PCB Impacted Soil Remediation Plan

Sylvan Complex
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1. INTRODUCTION

On behalf of the University of Massachusetts - Amherst (UMass), this Polychlorinated Biphenyl (PCB) Remediation Plan has been developed to present the risk-based disposal plan in accordance with 40 CFR 761.61 (a) and (c) for the excavation and off-site disposal of PCB impacted soils at the property identified by UMass as the Sylvan Complex located at 112 Eastman Lane on the UMass Amherst Campus in Amherst, Massachusetts. A Site Locus map is provided in **Figure 1-1**.

1.1 BACKGROUND

The Sylvan Complex, originally constructed in 1970/71, consists of three similarly constructed residence halls (Brown, McNamara, and Cashin). The buildings are currently used for UMass student housing and contain a total of 64 suites accommodating six to eight residents each.

Between 2011 and 2013, UMass conducted building envelope repairs and roof replacements at each of the three buildings in the Sylvan Complex, including the removal of exterior masonry joints identified as containing PCBs at concentrations up to 218,700 parts per million (ppm). The PCB remediation aspects of the building envelope project were conducted consistent with Remediation Plans submitted to the United States Environmental Protection Agency (EPA) under 40 CFR 761 (Woodard & Curran, 2011, 2012, and 2013); however, a written EPA approval of the remedial activities was not issued (verbal communications and emails only). Consistent with the remediation plans, and once the repair projects were complete on the three buildings, preliminary assessment of ground surfaces surrounding each of the three buildings was conducted. Woodard & Curran conducted surface soil sampling in May 2014 to determine whether PCBs had been released to site soils and additional soil sampling in September and October 2014, July 2015, and July and August 2018 to determine the extent of PCBs.

Based on the results of the sampling activities, which indicated that PCBs were present at concentrations > 1 ppm, UMass evaluated the timing of the excavation of impacted soils with respect to other potential projects within the Sylvan complex. This evaluation established the excavation and off-site disposal of PCB impacted soils as part of the preliminary activities associated with planned landscaping and ground surface modifications within the Sylvan complex and prior to potential utility upgrades in the area. It is the intent of UMass to conduct the PCB soil excavation activities during the 2019 Summer break session.

1.2 SITE DESCRIPTION

The Sylvan Complex is bounded by the perimeter road and Eastman Lane and contains approximately 4.3 acres. The area is approximately 25% paved (asphalt, brick, or concrete surface), 50% unpaved (grassed or landscaped areas), and 25% covered by the three buildings. The topography slopes generally downward to the northwest. The eastern portion of the Site is at an elevation of approximately 127 feet above mean sea level (amsl), and the northwestern portion of the Site is at an elevation of approximately 91 feet amsl. Groundwater is present at depths ranging from approximately 9.5 feet below ground surface (bgs) to approximately 12 feet bgs and appears to flow in a westerly/northwesterly direction across the Site consistent with the change in topography.

A Site Plan showing the location of each of the buildings, ground surface coverings, and other relevant site features is provided as **Figure 1-2**.

1.3 REGULATORY BACKGROUND – MASSACHUSETTS CONTINGENCY PLAN

During the initial assessment, soil samples detected PCBs at concentrations in excess of the Massachusetts Contingency Plan (MCP) reporting requirement for Reportable Concentrations (RC) for S-1 soils (RCS-1) (maximum reported concentration of 1,900 ppm versus 1 ppm) and a Release Notification Form (RNF) was submitted to the Massachusetts Department of Environmental Protection (MassDEP) on September 25, 2014 under the 120-day notification provisions. Following the notification, the MassDEP issued a Notice of Responsibility (NOR) on October 2, 2014, which required, in part, the submittal of a report summarizing the environmental assessment activities completed

to date as they related to PCBs in soils. That report was submitted to MassDEP on October 31, 2014 (Woodard & Curran, 2014). An imminent hazard evaluation was performed at the Site in 2014 and 2015 due to the concentrations of PCBs detected in soils in select locations. The evaluation concluded that an imminent hazard, as defined in the MCP, did not exist at the Site. On November 20, 2014, MassDEP conducted a site visit to observe site conditions and confirmed to UMass that an imminent hazard condition did not exist at the Site.

In accordance with MCP requirements, A Phase I Initial Site Investigation, Tier Classification, and Conceptual Phase II Site Assessment Scope of Work was submitted to MassDEP on September 24, 2015, classifying the Site as a Tier II Site. The Phase II Comprehensive Site Assessment Report, including a Method 1 Risk Characterization, was submitted to the MassDEP on September 19, 2018. To maintain compliance with the MCP, UMass intends to conduct the PCB-impacted soil excavation as a Release Abatement Measure (RAM) and file a Permanent Solution Statement prior to the September 2019 Phase III Remedial Action Plan and Phase IV Remedy Implementation deadline.

1.4 REGULATORY BACKGROUND – PREVIOUS SOIL RESPONSE ACTIONS – 40 CFR 761

In 2012 and 2013, UMass replaced the emergency generators at the three buildings within the Sylvan Complex. As part of the replacement, soils were required to be removed to depths of either three or four feet for the construction of concrete pads for the new generators. Due to the presence of PCBs at concentrations ≥ 50 ppm in the expansion joint caulking, UMass elected to dispose of the excavated soils at a hazardous waste landfill (Environmental Quality's Wayne Disposal Landfill in Belleville, Michigan [currently operated by US Ecology] or Waste Management's Model City Landfill in Model City, New York) under the conservative assumption that PCBs could be present in soils and to comply with the requirements of 40 CFR 761.61 (b) (i.e., no analytical testing was completed to confirm PCB presence or concentration prior to excavation).

Following excavation, verification soil samples were collected from the base of the excavations on a 5-foot sampling grid to comply with the requirements of 40 CFR 761 Subpart O and submitted for PCB analysis. Analytical results from samples collected at both Brown and McNamara indicated that PCBs were not present at concentrations greater than 1 ppm. Results from verification samples collected following the excavation at Cashin indicated that PCBs were present at concentrations up to 9.9 ppm. Based on these results, additional soil was excavated and disposed off-site at Environmental Quality's Wayne Disposal Landfill in Belleville, Michigan in accordance with 40 CFR 761.61(b). Results from subsequent verification samples indicated that PCBs were either non-detect or present at concentrations less than 1 ppm. Approximately 207 tons of soil were excavated from the three areas and disposed off-site as part of the emergency generator excavation.

1.5 OBJECTIVE

The objective of this PCB Remediation Plan is to present: the nature and extent of PCBs > 1 ppm in soils and other media within the Sylvan complex; the cleanup levels to be used to guide the cleanup; the cleanup plan to achieve the cleanup levels, the verification sampling and analyses plan, and the types of disposal facilities for the impacted media.

1.6 PLAN ORGANIZATION

This PCB Remediation Plan is organized into the following sections:

Section 2: Characterization Activities

The site characterization section provides a summary of the characterization samples collected to date from various media including soil, asphalt and brick ground surfaces, and accumulated solids within the storm water catch basins. This section presents the nature and extent of PCB impacts and provides summary analytical data tables and figures depicting the locations of the various samples collected.

Section 3: Remediation and Verification Plan

This section includes a discussion of the remedial objectives and cleanup levels, the remediation approach for the various PCB-impacted media, and the proposed verification sampling program. This section includes site figures depicting the areas proposed for excavation and locations for the verification sampling to be conducted.

Section 4: Schedule

The implementation and reporting schedule is provided in Section 4.

Written certification signed by the Owner of the property as required by 40 CFR 761.61 is provided in **Appendix A**.

2. CHARACTERIZATION ACTIVITIES

As previously noted, between 2011 and 2013, UMass conducted building envelope repairs at each of the three buildings in the Sylvan Complex, including the removal of PCB-containing caulking from exterior masonry joints. Once the repair projects were complete on the three buildings, preliminary assessment of ground surfaces surrounding each of the three buildings was conducted. The initial investigation activities, conducted in 2014, focused on the collection of samples from soil profiles around the three buildings. Samples were collected at the base of vertical control joints to evaluate the presence/absence of PCBs at assumed worse-case locations and along the face of the building away from vertical joints to evaluate locations that were not directly adjacent to known source (caulking) locations.

Results from the initial phase of soil investigation were used to develop the sampling approach for the remaining phases. The investigation was conducted in September and October of 2014, in July of 2015, and in July and August of 2018. The sampling focused (in a step-wise manner) on collecting data for the following purposes:

- Determining the presence/absence of ≥ 50 ppm PCBs in soils;
- Evaluating whether or not there was a difference in the vertical profiles of PCBs impacts within the recessed areas based on distance away from the vertical joints;
- Delineating the lateral and vertical extent of PCB impacts greater than 1 ppm; and
- Evaluating whether or not other media were impacted by PCBs (asphalt walks, brick pads, accumulated solids in catch basins).

For presentation purposes, the soils have been divided into two groups based on proximity to the former vertical caulked joints (presumed primary PCB source) as follows:

- Building Recess Areas (i.e., where the joints terminated at the ground surface); and
- Areas Away from the Recesses (where vertical joints terminating at the ground surface were not present).

Within the recessed areas, the sampling program was developed based on the presumed source of the PCBs (former vertical caulked joints) to the ground surface and the conceptual site model of decreasing PCB concentrations with distance away from the joints. This site model supports the evaluation of PCB concentrations based on soil profiles instead of a grid-based sampling approach as prescribed under 40 CFR 761 Subpart N. Outside the recessed areas, a grid-based sampling program was developed based on the overall size of the impacted areas and the relatively consistent results collected from around the buildings.

A depiction of these two areas and other major building features is presented on **Figure 2-1**. A summary of the characterization sampling methods and results for each of the groups is provided in the sections below. The locations of the samples are presented on **Figure 2-2** and the analytical results are presented on **Tables 1** and **2.** The complete analytical laboratory reports are provided in electronic format in **Appendix B**.

2.1 SOIL SAMPLING METHODS

Surficial soil samples were collected from 0 to 3 inches in depth using trowels. For deeper samples, the soils above the required sample interval were removed using hand tools (shovels, post hole diggers, etc.) prior to sample collection. All samples were placed into laboratory provided sample containers and transferred to the analytical laboratory under standard chain of custody procedures. Samples were submitted for extraction via USEPA method 3540C (Soxhlet Extraction) and analyzed for PCBs vis USEPA method 8082A.

Sampling equipment was decontaminated with an alconox scrub followed by a final wipe with a d-limonene dampened paper towel.

2.2 DATA QUALITY EVALUATION

Following receipt of the analytical laboratory reports, a data quality and usability assessment was conducted to verify the data was suitable for the delineation of the extent of PCB impacts in soils. Data validation and review of samples was conducted by both Woodard & Curran and a third-party validator, Data Check, Inc. of New Durham, New Hampshire.

This review included a check of field documentation including sample collection and preservation methods, a check of the laboratory data and documentation, a review of the internal laboratory QA/QC procedures and results including surrogate recoveries, blank results, laboratory control standard (LCS) and laboratory control standard duplicate (LCSD) results, and an evaluation of sample holding times and field duplicate results. Data validation summary is provided in **Appendix B**.

- All samples analyzed for PCBs were extracted and analyzed within technical holding times. No qualifications were applied to the data;
- Some samples were analyzed at dilutions due to the high concentrations of PCBs present in the samples and/or due to the sample matrix. Elevated quantitation limits (laboratory reporting limits) are reported in these samples as a result of the dilutions performed;
- The PCB method blanks were non-detect (ND) for all target analytes. No qualifications were applied;
- Ten field equipment blank samples were collected for equipment used for the collection of the characterization samples and submitted to the laboratory as part of the field QA/QC procedures. Results from the blank sample were ND for the target analytes. No qualifications were applied to the data;
- Results of the matrix spike/matrix spike duplicate (MS/MSD) samples met acceptance criteria with the exception of percent recoveries due to interferences from other Aroclors in the primary sample. No qualification were applied to the data;
- Accuracy of the analytical data was assessed by reviewing LCS/LCSD and surrogate recoveries. The recoveries for LCS/LCSD sample results met acceptance criteria. Surrogate recoveries for several samples did not meet the recovery limits due to either high analyte concentrations (dilutions) or matrix interferences. No qualifications were applied to the data;
- Sixteen field duplicate samples were collected and submitted to the laboratory as part of the field QA/QC procedures. RPD between the primary and duplicate samples did not meet the acceptance criteria in six of the samples. Detected results in those samples were estimated (J) as noted on the applicable data tables;
- The Relative Percent Difference (RPD) between the column results met the acceptance criteria (≤ 25%) for the majority of samples; Aroclor results for samples that did not meet the acceptance criteria were qualified as J as noted on the applicable data tables;
- Representativeness of the data was evaluated qualitatively utilizing site information and sampling data. Samples were extracted and analyzed within the allowable holding times. Consistent procedures and laboratory analysis of the data were achieved. Samples were accompanied by complete chain of custody forms from the time of sample collection until laboratory delivery. PCBs were not detected in the method blank analysis, indicated that there were no interferences introduced at the laboratory or during sample analysis; and
- The data packages were reviewed to ensure that all sample and associated quality assurance results were available. The completeness review indicated that all samples were analyzed and all quality control results were available to complete the data validation process.

Based on the results of the review, all data was considered usable for the intended purposes (determining the nature and extent of PCB impacts in soils). Copies of the validation summaries provided by Data Check, Inc. are included in **Appendix B**.

2.3 BUILDING RECESS AREAS

There are a total of 36 recessed areas around the Sylvan Complex buildings (12 per building) that contain vertical control joints on the "inner" 90-degree angles of the brick facade (see **Figure 2-1**). Of these recessed areas, three are located above the loading docks (one per building), six are located above the asphalt walkways at the ends of the buildings (two per building), and three are located above the brick pads and main entryways (one per building). Within the remaining 24 recessed areas, 69 of the 72 vertical joints terminate on soil and three terminate at the top of the large sloped concrete and stone retaining walls (one per building).

Following completion of the building envelope repair projects at the three buildings, which included the removal and replacement of the caulking within the joints, soil samples were collected at the base of the vertical control joints and at increasing depths and distances from the joints to evaluate the distribution of PCB impacts in soils within the recessed areas. At least one characterization soil sample was collected in each recess. The locations of the samples described above are presented on Figure 2-2. A summary of the results is provided on Table 1 and the complete analytical laboratory reports are provided in Appendix B.

Base of the Joint

- A total of 45 samples were collected from surficial soils (0-3 inches [in]) at the base of the 69 vertical joints to evaluate the presence/absence of PCBs ≥ 50 ppm at these worse-case locations. A minimum of 1 sample was collected in each of the 24 recessed areas with joints terminating on soil. Analytical results indicated the following:
    - Total PCBs were reported at concentrations ≥ 50 ppm in 19 of the 45 samples collected with a maximum reported concentration of 1,900 ppm;
    - Total PCBs were reported at concentrations > 1 ppm and ≤ 50 ppm in 26 of the samples (minimum reported concentration of 2.62 ppm and including 10 samples with total PCBs reported at concentrations > 25 ppm and < 50 ppm); and
    - Total PCBs were not reported at concentrations < 1 ppm.
- A total of 12 samples were collected at the base of the joints at a depth of 12-15 in bgs. Analytical results indicated that PCBs were present at concentrations > 1 ppm at six of these locations with a maximum concentration of 7.4 ppm. Analytical results from the other six locations indicated that PCBs were non-detect (< 0.11 ppm) or present at concentrations of 0.18, 0.34, 0.98, 1.03 and 1.06 ppm.
- A total of 12 samples were collected at the base of the joints at a depth of 24-27 in bgs. Analytical results indicated that PCBs were present at concentrations > 1 ppm at one location (2.4 ppm). The remaining results indicated that PCBs were either non-detect (seven samples at < 0.11 or < 0.12 ppm) or present at concentrations ≤ 1 ppm with total PCBs reported at concentrations of 0.71, 0.35, 0.22, and 0.56 ppm. Given the overall data set, it is believed that the one location with PCBs > 1 ppm is not representative of deeper soils and may have been due to soils falling from upper soils to the deeper interval during the sampling process.

Away from the Vertical Joint

- Ten surficial soil samples (0-3 in bgs) were collected at a distance of 10 lateral feet along the building wall from the vertical joints within the recessed areas. Analytical results indicated that PCBs were present at concentrations ranging from 1.55 to 23.6 ppm.

- Ten soil samples were also collected at a depth of 12-15 in bgs at a distance of 10 lateral feet along the building wall from the vertical joints within the recessed areas. Analytical results indicated PCBs were either non-detect (two samples at less than 0.11 ppm) or present at concentrations ≤ 1 ppm (eight samples with a maximum concentration of 1.04 ppm).
- To determine if there was a difference in the vertical profile of PCB impacts with increasing distance away from the vertical joints, seven soil samples were collected at a lateral distance of 5 lateral feet along the building wall from the base of the vertical joint at a depth of 12-15 in bgs. Analytical results from three of these locations indicated that PCBs were present at concentrations > 1 ppm with a maximum concentration of 2.7 ppm. The remaining four samples indicated that PCBs were present at concentrations ranging from 0.11 to 0.78 ppm.
- Three surficial soil samples (0-3 in bgs; 1 per building) were collected at a lateral distance of 20 feet from vertical joints within the recessed areas (samples were located at the edge of the recessed areas and approximately 10 lateral feet from the building walls). Analytical results indicated PCBs were present at concentrations of 0.97, 1.03, and 1.4 ppm.

Summary of Results

The data collected from samples within the recessed areas suggest PCB concentrations decrease with increasing depths and distance away from the vertical joints along the base of the building walls.

Based on the variability in results immediately below the caulked joints, soils at the base of 40 of the 69 joints terminating on soils have been classified as containing ≥ 50 ppm to a depth of 18 inches bgs. These include the 19 locations with reported PCBs ≥ 50 ppm; 11 locations with reported PCBs > 25 ppm; and 10 locations where soil samples were not collected (assumed concentrations). Soils at the base of the other 29 locations where samples were reported < 25 ppm have been classified as containing PCBs > 1 and < 50 ppm. Soils at depths below 18 in bgs are classified as containing PCBs ≤ 1 ppm (to be verified following excavation). Soils within recessed areas that are located greater than ten lateral feet along the building walls from the vertical joints (and along a line connecting such points), have been characterized as containing PCBs > 1 and < 50 ppm.

2.4 AREAS AWAY FROM THE BUILDING RECESSES

Soils beyond the recessed areas were sampled to assess the extent of PCBs in soils without a direct PCB source terminating at the ground surfaces (i.e., the former vertical joints). Samples were collected at lateral distances up to 45 feet perpendicular to the buildings and at depths of up to 24-27 in bgs (at the base of the building only). The locations of the samples described above are presented on Figure 2-2. A summary of the results is provided on Table 2 and the complete analytical laboratory reports are provided in Appendix B. A summary of analytical results is presented below.

Immediately adjacent to base building

- Six samples of surficial soils (0-3 in bgs) were collected from locations at the base of the buildings (2 samples at each of the three buildings) but away from the vertical control joints to evaluate the extent of PCBs in areas without a direct transfer path to the soils. Analytical results indicated that PCBs ranged from 1.58 to 10.7 ppm.
- Six samples were collected from soils at the base of the building walls and at a depth of 12-15 in bgs (two samples at each of the three buildings). Analytical results from four of the six samples reported PCBs as either non-detect (one sample at < 0.10 ppm) or present at concentrations < 1 ppm (total PCB of 0.35, 0.55, and 0.71 ppm). Analytical results from two samples indicated PCBs were present at concentrations > 1 ppm with reported concentrations of 1.4 and 1.6 ppm (both samples collected from Cashin).

- Six samples were collected at a depth of 24-27 in bgs (two samples at each of the three buildings). Analytical results indicated that PCBs were either non-detect (five samples at < 0.10 or < 0.11 ppm) or present at a concentration of 0.11 ppm.

Based on the analytical results described above, PCBs in soils at the base of the building in areas away from the vertical joints were consistent with impacts to shallow soils at distances greater than ten feet from the vertical joints in the recessed areas. This data supported the conceptual site model that PCBs in soils appeared to have originated primarily from the former vertical caulked joints and decrease in concentration with distance from the vertical joints.

Areas Away from the Base of the Building

Characterization samples of soils away from the building were collected to delineate the lateral and vertical extent of PCBs in soils away from the building. Samples were collected at lateral distances of up to 45 feet perpendicular from the building and at depths of up to 12-15 in bgs. A summary of the results of the sampling for each building is presented below.

- Cashin – A total of 49 characterization samples were collected from soils at the Cashin building. A summary of the analytical results for surficial and deeper soils is as follows:
    - Surficial Soils – Analytical results for the 35 surficial soil samples (0-3 in bgs) indicated that PCBs were present to distances between 10 and 25 feet from the building in most areas surrounding the Cashin building. The exception to this is along a portion of the north side of the building where analytical results indicate that PCBs were limited to soils within 5 feet of the building. Overall, the extent of PCBs > 1 ppm in shallow soils is slightly greater along the south and west sides of Cashin than it is on the north and east sides. This variation in distance generally corresponds to the areas where the ground surface slopes away from the building.
    - Deeper Soils – Analytical results from the 14 samples collected from depths of 6-9 in bgs (one sample due to obstruction at depth) and 12-15 in bgs indicated that PCBs were either non-detect (samples at < 0.11 ppm or < 0.12 ppm) or present at concentrations ≤ 1 ppm (total PCBs reported at concentrations up to 0.47 ppm).
- Brown – A total of 53 characterization samples were collected from soils at the Brown building. A summary of the analytical results for surficial and deeper soils is as follows:
    - Surficial Soils – Analytical results for 43 samples indicated that PCBs were present in surficial soils (0-3 in bgs) to a distance of approximately 10 feet from the building along the majority of the south and west sides of the building. On the east side of the building, PCBs > 1 ppm were limited to soils within 15 to 20 feet from the building including a portion of the area off the northeast corner. Analytical results indicated that PCBs > 1 ppm were present in soils samples collected away from the north side of the building (1.67 ppm 10 feet from the building) and off the southwest corner of the building (1.4 and 1.6 ppm at distances of 5 and 10 feet, respectively).
    - Deeper Soils – Analytical results from 8 of the 10 samples collected from depths of 12-15 in bgs indicated that PCBs were either non-detect (samples at < 0.11 and < 0.12 ppm) or present at concentrations ≤ 1 ppm (4 samples at 0.11, 0.14, 0.15, and 0.35 ppm). Analytical results from two samples (collected on the east side of the building) indicated that PCBs were present at a concentration of 2.8 and 5.2 ppm.
- McNamara – A total of 59 characterization samples were collected from soils at the McNamara building. A summary of the analytical results for surficial and deeper soils is as follows:
    - Surficial Soils – Analytical results for 41 samples indicated that PCBs were present in surficial soils (0-3 in bgs) to distances of up to 45 feet from the McNamara building with > 1 ppm concentrations typically limited to soils within distances of between 10 and 20 feet from the building with the

exceptions of the southwest and southeast corners of the building and a limited portion of soils to the north.

- Deeper Soils – Analytical results from 16 of 17 samples collected from depths of 12 to 15 in bgs indicated that PCBs were either non-detect (seven samples at < 0.11 ppm) or present at concentrations ≤ 1 ppm (total PCBs reported at concentrations up to 0.85 ppm). One sample from the southeast portion of the building was reported at concentrations > 1 ppm (total PCBs reported at a concentration of 2.6 ppm).

Summary of Results

Outside the recessed areas, PCBs > 1 ppm were identified in surface soils. Laterally, the extent of PCBs > 1 ppm was typically defined between 5 and 20 feet from the buildings with areas of impacts extending up to 45 feet from the buildings in some areas. Vertically, soils containing PCBs > 1 ppm are generally limited to the upper 12 inches of soil in areas further from the buildings. In the majority of locations where samples were collected from multiple depths, PCB concentrations decreased with increasing depth.

2.5 ASPHALT

Asphalt samples were collected from each of the six walkways located on the ends of the buildings (three samples at each building). Samples were collected using a rotary impact hammer drill to collect asphalt materials from 0 to 0.5 inches in depth and submitted for PCB analysis. During the first round of sampling in May 2014, one sample per walkway was collected at the base of the building to evaluate potential worse-case conditions (i.e., directly below the former vertical caulked joints located above the entrance doors). Analytical results indicated that PCBs were present at concentrations > 1 ppm in four of the six samples with concentrations up to 8.5 ppm. Analytical results from the other two samples indicated that PCBs were present at concentrations of 0.89 and 0.91 ppm.

Based on these results, one additional sample was collected at each building during the second round of sampling in September 2014 to delineate the horizontal extent of PCB impacts > 1 ppm. Results from the second round of sampling indicated that at a distance of 10 feet from the building, the concentrations of PCBs decreased but remained > 1 ppm at the three locations (1.6, 2.6, and 2.9 ppm). Based on these results additional characterization sampling will be required to verify the extent of PCB impacts > 1 ppm.

Sample locations are depicted on **Figure 2-2**. A summary of the analytical results is presented on **Table 3**.

2.6 GROUND SURFACE BRICK PADS

Brick pads are present on either side of the main entrances for each building (two per building). Based on the presence of a vertical caulked joint above each pad, one brick sample was collected directly below the joint at each of the six pads. Samples were collected to a depth of 0.5 inches using a rotary impact hammer drill and submitted for PCB analysis. Analytical results indicated that PCBs were non-detect in three of the samples collected and present at concentrations of 0.25 ppm, 0.45 ppm, and 2.7 ppm (one of the samples collected from the McNamara building). Sample locations are depicted on **Figure 2-2**. A summary of the analytical results is presented on **Table 3**.

2.7 STONE AND CONCRETE RETAINING WALLS

A sloped stone and concrete retaining wall is present at each building to the left or right of the main entries in areas of significant topography (the south sides of McNamara and Cashin and the east side of Brown). As noted in Section 2.1 above, vertical joints terminate at the top of the retaining walls (one per building). Due to the steepness of the slopes of the walls, characterization samples were not collected at the base of the vertical joints. However, based on the results of the samples collected from the brick pads (5 of 6 either non-detect or < 1 ppm), PCB impacts to these surfaces are not anticipated and additional evaluation is not proposed based on the inaccessible nature of those surfaces. Photos of two of the retaining walls are presented below.

Typical Stone and Concrete Retaining Walls

2.8 STORMWATER CATCH BASINS

Catch basins, located throughout the Sylvan complex, collect storm water runoff at the Site. Field observations and general topography indicate that for a significant portion of the areas around the three buildings, rainwater infiltrates directly into the ground and does not enter the storm drain system (areas of pooling and standing water were present during rain events and the topography is generally flat in the recessed areas and areas immediately around the buildings).

Based on field observations, measurements, and information provided by UMass Facilities department, stormwater from the Sylvan area is directed through two primary branches. The eastern branch collects runoff from around Cashin and the eastern side of McNamara. The western branch collects runoff from around portions of Brown (primarily west and north) and from the west side of McNamara. The two branches join up in a manhole at the northern end of the Sylvan Complex. From that manhole, stormwater is directed to an unnamed stream approximately 500 feet north of the site. The storm drainage system and catch basins are shown on **Figures 1-2 and 2-2**.

Based on the site topography, extent of PCB impacted soils, and observed run-off patterns, portions of each of the two branches were investigated due to the potential for run-off from PCB impacted areas to enter those parts of the storm drain system. Remaining portions of the system (i.e., those located topographically upgradient or side gradient from impacted areas and those separated from impacted areas by physical barriers such as curb lines) were not investigated.

On August 14, 2018, the respective catch basins and storm drain system manholes were inspected for accumulated solids and flow patterns. Results of the inspection indicated that accumulated solids were present to varying degrees in the catch basins. Accumulated solids were not observed in the manhole at the "downstream end" of the system (i.e., the last point before the outfall) nor were they observed in the discharge pipe at the outfall.

To evaluate whether or not PCB impacts were present in the accumulated solids, three samples were collected for laboratory analysis. One sample was collected from a catch basin in the vicinity of each of the three buildings which included materials from the east and west branches of the storm drain system. The specific sample locations, and analytical results from each were as follows (results are also presented on **Table 3** and **Figure 2-2**):

- Cashin – One sample was collected from a catch basin off the southeast corner of the Cashin building from within the limits of the identified PCB impacted soils. The catch basin was part of the eastern branch and was located at a low topographical point which would receive runoff from the southern side of the building.

Analytical results from this sample reported PCBs at a concentration of 2.9 ppm. Based on these results, an additional sample collected from the most downstream catch basin in the eastern branch of the system was submitted and reported to contain PCBs at a concentration of 0.26 ppm.

- McNamara – One sample was collected from a catch basin off the southwest corner of the McNamara building. This catch basin was part of the western branch of the system and, similar to Cashin, was within the limits of the identified PCB impacted soils and in a low topographic point which would receive runoff from the south side of the building. Analytical results from the sample collected reported PCBs as non-detect (< 0.095 ppm).

- Brown – One sample was collected from a catch basin off the north end of the Brown building and within the western branch of the storm drain system (located "downstream" of the catch basin sampled at McNamara). The catch basin was outside the limits of identified PCB impacted soils but at the end of an area of apparent surface run-off away from the Brown building. Analytical results reported PCBs at a concentration of 0.47 ppm.

Based on the observations and analytical results, accumulated solids in catch basins that are a part of the east branch of the storm drain system and are located within the footprint of the PCB impacted soils have been assumed/considered to contain PCBs (four catch basins). As indicated in Section 3.4, additional characterization sampling is proposed in the other catch basins along this branch.

2.9 GROUNDWATER SAMPLING

On July 12, 2018, Woodard & Curran sampled the three monitoring wells (MW-1, MW-2, and MW-3) installed at the Site. Prior to sampling, the wells were purged and sampled following sufficient recharge. Depth to water ranged from 9.65 ft bgs at MW-2 to 12.01 ft bgs at MW-3. No visual or olfactory issues were noted during sampling.

Each well was sampled using low-flow techniques and analyzed for PCBs by EPA method 8082A (SW-846). Analytical results reported PCBs as non-detect (< 0.20 ug/L) in the three samples. The analytical laboratory report is provided in **Appendix B**.

3. REMEDIATION AND VERIFICATION PLAN

This section presents a summary of the remediation and verification sampling plans for the project.

3.1 CONCEPTUAL SITE MODEL

Renovations to the three buildings conducted in 2011 through 2013 included the remediation of PCB-containing caulking from horizontal and vertical control joints on the exterior of the brick façade. Results of soil characterization sampling conducted after remediation of the caulking was complete, indicated that PCBs are present in soils surrounding the three buildings with decreasing concentrations with lateral distance and depth away from the buildings, in particular the vertical control joints in the building recesses.

Based on these results, PCB impacts to soils are considered to be from the former PCB-containing caulking and likely due to degradation and weathering of the caulking over time. Specifically, the highest contribution of PCBs to soils appears to be from the former vertical caulked joints which terminate directly at the ground surface.

Within the recessed areas, soils containing ≥ 50 ppm PCBs are considered to be present at the base of 40 of the 69 vertical joints that terminate on soils. These impacts are considered present to a distance of 10 lateral feet from the vertical joints. Soils at the base of the remaining 29 vertical joints and those soils within the recessed areas that are greater than ten lateral feet from the base of the vertical joints have been considered > 1 and < 50 ppm PCB impacted soils. Vertically, PCB impacted soils are considered limited to the upper 18 inches of soil at locations within 10 feet of the vertical control joints and the upper 12 inches of soil in areas further from the buildings.

Outside the recessed areas, the extent of PCBs > 1 ppm was typically defined between 5 and 20 feet from the buildings with areas of impacts extending up to 45 feet from the buildings in some areas. Vertically, soils containing PCBs > 1 ppm away from the building are limited to the upper 12 inches of soil.

PCB impacts have also been identified in brick and asphalt below the vertical joints with decreasing concentrations away from the building and in limited portions of the storm drain system where solids have accumulated over time from within the PCB soil impacted areas. PCB-impacted media (soil, brick, asphalt, and accumulate solids) meet the definition of bulk PCB Remediation Waste as defined in 40 CFR 761 and are subject to remediation in accordance with 40 CFR 761.61.

Locations of the PCB impacted areas are presented on **Figure 3-1**.

3.2 CLEAN UP LEVELS

In accordance with 40 CFR 761.61, the cleanup level for soils, asphalt, and brick during this project has been set at the high occupancy clean up level of ≤ 1 ppm for unrestricted use (40 CFR 761.61(a)(4). This level also corresponds to the applicable RCS-1 standard under the MCP. As described in Section 3.6.3 below, if materials containing > 1 ppm are required to remain on site (e.g., within rootballs of trees that cannot be eliminated), a risk-based evaluation will be conducted in accordance with the requirements of the MCP to verify that the remaining concentrations will result in a condition of no significant risk for human health or the environment and a modification to this Notification will be submitted to EPA outlining an in-place management approach.

Given that the catch basins are totally enclosed/contained (concrete sides and bottom), as well as the relatively low reported concentrations of PCBs in the accumulated solid samples collected, the proposed clean up standard for the removal of the accumulated solids will be visual confirmation that accumulated solids have been removed. No bulk testing of the catch basin structure is proposed to verify the remediation is complete.

3.3 GENERAL OVERVIEW OF PROPOSED REMEDIATION

The work described in this plan includes the remediation of soils and other media reported to contain PCBs > 1 ppm in accordance with 40 CFR 761.61. The proposed remediation includes the excavation and off-site disposal of PCB impacted soils, asphalt walk surfaces, brick pad surfaces, and accumulated solids from catch basins as bulk PCB remediation waste. A summary of the various areas and anticipated volumes of materials is provided below:

- Excavation and off-site disposal of soils containing PCBs ≥ 50 ppm from an area approximately 1,700 square feet and to depths of 18 inches below grade (approximately 95 cubic yards of in-place soils is estimated);
- Excavation and off-site disposal of soils containing PCBs > 1 and < 50 ppm from an area approximately 22,280 square feet and to depths of 12 to 18 inches below grade (approximately 1,100 cubic yards of in-place soils is estimated);
- Removal and off-site disposal of asphalt and brick pad ground surface materials containing > 1 and < 50 ppm PCBs from an area approximately 570 square feet (approximately 5 cubic yards of material is estimated); and
- Removal of accumulated solids containing > 1 and < 50 ppm PCBs from 4 catch basins within the east branch of the Sylvan Complex stormwater system that are present within the extent of PCB impacted soils (estimated at ½ a cubic yard or less of material per catch basin).

The above materials will be removed for off-site disposal to a landfill permitted to accept bulk PCB remediation waste at the indicated concentrations. The locations of each of the above areas are depicted on **Figure 3-1.** Prior to the remedial activities, site preparations and controls will be established and implemented.

3.4 PRE-EXCAVATION CHARACTERIZATION SAMPLING

Prior to the excavation, additional sampling will be conducted in the following areas:

- Cashin Hall Southwest Corner – analytical results from one soil sample reported PCBs at a concentration of 1.32 ppm at the base of the slope off the southwest corner of Cashin; one soil sample will be collected at the edge of the asphalt walkway to verify the extent of PCBs > 1 ppm in this area.
- Brown Hall West Side – analytical results from two soil samples collected five and ten feet from the building on either side of the asphalt drive leading to the loading dock reported PCBs at concentrations of 1.4 and 1.6 ppm, respectively; two soil samples will be collected in this area, one at a distance of 10 feet from the building on the south side of the asphalt and one at a distance of 15 feet from the building on the north side of the loading dock.
- Brown Hall Northeast Corner – analytical results from one soil sample reported PCBs at a concentration of 1.67 ppm approximately ten feet north of Brown; two soil samples will be collected 15 feet from the face of the building to verify the extent of PCBs > 1 ppm in this area.
- Asphalt Walkways – prior to removals, additional verification samples will be collected to verify the lateral extent of the removal. At each of the four asphalt walks designated for removal, one sample will be collected at a distance of 10 feet from the building.
- Accumulated Solids in Catch Basins –one sample of accumulated solids will be collected from the three catch basins in the eastern branch of the stormwater system that have not been previously characterized. If results indicate that PCBs > 1 ppm are present, the accumulated solids from the individual catch basin will be removed for off-site disposal.

Samples will be collected in accordance with the procedures presented in Section 2. In addition to the primary samples, one duplicate sample will be collected for each media and one equipment blank sample will be collected for equipment used for soil and asphalt sampling (two samples). Samples will be transferred under standard chain of custody procedures to the analytical laboratory for extraction via USEPA method 3540C (Soxhlet extraction) and analyzed for PCBs via USEPA method 8082A. The locations of the pre-removal verification samples are presented on **Figure 3-2**.

3.5 SITE PREPARATION AND CONTROLS

Prior to initiating the soil excavation and other media removals, the following site controls will be implemented:

- A Health & Safety Plan will be developed specific to the work activities. All workers will follow applicable Federal and State regulations regarding the work activities, including but not limited to OSHA regulations, respiratory protection, personal protective equipment, etc.
- Additional notifications and plans required for the work activities will be prepared and submitted for approval, as needed. This includes the MCP RAM Plan for the soils under the MCP.
- Prior to any work, the boundaries of the excavation area will be marked, properly secured, and a permit number obtained from Dig Safe.
- No students or other faculty will be residing in any of the buildings during the work activities.
- Access to the active work areas will be controlled with signage and caution tape. Access to the three buildings by Residential Life and Maintenance personnel will be required periodically during the remediation activities. Coordination between Residential Life and the project team will be used to maintain proper access to the three buildings via either the basement level loading docks or the first-floor main entries.
- Water misting will be used as a dust suppressant, as appropriate.

Air monitoring within the support work zone and perimeter to this zone will be conducted during the active removal of soils. To reduce dust levels and exposures to dust, a combination of engineering controls and personal protective equipment will be implemented as part of the work activities. A perimeter dust monitoring plan is provided in **Appendix C**.

3.6 SOIL REMOVAL AND VERIFICATION SAMPLING AND ANALYSES PLAN

Soils designated for removal will be excavated and transported off-site for disposal as bulk PCB remediation waste in accordance with 40 CFR 761.61 and the applicable MCP regulations under 310 CMR 40.000.

Excavated soils will be segregated for disposal as either ≥ 50 ppm PCB remediation waste or < 50 ppm PCB remediation waste. Prior to excavation, the extent of the ≥ 50 ppm soils will be marked out in the field to identify the segregation areas for the soils. Based on the limited quantity of ≥ 50 ppm soils (95 cubic yards), it is anticipated that the selected contractor will remove the ≥ 50 ppm soils from around each building prior to removing the < 50 ppm soils. However, final sequencing of the excavation will be dependent on the selected contractor and the sequencing developed for implementation.

Excavation of soils shall be conducted using an excavator and loaded directly into trailers for off-site disposal or placed into roll-off containers for temporary on-site storage prior to off-site disposal. All containers will be lined, labeled, and stored in accordance with applicable DOT regulations and 40 CFR 761.45 and 40 CFR 761.65.

Following completion of the initial and any subsequent soil excavations (if initial verification samples do not meet the cleanup levels), verification samples will be collected from the base and sidewalls of the excavation to confirm that PCBs > 1 ppm have been removed. The locations of the verification soil samples are presented on **Figure 3-2** and a summary of the sampling program is provided in the sections below.

3.6.1 Soil Excavation Base Sampling Program

Verification samples will be collected to confirm the vertical depth of excavation was adequate to remove PCBs > 1 ppm. Sample locations will be selected by placing a 10-foot grid over the recessed areas and a 20-foot grid over the areas away from the building.

Within the recessed areas, one sample will be collected from the center point of each 10-foot grid. A total of 60 samples (20 per building) will be collected from within the recessed areas. In areas away from the building, one verification sample will be collected at the base of the excavation within each grid that overlaps the excavation. Samples will be spaced to provide an approximate 20-foot sampling frequency around the perimeter of the buildings and away from the buildings (approximately 90 samples). Verification samples will be collected over a 3-inch sample interval from the base of the excavation and submitted to the analytical laboratory for extraction via USEPA method 3540C (Soxhlet extraction) and PCB analysis via USEPA method 8082A. Analytical results will be evaluated as follows:

- Total PCBs ≤ 1 ppm – excavation complete; no additional removals required.
- Total PCBs > 1 ppm – additional 6-inch lift of soils to be removed to the mid-point between the next sample location in all directions and follow up verification samples to be collected.

3.6.2 Soil Excavation Sidewall Sampling Program

In addition to the samples collected at the base of the excavations, sidewall samples will be collected at those locations where the excavation is bounded by the surrounding asphalt surfaces. In these areas, one sample will be collected below the edge of the asphalt from the upper three inches of soils below the asphalt (based on the surficial release site model) at a frequency of one sample for every 20-foot grid.

Following excavation, the results of verification sampling will be evaluated as follows:

- Total PCBs ≤ 1 ppm – excavation complete; no additional removals required.
- Total PCBs > 1 ppm – lateral extent of the excavation to be extended including the removal of asphalt ground surfaces and follow up verification samples to be collected.

3.6.3 Rootballs

In limited portions of the excavation areas, the lateral or vertical extent of soil removal may be limited due to the presence of trees and associated rootballs. Based on the current extent of the excavation and the locations of trees around the three buildings, this concern is anticipated to be encountered in the northern end of Brown and along the eastern ends of McNamara and Cashin (see **Figure 3-2**).

Prior to excavation, the project team will consult with an arborist to evaluate the extent of soil removals that can be conducted without impact to the viability of the trees, including hand removal of soils around the outer portions of the root ball. Following removal of soils to the extent practicable, verification soil samples will be collected from remaining soils to verify that the extent of removal was adequate to remove PCBs > 1 ppm. The verification samples will be incorporated into the sampling programs described above; however, additional samples may be collected depending on the location of the root balls and the extent of the excavations in these areas.

If results of the sampling indicate that PCBs > 1 ppm remain in areas where the excavation is restricted by the presence of root balls, UMass will evaluate whether or not to continue the excavation (and risk losing the tree) or to demarcate the presence of PCBs > 1 ppm with fabric barrier and to utilize institutional controls for the management of PCBs > 1 ppm in soils in the root balls. If institutional controls are required, then this condition would be considered a Modification to the Notification and EPA will be notified and a plan submitted.

3.6.4 Field Quality Assurance/Quality Control Sampling

In addition to the primary samples described in Sections 3.6.1 and 3.6.2, duplicate samples and equipment blank samples will be collected as part of standard field quality assurance and quality control practices. Duplicate samples will be collected at a frequency of one sample for every 20 primary samples. Equipment blank samples will be collected for non-disposable tools and equipment used for sample collection. The frequency/number of equipment blank samples will be dependent on the sequencing of the soil excavation activities, but a minimum of one equipment blank sample will be collected per building for samples collected within the recessed areas and for samples collected outside the recessed areas (minimum of 2 equipment blank samples per building).

3.7 BRICK AND ASPHALT REMOVAL AND VERIFICATION SAMPLING AND ANALYSES PLAN

As described above, PCBs > 1 ppm have been identified in one brick pad at McNamara and in four of the six asphalt walkways at the ends of the three buildings.

3.7.1 Brick Pad

The brick pad at McNamara will be removed in its entirety for disposal a < 50 ppm PCB remediation waste. Following removal, one verification sample will be collected from soils below the pad and submitted for PCB analysis. If results of that soil sample indicate that PCBs > 1 ppm are present in the soils, the soils will be excavated to an initial depth of six inches and a follow-up verification sample will be collected.

3.7.2 Asphalt Walks

Asphalt walkway materials containing PCBs > 1 ppm will be removed for off-site disposal as < 50 ppm PCB remediation waste. As described above, prior to removals, additional verification samples will be collected to verify the lateral extent of the removal.

Following removal of asphalt, one sample of the underlying soils will be collected from each area (four samples) and submitted for PCB analysis to determine if the underling soils are impacted by PCBs > 1 ppm. If analytical results indicate that PCBs > 1 ppm are present, the soils within the removal area will be excavated to a depth of 12 inches bgs and verification samples will be collected as part of the overall verification sampling program for soils away from the building.

3.8 ACCUMULATED SOLIDS IN CATCH BASINS

Accumulate solids in catch basins in the eastern branch of the drain system that are located within areas of PCB impacted soil will be removed for off-site disposal (four catch basins). Other accumulated solids identified within the eastern branch that are reported to contain PCBs > 1 ppm will be removed for off-site disposal as PCB remediation wastes (up to three additional catch basins). Removals will be conducted using a vac truck or similar method to eliminate the need for confined space entry.

Following removal of accumulated solids, visual inspections will be conducted to verify that all materials were removed. Given that the catch basins are totally enclosed/contained (concrete sides and bottom), as well as the relatively low reported concentrations of PCBs in the accumulated solid samples collected, additional assessment beyond visual confirmation of the catch basin materials is not proposed.

3.9 EQUIPMENT DECONTAMINATION

At the completion of the excavation in each area, the excavator bucket and any non-disposable equipment will be decontaminated in accordance with 40 CFR 761.79. A gross decontamination step will be performed to physically remove residual materials from the equipment followed by a scrub using detergent and brushes. A final wipe of the equipment will then be conducted using rags dampened with a citrus based cleaner or d-limonene based product. If generated, free liquids will be characterized for disposal in accordance with 40 CFR 761 761.79.

3.10 WASTE STORAGE AND DISPOSAL

The following activities will be completed with regard to the proper storage and disposal of PCB remediation wastes:

- At the end of each work day, any open excavations will be secured by temporary fencing or caution tape;
- A secure, lined, covered, and marked waste container (roll-off or equivalent) or 55-gallon DOT-approved steel containers will be staged for the collection of PCB wastes generated during the work activities in accordance with 40 CFR 761.65 and/or soils will be direct loaded in DOT approved transportation vehicles/trailers for shipment to the disposal facility;
- All containers will be properly labeled and marked in accordance with 40 CFR 761.40;
- Upon completion of the work or when a container is considered full, the waste will be transported off-site under manifest or bills of lading for disposal at an approved disposal facility as follows:
    - > 1 and < 50 ppm PCB containing soils, brick, asphalt, and accumulated solid materials are to be segregated for disposal as < 50 ppm PCB Remediation Wastes to a non-hazardous waste facility permitted to accept such wastes (e.g., Waste Management's Turnkey Landfill in Rochester, New Hampshire, or equivalent facility).
    - ≥ 50 ppm PCB containing soils are to be segregated for transport and disposal as > 50 ppm PCB Remediation Waste and a State of Massachusetts MA02 Hazardous waste to a hazardous waste landfill (e.g. US Ecology's Wayne Landfill in Belleville, Michigan, or equivalent facility).
    - Disposable tools and equipment, used PPE, polysheeting, and other similar wastes generated during the excavation will be transported for disposal with the > 1 and < 50 ppm PCB containing soils.
- If generated, free liquids will be containerized and disposed of in accordance with 40 CFR 761.79 and sampled for waste characterization. Liquids will be disposed of based on the results of the characterization sampling in accordance with 40 CFR 761.

Copies of all manifests, waste shipment records, bills of lading, and certificates of disposal will be collected and provided as part of the final report to EPA.

3.11 SITE RESTORATION

Upon verification that PCBs > 1 ppm have been removed from an area, the excavation will be backfilled to grade and restored to the original condition (grass, landscaped bed, etc.). The site controls will be dismantled, and all wastes will be transported off-site for disposal.

If the results of verification sampling indicate that PCBs > 1 ppm remain within the rootballs of trees that are not to be removed, the soils will be managed in accordance with a subsequent Modification submittal. It is anticipated that a demarcation liner material will be placed over the remaining soils/around the root balls and the area will be backfilled. The locations of any such areas will be documented and a Deed Notice recorded to memorialize the presence of PCBs in soils in these areas.

3.12 RECORDKEEPING AND DOCUMENTATION

Following completion of the work activities, records and documents per 40 CFR Part 761 will be generated and maintained at one location. These documents will be made available to EPA upon request. A final report documenting the completion of the work activities and including but not limited to a description of the work activities, verification analytical results, volumes of disposed materials, and waste disposal documentation will be prepared and submitted to EPA.

4. SCHEDULE

The excavation activities are scheduled to be conducted after completion of the spring semester in May of 2019 and to be completed prior to students returning in the fall (i.e., from May to August 2019). To comply with the requirements of the MCP, a RAM Plan will be developed and submitted to MassDEP following EPA approval of this remediation plan and prior to the start of excavation.

Table 1
Summary of Soil Characterization Sampling Results
Building Recess Areas

Sylvan Complex
UMass Amherst
RTN 1-19533

Location	Sample Depth (in. bgs)	Sample ID	Sample Date	Total PCBs
Brown Residence				
Base of Joint	0-3	SR-CBS-511(0-3)	5/21/2014	**16.1**
		SR-CBS-521(0-3)	5/21/2014	**14.1** J
		SR-CBS-611(0-3)	5/21/2014	**12.9**
		SR-CBS-621(0-3)	5/21/2014	**2.62**
		BR-CBS-120(0-3)	9/2/2014	**1800**
		BR-CBS-114(0-3)	9/2/2014	**34**
		BR-CBS-201	10/3/2014	**76**
		BR-CBS-204	10/3/2014	**100**
		BR-CBS-207	10/3/2014	**220**
		BR-CBS-210	10/3/2014	**190**
		BR-CBS-211	10/3/2014	**26**
		BR-CBS-212	10/3/2014	**57**
		BR-CBS-703	7/12/2018	**23.7**
		BR-CBS-704	7/12/2018	**30.4**
		BR-CBS-705	7/12/2018	**42.9**
		BR-CBS-708	7/12/2018	**42**
	12-15	SR-CBS-511(12-15)	5/21/2014	**3.9** J
		SR-CBS-521(12-15)	5/21/2014	**3.8** J
		SR-CBS-611(12-15)	5/21/2014	**0.98**
		SR-CBS-621(12-15)	5/21/2014	< 0.11
	24-27	SR-CBS-511(24-27)	5/20/2014	**0.22**
		SR-CBS-521(24-27)	5/20/2014	< 0.11
		SR-CBS-611(24-27)	5/20/2014	**0.56**
		SR-CBS-621(24-27)	5/20/2014	< 0.11
5 Lateral Feet from Joint - Along Building Wall	12-15	BR-CBS-121(12-15)	9/2/2014	**0.66**
		BR-CBS-115(12-15)	9/2/2014	**0.78**
		BR-CBS-111(12-15)	9/2/2014	**1.1**
10 Lateral Feet from Joint - Along Building Wall	0-3	SR-CBS-512(0-3)	5/21/2014	**12.3** J
		SR-CBS-522(0-3)	5/21/2014	**6** J
		SR-CBS-612(0-3)	5/21/2014	**1.55** J
	12-15	SR-CBS-512(12-15)	5/20/2014	**0.5**
		SR-CBS-522(12-15)	5/20/2014	**0.15**
		SR-CBS-612(12-15)	5/20/2014	**0.37**
20 Lateral Feet from Joint - Away from Builing Wall	0-3	SR-CBS-513(0-3)	5/21/2014	**0.97**

Table 1
Summary of Soil Characterization Sampling Results
Building Recess Areas

Sylvan Complex
UMass Amherst
RTN 1-19533

Location	Sample Depth (in. bgs)	Sample ID	Sample Date	Total PCBs
McNamara Residence				
Base of Joint	0-3	SR-CBS-311(0-3)	5/21/2014	**21.2**
		SR-CBS-321(0-3)	5/21/2014	**6.6**
		SR-CBS-411(0-3)	5/22/2014	**18.1** J
		SR-CBS-421(0-3)	5/22/2014	**6.9** J
		MR-CBS-171(0-3)	9/2/2014	**7.7**
		MR-CBS-138(0-3)	9/2/2014	**50**
		MR-CBS-213	10/3/2014	**120**
		MR-CBS-214	10/3/2014	**13**
		MR-CBS-219	10/3/2014	**55**
		MR-CBS-220	10/3/2014	**540**
		MR-CBS-223	10/3/2014	**88**
		MR-CBS-224	10/3/2014	**110**
		MR-CBS-714	7/12/2018	**52**
		MR-CBS-718	7/12/2018	**87**
		MR-CBS-719	7/12/2018	**31**
	12-15	SR-CBS-311(12-15)	5/21/2014	**1.03**
		SR-CBS-321(12-15)	5/21/2014	**1.06**
		SR-CBS-411(12-15)	5/22/2014	**2.07**
		SR-CBS-421(12-15)	5/22/2014	**0.34**
	24-27	SR-CBS-311(24-27)	5/21/2014	< 0.11
		SR-CBS-321(24-27)	5/21/2014	< 0.11
		SR-CBS-411(24-27)	5/22/2014	< 0.12
		SR-CBS-421(24-27)	5/22/2014	< 0.11
5 Lateral Feet from Joint - Along Building Wall	12-15	MR-CBS-170(12-15)	9/2/2014	**0.11**
		MR-CBS-131(12-15)	9/2/2014	**2.7**
		MR-CBS-139(12-15)	9/2/2014	**0.35**
10 Lateral Feet from Joint - Along Building Wall	0-3	SR-CBS-312(0-3)	5/21/2014	**5.4**
		SR-CBS-322(0-3)	5/21/2014	**23.6**
		SR-CBS-412(0-3)	5/22/2014	**5.4**
		SR-CBS-422(0-3)	5/22/2014	**2.04**
	12-15	SR-CBS-312(12-15)	5/21/2014	**0.39**
		SR-CBS-322(12-15)	5/21/2014	**0.8**
		SR-CBS-412(12-15)	5/22/2014	< 0.11
		SR-CBS-422(12-15)	5/22/2014	< 0.11
20 Lateral Feet from Joint - Away from Builing Wall	0-3	SR-CBS-313(0-3)	5/21/2014	**1.4**

Table 1
Summary of Soil Characterization Sampling Results
Building Recess Areas

Sylvan Complex
UMass Amherst
RTN 1-19533

Location	Sample Depth (in. bgs)	Sample ID	Sample Date	Total PCBs
Cashin Residence				
Base of Joint	0-3	SR-CBS-111(0-3)	5/20/2014	**8.9**
		SR-CBS-121(0-3)	5/20/2014	**10.1**
		SR-CBS-211(0-3)	5/20/2014	**30.9** J
		SR-CBS-221(0-3)	5/20/2014	**10.2**
		CR-CBS-161(0-3)	9/2/2014	**1900**
		CR-CBS-231	10/3/2014	**92**
		CR-CBS-232	10/3/2014	**42**
		CR-CBS-233	10/3/2014	**48**
		CR-CBS-234	10/3/2014	**110**
		CR-CBS-236	10/3/2014	**23**
		CR-CBS-238	10/3/2014	**59**
		CR-CBS-726	7/12/2018	**170**
		CR-CBS-728	7/12/2018	**34**
		CR-CBS-729	7/12/2018	**19**
	12-15	SR-CBS-111(12-15)	5/20/2014	**7.4**
		SR-CBS-121(12-15)	5/20/2014	**1.4**
		SR-CBS-211(12-15)	5/20/2014	**1.8**
		SR-CBS-221(12-15)	5/20/2014	**0.18**
	24-27	SR-CBS-111(24-27)	5/20/2014	**0.71**
		SR-CBS-121(24-27)	5/20/2014	< 0.11
		SR-CBS-211(24-27)	5/20/2014	**2.4**
		SR-CBS-221(24-27)	5/20/2014	**0.35**
5 Lateral Feet from Joint - Along Building Wall	12-15	CR-CBS-162(12-15)	9/2/2014	**2**
10 Lateral Feet from Joint - Along Building Wall	0-3	SR-CBS-112(0-3)	5/20/2014	**4.9**
		SR-CBS-122(0-3)	5/20/2014	**2.7**
		SR-CBS-212(0-3)	5/20/2014	**9.6**
	12-15	SR-CBS-112(12-15)	5/20/2014	**0.96**
		SR-CBS-122(12-15)	5/20/2014	**0.47**
		SR-CBS-212(12-15)	5/20/2014	**1.04** J
20 Lateral Feet from Joint - Away from Builing Wall	0-3	SR-CBS-113(0-3)	5/20/2014	**1.03** J

Notes:
All concentrations presented in units of milligrams per kilogram (mg/kg), equivalent to parts per million (ppm).
Samples collected from 3-inch depth intervals using hand tools.
Samples submitted for laboratory extraction via USEPA method 3540C and analyzed for PCBs via USEPA method 8082.
J: Analytical result estimated based on data validation.

Table 2
Summary of Soil Characterization Sampling Results
Areas Away from the Recess Areas

Sylvan Complex
UMass Amherst
RTN 1-19533

Location (Lateral Feet From Buildings)	Sample Depth (in bgs)	Sample ID	Sample Date	Total PCBs (mg/kg)	
Cashin Residence					
Base of Building (Away from Recessed Areas)	0-3	SR-CBS-131(0-3)	5/20/2014	**3.3**	
		SR-CBS-231(0-3)	5/20/2014	**10.7**	
	12-15	SR-CBS-131(12-15)	5/20/2014	**1.6**	
		SR-CBS-231(12-15)	5/20/2014	**1.4**	
	24-27	SR-CBS-131(24-27)	5/20/2014	< 0.11	
		SR-CBS-231(24-27)	5/20/2014	< 0.11	
5 Feet From Building	0-3	CR-CBS-145(0-3)	9/2/2014	**4**	
		CR-CBS-148(0-3)	9/2/2014	**0.74**	
		CR-CBS-149(0-3)	9/2/2014	**0.37**	
		CR-CBS-152(0-3)	9/2/2014	**0.37**	
	12-15	CR-CBS-146(12-15)	9/2/2014	**0.29**	
		CR-CBS-150(12-15)	9/2/2014	< 0.11	
10 Feet From Building	0-3	SR-CBS-222(0-3)	5/20/2014	**0.82**	
		SR-CBS-232(0-3)	5/20/2014	**1.1**	
		CR-CBS-165(0-3)	9/2/2014	**0.77**	
		CR-CBS-235	10/3/2014	**4**	
		CR-CBS-155(0-3)	9/2/2014	**1.2**	
		CR-CBS-160(0-3)	9/2/2014	**0.33**	
		CR-CBS-227	10/3/2014	**0.45**	
		CR-CBS-229	10/3/2014	**5.3**	J
	12-15	SR-CBS-222(12-15)	5/20/2014	**0.16**	J
		SR-CBS-232(12-15)	5/20/2014	**0.18**	
13 Feet From Building	0-3	SR-CBS-123(0-3)	5/20/2014	**1.4**	J
		SR-CBS-132(0-3)	5/20/2014	**0.6**	
		CR-CBS-147(0-3)	9/2/2014	**1.2**	
		CR-CBS-230	10/3/2014	**0.73**	
		CR-CBS-156 (0-3)	9/2/2014	**2**	
		CR-CBS-157(0-3)	9/2/2014	**1.1**	J
	12-15	CR-CBS-159(12-15)	9/2/2014	**0.26**	
		SR-CBS-123(12-15)	5/20/2014	**0.19**	J
		SR-CBS-132(12-15)	5/20/2014	**0.2**	
15 ft From Building	0-3	SR-CBS-233(0-3)	5/20/2014	**0.42**	
		SR-CBS-213(0-3)	5/20/2014	**0.45**	J
		CR-CBS-163(0-3)	9/2/2014	**0.32**	
		CR-CBS-153(0-3)	9/2/2014	**0.9**	J
		CR-CBS-237	10/3/2014	**0.84**	
		CR-CBS-239	10/3/2014	**0.76**	
		CR-CBS-724	7/12/2018	**1.04**	
	6-9	CR-CBS-164(6-9)	9/2/2014	**0.19**	
	12-15	CR-CBS-154(12-15)	9/2/2014	**0.17**	
20 ft From Building	0-3	SR-CBS-223(0-3)	5/20/2014	**0.35**	
		CH-CBS-500	7/30/2015	< 0.11	
		CH-CBS-502	7/30/2015	**0.65**	
		CH-CBS-504	7/30/2015	**0.55**	
		CR-CBS-723	7/12/2018	**0.41**	
		CR-CBS-725	7/12/2018	**0.35**	J
		CR-CBS-727	7/12/2018	**1.32**	
		CR-VBS-753	8/14/2018	**0.70**	J
	12-15	CH-CBS-501	7/30/2015	**0.47**	
		CH-CBS-503	7/30/2015	< 0.11	
		CH-CBS-505	7/30/2015	< 0.11	
23 ft From Building	0-3	CH-CBS-508	7/30/2015	**0.69**	
	12-15	CH-CBS-509	7/30/2015	**0.24**	
25 ft From Building	0-3	CH-CBS-506	7/30/2015	**0.22**	J
	12-15	CH-CBS-507	7/30/2015	< 0.12	

Table 2
Summary of Soil Characterization Sampling Results
Areas Away from the Recess Areas

Sylvan Complex
UMass Amherst
RTN 1-19533

Location	Sample Depth (in bgs)	Sample ID	Sample Date	Total PCBs (mg/kg)	
Brown Residence					
Base of Building (Away from Recessed Areas)	0-3	SR-CBS-531(0-3)	5/21/2014	**1.58**	
		SR-CBS-631(0-3)	5/21/2014	**2.23**	
	12-15	SR-CBS-531(12-15)	5/21/2014	**0.35**	
		SR-CBS-631(12-15)	5/21/2014	< 0.10	
	24-27	SR-CBS-531(24-27)	5/21/2014	< 0.10	
		SR-CBS-631(24-27)	5/21/2014	< 0.11	
5 ft From Building	0-3	BR-CBS-200	10/3/2014	**2.4**	
		BR-CBS-202	10/3/2014	**3.2**	
		BR-CBS-122(0-3)	9/2/2014	**0.53**	J
		BR-CBS-118(0-3)	9/2/2014	**22**	
		BR-CBS-116(0-3)	9/2/2014	**1.6**	
		BR-CBS-112(0-3)	9/2/2014	**5.6**	
		BR-CBS-209	10/3/2014	**0.45**	J
		BR-CBS-110(0-3)	9/2/2014	**0.85**	
		BR-CBS-107(0-3)	9/2/2014	**0.16**	
		BR-CBS-106(0-3)	9/2/2014	**1.2**	
		BR-CBS-105(0-3)	9/2/2014	**0.62**	
		BR-CBS-103(0-3)	9/2/2014	**0.18**	
		BR-CBS-102(0-3)	9/2/2014	**0.96**	
		BR-VBS-761	8/14/2018	**1.41**	J
		SR-CBS-613(0-3)	5/21/2014	**0.53**	
		SR-CBS-622(0-3)	5/21/2014	< 0.12	
		BR-CBS-707	7/12/2018	**5.4**	
		BR-CBS-709	7/12/2018	**3.2**	
	12-15	BR-CBS-119(12-15)	9/2/2014	**5.2**	
		BR-CBS-113(12-15)	9/2/2014	**0.35**	
		BR-CBS-104(12-15)	9/2/2014	**0.15**	
		SR-CBS-622(12-15)	5/21/2014	< 0.12	
10 ft From Building	0-3	BR-CBS-205	10/3/2014	**0.46**	
		BR-CBS-208	10/3/2014	**0.27**	
		SR-CBS-523(0-3)	5/21/2014	**0.3**	J
		SR-CBS-532(0-3)	5/21/2014	**0.74**	J
		SR-CBS-632(0-3)	5/21/2014	**0.18**	
		BH-CBS-500	7/30/2015	**0.44**	
		BH-CBS-502	7/30/2015	**0.61**	
		BH-CBS-504	7/30/2015	**3.01**	
		BR-CBS-706	7/12/2018	**1.67**	
		BR-CBS-710	7/12/2018	**0.44**	
		BR-VBS-762	8/14/2018	**1.6**	J
		BR-VBS-763	8/14/2018	**0.43**	
	12-15	SR-CBS-532(12-15)	5/21/2014	**0.11**	
		SR-CBS-632(12-15)	5/21/2014	< 0.12	
		BH-CBS-501	7/30/2015	< 0.12	
		BH-CBS-503	7/30/2015	**0.14**	
		BH-CBS-505	7/30/2015	**2.8**	
15 ft From Building	0-3	BR-CBS-109(0-3)	9/2/2014	**0.83**	
		BR-CBS-100	9/2/2014	**0.18**	
		BR-VBS-760	8/14/2018	**1.67**	
	12-15	CR-CBS-101	9/2/2014	< 0.11	
20 ft From Building	0-3	SR-CBS-533(0-3)	5/21/2014	**0.45**	
		SR-CBS-633(0-3)	5/21/2014	**0.5**	
		SR-CBS-623(0-3)	5/21/2014	**0.37**	J
		BR-CBS-701	7/12/2018	**2.19**	
		BR-CBS-702	7/12/2018	**1.70**	
		BR-CBS-711	7/12/2018	**1.12**	
		BR-CBS-712	7/12/2018	**0.43**	
25 ft From Building	0-3	BR-VBS-755	8/14/2018	**0.44**	J
		BR-VBS-757	8/14/2018	**0.21**	
		BR-VBS-759	8/14/2018	< 0.095	

Table 2
Summary of Soil Characterization Sampling Results
Areas Away from the Recess Areas

Sylvan Complex
UMass Amherst
RTN 1-19533

Location	Sample Depth (in bgs)	Sample ID	Sample Date	Total PCBs (mg/kg)	
McNamara Residence					
Base of Building (Away from Recessed Areas)	0-3	SR-CBS-331(0-3)	5/21/2014	**6.6**	
		SR-CBS-431(0-3)	5/22/2014	**4.2**	J
	12-15	SR-CBS-331(12-15)	5/21/2014	**0.71**	
		SR-CBS-431(12-15)	5/22/2014	**0.55**	
	24-27	SR-CBS-331(24-27)	5/21/2014	**0.11**	
		SR-CBS-431(24-27)	5/22/2014	< 0.11	
5 ft From Building	0-3	SR-CBS-432(0-3)	5/22/2014	**0.58**	J
	12-15	SR-CBS-432(12-15)	5/22/2014	< 0.11	
10 ft From Building	0-3	MR-CBS-166(0-3)	9/2/2014	**1.8**	
		MR-CBS-169(0-3)	9/2/2014	**29**	
		MR-CBS-221	10/3/2014	**0.43**	
		MR-CBS-222	10/3/2014	**5.3**	J
		MR-CBS-124(0-3)	9/2/2014	**4.3**	
		MR-CBS-125(0-3)	9/2/2014	< 0.10	
		MR-CBS-127(0-3)	9/2/2014	**1.4**	
		SR-CBS-323(0-3)	5/21/2014	**2.7**	
		SR-CBS-332(0-3)	5/22/2014	< 0.12	
		SR-CBS-413(0-3)	5/22/2014	**3.7**	
		MR-CBS-132(0-3)	9/2/2014	**2.2**	
		MR-CBS-136(0-3)	9/2/2014	**3.1**	
		MR-CBS-140(0-3)	9/2/2014	**0.44**	
		MR-CBS-143(0-3)	9/2/2014	**0.71**	
	12-15	SR-CBS-323(12-15)	5/21/2014	**0.61**	J
		SR-CBS-332(12-15)	5/22/2014	**0.42**	
		SR-CBS-413(12-15)	5/22/2014	< 0.11	J
		MR-CBS-126(12-15)	9/2/2014	< 0.11	
		MR-CBS-133(12-15)	9/2/2014	**0.85**	
		MR-CBS-142(12-15)	9/2/2014	< 0.11	
13 ft From Building	0-3	SR-CBS-423(0-3)	5/22/2014	**1.8**	
		MR-CBS-137(0-3)	9/12/2014	**4.8**	
	12-15	SR-CBS-423(12-15)	5/22/2014	**0.27**	J
		MR-CBS-217	10/3/2014	**0.29**	
15 ft From Building	0-3	MR-CBS-167(0-3)	9/2/2014	**0.12**	J
		MR-CBS-225	10/3/2014	< 0.12	
		MR-CBS-226	10/3/2014	**0.66**	
		CR-CBS-433(0-3)	5/22/2014	**2.6**	
		MR-CBS-130(0-3)	9/2/2014	**0.51**	
		MR-CBS-134(0-3)	9/2/2014	**0.59**	
		MR-CBS-218	10/3/2014	**0.85**	
	12-15	MR-CBS-168(12-15)	9/2/2014	**0.1**	
		CR-CBS-433(12-15)	5/22/2014	< 0.11	J

Table 2
Summary of Soil Characterization Sampling Results
Areas Away from the Recess Areas

Sylvan Complex
UMass Amherst
RTN 1-19533

Location	Sample Depth (in bgs)	Sample ID	Sample Date	Total PCBs (mg/kg)	
McNamara Residence					
20 ft From Building	0-3	MR-CBS-128(0-3)	9/2/2014	**0.81**	
		SR-CBS-333(0-3)	5/22/2014	**0.15**	
		MR-CBS-215	10/3/2014	**0.41**	
		MR-CBS-129(0-3)	9/2/2014	**3.9**	
		MH-CBS-500	7/30/2015	**3.04**	
		MH-CBS-502	7/30/2015	**1.4**	J
		MH-CBS-505	7/30/2015	**0.28**	
		MH-CBS-507	7/30/2015	**7**	
		MH-CBS-509	7/30/2015	**0.6**	
		MR-CBS-715	7/12/2018	**0.32**	
		MR-CBS-722	7/12/2018	**0.78**	
	12-15	MH-CBS-501	7/30/2015	**0.26**	
		MH-CBS-504	7/30/2015	**0.16**	
		MH-CBS-506	7/30/2015	< 0.11	
		MH-CBS-508	7/30/2015	**2.6**	
		MH-CBS-510	7/30/2015	**0.13**	
25 ft From Building	0-3	MR-CBS-216	10/3/2014	**2.4**	
30 ft From Building	0-3	BR-CBS-713	7/12/2018	**0.82**	
		MR-CBS-716	7/12/2018	**0.38**	
		MR-CBS-717	7/12/2018	**1.01**	
		MR-CBS-721	7/12/2018	**0.58**	
35 ft From Building	0-3	MR-CBS-720	7/12/2018	**0.45**	
45 ft From Building	0-3	MH-CBS-511	7/30/2015	**0.75**	J
	12-15	MH-CBS-513	7/30/2015	< 0.11	

Notes:
All concentrations presented in units of milligrams per kilogram (mg/kg), equivalent to parts per million (ppm).
Samples collected from 3-inch depth intervals using hand tools.
Samples submitted for laboratory extraction via USEPA method 3540C and analyzed for PCBs via USEPA method 8082.
J: Analytical result estimated based on data validation.

Table 3
Summary of Characterization Sampling Results - Other Media

Sylvan Complex
UMass Amherst
RTN 1-19533

Building	Sample ID	Sample Date	Total PCBs	Sample ID	Sample Date	Total PCBs
Location	**Base of Building**			**Ten Feet from Building**		
Asphalt Walkways						
Cashin	SR-CBA-001	5/20/2014	**8.5**	CR-CBA-175	9/2/2014	**2.9**
	SR-CBA-007	5/20/2014	**2.57**	- -	- -	- -
McNamara	SR-CBA-002	5/20/2014	**3.62**	MR-CBA-178	9/2/2014	**2.6**
	SR-CBA-003	5/20/2014	**0.91 J**	- -	- -	- -
Brown	SR-CBA-005	5/20/2014	**6.1**	BR-CBA-173	9/2/2014	**1.6**
	SR-CBA-006	5/20/2014	**0.89**	- -	- -	- -
Brick Pads						
Cashin	CR-CBB-177	9/2/2014	< 0.099	- -	- -	- -
	CR-CBB-731	7/12/2018	**0.25**	- -	- -	- -
McNamara	MR-CBB-172	9/2/2014	**2.7**	- -	- -	- -
	MR-CBB-730	7/12/2018	< 0.091	- -	- -	- -
Brown	MR-CBB-174	9/2/2014	**0.45**	- -	- -	- -
	BR-CBB-732	7/12/2018	< 0.095	- -	- -	- -
Accumulated Solids						
East Branch	SR-SS-1001	8/14/2018	**2.9**	- -	- -	- -
	SR-SS-1004	8/14/2018	**0.26**	- -	- -	- -
West Branch	SR-SS-1002	8/14/2018	< 0.095	- -	- -	- -
	SR-SS-1003	8/22/2018	**0.47**	- -	- -	- -

Notes

All concentrations are presented in units of milligrams per kilogram (mg/kg).

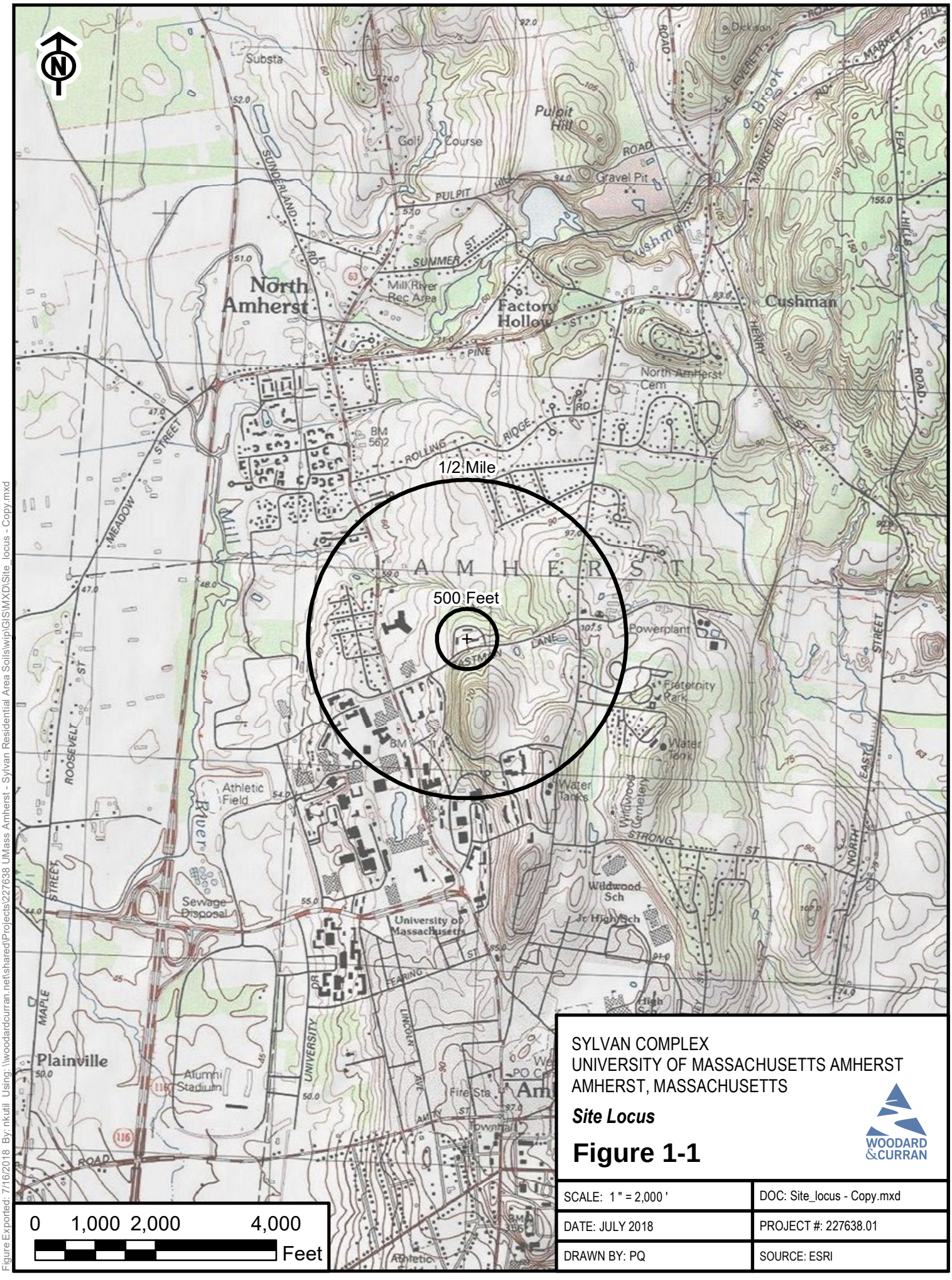
Detected concentrations are presented in bold.

The total of PCB aroclors is presented. If non-detect, the lowest laboratory reporting limit (LRL) is presented.

PCB = Polychlorinated biphenyl

< = Not detected above the presented LRL

-- = Not sampled



SYLVAN COMPLEX
UNIVERSITY OF MASSACHUSETTS AMHERST
AMHERST, MASSACHUSETTS

Site Locus

Figure 1-1

WOODARD &CURRAN

SCALE: 1 " = 2,000 '	DOC: Site_locus - Copy.mxd
DATE: JULY 2018	PROJECT #: 227638.01
DRAWN BY: PQ	SOURCE: ESRI

Figure Exported: 7/16/2018 By: nkutil Using: \\woodardcurran.net\shared\Projects\227638 UMass Amherst - Sylvan Residential Area Soils\wip\GIS\MXD\Site_locus - Copy.mxd

N
W E
S

Legend

- Concrete & Stone Retaining Wall
- Loading Dock
- Brick Ground Surface
- Storm Drainage System
- Road
- Asphalt Path
- Topographic Contour (2-ft)

NOTES

1. Location of site features and utilities based on site plan provided by UMass Amherst.
2. Topography based on site features map provided by UMass Amherst.

McNamara
Residence Hall

Loading Dock

Inaccessible

Brown
Residence Hall

Loading Dock

Cashin
Residence Hall

Loading Dock

EASTMAN LANE

0 10 20 40
Feet

SYLVAN RESIDENTIAL HOUSING COMPLEX
UNIVERSITY OF MASSACHUSETTS AMHERST
AMHERST, MASSACHUSETTS

Site Plan

FIGURE 1-2

WOODARD & CURRAN

SCALE: 1" = 25'	DOC: SYLVANRESULTS.MXD
DATE: November 2018	JOB NO: 227638.01
DRAWN BY: BLG/KNS	SOURCE: UMASS

N
W E
S

AWAY FROM
RECESSED AREAS

AWAY FROM
RECESSED AREAS

Loading Dock

MAIN ENTRY

AWAY FROM
RECESSED AREAS

AWAY FROM
RECESSED AREAS

Location of
Vertical Joints

Location of
Vertical Joints

Limits of
Recessed Soils

Location of
Vertical Joints

Limits of
Recessed Soils

Legend

- Concrete & Stone Retaining Wall
- Recessed Areas
- Brick Ground Surface
- Road
- Asphalt Path
- Topographic Contour (2-ft)

NOTES

1. Location of site features and utilities based on site plan provided by UMass Amherst.
2. Topography based on site features map provided by UMass Amherst.

0 7 14 Feet

SYLVAN RESIDENTIAL HOUSING COMPLEX
UNIVERSITY OF MASSACHUSETTS AMHERST
AMHERST, MASSACHUSETTS

Building Features and Recessed Areas

FIGURE 2-1

WOODARD & CURRAN

SCALE: 1" = 25'	DOC: SYLVANRESULTS.MXD
DATE: November 2018	JOB NO: 227638.01
DRAWN BY: BLG/KNS	SOURCE: UMASS

N
W E
S

McNamara
Residence Hall

Loading Dock

Brown
Residence Hall

Loading Dock

Cashin
Residence Hall

Loading Dock

Inaccessible

EASTMAN LANE

0 10 20 40
Feet

Legend

PCB Sample Results

- Soil Sample Location
- Brick Sample Location
- Asphalt Sample Location
- Accumulated Solids Sample Location
- Concrete & Stone Retaining Wall
- Extent of PCB impacts > 1ppm and < 50ppm to a depth of 18 inches bgs.
- Extent of PCB impacts ≥ 50 ppm to a depth of 18 inches bgs.
- Soils Previously Excavated for Installation of Emergency Generators
- Extent of PCB impacts > 1ppm and < 50ppm to a depth of 12 inches bgs.
- Loading Dock Area
- Brick Ground Surface
- Storm Drainage System
- Road
- Asphalt Path
- Topographic Contour (2-ft)

NOTES

1. Results greater than 1 ppm are highlighted in blue.
2. PCB sample results are from the following depth intervals:

0-3	in. bgs:	**9.60**
12-15	in. bgs:	**1.04J**
24-27	in. bgs:	--

-- = Not Analyzed
< = Not Detected at Listed Reporting Limit
J = Estimated Result
in. bgs = Inches Below Ground Surface

3. Location of site features and utilities based on site plan provided by UMass Amherst.
4. Topography based on site features map provided by UMass Amherst.

SYLVAN RESIDENTIAL HOUSING COMPLEX
UNIVERSITY OF MASSACHUSETTS AMHERST
AMHERST, MASSACHUSETTS

PCB Characterization Sampling Results

FIGURE 2-2

WOODARD & CURRAN

SCALE: 1" = 20'	DOC: SYLVANRESULTS.MXD
DATE: November 2018	JOB NO: 227638.01
DRAWN BY: BLG/KNS	SOURCE: UMASS

N
W E
S

McNamara
Residence Hall

Loading Dock

Inaccessible

Brown
Residence Hall

Loading Dock

Cashin
Residence Hall

Loading Dock

EASTMAN LANE

Legend

- Concrete & Stone Retaining Wall
- Extent of PCB removals > 1ppm and < 50ppm to a depth of 18 inches bgs.
- Extent of PCB removals ≥ 50 ppm to a depth of 18 inches bgs.
- Soils Previously Excavated for Installation of Emergency Generators
- Extent of PCB removals > 1ppm and < 50ppm to a depth of 12 inches bgs.
- Extent of PCB removals > 1 ppm in Asphalt and Brick Ground Surfaces
- Loading Dock Area
- Brick Ground Surface
- Storm Drainage System
- Catch Basin Accumulated Solid Removal > 1 ppm
- Road
- Asphalt Path
- Topographic Contour (2-ft)

NOTES

1. Location of site features and utilities based on site plan provided by UMass Amherst.
2. Topography based on site features map provided by UMass Amherst.

0 10 20 40
Feet

SYLVAN RESIDENTIAL HOUSING COMPLEX
UNIVERSITY OF MASSACHUSETTS AMHERST
AMHERST, MASSACHUSETTS

PCB Removal Areas
FIGURE 3-1

WOODARD & CURRAN

SCALE: 1" = 25'	DOC: SYLVANRESULTS.MXD
DATE: November 2018	JOB NO: 227638.01
DRAWN BY: BLG/KNS	SOURCE: UMASS

N
W E
S

McNamara
Residence Hall

Loading Dock

Inaccessible

Brown
Residence Hall

Loading Dock

Cashin
Residence Hall

Loading Dock

EASTMAN LANE

0 10 20 40
Feet

Legend

Verification Samples

- Post-Excavation Verification Sample Location
- Side Wall Verification Sample Location
- Pre-Excavation Lateral Verification Sample Location
- Pre-Removal Asphalt Verification Sample Location
- Pre-Removal Accumulated Solids Sample Location
- Previously Collected Lateral Verification Sample Location
- Catch Basin Accumulated Solid Removal > 1
- Areas where rootballs are anticipated to be encountered
- Verification Sampling Grid (10')
- Verification Sampling Grid (20')
- Concrete & Stone Retaining Wall
- Extent of PCB impacts > 1ppm and < 50ppm to a depth of 18 inches bgs.
- Extent of PCB impacts ≥ 50 ppm to a depth of 18 inches bgs.
- Soils Previously Excavated for Installation of Emergency Generators
- Extent of PCB impacts > 1ppm and < 50ppm to a depth of 12 inches bgs.
- Extent of PCB removals > 1 ppm in Asphalt and Brick Ground Surfaces
- Loading Dock Area
- Brick Ground Surface
- Storm Drainage System
- Road
- Asphalt Path
- Topographic Contour (2-ft)

NOTES

1. Location of site features and utilities based on site plan provided by UMass Amherst.
2. Topography based on site features map provided by UMass Amherst.

SYLVAN RESIDENTIAL HOUSING COMPLEX
UNIVERSITY OF MASSACHUSETTS AMHERST
AMHERST, MASSACHUSETTS

Verification Sampling Plan
FIGURE 3-2

WOODARD & CURRAN

SCALE: 1" = 20'	DOC: SYLVANRESULTS.MXD
DATE: November 2018	JOB NO: 227638.01
DRAWN BY: BLG/KNS	SOURCE: UMASS

APPENDIX A: OWNER CERTIFICATION

WOODARD &CURRAN

Certification

Project – Sylvan Complex Soil Excavation
112 Eastman Lane, Amherst, Massachusetts
University of Massachusetts

The undersigned owner of the property where the cleanup site is located and the party conducting the cleanup certify that all sampling plans, sampling collection procedures, sample preparation procedures, extraction procedures and instrumental/chemical analysis procedures used to assess or characterize the PCB contamination at the cleanup site, are on file at the location indicated below and are available for EPA inspection, as set forth below.

Document Location

University of Massachusetts

Environmental Health and Safety

40 Campus Center Way

Amherst, MA 01003-9244

Property Owner and Party Conducting the Cleanup

Authorized Signature

11/30/18
Date

Jeff Hescock
Name of Authorized representative (print)

Executive Director of EH+S
Title

APPENDIX B: ANALYTICAL LABORATORY REPORTS

APPENDIX C: PERIMETER DUST MONITORING PLAN

APPENDIX C – SUPPORT ZONE/PERIMETER DUST MONITORING PLAN

Airborne particulate matter (PM) consists of many different substances suspended in air in the form of particles (solids or liquid droplets) that vary widely in size. Inhalation hazards are caused if the intake of these particles includes intake of vapors and/or contaminated dust. Particles less than 10 micrometers in diameter (PM-10), which include both respirable fine (less than 2.5 micrometers) and coarse (less than 10 micrometers) dust particles, pose the greatest potential health concern because they can pass through the nose and throat and get into the lungs.

During the performance of the planned excavation activities, particulate matter in the form of potentially PCB-affected dust may be generated.

As indicated in the remediation plan, the main dust control mechanism to be employed on the project will be the use of engineering controls (e.g. wet techniques and misting) and personal protective equipment (PPE). In addition, particulate air monitoring will be conducted during active excavation within the Support Work Zone (SWZ), the around immediately around the perimeter of the excavation areas. Particulate air monitoring will determine if fugitive dust particles are present in the ambient air outside of the excavation area. A direct-reading particulate meter will be used to monitor airborne particulate concentrations during excavation. Particulate concentrations shall be utilized as an indirect indicator of exposures to on-site receptors.

Dust concentrations in the SWZ will be measured using a suitable real time aerosol particulate monitor capable of determining ambient air fugitive dust concentrations to 0.001 milligrams per cubic meter (mg/m^3). Dust monitoring shall be conducted during soil excavation and ground surface removal (brick and asphalt) at a frequency of one reading every two hours. Prior to the active removal actions and at periodic points during the project, dust monitoring readings will be recorded to document background particulate matter concentrations.

If total particulate concentrations exceed the action limits (as specified below and incorporating background readings) and are sustained (i.e. greater than 5 minutes), then the following actions will be taken:

- Engineering controls (wet methods) will be inspected to insure proper operation;
- Work practices will be evaluated; and
- Additional dust suppression techniques to mitigate fugitive dust shall be initiated.

If applicable, the dust suppression techniques shall involve the application of a fine mist of water over the area creating the fugitive dust condition. The water shall be applied either by small hand-held sprayers or sprinklers. In the event that the total of airborne particulate cannot be maintained below the action limit, then work activities shall be ceased until sustained readings are below the action limit or the SWZ designation is re-evaluated.

OSHA has published the following permissible exposure limits (8-hour time weighted average) for air contaminants (29 CFR 1910.1000):

Air Contaminant	PEL (8-hour TWA)
Total Dust	15 mg/m^3
Respirable Dust Fraction	5 mg/m^3
PCBs (42% Chlorine)	1 mg/m^3
PCBs (54% Chlorine)	0.5 mg/m^3

In addition, EPA has established a National Ambient Air Quality Standard for PM-10 of 0.150 mg/m^3 (24-hr average).

A total airborne particulate action limit has been established for the soil excavation work to be conducted with consideration of the specific receptors, PCB concentrations, work activities, and OSHA permissible exposure limits. The action limit applies only to dust monitoring within the SWZ (the perimeter of the excavation area); an action limit has not been set for the active work zones (exclusion zones) as engineering controls and PPE will be used within these zones.

Given the nature of surrounding buildings and the anticipated PCB concentration in dust that may be generated during abatement activities, a conservative action limit of 0.1 mg/m^3 above background will be maintained during site work. Dust monitoring at a location representative of background conditions (i.e. a location upwind without active remedial activities in progress) will be conducted at the same frequency as SWZ monitoring to obtain data representative of real-time background conditions. The action limit will be used to determine if and when additional engineered controls and/or work stoppages would be necessary.