCURY													0.14	0.095	0.63
SW-846 8082A (mg/Kg dry)															
PCB 1016						ND (0.57)	ND (0.12)	ND (0.55)	ND (0.11)	ND (0.10)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)
PCB 1221						ND (0.57)	ND (0.12)	ND (0.55)	ND (0.11)	ND (0.10)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)
PCB 1232						ND (0.57)	ND (0.12)	ND (0.55)	ND (0.11)	ND (0.10)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)
PCB 1242						ND (0.57)	ND (0.12)	ND (0.55)	ND (0.11)	ND (0.10)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)
PCB 1248						ND (0.57)	ND (0.12)	ND (0.55)	ND (0.11)	ND (0.10)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)
PCB 1254						**3.8**	0.29	**2.2**	ND (0.11)	ND (0.10)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)
PCB 1260						ND (0.57)	ND (0.12)	ND (0.55)	ND (0.11)	ND (0.10)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)
PCB 1262						ND (0.57)	ND (0.12)	ND (0.55)	ND (0.11)	ND (0.10)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)
PCB 1268						ND (0.57)	ND (0.12)	ND (0.55)	ND (0.11)	ND (0.10)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)
TOTAL PCBs						**3.8**	0.29	**2.2**	ND (0.11)	ND (0.10)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	SAMPLING LOCATIONS															
	B-1 (15'-20')	B-3 (15'-20')	B-3 (15'-20') (25-28'')	B-4 (15'-20')	B-4 (15'-20') (21-24'')	B-5 (3-6')	B-5 (6-11')	B-7 (3-6')	B-7 (6-11')	B-8 (1-3')	B-8 (3-6')	B-8 (6-11')	BTM-GT-1	BTM-GT-2	ESW-GT-1
SW-846 8081B (mg/Kg dry)															
ALDRIN													ND (0.0058)	ND (0.055)	ND (0.0056)
ALPHA-BHC													ND (0.0058)	ND (0.055)	ND (0.0056)
BETA-BHC													ND (0.0058)	ND (0.055)	ND (0.0056)
DELTA-BHC													ND (0.0058)	ND (0.055)	ND (0.0056)
GAMMA-BHC (LINDANE)													ND (0.0023)	ND (0.022) *	ND (0.0022)
CHLORDANE													ND (0.023)	ND (0.22)	ND (0.022)
4,4'-DDD													ND (0.0046)	ND (0.044)	ND (0.0045)
4,4'-DDE													ND (0.0046)	ND (0.044)	ND (0.0045)
4,4'-DDT													ND (0.0046)	ND (0.044)	ND (0.0045)
DIELDRIN													ND (0.0046)	ND (0.044)	ND (0.0045)
ENDOSULFAN I													ND (0.0058)	ND (0.055)	ND (0.0056)
ENDOSULFAN II													ND (0.0092)	ND (0.088)	ND (0.0089)
ENDOSULFAN SULFATE													ND (0.0092)	ND (0.088)	ND (0.0089)
ENDRIN													ND (0.0092)	ND (0.088)	ND (0.0089)
ENDRIN KETONE													ND (0.0092)	ND (0.088)	ND (0.0089)
HEPTACHLOR													ND (0.0058)	ND (0.055)	ND (0.0056)
HEPTACHLOR EPOXIDE													ND (0.0058)	ND (0.055)	ND (0.0056)
HEXACHLOROBENZENE													ND (0.0069)	ND (0.066)	ND (0.0067)
METHOXYCHLOR													ND (0.058)	ND (0.55)	ND (0.056)
SW-846 8151A (mg/kg dry)															
2,4-D															
2,4-DB															
2,4,5-TP (SILVEX)															
2,4,5-T															
DALAPON															
DICAMBA															
DICHLOROPROP															
DINOSEB															
MCPA															
MCPP															

NOTES:

1. An asterisk (*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regul. criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Bolded values exceed the Method 1 Cleanup Standards (exclusive of S-x/GW-1).
6. Italic values exceed MassDEP published background conc. for soils assoc. with fill containing coal ash or wood ash.

9. SP-3 was analyzed for VPH via MADEP's Method and for VOCs via USEPA Method 8260C. No VPH or VOCs were detected. It was also analyzed for SVOCs via USEPA Method 8270. Only PAHs and dibenzofuran were detected and they are reported with the EPH data.

10. B-7 (03') and B-10 (0-3') were analyzed for PAHs via both MassDEP's Method and USEPA Method 8270D. For each PAH, the highest detected value for both methods is provided in this table.

11. Soils were excavated and some were placed in the coal chute, which was modified to be a soil repository. SP-2 stockpile soils were placed in the coal chute first, then the remainder of the coal chute was backfilled with excavated soils from east section of courtyard. Soil soils were also placed in dry wells no. 2 to 4, located between B-11 and the utility void. The remaining soils from the east end excavation were stockpiled in the west end of the courtyard. Approximately 300 to 400 cubic yards of soils are located in the stockpile.

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	SAMPLING LOCATIONS													
	NSW-GT-1	**NSW-GT-2**	**SSW-GT-1**	**SSW-GT-2**	**WSW-GT-2**	**FO-1**	**FO-1-BTM**	**B-14 (10-15)**	**B-14A (0-5)**	**B-14A (5-10)**	**B-14A (10-15)**	**B-14A (10-15)**	**B-14A (15-16.5)**	**B-15 (0-5)**
Sampling Date	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/10/2016	3/10/2016	9/15/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/15/2016
Sample Depth During Investigative Event	3-4 Feet	5-6 Feet	3-4 Feet	5-6 Feet	5-6 Feet	7-8 feet (under vault, oily material)	Vault bottom (5.5 feet below grade)	10-15 Feet	0-5 Feet	5-10 Feet	10-15 Feet	10-15 Feet	15-16.5 Feet	0-5 Feet
Sample Depth Relative to October 1, 2016	0-1 Feet	2-3 Feet	0-1 Feet	2-3 Feet	2-3 Feet	4-5 feet (under vault, oil material)	2.5 Feet	10-15 Feet	0-5 Feet	5-10 Feet	10-15 Feet	10-15 Feet	15-16.5 Feet	0-5 Feet
NOTES:						8	8							
MADEP-EPH-04-1.1 (mg/Kg dry)						via 8270C								
C9-C18 ALIPHATICS	34	ND (22)	ND (11)	37	ND (11)				**2400**	**1300**	**8300**		220	
C19-C36 ALIPHATICS	140	77	17	200	ND (11)				**3400**	2100	**11000**		420	
C11-C22 AROMATICS	420	120	31	210	33				**7200**	**2500**	**15000**		**1600**	
ACENAPHTHENE	1.7	0.37	ND (0.11)	ND (0.43)	ND (0.11)	***4.9***			ND (2.9)	ND (0.56)	ND (2.4)		ND (1.3)	
ACENAPHTHYLENE	ND (0.23)	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	ND (3.8) *			ND (2.9) *	ND (0.56)	ND (2.4) *		ND (1.3) *	
ANTHRACENE	*4.7*	0.73	ND (0.11)	ND (0.43)	0.18	*4.9*			ND (2.9)	1.4	*11*		ND (1.3)	
BENZO(A)ANTHRACENE	***10***	1.7	ND (0.11)	0.78	0.5	4.8			ND (2.9)	ND (0.56)	ND (2.4)		ND (1.3)	
BENZO(A)PYRENE	***9.3***	0.69	0.24	0.94	0.52	ND (3.8) *			ND (2.9) *	ND (0.56)	ND (2.4) *		ND (1.3)	
BENZO(B)FLUORANTHENE	***13***	2	0.31	1.1	0.67	ND (3.8)			ND (2.9)	ND (0.56)	ND (2.4)		ND (1.3)	
BENZO(G,H,I)PERYLENE	*4.9*	0.96	0.33	0.77	0.41	ND (3.8)			ND (2.9)	ND (0.56)	ND (2.4)		ND (1.3)	
BENZO(K)FLUORANTHENE	*4.8*	0.73	ND (0.11)	0.44	0.26	ND (3.8)			ND (2.9)	ND (0.56)	ND (2.4)		ND (1.3)	
CHRYSENE	*12*	1.8	0.17	1.0	0.59	6.6			ND (2.9)	ND (0.56)	ND (2.4)		ND (1.3)	
DIBENZ(A,H)ANTHRACENE	***1.5***	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	ND (3.8) *			ND (2.9) *	ND (0.56)	ND (2.4) *		ND (1.3) *	
FLUORANTHENE	*27*	3.7	0.19	1.6	1.1	6.4			*12*	4.6	*22*		ND (1.3)	
FLUORENE	*2.1*	0.37	ND (0.11)	ND (0.43)	ND (0.11)	*11*			ND (2.9)	*3.1*	*29*		*4.9*	
INDENO(1,2,3-CD)PYRENE	*5.2*	0.93	0.25	0.56	0.36	ND (3.8)			ND (2.9)	ND (0.56)	ND (2.4)		ND (1.3)	
2-METHYLNAPHTHALENE	0.48	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	*33*			***12***	***5.7***	***65***		***1.9***	
NAPHTHALENE	0.70	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	*8.3*			ND (2.9)	*3.1*	***27***		ND (1.3)	
PHENANTHRENE	19	3	0.24	1.2	0.74	*32*			**12**	4.0	***35***		4.6	
PYRENE	*25*	3.4	0.19	1.6	1	*33*			7.1	1.7	12		ND (1.3)	
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)						ND (7.5)								
DIBENZOFURAN (see notes 7, 9)						ND (7.5)								
DI-N-BUTYLPHTHALATE (see note 7)						ND (7.5)								
MADEP-VPH-04-1.1 (mg/Kg dry)														
C5-C8 ALIPHATICS	ND (8.6)	ND (8.3)	ND (10)	ND (11)	ND (8.2)		ND (8.3)							
C9-C12 ALIPHATICS	ND (8.6)	ND (8.3)	ND (10)	ND (11)	ND (8.2)		ND (8.3)							
C9-C10 AROMATICS	ND (8.6)	ND (8.3)	ND (10)	ND (11)	ND (8.2)		ND (8.3)							
BENZENE	ND (0.043)	ND (0.042)	ND (0.052)	ND (0.053)	ND (0.041)		ND (0.042)							
ETHYLBENZENE	ND (0.043)	ND (0.042)	ND (0.052)	ND (0.053)	ND (0.041)		ND (0.042)							
METHYL TERT-BUTYL ETHER (MTBE)	ND (0.043)	ND (0.042)	ND (0.052)	ND (0.053)	ND (0.041)		ND (0.042)							
NAPHTHALENE	ND (0.22)	ND (0.21)	ND (0.26)	ND (0.26)	ND (0.20)		ND (0.21)							
TOLUENE	0.14	ND (0.042)	0.25	0.087	ND (0.041)		ND (0.042)							
M/P-XYLENE	ND (0.086)	ND (0.083)	ND (0.10)	ND (0.11)	ND (0.082)		ND (0.083)							
O-XYLENE	ND (0.043)	ND (0.042)	ND (0.052)	ND (0.053)	ND (0.041)		ND (0.042)							

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	SAMPLING LOCATIONS													
	NSW-GT-1	NSW-GT-2	SSW-GT-1	SSW-GT-2	WSW-GT-2	FO-1	FO-1-BTM	B-14 (10-15)	B-14A (0-5)	B-14A (5-10)	B-14A (10-15)	B-14A (10-15)	B-14A (15-16.5)	B-15 (0-5)
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
ANTIMONY	ND (2.6)	ND (2.8)	ND (2.8)	ND (2.8)	ND (2.7)	ND (3.4)	ND (2.5)							
ARSENIC	9.8	6.0	3.1	5.7	4.4	ND (3.4)	7.0							
BARIUM	*72*	42	27	31	28	36	30							
BERYLLIUM	ND (0.26)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.27)	0.58	ND (0.25)							
CADMIUM	0.81	0.61	ND (0.28)	0.60	0.33	ND (0.34)	0.26							
CHROMIUM (as +3)	26	19	12	18	11	3.1	20							
LEAD	**230**	64	58	59	40	8.5	6.3							
NICKEL	22	14	9.0	18	8.8	8.9	14							
SELENIUM	ND (5.3)	ND (5.6)	ND (5.6)	ND (5.5)	ND (5.5)	ND (6.8)	ND (5.0)							
SILVER	ND (0.53)	ND (0.56)	ND (0.56)	ND (0.55)	ND (0.55)	ND (0.68)	ND (0.50)							
THALLIUM	ND (2.6)	ND (2.8)	ND (2.8)	ND (2.8)	ND (2.7)	ND (3.4)	ND (2.5)							
VANADIUM	*100*	*32*	14	*50*	15	42	29							
ZINC	140	89	42	79	35	5.1	29							
SW-846 7471B (mg/Kg dry) Metals Digestion														
MERCURY	*1.3*	0.25	0.10	0.51	0.099	ND (0.035)	ND (0.026)							
SW-846 8082A (mg/Kg dry)														
PCB 1016	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.14)	ND (0.11)		ND (0.15)	ND (0.11)	ND (0.12)		ND (0.13)	ND (2.2) *
PCB 1221	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.14)	ND (0.11)		ND (0.15)	ND (0.11)	ND (0.12)		ND (0.13)	ND (2.2) *
PCB 1232	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.14)	ND (0.11)		ND (0.15)	ND (0.11)	ND (0.12)		ND (0.13)	ND (2.2) *
PCB 1242	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.14)	ND (0.11)		ND (0.15)	ND (0.11)	ND (0.12)		ND (0.13)	ND (2.2) *
PCB 1248	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.14)	ND (0.11)		ND (0.15)	ND (0.11)	ND (0.12)		ND (0.13)	ND (2.2) *
PCB 1254	**6.3**	**1.2**	ND (0.11)	0.35	0.16	0.45	ND (0.11)		ND (0.15)	0.14	0.14		ND (0.13)	**12**
PCB 1260	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.14)	ND (0.11)		ND (0.15)	ND (0.11)	ND (0.12)		ND (0.13)	ND (2.2) *
PCB 1262	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.14)	ND (0.11)		ND (0.15)	ND (0.11)	ND (0.12)		ND (0.13)	ND (2.2) *
PCB 1268	ND (1.1) *	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.14)	ND (0.11)		ND (0.15)	ND (0.11)	ND (0.12)		ND (0.13)	ND (2.2) *
TOTAL PCBs	**6.3**	**1.2**	ND (0.11)	0.35	0.16	0.45	ND (0.11)		ND (0.15)	0.14	0.14		ND (0.13)	**12**

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	SAMPLING LOCATIONS													
	NSW-GT-1	NSW-GT-2	SSW-GT-1	SSW-GT-2	WSW-GT-2	FO-1	FO-1-BTM	B-14 (10-15)	B-14A (0-5)	B-14A (5-10)	B-14A (10-15)	B-14A (10-15)	B-14A (15-16.5)	B-15 (0-5)
SW-846 8081B (mg/Kg dry)														
ALDRIN	ND (0.11) *	ND (0.11) *	ND (0.0056)	ND (0.11) *	ND (0.0055)	ND (0.69) *	ND (0.0054)							
ALPHA-BHC	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.69)	ND (0.0054)							
BETA-BHC	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.69)	ND (0.0054)							
DELTA-BHC	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.69)	ND (0.0054)							
GAMMA-BHC (LINDANE)	ND (0.045) *	ND (0.044) *	ND (0.0022)	ND (0.043) *	ND (0.0022)	ND (0.28) *	ND (0.0022)							
CHLORDANE	ND (0.45)	ND (0.44)	ND (0.022)	ND (0.43)	0.045	ND (2.8)	ND (0.022)							
4,4'-DDD	ND (0.090)	ND (0.088)	ND (0.0045)	ND (0.087)	ND (0.0044)	ND (0.56)	ND (0.0043)							
4,4'-DDE	ND (0.090)	ND (0.088)	ND (0.0045)	ND (0.087)	ND (0.0044)	ND (0.56)	ND (0.0043)							
4,4'-DDT	ND (0.090)	ND (0.088)	ND (0.0045)	ND (0.087)	ND (0.0044)	ND (0.56)	ND (0.0043)							
DIELDRIN	**0.11**	ND (0.088) *	ND (0.0045)	ND (0.087) *	ND (0.0044)	ND (0.56) *	ND (0.0043)							
ENDOSULFAN I	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.69) *	ND (0.0054)							
ENDOSULFAN II	ND (0.18)	ND (0.18)	ND (0.0089)	ND (0.17)	ND (0.0088)	ND (1.1) *	ND (0.0086)							
ENDOSULFAN SULFATE	ND (0.18)	ND (0.18)	ND (0.0089)	ND (0.17)	ND (0.0088)	ND (1.1)	ND (0.0086)							
ENDRIN	ND (0.18)	ND (0.18)	ND (0.0089)	ND (0.17)	ND (0.0088)	ND (1.1)	ND (0.0086)							
ENDRIN KETONE	ND (0.18)	ND (0.18)	ND (0.0089)	ND (0.17)	ND (0.0088)	ND (1.1)	ND (0.0086)							
HEPTACHLOR	ND (0.11)	ND (0.11)	ND (0.0056)	ND (0.11)	ND (0.0055)	ND (0.69) *	ND (0.0054)							
HEPTACHLOR EPOXIDE	ND (0.11) *	ND (0.11) *	ND (0.0056)	ND (0.11) *	ND (0.0055)	ND (0.69) *	ND (0.0054)							
HEXACHLOROBENZENE	ND (0.14)	ND (0.13)	ND (0.0067)	ND (0.13)	ND (0.0066)	ND (0.83) *	ND (0.0065)							
METHOXYCHLOR	ND (1.1)	ND (1.1)	ND (0.056)	ND (1.1)	ND (0.055)	ND (6.9)	ND (0.054)							
SW-846 8151A (mg/kg dry)														
2,4-D							ND (0.027)							
2,4-DB							ND (0.027)							
2,4,5-TP (SILVEX)							ND (0.0027)							
2,4,5-T							ND (0.0027)							
DALAPON							ND (0.068)							
DICAMBA							ND (0.0027)							
DICHLOROPROP							ND (0.027)							
DINOSEB							ND (0.014)							
MCPA							ND (2.7)							
MCPP							ND (2.7)							

NOTES:

1. An asterisk (*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regul. criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Bolded values exceed the Method 1 Cleanup Standards (exclusive of S-x/GW-1).
6. Italic values exceed MassDEP published background conc. for soils assoc. with fill containing coal ash or wood ash.

12. These soils contain >50 mg/kg PCBs and were excavated and transported off-site to a hazardous waste facility approved to accept >50 mg/kg PCBs.
13. Sample hydrocarbon fingerprinted via USEPA Method 8015C. Hydrocarbon was identified as Fuel Oil No. 6. B-3 (15'-20') (25-28") and B-4 (15'-20') (21-24") contained 10,000 and 6,300 mg/kg Fuel Oil No. 6, respectively.
14. EPH extraction for B-18(5-10), B-19 (5-10) and B-19 (10-15) was conducted on day 29 after sample collection, more than 2 times the extraction hold period of 14 days. This data is used only for qualitative purposes to evaluate distribution of petroleum contamination.

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	SAMPLING LOCATIONS													
	B-15 (5-10)	**B-16 (0-5)**	**B-16 (5-10)**	**B-16 (10-15)**	**B-17 (5-7.5)**	**B-18 (0-5)**	**B-18 (5-10)**	**B-18 (10-15)**	**B-19 (0-5)**	**B-19 (5-10)**	**B-19 (10-15)**	**B-19 (15-17)**	**B-20 (0-5)**	**B-20 (5-8)**
Sampling Date	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/16/2016	9/16/2016
Sample Depth During Investigative Event	5-10 Feet	0-5 Feet	5-10 Feet	10-15 Feet	5-7.5 Feet	0-5 Feet	5-10 Feet	10-15 Feet	0-5 Feet	5-10 Feet	10-15 Feet	15-17 Feet	0-5 Feet	5-8 Feet
Sample Depth Relative to October 1, 2016	5-10 Feet	0-5 Feet	5-10 Feet	10-15 Feet	5-7.5 Feet	0-5 Feet	5-10 Feet	10-15 Feet	0-5 Feet	5-10 Feet	10-15 Feet	15-17 Feet	0-5 Feet	5-8 Feet
NOTES:							14			14	14			
MADEP-EPH-04-1.1 (mg/Kg dry)														
C9-C18 ALIPHATICS	140			150	85		28	59		20	110	200		ND (11)
C19-C36 ALIPHATICS	**4700**			380	670		33	310		70	370	730		32
C11-C22 AROMATICS	**3700**			850	650		90	530		220	570	**1600**		67
ACENAPHTHENE	ND (1.1)			ND (0.20)	ND (0.21)		ND (0.12)	ND (0.52)		1.3	ND (0.53)	ND (0.53)		ND (0.11)
ACENAPHTHYLENE	ND (1.1) *			ND (0.20)	ND (0.21)		ND (0.12)	ND (0.52)		ND (0.11)	ND (0.53)	ND (0.53)		ND (0.11)
ANTHRACENE	ND (1.1)			ND (0.20)	ND (0.21)		ND (0.12)	ND (0.52)		2.5	ND (0.53)	ND (0.53)		ND (0.11)
BENZO(A)ANTHRACENE	ND (1.1)			ND (0.20)	ND (0.21)		ND (0.12)	ND (0.52)		6	ND (0.53)	ND (0.53)		0.14
BENZO(A)PYRENE	ND (1.1)			ND (0.20)	ND (0.21)		ND (0.12)	ND (0.52)		**5.1**	ND (0.53)	ND (0.53)		0.12
BENZO(B)FLUORANTHENE	ND (1.1)			ND (0.20)	ND (0.21)		0.15	ND (0.52)		7	ND (0.53)	ND (0.53)		0.23
BENZO(G,H,I)PERYLENE	ND (1.1)			ND (0.20)	ND (0.21)		ND (0.12)	ND (0.52)		2.7	ND (0.53)	ND (0.53)		0.13
BENZO(K)FLUORANTHENE	ND (1.1)			ND (0.20)	ND (0.21)		ND (0.12)	ND (0.52)		2.6	ND (0.53)	ND (0.53)		ND (0.11)
CHRYSENE	ND (1.1)			ND (0.20)	ND (0.21)		0.25	ND (0.52)		6.7	ND (0.53)	ND (0.53)		0.28
DIBENZ(A,H)ANTHRACENE	ND (1.1) *			ND (0.20)	ND (0.21)		ND (0.12)	ND (0.52)		**0.9**	ND (0.53)	ND (0.53)		ND (0.11)
FLUORANTHENE	ND (1.1)			ND (0.20)	ND (0.21)		0.15	ND (0.52)		*14*	ND (0.53)	ND (0.53)		0.3
FLUORENE	ND (1.1)			ND (0.20)	ND (0.21)		0.13	ND (0.52)		1.3	ND (0.53)	ND (0.53)		ND (0.11)
INDENO(1,2,3-CD)PYRENE	ND (1.1)			ND (0.20)	ND (0.21)		ND (0.12)	ND (0.52)		*3.3*	ND (0.53)	ND (0.53)		ND (0.11)
2-METHYLNAPHTHALENE	ND (1.1) *			ND (0.20)	ND (0.21)		0.16	ND (0.52)		**0.99**	ND (0.53)	ND (0.53)		ND (0.11)
NAPHTHALENE	ND (1.1)			ND (0.20)	ND (0.21)		0.31	ND (0.52)		0.44	ND (0.53)	ND (0.53)		ND (0.11)
PHENANTHRENE	ND (1.1)			ND (0.20)	0.63		0.49	ND (0.52)		**11**	ND (0.53)	ND (0.53)		0.37
PYRENE	ND (1.1)			ND (0.20)	ND (0.21)		0.18	ND (0.52)		13	ND (0.53)	ND (0.53)		0.37
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)														
DIBENZOFURAN (see notes 7, 9)														
DI-N-BUTYLPHTHALATE (see note 7)														
MADEP-VPH-04-1.1 (mg/Kg dry)														
C5-C8 ALIPHATICS														
C9-C12 ALIPHATICS														
C9-C10 AROMATICS														
BENZENE														
ETHYLBENZENE														
METHYL TERT-BUTYL ETHER (MTBE)														
NAPHTHALENE														
TOLUENE														
M/P-XYLENE														
O-XYLENE														

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	SAMPLING LOCATIONS													
	B-15 (5-10)	B-16 (0-5)	B-16 (5-10)	B-16 (10-15)	B-17 (5-7.5)	B-18 (0-5)	B-18 (5-10)	B-18 (10-15)	B-19 (0-5)	B-19 (5-10)	B-19 (10-15)	B-19 (15-17)	B-20 (0-5)	B-20 (5-8)
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
ANTIMONY														
ARSENIC														
BARIUM														
BERYLLIUM														
CADMIUM														
CHROMIUM (as +3)														
LEAD														
NICKEL														
SELENIUM														
SILVER														
THALLIUM														
VANADIUM														
ZINC														
SW-846 7471B (mg/Kg dry) Metals Digestion														
MERCURY														
SW-846 8082A (mg/Kg dry)														
PCB 1016	ND (0.11)	ND (0.11)				ND (5.5) *	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)		ND (0.11)	
PCB 1221	ND (0.11)	ND (0.11)				ND (5.5) *	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)		ND (0.11)	
PCB 1232	ND (0.11)	ND (0.11)				ND (5.5) *	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)		ND (0.11)	
PCB 1242	ND (0.11)	ND (0.11)				ND (5.5) *	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)		ND (0.11)	
PCB 1248	ND (0.11)	ND (0.11)				ND (5.5) *	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)		ND (0.11)	
PCB 1254	0.30	0.90				**29**	ND (0.12)	ND (0.10)	**6.7**	**2.1**	ND (0.11)		ND (0.11)	
PCB 1260	ND (0.11)	ND (0.11)				ND (5.5) *	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)		ND (0.11)	
PCB 1262	ND (0.11)	ND (0.11)				ND (5.5) *	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)		ND (0.11)	
PCB 1268	ND (0.11)	ND (0.11)				ND (5.5) *	ND (0.12)	ND (0.10)	ND (1.1) *	ND (0.42)	ND (0.11)		ND (0.11)	
TOTAL PCBs	0.30	0.90				**29**	ND (0.12)	ND (0.10)	**6.7**	**2.1**	ND (0.11)		ND (0.11)	

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	SAMPLING LOCATIONS													
	B-15 (5-10)	B-16 (0-5)	B-16 (5-10)	B-16 (10-15)	B-17 (5-7.5)	B-18 (0-5)	B-18 (5-10)	B-18 (10-15)	B-19 (0-5)	B-19 (5-10)	B-19 (10-15)	B-19 (15-17)	B-20 (0-5)	B-20 (5-8)
SW-846 8081B (mg/Kg dry)														
ALDRIN														
ALPHA-BHC														
BETA-BHC														
DELTA-BHC														
GAMMA-BHC (LINDANE)														
CHLORDANE														
4,4'-DDD														
4,4'-DDE														
4,4'-DDT														
DIELDRIN														
ENDOSULFAN I														
ENDOSULFAN II														
ENDOSULFAN SULFATE														
ENDRIN														
ENDRIN KETONE														
HEPTACHLOR														
HEPTACHLOR EPOXIDE														
HEXACHLOROBENZENE														
METHOXYCHLOR														
SW-846 8151A (mg/kg dry)														
2,4-D														
2,4-DB														
2,4,5-TP (SILVEX)														
2,4,5-T														
DALAPON														
DICAMBA														
DICHLOROPROP														
DINOSEB														
MCPA														
MCPP														
NOTES:														
1. An asterisk (*) following a detection limit														
indicates that the minimum laboratory reporting														
limit exceeds one or more of the regul. criteria.														
2. ND = Not detected above the lab reporting														
limits shown in parenthesis.														
3. NT = Not tested.														
4. ~ = No Method 1 Standard or UCL available														
5. Bolded values exceed the Method 1 Cleanup														
Standards (exclusive of S-x/GW-1).														
6. Italic values exceed MassDEP published														
background conc. for soils assoc. with fill														
containing coal ash or wood ash.														

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	SAMPLING LOCATIONS									SUMMARY STATISTICS			EVALUATION	
	B-21 (0-5)	B-21 (5-10)	B-21 (10-13.5)	B-22 (10-15)	B-22 (15-20)	B-23 (5-9)	B-26 (10-13)	B-27 (5-10)	B-28 (10-15)	Number Analyzed	Number Detected	Maximum Concentration Detected	Does Maximum Concentration Exceed Background Concentration for Fill?	Soil Contaminant of Concern
Sampling Date	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016					
Sample Depth During Investigative Event	0-5 Feet	5-10 Feet	10-13.5 Feet	10-15 Feet	15-20 Feet	5-9 Feet	10-13 Feet	5-10 Feet	10-15 Feet					
Sample Depth Relative to October 1, 2016	0-5 Feet	5-10 Feet	10-13.5 Feet	10-15 Feet	15-20 Feet	5-9 Feet	10-13 Feet	5-10 Feet	10-15 Feet					
NOTES:														
MADEP-EPH-04-1.1 (mg/Kg dry)														
C9-C18 ALIPHATICS	28	860	110	63	ND (11)	ND (11)				34	24	8300	Not applicable	**Yes**
C19-C36 ALIPHATICS	180	1200	500	330	ND (11)	18				34	31	11000	Not applicable	**Yes**
C11-C22 AROMATICS	390	**2400**	1000	560	ND (11)	48				34	33	15000	Not applicable	**Yes**
ACENAPHTHENE	1.6	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	0.32				35	9	4.9	Yes	**Yes**
ACENAPHTHYLENE	ND (0.22)	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	ND (0.11)				35	1	0.11	No	**Yes - a**
ANTHRACENE	3	ND (0.52)	ND (0.55)	0.28	ND (0.11)	0.32				35	16	11	Yes	**Yes**
BENZO(A)ANTHRACENE	6.7	ND (0.52)	ND (0.55)	0.53	ND (0.11)	1.2				35	16	10	Yes	**Yes**
BENZO(A)PYRENE	**6.3**	ND (0.52)	ND (0.55)	0.64	ND (0.11)	1.3				35	17	9.3	Yes	**Yes**
BENZO(B)FLUORANTHENE	***8.3***	ND (0.52)	ND (0.55)	0.85	ND (0.11)	1.6				35	18	13	Yes	**Yes**
BENZO(G,H,I)PERYLENE	*3.2*	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	0.82				35	15	4.9	Yes	**Yes**
BENZO(K)FLUORANTHENE	3.2	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	0.57				35	12	4.8	Yes	**Yes**
CHRYSENE	*7.9*	ND (0.52)	ND (0.55)	0.74	ND (0.11)	1.3				35	20	12	Yes	**Yes**
DIBENZ(A,H)ANTHRACENE	***1.2***	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	0.19				35	6	1.5	Yes	**Yes**
FLUORANTHENE	*18*	1.8	ND (0.55)	1.8	ND (0.11)	2.8				35	26	27	Yes	**Yes**
FLUORENE	1.7	1.5	ND (0.55)	ND (0.24)	ND (0.11)	0.15				35	15	29	Yes	**Yes**
INDENO(1,2,3-CD)PYRENE	*3.9*	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	0.79				35	14	5.2	Yes	**Yes**
2-METHYLNAPHTHALENE	0.39	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	ND (0.11)				35	13	65	No	**Yes**
NAPHTHALENE	0.41	ND (0.52)	ND (0.55)	ND (0.24)	ND (0.11)	0.18				35	14	27	Yes	**Yes**
PHENANTHRENE	**14**	3.3	ND (0.55)	0.41	ND (0.11)	1.9				35	26	35	Yes	**Yes**
PYRENE	17	ND (0.52)	ND (0.55)	1.7	ND (0.11)	2.7				35	23	33	Yes	**Yes**
BIS(2-ETHYLHEXYL)PHTHALATE (see note 7)										1	0		Not applicable	No
DIBENZOFURAN (see notes 7, 9)										1	0		Not applicable	No
DI-N-BUTYLPHTHALATE (see note 7)										1	0		Not applicable	No
MADEP-VPH-04-1.1 (mg/Kg dry)														
C5-C8 ALIPHATICS										12	0			No
C9-C12 ALIPHATICS										12	0			No
C9-C10 AROMATICS										12	3	100	Not applicable	**Yes**
BENZENE										12	5	0.52	Not applicable	**Yes**
ETHYLBENZENE										12	0			No
METHYL TERT-BUTYL ETHER (MTBE)										12	0			No
NAPHTHALENE										12	0			No
TOLUENE										12	7	0.6	Not applicable	**Yes**
M/P-XYLENE										12	0			No
O-XYLENE										12	0			No

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	SAMPLING LOCATIONS									SUMMARY STATISTICS			EVALUATION	
	B-21 (0-5)	B-21 (5-10)	B-21 (10-13.5)	B-22 (10-15)	B-22 (15-20)	B-23 (5-9)	B-26 (10-13)	B-27 (5-10)	B-28 (10-15)	Number	Number	Maximum Concentration	Does Maximum	Soil
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
ANTIMONY										10	0			No
ARSENIC										10	8	14	No	No
BARIUM										10	9	72	Yes	**Yes**
BERYLLIUM										10	0			No
CADMIUM										10	8	1	No	No
CHROMIUM (as +3)										10	9	26	No	No
LEAD										10	9	290	No	No
NICKEL										10	9	23	No	No
SELENIUM										10	0			No
SILVER										10	0			No
THALLIUM										10	0			No
VANADIUM										16	15	100	Yes	**Yes**
ZINC										10	9	210	No	No
SW-846 7471B (mg/Kg dry) Metals Digestion														
MERCURY										10	8	1.3	Yes	**Yes**
SW-846 8082A (mg/Kg dry)														
PCB 1016	ND (2.2) *	ND (0.11)	ND (0.11)											
PCB 1221	ND (2.2) *	ND (0.11)	ND (0.11)											
PCB 1232	ND (2.2) *	ND (0.11)	ND (0.11)											
PCB 1242	ND (2.2) *	ND (0.11)	ND (0.11)											
PCB 1248	ND (2.2) *	ND (0.11)	ND (0.11)											
PCB 1254	**11**	0.63	ND (0.11)											
PCB 1260	ND (2.2) *	0.12	ND (0.11)											
PCB 1262	ND (2.2) *	ND (0.11)	ND (0.11)											
PCB 1268	ND (2.2) *	ND (0.11)	ND (0.11)											
TOTAL PCBs	**11**	0.75	ND (0.11)							34	18	29	Not applicable	**Yes**

Table D-1
Comparison of Soil Analytical Data to Background Concentrations and Identification of Soil Contaminants of Concern

Parameter	SAMPLING LOCATIONS									SUMMARY STATISTICS			EVALUATION	
	B-21 (0-5)	B-21 (5-10)	B-21 (10-13.5)	B-22 (10-15)	B-22 (15-20)	B-23 (5-9)	B-26 (10-13)	B-27 (5-10)	B-28 (10-15)	Number	Number	Maximum Concentration	Does Maximum	Soil
SW-846 8081B (mg/Kg dry)														
ALDRIN										10	0			No
ALPHA-BHC										10	0			No
BETA-BHC										10	0			No
DELTA-BHC										10	0			No
GAMMA-BHC (LINDANE)										10	0			No
CHLORDANE										10	1	0.045	Not applicable	**Yes**
4,4'-DDD										10	0			No
4,4'-DDE										10	0			No
4,4'-DDT										10	0			No
DIELDRIN										10	1	0.11	Not applicable	**Yes**
ENDOSULFAN I										10	0			No
ENDOSULFAN II										10	0			No
ENDOSULFAN SULFATE										10	0			No
ENDRIN										10	0			No
ENDRIN KETONE										10	0			No
HEPTACHLOR										10	0			No
HEPTACHLOR EPOXIDE										10	0			No
HEXACHLOROBENZENE										10	0			No
METHOXYCHLOR										10	0			No
SW-846 8151A (mg/kg dry)														
2,4-D										1	0			No
2,4-DB										1	0			No
2,4,5-TP (SILVEX)										1	0			No
2,4,5-T										1	0			No
DALAPON										1	0			No
DICAMBA										1	0			No
DICHLOROPROP										1	0			No
DINOSEB										1	0			No
MCPA										1	0			No
MCPP										1	0			No
NOTES:														
1. An asterisk (*) following a detection limit														
indicates that the minimum laboratory reporting														
limit exceeds one or more of the regul. criteria.														
2. ND = Not detected above the lab reporting														
limits shown in parenthesis.														
3. NT = Not tested.														
4. ~ = No Method 1 Standard or UCL available														
5. Bolded values exceed the Method 1 Cleanup														
Standards (exclusive of S-x/GW-1).														
6. Italic values exceed MassDEP published														
background conc. for soils assoc. with fill														
containing coal ash or wood ash.														

Table D-2
Evaluation of 0-3 Foot Interval Data to Determine Method to Derive Exposure Point Concentrations

Parameter	MCP - Method 2 Direct Contact Standards			Upper Concentration Limit	SAMPLING LOCATIONS										
	S-1	S-2	S-3	UCL	B-5 (3-6')	B-7 (3-6')	B-8 (1-3')	BTM-GT-1	ESW-GT-1	NSW-GT-1	NSW-GT-2	SSW-GT-1	SSW-GT-2	WSW-GT-2	FO-1-BTM
Sampling Date					3/14/2016	3/14/2016	3/14/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/10/2016
Sample Depth Relative to October 1, 2016					0-3 Feet	0-3 Feet	0-2 Feet	3 Feet	0-1 Feet	0-1 Feet	2-3 Feet	0-1 Feet	2-3 Feet	2-3 Feet	2.5 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)															
C9-C18 ALIPHATICS	1000	3000	5000	20000	26	ND (11)		ND (12)	13	34	ND (22)	ND (11)	37	ND (11)	
C19-C36 ALIPHATICS	3000	5000	5000	20000	64	28		ND (12)	29	140	77	17	200	ND (11)	
C11-C22 AROMATICS	1000	3000	5000	10000	220	83		25	41	420	120	31	210	33	
ACENAPHTHENE	1000	3000	5000	10000	0.76	0.54		ND (0.12)	ND (0.11)	1.7	0.37	ND (0.11)	ND (0.43)	ND (0.11)	
ACENAPHTHYLENE	600	600	600	10000	0.11	ND (0.11)		ND (0.12)	ND (0.11)	ND (0.23)	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	
ANTHRACENE	1000	3000	5000	10000	1.8	1.4		ND (0.12)	ND (0.11)	*4.7*	0.73	ND (0.11)	ND (0.43)	0.18	
BENZO(A)ANTHRACENE	7	40	300	3000	4.1	2.9		ND (0.12)	ND (0.11)	***10***	1.7	ND (0.11)	0.78	0.5	
BENZO(A)PYRENE	2	7	30	300	**3.7**	**2.4**		0.27	ND (0.11)	***9.3***	0.69	0.24	0.94	0.52	
BENZO(B)FLUORANTHENE	7	40	300	3000	5.3	3.3		0.32	ND (0.11)	***13***	2	0.31	1.1	0.67	
BENZO(G,H,I)PERYLENE	1000	3000	5000	10000	1.7	1.2		0.38	ND (0.11)	*4.9*	0.96	0.33	0.77	0.41	
BENZO(K)FLUORANTHENE	70	400	3000	10000	2.0	1.2		ND (0.12)	ND (0.11)	*4.8*	0.73	ND (0.11)	0.44	0.26	
CHRYSENE	70	400	3000	10000	5.0	3.2		0.15	ND (0.11)	*12*	1.8	0.17	1.0	0.59	
DIBENZ(A,H)ANTHRACENE	0.7	4	30	300	0.65	0.41		ND (0.12)	ND (0.11)	***1.5***	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	
FLUORANTHENE	1000	3000	5000	10000	9.5	6.6		0.15	0.14	*27*	3.7	0.19	1.6	1.1	
FLUORENE	1000	3000	5000	10000	0.90	0.78		ND (0.12)	ND (0.11)	*2.1*	0.37	ND (0.11)	ND (0.43)	ND (0.11)	
INDENO(1,2,3-CD)PYRENE	7	40	300	3000	2.1	1.3		0.36	ND (0.11)	*5.2*	0.93	0.25	0.56	0.36	
2-METHYLNAPHTHALENE	300	500	500	5000	0.29	0.22		ND (0.12)	ND (0.11)	0.48	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	
NAPHTHALENE	500	1000	3000	10000	0.44	0.32		ND (0.12)	ND (0.11)	0.70	ND (0.22)	ND (0.11)	ND (0.43)	ND (0.11)	
PHENANTHRENE	500	1000	3000	10000	7.4	6.1		0.34	0.4	19	3	0.24	1.2	0.74	
PYRENE	1000	3000	5000	10000	8.8	5.9		ND (0.12)	0.13	*25*	3.4	0.19	1.6	1	
MADEP-VPH-04-1.1 (mg/Kg dry)															
C9-C10 AROMATICS	100	500	500	5000				ND (9.6)	ND (9.5)	ND (8.6)	ND (8.3)	ND (10)	ND (11)	ND (8.2)	ND (8.3)
BENZENE	40	200	1000	10000				0.10	0.15	ND (0.043)	ND (0.042)	ND (0.052)	ND (0.053)	ND (0.041)	ND (0.042)
TOLUENE	500	1000	3000	10000				0.60	0.23	0.14	ND (0.042)	0.25	0.087	ND (0.041)	ND (0.042)
SW-846 6010C/D (mg/Kg dry) Metals Digestion															
BARIUM	1000	3000	5000	10000				34	43	*72*	42	27	31	28	30
VANADIUM	400	700	700	7000	*55*	*31*		27	*36*	*100*	*32*	14	*50*	15	29
SW-846 7471B (mg/Kg dry) Metals Digestion															
MERCURY	20	30	30	300				0.14	0.63	*1.3*	0.25	0.10	0.51	0.099	ND (0.026)
SW-846 8082A (mg/Kg dry)															
TOTAL PCBs	1	4	4	100	**3.8**	**2.2**	ND (0.10)	ND (0.11)	ND (0.11)	**6.3**	**1.2**	ND (0.11)	0.35	0.16	ND (0.11)
SW-846 8081B (mg/Kg dry)															
CHLORDANE	5	30	60	600				ND (0.023)	ND (0.022)	ND (0.45)	ND (0.44)	ND (0.022)	ND (0.43)	0.045	ND (0.022)
DIELDRIN	0.08	0.5	3	30				ND (0.0046)	ND (0.0045)	**0.11**	ND (0.088) *	ND (0.0045)	ND (0.087) *	ND (0.0044)	ND (0.0043)
NOTES:															

Table D-2
Evaluation of 0-3 Foot Interval Data to Determine Method to Derive Exposure Point Concentrations

Parameter	SAMPLING LOCATIONS							EVALUATION				
	B-14A (0-5)	B-15 (0-5)	B-16 (0-5)	B-18 (0-5)	B-19 (0-5)	B-20 (0-5)	B-21 (0-5)	Number	Maximum Concentration	More than 10X >S-2?	% >S-2	Method to Derive
Sampling Date	9/16/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/16/2016	9/16/2016	Analyzed	Detected			Exposure Point Conc.
Sample Depth Relative to October 1, 2016	0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet					
MADEP-EPH-04-1.1 (mg/Kg dry)												
C9-C18 ALIPHATICS	**2400**						28	11	2400	No	0	**Mean**
C19-C36 ALIPHATICS	**3400**						180	11	3400	No	0	**Mean**
C11-C22 AROMATICS	**7200**						390	11	7200	No	9.1	**Mean**
ACENAPHTHENE	ND (2.9)						1.6	11	1.7	No	0	**Mean**
ACENAPHTHYLENE	ND (2.9) *						ND (0.22)	11	0.11	No	0	**Mean**
ANTHRACENE	ND (2.9)						3	11	4.7	No	0	**Mean**
BENZO(A)ANTHRACENE	ND (2.9)						6.7	11	10	No	0	**Mean**
BENZO(A)PYRENE	ND (2.9) *						**6.3**	11	9.3	No	9.1	**Mean**
BENZO(B)FLUORANTHENE	ND (2.9)						***8.3***	11	13	No	0	**Mean**
BENZO(G,H,I)PERYLENE	ND (2.9)						*3.2*	11	4.9	No	0	**Mean**
BENZO(K)FLUORANTHENE	ND (2.9)						3.2	11	4.8	No	0	**Mean**
CHRYSENE	ND (2.9)						*7.9*	11	12	No	0	**Mean**
DIBENZ(A,H)ANTHRACENE	ND (2.9) *						***1.2***	11	1.5	No	0	**Mean**
FLUORANTHENE	*12*						*18*	11	27	No	0	**Mean**
FLUORENE	ND (2.9)						1.7	11	2.1	No	0	**Mean**
INDENO(1,2,3-CD)PYRENE	ND (2.9)						*3.9*	11	5.2	No	0	**Mean**
2-METHYLNAPHTHALENE	***12***						0.39	11	12	No	0	**Mean**
NAPHTHALENE	ND (2.9)						0.41	11	0.7	No	0	**Mean**
PHENANTHRENE	**12**						**14**	11	19	No	0	**Mean**
PYRENE	7.1						17	11	25	No	0	**Mean**
MADEP-VPH-04-1.1 (mg/Kg dry)												
C9-C10 AROMATICS								8	0	No	0	**Mean**
BENZENE								8	0.15	No	0	**Mean**
TOLUENE								8	0.6	No	0	**Mean**
SW-846 6010C/D (mg/Kg dry) Metals Digestion												
BARIUM								8	72	No	0	**Mean**
VANADIUM								10	100	No	0	**Mean**
SW-846 7471B (mg/Kg dry) Metals Digestion												
MERCURY								8	1.3	No	0	**Mean**
SW-846 8082A (mg/Kg dry)												
TOTAL PCBs	ND (0.15)	**12**	0.90	**29**	**6.7**	ND (0.11)	**11**	18	29	No	28	**95th % UCL on mean**
SW-846 8081B (mg/Kg dry)												
CHLORDANE								8	0.045	No	0	**Mean**
DIELDRIN								8	0.11	No	0	**Mean**
NOTES:												
									95th % UCL on mean = 95th % upper confidence limit on the mean			

Table D-3
Evaluation of 3-6 Foot Interval Data to Determine Method to Derive Exposure Point Concentrations

Parameter	MCP - Method 2 Direct Contact Standards			Upper Concentration Limit	SAMPLING LOCATIONS									
	S-1	S-2	S-3	UCL	B-14A (0-5)	B-15 (0-5)	B-16 (0-5)	B-18 (0-5)	B-19 (0-5)	B-20 (0-5)	B-21 (0-5)	BTM-GT-2	FO-1	B-5 (6-11')
Sampling Date					9/16/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/16/2016	9/16/2016	3/8/2016	3/10/2016	3/14/2016
Sample Depth Relative to October 1, 2016					0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet	5 Feet	4-5 feet (under vault, oil material)	3-8 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)													via 8270C	
C9-C18 ALIPHATICS	1000	3000	5000	20000	**2400**						28	ND (11)		300
C19-C36 ALIPHATICS	3000	5000	5000	20000	**3400**						180	31		750
C11-C22 AROMATICS	1000	3000	5000	10000	**7200**						390	45		**1400**
ACENAPHTHENE	1000	3000	5000	10000	ND (2.9)						1.6	ND (0.11)	***4.9***	ND (0.49)
ACENAPHTHYLENE	600	600	600	10000	ND (2.9) *						ND (0.22)	ND (0.11)	ND (3.8) *	ND (0.49)
ANTHRACENE	1000	3000	5000	10000	ND (2.9)						3	ND (0.11)	*4.9*	ND (0.49)
BENZO(A)ANTHRACENE	7	40	300	3000	ND (2.9)						6.7	ND (0.11)	4.8	ND (0.49)
BENZO(A)PYRENE	2	7	30	300	ND (2.9) *						**6.3**	0.11	ND (3.8) *	ND (0.49)
BENZO(B)FLUORANTHENE	7	40	300	3000	ND (2.9)						***8.3***	0.15	ND (3.8)	ND (0.49)
BENZO(G,H,I)PERYLENE	1000	3000	5000	10000	ND (2.9)						*3.2*	ND (0.11)	ND (3.8)	ND (0.49)
BENZO(K)FLUORANTHENE	70	400	3000	10000	ND (2.9)						3.2	ND (0.11)	ND (3.8)	ND (0.49)
CHRYSENE	70	400	3000	10000	ND (2.9)						*7.9*	0.11	6.6	ND (0.49)
DIBENZ(A,H)ANTHRACENE	0.7	4	30	300	ND (2.9) *						***1.2***	ND (0.11)	ND (3.8) *	ND (0.49)
FLUORANTHENE	1000	3000	5000	10000	*12*						*18*	0.17	6.4	1.2
FLUORENE	1000	3000	5000	10000	ND (2.9)						1.7	ND (0.11)	*11*	ND (0.49)
INDENO(1,2,3-CD)PYRENE	7	40	300	3000	ND (2.9)						*3.9*	ND (0.11)	ND (3.8)	ND (0.49)
2-METHYLNAPHTHALENE	300	500	500	5000	***12***						0.39	ND (0.11)	*33*	0.70
NAPHTHALENE	500	1000	3000	10000	ND (2.9)						0.41	ND (0.11)	*8.3*	0.79
PHENANTHRENE	500	1000	3000	10000	**12**						**14**	ND (0.11)	*32*	1.6
PYRENE	1000	3000	5000	10000	7.1						17	0.18	*33*	ND (0.49)
MADEP-VPH-04-1.1 (mg/Kg dry)														
C9-C10 AROMATICS	100	500	500	5000								ND (9.9)		
BENZENE	40	200	1000	10000								0.058		
TOLUENE	500	1000	3000	10000								0.32		
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
BARIUM	1000	3000	5000	10000								27	36	
VANADIUM	400	700	700	7000								14	42	30
SW-846 7471B (mg/Kg dry) Metals Digestion														
MERCURY	20	30	30	300								0.095	ND (0.035)	
SW-846 8082A (mg/Kg dry)														
TOTAL PCBs	1	4	4	100	ND (0.15)	**12**	0.90	**29**	**6.7**	ND (0.11)	**11**	ND (0.11)	0.45	0.29
SW-846 8081B (mg/Kg dry)														
CHLORDANE	5	30	60	600								ND (0.22)	ND (2.8)	
DIELDRIN	0.08	0.5	3	30								ND (0.044)	ND (0.56) *	
NOTES:														

Table D-3
Evaluation of 3-6 Foot Interval Data to Determine Method to Derive Exposure Point Concentrations

Parameter	SAMPLING LOCATIONS		
	B-7 (6-11')	B-8 (3-6')	B-17 (5-7.5)
Sampling Date	3/14/2016	3/14/2016	9/15/2016
Sample Depth Relative to October 1, 2016	3-8 Feet	2-5 Feet	5-7.5 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)			
C9-C18 ALIPHATICS	ND (22)		85
C19-C36 ALIPHATICS	48		670
C11-C22 AROMATICS	83		650
ACENAPHTHENE	ND (0.22)		ND (0.21)
ACENAPHTHYLENE	ND (0.22)		ND (0.21)
ANTHRACENE	0.29		ND (0.21)
BENZO(A)ANTHRACENE	1.2		ND (0.21)
BENZO(A)PYRENE	1.1		ND (0.21)
BENZO(B)FLUORANTHENE	1.3		ND (0.21)
BENZO(G,H,I)PERYLENE	0.66		ND (0.21)
BENZO(K)FLUORANTHENE	0.52		ND (0.21)
CHRYSENE	1.3		ND (0.21)
DIBENZ(A,H)ANTHRACENE	ND (0.22)		ND (0.21)
FLUORANTHENE	2.3		ND (0.21)
FLUORENE	ND (0.22)		ND (0.21)
INDENO(1,2,3-CD)PYRENE	0.56		ND (0.21)
2-METHYLNAPHTHALENE	ND (0.22)		ND (0.21)
NAPHTHALENE	ND (0.22)		ND (0.21)
PHENANTHRENE	1.2		0.63
PYRENE	2.4		ND (0.21)
MADEP-VPH-04-1.1 (mg/Kg dry)			
C9-C10 AROMATICS			
BENZENE			
TOLUENE			
SW-846 6010C/D (mg/Kg dry) Metals Digestion			
BARIUM			
VANADIUM	14	*39*	
SW-846 7471B (mg/Kg dry) Metals Digestion			
MERCURY			
SW-846 8082A (mg/Kg dry)			
TOTAL PCBs	ND (0.11)	ND (0.11)	
SW-846 8081B (mg/Kg dry)			
CHLORDANE			
DIELDRIN			
NOTES:			

Table D-3
Evaluation of 3-6 Foot Interval Data to Determine Method to Derive Exposure Point Concentrations

Parameter	EVALUATION				
	Number	Maximum Concentration	More than 10X >S-2?	% >S-2	Method to Derive
Sampling Date	Analyzed	Detected			Exposure Point Conc.
Sample Depth Relative to October 1, 2016					
MADEP-EPH-04-1.1 (mg/Kg dry)					
C9-C18 ALIPHATICS	6	2400	No	0	**Mean**
C19-C36 ALIPHATICS	6	3400	No	0	**Mean**
C11-C22 AROMATICS	6	7200	No	16.7	**Mean**
ACENAPHTHENE	7	4.9	No	0	**Mean**
ACENAPHTHYLENE	7	0	No	0	**Mean**
ANTHRACENE	7	4.9	No	0	**Mean**
BENZO(A)ANTHRACENE	7	6.7	No	0	**Mean**
BENZO(A)PYRENE	7	6.3	No	14.3	**Mean**
BENZO(B)FLUORANTHENE	7	8.3	No	0	**Mean**
BENZO(G,H,I)PERYLENE	7	3.2	No	0	**Mean**
BENZO(K)FLUORANTHENE	7	3.2	No	0	**Mean**
CHRYSENE	7	7.9	No	0	**Mean**
DIBENZ(A,H)ANTHRACENE	7	1.2	No	0	**Mean**
FLUORANTHENE	7	18	No	0	**Mean**
FLUORENE	7	11	No	0	**Mean**
INDENO(1,2,3-CD)PYRENE	7	3.9	No	0	**Mean**
2-METHYLNAPHTHALENE	7	33	No	0	**Mean**
NAPHTHALENE	7	8.3	No	0	**Mean**
PHENANTHRENE	7	32	No	0	**Mean**
PYRENE	7	33	No	0	**Mean**
MADEP-VPH-04-1.1 (mg/Kg dry)					
C9-C10 AROMATICS	1	0	No	0	**Mean**
BENZENE	1	0.058	No	0	**Mean**
TOLUENE	1	0.32	No	0	**Mean**
SW-846 6010C/D (mg/Kg dry) Metals Digestion					
BARIUM	2	27	No	0	**Mean**
VANADIUM	5	39	No	0	**Mean**
SW-846 7471B (mg/Kg dry) Metals Digestion					
MERCURY	2	0.095	No	0	**Mean**
SW-846 8082A (mg/Kg dry)					
TOTAL PCBs	12	29	No	33	**95th % UCL on mean**
SW-846 8081B (mg/Kg dry)					
CHLORDANE	2	0	No	0	**Mean**
DIELDRIN	2	0	No	0	**Mean**
NOTES:					
		95th % UCL on mean = 95th % upper confidence limit on the mean			

Table D-4
Evaluation of 6-20 Foot Interval Data to Determine Method to Derive Exposure Point Concentrations

Parameter	MCP - Method 2 Direct Contact Standards			Upper Concentration Limit	SAMPLING LOCATIONS									
	S-1	S-2	S-3	UCL	B-5 (6-11')	B-7 (6-11')	B-17 (5-7.5)	B-1 (15'-20')	B-3 (15'-20')	B-3 (15'-20') (25-28'')	B-4 (15'-20')	B-4 (15'-20') (21-24'')	B-8 (6-11')	B-14 (10-15)
Sampling Date					3/14/2016	3/14/2016	9/15/2016	8/14/2015	8/14/2015	8/14/2015	8/14/2015	8/14/2015	3/14/2016	9/15/2016
Sample Depth Relative to October 1, 2016					3-8 Feet	3-8 Feet	5-7.5 Feet	12-17 Feet	14-19 Feet	14-19 Feet	12-17 Feet	12-17 Feet	5-10 Feet	10-15 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)														
C9-C18 ALIPHATICS	1000	3000	5000	20000	300	ND (22)	85	810	48		570			
C19-C36 ALIPHATICS	3000	5000	5000	20000	750	48	670	1700	77		1200			
C11-C22 AROMATICS	1000	3000	5000	10000	**1400**	83	650	**3400**	200		**3600**			
ACENAPHTHENE	1000	3000	5000	10000	ND (0.49)	ND (0.22)	ND (0.21)	ND (0.22)	0.22		ND (0.22)			
ACENAPHTHYLENE	600	600	600	10000	ND (0.49)	ND (0.22)	ND (0.21)	ND (0.22)	ND (0.11)		ND (0.22)			
ANTHRACENE	1000	3000	5000	10000	ND (0.49)	0.29	ND (0.21)	1.9	0.65		5.4			
BENZO(A)ANTHRACENE	7	40	300	3000	ND (0.49)	1.2	ND (0.21)	3.0	1.1		**7.4**			
BENZO(A)PYRENE	2	7	30	300	ND (0.49)	1.1	ND (0.21)	ND (0.22)	0.88		**5.5**			
BENZO(B)FLUORANTHENE	7	40	300	3000	ND (0.49)	1.3	ND (0.21)	ND (0.22)	1.2		**7.1**			
BENZO(G,H,I)PERYLENE	1000	3000	5000	10000	ND (0.49)	0.66	ND (0.21)	ND (0.22)	0.58		1.5			
BENZO(K)FLUORANTHENE	70	400	3000	10000	ND (0.49)	0.52	ND (0.21)	ND (0.22)	0.43		2.5			
CHRYSENE	70	400	3000	10000	ND (0.49)	1.3	ND (0.21)	3.8	1.2		*7.8*			
DIBENZ(A,H)ANTHRACENE	0.7	4	30	300	ND (0.49)	ND (0.22)	ND (0.21)	ND (0.22)	ND (0.11)		ND (0.22)			
FLUORANTHENE	1000	3000	5000	10000	1.2	2.3	ND (0.21)	3.5	2.3		*15*			
FLUORENE	1000	3000	5000	10000	ND (0.49)	ND (0.22)	ND (0.21)	*3.5*	0.44		*6.9*			
INDENO(1,2,3-CD)PYRENE	7	40	300	3000	ND (0.49)	0.56	ND (0.21)	ND (0.22)	0.51		2.6			
2-METHYLNAPHTHALENE	300	500	500	5000	0.70	ND (0.22)	ND (0.21)	0.49	ND (0.11)		***3.1***			
NAPHTHALENE	500	1000	3000	10000	0.79	ND (0.22)	ND (0.21)	*1.3*	0.12		*2.1*			
PHENANTHRENE	500	1000	3000	10000	1.6	1.2	0.63	5.3	1.9		***21***			
PYRENE	1000	3000	5000	10000	ND (0.49)	2.4	ND (0.21)	2.6	2.3		13			
MADEP-VPH-04-1.1 (mg/Kg dry)														
C9-C10 AROMATICS	100	500	500	5000				84	51		100			
BENZENE	40	200	1000	10000				0.26	ND (0.062)		0.52			
TOLUENE	500	1000	3000	10000				ND (0.14)	ND (0.062)		0.32			
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
BARIUM	1000	3000	5000	10000										
VANADIUM	400	700	700	7000	30	14							*41*	
SW-846 7471B (mg/Kg dry) Metals Digestion														
MERCURY	20	30	30	300										
SW-846 8082A (mg/Kg dry)														
TOTAL PCBs	1	4	4	100	0.29	ND (0.11)							ND (0.11)	
SW-846 8081B (mg/Kg dry)														
CHLORDANE	5	30	60	600										
DIELDRIN	0.08	0.5	3	30										
NOTES:														

Table D-4
Evaluation of 6-20 Foot Interval Data to Determine Method to Derive Exposure Point Concentrations

Parameter	SAMPLING LOCATIONS													
	B-14A (5-10)	**B-14A (10-15)**	**B-14A (10-15)**	**B-14A (15-16.5)**	**B-15 (5-10)**	**B-16 (5-10)**	**B-16 (10-15)**	**B-18 (5-10)**	**B-18 (10-15)**	**B-19 (5-10)**	**B-19 (10-15)**	**B-19 (15-17)**	**B-20 (5-8)**	**B-21 (5-10)**
Sampling Date	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/16/2016	9/16/2016
Sample Depth Relative to October 1, 2016	5-10 Feet	10-15 Feet	10-15 Feet	15-16.5 Feet	5-10 Feet	5-10 Feet	10-15 Feet	5-10 Feet	10-15 Feet	5-10 Feet	10-15 Feet	15-17 Feet	5-8 Feet	5-10 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)														
C9-C18 ALIPHATICS	**1300**	**8300**		220	140		150	28	59	20	110	200	ND (11)	860
C19-C36 ALIPHATICS	2100	**11000**		420	**4700**		380	33	310	70	370	730	32	1200
C11-C22 AROMATICS	**2500**	**15000**		**1600**	**3700**		850	90	530	220	570	**1600**	67	**2400**
ACENAPHTHENE	ND (0.56)	ND (2.4)		ND (1.3)	ND (1.1)		ND (0.20)	ND (0.12)	ND (0.52)	1.3	ND (0.53)	ND (0.53)	ND (0.11)	ND (0.52)
ACENAPHTHYLENE	ND (0.56)	ND (2.4) *		ND (1.3) *	ND (1.1) *		ND (0.20)	ND (0.12)	ND (0.52)	ND (0.11)	ND (0.53)	ND (0.53)	ND (0.11)	ND (0.52)
ANTHRACENE	1.4	*11*		ND (1.3)	ND (1.1)		ND (0.20)	ND (0.12)	ND (0.52)	2.5	ND (0.53)	ND (0.53)	ND (0.11)	ND (0.52)
BENZO(A)ANTHRACENE	ND (0.56)	ND (2.4)		ND (1.3)	ND (1.1)		ND (0.20)	ND (0.12)	ND (0.52)	6	ND (0.53)	ND (0.53)	0.14	ND (0.52)
BENZO(A)PYRENE	ND (0.56)	ND (2.4) *		ND (1.3)	ND (1.1)		ND (0.20)	ND (0.12)	ND (0.52)	**5.1**	ND (0.53)	ND (0.53)	0.12	ND (0.52)
BENZO(B)FLUORANTHENE	ND (0.56)	ND (2.4)		ND (1.3)	ND (1.1)		ND (0.20)	0.15	ND (0.52)	7	ND (0.53)	ND (0.53)	0.23	ND (0.52)
BENZO(G,H,I)PERYLENE	ND (0.56)	ND (2.4)		ND (1.3)	ND (1.1)		ND (0.20)	ND (0.12)	ND (0.52)	2.7	ND (0.53)	ND (0.53)	0.13	ND (0.52)
BENZO(K)FLUORANTHENE	ND (0.56)	ND (2.4)		ND (1.3)	ND (1.1)		ND (0.20)	ND (0.12)	ND (0.52)	2.6	ND (0.53)	ND (0.53)	ND (0.11)	ND (0.52)
CHRYSENE	ND (0.56)	ND (2.4)		ND (1.3)	ND (1.1)		ND (0.20)	0.25	ND (0.52)	6.7	ND (0.53)	ND (0.53)	0.28	ND (0.52)
DIBENZ(A,H)ANTHRACENE	ND (0.56)	ND (2.4) *		ND (1.3) *	ND (1.1) *		ND (0.20)	ND (0.12)	ND (0.52)	**0.9**	ND (0.53)	ND (0.53)	ND (0.11)	ND (0.52)
FLUORANTHENE	4.6	*22*		ND (1.3)	ND (1.1)		ND (0.20)	0.15	ND (0.52)	*14*	ND (0.53)	ND (0.53)	0.3	1.8
FLUORENE	*3.1*	*29*		*4.9*	ND (1.1)		ND (0.20)	0.13	ND (0.52)	1.3	ND (0.53)	ND (0.53)	ND (0.11)	1.5
INDENO(1,2,3-CD)PYRENE	ND (0.56)	ND (2.4)		ND (1.3)	ND (1.1)		ND (0.20)	ND (0.12)	ND (0.52)	*3.3*	ND (0.53)	ND (0.53)	ND (0.11)	ND (0.52)
2-METHYLNAPHTHALENE	***5.7***	***65***		***1.9***	ND (1.1) *		ND (0.20)	0.16	ND (0.52)	**0.99**	ND (0.53)	ND (0.53)	ND (0.11)	ND (0.52)
NAPHTHALENE	*3.1*	***27***		ND (1.3)	ND (1.1)		ND (0.20)	0.31	ND (0.52)	0.44	ND (0.53)	ND (0.53)	ND (0.11)	ND (0.52)
PHENANTHRENE	4.0	***35***		4.6	ND (1.1)		ND (0.20)	0.49	ND (0.52)	**11**	ND (0.53)	ND (0.53)	0.37	3.3
PYRENE	1.7	12		ND (1.3)	ND (1.1)		ND (0.20)	0.18	ND (0.52)	13	ND (0.53)	ND (0.53)	0.37	ND (0.52)
MADEP-VPH-04-1.1 (mg/Kg dry)														
C9-C10 AROMATICS														
BENZENE														
TOLUENE														
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
BARIUM														
VANADIUM														
SW-846 7471B (mg/Kg dry) Metals Digestion														
MERCURY														
SW-846 8082A (mg/Kg dry)														
TOTAL PCBs	0.14	0.14		ND (0.13)	0.30			ND (0.12)	ND (0.10)	**2.1**	ND (0.11)			0.75
SW-846 8081B (mg/Kg dry)														
CHLORDANE														
DIELDRIN														
NOTES:														

Table D-4
Evaluation of 6-20 Foot Interval Data to Determine Method to Derive Exposure Point Concentrations

Parameter	SAMPLING LOCATIONS							EVALUATION				
	B-21 (10-13.5)	B-22 (10-15)	B-22 (15-20)	B-23 (5-9)	B-26 (10-13)	B-27 (5-10)	B-28 (10-15)	Number	Maximum Concentration	More than 10X >S-2?	% >S-2	Method to Derive
Sampling Date	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	Analyzed	Detected			Exposure Point Conc.
Sample Depth Relative to October 1, 2016	10-13.5 Feet	10-15 Feet	15-20 Feet	5-9 Feet	10-13 Feet	5-10 Feet	10-15 Feet					
MADEP-EPH-04-1.1 (mg/Kg dry)												
C9-C18 ALIPHATICS	110	63	ND (11)	ND (11)				22	8300	No	4.5	**Mean**
C19-C36 ALIPHATICS	500	330	ND (11)	18				22	11000	No	4.5	**Mean**
C11-C22 AROMATICS	1000	560	ND (11)	48				22	15000	No	18	**Mean**
ACENAPHTHENE	ND (0.55)	ND (0.24)	ND (0.11)	0.32				22	1.3	No	0	**Mean**
ACENAPHTHYLENE	ND (0.55)	ND (0.24)	ND (0.11)	ND (0.11)				22	0	No	0	**Mean**
ANTHRACENE	ND (0.55)	0.28	ND (0.11)	0.32				22	11	No	0	**Mean**
BENZO(A)ANTHRACENE	ND (0.55)	0.53	ND (0.11)	1.2				22	7.4	No	0	**Mean**
BENZO(A)PYRENE	ND (0.55)	0.64	ND (0.11)	1.3				22	5.5	No	4.5	**Mean**
BENZO(B)FLUORANTHENE	ND (0.55)	0.85	ND (0.11)	1.6				22	7.1	No	0	**Mean**
BENZO(G,H,I)PERYLENE	ND (0.55)	ND (0.24)	ND (0.11)	0.82				22	2.7	No	0	**Mean**
BENZO(K)FLUORANTHENE	ND (0.55)	ND (0.24)	ND (0.11)	0.57				22	2.6	No	0	**Mean**
CHRYSENE	ND (0.55)	0.74	ND (0.11)	1.3				22	7.8	No	0	**Mean**
DIBENZ(A,H)ANTHRACENE	ND (0.55)	ND (0.24)	ND (0.11)	0.19				22	0.9	No	0	**Mean**
FLUORANTHENE	ND (0.55)	1.8	ND (0.11)	2.8				22	22	No	0	**Mean**
FLUORENE	ND (0.55)	ND (0.24)	ND (0.11)	0.15				22	29	No	0	**Mean**
INDENO(1,2,3-CD)PYRENE	ND (0.55)	ND (0.24)	ND (0.11)	0.79				22	3.3	No	0	**Mean**
2-METHYLNAPHTHALENE	ND (0.55)	ND (0.24)	ND (0.11)	ND (0.11)				22	65	No	0	**Mean**
NAPHTHALENE	ND (0.55)	ND (0.24)	ND (0.11)	0.18				22	27	No	0	**Mean**
PHENANTHRENE	ND (0.55)	0.41	ND (0.11)	1.9				22	35	No	0	**Mean**
PYRENE	ND (0.55)	1.7	ND (0.11)	2.7				22	13	No	0	**Mean**
MADEP-VPH-04-1.1 (mg/Kg dry)												
C9-C10 AROMATICS								3	100	No	0	**Mean**
BENZENE								3	0.52	No	0	**Mean**
TOLUENE								3	0.32	No	0	**Mean**
SW-846 6010C/D (mg/Kg dry) Metals Digestion												
BARIUM								no data				
VANADIUM								3	41	No	0	**Mean**
SW-846 7471B (mg/Kg dry) Metals Digestion												
MERCURY								no data				
SW-846 8082A (mg/Kg dry)												
TOTAL PCBs	ND (0.11)							13	2.1	No	0	**95th % UCL on mean**
SW-846 8081B (mg/Kg dry)												
CHLORDANE								no data				
DIELDRIN								no data				
NOTES:												
									95th % UCL on mean = 95th % upper confidence limit on the mean			

Table D-5
Derivation of Exposure Point Concentrations for Soils: 0-3 Foot Interval

Parameter	MCP - Method 2 Direct Contact Standards			Upper Concentration Limit	SAMPLING LOCATIONS										
	S-1	S-2	S-3	UCL	B-5 (3-6')	B-7 (3-6')	B-8 (1-3')	BTM-GT-1	ESW-GT-1	NSW-GT-1	NSW-GT-2	SSW-GT-1	SSW-GT-2	WSW-GT-2	FO-1-BTM
Sampling Date					3/14/2016	3/14/2016	3/14/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/8/2016	3/10/2016
Sample Depth Relative to October 1, 2016					0-3 Feet	0-3 Feet	0-2 Feet	3 Feet	0-1 Feet	0-1 Feet	2-3 Feet	0-1 Feet	2-3 Feet	2-3 Feet	2.5 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)															
C9-C18 ALIPHATICS	1000	3000	5000	20000	26	5.5		6	13	34	11	5.5	37	5.5	
C19-C36 ALIPHATICS	3000	5000	5000	20000	64	28		6	29	140	77	17	200	5.5	
C11-C22 AROMATICS	1000	3000	5000	10000	220	83		25	41	420	120	31	210	33	
ACENAPHTHENE	1000	3000	5000	10000	0.76	0.54		0.06	0.055	1.7	0.37	0.055	0.215	0.055	
ACENAPHTHYLENE	600	600	600	10000	0.11	0.055		0.06	0.055	0.115	0.11	0.055	0.215	0.055	
ANTHRACENE	1000	3000	5000	10000	1.8	1.4		0.06	0.055	*4.7*	0.73	0.055	0.215	0.18	
BENZO(A)ANTHRACENE	7	40	300	3000	4.1	2.9		0.06	0.055	***10***	1.7	0.055	0.78	0.5	
BENZO(A)PYRENE	2	7	30	300	**3.7**	**2.4**		0.27	0.055	***9.3***	0.69	0.24	0.94	0.52	
BENZO(B)FLUORANTHENE	7	40	300	3000	5.3	3.3		0.32	0.055	***13***	2	0.31	1.1	0.67	
BENZO(G,H,I)PERYLENE	1000	3000	5000	10000	1.7	1.2		0.38	0.055	*4.9*	0.96	0.33	0.77	0.41	
BENZO(K)FLUORANTHENE	70	400	3000	10000	2.0	1.2		0.06	0.055	*4.8*	0.73	0.055	0.44	0.26	
CHRYSENE	70	400	3000	10000	5.0	3.2		0.15	0.055	*12*	1.8	0.17	1.0	0.59	
DIBENZ(A,H)ANTHRACENE	0.7	4	30	300	0.65	0.41		0.06	0.055	***1.5***	0.11	0.055	0.215	0.055	
FLUORANTHENE	1000	3000	5000	10000	9.5	6.6		0.15	0.14	*27*	3.7	0.19	1.6	1.1	
FLUORENE	1000	3000	5000	10000	0.90	0.78		0.06	0.055	*2.1*	0.37	0.055	0.215	0.055	
INDENO(1,2,3-CD)PYRENE	7	40	300	3000	2.1	1.3		0.36	0.055	*5.2*	0.93	0.25	0.56	0.36	
2-METHYLNAPHTHALENE	300	500	500	5000	0.29	0.22		0.06	0.055	0.48	0.11	0.055	0.215	0.055	
NAPHTHALENE	500	1000	3000	10000	0.44	0.32		0.06	0.055	0.70	0.11	0.055	0.215	0.055	
PHENANTHRENE	500	1000	3000	10000	7.4	6.1		0.34	0.4	19	3	0.24	1.2	0.74	
PYRENE	1000	3000	5000	10000	8.8	5.9		0.06	0.13	*25*	3.4	0.19	1.6	1	
MADEP-VPH-04-1.1 (mg/Kg dry)															
C9-C10 AROMATICS	100	500	500	5000				4.8	4.75	4.3	4.15	5	5.5	4.1	4.15
BENZENE	40	200	1000	10000				0.10	0.15	0.0215	0.021	0.026	0.0265	0.0205	0.021
TOLUENE	500	1000	3000	10000				0.60	0.23	0.14	0.021	0.25	0.087	0.0205	0.021
SW-846 6010C/D (mg/Kg dry) Metals Digestion															
BARIUM	1000	3000	5000	10000				34	43	*72*	42	27	31	28	30
VANADIUM	400	700	700	7000	*55*	*31*		27	*36*	*100*	*32*	14	*50*	15	29
SW-846 7471B (mg/Kg dry) Metals Digestion															
MERCURY	20	30	30	300				0.14	0.63	*1.3*	0.25	0.10	0.51	0.099	0.013
SW-846 8082A (mg/Kg dry)															
TOTAL PCBs	1	4	4	100	**3.8**	**2.2**	0.05	0.055	0.055	**6.3**	**1.2**	0.055	0.35	0.16	0.055
SW-846 8081B (mg/Kg dry)															
CHLORDANE	5	30	60	600				0.0115	0.011	0.225	0.22	0.011	0.215	0.045	0.011
DIELDRIN	0.08	0.5	3	30				0.0023	0.00225	**0.11**	0.044	0.00225	0.0435	0.0022	0.0215
NOTES:															

Table D-5
Derivation of Exposure Point Concentrations for Soils: 0-3 Foot Interval

Parameter	SAMPLING LOCATIONS							EXPOSURE POINT CONCENTRATION				
	B-14A (0-5)	B-15 (0-5)	B-16 (0-5)	B-18 (0-5)	B-19 (0-5)	B-20 (0-5)	B-21 (0-5)	Number	Mean Concentration	Standard Deviation	95th % Confidence	95th % UCL on mean
Sampling Date	9/16/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/16/2016	9/16/2016	Analyzed		(Population)	Limit	
Sample Depth Relative to October 1, 2016	0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet					
MADEP-EPH-04-1.1 (mg/Kg dry)												
C9-C18 ALIPHATICS	**2400**						28	11	**234**			
C19-C36 ALIPHATICS	**3400**						180	11	**377**			
C11-C22 AROMATICS	**7200**						390	11	**798**			
ACENAPHTHENE	1.45						1.6	11	**0.624**			
ACENAPHTHYLENE	1.45						0.11	11	**0.217**			
ANTHRACENE	1.45						3	11	**1.24**			
BENZO(A)ANTHRACENE	1.45						6.7	11	**2.57**			
BENZO(A)PYRENE	1.45						**6.3**	11	**2.35**			
BENZO(B)FLUORANTHENE	1.45						***8.3***	11	**3.26**			
BENZO(G,H,I)PERYLENE	1.45						*3.2*	11	**1.40**			
BENZO(K)FLUORANTHENE	1.45						3.2	11	**1.30**			
CHRYSENE	1.45						*7.9*	11	**3.03**			
DIBENZ(A,H)ANTHRACENE	1.45						***1.2***	11	**0.524**			
FLUORANTHENE	*12*						*18*	11	**7.27**			
FLUORENE	1.45						1.7	11	**0.704**			
INDENO(1,2,3-CD)PYRENE	1.45						*3.9*	11	**1.50**			
2-METHYLNAPHTHALENE	***12***						0.39	11	**1.27**			
NAPHTHALENE	1.45						0.41	11	**0.352**			
PHENANTHRENE	**12**						**14**	11	**5.86**			
PYRENE	7.1						17	11	**6.38**			
MADEP-VPH-04-1.1 (mg/Kg dry)												
C9-C10 AROMATICS								8	**4.59**			
BENZENE								8	**0.0483**			
TOLUENE								8	**0.171**			
SW-846 6010C/D (mg/Kg dry) Metals Digestion												
BARIUM								8	**38.4**			
VANADIUM								10	**38.9**			
SW-846 7471B (mg/Kg dry) Metals Digestion												
MERCURY								8	**0.380**			
SW-846 8082A (mg/Kg dry)												
TOTAL PCBs	0.075	**12**	0.90	**29**	**6.7**	0.055	**11**	18	4.111666667	7.102334906	3.281051036	**7.39**
SW-846 8081B (mg/Kg dry)												
CHLORDANE								8	**0.094**			
DIELDRIN								8	**0.029**			

NOTES:

95th % UCL on mean = 95th % upper confidence limit on the mean

When none detected, one-half reported detection limit used to derive exposure point concentration.

Table D-6
Derivation of Exposure Point Concentrations for Soils: 3-6 Foot

Parameter	MCP - Method 2 Direct Contact Standards			Upper Concentration Limit	SAMPLING LOCATIONS									
	S-1	S-2	S-3	UCL	B-14A (0-5)	B-15 (0-5)	B-16 (0-5)	B-18 (0-5)	B-19 (0-5)	B-20 (0-5)	B-21 (0-5)	BTM-GT-2	FO-1	B-5 (6-11')
Sampling Date					9/16/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/16/2016	9/16/2016	3/8/2016	3/10/2016	3/14/2016
Sample Depth Relative to October 1, 2016					0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet	0-5 Feet	5 Feet	4-5 feet (under vault, oil material)	3-8 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)													via 8270C	
C9-C18 ALIPHATICS	1000	3000	5000	20000	**2400**						28	5.5		300
C19-C36 ALIPHATICS	3000	5000	5000	20000	**3400**						180	31		750
C11-C22 AROMATICS	1000	3000	5000	10000	**7200**						390	45		**1400**
ACENAPHTHENE	1000	3000	5000	10000	1.45						1.6	0.055	***4.9***	0.245
ACENAPHTHYLENE	600	600	600	10000	1.45						0.11	0.055	1.9	0.245
ANTHRACENE	1000	3000	5000	10000	1.45						3	0.055	*4.9*	0.245
BENZO(A)ANTHRACENE	7	40	300	3000	1.45						6.7	0.055	4.8	0.245
BENZO(A)PYRENE	2	7	30	300	1.45						**6.3**	0.11	1.9	0.245
BENZO(B)FLUORANTHENE	7	40	300	3000	1.45						***8.3***	0.15	1.9	0.245
BENZO(G,H,I)PERYLENE	1000	3000	5000	10000	1.45						*3.2*	0.055	1.9	0.245
BENZO(K)FLUORANTHENE	70	400	3000	10000	1.45						3.2	0.055	1.9	0.245
CHRYSENE	70	400	3000	10000	1.45						*7.9*	0.11	6.6	0.245
DIBENZ(A,H)ANTHRACENE	0.7	4	30	300	1.45						***1.2***	0.055	1.9	0.245
FLUORANTHENE	1000	3000	5000	10000	*12*						*18*	0.17	6.4	1.2
FLUORENE	1000	3000	5000	10000	1.45						1.7	0.055	*11*	0.245
INDENO(1,2,3-CD)PYRENE	7	40	300	3000	1.45						*3.9*	0.055	1.9	0.245
2-METHYLNAPHTHALENE	300	500	500	5000	***12***						0.39	0.055	*33*	0.70
NAPHTHALENE	500	1000	3000	10000	1.45						0.41	0.055	*8.3*	0.79
PHENANTHRENE	500	1000	3000	10000	**12**						**14**	0.055	*32*	1.6
PYRENE	1000	3000	5000	10000	7.1						17	0.18	*33*	0.245
MADEP-VPH-04-1.1 (mg/Kg dry)														
C9-C10 AROMATICS	100	500	500	5000								4.95		
BENZENE	40	200	1000	10000								0.058		
TOLUENE	500	1000	3000	10000								0.32		
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
BARIUM	1000	3000	5000	10000								27	36	
VANADIUM	400	700	700	7000								14	42	30
SW-846 7471B (mg/Kg dry) Metals Digestion														
MERCURY	20	30	30	300								0.095	0.0175	
SW-846 8082A (mg/Kg dry)														
TOTAL PCBs	1	4	4	100	0.075	**12**	0.90	**29**	**6.7**	0.055	**11**	0.055	0.45	0.29
SW-846 8081B (mg/Kg dry)														
CHLORDANE	5	30	60	600								0.11	1.4	
DIELDRIN	0.08	0.5	3	30								0.022	0.28	
NOTES:														

Table D-6
Derivation of Exposure Point Concentrations for Soils: 3-6 Foot

Parameter	SAMPLING LOCATIONS			EXPOSURE POINT CONCENTRATION				
	B-7 (6-11')	B-8 (3-6')	B-17 (5-7.5)	Number	Mean Concentration	Standard Deviation	95th % Confidence	95th % UCL on mean
Sampling Date	3/14/2016	3/14/2016	9/15/2016	Analyzed		(Population)	Limit	
Sample Depth Relative to October 1, 2016	3-8 Feet	2-5 Feet	5-7.5 Feet					
MADEP-EPH-04-1.1 (mg/Kg dry)								
C9-C18 ALIPHATICS	11		85	6	**472**			
C19-C36 ALIPHATICS	48		670	6	**847**			
C11-C22 AROMATICS	83		650	6	**1628**			
ACENAPHTHENE	0.11		0.105	7	**1.21**			
ACENAPHTHYLENE	0.11		0.105	7	**0.568**			
ANTHRACENE	0.29		0.105	7	**1.44**			
BENZO(A)ANTHRACENE	1.2		0.105	7	**2.08**			
BENZO(A)PYRENE	1.1		0.105	7	**1.60**			
BENZO(B)FLUORANTHENE	1.3		0.105	7	**1.92**			
BENZO(G,H,I)PERYLENE	0.66		0.105	7	**1.09**			
BENZO(K)FLUORANTHENE	0.52		0.105	7	**1.07**			
CHRYSENE	1.3		0.105	7	**2.53**			
DIBENZ(A,H)ANTHRACENE	0.11		0.105	7	**0.724**			
FLUORANTHENE	2.3		0.105	7	**5.74**			
FLUORENE	0.11		0.105	7	**2.10**			
INDENO(1,2,3-CD)PYRENE	0.56		0.105	7	**1.17**			
2-METHYLNAPHTHALENE	0.11		0.105	7	**6.62**			
NAPHTHALENE	0.11		0.105	7	**1.60**			
PHENANTHRENE	1.2		0.63	7	**8.78**			
PYRENE	2.4		0.105	7	**8.58**			
MADEP-VPH-04-1.1 (mg/Kg dry)								
C9-C10 AROMATICS				1	**4.95**			
BENZENE				1	**0.0580**			
TOLUENE				1	**0.320**			
SW-846 6010C/D (mg/Kg dry) Metals Digestion								
BARIUM				2	**27.0**			
VANADIUM	14	*39*		5	**24.3**			
SW-846 7471B (mg/Kg dry) Metals Digestion								
MERCURY				2	**0.056**			
SW-846 8082A (mg/Kg dry)								
TOTAL PCBs	0.055	0.055		12	5.052916667	8.394545466	4.749573947	**9.80**
SW-846 8081B (mg/Kg dry)								
CHLORDANE				2	**0.755**			
DIELDRIN				2	**0.151**			
NOTES:								
				95th % UCL on mean = 95th % upper confidence limit on the mean				
				When none detected, one-half reported detection limit used to derive exposure				
				point concentration.				

Table D-7
Derivation of Exposure Point Concentrations for Soils: 6-20 Foot Interval

Parameter	MCP - Method 2 Direct Contact Standards			Upper Concentration Limit	SAMPLING LOCATIONS									
	S-1	S-2	S-3	UCL	B-5 (6-11')	B-7 (6-11')	B-17 (5-7.5)	B-1 (15'-20')	B-3 (15'-20')	B-3 (15'-20') (25-28'')	B-4 (15'-20')	B-4 (15'-20') (21-24'')	B-8 (6-11')	B-14 (10-15)
Sampling Date					3/14/2016	3/14/2016	9/15/2016	8/14/2015	8/14/2015	8/14/2015	8/14/2015	8/14/2015	3/14/2016	9/15/2016
Sample Depth Relative to October 1, 2016					3-8 Feet	3-8 Feet	5-7.5 Feet	12-17 Feet	14-19 Feet	14-19 Feet	12-17 Feet	12-17 Feet	5-10 Feet	10-15 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)														
C9-C18 ALIPHATICS	1000	3000	5000	20000	300	11	85	810	48		570			
C19-C36 ALIPHATICS	3000	5000	5000	20000	750	48	670	1700	77		1200			
C11-C22 AROMATICS	1000	3000	5000	10000	**1400**	83	650	**3400**	200		**3600**			
ACENAPHTHENE	1000	3000	5000	10000	0.245	0.11	0.105	0.11	0.22		0.11			
ACENAPHTHYLENE	600	600	600	10000	0.245	0.11	0.105	0.11	0.055		0.11			
ANTHRACENE	1000	3000	5000	10000	0.245	0.29	0.105	1.9	0.65		5.4			
BENZO(A)ANTHRACENE	7	40	300	3000	0.245	1.2	0.105	3.0	1.1		**7.4**			
BENZO(A)PYRENE	2	7	30	300	0.245	1.1	0.105	0.11	0.88		**5.5**			
BENZO(B)FLUORANTHENE	7	40	300	3000	0.245	1.3	0.105	0.11	1.2		**7.1**			
BENZO(G,H,I)PERYLENE	1000	3000	5000	10000	0.245	0.66	0.105	0.11	0.58		1.5			
BENZO(K)FLUORANTHENE	70	400	3000	10000	0.245	0.52	0.105	0.11	0.43		2.5			
CHRYSENE	70	400	3000	10000	0.245	1.3	0.105	3.8	1.2		*7.8*			
DIBENZ(A,H)ANTHRACENE	0.7	4	30	300	0.245	0.11	0.105	0.11	0.055		0.11			
FLUORANTHENE	1000	3000	5000	10000	1.2	2.3	0.105	3.5	2.3		*15*			
FLUORENE	1000	3000	5000	10000	0.245	0.11	0.105	*3.5*	0.44		*6.9*			
INDENO(1,2,3-CD)PYRENE	7	40	300	3000	0.245	0.56	0.105	0.11	0.51		2.6			
2-METHYLNAPHTHALENE	300	500	500	5000	0.70	0.11	0.105	0.49	0.055		***3.1***			
NAPHTHALENE	500	1000	3000	10000	0.79	0.11	0.105	*1.3*	0.12		*2.1*			
PHENANTHRENE	500	1000	3000	10000	1.6	1.2	0.63	5.3	1.9		***21***			
PYRENE	1000	3000	5000	10000	0.245	2.4	0.105	2.6	2.3		13			
MADEP-VPH-04-1.1 (mg/Kg dry)														
C9-C10 AROMATICS	100	500	500	5000				84	51		100			
BENZENE	40	200	1000	10000				0.26	0.031		0.52			
TOLUENE	500	1000	3000	10000				0.07	0.031		0.32			
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
BARIUM	1000	3000	5000	10000										
VANADIUM	400	700	700	7000	30	14							*41*	
SW-846 7471B (mg/Kg dry) Metals Digestion														
MERCURY	20	30	30	300										
SW-846 8082A (mg/Kg dry)														
TOTAL PCBs	1	4	4	100	0.29	ND (0.11)							ND (0.11)	
SW-846 8081B (mg/Kg dry)														
CHLORDANE	5	30	60	600										
DIELDRIN	0.08	0.5	3	30										
NOTES:														

Table D-7
Derivation of Exposure Point Concentrations for Soils: 6-20 Foot Interval

Parameter	SAMPLING LOCATIONS													
	B-14A (5-10)	**B-14A (10-15)**	**B-14A (10-15)**	**B-14A (15-16.5)**	**B-15 (5-10)**	**B-16 (5-10)**	**B-16 (10-15)**	**B-18 (5-10)**	**B-18 (10-15)**	**B-19 (5-10)**	**B-19 (10-15)**	**B-19 (15-17)**	**B-20 (5-8)**	**B-21 (5-10)**
Sampling Date	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/15/2016	9/16/2016	9/16/2016
Sample Depth Relative to October 1, 2016	5-10 Feet	10-15 Feet	10-15 Feet	15-16.5 Feet	5-10 Feet	5-10 Feet	10-15 Feet	5-10 Feet	10-15 Feet	5-10 Feet	10-15 Feet	15-17 Feet	5-8 Feet	5-10 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)														
C9-C18 ALIPHATICS	**1300**	**8300**		220	140		150	28	59	20	110	200	ND (11)	860
C19-C36 ALIPHATICS	2100	**11000**		420	**4700**		380	33	310	70	370	730	32	1200
C11-C22 AROMATICS	**2500**	**15000**		**1600**	**3700**		850	90	530	220	570	**1600**	67	**2400**
ACENAPHTHENE	0.28	1.2		0.65	0.55		0.1	0.06	0.26	1.3	0.265	0.265	0.055	0.26
ACENAPHTHYLENE	0.28	1.2		0.65	0.55		0.1	0.06	0.26	0.055	0.265	0.265	0.055	0.26
ANTHRACENE	1.4	*11*		0.65	0.55		0.1	0.06	0.26	2.5	0.265	0.265	0.055	0.26
BENZO(A)ANTHRACENE	0.28	1.2		0.65	0.55		0.1	0.06	0.26	6	0.265	0.265	0.14	0.26
BENZO(A)PYRENE	0.28	1.2		0.65	0.55		0.1	0.06	0.26	**5.1**	0.265	0.265	0.12	0.26
BENZO(B)FLUORANTHENE	0.28	1.2		0.65	0.55		0.1	0.15	0.26	7	0.265	0.265	0.23	0.26
BENZO(G,H,I)PERYLENE	0.28	1.2		0.65	0.55		0.1	0.06	0.26	2.7	0.265	0.265	0.13	0.26
BENZO(K)FLUORANTHENE	0.28	1.2		0.65	0.55		0.1	0.06	0.26	2.6	0.265	0.265	0.055	0.26
CHRYSENE	0.28	1.2		0.65	0.55		0.1	0.25	0.26	6.7	0.265	0.265	0.28	0.26
DIBENZ(A,H)ANTHRACENE	0.28	1.2		0.65	0.55		0.1	0.06	0.26	**0.9**	0.265	0.265	0.055	0.26
FLUORANTHENE	4.6	*22*		0.65	0.55		0.1	0.15	0.26	*14*	0.265	0.265	0.3	1.8
FLUORENE	*3.1*	*29*		*4.9*	0.55		0.1	0.13	0.26	1.3	0.265	0.265	0.055	1.5
INDENO(1,2,3-CD)PYRENE	0.28	1.2		0.65	0.55		0.1	0.06	0.26	*3.3*	0.265	0.265	0.055	0.26
2-METHYLNAPHTHALENE	***5.7***	***65***		***1.9***	0.55		0.1	0.16	0.26	**0.99**	0.265	0.265	0.055	0.26
NAPHTHALENE	*3.1*	***27***		0.65	0.55		0.1	0.31	0.26	0.44	0.265	0.265	0.055	0.26
PHENANTHRENE	4.0	***35***		4.6	0.55		0.1	0.49	0.26	**11**	0.265	0.265	0.37	3.3
PYRENE	1.7	12		0.65	0.55		0.1	0.18	0.26	13	0.265	0.265	0.37	0.26
MADEP-VPH-04-1.1 (mg/Kg dry)														
C9-C10 AROMATICS														
BENZENE														
TOLUENE														
SW-846 6010C/D (mg/Kg dry) Metals Digestion														
BARIUM														
VANADIUM														
SW-846 7471B (mg/Kg dry) Metals Digestion														
MERCURY														
SW-846 8082A (mg/Kg dry)														
TOTAL PCBs	0.14	0.14		ND (0.13)	0.30			ND (0.12)	ND (0.10)	**2.1**	ND (0.11)			0.75
SW-846 8081B (mg/Kg dry)														
CHLORDANE														
DIELDRIN														
NOTES:														

Table D-7
Derivation of Exposure Point Concentrations for Soils: 6-20 Foot Interval

Parameter	SAMPLING LOCATIONS							EXPOSURE POINT CONCENTRATION				
	B-21 (10-13.5)	B-22 (10-15)	B-22 (15-20)	B-23 (5-9)	B-26 (10-13)	B-27 (5-10)	B-28 (10-15)	Number	Mean Concentration	Standard Deviation	95th % Confidence	95th % UCL on mean
Sampling Date	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	9/16/2016	Analyzed		(Population)	Limit	
Sample Depth Relative to October 1, 2016	10-13.5 Feet	10-15 Feet	15-20 Feet	5-9 Feet	10-13 Feet	5-10 Feet	10-15 Feet					
MADEP-EPH-04-1.1 (mg/Kg dry)												
C9-C18 ALIPHATICS	110	63	5.5	5.5				22	**638**			
C19-C36 ALIPHATICS	500	330	5.5	18				22	**1211**			
C11-C22 AROMATICS	1000	0.12	5.5	48				22	**1796**			
ACENAPHTHENE	0.275	0.12	0.055	0.32				22	**0.314**			
ACENAPHTHYLENE	0.275	0.12	0.055	0.055				22	**0.238**			
ANTHRACENE	0.275	0.28	0.055	0.32				22	**1.22**			
BENZO(A)ANTHRACENE	0.275	0.53	0.055	1.2				22	**1.14**			
BENZO(A)PYRENE	0.275	0.64	0.055	1.3				22	**0.878**			
BENZO(B)FLUORANTHENE	0.275	0.85	0.055	1.6				22	**1.09**			
BENZO(G,H,I)PERYLENE	0.275	0.12	0.055	0.82				22	**0.509**			
BENZO(K)FLUORANTHENE	0.275	0.12	0.055	0.57				22	**0.522**			
CHRYSENE	0.275	0.74	0.055	1.3				22	**1.27**			
DIBENZ(A,H)ANTHRACENE	0.275	0.12	0.055	0.19				22	**0.283**			
FLUORANTHENE	0.275	1.8	0.055	2.8				22	**3.38**			
FLUORENE	0.275	0.12	0.055	0.15				22	**2.31**			
INDENO(1,2,3-CD)PYRENE	0.275	0.12	0.055	0.79				22	**0.573**			
2-METHYLNAPHTHALENE	0.275	0.12	0.055	0.055				22	**3.75**			
NAPHTHALENE	0.275	0.12	0.055	0.18				22	**1.75**			
PHENANTHRENE	0.275	0.41	0.055	1.9				22	**4.28**			
PYRENE	0.275	1.7	0.055	2.7				22	**2.50**			
MADEP-VPH-04-1.1 (mg/Kg dry)												
C9-C10 AROMATICS								3	**78.3**			
BENZENE								3	**0.270**			
TOLUENE								3	**0.140**			
SW-846 6010C/D (mg/Kg dry) Metals Digestion												
BARIUM								0	Used 3-6 Foot Interval Exposure Point Concentration			
VANADIUM								3	**28.3**			
SW-846 7471B (mg/Kg dry) Metals Digestion												
MERCURY								0	Used 3-6 Foot Interval Exposure Point Concentration			
SW-846 8082A (mg/Kg dry)												
TOTAL PCBs	ND (0.11)							13	0.62	0.69274815	0.376575265	**0.997**
SW-846 8081B (mg/Kg dry)												
CHLORDANE								0	Used 3-6 Foot Interval Exposure Point Concentration			
DIELDRIN								0	Used 3-6 Foot Interval Exposure Point Concentration			
NOTES:												
								95th % UCL on mean = 95th % upper confidence limit on the mean				
								When none detected, one-half reported detection limit used to derive exposure				
								point concentration.				

Table D-8

Calculation of Dioxin-Like PCB Congener Exposure Point Concentrations, as TCDD Equivalence

(East End Courtyard: October 2016)

Exposure Point	Units	PCB Exposure Point Concentration	Fraction as TCDD-Like PCBs	TCDD-Like PCB Concentration	TEF for all dioxin-like congeners*	TCDD-Like PCB Exposure Point Concentration
			unitless		unitless	
East Part Courtyard: 0-3 Foot Interval	mg/kg	7.39	0.11	0.8129	3.00E-05	2.44E-05
East Part Courtyard: 3-6 Foot Interval	mg/kg	9.80	0.11	1.078	3.00E-05	3.23E-05
East Part Courtyard: 6-20 Foot Interval	mg/kg	0.997	0.11	0.10967	3.00E-05	3.29E-06

Reference: USEPA's Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-*p* -dioxin & Dioxin-Like Compounds, (EPA/100/R 10/005/ December 2010)

TCDD = 2,3,7,8-Tetrachlorodibenzo-*p* -dioxin

TEF = TCDD Toxicity Equivalence Factor

TEQ = TCDD Toxic Equivalence (summation of products of congener concentration and TEF, for each congener *i*)

* All detected TCDD-like PCB congeners had the same TEF value of 0.00003 (3.00E-05), which simplified the calculation of EPCs for dioxin-like PCBs.

EPC = Exposure Point Concentration

Table D-9
Comparison of Risk Estimates to MCP Risk Limits
(East End of Courtyard: October 2016)

Receptor	Exposure Point	Soil Interval (feet)	ELCR	Cancer Risk Limit	Significant Risk of Harm?	HI	Non-Cancer Risk Limit	Significant Risk of Harm?
Construction / Utility Worker	East End Courtyard	0 - 3	4.6E-07	1.E-05	No	0.50	1	No
	East End Courtyard	3 - 6	5.8E-07	1.E-05	No	0.65	1	No
	East End Courtyard	6 - 20	1.4E-07	1.E-05	No	0.25	1	No
Resident	East End Courtyard	0 - 3	3.0E-06	1.E-05	No	0.62	1	No
	East End Courtyard	3 - 6	3.8E-06	1.E-05	No	0.82	1	No
	East End Courtyard	6 - 20	2.2E-06	1.E-05	No	0.29	1	No

ASSUMPTIONS:
NO SINGLE FAMILY RESIDENCE. NO GARDENING OF EDIBLE PRODUCE.
EXPOSURE TO SOILS OCCURS ONLY DURING A SINGLE SIX-MONTH CONSTRUCTION PROJECT, AFTER WHICH TIME THE SOILS ARE RETURNED TO EXCAVATION OR ARE TRANSPORTED OFF-SITE.
FOR 0-3 AND 3-6 FOOT INTERVAL SOILS, ASSUME CONTROLS ARE USED TO LIMIT FREQUENCY OF RESIDENTIAL EXPOSURE TO SOILS DURING CONSTRUCTION PROJECT.
PROTECTIVE COVER MUST REMAIN OVER SOILS EXCEPT DURING CONSTRUCTION OR UTILITY PROJECT, AFTER WHICH TIME THE PROTECTIVE COVER MUST BE RE-INSTALLED.

APPENDIX E:

Phase III Remedial Action Plan

APPENDIX E

(to *the Immediate Response Action (IRA) Plans for RTN 3-33853 (Asbestos) and RTN 3-33793 (Oily Sheen in River), IRA Plan Modification No. 3 and IRA Status Report No. 4 for RTN 3-33101 (No. 6 Fuel Oil NAPL in Subsurface*, submitted to each RTN on November 2, 2016)

Revised Phase III Remedial Action Plan
Massachusetts Mills III Courtyard
169.2 Bridge Street
Lowell, Massachusetts
MassDEP RTN: 3-33101 (No. 6 Fuel Oil NAPL)
MassDEP RTN: 3-33474 (PCBs, metals and insecticides) (secondary to RTN 3-33101)
MassDEP RTN: 3-33853 (asbestos)
MassDEP RTN: 33-33793 (oily seepage to Concord River)

1.0 INTRODUCTION

Goldman Environmental Consultants, Inc., (GEC) of Braintree, Massachusetts was retained by R-M Developer, LLC to conduct response actions at 169.2 Bridge Street, Lowell, Massachusetts, relative to four release tracking numbers (RTN 3-33101, RTN 3-33474, RTN 3-33793 and RTN 3-33853) associated with the courtyard of the 169.2 Bridge Street property.

The property where the releases were encountered is located approximately 450 feet southeast of Bridge Street and just northeast of Massmills Drive in Lowell, Massachusetts. The property is a portion of a former mill complex, commonly known as Massachusetts Mills and is located along the Merrimack and Concord Rivers. The property includes a portion of the tax parcel presently identified by the City of Lowell as Lot 169.2 of Block 780 on Map 177, and it is identified as Lot 3B on a Plan of Land of Massachusetts Mills, prepared by R.E. Cameron & Associates, Inc. and dated April 22, 2014. According to available records from the City of Lowell and the North Middlesex Registry of Deeds, the property may be addressed as 169.2 Bridge Street or 150 Massmills Drive. It was previously identified under an umbrella address of 95 Bridge Street.

The property consists of an irregular-shaped, 47,218-square-foot area of land improved with a portion of a three-story brick building, which was formerly utilized as the Boiler House building for the mill. The Boiler House building occupies approximately 40% of the property. The property also includes a courtyard south of the Boiler House building and the adjacent property. The entire Boiler House building is currently vacant and unused. According to the Site contact, the Boiler House building will be redeveloped.

The location where the release was encountered (Disposal Site or Site) is comprised of the triangular-shaped courtyard located between the Boiler House building to the north, the Picker building to the south, and the Concord River to the east. The Site vicinity contains vacant former mill buildings and redeveloped former mill buildings that are currently used for multi-tenant residential housing. The oily seepage, comprised of No. 6 fuel oil, recently discharging through the retaining wall along the Concord River, extended to the confluence of the Concord and Merrimack Rivers, until emergency response actions were conducted for RTN 3-33793.

Based on available historic records, the property and its vicinity were originally occupied by the Massachusetts Cotton Mills complex. Based on historic atlases and maps, it appears that

the property buildings were constructed in stages, prior to 1871. By 1911, river fill had been used to extend the mill area and construct the southeast end of the Picker building as well as the Boiler House building.

Of note, the Boiler House building was originally powered using coal, but switched to Bunker C (#6) fuel oil by the 1950s. At least two former fuel oil underground storage tanks (USTs) or vaults remain in place in the courtyard. Two gasoline USTs were installed in the courtyard and likely utilized by one of the property building tenants; these gasoline USTs have been removed. By the late 1970s and early 1980s, the property and most of the surrounding mill buildings were abandoned. In 1988, certified rehabilitation to convert the former mill complex to residential apartments was commenced. Though south-southwest and west mill buildings have been converted to apartments, the Boiler House building and south to southeast abutting Picker building have remained vacant and boarded up. Renovation is beginning to convert the Picker building to multi-tenant residential and/or commercial use.

The topography of the Site is generally flat but gently slopes downward toward the northeast (Merrimack River), east, and southeast (Concord River). The elevation of the Site is approximately 55 to 65 feet above Mean Sea Level (MSL).

The Universal Transverse Mercator (UTM) coordinates of the Site are 5258337 meters north and -7937439 meters east. A Site Locus, MCP Phase I Site Assessment Map and Site Plan are attached as Figures 1, 2 and 3, respectively, in the Immediate Response Action (IRA) Plan Modification No. 3 (IRAPM3), to which this Revised Phase III Remedial Action Plan (Phase III RAP) is attached as Appendix E.

The original Phase III RAP was submitted with the IRA Plan Modification No. 2, on August 15, 2016. The original Phase III RAP was a focused RAP, requested by MassDEP, to support the planned placement of PCB-contaminated soils in on-Site, subsurface, isolated soil repositories. Subsequently, MassDEP suggested that the Phase III RAP also include the petroleum-contaminated soils located mostly below the PCB-contaminated soils. This documented is the Revised Phase III RAP, which addresses the shallow PCB- and asbestos-contaminated soils and the petroleum-contaminated soils.

1.1 Description of Release Conditions

RTN 3-33101 was assigned to a condition entailing the presence of greater than 0.5 inches of non-aqueous phase liquid (NAPL) in the subsurface of the courtyard, which was reported to the MassDEP on August 21, 2015. The NAPL is associated with releases from underground petroleum storage structures (no. 6 fuel oil bunkers and/or gasoline USTs).

RTN 3-33474 was assigned to a release reported to MassDEP on March 17, 2016. This new release was discovered as a result of disposal criteria testing of stockpiled soils (designated SP-1) in the courtyard that were generated during property renovation activities. A soil sample collected from the stockpiled soils on February 29, 2016 was found to contain 63 mg/kg polychlorinated biphenyls (PCBs) (identified as Aroclor 1254), 23 mg/kg arsenic, 2,400 mg/kg lead, 3,500 mg/kg vanadium, 1,100 mg/kg zinc and 0.29 mg/kg heptachlor epoxide. Each of these hazardous materials was detected at a level exceeding its applicable RCS-1 Reportable Concentration.

These two release tracking numbers are not yet linked; however, they are largely co-located spatially. The petroleum release is mostly located beneath the PCB, metal and

insecticide release. The RTN 3-33474 release is mostly located within the top six feet of the courtyard soils.

On September 6, 2016 GEC notified the MassDEP of a 2-hour release condition associated with the presence of an oil sheen on the surface water of the Concord River, adjacent to the site. MassDEP assigned RTN 3-33793 to this release.

Subsequently, asbestos fibers were discovered in the courtyard soils as a result of follow-up investigations required by the MassDEP Bureau of Waste Prevention, following their inspection of the property in response to a complaint due to dusts exiting a window during interior renovation activities. Earlier, an asbestos inspection and abatement program had been completed inside the building.

Per the MassDEP recommendation on September 12, 2016, GEC reported the presence of asbestos fibers in soil as a 120-day release. MassDEP assigned RTN 3-33807 to this release. The MassDEP later requested that we retract the 120-day release and report it as a 2-hour release. The release was reported on October 12, 2016, and the MassDEP assigned RTN 3-33853. The 120-day release has been retracted.

1.2 Initial Immediate Response Action (IRA) Remediation, Non-IRA Investigations and IRA Reports

GEC, on behalf of R-M Developer, LLC and Massachusetts Mill III Limited Partnership (owner), submitted the original IRAP on October 20, 2015. The IRAP described the plans to remediate the subsurface petroleum contamination. The IRA remedial activities began during early March 2016, which included: the removal of the two USTs and confirmatory soil sampling; investigation of soils overlying, within and beneath the concrete bunkers; and initial excavation of soils within the concrete bunkers.

Surficial renovation activities within the courtyard began at about the same time as the IRA remedial activities, i.e., in early 2016. The renovation activities entailed the removal of soils from window wells and from the top one foot of soil over a portion of the courtyard, and stockpiling the soils (designated stockpile SP-1) until their disposition could be determined. These stockpiled soils were found to contain elevated levels of PCBs, metals and insecticides.

Subsequently, during the period March 14 to 30, 2016, additional investigations of the soils throughout the courtyard were conducted to determine the horizontal and vertical extent of the contamination. These investigations included analysis of soil samples for: (1) PCB Aroclors, (2) PCB congeners, (3) extractable petroleum hydrocarbons (EPH) and polycyclic aromatic hydrocarbons (PAHs), (4) MA14 metals, lead alone or vanadium alone, (5) pesticides, and/or (6) herbicides. These investigations identified a small PCB hot spot with concentrations exceeding 50 mg/kg within the courtyard, and also determined that the PCB, metal and insecticide contamination was mostly confined to the top 6 feet of soils in the courtyard. These investigations provided sufficient analytical data to: (1) determine the horizontal and vertical extent of PCB, metal and insecticide contamination in soils, (2) determine the horizontal and vertical extent of the PCB hotspot, and (3) support a targeted risk assessment.

During excavation of the soils within the vault, as part of the IRA, oil was observed oozing into the excavation at a depth of approximately 5.5 feet below grade. Because of the shallow depth to the petroleum contamination, the discovery that no. 6 fuel oil vault FO-1 is larger than anticipated, and the levels of PCB and metal contamination in shallow soils, a decision was made to address the PCB and metal contamination before continuing with the

petroleum remediation. Therefore, on April 19, 2016, an IRA Plan Modification (IRAPM1) was submitted to the MassDEP outlining steps necessary to remediate the PCB, metal and insecticide-contaminated soils. The IRAPM1 included a targeted risk assessment, which determined that the principal risk drivers were PCB and, to lesser extents, dioxin-like PCB congeners and lead. The results of the risk assessment were used to determine what soils needed to be remediated, what soils could remain on-Site in a segregated "soil repository", and what conditions would be required in a Notice of Activity and Use Limitation. Based on Site conditions (limited access to the courtyard and availability of subsurface void spaces in the courtyard), a decision was made to remove soils containing more than 50 mg/kg PCBs from the Site, to place the remainder of the PCB-contaminated soils from the 0-1 and 1-3 foot intervals in on-Site subsurface repositories, to leave contaminated soils more than three feet below grade in place, to install a protective barrier over the courtyard, and to record a Notice of Activity and Use Limitation. The IRA activities related to the PCB contamination would be initiated prior to resuming the IRA activities for the petroleum contamination. Refer to the IRAPM1 for figures showing sampling locations and other key site features and for tables summarizing the analytical data.

The IRA activities to address the PCB contamination started with the excavation of the PCB hot spot to be added to the stockpile containing 63 mg/kg PCBs, confirmatory sampling of the hot spot excavation's sidewalls and bottom, and the off-site disposal of the greater than 50 mg/kg (or 50 parts per million (ppm)) PCB soil stockpile. In addition, the top 0-1 and 1-3 feet of soil was removed from the eastern side of the courtyard and placed in designated on-site repositories or within a stockpile located in the northwest corner of the courtyard. The greater than 50 ppm PCB soils were placed in six containers on or about June 3 through 6, 2016, and shipped to an approved treatment, storage disposal facility (TSDF) Tradebe, located at 410 Shattuck Way, Newington, New Hampshire, prior to shipment to Wayne Disposal Inc., in Belleville, Michigan.

On June 9, 2016, the MassDEP received a complaint that excessive dust was being generated as part of the on-Site activities. It's unlikely that the dust was being generated by the on-going remedial actions since the work was being conducted in accordance with the IRAPM1, which includes a dust monitoring program. The monitoring plan entails monitoring the levels of dust in the ambient air and the wetting of soils if the dust levels exceed standards. The dust levels were not exceeded on this day; however, dust could be seen exiting windows located in the rear of the Picker Building.

As a result, the MassDEP required the dumpsters containing the PCB soils be analyzed for asbestos. On June 21, 2016, Axiom Partners, Inc. (Axiom) collected one composite sample from each of the five dumpsters that were intercepted on route to the receiving facility; the sixth dumpster had already been received by the facility. All analytical results were negative for asbestos. The dumpsters where then allowed to be transported to Wayne Disposal Inc. (a facility authorized to receive both >50 mg/kg PCB and asbestos waste), in Belleville, Michigan.

The MassDEP also required that all IRA work in the courtyard stop and that the courtyard soils be analyzed for asbestos. At that time the MassDEP allowed on-going demolition / renovation activities to continue within the courtyard, if large sheets of poly and plywood were placed on the ground to prevent access to the courtyard soils. At MassDEP's request, on June 23, 2016, Axiom collected composite soil samples throughout the courtyard for the analysis of asbestos. The results for each sample were positive for the presence of asbestos fibers.

As a result of the detection of asbestos (mostly identified as chrysotile) in soil the MassDEP prohibited demolition / renovation work in the courtyard, required the stoppage of remedial response actions, and required the submittal of a Non-Traditional Asbestos Abatement Work Plan (Work Plan). Axiom's Work Plan (provided as Appendix C in the IRA Plan Modification No. 2 (IRAPM2)) describes the soil sampling and asbestos analyses, outlines the abatement of presumed asbestos-containing pipe insulation located on pipes within the courtyard, and the proper procedures to be followed for the remediation of oils or hazardous materials (OHM) contaminated soils that also contain asbestos. The IRAPM3 is prepared again, in part, to incorporate Axiom's Work Plan into the IRA and to provide this Phase III RAP.

Prior to modifying the IRA Plan a third time, GEC conducted additional assessment activities throughout the courtyard to evaluate the horizontal and vertical extent of petroleum contamination, to determine if and the extent to which PCB and asbestos contaminated soils are commingled with the petroleum-contaminated soils, to obtain disposal criteria data for the petroleum-contaminated soils, and to determine other soils containing more than 50 mg/kg PCBs are present in the courtyard. The additional assessments and their results are described in the IRAPM3. The results of the assessment show: (1) that no other >50 mg/kg PCB contaminated soils were discovered subsequent to the removal of the known >50 mg/kg PCB-contaminated soils, 2) the PCB and asbestos contamination is not commingled with the deeper grossly (visibly) petroleum-contaminated soils mostly found below the fuel oil vault and extending within the smear zone, and 3) during extreme drought conditions free-phase petroleum can flow under the 17 foot high retaining wall and into the Concord River. IRAPM3 also provided an updated human health risk assessment for the east end of the courtyard, which included the petroleum contamination with the other known contaminants of concern (i.e., PCBs, certain metals, insecticides). Asbestos was not included in this risk assessment, because there is no method within the MCP to include it and because any soils containing asbestos are presumed to represent Significant Risk of harm, unless the soils are isolated. The results of both the original and updated human health risk assessments are provided in the IRAPM3 and are interpreted below (Section 2.0) to identify remedial goals.

1.3 Why a Phase III Remedial Action Plan is Required

Pursuant to 310 CMR 40.0414(7), a cap or engineered barrier that is constructed in accordance with the performance standards contained in 310 CMR 40.0996(5) as an Immediate Response Action will not be considered part of a Permanent Solution at a disposal site, unless and until a Phase III is performed pursuant to the provisions of 310 CMR 40.0850 demonstrating the lack of a feasible alternative. The citation provided at 310 CMR 40.0414(7), pertains to a cap or engineered barrier used to cover soils containing OHM at levels exceeding an applicable Upper Concentration Limit. That situation does not exist at this Site. With one exception, no OHM was detected at a level exceeding an applicable Upper Concentration Limit, as documented in Table 1 in the IRAPM3. C11-C22 aromatic hydrocarbons was detected in one (at 15,000 mg/kg) out of 50 soil samples above its Upper Concentration Limit of 10,000 mg/kg. The C11-C22 aromatic hydrocarbon exposure point concentration, considering just the east end courtyard soil samples impacted by petroleum, would be significantly less than its Upper Concentration Limit.

Pursuant to 310 CMR 40.0427(1)(c)(2), during an IRA, if a Critical Exposure Pathway is present and is not eliminated, prevented or mitigated, the IRA cannot be considered complete

until a feasibility evaluation, conducted as part of a Phase III evaluation of Comprehensive Remedial Alternatives as specified in 310 CMR 40.0860, supports the conclusion that it is not feasible to eliminate, prevent, or mitigate the Critical Exposure Pathway(s) as part of the Comprehensive Remedial Alternative (there are also other possible routes to IRA completion). The term Critical Exposure Pathway is defined at 310 CMR 40.0006, and none of the conditions identified as Critical Exposure Pathway are associated with exposure to soils. None of the conditions identified as Critical Exposure Pathways exist at the Site. Therefore, a Phase III evaluation is not needed for this reason for PCBs and petroleum in soil.

Pursuant to 310 CMR 40.0852, a Phase III must be conducted for any disposal site for which a Phase II Comprehensive Site Assessment has been completed and a Permanent Solution in accordance with 310 CMR 40.1000 has not yet been achieved. Although the Phase I Initial Site Investigation was submitted on August 29, 2016 for RTN 3-33101 and RTN 3-33474, the Phase II Comprehensive Site Assessment has not been completed. Therefore, a Phase III evaluation does not need to be conducted for this reason.

MassDEP requested that a focused Phase III be conducted to support leaving most of the PCB-contaminated soils in the courtyard either beneath the protective barrier or in the soil repositories, instead of removing the soils from the Site. Possibly this request was made to be consistent with the requirements of the Toxic Substances Control Act (TSCA) where a Phase III-type benefit-cost evaluation is required when PCB-contaminated soils will remain on Site beneath a TSCA cap.

The protective barrier is not specifically a TSCA cap, as defined by those regulations. Based on the results of the human health risk assessments, documented in the IRAPM1 and IRAPM3, the function of the protective barrier and isolated soil repositories are to limit direct contact to the PCB-contaminated soils of the courtyard (i.e., those placed in soil repositories and those located *in situ*, three feet or more below grade). The TSCA regulations require a feasibility evaluation that includes other remedial alternatives, before installing a cap over PCB-contaminated soils.

According to 310 CMR 40.0859(4), under Selection of Remedial Action Alternative, an engineered barrier, cap or other remedial action alternative that relies upon on-site disposal, isolation or containment of OHM shall not be selected unless and until a Phase III evaluation performed demonstrates the lack of a feasible alternative. The selected alternative relies on isolation and containment, therefore this Phase III is necessary.

The Phase III RAP is provided in the following sections, and includes PCB, metal, insecticide, asbestos and petroleum-contaminated soils. The asbestos contamination is commingled (at least at the shallower depths) with PCB, metal and insecticide contamination, and, therefore, its remediation by default will be the same as that of the PCB, metal and insecticide contamination. Since the objective of the IRA Plan also includes the remove of the majority of the source of petroleum-contaminated soil (in and around the fuel oil vaults), the subsurface petroleum contamination has been included in this revised Phase III RAP. This report was prepared in accordance with the Phase III provisions of the Massachusetts Contingency Plan (MCP) [310 CMR 40.0850]. However, since it is being submitted as part of an IRA Plan, the public notification requirements have not been completed for a full Phase III.

2.0 REMEDIAL GOALS

Remedial Goals based on Results of Original Human Health Risk Assessment, updated to include Asbestos (Excludes Petroleum Contamination)

Based on the results of the original human health risk assessments provided in IRAPM1, a Significant Risk of harm exists for the following exposure points and soil intervals: (1) 0-1 foot interval courtyard soils for construction workers, utility workers and future residents; (2) 1-3 foot interval courtyard soils for future residents; and (3) SP-3 stockpile for construction workers, utility workers and future residents. For the 3-6 and 3-11 foot interval soils, No Significant Risk of harm exists assuming that exposure only occurs during a six-month construction project and, otherwise, the soils remain more than three feet below grade. Refer to Appendix C Table C-11 in the IRAPM3 for a summary of the risk estimates. These results do not consider the potential presence of asbestos. To date, asbestos has been detected in shallow soils, and are presumed present in at least the 0-3 foot interval soils unless sampling demonstrates it is not present. Any soil volume with detectable levels of asbestos are considered to be a Significant Risk of harm to human health.

Based on the original human health risk assessment, the OHM that are the principal risk drivers are PCBs and asbestos, and to a lesser extent dioxin-like congeners of PCBs and lead. For each exposure point and soil interval, the summary statistics for PCBs are provided below (based on information obtained from Appendix C Tables C-2 to C-6 of the IRAPM3).

Summary Statistics for PCBs

Exposure Point / Soil Interval	Mean Concentration (mg/kg)	95th Percentile Upper Confidence Limit on the Mean (mg/kg)	Maximum Concentration (mg/kg)
Courtyard 0-1 feet *	26	41	100
Courtyard 1-3 feet	3.8	7.6	25
Courtyard 3-6 feet	1.1	1.9	6.3
Courtyard 3-11 feet	1.1	2.0	6.3
SP-3 Stockpiled Soils	8.9	13	13

*This includes a localized area (i.e., B-11 and B-11-r5c) where PCB contamination is greater than 50 mg/kg.

As part of the IRA, approximately 10 cubic yards of soils contaminated with PCBs at levels exceeding 50 mg/kg were excavated from the B-11 area, combined with the approximately 40 cubic yard SP-1 stockpile (which contained more than 50 mg/kg PCBs), and the combined approximately 50 cubic yard SP-1/B-11 stockpile was transported off-site under hazardous waste manifests to a facility approved to accept wastes containing >50 ppm PCBs. Confirmatory soil samples were collected from the west wall, east wall and bottom of the excavation for analysis of PCBs via USEPA Method 8082A with USEPA Method 3540 Soxhlet extraction. These data are summarized in Table 1. No north or south wall samples were collected because excavation extended to the Picker building's and Boiler House's foundation walls. Therefore, the summary statistics for "Courtyard 0-1 feet" soils were recalculated excluding the samples representative of the excavated soils and including the new confirmatory soil samples, as documented in Table 2 and provided below.

Updated Summary Statistics for PCBs

Exposure Point / Soil Interval	Mean Concentration (mg/kg)	95th Percentile Upper Confidence Limit on the Mean (mg/kg)	Maximum Concentration (mg/kg)
Courtyard 0-1 feet **	14	20	42

** Excludes the soils from B-11, B-11-r5a, B-11-r5b, B-11-r5c and B-11-r10b that were excavated and transported off-Site.

Based on the outcome of the targeted risk assessment, the primary remedial goal is to preclude exposure to the 0-1 and 1-3 foot interval soils even during a future construction project. For the 3-6 / 3-11 foot interval soils, the primary remedial goal is to minimize exposure to soils to no longer than a six-month construction period, unless asbestos is present. If asbestos is present in soils located more than three feet below original grade (based on grade prior to when the IRA excavation activities were initiated in May 2016), exposure to soils below 3 feet must be precluded except by persons trained to work with both asbestos and OHM contaminated conditions. The available data does not indicate the presence of asbestos at depths more than 3 feet below original grade. The 0-3 foot interval soils could either be: (1) removed from the Site and transported to an acceptable receiving facility; or (2) placed on-Site in isolated subsurface soil repositories. The soils below three feet could remain in place with a protective barrier overlying the soils. An assumption is made that a Notice of Activity and Use Limitation (AUL)) would be implemented to maintain the isolated soil repositories and protective barrier. Based on the findings of the risk characterization, the protective barrier does not need to meet the technical specifications of a TSCA cap, since it only needs to limit direct contact to soils.

An alternative remedial goal could be to reduce PCB concentrations of soils in the courtyard to levels less than 10 mg/kg, thus avoiding the use of isolated soil repositories. This approach would entail removing most or all of the remaining 0-3 foot interval soils, which also contain asbestos, and transporting them off-Site. A Notice of AUL would still be needed for this alternative, because a protective barrier would still be needed for the soils below three feet.

Although not considered probable, if soils below three feet contain asbestos, three remedial goals are identified: (1) excavate all soils impacted by asbestos until none is detected for off-Site disposal; (2) excavate all soils impacted by asbestos until none is detected and placing the soils in an isolated on-Site repository; or (3) to leave the soils in place and consider depths more than three feet below grade to be an isolated soil repository.

A second alternative remedial goal could be to reduce PCB concentrations of soils in the courtyard to levels less than 1 mg/kg, based on conservative average estimate, consistent with the TSCA limit for high occupancy areas, where no cap is in place. No Notice of AUL would be needed for this alternative assuming the asbestos contaminated soil is removed during this alternative. The relative feasibility of these three remedial goals will be considered below, in Sections 4 and 5.

A third alternative remedial goal could be to reduce PCB concentrations and asbestos to levels that approach or achieve background conditions. Consideration of this remedial goal is a Phase III requirement under the MCP. It is documented separately in Section 6.0, below.

<u>Remedial Goals based on Results of Updated Human Health Risk Assessment for the East End of the Courtyard, including (Includes Petroleum Contamination)</u>

During June 2016, the shallow PCB-contaminated soils from the east end of the courtyard were excavated in preparation for excavating the petroleum-contaminated soils. All soils between the Boiler House smoke stack east to the retaining wall were excavated one-foot below grade and were mostly placed in on-Site soil repositories with a portion placed in a stockpile at the west end of the courtyard. Soils from the FO-1 fuel oil bunker east to the retaining wall were excavated an additional 1.5 feet before the IRA excavations were stopped. These soils were also placed in the stockpile at the west end of the courtyard.

The human health risk assessment was redone targeting the east end of the courtyard (from the east side of the Boiler House smoke stack east to the retaining wall). It considered current conditions and included both the asbestos and petroleum contamination, including PCBs, PCB dioxin-like congeners, certain metals and certain insecticides. Most of the petroleum contamination is located at depth (as a smear zone across the water table, approximately 17 feet below current grade) below the shallower PCB and asbestos contamination. Near the FO-1 fuel oil bunker, the petroleum contamination is shallower, starting approximately 2 to 5 feet below grade. Some of these soils are commingled with PCB contamination, at lower levels than detected in the original 0-1 and 1-3 foot interval soils.

Based on the results of the updated human health risk assessment for the east end of the courtyard, a No Significant Risk of harm exists for the following soil intervals (based on current grade): (1) 0-3 foot interval east end courtyard soils for construction workers, utility workers and future residents; (2) 3-6 foot interval east end courtyard soils for construction workers, utility workers and future residents; and (3) 6-20 foot interval east end courtyard soils for construction workers, utility workers and future residents. For each soil interval, an assumption is made that residential exposure only occurs during a future six-month construction project; otherwise the soils remain covered by a protective barrier. For the 0-3 and 3-6 foot interval soils, a further assumption is made that controls (outlined in a Soil Management Plan) are used to limit the frequency of residential exposure to the 0-3 and 3-6 foot interval soils during the construction project. Refer to Appendix D Table D-9 in the IRAPM3 for a summary of the risk estimates. These results do not consider the potential presence of asbestos. To date, asbestos has been detected in shallow soils, and in one 0-5 foot interval soil sample collected from the east end of the courtyard. Therefore, asbestos is presumed present in at least the 0-5 foot interval soils unless sampling demonstrates it is only present at shallower depths. Asbestos was not detected in any discrete or composited soil sample that contained visible evidence of petroleum contamination. Any soil volume with detectable levels of asbestos are considered to be a Significant Risk of harm to human health.

Human exposure to the petroleum contamination is unlikely to result in Significant Risk of harm. However, NAPL was observed in monitoring well GEC-1 at more than one-half inch, and an oily sheen was observed seeping through the retaining wall and into the Concord River during an extreme drought. This observation indicates the presence of non-stable NAPL (discharge to surface water) and likely NAPL with micro-scale mobility (presence of NAPL, from an old no. 6 fuel oil release, in a monitoring well). The first remedial goal would be to achieve a Permanent Solution, which would require the removal of the petroleum contamination until no non-stable NAPL is present under current conditions and for the foreseeable future (e.g., a future extreme drought condition) and all NAPL with micro-scale mobility is removed if and to the extent feasible. The second remedial goal would be to achieve a Temporary Solution, which would require the removal or control of all non-stable NAPL and NAPL with micro-scale

mobility if and to the extent feasible. The relative feasibility of these two remedial goals will be considered below, in Sections 4 and 5.

A third alternative remedial goal could be to reduce the petroleum contamination to levels that approach or achieve background conditions. Consideration of this remedial goal is a Phase III requirement under the MCP. It is documented separately in Section 6.0, below.

3.0 PERFORMANCE STANDARDS

The feasibility of remediating PCB-contaminated soils (and by default asbestos) will be evaluated as well as the petroleum-contaminated soils according to the MCP Phase III requirements specified at 310 CMR 40.0853. According to this citation, a Phase III shall result in:

1. the identification and evaluation of remedial action alternatives which are reasonably likely to achieve a level of No Significant Risk considering the oil and hazardous material present, media contaminated, and site characteristics; and
2. the recommendation of a remedial action alternative that is a Permanent or Temporary Solution, where a Permanent Solution includes measures that reduce, to the extent feasible, the concentrations of oil and hazardous material in the environment to levels that achieve or approach background.

In addition, 310 MCR 40.0853(2) states "A Phase III Remedial Action Plan shall describe and document the information, reasoning and results used to identify and evaluate remedial action alternatives in sufficient detail to support the selection of the proposed remedial action alternative."

The objective of remedial response actions conducted in accordance with the MCP is to achieve a condition of No Significant Risk of harm and a Permanent Solution. As defined in the MCP, a Permanent Solution means a measure or combination of measures that will, when implemented, ensure attainment of a level of control of each identified substance of concern at a disposal site or in the surrounding environment such that no substance of concern will present a significant risk of damage to health, safety, public welfare, or the environment during any foreseeable period of time (310 CMR 40.0006). In addition, in accordance with the requirements of the Phase III, the feasibility of achieving or approaching background levels of OHM shall be evaluated in accordance with 310 CMR 40.0860(3) for the disposal site or the portion of a disposal site where comprehensive remedial actions have been selected to achieve a Permanent Solution, unless the comprehensive remedial action is designed to achieve and achieves background conditions.

4.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

4.1 Identification and Initial Screening of Technologies / Process Options

This section identifies remedial alternatives and technologies (remedial action alternatives) that are likely to achieve a Permanent Solution or a Temporary Solution, and for which persons with expertise are available to implement the remedial alternative. Potential alternatives have been identified based on GEC's experience and site-specific considerations (including the contaminants present, the impacted media and the receptors identified during the

targeted risk assessment). The purpose of the initial screening is to identify those remedial action alternatives that are reasonably likely to be feasible and achieve a level of No Significant Risk and a Permanent Solution or a level of No Substantial Hazard and a Temporary Solution. Remedial action alternatives that, based on the initial screening, may be considered appropriate candidates are further evaluated as part of the Detailed Evaluation of Remedial Action Alternatives (Section 5.2.1), and are described below. For the purpose of this evaluation, GEC presumes that the Picker building will be renovated for multi-family residential use, but that the courtyard will not be changed in configuration or use in the foreseeable future (except that it will be improved as a courtyard suitable for passive use by residents). GEC recognizes that it is possible that the Site might be altered in the future if the Site use changes. As such, certain remedial alternatives that are not considered feasible now might become feasible in the future.

Each remedial alternative is evaluated with respect to its ability to reduce contaminant concentrations such that a condition of No Significant Risk for all future uses is achieved. Typically, each remedial alternative would be evaluated with respect to its ability to reduce contaminant concentrations to below Upper Concentrations Limits (UCLs); however, no exposure point concentration for any of the OHM detected in soils exceeded the applicable UCLs. Also typically, each remedial alternative would be evaluated with respect to its ability to mitigate contamination such that one contaminated medium does not act as a source of additional contamination to other environmental media. At this Site, soils and separate phase product are present. Recently, the separate phase product was observed discharging to the surface waters of the Concord River as an oily sheen. Therefore, the media evaluated in this Phase III RAP are soils and separate phase product. Due to the physical and chemical properties (i.e., poorly water soluble and relatively non-volatile) of the OHM detected in soils (i.e., PCBs, metals, insecticides and petroleum from No. 6 fuel oil), the depth to which soil contamination extends (surficial for asbestos, approximately 11 feet for PCBs, metals and insecticides and 5-17 feet for petroleum), and the depth to groundwater (i.e., more than 15 feet below grade), the PCB, metals, insecticides, asbestos and petroleum soil-contamination is not likely a source of contaminant leaching to groundwater or volatilization of vapor to the vadose zone, indoor air or outdoor air. Asbestos can become airborne, especially when the soils are disturbed. PCB, metals and insecticide soil contamination is likely not a source of contamination to other environmental media. The free-phase petroleum present in the subsurface is considered a source of contamination (constituting an oily sheen) to the nearby surface water. Given the nature and age of the No. 6 fuel oil release, the subsurface petroleum contamination is unlikely to result to be a significant source of dissolved-phase groundwater or surface water contamination.

A Permanent Solution is a remedial measure that is conducted to accomplish one or more of the following: (a) achieve a level of No Significant Risk; (b) eliminate or control any source of oil and/or hazardous materials; and (c) where feasible, reduce to the extent possible, the level of oil and/or hazardous material concentrations in the environment to background. A Significant Risk of harm exists at the Site because of the levels of PCBs present in soils and because of the presence of asbestos in soils. The PCBs in soils are not a significant source of contamination to other media; however, the asbestos may be a source to ambient air especially if soils are disturbed. The remedial goals for the PCBs are based on the results of the targeted risk assessment contained in Appendix C of the IRAPM3, and are identified in Section 2.0, above. Since the asbestos contamination is commingled with the PCB contamination, the remedial goals for asbestos is the same as for PCBs, with the caveat that all asbestos-contaminated soils must be in isolated on-Site repositories, under a three foot cover, or removed from the Site. For PCBs

and asbestos, the primary remedial goal as well as each alternative remedial goal, if achieved, would result in a Permanent Solution. For the petroleum contamination, to achieve a Permanent Solution, the remedial goal is to remove the non-stable NAPL until not present under current conditions or future drought conditions and to remove NAPL with micro-scale mobility if and to the extent feasible. The feasibility of achieving or approaching background conditions is evaluated in Section 6.0. Within Section 6.0, GEC demonstrates that it is not feasible to reduce PCB levels to achieve or approach background. Therefore to achieve a Permanent Solution, at a minimum, either the primary remedial goal or the first or second alternate remedial goal must be achieved.

Requirements of a Temporary Solution include the following: (1) the elimination of any Substantial Hazard; and (2) the identification, characterization, and, to the extent feasible, the elimination, control or mitigation of any source of oil and / or hazardous material. Because the remedial goals for PCBs are consistent with a Permanent Solution, no additional remedial alternatives will be evaluated for the feasibility to achieve a Temporary Solution for PCBs. However, remedial goals for the petroleum contamination include the elimination, control or mitigation of the source of petroleum and therefore remedial alternatives will be evaluated for the feasibility to achieve a Temporary Solution. For the petroleum contamination, a Temporary Solution is achieved if all non-stable NAPL and NAPL with micro-scale mobility are removed and/or controlled to the extent feasible.

Included in the following paragraphs is a summary of those Remedial Action Alternatives evaluated as part of the initial screening process. Most of these remedial action alternatives were identified using the Federal Remediation Technologies Roundtable's (FRTR) *Remediation Technologies Screening Matrix and Reference Guide*, Table 3-2: Treatment Technologies Screening Matrix for halogenated semi-volatile organic compounds (SVOCs), which include PCBs. See www.frtr.gov/matrix2/section3/table3_2.pdf. For the evaluation of the petroleum release the Treatment Technologies Screening Matrix for fuel was used.

Also included below are brief descriptions of each alternative and discussions of the likelihood that the remedial action alternative would achieve a Permanent Solution or Temporary Solution. Finally, based on the information presented, each remedial action alternative is either considered for further evaluation or is eliminated as being a candidate for further evaluation. Those remedial action alternatives, identified on Table 3-2: Treatment Technologies Screening Matrix as having average or above average chances of success, were usually identified for further evaluation. Those identified in Table 3-2 as having a less than average or uncertain chance of success were not selected for further evaluation.

4.1.1 No Action

"No Action" is an alternative where no remedial action is conducted for a disposal site. Because Significant Risk of harm exists at the Disposal Site, "No Action" will not result in a Permanent Solution (or Temporary Solution). Therefore, the "No Action" alternative is not considered appropriate for this Site and will not be evaluated further.

4.1.2 Activity and Use Limitation

A Notice of AUL is an institutional control (also a deed restriction) over the use of the Site. An AUL does not involve any physical remedial efforts or work at the Site. Rather an

AUL restricts certain site activities and uses or requires maintenance of certain conditions of the Site in order to assure that unacceptable exposure to contaminants does not occur.

By itself, a Notice of AUL is not an appropriate remedial option for this disposal site. However, if the PCB-contaminated soils and asbestos-contaminated soils are remediated to a point where they are placed in on-Site isolated soil repositories and / or are located beneath a protective barrier, a Notice of AUL may be an applicable remedial action alternative. This alternative will be evaluated in conjunction with other remedial alternatives.

Notice of AUL may also be appropriate for residual petroleum contamination once the majority of the source has been removed.

4.1.3 *In Situ* Biological Treatment

The following *in situ* biological treatment methods were identified in Table 3-2 as having above average success and are further evaluated for remediating the petroleum release to soils: (1) bioventing; (2) enhanced bioremediation. Bioventing stimulates the natural *in situ* biodegradation of any aerobically degradable compounds in soil by providing oxygen to existing soil microorganisms. A limitation to this approach is the potential buildup of off-gas in basements and nearby building. Since the release is directly adjacent to a building being developed for residential use, this method will not be evaluated further.

Enhanced bioremediation is a process in which indigenous or inoculated micro-organisms degrade organic contaminants found in soil and/or groundwater, converting them to innocuous end products. This typically involves the percolation or injection of groundwater or uncontaminated water mixed with nutrients and saturated with dissolved oxygen. This method is less effective in the presence of light NAPL (LNAPL). The injection of groundwater could also enhance LNAPL migration which is currently impacting the adjacent surface water body. This method should be re-evaluated to address residual levels of contamination that may remain once the LNAPL (to the extent practicable) has been remediated.

4.1.4 *In Situ* Physical/Chemical Treatment

The following *in situ* physical/chemical treatment methods were identified in Table 3-2 as having above average to average chance of success and are further evaluated for remediating the PCB-contaminated soils as well as the petroleum contaminated soil: (1) chemical oxidation (PCB only); (2) electrokinetic separation (PCBs only); (3) fracturing; (4) soil flushing; and (5) solidification/stabilization. *In situ* soil vapor extraction is unlikely to be successful at remediating PCB-contaminated soils or old weathered number 6 oil, and was not evaluated further.

Brief descriptions of each of these treatment methods were obtained from FRTR's website (many of the sentences provided below are direct quotes from FRTR). Chemical oxidation results in the complete or partial destruction of organic chemicals, and is usually accomplished using peroxide, ozone or permanganate. The electrokinetic separation process removes metals and organic contaminants from low permeability soil, mud, sludge, and marine dredging. It desorbs then removes metals and polar organics. Fracturing is an enhancement technology that increases the efficiency of other treatment technologies. Cracks are developed by fracturing beneath the surface in low permeability and over-consolidated sediments to open new passageways that increase the effectiveness of many *in situ* processes and enhance

extraction efficiencies. *In situ* soil flushing is the extraction of contaminants from the soil with water or other suitable aqueous solutions. Soil flushing is accomplished by passing the extraction fluid through in-place soils using an injection or infiltration process. Extraction fluids must be recovered from the underlying aquifer and, when possible, they are recycled. Solidification/stabilization (S/S) reduces the mobility of hazardous substances and contaminants in the environment through both physical and chemical means. Unlike other remedial technologies, S/S seeks to trap or immobilize contaminants within their "host" medium (i.e., the soil, sand, and/or building materials that contain them) instead of removing them through chemical or physical treatment. Except for *in situ* soil vapor extraction, these remedial alternatives are evaluated further for this Site.

4.1.5 *In Situ* Thermal Treatment

The following *in situ* thermal treatment method was identified as having average or above-average potential for success and is further evaluated for remediating the PCB- and petroleum-contaminated soils: (1) thermal treatment. Thermally enhanced soil vapor extraction (SVE) is a full-scale technology that uses electrical resistance/electromagnetic/fiber optic/radio frequency heating or hot-air/steam injection to increase the volatilization rate of semi-volatiles and facilitate extraction. The process is otherwise similar to standard SVE, but requires heat resistant extraction wells.

4.1.6 *Ex Situ* Biological Treatment (Assuming Soil Excavation)

The following *ex situ* biological treatment method was identified as having average or above average potential for success and is further evaluated for remediating the PCB- and petroleum-contaminated soils: (1) biopiles (petroleum only); (2) composting (petroleum only); (3) land farming; (4) slurry phase biological treatment. The following *ex situ* biological treatment methods were not further evaluated, because they are less likely to be successful at remediating PCB-contaminated soils: (1) biopiles; (2) composting; and (3) slurry phase biological treatment. Land farming is a full-scale bioremediation technology, which usually incorporates liners and other methods to control leaching of contaminants, which requires excavation and placement of contaminated soils, sediments, or sludges. Contaminated media is applied into lined beds and periodically turned over or tilled to aerate the waste.

The *ex situ* remedial alternatives require soil excavation. Although some of the soils are already excavated, there is insufficient available space on the property to treat the excavated soils prior to re-use on-Site. In addition, the presence of asbestos in some soils mean that even if treated they would need to remain inaccessible to mitigate future human exposure. Therefore, the *ex situ* remedial alternatives will only be reviewed in the context of those available at permitted off-Site treatment facilities, followed by off-Site landfill disposal by the permitted facility.

4.1.7 *Ex Situ* Physical/Chemical Treatment (Assuming Soil Excavation)

The following *ex situ* physical/chemical treatment methods were identified as having average or above average potential for success in remediating PCB- and petroleum-contaminated soils and were evaluated further: (1) chemical extraction; (2) dehalogenation; (3) chemical

reduction/oxidation (PCBs only); (4) separation (PCBs only); (5) soil washing; and (6) solidification/stabilization (PCBs only). No ex-situ physical/chemical treatment methods were eliminated from further evaluation based on unlikelihood of success.

Chemical extraction does not destroy wastes but is a means of separating hazardous contaminants from soils, sludges, and sediments, thereby reducing the volume of the hazardous waste that must be treated. The technology uses an extracting chemical and differs from soil washing, which generally uses water or water with wash-improving additives.

Dehalogenation process is either base-catalyzed decomposition or glycolate/alkaline polyethylene glycol treatment. Contaminated soil is screened, processed with a crusher and pug mill, and mixed with reagents. The mixture is heated in a reactor. The dehalogenation process is achieved by either the replacement of the halogen molecules or the decomposition and partial volatilization of the contaminants.

Reduction/oxidation chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert. The oxidizing agents most commonly used are ozone, hydrogen peroxide, hypochlorites, chlorine, and chlorine dioxide.

The separation processes are used for removing contaminated concentrates from soils, to leave relatively uncontaminated fractions that can then be regarded as treated soil. *Ex situ* separation can be performed by many processes. Gravity separation and sieving/physical separation are two well-developed processes that have long been primary methods for treating municipal wastewaters. Magnetic separation, on the other hand, is a much newer separation process that is still being tested.

Soil washing is a water-based process for scrubbing soils ex-situ to remove contaminants. The process removes contaminants from soils in one of the following two ways:

- By dissolving or suspending them in the wash solution (which can be sustained by chemical manipulation of pH for a period of time); or
- By concentrating them into a smaller volume of soil through particle size separation, gravity separation, and attrition scrubbing (similar to those techniques used in sand and gravel operations).

During ex-situ solidification/stabilization, contaminants are physically bound or enclosed within a stabilized mass (solidification), or chemical reactions are induced between the stabilizing agent and contaminants to reduce their mobility (stabilization).

The *ex situ* remedial alternatives require soil excavation. Although some of the soils are already excavated, there is insufficient available space on the property to treat the excavated soils prior to re-use on-Site. In addition, the presence of asbestos in some soils mean that even if treated they would need to remain inaccessible to mitigate future human exposure. Therefore, the *ex situ* remedial alternatives will only be reviewed in the context of those available at permitted off-Site treatment facilities, followed by off-Site landfill disposal by the permitted facility.

4.1.8 *Ex Situ* Thermal Treatment (Assuming Soil Excavation)

The following *ex situ* thermal treatment methods were evaluated for remediating the PCB and petroleum-contaminated soils: (1) pyrolysis; (2) thermal desorption; and (3) incineration. Pyrolysis has above average capital costs, operation and maintenance requirements, system reliability and maintenance issues, and high relative costs. It will not be evaluated further. *Ex*

situ thermal desorption and incineration will be evaluated further. The following *ex situ* thermal treatment methods have below average or uncertain potential for success and were not evaluated further: (1) hot gas decontamination; and (2) open burn/open detonation.

Thermal desorption is a physical separation process and is not designed to destroy organics. Wastes are heated to volatilize water and organic contaminants. A carrier gas or vacuum system transports volatilized water and organics to the gas treatment system. The bed temperatures and residence times designed into these systems will volatilize selected contaminants but will typically not oxidize them.

For incineration, high temperatures, 870 to 1,200 °C (1,400 to 2,200 °F), are used to volatilize and combust (in the presence of oxygen) halogenated and other refractory organics in hazardous wastes. Often auxiliary fuels are employed to initiate and sustain combustion. The destruction and removal efficiency (DRE) for properly operated incinerators exceeds the 99.99% requirement for hazardous waste and can be operated to meet the 99.9999% requirement for PCBs and dioxins. Off gases and combustion residuals generally require treatment.

4.1.9 On-Site Containment

This method entails the installation and use of one or both of the following:

(1) Isolated subsurface soil repositories to place soils containing between 10 and 30 mg/kg PCB and asbestos. These soils will be segregated from the remainder of the Site soils such that no exposure would occur including during a future construction project or utility repair project and such that these soils are not commingled with other Site soils in the future. The soils will be wetted during segregations to eliminate the release of asbestos to the environment. Much of the soils are already at depth.

(2) Protective covers and clean utility corridors over soils contaminated with less than 10 mg/kg PCB and no detectable asbestos. These soils will be isolated such that no exposure would occur even during a single six-month construction project or utility repair project and such that these soils are not commingled with other Site soils in the future.

This remedial alternative may result in a Permanent Solution, if implemented with a Notice of AUL requiring the maintenance of the repositories or protective covers or clean utility corridors. This remedial alternative will be evaluated further.

This method may also be appropriate to contain the petroleum contamination onsite and could include one or both of the following:

(1) Seal the cracks and holes at the base of the retaining wall where the oily water was passing through. This could be done on either side of the wall (riverside or landside). It would include building a containment structure in the river adjacent to the wall and evacuating the water long enough to apply a sealant, or excavate a trench on the landside of the wall to expose the base of the wall and install a cement/grout slurry wall.
(2) Install a drain line or cutoff trench above the slurry wall to collect the buildup or oil and water that may accumulate against the wall.

This remedial alternative may result in a Temporary Solution or, if conducted along with source removal, a Permanent Solution. This remedial alternative will be evaluated further.

4.1.10 Soil Excavation and Off-Site Disposal

This method entails excavation of soils and transportation to a permitted off-Site treatment or disposal facility for disposal. Treatment may be required prior to disposal. This method may achieve a Permanent Solution, by itself or in conjunction with a protective barrier and Notice of AUL. This remedial alternative will be evaluated further.

4.1.11 LNAPL Removal with Extraction Wells

This method entails the installation of one or more excavation wells along the retaining wall, used to periodically monitor and extract light non-aqueous phase liquid (LNAPL). The extracted oily water would be transported offsite for treatment and disposal. This method could be combined with heating the LNAPL to enhance removal. This alternative has been identified as having average or above average potential for success in remediating LNAPL, although it can be difficult to remove number 6 oil. This alternative will be evaluated further.

4.1.12 Monitored Natural Attenuation

Monitored natural attenuation, as used in this context, includes the monitored documentation of natural contaminant attenuating processes. Processes considered part of natural attenuation include advection, dilution, dispersion, sorption (adsorption/absorption), and biodegradation. Natural attenuation differs from the "No Action" alternative in that it includes a long-term monitoring plan and represents a considered evaluation of the degree to which natural attenuating process are occurring. In addition, natural attenuation differs from enhanced biodegradation or bioremediation in that it does not involve injecting bacteria or phytoorganisms into the soils, but instead utilizes indigenous bacteria and nutrients to degrade contaminants.

Natural attenuation does not involve active pumping of groundwater or air as is required for many other remedial technologies. Instead natural attenuation involves the natural flow of groundwater through the soil matrix and the interaction of contaminated groundwater with uncontaminated groundwater, naturally occurring microbiota and chemical processes to decrease contaminant concentrations.

The soil contamination is largely located above the water table and the soil contamination is unlikely to leach to groundwater. Advection, dilution and dispersion processes are not applicable to the PCB-contaminated soils under current Site conditions. The PCB contamination is already adsorbed to soils. Naturally occurring biodegradation, to the extent it is occurring is likely slow, and would not result in the attainment of a Permanent Solution within the next several years. Monitored natural attenuation will not be evaluated further with respect to PCB- or asbestos-contaminated soils because it will not achieve a Permanent Solution in the short term. It may be evaluated further for the petroleum release, likely in conjunction with other remedial alternatives.

4.2 Findings of Initial Screening of Technologies / Process Options

Pursuant to 310 CMR 40.0856, alternatives must be further evaluated if they are considered reasonably likely to achieve a Permanent or Temporary Solution (based on the oil and/or hazardous material present, media contaminated, and site characteristics), and if

individuals with the expertise needed to effectively implement the solutions are available. None of the screened alternatives was eliminated as a potential remedy because of the unavailability of expert individuals. Given the Site conditions (including the presence of asbestos), remediation of the PCB- and asbestos-contaminated soils would result in a Permanent Solution. There is no remedial goal for these OHM that would result in a Temporary Solution. Therefore, for PCBs and asbestos, each remedial alternative will not be reviewed for its ability to achieve a Temporary Solution, only a Permanent Solution. For the petroleum contamination, the remedial alternatives will be evaluated to achieve either a Temporary or Permanent Solution.

The following alternatives were eliminated because they will not or are unlikely to achieve a Permanent Solution for PCBs or asbestos: 1) "No Action"; 2) monitored natural attenuation; 3) *in situ* bioventing; 4) *in situ* enhanced bioremediation; 5) *in situ* phytoremediation; 6) *in situ* soil vapor extraction; 7) *ex situ* biopiles; 8) *ex situ* composting; 9) *ex situ* slurry phase biological treatment; 10) *ex situ* hot gas decontamination; and 11) *ex situ* open burn/open detonation. *Ex situ* pyrolysis was also eliminated because of operation and maintenance costs, capital expenses, system reliability and maintenance issues, and high relative costs. *In situ* solidification/stabilization was eliminated because it would not reduce PCB concentrations below levels needed to achieve No Significant Risk and a Permanent Solution.

The following alternatives were eliminated because they will not or are unlikely to achieve a Permanent Solution for petroleum: 1) "No Action"; 2) monitored natural attenuation; 3) chemical oxidation; 4) electrokinetic separation; 5) *in situ* phytoremediation; 6) *in situ* soil vapor extraction; 7) *ex situ* dehalogenation; 8) *ex situ* chemical reduction/oxidation; 9) *ex situ* separation; 10) *ex situ* solidification/stabilization; 11) *ex situ* hot gas decontamination; 12) *ex situ* open burn/open detonation; and 13) *ex situ* pyrolysis.

For PCBs and asbestos, Initial Screening of Remedial Alternatives indicates that the following remedial alternatives should be considered for detailed evaluation, either as individual alternatives or in combination with other alternatives: 1) *in situ* chemical oxidation; 2) *in situ* electrokinetic separation; 3) *in situ* fracturing; 4) *in situ* soil flushing; 5) *in situ* thermal treatment; 6) one or more *ex situ* technologies as part of treatment of excavated soils, such as land farming, slurry phase biological treatment, chemical extraction, dehalogenation, chemical reduction/oxidation, separation, soil washing, solidification/stabilization, incineration or thermal desorption; 7) excavation and off-Site landfilling; 8) on-Site isolation/containment, cap or protective cover installation; 9) containment by sealing the retaining wall or slurry wall; 10) LNAPL removal or containment with a cutoff trench and/or extraction wells; and 11) implementation of Notice of AUL. The remedial alternatives targeted for detailed evaluation have the potential to result in a Permanent Solution. The *ex situ* remedial alternatives require soil excavation. Although some of the soils are already excavated, there is insufficient available space on the property to treat the excavated soils prior to re-use on-Site. In addition, the presence of asbestos in these soils mean that even if treated they would need to remain inaccessible to mitigate future human exposure. Therefore, the *ex situ* remedial alternatives will only be reviewed in the context of those available at permitted off-Site treatment facilities, followed by off-Site landfill disposal by the permitted facility. The treatment alternatives readily available at local permitted off-Site treatment facilities include the following: thermal desorption and chemical oxidation. Because these soils also contain asbestos, these soils will ultimately be disposed whether treated to remove or destroy PCBs or not.

For petroleum, Initial Screening of Remedial Alternatives indicates that the following remedial alternatives should be considered for detailed evaluation, either as individual

alternatives or in combination with other alternatives: 1) *in situ* bioventing; 2) *in situ* enhanced remediation; 3) *in situ* fracturing; 4) *in situ* soil flushing; 5) *in situ* thermal treatment; 6) one or more *ex situ* technologies as part of treatment of excavated soils, such as biopiles, composting, land farming, slurry phase biological treatment, chemical extraction, soil washing, thermal desorption, incineration or thermal desorption; 7) excavation and off-Site landfilling; 8) on-Site isolation/containment, cap or protective cover installation; 9) containment by sealing the retaining wall or slurry wall; 10) LNAPL removal or containment with a cutoff trench or extraction wells and; 11) implementation of Notice of AUL. The remedial alternatives targeted for detailed evaluation have the potential to result in a Permanent or Temporary Solution. The *ex situ* remedial alternatives require soil excavation. None of the petroleum contaminated soils are currently excavated. There is insufficient available space on the property to treat the excavated soils prior to re-use on-Site. Therefore, the *ex situ* remedial alternatives will only be reviewed in the context of those available at permitted off-Site treatment facilities, followed by off-Site landfill disposal by the permitted facility. The treatment alternatives readily available at local permitted off-Site treatment facilities include the following: thermal desorption and chemical oxidation.

4.3 Detailed Evaluation of Remedial Alternatives

In this section, the remedial alternatives that passed the initial screening are further evaluated considering the criteria specified at 310 CMR 40.0858. For each of the Remedial Alternatives, GEC evaluated the comparative effectiveness in terms of: (a) achieving a Permanent; (b) reusing, recycling, destroying, detoxifying or treating contaminants present at the Site; and (c) reducing levels of untreated contaminants at the Site to concentrations that achieve or approach background. GEC also evaluated the short- and long-term reliability of the alternatives, including the degree of certainty that the alternative will be successful and the effectiveness of any measures required to manage residues or remaining wastes or control emissions or discharges to the environment. Lastly, GEC evaluated each of the remedial alternatives with respect to the comparative difficulty of implementing each alternative, the costs associated with each alternative, the risks of each alternative, and the benefits of each alternative.

GEC's detailed screening is presented in Table 3. For clarity of presentation and ease of interpretation, the evaluation of each alternative is presented in a tabular format. The table format mimics the format presented at 310 CMR 40.0858. With respect to each criterion the remedial alternative was graded relative to the other remedial alternatives.

4.4 Summary of Appropriate Technologies

As a result of the detailed evaluation of remedial alternatives, the following six remedial alternatives were eliminated as appropriate alternatives for PCBs/asbestos:

(1) *In situ* electrokinetic separation is an enhancement technology used to separate metals and polar organics from soils or sediments and/or to concentrate metals or polar organics in one location for treatment or collection. This technology works best in low permeability, saturated soils. The PCB contamination is mostly located in unsaturated soils, above the water table. Given the history of the Site and presence of fill throughout the courtyard, buried metallic material are likely present and, if so, would interfere with its operation. This remedial alternative would not address the asbestos present in soils.

(2) *In situ* fracturing is an enhancement technology used with other technologies. By itself it will not work. In-situ fracturing may damage the underground utility lines and foundation walls in the courtyard; this is particularly of concern given the age of the buildings and retaining walls along the river. There are limited vendors offering this technology. The fractures will close in non-clayey soils. This remedial alternative would not address the asbestos present in soils.

(3) *In situ* soil flushing is an enhancement technology used with other technologies. By itself it will not work. According to FRTR, water or water containing an additive to enhance contaminant solubility is applied to soils or injected into groundwater to raise the groundwater table into the contaminated soil zone. The contamination is leached into groundwater, which is extracted and treated. This method is likely technically infeasible for this Site because the soil contamination exists mostly one to eleven feet below grade, and the water table is more than fifteen feet below grade. Water injection is unlikely to sufficiently raise the water table to result in sufficient leaching to reach the clean-up goal of 1 mg/kg. This remedial alternative would not address the asbestos present in soils.

(4) *In situ* thermal treatment is an enhancement technology used with other technologies, such as soil vapor extraction. The goal of the treatment is to desorb and volatilize the PCBs. Because of the location of the contamination near residential buildings, there is a potential for the volatilized PCBs to enter the residential building as vapor. The potential for short-term risk to existing residents is elevated. In addition, the thermal treatment is complicated by the presence of foundation walls, subsurface utility lines and other subsurface structures in or abutting the courtyard. The presence of these utility lines could facilitate PCB vapor migration into the nearby mill buildings, and may result in uneven heating of the soils. This remedial alternative would not address the asbestos present in soils.

(5) Complete excavation and off-site treatment and re-use / recycling of soils is not feasible for the Site because it may significantly compromise the integrity of the Picker building's and Boiler House's foundation walls and the retaining walls along the river. Because it would entail the removal of all subsurface structures, including utility lines, abandoned coal chute, utility vault and fuel oil bunkers within the courtyard, the chance of compromising nearby foundation and retaining walls increase. This issue is particularly important given the age of the buildings and their construction on filled land. If the utility lines, etc., are left in place, sufficient soils may not be removed to achieve the clean-up objective and a cap/protective cover may be needed anyways.

(6) Complete excavation and off-site landfilling approach has the same limitations as complete excavation and off-site treatment and re-use/recycling.

The remaining remedial alternatives will be evaluated further in Section 5.0.

As a result of the detailed evaluation of remedial alternatives, the following three remedial alternatives were eliminated as appropriate alternatives for petroleum:

(1) *In situ* fracturing is an enhancement technology used with other technologies. By itself it will not work. In situ fracturing may damage the underground utility lines and foundation walls in the courtyard; this is particularly of concern given the age of the

buildings and retaining walls along the river. There are limited vendors offering this technology. The fractures will close in non-clayey soils.

(2) *In situ* soil flushing is an enhancement technology used with other technologies. By itself it will not work. According to FRTR, water or water containing an additive to enhance contaminant solubility is applied to soils or injected into groundwater to raise the groundwater table into the contaminated soil zone. The contamination is leached into groundwater, which is extracted and treated. This method is likely technically infeasible for this Site because the petroleum contaminated soil exists from five to seventeen feet below current grade, and the water table is at least seventeen feet below grade. In addition, the petroleum contamination is relatively non-soluble will likely not significantly dissolve in groundwater. Water injection is unlikely to sufficiently raise the water table to result in sufficient leaching to reach the clean-up goal of removing NAPL and may result in breakout of oily water to the Concord River.

(3) In-situ thermal treatment is an enhancement technology used with other technologies, such as soil vapor extraction. The goal of the treatment is to desorb and volatilize the petroleum contamination. Because of the type of petroleum product (no. 6 fuel oil) and age of the release, most of the lighter molecular weight VOCs are likely already degraded.

The remaining remedial alternatives will be evaluated further in Section 5.0.

5.0 COMPARISON AND SELECTION OF REMEDIAL ALTERNATIVES

A feasibility evaluation of remedial alternatives was conducted to support the IRAPM3, to which this evaluation is attached. The feasibility evaluation was conducted consistent the Phase III requirements specified in the MCP. The remedial goal is to achieve No Significant Risk of harm such that the courtyard can be used, at a minimum, for passive use by residents.

The volumes and PCB levels of soils evaluated for remediation are provided below:

Location	Volume (cubic yards)	PCB Mean Conc.**	PCB 95th % UCL* **
0-1 Foot Interval	341	14	20
1-3 Foot Interval	681	3.8	7.6
3-11 Foot interval	2,762	1.1	2.0
Total	3,784		

*95th upper percentile confidence limit on the mean
**After removal of >50 ppm PCB soils

Soils containing more than 50 mg/kg PCBs were already excavated and transported to a facility approved to accept >50 ppm PCB wastes. Remediation of these soils is considered herein, only within the context of cost. The following remedial alternative was evaluated for the feasibility of achieving a Permanent Solution, with a remedial goal of reducing PCB levels to less than 1 mg/kg:

1. *In situ* chemical oxidation.

The following remedial alternatives were evaluated for the feasibility of achieving a Permanent Solution, with a remedial goal of reducing PCB levels to less than 10 mg/kg:

1. Excavation of 0-3 foot interval soils and off-Site treatment and disposal of soils, installation of a protective barrier over the courtyard, and recording a Notice of AUL requiring the existence and maintenance of the protective barrier over the courtyard, and
2. Excavation of 0-3 foot interval soils and off-Site landfilling, installation of a protective barrier over the courtyard, and recording a Notice of AUL requiring the existence and maintenance of the protective barrier over the courtyard.

The following remedial alternative was evaluated for the feasibility of achieving a Permanent Solution, with a remedial goal of on-Site segregation / isolation of soils containing PCBs at levels between 10 and 30 mg/kg and elsewhere reducing PCB levels to less than 10 mg/kg:

1. Excavation of soils from the 0-1 and 1-3 foot intervals and placement in on-Site soil repositories used to isolate these soils, installation of a protective barrier over the courtyard, and recording a Notice of AUL requiring the existence and maintenance of the protective barrier over the courtyard.

Although *in situ* chemical oxidation is the only *in situ* remedial alternative with a feasibility of reducing PCB levels to less than 1 mg/kg, its likelihood of success is low and would require treatment to approximately 11 feet below grade. Its likelihood of success is low because the contaminated soils are above the water table and it would be difficult to maintain oxidant contact with soils; in addition, the presence of subsurface structures also make treating the soils difficult. In addition, the in-situ chemical oxidation would do nothing to the asbestos present in soils. Therefore, a protective barrier mitigating human exposure to the soils would still be needed. This remedial alternative is also the most expensive of the evaluated options.

The costs for partial excavation (0-3 foot interval soils) and either off-Site treatment and disposal of soils or off-Site landfilling, with the installation of a protective barrier over the courtyard and recording of a Notice of AUL are significantly expensive (approximately $600,000) because: (1) there are logistical, time-consuming and costly difficulties in removing the contaminated soils from the courtyard; and (2) even though only 50 cubic yards of soils contained >50 ppm PCBs, all soils would have to be disposed as hazardous waste due to the presence of asbestos. In addition, this method has inherent short-term risks from exposure or with regards to safety, due to the manual labor needed to load the containers with soils and the transport of the drums or other containers through a building. In addition, this method is not "green", in that it would require a lot of fuel oil usage to operate small machinery used to load and transport the containers and to transport the soils to Michigan. Therefore, partial excavation and either off-Site treatment and disposal of soils or off-Site landfilling of soils, installation of a protective barrier over the courtyard and recording of a Notice of AUL is eliminated as an option.

The last alternative, partial excavation (0-3 foot interval soils) and placement of soils in on-Site isolated soil repositories, with installation of distinctive protective barriers over the isolated soil repositories and the remainder of the courtyard, and recording a Notice of AUL will provide a high success rate of eliminating exposure to soils and will minimize the short-term risks associated with exposure to PCB and asbestos contaminated soils during excavation, containerizing soils, moving the soils through the building and then transporting the soils to a receiving facility in Michigan. This remedial alternative is also the most "green" because it minimizes fuel oil costs. This remedial alternative is less expensive, which is necessary because there are substantial costs associated with remediating the subsurface petroleum-contaminated

soils located mostly beneath the PCB contamination. Light non-aqueous phase liquid is associated with the petroleum-contaminated soils and requires remediation to achieve either a Permanent or Temporary Solution. The excavation of the petroleum-contaminated soils will leave void space that will require backfilling and will be suitable for use as an on-Site isolated soil repository. Otherwise, clean fill would need to be moved through a building and into the courtyard. Other void spaces that are suitable for use as isolated soil repositories already exist in the courtyard: the coal chute, two or three dry wells, and a utility vault.

Therefore, this remedial alternative is chosen for this Site and will require the recording a Notice of AUL.

The selected remedy assumes since the >50 ppm PCB soils are removed from the Site, no further USEPA Region 1 oversight under TSCA is necessary. This remedy entails the following:

1. partial excavation of the most contaminated horizons of soils across the courtyard (i.e., 0-1 and 1-3 foot intervals) so that conservative representative average concentrations of PCBs are below 7.6 mg/kg,
2. placing the excavated soils in soil repositories set up to isolate the soils from surrounding soils using sidewall and bottom markers,
3. the installation of a protective barrier over the soil repositories, placement of markers on the surface of the ground to distinguish the soil repository locations from the remainder of the courtyard, and surveying locations of soil repositories,
4. installation of protective barrier(s) over soils of the courtyard located three feet or more below grade and surveying the locations of the protective barrier(s),
5. installation of clean utility corridors where ever live subsurface utility lines will be located within the courtyard, including the placing a marker layer on the sidewalls and bottom of the clean utility corridors to separate the clean soils from the surrounding soils and surveying the location of the clean utility corridors,
6. preparing and recording a Plan of Land showing the location of the protective barrier(s),
7. preparing a Soil Management Plan to be used in the future if construction or utility work is to be conducted within a soil repository or below the protective barrier(s), and
8. preparing and recording a Notice of AUL requiring the maintenance of soil repositories, protective barrier(s) and clean utility corridors.

The Phase III feasibility evaluation for the petroleum-contaminated soils and LNAPL is described below. The volumes and total extractable petroleum hydrocarbon (EPH) or total petroleum hydrocarbon (TPH) levels of soils evaluated for remediation are contained in the following table and in Figure 8 of the IRAPM3. Each location identified below is depicted in Figure 8B of the IRAPM3.

Location	Depth Interval (ft)	Volume (cubic yards)	Maximum Conc. (mg/kg)
Through the vault	0-20*	370	33,000
Adjacent to south side of vault	2-20*	270	34,300

Adjacent to north side and southwest corner of vault	5-20*	600	8,540
Beyond the vault to the south and east	10-20*	960	5,910
Total		3,000	

*Based on current grade following the excavation of approximately 2.5 feet of soils from this area prior to stopping IRA.

The remedial goal is to eliminate, to the extent feasible, the non-stable NAPL and NAPL with micro-scale mobility. The soils containing this attributes are visibly contaminated. Therefore, the goal is to remediate all soils that are visibly contaminated with petroleum as well as all separate phase product observed in the excavation(s). Remediation of these soils is considered herein, only within the context of cost.

The following remedial alternative was evaluated for the feasibility of achieving a Permanent Solution (with a remedial goal of reducing removing all non-stable NAPL and of removing all NAPL with micro-scale mobility if and to the extent feasible) or a Temporary Solution (with remedial goal of removing or containing all non-stable NAPL and NAPL with micro-scale mobility if and to the extent feasible): (1) partial or complete removal of the visible petroleum-contaminated soils (via excavation and off-site treatment or disposal); (2) contain LNAPL within the courtyard to prevent discharge of oily sheen to the Concord River (via coating the courtyard-side and/or riverside of the retaining wall, installing cutoff trench or oil recovery wells (and operating pumps to recover the NAPL, if NAPL is present and recovery is feasible and necessary); and (3) if needed and feasible following soil excavation, removal of non-stable NAPL and/or NAPL with micro-scale mobility (via installing cutoff trench and/or recovery wells and operating pumps to recover the NAPL, if NAPL is present and recovery is feasible).

<u>Partial or Complete Excavation of Visible Petroleum-Contaminated Soils.</u>

1. Excavation of soil between 0-20 feet in the vicinity of the vault and between 10-20 beyond the vault and off-Site treatment and disposal of soils, and

2. Excavation of soil between 0-20 feet in the vicinity of the vault and between 10-20 beyond the vault and off-Site landfilling.

<u>Contain LNAPL onsite to prevent discharge to the Concord River</u>.

3. Seal the retaining wall on the riverside by grouting in holes and applying a sealant to the wall, and

4. Excavation of soil to 20 feet along the landside of the wall and applying a spray on or slurry grout to the base of the wall.

<u>Recover LNAPL</u>

5. Install a cutoff trench along the landside of the wall with the ability to pump and treat and/or dispose of the oily water, and/or

6. Install extraction wells along the wall with the ability to pump and treat and/or dispose of the oily water.

The excavation and disposal of the majority of the petroleum contamination is expensive since it is mostly found at depth within the smear zone and much of the overburden would need to be temporarily removed, and the total volume of soil would approach 3,000 tons. The cost estimate is greater than $600,000. It would be more cost-effective to remove the petroleum contaminated soils in the vicinity of the vault and along the retaining wall so that other remedial efforts could be implemented there.

It is imperative to eliminate the potential discharge of oil to the Concord River; however sealing the retaining wall below the surface water may prove to be impractical. Once the petroleum-contaminated soil has been removed along the landside of the retaining wall a slurry wall could be installed to prevent any further migration. In addition, a cutoff trench or series of extraction wells could be installed along the wall if LNAPL removal is necessary and feasible.

The selected remedy for the remediation of the petroleum release entails the following:

1. Partial excavation of petroleum saturated soils located beneath and in the vicinity of the fuel oil vault,

2. Offsite disposal of the petroleum contaminated soil,

3. If possible seal leaks in the retaining wall from the riverside,

4. Installation of a slurry wall and/or spray-on grout to the base of the retaining wall on the landside while the excavation is open,

5. Installation of a cutoff trench or extraction wells with the ability to remove LNAPL,

6. Backfill the excavation with PCB and asbestos contaminated soils,

7. Installation of protective barrier(s) over soils of the courtyard located three feet or more below grade and surveying the locations of the protective barrier(s) (as discussed above),

6.0 FEASIBILITY OF ACHIEVING OR APPROACHING BACKGROUND

The evaluation of the feasibility of achieving or approaching background is described in 310 CMR 40.0860. In 2004, MADEP issued a document, entitled *Conducting Feasibility Evaluations under the MCP* (Policy #WSC-04-160) (MassDEP Feasibility Policy), which provides policy for conducting feasibility evaluations regarding achieving or approaching background conditions. The disposal site is approximately 9,200 square feet in area. The contamination is comprised of PCB, lead, vanadium, asbestos-contaminated soils and petroleum-contaminated soils. Little to no dissolved-phase groundwater or soil vapor contamination associated with the soil contamination is likely present due to the physical and chemical

properties of the contaminants. LNAPL comprised of no. 6 fuel oil is present in the subsurface which has been added to the Phase III RAP per the recommendation of the MassDEP.

The selected remedy entails excavation of the most PCB-contaminated soils, which is located in the 0-3 foot interval, and placement of the excavated soils in isolated repositories within the courtyard and the installation of distinctive protective barriers over the soil repositories and remainder of the courtyard soils. Recently, soils containing more than 50 mg/kg PCBs were excavated and transported to a facility approved to receive >50 ppm PCB waste.

To achieve background conditions, the levels of PCBs and petroleum constituents would have to be reduced to below detectable limits or very low concentrations, respectively. This would entail excavating all soils containing detectable levels of PCB, to at least 11 feet below grade and nearly all petroleum contaminated soils to approximately 20 feet below grade. In order to achieve background conditions, the volume of soil that would need to be excavated and transported off-Site is approximately 3,784 cubic yards for PCBs and 3,000 cubic yards for petroleum.

To approach background conditions, the levels of PCBs would have to be reduced to one-half the Method 1 S-1 concentration (e.g., to 0.5 mg/kg PCBs or less). This would entail excavating all soils containing detectable levels of PCB, to at least 11 feet below grade. In order to achieve background conditions, the volume of soil that would need to be excavated and transported off-Site is approximately 3,784 cubic yards. This would entail excavating all soils containing detectable >0.5 mg/kg of PCB, to between 6 and 11 feet. In order to approach background conditions, the volume of soil that would need to be excavated and transported off-Site is approximately 2,000 to 3,784 cubic yards.

MassDEP's Feasibility Policy provides conditions of categorical infeasibility to achieve or approach background conditions. Table 9-2 of this policy identifies no. 6 fuel oil as persistent contaminant (unlike other petroleum products, which are considered non-persistent or degradable). The policy identifies the condition where persistent contaminants are present in category S-2 or S-3 soils to be infeasible to achieve or approach background conditions. Based on current conditions, all soils of the courtyard are categorized as S-2 or S-3. Therefore, achieving or approaching background conditions for the no. 6 fuel oil contamination in soils is considered to be categorically infeasible. However, the cost to achieve or approach background conditions for petroleum contamination is included in the site-specific feasibility evaluation required due the presence of PCBs.

The cost to approach or achieve background for PCBs ranges between approximately $1,200,000 and $1,500,000. Because asbestos was detected in soils three feet below grade, an assumption had to be made that asbestos contamination may extend significantly below this depth. Therefore, an assumption was made that a significant portion of these soils will have to be transported to a hazardous waste facility in order to achieve or approach background conditions. In addition, there would be significant logistical issues (and associated costs) with moving such a large volume of soils through a building.

The cost to approach or achieve background for petroleum ranges between approximately $400,000 and $600,000. This cost assumes that the deeper soils are not contaminated with asbestos (based on the recent results for asbestos analysis for deeper subsurface soils and disposal criteria testing for *in situ* petroleum-contaminated soils) and do not need to be disposed as hazardous waste. If it is contaminated with asbestos, the cost would be similar to that of the PCB soils.

A site-specific evaluation of the feasibility of achieving or approaching background conditions was evaluated in accordance with Section 9.3.3 of Policy #WSC-04-160. This site-specific evaluation entails a technological feasibility evaluation component and a benefit-cost evaluation component. It is feasible to achieve or approach background conditions if all or nearly all of the PCB-contaminated and petroleum-contaminated soils are removed from the Site. However, given the age of buildings surrounding the courtyard, the presence of surface structures located near or connected to the building foundations, the construction of the buildings on filled land abutting a river, and the depth to which excavation must be conducted to achieve or approach background conditions (i.e., 11 feet or more below grade and 20 feet below grade), it will be difficult to achieve or approach background conditions. The cost to achieve or approach background conditions for PCBs is likely to exceed $1,500,000 and $1,200,000, respectively. The cost to achieve or approach background for petroleum is approximately $400,000 to $600,000. Based on a benefit-cost evaluation, it is considered feasible to achieve or approach background conditions if the additional cost to remediate is no more than 20% of the cost to remediate to No Significant Risk. The cost to remediate to achieve or approach background conditions far exceeds the 20% extra cost criteria. Therefore, based on a site-specific evaluation, a conclusion is made that it is infeasible to achieve or approach background conditions.

7.0 SCHEDULE FOR IMPLEMENTATION OF SELECTED ALTERNATIVES

The remedy will be implemented after the MassDEP approves or presumptively approves the IRA Plan Modification No. 3, presuming USEPA determines that TSCA no longer applies to the project. GEC estimates that it will take approximately three to four months to complete the project, including the recording of the Plan of Land and Notice of AUL with the registry of deeds.

8.0 LSP OPINION

This LSP Opinion is prepared by Brian T. Butler, L.S.P. no. 5736, and Goldman Environmental Consultants, Inc. for the courtyard release located at 169.2 Bridge St., in Lowell, MA, identified as RTN 3-33101. This LSP Opinion is prepared on behalf of R-M Developer, LLC, c/o Rees-Larkin Development, LLC and in accordance with 310 CMR 40.0862(3). This Phase III is being conducted in conjunction with an IRA Plan that proposes to utilize onsite isolation or containment of OHM and therefore this Phase III is required. Although many components of a Phase II Comprehensive Site Assessment have been completed, this Phase III is being submitted before the Phase II.

The selected remedial alternatives for the PCBs, metals, insecticides and asbestos are likely to achieve a Permanent Solution. The goal of the selected remedial alternatives for petroleum is to achieve a Permanent Solution, however it is possible that residual levels of petroleum will remain and a Temporary Solution will be achieved.

The Phase III conforms with applicable Phase III performance standards and requirements and approval conditions for a Phase III associated with an IRA proposed to utilize onsite isolation or containment. The written conditions of approval for the IRAs include the following; 1) for RTN 3-33793 for the sheen on surface water, only activities that were verbally approved at the time of the notification are permitted, 2) for RTN 3-33853 the release of asbestos, there is a 10 month Interim Deadline to complete the assessment activities, and 3) for RTNs 3-33101 the greater than 1/2inch of

product in a well and RTN 3-33474 the release of PCBs, metals and insecticides, only standard requirements associated with the NORs apply.

Since this report is being attached to the IRA Plan Modification report that has already been submitted, it is being submitted under BWSC Form 126, miscellaneous.

9.0 WARRANTY

The conclusions and recommendations contained in this report are based on the information available to GEC and upon the current regulatory climate as of November 7, 2016. The conclusions and recommendations may require revision if future regulatory changes occur. GEC provides no warranties on information provided by third parties and contained herein. Data compiled was in accordance with GEC's existing procedures and consistent with the MCP, and should not be construed beyond its limitations. Any interpretations or use of this report other than those expressed herein are not warranted.

The use, partial use, or duplication of this report without the written consent of Goldman Environmental Consultants, Inc. is strictly prohibited. This report is subject to GEC's Contract for Consulting Services with the client.

Respectfully submitted,
Goldman Environmental Consultants, Inc.

Eileen Furlong *Brian Butler*

Eileen A. Furlong
Principal, Sr. Risk Assessor

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Sr. V.P., Operations

Attachments:

Table 1: Summary of Confirmatory Soil Analytical Data following Excavation of B-11: Polychlorinated Biphenyls (PCBs)

Table 2: Identification of Method to Derive Exposure Point Concentrations and Calculation of Exposure Point Concentrations following Excavation of B-11: 0-1 Foot Interval (PCBs)

Table 3: Comparative Evaluation of Remedial Alternatives

Appendix E Table 1

Summary of Confirmatory Soil Analytical Data following Excavation at B-11: Polychlorinated Biphenyls (PCBs)

Parameter	MCP Method 1 Standards								Upper Concentration Limit	SAMPLING LOCATION		
	S-1/GW-2	S-1/GW-3	S-2/GW-1	S-2/GW-2	S-2/GW-3	S-3/GW-1	S-3/GW-2	S-3/GW-3	UCL	Btm-B11-ex	ESW-B11-ex	WSW-B11-ex
Sampling Date										5/27/2016	5/27/2016	5/27/2016
Sample Depth										- Feet	- Feet	- Feet
SM 2540G (% Wt)												
% Solids	~	~	~	~	~	~	~	~	~	88.3	86.8	87.1
SW-846 8082A (mg/Kg dry)												
PCB 1016	1	1	4	4	4	4	4	4	100	ND (0.11)	ND (0.12)	ND (0.11)
PCB 1221	1	1	4	4	4	4	4	4	100	ND (0.11)	ND (0.12)	ND (0.11)
PCB 1232	1	1	4	4	4	4	4	4	100	ND (0.11)	ND (0.12)	ND (0.11)
PCB 1242	1	1	4	4	4	4	4	4	100	ND (0.11)	ND (0.12)	ND (0.11)
PCB 1248	1	1	4	4	4	4	4	4	100	ND (0.11)	ND (0.12)	ND (0.11)
PCB 1254	1	1	4	4	4	4	4	4	100	0.79	0.38	1.1
PCB 1260	1	1	4	4	4	4	4	4	100	ND (0.11)	ND (0.12)	ND (0.11)
PCB 1262	1	1	4	4	4	4	4	4	100	ND (0.11)	ND (0.12)	ND (0.11)
PCB 1268	1	1	4	4	4	4	4	4	100	ND (0.11)	ND (0.12)	ND (0.11)
NOTES:												
1. ND = Not detected above the lab reporting limits shown in parenthesis.												

Appendix E Table 2
Identification of Method to Derive Soil Exposure Point Concentrations and Calculation of Soil Exposure Point Concentrations Following B-11 Excavation: 0-1 Foot Interval (PCBs)

Parameter	MCP - Method 2 Direct Contact Standards			Upper Concentration Limit	SAMPLING LOCATIONS										
	S-1	S-2	S-3	UCL	B-5 (0-1')	B-7 (0-1')	B-8 (0-1')	B-9 (0-1')	B-10 (0-1')	B-11 (0-1')	B-11-r10B (0-1')	B-11-r5A (0-1')	B-11-r5B (0-1')	B-11-r5C (0-1')	Btm-B11-ex
Sampling Date					3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/14/2016	3/30/2016	3/30/2016	3/30/2016	3/30/2016	5/27/2016
Sample Depth					0-1 Feet	0-1 Feet	0-1 Feet	0-1 Feet	0-1 Feet	0-1 Feet	0-1 Feet	0-1 Feet	0-1 Feet	0-1 Feet	- Feet
NOTES:										1	1	1	1	1	2
SW-846 8082A (mg/Kg dry)															
TOTAL PCBs	1	4	4	100	7.0	8.5	39	42	21	100	7.0	7.6	4.0	97	0.79
NOTES:															
When no analyte detected, one-half reported					1. These soils were already excavated and transported off-site to a facility that can accept soils containing more than										
detection limit used to calculate exposure					50 mg/kg PCBs. Therefore, they are excluded from these calculations.										
point concentration.					2. Confirmatory samples collected after excavation of B-11 area.										

Appendix E Table 2
Identification of Method to Derive Soil Exposure Point Concentrations and Calculation of Soil Exposure Point Concentrations Following B-11 Excavation: 0-1 Foot Interval (PCBs)

Parameter	ESW-B11-ex	WSW-B11-ex	B-12 (0-1')	B-13 (0-1')	FO-1-TP (0-1')	FO-1-TP (1-2')	FO-1-TP (2-3')
Sampling Date	5/27/2016	5/27/2016	3/23/2016	3/23/2016	3/9/2016	3/9/2016	3/9/2016
Sample Depth	- Feet	- Feet	0-1 Feet	0-1 Feet	0-1 Feet (below grade /	1-2 Feet (below grade /	2-3 Feet (below grade /
NOTES:	2	2			3	3	3
SW-846 8082A (mg/Kg dry)							
TOTAL PCBs	0.38	1.1	11	12	13	12	7.8
NOTES:							
When no analyte detected, one-half reported	3. These soils were excavated from the top of FO-1 and were temporarily stockpiled						
detection limit used to calculate exposure	as SP-2. Subsequently, these soils were placed in the coal chute, which was modified						
point concentration.	to be an isolated soil repository.						

Appendix E Table 2

Identification of Method to Derive Soil Exposure Point Concentrations and Calculation of Soil Exposure Point Concentrations Following B-11 Excavation: 0-1 Foot Interval (PCBs)

Parameter	Evaluation: S-2 Soils					Derivation of Exposure Point Concentration				
Sampling Date Sample Depth	Number Analyzed	Number Detected > S-2 Standard	% > S-2 Standard	Maximum Concentration	Method to Derive EPC for S-2 Soils	Mean Concentration	Standard Deviation (Population)	95th Percentile Confidence Interval	Upper 95th Percentile Confidence Limit on the Mean	Exposure Point Concentration
NOTES:										
SW-846 8082A (mg/Kg dry)										
TOTAL PCBs	13	10	77	42	95th % UCL	13.51	12.76	6.94	20.44	20
NOTES:										
When no analyte detected, one-half reported										
detection limit used to calculate exposure										
point concentration.										

Appendix E Table 3
Comparative Evaluation of Remedial Alternatives

Clean-up Goal: Reduce PCB Levels to Less than 1 mg/kg [no Protective Cover or Notice of Activity and Use Limitation needed] (Permanent Solution)	**Remedial Alternatives**	
Remedy and disposal alternative:	**In-Situ Chemical Oxidation**	**In-Situ Electrokinetic Separation**
Comparative Effectiveness		
Achieving permanent solution	+++	+ (not by itself)
Achieving temporary solution	Not Evaluated	Not Evaluated
Re-use, recycling, destroying, detoxifying, and treating OHM	+++++	+
Reducing to levels that achieve or approach background	Yes, if effective	No, not by itself
Comparative Short-term and Long-term Reliability of Alternatives		
Degree of certainty of success	Low: due to PCB depth, contamination above water table	Low: best in saturated, low permeability soils.
Effectiveness of measures to manage residues or remaining wastes or to control emissions or discharges	Uncertain: may produce heat, gas and toxic byproducts	Uncertain: by itself it is not effective
Comparative Difficulty of Implementation of Alternative		
Technical complexity	Logistically complex: subsurface structures/oxid. dem.	
Integration into existing facility operations	Poor – dev. work	
Necessary monitoring, operations, maintenance or site access requirements or limitations	More monitoring / many injection points needed	
Availability of necessary services, materials, equipment or specialists	Available	
Availability, capacity and location of necessary off-site treatment, storage and disposal facilities	N/A	
Alternative meets regulatory requirements for any likely approvals, permits or licenses	Yes	
Comparative Costs of Alternatives (in thousands of dollars)		
Costs of implementation to achieve MCP or TSCA Clean-up objectives	>$1,000,000	
Costs of environmental restoration	None	
Costs of implementation to approach background conditions	>1,000,000	
Costs of implementation to achieve background conditions	>$1,000,000	
Relative consumption of energy resources	Moderate	
Comparative Risks of Alternatives		
Short-term on-site and off-site risks	On-Site: relatively high	
Longer-term on-site and off-site risks	Moderate / Uncertain	
Potential of risk of harm following completion of remedy	Moderate / Uncertain	
Comparative Benefits of Alternatives		
Benefit of restoring natural resources	N/A	
Providing for productive reuse of the site	++++	
Avoided costs of relocating people, businesses, or providing alternative water supplies	++++	
Avoided lost value of the site	Better	
Comparative Timeliness of Alternatives	Short-Term: <1 Year	
Relative Effect of Alternative on Non-Pecuniary Interests	+++	

Clean-up Goal: Reduce PCB Levels to Less than 1 mg/kg [no Protective Cover or Notice of Activity and Use Limitation needed] (Permanent Solution)	**Remedial Alternatives**	
Remedy and disposal alternative:	**In-Situ Fracturing**	**In-Situ Soil Flushing**
Comparative Effectiveness		
Achieving permanent solution	+ (not by itself)	+ (not by itself)
Achieving temporary solution	Not Evaluated	Not Evaluated
Re-use, recycling, destroying, detoxifying, and treating OHM	+	+
Reducing to levels that achieve or approach background	No – not by itself	No – not by itself
Comparative Short-term and Long-term Reliability of Alternatives		
Degree of certainty of success	Low: Best in silty, clayey soils, shale, rock; may damage utility lines and underground structures (foundations or retaining walls along the river)	Low: Will not raise water table sufficient to leach contaminants into groundwater, for recovery
Effectiveness of measures to manage residues or remaining wastes or to control emissions or discharges	Uncertain: By itself it is not effective	Uncertain: By itself it is not effective
Comparative Difficulty of Implementation of Alternative		
Technical complexity		
Integration into existing facility operations		
Necessary monitoring, operations, maintenance or site access requirements or limitations		
Availability of necessary services, materials, equipment or specialists		
Availability, capacity and location of necessary off-site treatment, storage and disposal facilities		
Alternative meets regulatory requirements for any likely approvals, permits or licenses		
Comparative Costs of Alternatives (in thousands of dollars)		
Costs of implementation to achieve NSR or TSCA Clean-up objectives		
Costs of implementation to approach background conditions		
Costs of implementation to achieve background conditions		
Costs of environmental restoration		
Relative consumption of energy resources		
Comparative Risks of Alternatives		
Short-term on-site and off-site risks		
Longer-term on-site and off-site risks		
Potential of risk of harm following completion of remedy		
Comparative Benefits of Alternatives		
Benefit of restoring natural resources		
Providing for productive reuse of the site		
Avoided costs of relocating people, businesses, or providing alternative water supplies		
Avoided lost value of the site		
Comparative Timeliness of Alternatives		
Relative Effect of Alternative on Non-Pecuniary Interests		

Clean-up Goal: Reduce PCB Levels to Less than 1 mg/kg [no Protective Cover or Notice of Activity and Use Limitation needed] (Permanent Solution)	**Remedial Alternatives**	
Remedy and disposal alternative:	**In-Situ Thermal Treatment**	
Comparative Effectiveness		
Achieving permanent solution	+ (not by itself)	
Achieving temporary solution	Not Evaluated	
Re-use, recycling, destroying, detoxifying, and treating OHM	+	
Reducing to levels that achieve or approach background	No – not by itself	
Comparative Short-term and Long-term Reliability of Alternatives		
Degree of certainty of success	Low: Presence of subsurface structures likely to complicate success	
Effectiveness of measures to manage residues or remaining wastes or to control emissions or discharges	Uncertain: By itself it is not effective	
Comparative Difficulty of Implementation of Alternative		
Technical complexity		
Integration into existing facility operations		
Necessary monitoring, operations, maintenance or site access requirements or limitations		
Availability of necessary services, materials, equipment or specialists		
Availability, capacity and location of necessary off-site treatment, storage and disposal facilities		
Alternative meets regulatory requirements for any likely approvals, permits or licenses		
Comparative Costs of Alternatives (in thousands of dollars)		
Costs of implementation to achieve NSR or TSCA Clean-up objectives		
Costs of environmental restoration		
Relative consumption of energy resources		
Comparative Risks of Alternatives		
Short-term on-site and off-site risks	Potentially, high (PCB vapor to indoor air)	
Longer-term on-site and off-site risks		
Potential of risk of harm following completion of remedy		
Comparative Benefits of Alternatives		
Benefit of restoring natural resources		
Providing for productive reuse of the site		
Avoided costs of relocating people, businesses, or providing alternative water supplies		
Avoided lost value of the site		
Comparative Timeliness of Alternatives		
Relative Effect of Alternative on Non-Pecuniary Interests		

Clean-up Goal: Reduce PCB Levels to Less than 1 mg/kg [no Protective Cover or Notice of Activity and Use Limitation needed] if complete excavation (Permanent Solution)	**Remedial Alternatives**	
Remedy and disposal alternative:	**Complete Excavation and Off-Site Treatment, then Re-Use / Recycling of Treated Soil**	**Complete Excavation and Off-Site Landfilling**
Comparative Effectiveness		
Achieving permanent solution	+++++	+++++
Achieving temporary solution	Not Evaluated	Not Evaluated
Re-use, recycling, destroying, detoxifying, and treating OHM	+++++	+
Reducing to levels that achieve or approach background	+++++	+++++
Comparative Short-term and Long-term Reliability of Alternatives		
Degree of certainty of success	Low, likely to compromise foundation walls of historic buildings; numerous subsurface structures present	Low, likely to compromise foundation walls of historic buildings; numerous subsurface structures present
Effectiveness of measures to manage residues or remaining wastes or to control emissions or discharges	+++	+++
Comparative Difficulty of Implementation of Alternative		
Technical complexity		
Integration into existing facility operations	Poor – very disruptive to on-going development work	Poor – very disruptive to on-going development work
Necessary monitoring, operations, maintenance or site access requirements or limitations	Courtyard is poorly accessible to needed machinery and equipment; severe impediment to completion	Courtyard is poorly accessible to needed machinery and equipment, severe impediment to completion
Availability of necessary services, materials, equipment or specialists	Not readily available	Available
Availability, capacity and location of necessary off-site treatment, storage and disposal facilities	N/A	N/A
Alternative meets regulatory requirements for any likely approvals, permits or licenses	Yes	Yes
Comparative Costs of Alternatives (in thousands of dollars)		
Costs of implementation to achieve NSR or TSCA Clean-up objectives		
Costs of implementation to approach background conditions		
Costs of implementation to achieve background conditions		
Costs of environmental restoration		
Relative consumption of energy resources		
Comparative Risks of Alternatives		
Short-term on-site and off-site risks		
Longer-term on-site and off-site risks		
Potential of risk of harm following completion of remedy		
Comparative Benefits of Alternatives		
Benefit of restoring natural resources		
Providing for productive reuse of the site		
Avoided costs of relocating people, businesses, or providing alternative water supplies		
Avoided lost value of the site		
Comparative Timeliness of Alternatives		
Relative Effect of Alternative on Non-Pecuniary Interests		

Clean-up Goal: Reduce PCB Levels to Less than 10 mg/kg [With Protective Cover and Notice of Activity and Use Limitation] (Permanent Solution) [Excavate 0-3 Foot Interval Soils]	**Remedial Alternatives**	
Remedy and disposal alternative:	**Partial Excavation and Off-Site Treatment; Re-Use / Recycling of Treated Soil; Construction of Protective Barrier over Soils with >1 but <10 mg/kg PCBs**	**Partial Excavation and Off-Site Landfilling; and Construction of Protective Barriers over Soils with >1 but <10 mg/kg PCBs**
Comparative Effectiveness		
Achieving permanent solution	+++++	+++++
Achieving temporary solution	Not Evaluated	Not Evaluated
Re-use, recycling, destroying, detoxifying, and treating OHM	+++++	+
Reducing to levels that achieve or approach background	++	++
Comparative Short-term and Long-term Reliability of Alternatives		
Degree of certainty of success	Uncertain, may compromise foundation walls of historic buildings; numerous subsurface structures present	Uncertain, may compromise foundation walls of historic buildings; numerous subsurface structures present
Effectiveness of measures to manage residues or remaining wastes or to control emissions or discharges	+++	+++
Comparative Difficulty of Implementation of Alternative		
Technical complexity	Logistically difficult	Logistically difficult
Integration into existing facility operations	Poor – disruptive to on-going development work	Poor – disruptive to on-going development work
Necessary monitoring, operations, maintenance or site access requirements or limitations	Courtyard is poorly accessible to needed machinery and equipment; impediment to completion	Courtyard is poorly accessible to needed machinery and equipment; impediment to completion
Availability of necessary services, materials, equipment or specialists	Available	Available
Availability, capacity and location of necessary off-site treatment, storage and disposal facilities	Available	Available
Alternative meets regulatory requirements for any likely approvals, permits or licenses	Yes	Yes
Comparative Costs of Alternatives (in thousands of dollars)		
Costs of implementation to achieve NSR or TSCA Clean-up objectives	$600,000	$600,000
Costs of implementation to approach background conditions	>$1,200,000, if excavate most	>$1,200,000, if excavate most
Costs of implementation to achieve background conditions	>$1,500,000, if excavate all	>$1,500,000, if excavate all
Costs of environmental restoration	None	None
Relative consumption of energy resources	Higher – transport/treatm	Higher - transportation
Comparative Risks of Alternatives		
Short-term on-site and off-site risks	High – move thru bldg.; trans	High – move thru bldg; trans
Longer-term on-site and off-site risks	Low	Low
Potential of risk of harm following completion of remedy	Low – mngd with prot. bar.	Low – mngd with prot. bar.
Comparative Benefits of Alternatives		
Benefit of restoring natural resources	N/A	N/A
Providing for productive reuse of the site	++++	++++
Avoided costs of relocating people, businesses, or providing alternative water supplies	+++++	+++++
Avoided lost value of the site	Moderate	Moderate
Comparative Timeliness of Alternatives	Short-Term: <4 months	Short-Term: <4 months
Relative Effect of Alternative on Non-Pecuniary Interests	Good	Good

Clean-up Goal: Isolate Soils containing 10 to 30 mg/kg PCBs by placing in On-Site Soil Repository [with Protective Cover and Notice of Activity and Use Limitation] (Permanent Solution)	**Remedial Alternatives**	
Remedy and disposal alternative:	**Partial Excavation and Placement of 10 to 30 mg/kg PCBs in Soil Repository and Construction of Protective Barrier over Soils**	
Comparative Effectiveness		
Achieving permanent solution	+++++	
Achieving temporary solution	Not Evaluated	
Re-use, recycling, destroying, detoxifying, and treating OHM	+++	
Reducing to levels that achieve or approach background	+	
Comparative Short-term and Long-term Reliability of Alternatives		
Degree of certainty of success	More certain, less likely to compromise foundation walls of historic buildings; existing void spaces to use for isolating soil repositories	
Effectiveness of measures to manage residues or remaining wastes or to control emissions or discharges	+++	
Comparative Difficulty of Implementation of Alternative		
Technical complexity	Less logistically complex	
Integration into existing facility operations	Moderate – less disruptive to on-going development work	
Necessary monitoring, operations, maintenance or site access requirements or limitations	Courtyard accessibility is less of an issue	
Availability of necessary services, materials, equipment or specialists	Available	
Availability, capacity and location of necessary off-site treatment, storage and disposal facilities	N/A	
Alternative meets regulatory requirements for any likely approvals, permits or licenses	Yes	
Comparative Costs of Alternatives (in thousands of dollars)		
Costs of implementation to achieve NSR or TSCA Clean-up objectives	$150,000	
Costs of implementation to approach background conditions	Not Applicable	
Costs of implementation to achieve background conditions	Not Applicable	
Costs of environmental restoration	None	
Relative consumption of energy resources	Lower – no transport. costs	
Comparative Risks of Alternatives		
Short-term on-site and off-site risks	Moderate – no transport risks	
Longer-term on-site and off-site risks	Low	
Potential of risk of harm following completion of remedy	Low – mngd with prot. bar.	
Comparative Benefits of Alternatives		
Benefit of restoring natural resources	N/A	
Providing for productive reuse of the site	++++	
Avoided costs of relocating people, businesses, or providing alternative water supplies	+++++	
Avoided lost value of the site	Moderate	
Comparative Timeliness of Alternatives	Short-Term: <4 months	
Relative Effect of Alternative on Non-Pecuniary Interests	Good	

Clean-up Goal: Reduce Petroleum Contamination to the extent possible	**Remedial Alternatives**	
Remedy and disposal alternative:	**In-Situ Fracturing**	**In-Situ Soil Flushing**
Comparative Effectiveness		
Achieving permanent solution	+ (not by itself)	+ (not by itself)
Achieving temporary solution	Not Evaluated	Not Evaluated
Re-use, recycling, destroying, detoxifying, and treating OHM	+	+
Reducing to levels that achieve or approach background	No – not by itself	No – not by itself
Comparative Short-term and Long-term Reliability of Alternatives		
Degree of certainty of success	Low: Best in silty, clayey soils, shale, rock; may damage utility lines and underground structures (foundations or retaining walls along the river)	Low: Will not raise water table sufficient to leach contaminants into groundwater, for recovery
Effectiveness of measures to manage residues or remaining wastes or to control emissions or discharges	Uncertain: By itself it is not effective	Uncertain: By itself it is not effective
Comparative Difficulty of Implementation of Alternative		
Technical complexity		
Integration into existing facility operations		
Necessary monitoring, operations, maintenance or site access requirements or limitations		
Availability of necessary services, materials, equipment or specialists		
Availability, capacity and location of necessary off-site treatment, storage and disposal facilities		
Alternative meets regulatory requirements for any likely approvals, permits or licenses		
Comparative Costs of Alternatives (in thousands of dollars)		
Costs of implementation to achieve NSR or TSCA Clean-up objectives		
Costs of implementation to approach background conditions		
Costs of implementation to achieve background conditions		
Costs of environmental restoration		
Relative consumption of energy resources		
Comparative Risks of Alternatives		
Short-term on-site and off-site risks		
Longer-term on-site and off-site risks		
Potential of risk of harm following completion of remedy		
Comparative Benefits of Alternatives		
Benefit of restoring natural resources		
Providing for productive reuse of the site		
Avoided costs of relocating people, businesses, or providing alternative water supplies		
Avoided lost value of the site		
Comparative Timeliness of Alternatives		
Relative Effect of Alternative on Non-Pecuniary Interests		

Clean-up Goal: Reduce Petroleum Contamination to the extent possible	**Remedial Alternatives**	
Remedy and disposal alternative:	**In-Situ Thermal Treatment**	
Comparative Effectiveness		
Achieving permanent solution	+ (not by itself)	
Achieving temporary solution	Not Evaluated	
Re-use, recycling, destroying, detoxifying, and treating OHM	+	
Reducing to levels that achieve or approach background	No – not by itself	
Comparative Short-term and Long-term Reliability of Alternatives		
Degree of certainty of success	Low: Most of the lighter VOCs have already degraded from the six oil	
Effectiveness of measures to manage residues or remaining wastes or to control emissions or discharges	Uncertain: By itself it is not effective	
Comparative Difficulty of Implementation of Alternative		
Technical complexity		
Integration into existing facility operations		
Necessary monitoring, operations, maintenance or site access requirements or limitations		
Availability of necessary services, materials, equipment or specialists		
Availability, capacity and location of necessary off-site treatment, storage and disposal facilities		
Alternative meets regulatory requirements for any likely approvals, permits or licenses		
Comparative Costs of Alternatives (in thousands of dollars)		
Costs of implementation to achieve NSR or TSCA Clean-up objectives		
Costs of environmental restoration		
Relative consumption of energy resources		
Comparative Risks of Alternatives		
Short-term on-site and off-site risks		
Longer-term on-site and off-site risks		
Potential of risk of harm following completion of remedy		
Comparative Benefits of Alternatives		
Benefit of restoring natural resources		
Providing for productive reuse of the site		
Avoided costs of relocating people, businesses, or providing alternative water supplies		
Avoided lost value of the site		
Comparative Timeliness of Alternatives		
Relative Effect of Alternative on Non-Pecuniary Interests		

Clean-up Goal: Reduce Petroleum Contamination to the extent possible.	**Remedial Alternatives**	
Remedy and disposal alternative:	**Partial or Complete Excavation and Off-Site Treatment; Re-Use / Recycling of Treated Soil;**	**Partial or Complete Excavation and Off-Site Landfilling;**
Comparative Effectiveness		
Achieving permanent solution	++++	++++
Achieving temporary solution	+++++	+++++
Re-use, recycling, destroying, detoxifying, and treating OHM	+++++	+
Reducing to levels that achieve or approach background	++	++
Comparative Short-term and Long-term Reliability of Alternatives		
Degree of certainty of success	Uncertain, may compromise foundation walls of historic buildings; numerous subsurface structures present	Uncertain, may compromise foundation walls of historic buildings; numerous subsurface structures present
Effectiveness of measures to manage residues or remaining wastes or to control emissions or discharges	+++	+++
Comparative Difficulty of Implementation of Alternative		
Technical complexity	Logistically difficult	Logistically difficult
Integration into existing facility operations	Poor – disruptive to on-going development work	Poor – disruptive to on-going development work
Necessary monitoring, operations, maintenance or site access requirements or limitations	Courtyard is poorly accessible to needed machinery and equipment; impediment to completion	Courtyard is poorly accessible to needed machinery and equipment; impediment to completion
Availability of necessary services, materials, equipment or specialists	Available	Available
Availability, capacity and location of necessary off-site treatment, storage and disposal facilities	Available	Available
Alternative meets regulatory requirements for any likely approvals, permits or licenses	Yes	Yes
Comparative Costs of Alternatives (in thousands of dollars)		
Costs of implementation to achieve NSR	$200,000	$200,000
Costs of implementation to approach background conditions	>$400,000, if excavate most	>400,000, if excavate most
Costs of implementation to achieve background conditions	>$600,000, if excavate all	>$600,000, if excavate all
Costs of environmental restoration	None	None
Relative consumption of energy resources	Higher – transport/treatm	Higher - transportation
Comparative Risks of Alternatives		
Short-term on-site and off-site risks	High – move thru bldg.; trans	High – move thru bldg; trans
Longer-term on-site and off-site risks	Low	Low
Potential of risk of harm following completion of remedy	Low – mngd with prot. bar.	Low – mngd with prot. bar.
Comparative Benefits of Alternatives		
Benefit of restoring natural resources	N/A	N/A
Providing for productive reuse of the site	++++	++++
Avoided costs of relocating people, businesses, or providing alternative water supplies	+++++	+++++
Avoided lost value of the site	Moderate	Moderate
Comparative Timeliness of Alternatives	Short-Term: <4 months	Short-Term: <4 months
Relative Effect of Alternative on Non-Pecuniary Interests	Good	Good

Clean-up Goal: Contain LNAPL onsite and prevent from discharging into Concord River	**Remedial Alternatives**	
Remedy and disposal alternative:	**Seal the retaining wall on the riverside;**	**Install a Slurry wall on the landside;**
Comparative Effectiveness		
Achieving permanent solution	+	+
Achieving temporary solution	++	++
Re-use, recycling, destroying, detoxifying, and treating OHM	NA	NA
Reducing to levels that achieve or approach background	NA	NA
Comparative Short-term and Long-term Reliability of Alternatives		
Degree of certainty of success	Uncertain, may not be able to seal the wall now that the river level has increased	Uncertain, may not be able to excavate to the base of the wall the seal all openings
Effectiveness of measures to manage residues or remaining wastes or to control emissions or discharges	+++	+++
Comparative Difficulty of Implementation of Alternative		
Technical complexity	Logistically very difficult	Logistically very difficult
Integration into existing facility operations	Poor – disruptive to on-going development work	Poor – disruptive to on-going development work
Necessary monitoring, operations, maintenance or site access requirements or limitations	River is poorly accessible to needed machinery and equipment; impediment to completion	Courtyard is poorly accessible to needed machinery and equipment; impediment to completion
Availability of necessary services, materials, equipment or specialists	Available	Available
Availability, capacity and location of necessary off-site treatment, storage and disposal facilities	Available	Available
Alternative meets regulatory requirements for any likely approvals, permits or licenses	May need local Conservation Commission approval	Yes
Comparative Costs of Alternatives (in thousands of dollars)		
Costs of implementation to achieve NSR	$50,000	$50,000
Costs of implementation to approach background conditions	$150,000 for all of the wall	NA
Costs of implementation to achieve background conditions	$150,000 for all of the wall	NA
Costs of environmental restoration	Unknown	None
Relative consumption of energy resources	Higher – transport/treatm	Higher - transportation
Comparative Risks of Alternatives		
Short-term on-site and off-site risks	High – working in river	High – move thru bldg; trans
Longer-term on-site and off-site risks	Low	Low
Potential of risk of harm following completion of remedy	Low – disturbing river environs	Low .
Comparative Benefits of Alternatives		
Benefit of restoring natural resources	Via eliminating further impacts	Via eliminating further impacts
Providing for productive reuse of the site	++++	++++
Avoided costs of relocating people, businesses, or providing alternative water supplies	+++++	+++++
Avoided lost value of the site	Moderate	Moderate
Comparative Timeliness of Alternatives	Short-Term: <1 months	Short-Term: <2 months
Relative Effect of Alternative on Non-Pecuniary Interests	Good	Good

Clean-up Goal: Remove LNAPL and prevent from discharging into Concord River	**Remedial Alternatives**	
Remedy and disposal alternative:	**Install a cutoff trench;**	**Install extraction wells;**
Comparative Effectiveness		
Achieving permanent solution	+++	+++
Achieving temporary solution	+++++	+++++
Re-use, recycling, destroying, detoxifying, and treating OHM	+	+
Reducing to levels that achieve or approach background	++	++
Comparative Short-term and Long-term Reliability of Alternatives		
Degree of certainty of success	Uncertain, trench may not be install to capture oil during fluctuating water levels	Uncertain, may not be able to extract number 6 oil
Effectiveness of measures to manage residues or remaining wastes or to control emissions or discharges	+++	+++
Comparative Difficulty of Implementation of Alternative		
Technical complexity	Logistically difficult	Logistically less difficult
Integration into existing facility operations	Poor – very disruptive to on-going development work	Poor – disruptive to on-going development work
Necessary monitoring, operations, maintenance or site access requirements or limitations	Courtyard is poorly accessible to needed machinery and equipment; impediment to completion	Courtyard is poorly accessible to needed machinery and equipment; impediment to completion
Availability of necessary services, materials, equipment or specialists	Available	Available
Availability, capacity and location of necessary off-site treatment, storage and disposal facilities	Available	Available
Alternative meets regulatory requirements for any likely approvals, permits or licenses	Yes	Yes
Comparative Costs of Alternatives (in thousands of dollars)		
Costs of implementation to achieve NSR	$25,000	$10,000
Costs of implementation to approach background conditions	NA	NA
Costs of implementation to achieve background conditions	NA	NA
Costs of environmental restoration	None	None
Relative consumption of energy resources	Higher – transport/treatm	Medium
Comparative Risks of Alternatives		
Short-term on-site and off-site risks	High – move thru bldg.; trans	High – move thru bldg; trans
Longer-term on-site and off-site risks	Medium	Medium
Potential of risk of harm following completion of remedy	Low	Low
Comparative Benefits of Alternatives		
Benefit of restoring natural resources	N/A	N/A
Providing for productive reuse of the site	++++	++++
Avoided costs of relocating people, businesses, or providing alternative water supplies	+++++	+++++
Avoided lost value of the site	Moderate	Moderate
Comparative Timeliness of Alternatives	Long Term: <years	Long Term: <years
Relative Effect of Alternative on Non-Pecuniary Interests	Good	Good

APPENDIX F:

Soil Management Plan/ Air Monitoring Procedures/ Decontamination Procedures/ PPE Procedures

APPENDIX F

GEC'S SOIL MANAGEMENT PLAN FOR
REMEDIAL RELEASE ABATEMENT MEASURES PLAN (RAM) ACTIVITIES

169.2 BRIDGE ST., LOWELL, MA
RTNs 3-33474, 3-33101, 3-33xxx and 3-33xxx

Introduction

A 120-day reportable condition was discovered at 169.2 Bridge Street, (Subject Property, which is a historic mill complex), due to the presence of polychlorinated biphenyls (PCBs), metals and insecticides above Reportable Concentrations (RCS-1) in shallow soils in the courtyard located between the "Boiler House" and the adjacent site on which renovation is currently occurring, i.e., the "Picker Building". This soil contamination extends across the entire courtyard, and gradually diminishes with depth to approximately 11 feet below grade. Polycyclic aromatic hydrocarbons (PAHs), mostly associated with coal ash, are also present in these soils. Asbestos, comprised mostly of chrysotile but also including some amosite, is present in the shallow soils of the courtyard. No asbestos contamination has been detected in subsurface soil samples collected at the east end of the courtyard. Petroleum contamination, comprised of no. 6 fuel oil, is present at the east end of the courtyard near two abandoned fuel oil bunkers. This petroleum contamination extends from the west side of the fuel oil bunkers east to the retaining wall bordering the Concord River. It extends north to the Boiler House and south to the Picker Building. Near the fuel oil bunkers the petroleum contamination is approximately 2-5 feet below current grade and extends to a smear zone straddling the water table, approximately 16 to 17 feet below current grade. The no. 6 fuel oil is likely present as free phase at or near the smear zone and perhaps at the bottom of and beneath the fuel oil bunker(s).

This Soil Management Plan (SMP) addresses is prepared considering the remaining planned IRA activities where soils may be encountered: (1) preparation of existing structures (utility vault, dry wells and coal chute) to prepare final soil repositories; (2) creation of a final soil repository at the location of the fuel oil bunker(s), following excavation of petroleum-contaminated soils; (3) excavation of asbestos/PCB-contaminated soils and placement of soils in on-Site soil repositories; (4) excavation of petroleum-contaminated soils for off-Site disposal; (5) coating of the courtyard-side of the retaining wall with a waterproofing product or installation of a water-tight wall at the base of the retaining wall; (6) installation of oil recovery wells, either in excavation hole or later by drill rigs; (7) (optional) installation of an interceptor trench and catch basin to relieve hydrostatic pressure on the courtyard side of the retaining wall; (8) installation of clean utility corridors; and (9) installation of a three-foot protective cover over the soils, comprised of a geotextile fabric cover over the affected soils followed by three feet of clean fill and landscaping. If excavation can advance low enough to reach the petroleum smear zone, groundwater is likely to be encountered; therefore, dewatering of the excavation hole(s) at the east end of the courtyard is expected.

Management of Soils during Removal Activities

Activities that involve the disturbance or excavation of Site soils shall be conducted in a manner that is consistent with this SMP and Axiom's Non-Traditional Asbestos Abatement Work Plan (NT), dated October 4, 2016 (where applicable). If there are inconsistencies between this SMP and Axiom's NT (or its successor), the requirements in Axiom's NT will prevail, because this SMP does not address all issues associated with asbestos-contaminated soils and other materials. Axiom's NT, dated October 4, 2016, is provided as Appendix F-1, to this SMP. Axiom's decontamination requirements are provide as Appendix F-2, and details regarding Axiom's Equipment Wash Station are provided in Appendix F-3. Asbestos ambient air monitoring is required in Axiom's NT. The locations of the four asbestos ambient air monitoring stations, 3-stage personnel decontamination facility and the equipment washing station are depicted in Figure 10A.

This SMP describes appropriate soil excavation, handling, storage, on-Site reuse or off-site disposition of soils disturbed during IRA activities. It also contains provisions for actions to be taken when contaminated soils are encountered. This SMP also includes a description of appropriate engineering controls and screening procedures necessary to mitigate potential exposure of workers and other individuals in the project area to fugitive dust, particulates, vapor emissions, and exposure to contaminated soil via inhalation or ingestion, as well as procedures for dewatering of water in excavation holes.

The entire scope of work as defined below shall be managed, monitored and supervised by a Licensed Site Professional (LSP) or his/her designee. Refer to part E. GEC Contacts for the name and contact information of the LSP and his/her designee overseeing work within the disposal Site. The contacts for the Massachusetts-licensed contractor, supervisor and project manager and the construction manager/project manager/site superintended are provided in Section B of Axiom's NT (Appendix F-1).

A.	**Requirements for Soil Disturbance Activities, including Excavation Activities**
(1)	Erosion controls must be installed and maintained to protect storm water catch basins from run-off from the construction area. Appropriate erosion controls must be maintained during the project until the Site is in final stabilized condition. The Site shall be managed such that no sediment leaves the work site to protect water quality of the Concord and Merrimack Rivers.
(2)	At the start of the project, an on-Site meeting will be held to go over planned work for the day, to ensure all workers are 40-hour HAZWOPER trained, and to discuss health and safety issues, and go over soil management and MCP-specific issues. For that day, persons will be identified who are responsible for health and safety issues, evaluating soils and groundwater for evidence of contamination, managing dust suppression, and managing erosion controls. All erosion control and dust suppression controls must be in place prior to beginning work for that day.
(3)	Soils disturbed during removal activities shall be continuously inspected for visual and olfactory evidence of contamination. This evidence includes but is not limited to stained soils, presence of free-phase product and odors. The air space immediately above the soils will be periodically screened during the day using a photoionization equipped with a 10.6 eV lamp (10.6 eV PID).

	Note: Based on the existing headspace screening data for test borings, no elevated headspace readings were encountered and are unlikely to be encountered during this project.
(4)	During removal of soils from the courtyard, soils with no evidence of contamination should be segregated from soils with visible/olfactory/screening evidence of contamination.
(5)	If evidence of soil contamination is encountered, refer to part **B. Requirements for Soil Excavation**, below, for further instructions.
(6)	During soil disturbance activities, disturbed soil and/or stockpiled soils shall be lightly sprayed with water to prevent dust generation. Soil moisture shall be monitored continuously and water applied to the excavation area and the excavate material, as needed, and if the soils are dry during windy conditions. If site conditions become windy, and excessive dust generation is likely, stop work and apply water to the area, including any stockpiled soil. Decontaminate trucks, covered dumpsters or heavy equipment prior to leaving the Site in order to remove dust, soils and other debris. Water used for dust suppression cannot be obtained from the Concord or Merrimack Rivers or associated waters. The water must be free of oil, acid, alkali, hazardous materials above MMCLs, vegetative matter and sediments and shall not be salt or brackish. The use of water for dust suppression must be monitored carefully so that runoff does not impact wetland resource areas, storm drain basins or cause erosion.
(7)	During all soil disturbance activities, dust monitoring must be continuously conducted following the procedures in GEC's Dust Monitoring Plan (Appendix F-4). Dust monitoring will be conducted at two of the four ambient air asbestos monitoring stations. Personal asbestos air monitoring and ambient air asbestos monitoring must be conducted in accordance with Axiom's NT (Appendix F-1). The air monitoring stations are identified in Figure 10A.
(8)	Fill will be needed to create the protective cover over the courtyard soils, upon completion of all excavation activities. Other fill may be needed to backfill excavations. Any fill brought onto the site must be clean material. It may not contain trash, refuse, rubbish or debris. In addition, the clean fill cannot contain oils or hazardous materials at levels exceeding the Soil Reporting Category 1 (RCS-1) Reportable Concentrations provided in the MCP. The origin of the soils and certification / laboratory reports documenting the soils are clean must be provided, for submittal to the MassDEP in the IRA Status Report or IRA Completion Report.
(9)	Six different marker layers will be used for this project: (1) three distinctively different colors of geotextile fabric, one color each for (a) two clean utility corridors, (b) the soil repositories identified as the utility vault and FO-1, and (c) the initial covering of the protective cover, which will be installed over courtyard soils located three feet below grade (based on grade prior to starting the IRA; (2) 3-inch layer of gravel to be placed over the geotextile fabric covering the utility vault and FO-1 soil repositories; (3) concrete that will seal the tops of the five soil repositories, identified as four dry wells and one modified coal chute; and (4) for the FO-1 soil repository, orange snow fencing that will be used to line the sidewalls of the repository (before the geotextile fabric is placed inside the snow fencing to line the sidewalls and bottoms of FO-1.
(10)	Clean utility corridors will be approximately 4 feet wide, and will be lined with

	geotextile fabric to separate it from surrounding contaminated soils. It will extend from below the utility line or structure to at least three feet below final grade. The utility corridor will be backfilled with clean soils or similar material suitable to support the utility line. Each clean utility corridor will be covered with the same geotextile fabric. The clean fill, comprising the protective cover shall be placed on top of the clean utility corridor.
(11)	During rain events or overnight work stoppage, the disturbed soils must be temporarily stabilized using 6-mil polyethylene sheeting and ¾-inch plywood. A construction fence or other barrier must be placed around the disturbed soils during work stoppage, to mitigate access by others to the work area, unless access to the courtyard is secured.
(12)	All soils across the courtyard must be covered with 6-mil polyethylene sheeting, weighed down with ¾-inch plywood, until determined to be clear of asbestos. All stockpiled soils must be covered with 6-mil polyethylene sheeting, weighed down with ¾-inch plywood, at all times except when soils are being added or removed from the stockpile or soil samples are being collected from the stockpile for analysis.
(13)	No soil disturbance work shall be conducted beyond the erosion control barrier. No construction materials, clean fill, debris, brush, leaves or other materials may be placed beyond the project work limit.
(14)	All soil disturbance activities shall be limited to daylight hours.
(15)	No equipment, materials, debris or waste may be placed beyond the erosion control barriers. No equipment or materials may be removed from the courtyard without first going through decontamination and/or obtaining permission from the Massachusetts-licensed Asbestos Project Manager or LSP. No asbestos debris or wastes may be removed from the courtyard without obtaining permission from the Massachusetts-licensed Asbestos Project Manager and/or LSP. No remedial waste, remedial wastewater or other debris may be removed from the courtyard without the permission of the LSP.
(16)	All brick or concrete removed from the dry wells or coal chute to prepare final soil repositories shall be handled, containerized and disposed as asbestos-contaminated debris, in accordance with the requirements of Axiom's NT (Appendix F-1). All plywood and polyethylene sheeting used prior to clearing an area of asbestos contaminated material shall be handled, containerized and disposed as asbestos-contaminated debris, in accordance with Axiom's NT. All personal protective equipment and other wastes generated during the asbestos portions of this project shall be handled, containerized and disposed as asbestos-contaminated debris, in accordance with Axiom's NT.
(17)	Following the completion of construction and grading, all exposed soils must be restored to the previous grade and permanently stabilized with a protective cover, such as a marker barrier overlain by three-feet of clean soils planted with vegetation.
(18)	Erosion control devices may be removed from the Site when soils are permanently stabilized.

B.	**Requirements for Soil Excavation**

(1)	**Between 1,000 and 2,000 cubic yards of shallow soils contaminated with asbestos/PCBs or PCBs** will be excavated from the courtyard to at least three feet below final grade and placed in permanent on-Site soil repositories. If a soil repository is not ready for any of these excavated soils, the soils shall be stockpiled and covered by 6-mil polyethylene sheeting weighed down with ¾-inch plywood. Soil stockpiles containing or suspected of containing asbestos shall be placed at the west end of courtyard. Soil stockpiles with no detectable asbestos shall be placed on the east central portion of the courtyard. An orange snow fence shall be placed between the asbestos and non-asbestos stockpiled soils. If more than 2,000 yards of soils will be excavated, notify the LSP immediately so that permission can be obtained from MassDEP to proceed. Excavated soils will be inspected for evidence of contamination, including jar headspace screening of composite soil samples using a 10.6 eV PID. A daily log must be maintained of the volume of excavated soils and jar headspace screening results for inclusion in the IRA Status Report and IRA Completion Report. Refer to part **D. GEC Contacts** for the name and contact information of the LSP.
(2)	Removal of asbestos-contaminated soils will be done in one- to two-foot increments. Following each round of excavation, the Massachusetts-licensed asbestos manager will divide the excavated area of the courtyard into sections, and will collect five 0-1 inch soil samples from each section. For each section, these soil samples will be composited into a single sample, placed into a labeled container (e.g., Whirlpak™ sample bags), and submitted under chain of custody documentation to a Massachusetts-certified laboratory for analysis of asbestos via USEPA Method 600/R-93/116. The soils will be covered with clean 6-mil polyethylene sheeting pending the analytical results. If asbestos is detected in the composited sample for any section, the one-foot interval excavation and composite sampling will be repeated, until no asbestos is detected or at least three feet below final grade (it may extend deeper to allow excavation of petroleum contaminated soils at the east end of the courtyard). Each portion of the courtyard cleared of asbestos will be covered with clean 6-mil polyethylene sheeting, weighed down with ¾-inch plywood, until remediation is completed in the courtyard and the protective barrier will be installed.
(3)	Significant soil excavation will be conducted at the east end of the courtyard. **Between 1,000 and 2,000 cubic yards of petroleum-contaminated soils** will be excavated from the fuel oil bunker area east to the retaining wall. The depth of excavation may extend to approximately 18 to 20 feet below current grade. No person may enter the excavation hole, except by following OSHA requirements for entrance to an excavation hole and/or confined space. The need for shoring (of the excavation wall, foundation wall or retaining wall) or step-down of the excavation hole shall be assessed by a Massachusetts-licensed structural engineer. Subsurface structures, likely comprised of concrete or brick, may exist in the subsurface. If these structures are tied into a building foundation or retaining wall, their removal may affect the structural integrity of the building or retaining wall. A structural engineer should evaluate each situation.
(4)	Soils not containing significant contamination must be excavated to gain access to the petroleum-contaminated soils. The soils with no visible evidence of petroleum

	contamination must either be stockpiled in the east central portion of the courtyard, temporarily stored in the FO-1 soil repository or used as backfill elsewhere within the east end at depths more than 3 feet below final grade. If more than 2,000 cubic yards of petroleum-contaminated soils will be excavated, notify the LSP immediately so that permission can be obtained from MassDEP to proceed. Excavated soils will be inspected for evidence of contamination, including jar headspace screening of composite soil samples using a 10.6 eV PID. A daily log must be maintained of the volume of excavated soils and jar headspace screening results for inclusion in the IRA Status Report and IRA Completion Report. Refer to part **D. GEC Contacts** for the name and contact information of the LSP.
(5)	Soil samples must be collected from the bottoms and sidewalls of the petroleum-contaminated soil excavations, and submitted under chain-of-custody documentation for analysis of EPH and PAHs via MassDEP's method and for total petroleum hydrocarbons via USEPA Method 8100M.
(6)	If permitted by the receiving facility, based on existing disposal criteria data, all or some of the petroleum-contaminated soils may be live-loaded by moving soils along the corridor and filling roll-off dumpsters and/or dump trucks for immediate transport to the receiving facility. If disposal criteria data is needed for excavated soils prior to shipment, composite soil samples from the contaminated stockpiled soils must be analyzed for disposal criteria so that the appropriate receiving facility can be identified. All petroleum-contaminated soils must be transported off-site for treatment, recycling or re-use. Only if treatment, recycling or re-use is not feasible can soils be shipped off-site for disposal. The LSP or his/her designee will determine what disposal criteria testing needs to be done and the numbers of samples needed, and will identify the potential receiving facility. No soils can be transported off-site without authorization from the LSP and receiving facility. Refer to part **D. GEC Contacts** for the name and contact information of the LSP.
(7)	The LSP or his/her designee will evaluate all analytical data to determine the following: (1) whether the soils are suitable for re-use within the disposal Site or must be transported under a Bill of Lading or Hazardous Waste Manifest to an appropriate receiving facility for treatment, recycling, re-use or disposal; (2) whether a new reportable condition exists; (3) whether further excavation of contamination is necessary, which may require an IRA Plan Modification or obtaining verbal authorization from MassDEP; and (4) whether additional investigation is required.

C.	**Removal of Oil or Oily Water from Excavation Hole (as needed)**
(1)	If the excavation proceeds according to plan, groundwater will likely be encountered. Therefore, when setting up for petroleum-contaminated soil excavation, equipment should be on hand for dewatering the excavation and storage of oily water. If groundwater is encountered during petroleum excavation, immediately contact the LSP. Up to a **cumulative total of 2,000 gallons of oily water** is estimated to be pumped from the bottom of the petroleum excavations and stored in frac tank(s). Following disposal criteria testing, the oily water should be transported by ENPRO Services, Inc., under a Hazardous Waste

	Manifest, for reclamation. If more than 2,000 gallons of oil/water is recovered, the LSP should be notified immediately so that the MassDEP can be notified of the new volume. Refer to part **D. GEC Contacts**, for the contact information for GEC's LSP.

D.	**GEC Contacts**
(1)	Brian Butler, LSP 5736 Tel: 781-356-9140 x113 Cell: 781-799-0385 Email: bbutler@goldmanenvironmental.com
(2)	Andrew Foley Tel: 781-356-9140 x150 Cell: 808-747-3616 Email: mbradley@goldmanenvironmental.com

NON-TRADITIONAL ASBESTOS ABATEMENT WORK PLAN FOR THE REMEDIATION OF CONTAMINATED SOILS

MASSACHUSETTS MILLS III COURTYARD
150 MASS MILLS DRIVE
LOWELL, MASSACHUSETTS

PREPARED FOR:

MM Picker LLC
179 Boylston Street
Jamaica Plain, Massachusetts 02130

PREPARED BY:

Axiom Partners, Inc.
One Pleasure Island Road, Suite 2C
Wakefield, Massachusetts 01880

October 4, 2016

REVISION 3

Job Number 01136.283

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ABATEMENT PLAN CERTIFICATION

This report has been prepared for the exclusive use of the Client, MM Picker, LLC (Picker). Photocopying of this document by parties other than those designated by the Client, or use of this document for purposes other than it is intended, is prohibited.

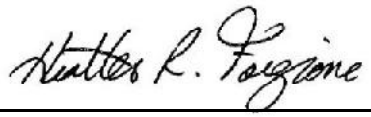
Respectfully submitted on this 28th of July 2016.

Respectfully resubmitted on this 1st of September 2016.

Respectfully resubmitted on this 18th of September 2016.

Respectfully resubmitted on this 4th of October 2016.

Reviewed by:



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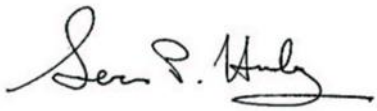


Sean P. Hurley
Principal

Reviewed by:

Authorized Personnel
MM Picker, LLC

A. INTRODUCTION/BACKGROUND

This Non-Traditional Work Plan (Work Plan) has been prepared, in part, to be an attachment to a formal Immediate Response Action (IRA) Plan Modification for 169.2 Bridge Street, Lowell, Massachusetts. The original IRA Plan was prepared to address the discovery of a petroleum release and RTN 3-33101. It has been updated to address PCBs, metals and pesticides in the soil and RTN 3-33474. It is modified here to address the discovery of asbestos fibers in soil that require onsite reuse. No confirmatory sampling for asbestos will be conducted. The original IRA Plan and the IRA Plan Modification has details on what soils are being removed from the site for disposal and which soils will remain onsite.

A portion of the former Mass Mills complex (Lot 3A/3B) in Lowell, Massachusetts, is currently under extensive renovation. The Picker Building (Lot 3A) has been gutted and efforts are underway to convert the space into residential housing.

Soil in the courtyard on Lot 3B (the "Courtyard") was determined to contain PCBs above 50 ppm, and this material was stockpiled at the northwestern end of the Courtyard and covered with polyethylene plastic sheeting. Lined dumpsters were filled with contaminated soil in preparation for transport to and disposal in an EPA-approved landfill for PCB-contaminated materials.

At the request of the Massachusetts Department of Environmental Protection (MassDEP), Axiom Partners, Inc. (AXIOM) performed sampling of the soil in these dumpsters in June 2016 to evaluate the material for asbestos content. For each dumpster, a sample was compiled from soil collected in five locations within the dumpster. Bulk samples were collected and immediately placed in labeled containers (e.g., Whirlpak™ sample bags) which were assigned a unique sample number and sealed for submission to the laboratory for analysis. The samples were hand-delivered to a Massachusetts-licensed asbestos bulk sample laboratory. Chain-of-custody documentation was used to ensure sample integrity. The laboratory analyzed the samples for asbestos content by the EPA Method 600/R-93/116. All composite samples of this soil were found to be negative for the presence of asbestos. Please refer to the attached analytical results Attachment 1.

At the request of MassDEP, AXIOM returned to the site in June of 2016 and performed sampling of stockpiled soil and remaining soil in the Courtyard for asbestos content. AXIOM delineated the stockpiled soil into three areas and the Courtyard into six areas for the purposes of sampling. Collection of composite samples in each of these areas was conducted as described above. The samples were hand-delivered to a Massachusetts-licensed asbestos bulk sample laboratory for analysis by EPA Method 600/R-93/116. All composite samples collected from these areas were found to contain asbestos. Please refer to the attached analytical results and site plan showing sampling locations Attachment 2 and Attachment 3.

Soils in the Courtyard have been fully covered with a layer of 6-mil polyethylene plastic sheeting at the request of MassDEP. Signage indicating asbestos contamination has been posted at the entry to the Courtyard and on the building at Lot 3A/3B.

Based on these circumstances and the location of the material, compliance with the following requirements in 310 CMR 7.00 is not feasible (at a minimum):

- 310 CMR 7.15 (7)(c), Specific Abatement Work Practice Standards

- 310 CMR 7.15 (7)(e), Work Area Ventilation Requirements

Upon receipt of MassDEP approval and the submittal of required regulatory notifications, the purpose of this Work Plan is to establish parameters in compliance with governing asbestos regulations for the safe onsite reuse of contaminated soil which may also contain asbestos fibers.

B. PROJECT PERSONNEL

As required by governing regulations, the Asbestos Contractor shall have one or more "Competent Persons" on site at all times during the safe onsite reuse of contaminated soil related activities to ensure compliance with this Work Plan. The Asbestos Contractor shall be required to be a Massachusetts-licensed Asbestos Contractor and all personnel working directly with asbestos-contaminated soils shall be Massachusetts-licensed Asbestos Workers/Supervisors or Supervisors with proper and current medical clearances, respirator fit test documentation and 40-hour HAZWOPER credentials.

The Competent Person must have attended a comprehensive training course for contractors and supervisors certified by the U.S. Environmental Protection Agency (EPA) or a state-approved training provider.

The Asbestos Contractor will identify each Competent Person qualified and authorized to ensure worker safety and health as required by 29 CFR 1926.20, Subpart C, *General Safety and Health Provisions for Construction*. The Competent Person will frequently inspect the job site, materials and equipment throughout the course of abatement and abatement-related activities.

The Competent Person will supervise:

1. The establishment of, and ensure the integrity of, regulated areas or enclosures by onsite inspection;

2. The establishment of procedures for controlling entry to and exit from the regulated work area(s);

3. All employee exposure monitoring, ensuring it is properly conducted;

4. The use of required protective clothing and equipment by employees working within the regulated work area(s);

5. The proper establishment, performance and removal of engineering controls, work practices and personal protective equipment through onsite inspections;

6. Employee use of hygiene facilities and required decontamination procedures; and

7. Notification requirements.

AXIOM will have a Massachusetts-licensed Asbestos Project Monitor (APM) onsite during remedial activities including soil excavation and or onsite relocation/reuse operations to observe and record progress and conduct air monitoring in accordance with Section E of this document.

The following information is for relevant project personnel involved in the daily execution of the Work Plan as well as monitoring/sampling duties:

Title	Name / Company	Phone Number
Construction Manager / Project Manager	Steve Draleau Dellbrook Construction, LLC	(508) 540-6226
Site Superintendent	Individual TBD Dellbrook Construction, LLC	TBD
License Site Professional	Brian T. Butler, LSP, PG Goldman Environmental Consultants, Inc.	(781) 356-9140
Environmental Scientist	Andrew Foley Goldman Environmental Consultants, Inc.	(808) 747-3616
MA Licensed Abatement Contractor	Infinity Abatement Services, Inc. AC000733	(978) 208-7256
MA Licensed Asbestos Supervisor	Mauricio Ferreira AS001078	(978) 208-7256
Asbestos Consultant	Sean P. Hurley, Principal Axiom Partners, Inc. AD061454	(617) 285-3441
MA Licensed Asbestos Project Monitor	Individual TBD Axiom Partners, Inc.	(781) 213-9198
Waste Transporter	Services Transport Group, Inc.	(877) 999-9559
Waste Landfill	Minerva Enterprise, Inc.	(330) 866-3435

C. RELATED CODES AND STANDARDS

The publications listed below typically determine the type and procedure for asbestos abatement activity and are referred to within the text of this document by designation only. The work practices identified herein have incorporated the substantive requirements of these codes and standards. The current edition of each reference has been utilized.

1. Environmental Protection Agency
   - 40 CFR Part 61, Subpart M *National Emission Standard for Asbestos*
   - EPA 560/5-85-024, *Guidance for Controlling Asbestos-Containing Materials in Buildings* (June 1985)
   - EPA 340/1-90-019, *Asbestos NESHAP Adequately Wet Guidance* (Dec. 1990)
   - EPA 340/1-90-019, *Asbestos NESHAP Regulated Asbestos Containing Materials Guidance* (Dec. 1990)

- EPA 340/1-92-013, *Demolition Practices Under the Asbestos NESHAP*

2. Occupational Safety and Health Administration
   - 29 CFR 1910.1001 (Subpart Z), *Asbestos (General Industry)*
   - 29 CFR 1926.1101 (Subpart Z), *Asbestos (Construction)*
   - 29 CFR 1910.134 (Subpart I), *Personal Protective Equipment (General Industry)*
   - 29 CFR 1910.141 (Subpart J), *General Environmental Controls (General Industry)*

3. Massachusetts Asbestos Regulations
   - 453 CMR 6.00, *The Removal, Containment or Encapsulation of Asbestos*
   - 310 CMR 7.00, *Air Pollution Control Regulations* and specifically 310 CMR 7.15, *Asbestos*
   - 310 CMR 19.061, *Solid Waste Management, Special Waste*
   - 310 CMR 40.0000, *Massachusetts Contingency Plan*, regarding waste site clean-up requirements
   - 310 CMR 4.00, *Timely Action Schedule and Fee Provisions*
   - 310 CMR 5.00, *Administrative Penalty*

D. SITE SPECIFIC ABATEMENT WORK PRACTICES

The following site-specific work practices and engineering controls will be employed for the remediation (excavation and/or onsite reuse) of contaminated soil which may also contain asbestos fibers.

1. The MassDEP will be notified prior to the beginning of remediation and abatement activities and in the event of any changes to site conditions or anticipated work activities. Once the area has been set up, but prior to abatement, MassDEP may conduct a pre-abatement visual inspection of the site. The abatement contractor shall provide a minimum of 24 hours' notice for scheduling of this inspection.

2. The soil stockpile and the soil in the Courtyard are within a secure construction site. Asbestos warning tape and signs will be used to demarcate the area where asbestos-related work activities will be performed (the regulated work area).

3. The Power House (old boiler room) interior windows facing the Courtyard will be sealed with wood barriers which will remain in place. The outer window frames will be sealed with polyurethane barriers that will remain until the completion of the remediation project, removed and decontaminated and disposed of as waste. The Picker building windows are newly installed and will be sealed with polyurethane barriers that will remain until the completion of the remediation project, removed and decontaminated and disposed of as waste.

4. A remote worker decontamination facility (DF) will be established at the site immediately adjacent to the regulated work area. All workers including heavy equipment operators will enter and exit the regulated work area through the DF.

5. Asbestos Workers and Supervisors who are directly involved with asbestos-contaminated soils in the Courtyard shall be Massachusetts-licensed Asbestos Workers or Supervisors with proper and current medical clearances, respirator fit test documentation and 40-hour HAZWOPER credentials.

6. All other personnel entering the regulated area during remediation activities (e.g., licensed site professionals, environmental scientists) or touching the contaminated soils (e.g., supplemental soil sampling) shall have proper and current medical clearances, respirator fit test documentation and 40-hour HAZWOPER credentials.

7. Open top dumpsters will be positioned immediately adjacent to the Courtyard and lined with two form-fitted 10-mil premanufactured bladder bags.

8. After work area preparation has been completed and approved by Picker or their representative (e.g., (GOLDMAN or AXIOM), soils to be disposed offsite will be pre-wetted and heavy equipment (e.g., excavators, front end loaders) will bulk load soil directly into the lined disposal containers. There shall be no visible emissions and no water run-off at any time during this process.

9. A Massachusetts-licensed APM will be on site to work with the remediation contractor to ensure that the onsite reuse of the soils is conducted in accordance with federal and state regulations, this Work Plan and the IRA Plan Modification.

10. Prior to and continuously during the work, the soil shall be thoroughly wetted using water in sufficient pressure and quantity to reduce the generation of airborne dust and prevent visible emissions. The soil shall be kept wet while collected for disposal or relocation onsite.

11. Upon project completion, all tools and associated heavy equipment shall also utilize the decontamination facility prior to exiting the regulated area.

12. Transportation vehicles will be properly placarded with Department of Transportation (DOT) approved 2212 placard labels identifying contaminated soils/waste.

13. Perimeter air monitoring will be conducted and will be performed by an APM during alternative work practice and remedial activities. Section E of this Work Plan details the perimeter air monitoring.

14. MassDEP may conduct a post-abatement visual inspection. The abatement contractor shall provide a minimum of 24 hours' notice for scheduling of this inspection. An APM will conduct a final visual inspection of the remediation area.

E. NON-ABATEMENT AND NON-REMEDIATION RELATED SITE ACTIVITIES

1. General construction and demolition personnel will require access to the Courtyard to perform limited demolition of building components prior to the completion of soil remediation activities.

2. A travel way has been created approximately 10 feet wide and approximately 140 feet long running along the Picker Building (east to west) on the north side from the Arcade (east side along the Concord River) to an existing masonry shaft. The travel way is constructed of a base layer of 6-mil clear polyethylene plastic sheeting (poly) covered by a 20-mil layer of black poly. A layer of 3/4-inch plywood was placed on the poly to protect it from tears and punctures and then covered with a second layer of 20-mil black poly. At the direction of MassDEP, the soils in the Courtyard are completely covered with one layer of 6-mil poly.

3. In order to continue with the building demolition work behind the Picker Building it is necessary to lay down a gravel road to eliminate disturbance to the surficial soils and worker exposure to contamination including asbestos fibers, elevated concentrations of metals and PCBs in soil. Currently the Courtyard behind the building is covered with polyethylene sheets and some plywood. Dellbrook will place clean processed gravel beginning at the entrance to the Courtyard moving northwesterly along the back of the Picker Building to the portion of the building to be razed. The gravel will be placed directly on the poly and will be approximately 3 to 6 inches thick. The road will run about 100 feet and surround the portion of the building being demolished. It will be approximately 8 to 10 feet in width, wide enough to accommodate personnel and heavy equipment.

4. Heavy equipment will not be place on or driven directly over the poly. The road and poly throughout the Courtyard will be maintained as long as the work is being conducted. Once the demolition work is complete and all equipment and materials have left the site, the gravel road will be managed in accordance with the ongoing response actions. The road will be used to backfill and regrade the Courtyard. Ultimately this material will be covered with a geotextile marker layer followed by three feet of clean material.

5. The existing masonry shaft will be demolished to its foundation. This will be performed by a mini-excavator, which will knock the brick chase down into itself and then use its bucket to load either a skid steer bucket or a mini front-end loader. The skid steer or loader will use the plywood travel way as a road to haul the removed brick from the rear of the building to the front, through the Arcade on the east side, where the brick will be placed in dumpsters staged for removal and disposal.

6. The Contractor and Subcontractor shall perform regular inspections to insure the poly and plywood layers remain intact and in good condition. The project's licensed site professional (LSP) will also conduct periodic inspections of the poly and plywood protective barrier. In the event that the poly and/or plywood become damaged, the Contractor, Subcontractor, LSP and/or the Competent Person shall have the right and responsibility to stop work until the damage has been repaired or new poly and/or plywood have been installed.

7. Upon completion of demolition of the masonry shaft, the two 20-mil layers of poly and single layer of plywood will be removed. The bottom layer of 6-mil poly shall remain in place throughout the Courtyard until soil remediation activities are completed.

F. PROJECT MONITORING

1. AXIOM will have a Massachusetts-licensed APM onsite during remediation related activities to observe the work for regulatory compliance with federal and state regulations and this

Work Plan, to document the work and to perform ambient air monitoring. Compliance with the overall IRA Plan Modification will be determined by others.

2. **Ambient Air Monitoring:** AXIOM's APM will conduct continuous exterior perimeter "fence-line" air monitoring during remediation and asbestos abatement, live load-out procedures and asbestos-related activities using high-volume electric pumps. Whenever practicable, a minimum of four air monitoring stations shall be established around the perimeter of the regulated work area to the north, south, east and west of abatement activities. The APM shall consider wind direction with respect to adjacent buildings and walkways to ensure that circumferential monitoring points coincide with downwind and other sensitive receptors.

   Please refer to Attachment 4 for the locations of the proposed air monitoring stations. These locations are approximate and may be adjusted depending upon the work being performed each shift. Location adjustments will be for the purpose of protecting sampling equipment and cassettes from damage due to the movements of equipment and personnel, but will remain in the same general locations to the extent feasible.

   Perimeter air samples shall be collected at a minimum of 54 inches and a maximum of 72 inches above ground level. Each air filter cassette shall have the start and stop time and associated start and stop flow rates recorded in the APM's site log. At the request of MassDEP, two sets of air samples shall be collected per 8-hour shift (i.e., one set of samples every four hours).

   All air monitoring shall be performed by consultants who are properly trained and licensed in the Commonwealth of Massachusetts (Commonwealth) as Asbestos Project Monitors. All sample analysis shall be performed by consultants who are properly trained, are successful participants in the American Industrial Hygiene Association's Asbestos Analytical Registry (AIHA's AAR), or alternatively, who work for a laboratory, which is licensed by the Commonwealth to perform such analysis and is accredited with either the AIHA or National Voluntary Laboratory Accreditation Program (NVLAP). Air samples will be analyzed daily and results reported to the Asbestos Contractor and the General Contractor.

   The collection and analysis of phase contrast microscopy (PCM) air samples shall be in accordance with the NIOSH 7400 Method. PCM analysis will be performed on site by a Massachusetts-licensed APM to facilitate immediate corrections in the Asbestos Contractor's work practices as necessary. Air sample results shall be e-mailed to MassDEP on the day they are collected.

   If air sample results reach or exceed the Massachusetts Department of Labor Standards (MA DLS) clean air criteria of 0.010 fibers per cubic centimeter (f/cc) of air, then all work shall stop. The work methods shall be evaluated prior to continuing any further work and MassDEP shall be notified by telephone within two hours. If the airborne fiber concentrations reach or exceed the OSHA Permissible Exposure Limit (PEL) of 0.1 f/cc of air, then work shall stop, MassDEP shall be notified by telephone immediately and the requirements for elevated airborne fiber levels in Item 4 of this section will be followed.

3. **Personal Exposure Monitoring:** The Asbestos Contractor shall have their Competent Person oversee exposure monitoring to accurately determine the airborne concentrations of asbestos to which employees may be exposed. This monitoring shall be conducted in

accordance with OSHA 29 CFR 1926.1101, *Asbestos in Construction*. A sufficient number of workers performing remediation and asbestos abatement activities will be monitored initially and on a daily basis to effectively evaluate worker exposure for specific work activities. At least ten percent (10%) of each employer's work force shall be monitored on a daily basis.

Sampled workers will be outfitted with low-flow personal air pumps to collect air samples within the workers' breathing zone (within 6 to 9 inches of the nose and mouth). The Asbestos Contractor will log the start/stop times and associated start/stop flow rates on an appropriate chain-of-custody air sampling form. Pumps will be calibrated prior to use in accordance with manufacturer's instructions and checked daily with calibrated rotameters. Samples will be analyzed by properly qualified and licensed personnel.

Air monitoring samples which are overloaded with particulate and cannot be analyzed shall be considered to be out of compliance with this Work Plan.

The Asbestos Contractor will ensure that no employee is exposed to airborne asbestos concentrations exceeding 0.1 f/cc during an 8-hour time-weighted average (TWA). If the airborne fiber concentrations reach or exceed the OSHA PEL of 0.1 f/cc, all work will stop immediately, MassDEP will be notified, and the requirements for elevated airborne fiber levels in Item 4 of this section will be followed.

Although half-face air-purifying respirators are specified as the minimum respiratory protection required for this project, the Asbestos Contractor shall determine actual respirators necessary for the project based on one or more exposure assessments performed by properly qualified individuals. Prior to obtaining exposure assessment results, the Asbestos Contractor shall require all Asbestos Workers and Supervisors to wear half-face air-purifying respirators within the regulated work area.

4. **Elevated Airborne Fiber Levels:** The following procedures shall be employed by the APM in the event that airborne fiber levels greater than 0.010 f/cc are measured outside the regulated work area(s):

   a. Stop all work immediately and notify MassDEP;
   b. Restrict access to critical personnel;
   c. Instruct the Asbestos Contractor to perform additional wetting and air misting procedures to reduce airborne fiber levels;
   d. With MassDEP (as appropriate), General Contractor and Asbestos Contractor, evaluate effectiveness of existing work practices and engineering controls, and implement additional controls as necessary; and
   e. Conduct additional air monitoring until airborne asbestos fiber levels are within acceptable levels.

G. PERSONAL PROTECTIVE EQUIPMENT (PPE)

1. Respiratory Protection

   Respirators will be used during the following activities:

a. All work performed within a regulated area where respirators are required; and
b. All work where employees are or may be exposed to airborne asbestos fiber concentrations at or above the OSHA PEL.

The Asbestos Contractor will provide respirators to their respective employees, selecting the appropriate type from among those approved by the National Institute of Occupational Safety and Health (NIOSH). The Asbestos Contractor will be required to have a written respiratory protection program that will be in full force for the duration of this project. The respiratory protection program shall comply with governing regulations and will include respirator selection and use, medical clearance for respirator use and medical surveillance for asbestos exposure (reference 29 CFR 1910.134).

The Asbestos Contractor will provide, at a minimum, half-face air purifying respirators equipped with P-100 high-efficiency particulate air (HEPA) filters because most of the remediation and/or abatement work will involve directly impacting presumed asbestos-containing materials (pipe insulation) or contaminated soil containing asbestos fibers. A negative exposure assessment (NEA) may be performed by qualified individuals and reviewed by a Certified Industrial Hygienist (CIH) for activities that are not expected to result in worker exposures at or above the OSHA PEL.

If a particular task is not addressed herein and worker exposure is at or above the PEL, the OSHA asbestos standard, 29 CFR 1926.1101 specifies additional respiratory protection requirements.

2. Protective Clothing

The Asbestos Contractor will require workers to wear protective clothing consisting of, at a minimum, disposable Tyvek or equivalent suits, nitrile gloves, rubber boots and safety glasses, as well as any other personal protective equipment required for compliance with the IRA Modification Plan. The protective clothing will be required for the following tasks:

a. Activities when an employee may be exposed to airborne asbestos concentrations at or above the PEL;
b. Activities without a NEA reviewed by the CIH; and/or
c. Activities in which an employee may perform work involving the removal, packaging or disposal of ACM's.
d. The Asbestos Contractor will package, transport and dispose of contaminated clothing in sealed, impermeable bags or other approved containers bearing appropriate asbestos warning labels. The Competent Person will periodically examine employee protective clothing to ensure compliance with this Work Plan. Rips or tears in protective clothing must be mended or the clothing must be replaced immediately.

H. REGULATED WORK AREAS

Only properly trained personnel with appropriate, applicable Massachusetts asbestos licensing, appropriate asbestos training, appropriate HAZWOPER training and proper personal protective equipment/clothing may enter a regulated area. Visitors to the work site will be briefed on the nature of the work and the regulated area requirements. Only visitors with appropriate, applicable licenses, appropriate asbestos training and proper personal protective equipment/clothing will be

allowed inside a regulated area. Please refer to Attachment 4 for the extent of the regulated work area.

All affected areas of the site shall be contained within a regulated work area. This includes any adjoining area(s) where debris and asbestos waste accumulates or where airborne concentrations of asbestos exceed or may exceed the PEL.

All asbestos abatement work or any other operations where airborne asbestos can potentially exceed the PEL will only be performed within regulated area(s). The designated Competent Person will supervise all asbestos work performed in the regulated area(s).

The Asbestos Contractor will demarcate the regulated area(s) in any manner that minimizes the number of persons within the area, prevents access by unauthorized personnel and protects persons outside the area from exposure to airborne asbestos. Red asbestos demarcation tape (asbestos warning barrier tape) will be used to define the regulated work area. Additionally, proper asbestos warning signs will be prominently displayed at all points of access to the regulated area(s). The signs will bear the following information:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORY AND PROTECTIVE CLOTHING ARE
REQUIRED IN THIS AREA

The Asbestos Contractor will provide all employees with appropriate respirators. Employees will not eat, drink, smoke, chew tobacco or gum or apply cosmetics in regulated area(s). The Asbestos Contractor will work in advance of all other construction personnel. The Asbestos Contractor will inform other building/site occupants (construction personnel) of the following:

1. Nature of the work;
2. Regulated work area requirements; and
3. Measures taken to protect employees.

I. HYGIENE FACILITIES

The Asbestos Contractor will establish a remote, three-chamber decontamination facility (DF) immediately adjacent to the regulated work area(s) for the decontamination of employees and their equipment. All equipment and the surfaces of containers filled with asbestos-contaminated soils will be cleaned prior to removal. The Asbestos Contractor will ensure employees enter and exit the regulated work area through the DF. Please refer to Attachment 4 for the location of the decontamination facility.

The DF will be equipped with tepid water, soap, disposable towels and other items necessary for the proper containment and control of asbestos.

J. DECONTAMINATION OF EQUIPMENT

Decontamination of equipment will be conducted by first performing HEPA vacuuming followed by power washing parts of the equipment that have come in contact with asbestos-contaminated soil. Power washing will occur in a decontamination area. The decontamination area is constructed with vertical edges that are designed to contain all liquids. All waste water from decontamination procedures shall be filtered via two 5-micron filters and stored on-site for metered disposal. All water filters shall be disposed of as ACM/PACM waste. This waste may also contain other OHM. Please refer to Attachment 4 for the location of the equipment washing station. Please refer to Attachment 5 for details regarding the construction of the equipment washing station.

K. ACCESS AND NOTIFICATION OF OTHER WORKERS AT MULTI-EMPLOYER WORKSITE

All personnel entering the job site will be required to read the Work Plan before they are permitted to enter any regulated work area at the site. Access to the area(s) to be remediated or abated will be limited to personnel with proper training only.

No other trades will be permitted into the regulated work area without proper asbestos awareness training in accordance with federal, state and local regulations.

L. WASTE PACKAGING, STORAGE AND DISPOSAL

1. Debris shall be promptly containerized into one or more of the following:
   - Gaylord boxes having two (2) internal layers of form-fitting, 6-mil polyethylene liners;
   - Double-layered 6-mil asbestos waste bags; and/or
   - Open top dumpsters lined with two form-fitting 10-mil premanufactured bladder bags.

2. All waste bags and boxes shall be cleaned and sealed inside the DF. Waste bags and boxes shall then be transported from the DF to a storage container using heavy equipment as necessary.

3. All heavy equipment is to remain in the respective specific designated work area(s). No heavy equipment will be permitted to migrate in or out of regulated work area(s) without passing through the DF. Decontamination facility doors shall be equipped with polyethylene sheeting with over-lapping flaps to minimize fiber migration from the DF into unregulated space.

4. Prior to transportation of any ACM waste, waste haulers will individually seal each form-fitting bladder bag and clearly label all containers/trucks with the appropriate generator labels and DOT placards bearing the numbers 2212, as well as any additional appropriate asbestos warning labels.

5. Asbestos waste shall be transported to a landfill approved to accept asbestos- and, if necessary, PCB-contaminated materials and other OHM, as appropriate. Transportation of asbestos waste shall be in conformance with the DOT regulations 49 CFR Parts 172 and 173. Waste generated at the site may be transported to Minerva Enterprises, LLC (Minerva) located at 9000 Minerva Road, Waynesburg, Ohio.

6. Disposal of asbestos waste shall be in conformance with EPA NESHAPS regulations 40 CFR Part 61 and MassDEP regulations 310 CMR 7.00, 18.00 and 19.00.

7. An asbestos waste shipment record (AWSR) is required whenever asbestos-containing waste material is shipped. A copy of this AWSR shall be e-mailed to MassDEP on the day the material leaves the site.

M. QUALITY CONTROL

Remediation, abatement and related operations will be monitored by a minimum of one fully trained, experienced and competent Asbestos Supervisor who will work in conjunction with the Asbestos Consultant/Industrial Hygiene firm (AXIOM) and LSP firm (GOLDMAN) to comply with applicable federal, state and local regulations. This individual will ensure that safe work practices in the workplace are implemented including, but not limited to:

- Exclusion of eating, drinking or smoking; and
- Use of procedures or equipment that may reduce the effectiveness of respiratory protection or other engineering controls.

In addition, the Asbestos Supervisor will ensure that OSHA-required personal monitoring is conducted in accordance with all applicable Federal, State and local regulations. Results will be routinely posted at a designated onsite location. The Asbestos Supervisor shall have the authority to stop work and modify work practices and/or engineering controls to ensure regulatory compliance.

N. EMERGENCY RESPONSE PROCEDURES

The Contractor will post the name and address of the closest hospital with a route map illustrating the route from the work site to the hospital in a conspicuous location at the site.

A daily sign-in log will be utilized to account for all personnel and visitors entering the regulated work area. The log will be administered by the Competent Person or Site Superintendent and will be used to account for all personnel in the event of an emergency evacuation.

All personnel not involved in an emergency will proceed to the General Contractor's field office unless otherwise directed.

An assessment of the problem will be made and appropriate actions implemented. Other personnel in the work area will be evacuated to a safe distance until the Site Superintendent and/or Competent Person determine that it is safe for work to resume.

Work will not commence until all emergency response activities are completed and hazard control issues are resolved. In the event of an emergency during asbestos abatement activities, field personnel will dial 911 to access off-site emergency response personnel and equipment. In the event of a release to the environment, the MassDEP will be notified in addition to the aforementioned as applicable.

Emergency Contact Information

Agency	Telephone
Project Emergency	911
Lowell Police Department	911 (978) 937-3200 (non-emergency)
Lowell Fire Department	911 (978) 459-5553 (non-emergency)
Lowell General Hospital 1 Hospital Drive, Lowell MA	(978) 458-1411

Appendix F-2

AXIOM'S DECONTAMINATION PROCEDURES

Decontamination of field equipment is necessary to minimize the potential for the release of contamination beyond the exclusion zone of the site, reducing health hazards associated with the spread of contaminants; and to ensure the quality of samples by preventing cross-contamination. The following decontamination procedures are based on EPA regulations 40 CFR § 761.360, Subpart S.

Required Supplies

Large Equipment Decontamination: drill rig, excavator, backhoe/loader, etc.

- Decontamination pad with a foot-print larger that the equipment to be de-contaminated and capable of retaining all removed contaminated material and wash water.
- Simple Green All Purpose Cleaner/Degreaser
- An approved PODF as listed in § 761.79 (c)(3)(iv) -i.e. (A) Kerosene.(B) Diesel fuel.(C) Terpene hydrocarbons. (D) Mixtures of terpene hydrocarbons and terpene alcohols.
- 2- to 5- gal manual-pump sprayer (pump sprayer material must be compatible with the solution used).
- Absorbent pads and stiff-bristle brushes that are not dissolved by the solvents/cleaners used, and that do not shred, crumble, or leave visible fragments on the surface.
- Gloves, goggles, boots, and other protective clothing that are resistant to the solvents/cleaners used.

Small Equipment Decontamination: split spoon soil sampler, bowls, dredges, saws etc.

- 5-gal plastic buckets and/or troughs big enough to fully contain the sampling equipment.
- Simple Green All Purpose Cleaner/Degreaser
- An approved PODF as listed in § 761.79 (c)(3)(iv)
- 2- to 5- gal manual-pump sprayer (pump sprayer material must be compatible with the solution used.
- Absorbent pads and stiff-bristle brushes that are not dissolved by the solvents/cleaners used, and that do not shred, crumble, or leave visible fragments on the surface.
- Gloves, goggles, and other protective clothing that are resistant to the solvents/cleaners used.

Procedures

The same Procedures Apply to Both Heavy Equipment Decontamination and Small Equipment Decontamination

1. Set up a decontamination pad that is large enough to fully contain the equipment to be cleaned and that will contain all wash and rinse water used.

1a. Setup a mister such that the entire piece of machinery is being misted with clean water during the entire decontamination process.

2. First Wash:

a. Cover the entire surface of equipment to be decontaminated with Simple Green All Purpose Cleaner/Degreaser. Contain and collect all cleaning solutions for proper disposal.

b. Scrub rough surfaces with a stiff-bristle brush, adding cleaning solution such that the surface is always ***very wet***.

c. Wipe smooth surfaces with a cleaning solution soaked disposable absorbent pad

d. Mop up or absorb the residual cleaner solution and suds from all surfaces with clean disposable, absorbent pads until the surface appears dry. Note: This cleaning should remove any residual dirt, dust, grime, or other absorbent materials left on the surface during the first wash.

3. First Rinse:

a. Rinse off the wash solution with clean water and capture the rinse water.

b. Mop up the wet surface with clean, disposable, absorbent pad until the surface appears dry.

4. Second Wash:

a. Cover the entire surface with an approved PODF – contain and collect any runoff solvent for disposal.

b. Scrub rough surfaces with a stiff-bristle brush, adding an approved PODF such that the surface is always very wet.

c. Wipe smooth surfaces with an approved PODF soaked disposable absorbent pad.

d. Mop up or absorb the residual approved PODF from all surfaces with clean disposable, absorbent pads until the surface appears dry.

5. Second Rinse:

a. Wet the entire surface with clean approved PODF such that all surfaces are very wet and capture the rinse approved PODF.

b. Wipe off the residual approved PODF from the surfaces using a clean, disposable absorbent pad until no liquid is visible on the surface.

6. Documenting Decontamination:

a. Record equipment type, date, time in logbook and document decontamination with pictures.

7. Cleanup After Decontamination:

a. After decontamination activities are completed, collect all contaminated waters, used solvents, plastic sheeting, and disposable gloves, boots, and clothing. Place contaminated items in properly labeled drums for disposal. Liquids and solids must be drummed separately.

i. All wash water, rinse water, and decontamination solutions that have come in contact with contaminated equipment are to be handled, packaged, labeled, marked, stored, and disposed of as hazardous waste.

ii. All solids, (i.e., plastic sheeting, scrub brushes, absorbent pads, disposable gloves, boots and clothing that have come in contact with contaminated equipment are to be handled, packaged, labeled, marked, stored, and disposed of as hazardous waste.

7. Have 2 ambient air asbestos testing stations setup around the decontamination pad in order to survey if asbestos was present during the decontamination procedure. A total of 4 samples will need to be analyzed if the process takes a full work day (2 in AM, 2 in PM)

BARRIER TO ALLOW ACCESS TO THE COURTYARD FOR DEMOLITION PURPOSES

The following will be instituted prior to any demolition work proceeding in the courtyard:

1. A base layer of at least 20-mil poly sheeting will be placed on the surface of the courtyard or portion of the courtyard. (double layer of 12-mil is acceptable)
2. A center layer of plywood will be placed to ensure that the weight of the machinery does not rip through the base layer, as well as to protect the base layer from any falling debris during the demolition process.
3. Finally, a layer of 12-mil poly will be placed on top of the ply wood and base layer to ensure the integrity can be maintained. If any rips, tears, punctures occur in this layer, work will be stopped until the rip, tear, or puncture is repaired.

EQUIPMENT WASHING STATION

An equipment washing station will be constructed at the perimeter of the exclusion area out of impermeable material sufficient to prevent run-off and to allow the collection of water. The location will be directly in front of the access tunnel inside the courtyard. When excavators and other equipment are used in the exclusion area, they will remain in the exclusion area and will exit only after decontamination at the equipment washing station.

The equipment washing station will be approximately 12’ x 25’ to cover a small sized front end loader, and bermed to contain wash water. The equipment washing station will be lined with two layers of poly and filled with stone. The station will be sloped to a corner to accumulate wash water. Water will be filtered (5-micron filtration) and used to mist the impact area. AT completion of the work, gravel and polyethylene sheeting, Rinse water and other materials will be disposed of as TSCA PCB waste containing Asbestos at ENPRO Services of Vermont (EVI).

DUST MONITORING PROCEDURES
(March 24, 2016)

Dust monitoring is necessary to minimize the potential for exposure to contamination within and beyond the exclusion zone of the site, reducing health hazards, and to prevent fugitive migration of contamination.

GENERAL STANDARD OPERATING PROCEDURS

Notify Interested Parties and Plan for Emergencies

- Communicate the goals, type, and length of projects and specific behavior rules to the affected groups (onsite workers and residence).
- Have an emergency contact list (hospitals, police, etc.).
- Prevent unauthorized persons from entering the site.

Take General Protective Measures

- Ensure workers are properly trained.
- Choose the method that minimizes the amount of dust generated.
- Choose methods that protect workers, building users, passersby, and the surroundings of the remediation project.
- Use proper containers to hold excavated material.
- Use gloves and skin protection.
- Use eye goggles during windy conditions.
- Do not smoke, drink, or eat in the work area.
- Wash hands prior to breaks.

Exterior Areas

- Mark off the work areas to keep non-workers away.
- Cover any plants with heavy plastic sheeting.
- Close windows and doors near the work area.
- Cover the excavate material prior to off-site disposal.

Leave the Work Area Clean

- Put trash and debris in heavy-duty plastic bags.
- Ensure tools, equipment, and workers, are free of dust and debris before leaving the work area.
- Remind workers (non-HAZWOPER trained) to stay out of the work area.
- When the job is complete:
  Remove any plastic sheeting carefully, mist with water, fold dirty side in, tape shut, and dispose of it.

Check the work area for dust. If any dust or debris is present, then wet the area to reduce the potential for dust from being picked up by the wind.

SITE SPECIFIC PROCEDURES

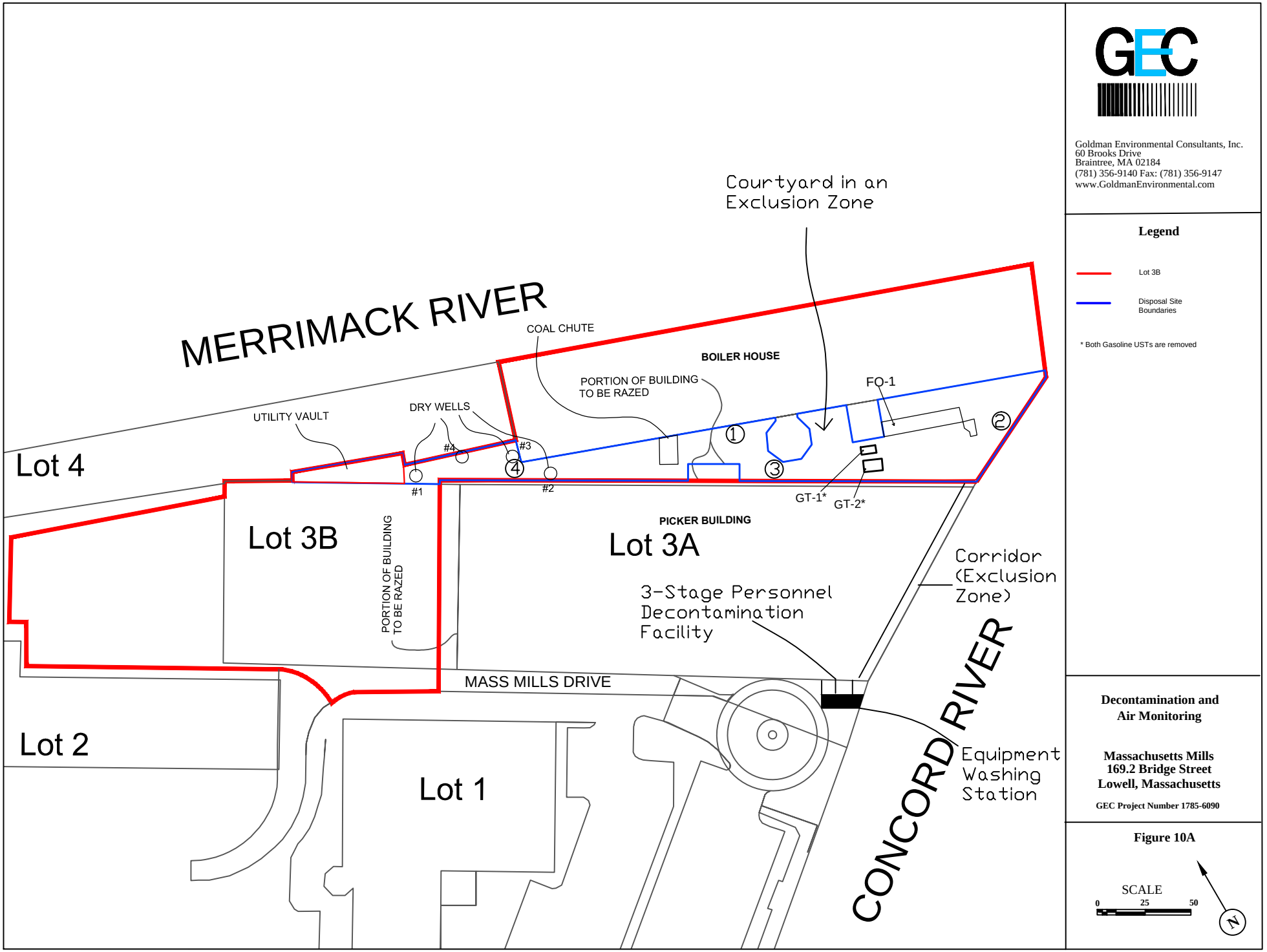
Same Procedures Apply to Soil Excavation, Loading, and Backfill

1. Once the soils are removed and the soils are exposed, lightly spray the surface with water to prevent dust generation. Continue to monitor the soil moisture and apply water to the excavation area and the excavate material as needed, and if the soils are dry during windy conditions.
2. If site conditions become windy, and excessive dust generation is likely, stop work and apply water to the area, including any stockpiled or loaded soil in trucks.
3. During overnight work stoppage, cover the excavation and excavate material with polyethylene sheets. Once a truck has been loaded for off-site transport of the material, cover the soil within the truck with a heavy tarp.
4. Once the excavation work has been completed, shovel, sweep or wash residual soil/dust on the pavement into the excavation.
5. Dust suppression and control shall be maintained in the excavation areas, and off-site haul roads by keeping surfaces wet and clean to prevent wind-blown dust and road mud and debris from occurring during excavation. The nearest access road and access gate area shall be kept clean during excavation activities. If necessary use street sweepers and wet by sprinkling the road surfaces with a tank, gauges, pressure pump and nozzle spray bar. Water shall be dispersed through the nozzle under a minimum pressure of 20 pounds per square inch pressure gauge. Water shall be free from oil, acid and alkali or vegetative matter and shall not be salt or brackish.
6. Air monitoring shall be provided continuously during excavation activities for PM-10 in real time data. Air monitoring shall be coordinated by GEC. Two weather proof Dust Trak II Aerosol Monitors (Model 8530) will be used to collect real-time data and placed on site down gradient of the established prevailing wind direction prior to initiating excavation activities. The monitoring data will be collected using a data logger for submittal to EPA and daily fugitive dust levels will be assessed to determine the effectiveness of the dust suppression measures and necessary additional mitigation measures. The PM-10 dust monitors will be set with an alarm in case of dust exceedances. Two PM-10 Dust Action Levels are established, one for soil excavations within the PCB hot spots and one for soil excavations outside the PCB hot spots as indicated below. The dust monitor will have the alarm set at or below the appropriate PM10 Dust Action Level.

PM-10 Dust Action Level for PCB Hot Spots: 180 micrograms per cubic meter ($\mu g/m^3$)

PM-10 Dust Action Level for Outside PCB Hot Spots: 300 $\mu g/m^3$

7. If significant airborne dust is identified, all construction activities shall be temporarily stopped until additional dust suppression (water) is applied to any open excavations or stockpiled material and PM-10 dust levels are below applicable PM-10 Dust Action Level.
8. Organic compounds shall also be monitored during excavation activities using handheld photoionization detectors (PID). Levels of total organic vapors (TOV) readings will be recorded during excavation. Little to no volatile contamination has been detected at the Site and elevated TOV readings are unlikely.



Goldman Environmental Consultants, Inc.
60 Brooks Drive
Braintree, MA 02184
(781) 356-9140 Fax: (781) 356-9147
www.GoldmanEnvironmental.com

Legend

Lot 3B

Disposal Site Boundaries

* Both Gasoline USTs are removed

Decontamination and Air Monitoring

Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

GEC Project Number 1785-6090

Figure 10A

NON-TRADITIONAL ASBESTOS ABATEMENT WORK PLAN FOR THE REMEDIATION OF CONTAMINATED SOILS

MASSACHUSETTS MILLS III COURTYARD
150 MASS MILLS DRIVE
LOWELL, MASSACHUSETTS

PREPARED FOR:

MM Picker LLC
179 Boylston Street
Jamaica Plain, Massachusetts 02130

PREPARED BY:

Axiom Partners, Inc.
One Pleasure Island Road, Suite 2C
Wakefield, Massachusetts 01880

October 4, 2016

REVISION 3

Job Number 01136.283

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Attachment 1 – Dumpster Soil Bulk Sample Results for Asbestos Content
Attachment 2 – Stockpile and Courtyard Soil Bulk Sample Results for Asbestos Content
Attachment 3 – Stockpile and Courtyard Soil Bulk Sample Locations
Attachment 4 – Work Area Site Plan
Attachment 5 – Equipment Washing Station

ABATEMENT PLAN CERTIFICATION

This report has been prepared for the exclusive use of the Client, MM Picker, LLC (Picker). Photocopying of this document by parties other than those designated by the Client, or use of this document for purposes other than it is intended, is prohibited.

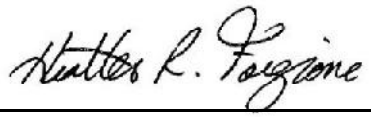
Respectfully submitted on this 28th of July 2016.

Respectfully resubmitted on this 1st of September 2016.

Respectfully resubmitted on this 18th of September 2016.

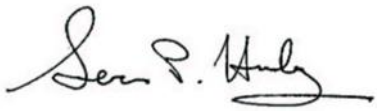
Respectfully resubmitted on this 4th of October 2016.

Reviewed by:



Heather R. Forgione
Project Manager

Prepared by:



Sean P. Hurley
Principal

Reviewed by:

Authorized Personnel
MM Picker, LLC

A. INTRODUCTION/BACKGROUND

This Non-Traditional Work Plan (Work Plan) has been prepared, in part, to be an attachment to a formal Immediate Response Action (IRA) Plan Modification for 169.2 Bridge Street, Lowell, Massachusetts. The original IRA Plan was prepared to address the discovery of a petroleum release and RTN 3-33101. It has been updated to address PCBs, metals and pesticides in the soil and RTN 3-33474. It is modified here to address the discovery of asbestos fibers in soil that require onsite reuse. No confirmatory sampling for asbestos will be conducted. The original IRA Plan and the IRA Plan Modification has details on what soils are being removed from the site for disposal and which soils will remain onsite.

A portion of the former Mass Mills complex (Lot 3A/3B) in Lowell, Massachusetts, is currently under extensive renovation. The Picker Building (Lot 3A) has been gutted and efforts are underway to convert the space into residential housing.

Soil in the courtyard on Lot 3B (the "Courtyard") was determined to contain PCBs above 50 ppm, and this material was stockpiled at the northwestern end of the Courtyard and covered with polyethylene plastic sheeting. Lined dumpsters were filled with contaminated soil in preparation for transport to and disposal in an EPA-approved landfill for PCB-contaminated materials.

At the request of the Massachusetts Department of Environmental Protection (MassDEP), Axiom Partners, Inc. (AXIOM) performed sampling of the soil in these dumpsters in June 2016 to evaluate the material for asbestos content. For each dumpster, a sample was compiled from soil collected in five locations within the dumpster. Bulk samples were collected and immediately placed in labeled containers (e.g., Whirlpak™ sample bags) which were assigned a unique sample number and sealed for submission to the laboratory for analysis. The samples were hand-delivered to a Massachusetts-licensed asbestos bulk sample laboratory. Chain-of-custody documentation was used to ensure sample integrity. The laboratory analyzed the samples for asbestos content by the EPA Method 600/R-93/116. All composite samples of this soil were found to be negative for the presence of asbestos. Please refer to the attached analytical results Attachment 1.

At the request of MassDEP, AXIOM returned to the site in June of 2016 and performed sampling of stockpiled soil and remaining soil in the Courtyard for asbestos content. AXIOM delineated the stockpiled soil into three areas and the Courtyard into six areas for the purposes of sampling. Collection of composite samples in each of these areas was conducted as described above. The samples were hand-delivered to a Massachusetts-licensed asbestos bulk sample laboratory for analysis by EPA Method 600/R-93/116. All composite samples collected from these areas were found to contain asbestos. Please refer to the attached analytical results and site plan showing sampling locations Attachment 2 and Attachment 3.

Soils in the Courtyard have been fully covered with a layer of 6-mil polyethylene plastic sheeting at the request of MassDEP. Signage indicating asbestos contamination has been posted at the entry to the Courtyard and on the building at Lot 3A/3B.

Based on these circumstances and the location of the material, compliance with the following requirements in 310 CMR 7.00 is not feasible (at a minimum):

- 310 CMR 7.15 (7)(c), Specific Abatement Work Practice Standards

- 310 CMR 7.15 (7)(e), Work Area Ventilation Requirements

Upon receipt of MassDEP approval and the submittal of required regulatory notifications, the purpose of this Work Plan is to establish parameters in compliance with governing asbestos regulations for the safe onsite reuse of contaminated soil which may also contain asbestos fibers.

B. PROJECT PERSONNEL

As required by governing regulations, the Asbestos Contractor shall have one or more "Competent Persons" on site at all times during the safe onsite reuse of contaminated soil related activities to ensure compliance with this Work Plan. The Asbestos Contractor shall be required to be a Massachusetts-licensed Asbestos Contractor and all personnel working directly with asbestos-contaminated soils shall be Massachusetts-licensed Asbestos Workers/Supervisors or Supervisors with proper and current medical clearances, respirator fit test documentation and 40-hour HAZWOPER credentials.

The Competent Person must have attended a comprehensive training course for contractors and supervisors certified by the U.S. Environmental Protection Agency (EPA) or a state-approved training provider.

The Asbestos Contractor will identify each Competent Person qualified and authorized to ensure worker safety and health as required by 29 CFR 1926.20, Subpart C, *General Safety and Health Provisions for Construction*. The Competent Person will frequently inspect the job site, materials and equipment throughout the course of abatement and abatement-related activities.

The Competent Person will supervise:

1. The establishment of, and ensure the integrity of, regulated areas or enclosures by onsite inspection;

2. The establishment of procedures for controlling entry to and exit from the regulated work area(s);

3. All employee exposure monitoring, ensuring it is properly conducted;

4. The use of required protective clothing and equipment by employees working within the regulated work area(s);

5. The proper establishment, performance and removal of engineering controls, work practices and personal protective equipment through onsite inspections;

6. Employee use of hygiene facilities and required decontamination procedures; and

7. Notification requirements.

AXIOM will have a Massachusetts-licensed Asbestos Project Monitor (APM) onsite during remedial activities including soil excavation and or onsite relocation/reuse operations to observe and record progress and conduct air monitoring in accordance with Section E of this document.

The following information is for relevant project personnel involved in the daily execution of the Work Plan as well as monitoring/sampling duties:

Title	Name / Company	Phone Number
Construction Manager / Project Manager	Steve Draleau Dellbrook Construction, LLC	(508) 540-6226
Site Superintendent	Individual TBD Dellbrook Construction, LLC	TBD
License Site Professional	Brian T. Butler, LSP, PG Goldman Environmental Consultants, Inc.	(781) 356-9140
Environmental Scientist	Andrew Foley Goldman Environmental Consultants, Inc.	(808) 747-3616
MA Licensed Abatement Contractor	Infinity Abatement Services, Inc. AC000733	(978) 208-7256
MA Licensed Asbestos Supervisor	Mauricio Ferreira AS001078	(978) 208-7256
Asbestos Consultant	Sean P. Hurley, Principal Axiom Partners, Inc. AD061454	(617) 285-3441
MA Licensed Asbestos Project Monitor	Individual TBD Axiom Partners, Inc.	(781) 213-9198
Waste Transporter	Services Transport Group, Inc.	(877) 999-9559
Waste Landfill	Minerva Enterprise, Inc.	(330) 866-3435

C. RELATED CODES AND STANDARDS

The publications listed below typically determine the type and procedure for asbestos abatement activity and are referred to within the text of this document by designation only. The work practices identified herein have incorporated the substantive requirements of these codes and standards. The current edition of each reference has been utilized.

1. Environmental Protection Agency
   - 40 CFR Part 61, Subpart M *National Emission Standard for Asbestos*
   - EPA 560/5-85-024, *Guidance for Controlling Asbestos-Containing Materials in Buildings* (June 1985)
   - EPA 340/1-90-019, *Asbestos NESHAP Adequately Wet Guidance* (Dec. 1990)
   - EPA 340/1-90-019, *Asbestos NESHAP Regulated Asbestos Containing Materials Guidance* (Dec. 1990)

- EPA 340/1-92-013, *Demolition Practices Under the Asbestos NESHAP*

2. Occupational Safety and Health Administration
   - 29 CFR 1910.1001 (Subpart Z), *Asbestos (General Industry)*
   - 29 CFR 1926.1101 (Subpart Z), *Asbestos (Construction)*
   - 29 CFR 1910.134 (Subpart I), *Personal Protective Equipment (General Industry)*
   - 29 CFR 1910.141 (Subpart J), *General Environmental Controls (General Industry)*

3. Massachusetts Asbestos Regulations
   - 453 CMR 6.00, *The Removal, Containment or Encapsulation of Asbestos*
   - 310 CMR 7.00, *Air Pollution Control Regulations* and specifically 310 CMR 7.15, *Asbestos*
   - 310 CMR 19.061, *Solid Waste Management, Special Waste*
   - 310 CMR 40.0000, *Massachusetts Contingency Plan*, regarding waste site clean-up requirements
   - 310 CMR 4.00, *Timely Action Schedule and Fee Provisions*
   - 310 CMR 5.00, *Administrative Penalty*

D. SITE SPECIFIC ABATEMENT WORK PRACTICES

The following site-specific work practices and engineering controls will be employed for the remediation (excavation and/or onsite reuse) of contaminated soil which may also contain asbestos fibers.

1. The MassDEP will be notified prior to the beginning of remediation and abatement activities and in the event of any changes to site conditions or anticipated work activities. Once the area has been set up, but prior to abatement, MassDEP may conduct a pre-abatement visual inspection of the site. The abatement contractor shall provide a minimum of 24 hours' notice for scheduling of this inspection.

2. The soil stockpile and the soil in the Courtyard are within a secure construction site. Asbestos warning tape and signs will be used to demarcate the area where asbestos-related work activities will be performed (the regulated work area).

3. The Power House (old boiler room) interior windows facing the Courtyard will be sealed with wood barriers which will remain in place. The outer window frames will be sealed with polyurethane barriers that will remain until the completion of the remediation project, removed and decontaminated and disposed of as waste. The Picker building windows are newly installed and will be sealed with polyurethane barriers that will remain until the completion of the remediation project, removed and decontaminated and disposed of as waste.

4. A remote worker decontamination facility (DF) will be established at the site immediately adjacent to the regulated work area. All workers including heavy equipment operators will enter and exit the regulated work area through the DF.

5. Asbestos Workers and Supervisors who are directly involved with asbestos-contaminated soils in the Courtyard shall be Massachusetts-licensed Asbestos Workers or Supervisors with proper and current medical clearances, respirator fit test documentation and 40-hour HAZWOPER credentials.

6. All other personnel entering the regulated area during remediation activities (e.g., licensed site professionals, environmental scientists) or touching the contaminated soils (e.g., supplemental soil sampling) shall have proper and current medical clearances, respirator fit test documentation and 40-hour HAZWOPER credentials.

7. Open top dumpsters will be positioned immediately adjacent to the Courtyard and lined with two form-fitted 10-mil premanufactured bladder bags.

8. After work area preparation has been completed and approved by Picker or their representative (e.g., (GOLDMAN or AXIOM), soils to be disposed offsite will be pre-wetted and heavy equipment (e.g., excavators, front end loaders) will bulk load soil directly into the lined disposal containers. There shall be no visible emissions and no water run-off at any time during this process.

9. A Massachusetts-licensed APM will be on site to work with the remediation contractor to ensure that the onsite reuse of the soils is conducted in accordance with federal and state regulations, this Work Plan and the IRA Plan Modification.

10. Prior to and continuously during the work, the soil shall be thoroughly wetted using water in sufficient pressure and quantity to reduce the generation of airborne dust and prevent visible emissions. The soil shall be kept wet while collected for disposal or relocation onsite.

11. Upon project completion, all tools and associated heavy equipment shall also utilize the decontamination facility prior to exiting the regulated area.

12. Transportation vehicles will be properly placarded with Department of Transportation (DOT) approved 2212 placard labels identifying contaminated soils/waste.

13. Perimeter air monitoring will be conducted and will be performed by an APM during alternative work practice and remedial activities. Section E of this Work Plan details the perimeter air monitoring.

14. MassDEP may conduct a post-abatement visual inspection. The abatement contractor shall provide a minimum of 24 hours' notice for scheduling of this inspection. An APM will conduct a final visual inspection of the remediation area.

E. NON-ABATEMENT AND NON-REMEDIATION RELATED SITE ACTIVITIES

1. General construction and demolition personnel will require access to the Courtyard to perform limited demolition of building components prior to the completion of soil remediation activities.

2. A travel way has been created approximately 10 feet wide and approximately 140 feet long running along the Picker Building (east to west) on the north side from the Arcade (east side along the Concord River) to an existing masonry shaft. The travel way is constructed of a base layer of 6-mil clear polyethylene plastic sheeting (poly) covered by a 20-mil layer of black poly. A layer of 3/4-inch plywood was placed on the poly to protect it from tears and punctures and then covered with a second layer of 20-mil black poly. At the direction of MassDEP, the soils in the Courtyard are completely covered with one layer of 6-mil poly.

3. In order to continue with the building demolition work behind the Picker Building it is necessary to lay down a gravel road to eliminate disturbance to the surficial soils and worker exposure to contamination including asbestos fibers, elevated concentrations of metals and PCBs in soil. Currently the Courtyard behind the building is covered with polyethylene sheets and some plywood. Dellbrook will place clean processed gravel beginning at the entrance to the Courtyard moving northwesterly along the back of the Picker Building to the portion of the building to be razed. The gravel will be placed directly on the poly and will be approximately 3 to 6 inches thick. The road will run about 100 feet and surround the portion of the building being demolished. It will be approximately 8 to 10 feet in width, wide enough to accommodate personnel and heavy equipment.

4. Heavy equipment will not be place on or driven directly over the poly. The road and poly throughout the Courtyard will be maintained as long as the work is being conducted. Once the demolition work is complete and all equipment and materials have left the site, the gravel road will be managed in accordance with the ongoing response actions. The road will be used to backfill and regrade the Courtyard. Ultimately this material will be covered with a geotextile marker layer followed by three feet of clean material.

5. The existing masonry shaft will be demolished to its foundation. This will be performed by a mini-excavator, which will knock the brick chase down into itself and then use its bucket to load either a skid steer bucket or a mini front-end loader. The skid steer or loader will use the plywood travel way as a road to haul the removed brick from the rear of the building to the front, through the Arcade on the east side, where the brick will be placed in dumpsters staged for removal and disposal.

6. The Contractor and Subcontractor shall perform regular inspections to insure the poly and plywood layers remain intact and in good condition. The project's licensed site professional (LSP) will also conduct periodic inspections of the poly and plywood protective barrier. In the event that the poly and/or plywood become damaged, the Contractor, Subcontractor, LSP and/or the Competent Person shall have the right and responsibility to stop work until the damage has been repaired or new poly and/or plywood have been installed.

7. Upon completion of demolition of the masonry shaft, the two 20-mil layers of poly and single layer of plywood will be removed. The bottom layer of 6-mil poly shall remain in place throughout the Courtyard until soil remediation activities are completed.

F. PROJECT MONITORING

1. AXIOM will have a Massachusetts-licensed APM onsite during remediation related activities to observe the work for regulatory compliance with federal and state regulations and this

Work Plan, to document the work and to perform ambient air monitoring. Compliance with the overall IRA Plan Modification will be determined by others.

2. **Ambient Air Monitoring:** AXIOM's APM will conduct continuous exterior perimeter "fence-line" air monitoring during remediation and asbestos abatement, live load-out procedures and asbestos-related activities using high-volume electric pumps. Whenever practicable, a minimum of four air monitoring stations shall be established around the perimeter of the regulated work area to the north, south, east and west of abatement activities. The APM shall consider wind direction with respect to adjacent buildings and walkways to ensure that circumferential monitoring points coincide with downwind and other sensitive receptors.

   Please refer to Attachment 4 for the locations of the proposed air monitoring stations. These locations are approximate and may be adjusted depending upon the work being performed each shift. Location adjustments will be for the purpose of protecting sampling equipment and cassettes from damage due to the movements of equipment and personnel, but will remain in the same general locations to the extent feasible.

   Perimeter air samples shall be collected at a minimum of 54 inches and a maximum of 72 inches above ground level. Each air filter cassette shall have the start and stop time and associated start and stop flow rates recorded in the APM's site log. At the request of MassDEP, two sets of air samples shall be collected per 8-hour shift (i.e., one set of samples every four hours).

   All air monitoring shall be performed by consultants who are properly trained and licensed in the Commonwealth of Massachusetts (Commonwealth) as Asbestos Project Monitors. All sample analysis shall be performed by consultants who are properly trained, are successful participants in the American Industrial Hygiene Association's Asbestos Analytical Registry (AIHA's AAR), or alternatively, who work for a laboratory, which is licensed by the Commonwealth to perform such analysis and is accredited with either the AIHA or National Voluntary Laboratory Accreditation Program (NVLAP). Air samples will be analyzed daily and results reported to the Asbestos Contractor and the General Contractor.

   The collection and analysis of phase contrast microscopy (PCM) air samples shall be in accordance with the NIOSH 7400 Method. PCM analysis will be performed on site by a Massachusetts-licensed APM to facilitate immediate corrections in the Asbestos Contractor's work practices as necessary. Air sample results shall be e-mailed to MassDEP on the day they are collected.

   If air sample results reach or exceed the Massachusetts Department of Labor Standards (MA DLS) clean air criteria of 0.010 fibers per cubic centimeter (f/cc) of air, then all work shall stop. The work methods shall be evaluated prior to continuing any further work and MassDEP shall be notified by telephone within two hours. If the airborne fiber concentrations reach or exceed the OSHA Permissible Exposure Limit (PEL) of 0.1 f/cc of air, then work shall stop, MassDEP shall be notified by telephone immediately and the requirements for elevated airborne fiber levels in Item 4 of this section will be followed.

3. **Personal Exposure Monitoring:** The Asbestos Contractor shall have their Competent Person oversee exposure monitoring to accurately determine the airborne concentrations of asbestos to which employees may be exposed. This monitoring shall be conducted in

accordance with OSHA 29 CFR 1926.1101, *Asbestos in Construction*. A sufficient number of workers performing remediation and asbestos abatement activities will be monitored initially and on a daily basis to effectively evaluate worker exposure for specific work activities. At least ten percent (10%) of each employer's work force shall be monitored on a daily basis.

Sampled workers will be outfitted with low-flow personal air pumps to collect air samples within the workers' breathing zone (within 6 to 9 inches of the nose and mouth). The Asbestos Contractor will log the start/stop times and associated start/stop flow rates on an appropriate chain-of-custody air sampling form. Pumps will be calibrated prior to use in accordance with manufacturer's instructions and checked daily with calibrated rotameters. Samples will be analyzed by properly qualified and licensed personnel.

Air monitoring samples which are overloaded with particulate and cannot be analyzed shall be considered to be out of compliance with this Work Plan.

The Asbestos Contractor will ensure that no employee is exposed to airborne asbestos concentrations exceeding 0.1 f/cc during an 8-hour time-weighted average (TWA). If the airborne fiber concentrations reach or exceed the OSHA PEL of 0.1 f/cc, all work will stop immediately, MassDEP will be notified, and the requirements for elevated airborne fiber levels in Item 4 of this section will be followed.

Although half-face air-purifying respirators are specified as the minimum respiratory protection required for this project, the Asbestos Contractor shall determine actual respirators necessary for the project based on one or more exposure assessments performed by properly qualified individuals. Prior to obtaining exposure assessment results, the Asbestos Contractor shall require all Asbestos Workers and Supervisors to wear half-face air-purifying respirators within the regulated work area.

4. **Elevated Airborne Fiber Levels:** The following procedures shall be employed by the APM in the event that airborne fiber levels greater than 0.010 f/cc are measured outside the regulated work area(s):

   a. Stop all work immediately and notify MassDEP;
   b. Restrict access to critical personnel;
   c. Instruct the Asbestos Contractor to perform additional wetting and air misting procedures to reduce airborne fiber levels;
   d. With MassDEP (as appropriate), General Contractor and Asbestos Contractor, evaluate effectiveness of existing work practices and engineering controls, and implement additional controls as necessary; and
   e. Conduct additional air monitoring until airborne asbestos fiber levels are within acceptable levels.

G. PERSONAL PROTECTIVE EQUIPMENT (PPE)

1. Respiratory Protection

   Respirators will be used during the following activities:

a. All work performed within a regulated area where respirators are required; and
b. All work where employees are or may be exposed to airborne asbestos fiber concentrations at or above the OSHA PEL.

The Asbestos Contractor will provide respirators to their respective employees, selecting the appropriate type from among those approved by the National Institute of Occupational Safety and Health (NIOSH). The Asbestos Contractor will be required to have a written respiratory protection program that will be in full force for the duration of this project. The respiratory protection program shall comply with governing regulations and will include respirator selection and use, medical clearance for respirator use and medical surveillance for asbestos exposure (reference 29 CFR 1910.134).

The Asbestos Contractor will provide, at a minimum, half-face air purifying respirators equipped with P-100 high-efficiency particulate air (HEPA) filters because most of the remediation and/or abatement work will involve directly impacting presumed asbestos-containing materials (pipe insulation) or contaminated soil containing asbestos fibers. A negative exposure assessment (NEA) may be performed by qualified individuals and reviewed by a Certified Industrial Hygienist (CIH) for activities that are not expected to result in worker exposures at or above the OSHA PEL.

If a particular task is not addressed herein and worker exposure is at or above the PEL, the OSHA asbestos standard, 29 CFR 1926.1101 specifies additional respiratory protection requirements.

2. Protective Clothing

The Asbestos Contractor will require workers to wear protective clothing consisting of, at a minimum, disposable Tyvek or equivalent suits, nitrile gloves, rubber boots and safety glasses, as well as any other personal protective equipment required for compliance with the IRA Modification Plan. The protective clothing will be required for the following tasks:

a. Activities when an employee may be exposed to airborne asbestos concentrations at or above the PEL;
b. Activities without a NEA reviewed by the CIH; and/or
c. Activities in which an employee may perform work involving the removal, packaging or disposal of ACM's.
d. The Asbestos Contractor will package, transport and dispose of contaminated clothing in sealed, impermeable bags or other approved containers bearing appropriate asbestos warning labels. The Competent Person will periodically examine employee protective clothing to ensure compliance with this Work Plan. Rips or tears in protective clothing must be mended or the clothing must be replaced immediately.

H. REGULATED WORK AREAS

Only properly trained personnel with appropriate, applicable Massachusetts asbestos licensing, appropriate asbestos training, appropriate HAZWOPER training and proper personal protective equipment/clothing may enter a regulated area. Visitors to the work site will be briefed on the nature of the work and the regulated area requirements. Only visitors with appropriate, applicable licenses, appropriate asbestos training and proper personal protective equipment/clothing will be

allowed inside a regulated area. Please refer to Attachment 4 for the extent of the regulated work area.

All affected areas of the site shall be contained within a regulated work area. This includes any adjoining area(s) where debris and asbestos waste accumulates or where airborne concentrations of asbestos exceed or may exceed the PEL.

All asbestos abatement work or any other operations where airborne asbestos can potentially exceed the PEL will only be performed within regulated area(s). The designated Competent Person will supervise all asbestos work performed in the regulated area(s).

The Asbestos Contractor will demarcate the regulated area(s) in any manner that minimizes the number of persons within the area, prevents access by unauthorized personnel and protects persons outside the area from exposure to airborne asbestos. Red asbestos demarcation tape (asbestos warning barrier tape) will be used to define the regulated work area. Additionally, proper asbestos warning signs will be prominently displayed at all points of access to the regulated area(s). The signs will bear the following information:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORY AND PROTECTIVE CLOTHING ARE
REQUIRED IN THIS AREA

The Asbestos Contractor will provide all employees with appropriate respirators. Employees will not eat, drink, smoke, chew tobacco or gum or apply cosmetics in regulated area(s). The Asbestos Contractor will work in advance of all other construction personnel. The Asbestos Contractor will inform other building/site occupants (construction personnel) of the following:

1. Nature of the work;
2. Regulated work area requirements; and
3. Measures taken to protect employees.

I. HYGIENE FACILITIES

The Asbestos Contractor will establish a remote, three-chamber decontamination facility (DF) immediately adjacent to the regulated work area(s) for the decontamination of employees and their equipment. All equipment and the surfaces of containers filled with asbestos-contaminated soils will be cleaned prior to removal. The Asbestos Contractor will ensure employees enter and exit the regulated work area through the DF. Please refer to Attachment 4 for the location of the decontamination facility.

The DF will be equipped with tepid water, soap, disposable towels and other items necessary for the proper containment and control of asbestos.

J. DECONTAMINATION OF EQUIPMENT

Decontamination of equipment will be conducted by first performing HEPA vacuuming followed by power washing parts of the equipment that have come in contact with asbestos-contaminated soil. Power washing will occur in a decontamination area. The decontamination area is constructed with vertical edges that are designed to contain all liquids. All waste water from decontamination procedures shall be filtered via two 5-micron filters and stored on-site for metered disposal. All water filters shall be disposed of as ACM/PACM waste. This waste may also contain other OHM. Please refer to Attachment 4 for the location of the equipment washing station. Please refer to Attachment 5 for details regarding the construction of the equipment washing station.

K. ACCESS AND NOTIFICATION OF OTHER WORKERS AT MULTI-EMPLOYER WORKSITE

All personnel entering the job site will be required to read the Work Plan before they are permitted to enter any regulated work area at the site. Access to the area(s) to be remediated or abated will be limited to personnel with proper training only.

No other trades will be permitted into the regulated work area without proper asbestos awareness training in accordance with federal, state and local regulations.

L. WASTE PACKAGING, STORAGE AND DISPOSAL

1. Debris shall be promptly containerized into one or more of the following:
   - Gaylord boxes having two (2) internal layers of form-fitting, 6-mil polyethylene liners;
   - Double-layered 6-mil asbestos waste bags; and/or
   - Open top dumpsters lined with two form-fitting 10-mil premanufactured bladder bags.

2. All waste bags and boxes shall be cleaned and sealed inside the DF. Waste bags and boxes shall then be transported from the DF to a storage container using heavy equipment as necessary.

3. All heavy equipment is to remain in the respective specific designated work area(s). No heavy equipment will be permitted to migrate in or out of regulated work area(s) without passing through the DF. Decontamination facility doors shall be equipped with polyethylene sheeting with over-lapping flaps to minimize fiber migration from the DF into unregulated space.

4. Prior to transportation of any ACM waste, waste haulers will individually seal each form-fitting bladder bag and clearly label all containers/trucks with the appropriate generator labels and DOT placards bearing the numbers 2212, as well as any additional appropriate asbestos warning labels.

5. Asbestos waste shall be transported to a landfill approved to accept asbestos- and, if necessary, PCB-contaminated materials and other OHM, as appropriate. Transportation of asbestos waste shall be in conformance with the DOT regulations 49 CFR Parts 172 and 173. Waste generated at the site may be transported to Minerva Enterprises, LLC (Minerva) located at 9000 Minerva Road, Waynesburg, Ohio.

6. Disposal of asbestos waste shall be in conformance with EPA NESHAPS regulations 40 CFR Part 61 and MassDEP regulations 310 CMR 7.00, 18.00 and 19.00.

7. An asbestos waste shipment record (AWSR) is required whenever asbestos-containing waste material is shipped. A copy of this AWSR shall be e-mailed to MassDEP on the day the material leaves the site.

M. QUALITY CONTROL

Remediation, abatement and related operations will be monitored by a minimum of one fully trained, experienced and competent Asbestos Supervisor who will work in conjunction with the Asbestos Consultant/Industrial Hygiene firm (AXIOM) and LSP firm (GOLDMAN) to comply with applicable federal, state and local regulations. This individual will ensure that safe work practices in the workplace are implemented including, but not limited to:

- Exclusion of eating, drinking or smoking; and
- Use of procedures or equipment that may reduce the effectiveness of respiratory protection or other engineering controls.

In addition, the Asbestos Supervisor will ensure that OSHA-required personal monitoring is conducted in accordance with all applicable Federal, State and local regulations. Results will be routinely posted at a designated onsite location. The Asbestos Supervisor shall have the authority to stop work and modify work practices and/or engineering controls to ensure regulatory compliance.

N. EMERGENCY RESPONSE PROCEDURES

The Contractor will post the name and address of the closest hospital with a route map illustrating the route from the work site to the hospital in a conspicuous location at the site.

A daily sign-in log will be utilized to account for all personnel and visitors entering the regulated work area. The log will be administered by the Competent Person or Site Superintendent and will be used to account for all personnel in the event of an emergency evacuation.

All personnel not involved in an emergency will proceed to the General Contractor's field office unless otherwise directed.

An assessment of the problem will be made and appropriate actions implemented. Other personnel in the work area will be evacuated to a safe distance until the Site Superintendent and/or Competent Person determine that it is safe for work to resume.

Work will not commence until all emergency response activities are completed and hazard control issues are resolved. In the event of an emergency during asbestos abatement activities, field personnel will dial 911 to access off-site emergency response personnel and equipment. In the event of a release to the environment, the MassDEP will be notified in addition to the aforementioned as applicable.

Emergency Contact Information

Agency	Telephone
Project Emergency	911
Lowell Police Department	911 (978) 937-3200 (non-emergency)
Lowell Fire Department	911 (978) 459-5553 (non-emergency)
Lowell General Hospital 1 Hospital Drive, Lowell MA	(978) 458-1411

Appendix F-2

AXIOM'S DECONTAMINATION PROCEDURES

Decontamination of field equipment is necessary to minimize the potential for the release of contamination beyond the exclusion zone of the site, reducing health hazards associated with the spread of contaminants; and to ensure the quality of samples by preventing cross-contamination. The following decontamination procedures are based on EPA regulations 40 CFR § 761.360, Subpart S.

Required Supplies

Large Equipment Decontamination: drill rig, excavator, backhoe/loader, etc.

- Decontamination pad with a foot-print larger that the equipment to be de-contaminated and capable of retaining all removed contaminated material and wash water.
- Simple Green All Purpose Cleaner/Degreaser
- An approved PODF as listed in § 761.79 (c)(3)(iv) -i.e. (A) Kerosene.(B) Diesel fuel.(C) Terpene hydrocarbons. (D) Mixtures of terpene hydrocarbons and terpene alcohols.
- 2- to 5- gal manual-pump sprayer (pump sprayer material must be compatible with the solution used).
- Absorbent pads and stiff-bristle brushes that are not dissolved by the solvents/cleaners used, and that do not shred, crumble, or leave visible fragments on the surface.
- Gloves, goggles, boots, and other protective clothing that are resistant to the solvents/cleaners used.

Small Equipment Decontamination: split spoon soil sampler, bowls, dredges, saws etc.

- 5-gal plastic buckets and/or troughs big enough to fully contain the sampling equipment.
- Simple Green All Purpose Cleaner/Degreaser
- An approved PODF as listed in § 761.79 (c)(3)(iv)
- 2- to 5- gal manual-pump sprayer (pump sprayer material must be compatible with the solution used.
- Absorbent pads and stiff-bristle brushes that are not dissolved by the solvents/cleaners used, and that do not shred, crumble, or leave visible fragments on the surface.
- Gloves, goggles, and other protective clothing that are resistant to the solvents/cleaners used.

Procedures

The same Procedures Apply to Both Heavy Equipment Decontamination and Small Equipment Decontamination

1. Set up a decontamination pad that is large enough to fully contain the equipment to be cleaned and that will contain all wash and rinse water used.

1a. Setup a mister such that the entire piece of machinery is being misted with clean water during the entire decontamination process.

2. First Wash:

a. Cover the entire surface of equipment to be decontaminated with Simple Green All Purpose Cleaner/Degreaser. Contain and collect all cleaning solutions for proper disposal.

b. Scrub rough surfaces with a stiff-bristle brush, adding cleaning solution such that the surface is always ***very wet***.

c. Wipe smooth surfaces with a cleaning solution soaked disposable absorbent pad

d. Mop up or absorb the residual cleaner solution and suds from all surfaces with clean disposable, absorbent pads until the surface appears dry. Note: This cleaning should remove any residual dirt, dust, grime, or other absorbent materials left on the surface during the first wash.

3. First Rinse:

a. Rinse off the wash solution with clean water and capture the rinse water.

b. Mop up the wet surface with clean, disposable, absorbent pad until the surface appears dry.

4. Second Wash:

a. Cover the entire surface with an approved PODF – contain and collect any runoff solvent for disposal.

b. Scrub rough surfaces with a stiff-bristle brush, adding an approved PODF such that the surface is always very wet.

c. Wipe smooth surfaces with an approved PODF soaked disposable absorbent pad.

d. Mop up or absorb the residual approved PODF from all surfaces with clean disposable, absorbent pads until the surface appears dry.

5. Second Rinse:

a. Wet the entire surface with clean approved PODF such that all surfaces are very wet and capture the rinse approved PODF.

b. Wipe off the residual approved PODF from the surfaces using a clean, disposable absorbent pad until no liquid is visible on the surface.

6. Documenting Decontamination:

a. Record equipment type, date, time in logbook and document decontamination with pictures.

7. Cleanup After Decontamination:

a. After decontamination activities are completed, collect all contaminated waters, used solvents, plastic sheeting, and disposable gloves, boots, and clothing. Place contaminated items in properly labeled drums for disposal. Liquids and solids must be drummed separately.

i. All wash water, rinse water, and decontamination solutions that have come in contact with contaminated equipment are to be handled, packaged, labeled, marked, stored, and disposed of as hazardous waste.

ii. All solids, (i.e., plastic sheeting, scrub brushes, absorbent pads, disposable gloves, boots and clothing that have come in contact with contaminated equipment are to be handled, packaged, labeled, marked, stored, and disposed of as hazardous waste.

7. Have 2 ambient air asbestos testing stations setup around the decontamination pad in order to survey if asbestos was present during the decontamination procedure. A total of 4 samples will need to be analyzed if the process takes a full work day (2 in AM, 2 in PM)

BARRIER TO ALLOW ACCESS TO THE COURTYARD FOR DEMOLITION PURPOSES

The following will be instituted prior to any demolition work proceeding in the courtyard:

1. A base layer of at least 20-mil poly sheeting will be placed on the surface of the courtyard or portion of the courtyard. (double layer of 12-mil is acceptable)
2. A center layer of plywood will be placed to ensure that the weight of the machinery does not rip through the base layer, as well as to protect the base layer from any falling debris during the demolition process.
3. Finally, a layer of 12-mil poly will be placed on top of the ply wood and base layer to ensure the integrity can be maintained. If any rips, tears, punctures occur in this layer, work will be stopped until the rip, tear, or puncture is repaired.

EQUIPMENT WASHING STATION

An equipment washing station will be constructed at the perimeter of the exclusion area out of impermeable material sufficient to prevent run-off and to allow the collection of water. The location will be directly in front of the access tunnel inside the courtyard. When excavators and other equipment are used in the exclusion area, they will remain in the exclusion area and will exit only after decontamination at the equipment washing station.

The equipment washing station will be approximately 12’ x 25’ to cover a small sized front end loader, and bermed to contain wash water. The equipment washing station will be lined with two layers of poly and filled with stone. The station will be sloped to a corner to accumulate wash water. Water will be filtered (5-micron filtration) and used to mist the impact area. AT completion of the work, gravel and polyethylene sheeting, Rinse water and other materials will be disposed of as TSCA PCB waste containing Asbestos at ENPRO Services of Vermont (EVI).

DUST MONITORING PROCEDURES
(November 30, 2016)

Dust monitoring is necessary to minimize the potential for exposure to contamination within and beyond the exclusion zone of the site, reducing health hazards, and to prevent fugitive migration of contamination.

GENERAL STANDARD OPERATING PROCEDURES

Notify Interested Parties and Plan for Emergencies

- Communicate the goals, type, and length of projects and specific behavior rules to the affected groups (onsite workers and residence).
- Have an emergency contact list (hospitals, police, etc.).
- Prevent unauthorized persons from entering the site.

Take General Protective Measures

- Ensure workers are properly trained.
- Choose the method that minimizes the amount of dust generated.
- Choose methods that protect workers, building users, passersby, and the surroundings of the remediation project.
- Use proper containers to hold excavated material.
- Use gloves and skin protection.
- Use eye goggles during windy conditions.
- Do not smoke, drink, or eat in the work area.
- Wash hands prior to breaks.

Exterior Areas

- Mark off the work areas to keep non-workers away.
- Cover any plants with heavy plastic sheeting.
- Close windows and doors near the work area.
- Cover the excavate material prior to off-site disposal.

Leave the Work Area Clean

- Put trash and debris in heavy-duty plastic bags.
- Ensure tools, equipment, and workers, are free of dust and debris before leaving the work area.
- Remind workers (non-HAZWOPER trained) to stay out of the work area.
- When the job is complete, remove any plastic sheeting carefully, mist with water, fold dirty side in, tape shut, and dispose of it.

Check the work area for dust. If any dust or debris is present, then wet the area to reduce the potential for dust from being picked up by the wind.

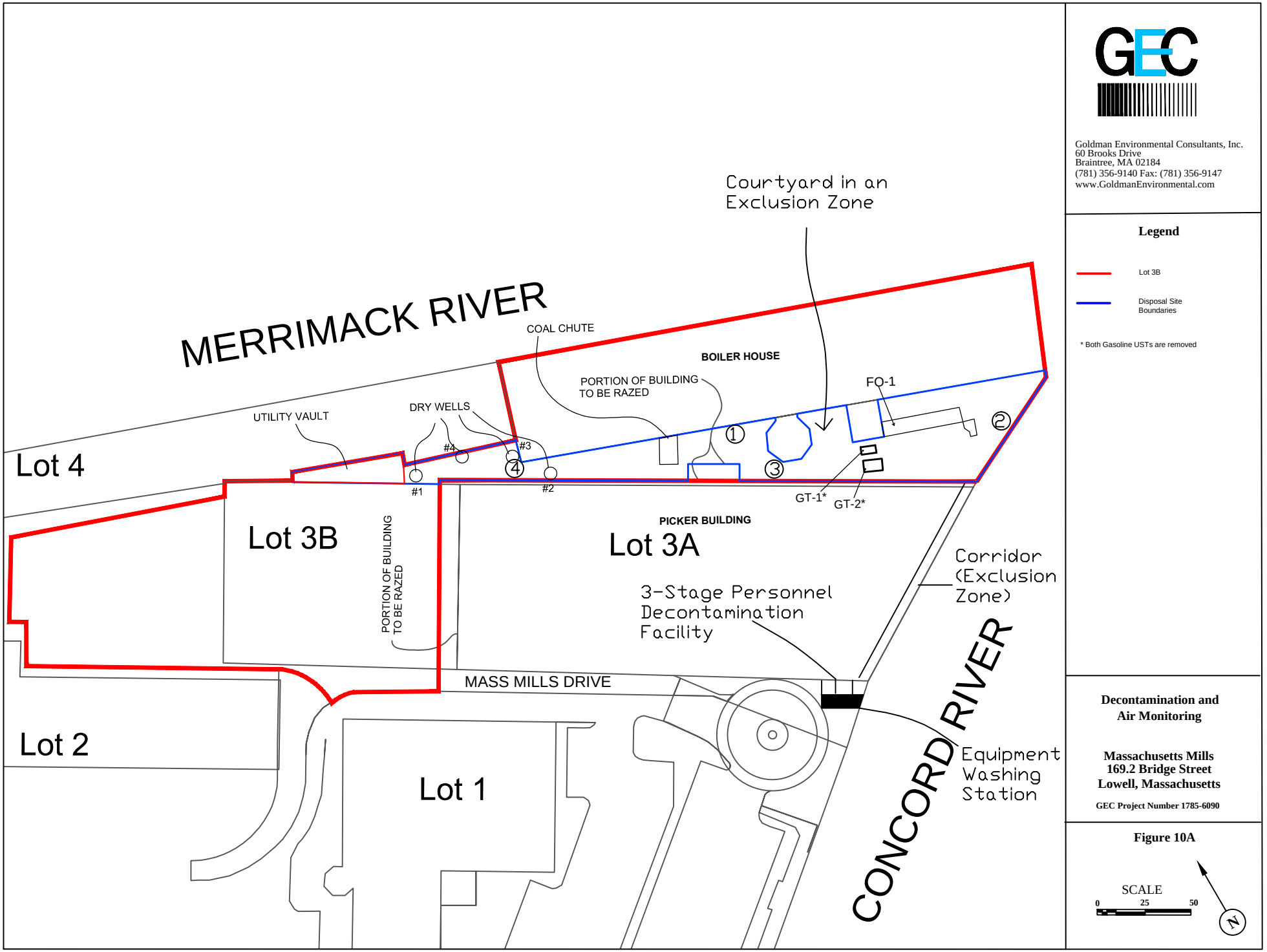
SITE-SPECIFIC PROCEDURES

Same Procedures Apply to Soil Excavation, Movement of Stockpiles, Loading, and Backfill

1. Once the soils are removed and the soils are exposed, lightly spray the surface with water to prevent dust generation. Continue to monitor the soil moisture and apply water to the excavation area and the excavate material as needed, and if the soils are dry during windy conditions.
2. If site conditions become windy, and excessive dust generation is likely, stop work and apply water to the area, including any stockpiled or loaded soil in trucks.
3. During overnight work stoppage, cover the excavation and excavate material with polyethylene sheets. Once a truck has been loaded for off- site transport of the material, cover the soil within the truck with a heavy tarp.
4. Once the excavation work has been completed, shovel, sweep or wash residual soil/dust on the pavement into the excavation.
5. Dust suppression and control shall be maintained in the excavation areas, and off-site haul roads by keeping surfaces wet and clean to prevent wind-blown dust and road mud and debris from occurring during excavation. The nearest access road and access gate area shall be kept clean during excavation activities. If necessary use street sweepers and wet by sprinkling the road surfaces with a tank, gauges, pressure pump and nozzle spray bar. Water shall be dispersed through the nozzle under a minimum pressure of 20 pounds per square inch pressure gauge. Water shall be free from oil, acid and alkali or vegetative matter and shall not be salt or brackish.
6. Air monitoring shall be provided continuously during excavation activities for PM-10 in real time data. Air monitoring shall be coordinated by GEC. Two weather proof Dust Trak II Aerosol Monitors (Model 8530) will be used to collect real-time data and placed on site down gradient of the established prevailing wind direction prior to initiating excavation activities. The monitoring data will be collected using a data logger for submittal to MassDEP and USEPA and daily dust levels will be assessed to determine the effectiveness of the dust suppression measures and necessary additional mitigation measures. The PM-10 dust monitors will be set with an alarm in case of dust exceedances. One PM-10 Dust Action Level is established for all soil excavation and soil disturbance activities. The dust monitor will have the alarm set at or below the appropriate PM-10 Dust Action Level.

   PM-10 Dust Action Level: 150 micrograms per cubic meter ($\mu g/m^3$)

7. If significant airborne dust is identified, all construction activities shall be temporarily stopped until additional dust suppression (water) is applied to any open excavations or stockpiled material and PM-10 dust levels are below applicable PM-10 Dust Action Level.
8. Organic compounds shall also be monitored during excavation activities using handheld photoionization detectors (PID). Levels of total organic vapors (TOV) readings will be recorded during excavation. Little to no volatile contamination has been detected at the Site and elevated TOV readings are unlikely.



Goldman Environmental Consultants, Inc.
60 Brooks Drive
Braintree, MA 02184
(781) 356-9140 Fax: (781) 356-9147
www.GoldmanEnvironmental.com

Legend

Lot 3B

Disposal Site Boundaries

* Both Gasoline USTs are removed

Decontamination and Air Monitoring

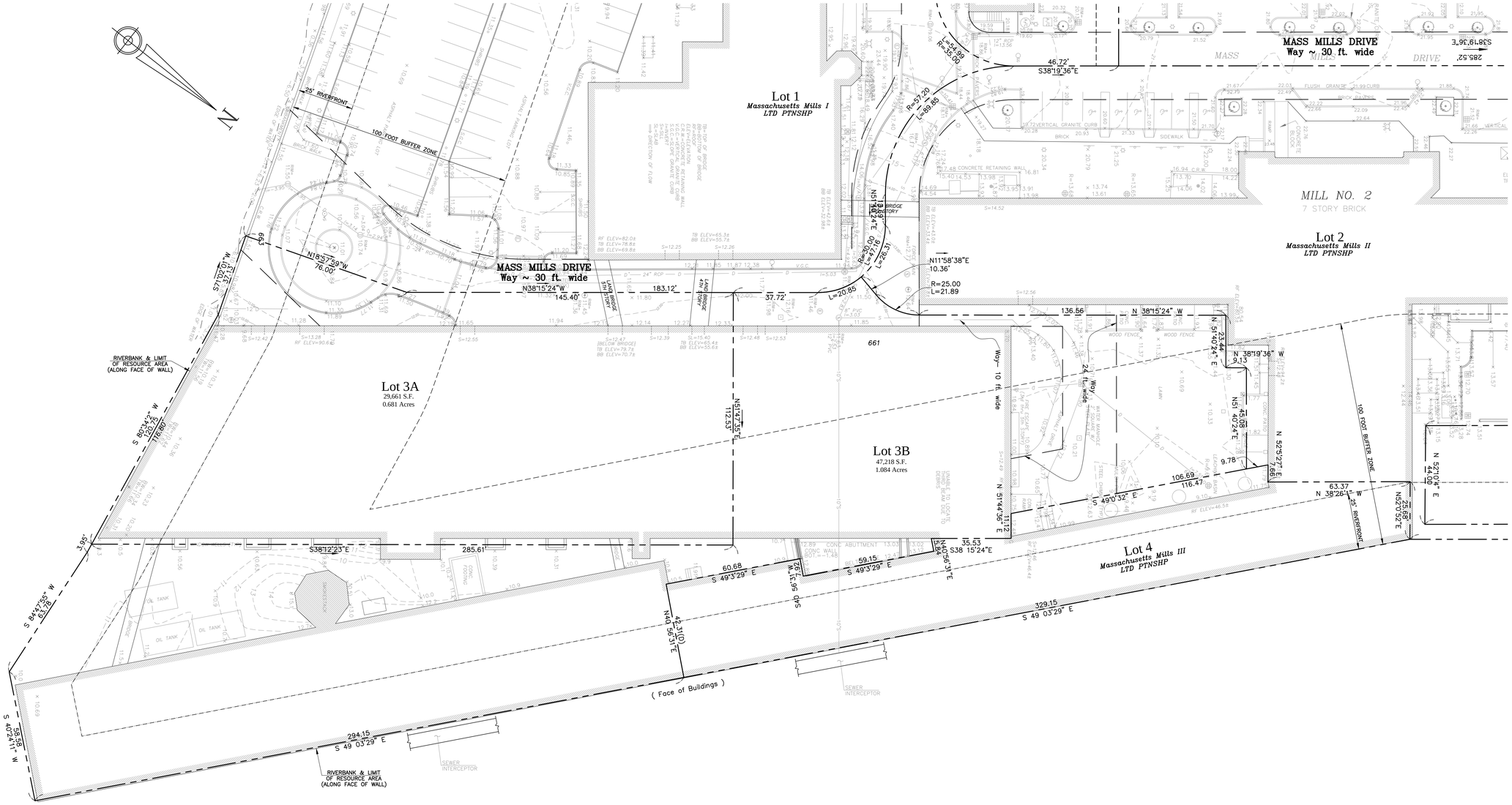
Massachusetts Mills
169.2 Bridge Street
Lowell, Massachusetts

GEC Project Number 1785-6090

Figure 10A

APPENDIX G:

Massachusetts Mills III Drawings



PLAN REFERENCES:

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2. PROPERTY LINE TAKEN FROM A PLAN TITLED "PLAN OF LAND, MASSACHUSETTS MILLS, 169.2 BRIDGE STREET, LOWELL, MASSACHUSETTS". PLAN PREPARED BY R. E. CAMERON & ASSOCIATES, INC. OF NORWOOD, MA AND DATED APRIL 22, 2014.

NOTES:

1. LOCATIONS AND ELEVATIONS OF UNDERGROUND PIPES AND CONDUITS HAVE BEEN DETERMINED FROM THE ABOVE REFERENCED PLAN AND SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. H.W. MOORE ASSOCIATES, INC. ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES INACCURATELY SHOWN OR OMITTED. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER UTILITY DEPARTMENT SHALL BE NOTIFIED AND THE ACTUAL LOCATIONS OF SUBSURFACE STRUCTURES SHALL BE VERIFIED IN THE FIELD. CALL THE BWSC, (617)330-9400 (x590) AND DIG-SAFE CALL CENTER, (888)344-7233, 72 HOURS (3 WORKING DAYS) PRIOR TO EXCAVATION.
2. THE 100 FOOT BUFFER ZONE FROM THE RIVERBANK, AND THE 25 FOOT RIVERFRONT ZONE WERE AMMENDED TO THE PLAN BY H. W. MOORE ASSOCIATES, INC.
3. 100 YEAR FLOOD BOUNDARY, ZONE AE, TRACED FROM FIRM FLOOD INSURANCE MAP, PANEL 143, MAP NUMBER 25017C0143E, EFFECTIVE DATE JUNE 4, 2010.
4. 100 YEAR FLOOD ELEVATION VARIES BETWEEN 66.6 NAD 88 DATUM (11.4 LOWELL DATUM) AND 66.2 NAD 88 DATUM (11.0 LOWELL DATUM) FROM FIRM FLOOD INSURANCE RATE MAP JUNE 4, 2010.

hwmoore
ASSOCIATES, INC.
CIVIL ENGINEERING | LAND PLANNING
112 Shawmut Avenue, Boston, MA 02118-2227
tel: 617-357-8145 fax: 617-357-9495 web: hwmoore.com

R-M Developer LLC
Massachusetts Mills III - **PICKER BLDG**
Lowell, Massachusetts

EXISTING CONDITIONS PLAN

Date: JULY 8, 2014
Rev:
Scale: 1"=20'

C-2

Russell Scott Steedle & Capone Architects Inc.
18 Brattle Street Cambridge Massachusetts 02138 617-661-0880 Fax 661-0613

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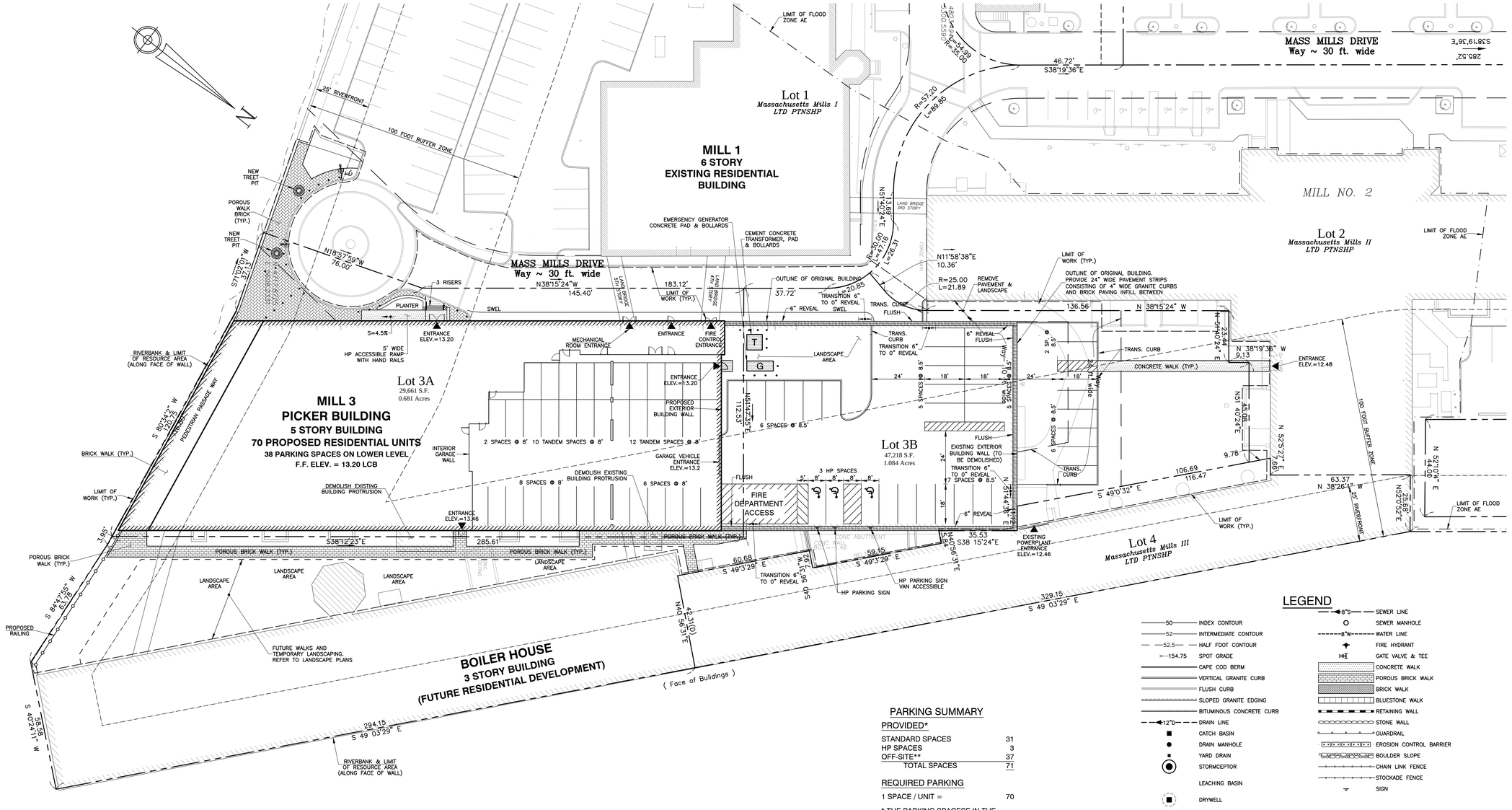

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PARKING SUMMARY

PROVIDED*

STANDARD SPACES	31
HP SPACES	3
OFF-SITE**	37
TOTAL SPACES	71

REQUIRED PARKING

1 SPACE / UNIT =	70

* THE PARKING SPACESE IN THE STRUCTURE ARE NOT COUNTED IN THE SUMMARY.
** OFF-SITE PARKING HAS BEEN SECURED IN THE PARKING GARAGE AT 75 JOHN STREET.

LEGEND

50	INDEX CONTOUR
52	INTERMEDIATE CONTOUR
52.5	HALF FOOT CONTOUR
154.75	SPOT GRADE
	CAPE COD BERM
	VERTICAL GRANITE CURB
	FLUSH CURB
	SLOPED GRANITE EDGING
	BITUMINOUS CONCRETE CURB
12"D	DRAIN LINE
	CATCH BASIN
	DRAIN MANHOLE
	YARD DRAIN
	STORMCEPTOR
	LEACHING BASIN
	DRYWELL
8"S	SEWER LINE
	SEWER MANHOLE
8"W	WATER LINE
	FIRE HYDRANT
	GATE VALVE & TEE
	CONCRETE WALK
	POROUS BRICK WALK
	BRICK WALK
	BLUESTONE WALK
	RETAINING WALL
	STONE WALL
	GUARDRAIL
	EROSION CONTROL BARRIER
	BOULDER SLOPE
	CHAIN LINK FENCE
	STOCKADE FENCE
	SIGN

20 0 10 20 40
HORIZONTAL GRAPHIC SCALE IN FEET

hwmoore ASSOCIATES, INC.
CIVIL ENGINEERING | LAND PLANNING
112 Shawmut Avenue, Boston, MA 02118-2227
tel: 617-357-8145 fax: 617-357-9495 web: hwmoore.com

R-M Developer LLC
Massachusetts Mills III - **PICKER BLDG**
Lowell, Massachusetts

LAYOUT & MATERIAL PLAN

Russell Scott Steedle & Capone Architects Inc.
18 Brattle Street Cambridge Massachusetts 02138 617-661-5880 Fax 661-0613

Date: JULY 8, 2014
Rev:
Scale: 1"=20'

C-3

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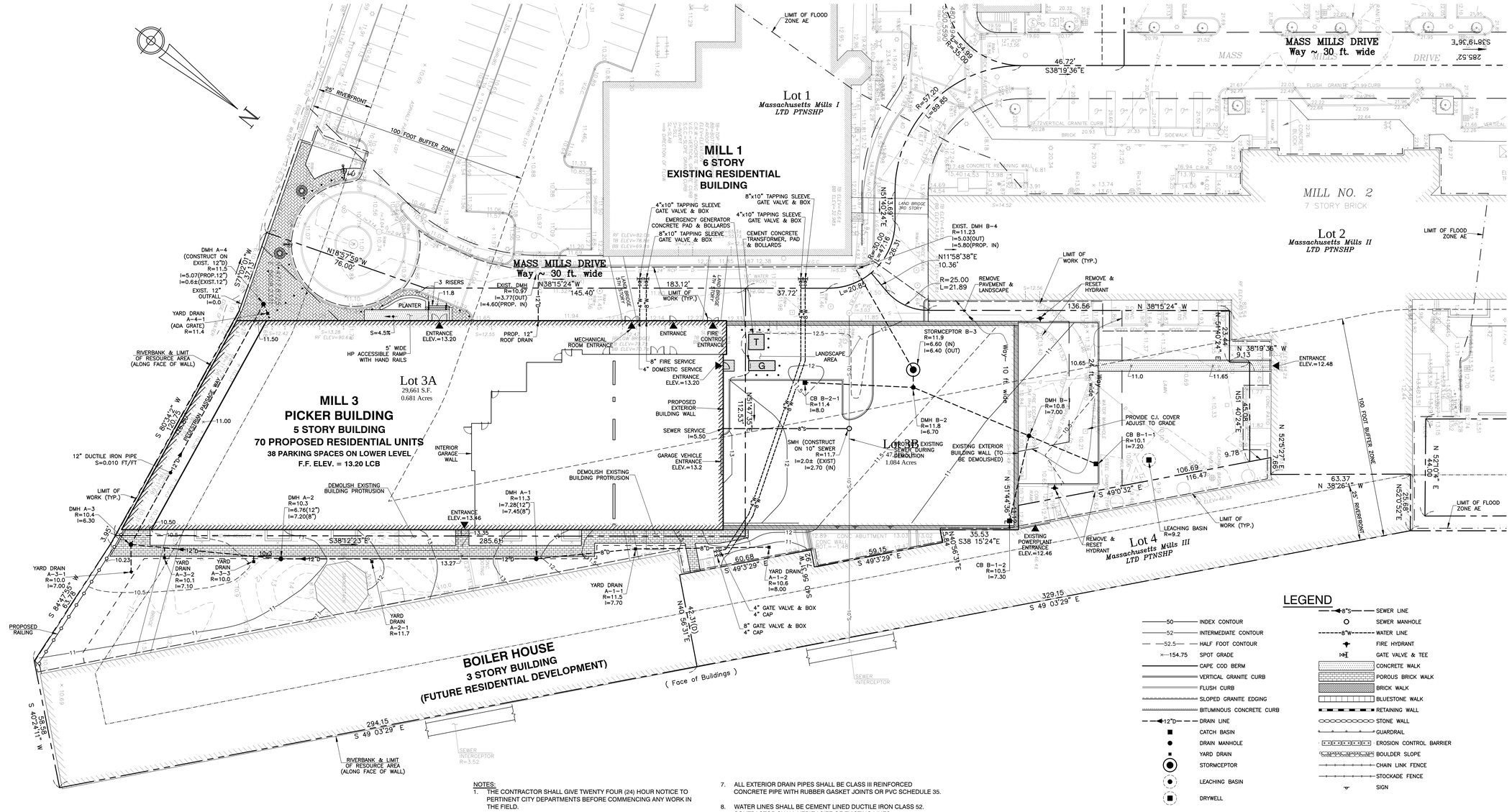

NOTES:

1. THE CONTRACTOR SHALL GIVE TWENTY FOUR (24) HOUR NOTICE TO PERTINENT CITY DEPARTMENTS BEFORE COMMENCING ANY WORK IN THE FIELD.
2. ALL SITE WORK AND MATERIALS SHALL CONFORM WITH THE CITY OF LOWELL BUILDING REQUIREMENTS.
3. UNDERGROUND UTILITIES, AS SHOWN, WERE DERIVED FROM FIELD INVESTIGATION AND PLANS OF RECORD AND MAY NOT BE COMPLETE OR ACCURATE. CONTACT "DIG-SAFE" A MINIMUM OF 72 HOURS PRIOR TO COMMENCING SITE WORK.
4. ALL DISTURBED AREAS, NOT OTHERWISE DESIGNATED, SHALL BE COVERED WITH 4" OF LOAM AND SEEDED.
5. RIM ELEVATIONS OF DRAINAGE AND SANITARY SEWER MANHOLES ARE APPROXIMATE. FINAL ELEVATIONS ARE TO BE SET FLUSH. ADJUST ALL OTHER RIM ELEVATIONS OF EXISTING MANHOLES, WATER GATES, GAS GATES AND OTHER UTILITIES TO FINISH GRADE WITHIN LIMITS OF SITE WORK.
6. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE, FIRE ALARM AND OTHER PRIVATE UTILITIES BY THE RESPECTIVE UTILITY COMPANIES, AS REQUIRED.
7. ALL EXTERIOR DRAIN PIPES SHALL BE CLASS III REINFORCED CONCRETE PIPE WITH RUBBER GASKET JOINTS OR PVC SCHEDULE 35.
8. WATER LINES SHALL BE CEMENT LINED DUCTILE IRON CLASS 52. CONTRACTOR SHALL VERIFY SIZE OF EXISTING LINES
9. SEDIMENT TRACKED ONTO ADJACENT DRIVES SHALL BE SWEPT AT THE CONCLUSION OF EACH CONSTRUCTION DAY.
10. ANY AREAS OUTSIDE THE LIMIT OF WORK DISTURBED BY THE CONTRACTOR SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
11. THE CONTRACTOR IS RESPONSIBLE FOR THE IMPLEMENTATION AND COMPLIANCE WITH THE CONSERVATION COMMISSION'S ORDER OF CONDITIONS. A COPY OF THE ORDER MUST BE AT THE SITE AT ALL TIMES.
12. SEWER PIPE SHALL BE PVC CONFORMING TO ASTM D 3034-SDR35. FITTINGS SHALL BE RUBBER RING CONFORMING TO ASTM D 3212.
13. REFER TO LANDSCAPE PLANS FOR PAVING MATERIALS AND LAYOUT INFORMATION.

LEGEND

50	INDEX CONTOUR
52	INTERMEDIATE CONTOUR
52.5	HALF FOOT CONTOUR
×154.75	SPOT GRADE
	CAPE COD BERM
	VERTICAL GRANITE CURB
	FLUSH CURB
	SLOPED GRANITE EDGING
	BITUMINOUS CONCRETE CURB
12"D	DRAIN LINE
	CATCH BASIN
	DRAIN MANHOLE
	YARD DRAIN
	STORMCEPTOR
	LEACHING BASIN
	DRYWELL
8"S	SEWER LINE
	SEWER MANHOLE
8"W	WATER LINE
	FIRE HYDRANT
	GATE VALVE & TEE
	CONCRETE WALK
	POROUS BRICK WALK
	BRICK WALK
	BLUESTONE WALK
	RETAINING WALL
	STONE WALL
	GUARDRAIL
	EROSION CONTROL BARRIER
	BOULDER SLOPE
	CHAIN LINK FENCE
	STOCKADE FENCE
	SIGN

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HORIZONTAL GRAPHIC SCALE IN FEET
20 0 10 20 40

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R-M Developer LLC
Massachusetts Mills III - **PICKER BLDG**
Lowell, Massachusetts

GRADING & UTILITY PLAN

Date: JULY 8, 2014
Rev:
Scale: 1"=20'

C-4

Russell Scott Steedle & Capone Architects Inc.
18 Bratte Street Cambridge Massachusetts 02138 617-661-5880 Fax 661-0613

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HAYBALES & SILTATION FENCE

(NOT TO SCALE)

NOTES:

1. SILT SACK SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION, AND SHALL BE REMOVED AFTER SITE HAS STABILIZED.

2. HAY BALES SHALL BE REMOVED AFTER BITUMINOUS PAVEMENT HAS BEEN PLACED. IF SITE CONDITIONS WARRANT, AS DETERMINED BY ENGINEER, THEY SHALL BE REPLACED AFTER PAVING AND MAINTAINED UNTIL SITE HAS STABILIZED.

HAY BALE CATCH BASIN PROTECTION

NOT TO SCALE

30 0 15 30 60

HORIZONTAL GRAPHIC SCALE IN FEET

EROSION CONTROL REQUIREMENTS
OPERATION & MAINTENANCE PLAN
MASSACHUSETTS MILLS
LOWELL, MA

January 19, 2004

INTRODUCTION

The proposed project site is located on Lot #3 within the 7.5 acre Massachusetts Mills complex situated south of Bridge Street in Lowell, MA (Middlesex County). The Massachusetts Mills complex is bordered by Bridge and Canal Streets to the north, the Merrimack River to the east, the Concord River to the south and Merrimack Street to the west. The Massachusetts Mills complex was a former mill operation that now contains residential apartment buildings while the surrounding area includes a mixture of commercial and residential developments.

Lot #3 is a 1.65 acre parcel located along the southeast corner of the Massachusetts Mills site at the confluence of the Merrimack and Concord Rivers. This lot is currently developed with two existing buildings (Mill Building 3 and the Boiler House building) along with additional bituminous parking and degraded areas. The Boiler House building abuts against the existing power plant building, which in turn abuts against Mill Building 2, forming a contiguous section of bank along the Merrimack River. Mill Building 3 is located west of the Boiler House building and forms a section of bank along the Concord River.

The proposed project includes the redevelopment of Mill Building 3 into residential apartments along with the construction of an associated access drive, parking, walkways, utilities and stormwater management system. Approximately 20 percent of the northern end of Mill Building 3 will be demolished and replaced with a bituminous driveway access to the proposed basement level parking area. A pedestrian walkway will extend from the present courtyard area between Mill Building 2 and Mill Building 3 to the end of Mill Building 3 at the Concord River. This walkway will provide pedestrian access to the Boiler House Building. The walkway will then extend westerly through the southern end of Mill Building 3 along the Concord River and connect to the existing walkway located 80 feet west of the building.

The proposed project includes work that comes under the jurisdiction of the Lowell Conservation Commission. It is anticipated that the Commission will issue an Order of Conditions, a copy of which the contractor must retain on site, and must comply with all conditions stated therein. The purpose of the Orders is to minimize the potential of siltation of the wetlands from both overland flow and from pipe flow, and to minimize the impact on the buffer zone adjacent to the wetlands. The following notes and details are intended to be a minimum set of guidelines, and the contractor shall be responsible for their implementation. Should additional control be required, the contractor shall take whatever steps are necessary.

The existing site features riverfront area along the southern and eastern borders at the confluence of the Concord and Merrimack Rivers. The two existing site buildings occupy almost all of the 25-ft riverfront area on Lot #3. The remaining riverfront area within Lot #3 is entirely altered and includes degraded areas.

The Interim Soils Map for Dracut/Lowell (1989) provided by the USDA Natural Resources Conservation Service (NRCS) identifies the onsite soils as Urban Land (map code 260). An urban land designation describes soils that have been so altered by historic development that they can no longer be classified.

SILTATION CONTROLS

The first phase of construction will consist of the placement of siltation controls in accordance with the detail and at the location indicated on the plans. No further construction activity will take place until the siltation controls are inspected and approved. No encroachment or alteration shall occur beyond the erosion control barriers. Erosion control barriers shall be maintained and replaced, if necessary, throughout the course of construction.

SITE CONSTRUCTION

All unvegetated areas, including stockpiles, that will remain unvegetated for greater than 21 days should be mulched or seeded within 7 days of their grading. The perimeter sedimentation controls at the stockpiles should be in place at the end of each day and before rain events.

During the construction of the drainage system, care must be taken to prevent siltation from entering the system. Drainage pipes in open excavations shall not remain open overnight. Hay bales shall be staked around the catch basins and/or a woven geotexile material shall be placed in the catch basins until the binder course has been placed. The silt and sand, which may accumulate around the catch basins, shall be removed after every rainstorm.

Small mesh netting shall be installed along the riverfront side of the buildings if any exterior brick or mortar work is proceeding. The purpose of the netting is to prevent debris from falling into the river. Immediately after the exterior work is completed, the netting shall be carefully removed, and the debris properly disposed of.

Catch basins shall be set to binder grade until immediately prior to placement of the top course, at which time they will be set at final grade. The drainage system shall be cleaned prior to acceptance

Work shall commence as soon as practical on the perimeter disturbed areas not to be paved. Four inches (4") of topsoil is to be placed in these areas and the areas hydroseeded. All areas shall be stabilized within sixty (60) days of disturbance. When weather conditions do not permit stabilization by seeding, hay mulch, straw mats, jute netting or other approved means shall be used for temporary stabilization.

INSPECTION AND MAINTENANCE

Prior to construction, the Contractor shall formulate a schedule for inspection and maintenance of the erosion control measures. This schedule shall establish, at a minimum, the weekly inspections of the sedimentation controls, stockpiles, catch basins, unstabilized areas within the site and a report of any required maintenance. The schedule will also appoint an individual who will be responsible for performing the weekly inspections.

During the weekly inspection, and at any time during the course of construction, the Engineer, the Conservation Commission Agent, the Owner or the individual responsible for the erosion control measures may direct the Contractor to take immediate action to correct a deficiency or to increase the erosion control measures.

ADDITIONAL REQUIREMENTS

The contractor shall employ measures to control dust during construction. All debris shall be properly contained and disposed of.

The Massachusetts Mills parking and roadway areas and shall be swept clean of any soils tracked onto the pavement from vehicles exiting the site.

A supply of hay bales and siltation fence shall be kept on site to provide for additional siltation control, as may be required. Any construction equipment observed leaking or dripping oil shall be removed from the site. No construction equipment shall be re-fueled within 200 feet of the resource area.

The above requirements are intended to be a minimum set of guidelines. The contractor shall be responsible for their implementation. Should additional controls be required, the contractor shall take whatever steps are necessary.

Temporary grass stabilization shall be applied at rate of 4-pounds/1,000 sf. and conform to the specifications outlined in Table 1.

Table 1
Seed Mixture

SEED	% WEIGHT
Winter Rye	80.0 Min.
Red Fescue (Creeping)	4.0 Min.
Perennial Rye Grass	3.0 Min.
Red Clover	3.0 Min.
Other Crop Grass	0.5 Min.
Noxious Weed Seed	0.5 Max.
Inert Matter	1.0 Max.

CONSTRUCTION SCHEDULE

A. Prior to construction, sediment control fence shall be installed as indicated on the plan, and silt sacks shall be installed in the existing catch basins.

B. The site utility work building renovation and site improvement work is to commence.

C. Small mesh netting is to be installed prior to commencing any exterior brick and mortar work on river sides of the building.

D. Additional siltation fence or hay bales will be added as construction proceeds where required to control erosion. Sedimentation controls shall be installed along the downhill side of all soil stockpiles.

E. Catch basins shall have either staked haybales placed around the grate or have a geotextile bag installed until the parking area is paved.

F. The pavement subgrade will then be graded, and the gravel and the bituminous base course placed. This shall be completed as soon as practical after the site clearing.

G. All disturbed areas not already stabilized will then be spread with the required a minimum of 4 inches of topsoil and seeded.

H. The drainage system shall be completely operational prior to any paving.

I. The building roof drains will be in operation immediately after the roof is completed.

J. All drainage structures will be cleaned upon completion of construction.

K. The siltation controls shall be removed after the site has stabilized and permission is given by the Lowell Conservation Commission.

BMP MAINTENANCE SCHEDULE FOR CONSTRUCTED SITE

1. Inspect catch basins and Stormceptor Treatment Chambers quarterly if all tributary areas are stabilized with vegetation or monthly if not. Clean out if more than 1/4 full of sediment (1 foot deep in a 4-foot sump). Inspect and clean as necessary after intense rainfall and as soon as practical after winter sanding.

2. Keep all pervious site areas stabilized at all times. Keep any stockpiled earth covered. Remove leaves and trimmings from site.

3. Sweep parking areas and access drives with vacuum sweeper four (4) times annually, once after winter sanding, a second time during the early spring, a third time during the summer and a fourth time during the fall after the foliage has fallen.

4. Stormceptor Recommended Maintenance Procedure
Oil is removed through the 6" inspection/cleanout pipe and sediment is removed through the 24" diameter outlet riser pipe. Alternatively, oil could be removed from the 24" opening if water is removed from the treatment chamber, lowering the oil level below the drop pipes.

The depth of sediment can be measured from the surface of the Stormceptor with a dipstick tube equipped with a ball valve (Sludge Judge). Rinker Materials recommends maintenance be performed once the sediment depth exceeds approximately 8 inches in Model STC 900.

No entry into the unit is required for routine maintenance of the Inlet Stormceptor or the smaller disc insert models of the In-Line Stormceptor. Entry to the level of the by-pass may be required for the servicing of the larger in-line models. Any potential obstructions at the inlet can be observed from the surface. The by-pass chamber has been designed as a platform for authorized maintenance personnel, in the event that an obstruction needs to be removed, drain flushing needs to be performed, or camera surveys are required.

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R-M Developer LLC
Massachusetts Mills III - **PICKER BLDG**
Lowell, Massachusetts

Russell Scott Steedle & Capone Architects Inc.
18 Brattle Street Cambridge Massachusetts 02138 617-661-5880 Fax 661-0613

EROSION CONTROL PLAN

Date: JULY 8, 2014
Rev:
Scale: 1"=20'

C-7

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APPENDIX H:

Public Involvement Letters

Goldman
Environmental
Consultants, Inc.

60 Brooks Drive
Braintree, MA 02184

781-356-9140
Fax 781-356-9147
www.goldmanenvironmental.com

November 30, 2016

Mr. Edward J. Kennedy, Jr., Mayor
City of Lowell
375 Merrimack St., 2nd Floor, Room 50
Lowell, MA 01852

Certified U.S. Mail, Return Receipt Requested

Re: Release Abatement Measure
169.2 Bridge St., Lowell, MA
MassDEP Release Tracking Number (RTN) 3-33474

Dear Mayor Kennedy,

On behalf of Massachusetts Mills III Limited Partnership, owner, and R-M Developer, LLC, agent for owner of Lot 3B, located at 169.2 Bridge St. in Lowell, Massachusetts, Goldman Environmental Consultants, Inc. (GEC) is notifying you, in accordance with 310 CMR 40.1403(3)(d), of the purpose, nature and planned duration of a Release Abatement Measure (RAM).

The courtyard of 169.2 Bridge Street contains soils contaminated with polychlorinated biphenyls (PCBs), lead and other oils and hazardous wastes. The purpose of RAM is to isolate soils to minimize the potential for contact to the contaminated soils by nearby residents and workers. The RAM entails moving the contaminated surface soils to subsurface locations within the courtyard, then to cover the courtyard with a protective barrier, comprised of a marker layer and three feet of clean soils. Clean utility corridors will also be created to minimize the potential for contact to contaminated soils by future utility repair workers.

A copy of the RAM Plan may be obtained by contacting R-M Developer, LLC, c/o Rees-Larkin Development, LLC, 179 Boylston St., Building P, Jamaica Plain, MA 02130 or from MassDEP's Sites Database [http://public.dep.state.ma.us/SearchableSites2/Search.aspx].

Should you have any questions regarding this matter, please do not hesitate to contact Brian Butler of GEC at (781) 356-9140.

Respectfully submitted,
Goldman Environmental Consultants, Inc.

Brian T. Butler, L.S.P.
Sr. V.P., Operations

cc: MassDEP Northeast Region

Goldman
Environmental
Consultants, Inc.

60 Brooks Drive
Braintree, MA 02184

781-356-9140
Fax 781-356-9147
www.goldmanenvironmental.com

November 30, 2016

Mr. Frank Singleton, Director
City of Lowell Health Department
341 Pine Street
Lowell, MA 01851

Certified Mail, Receipt Requested

Re: Release Abatement Measure
169.2 Bridge St., Lowell, MA
MassDEP Release Tracking Number (RTN) 3-33474

Dear Mr. Singleton,

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cc: MassDEP Northeast Region