VOLUME I of III

RISK BASED SITE CLEANUP AND DISPOSAL PLAN AND ASSESSMENT REPORT (Revision 1)

THOMAS PRINCE SCHOOL
TOWN OF PRINCETON, MA

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EXECUTIVE SUMMARY

The primary intent of this report is to seek United States Environmental Protection Agency (EPA) approval for the management of PCBs within six classrooms (classrooms 201, 203, 205,207,209 (substrate only for 209) & 211), the cafeteria and the kitchen during the window removal/replacement project of the Thomas Prince School located in Princeton, Massachusetts. Windows are planned to be removed from classrooms 201, 203, 205, 207, 211, the cafeteria and the kitchen. The removal of the windows is tentatively scheduled for the week of February 20, 2012 and the replacement of the windows is tentatively scheduled for the week of April 16, 2012. The Thomas Prince School is a K-8 (ages 5-14 years) elementary school located in Princeton, Massachusetts. The school was constructed in 1962 and a significant addition was added in 1991. In 1991, windows were replaced[1] in portions of the older building. Replacement of the remaining older windows[2] in the older portion of the building was recently planned for 2011-2012 in association with the Massachusetts School Building Authority (MSBA) Green Repair Program initiative. In April 2011, as part of preliminary window materials assessment activities performed prior to the window upgrade, polychlorinated biphenyls (PCBs) were detected at concentrations >50 parts per million (ppm) in window caulking and glazing[3]. Due to detection of the elevated levels of PCB in these building materials, in early August 2011 indoor air samples were collected[4] from the six classrooms for which windows were scheduled to be replaced as part of the window replacement project. PCBs above the EPA guidance levels[5] for indoor school air were detected in the initial air samples thus a more comprehensive indoor air sampling program[6], evaluating indoor air within the entire school building, was performed on August 20, 2011. The result of the comprehensive sampling was that PCBs above appropriate EPA guidance levels were detected in two additional classrooms[7], also located in the older portion of the building. Elevated levels of PCBs were also detected in other areas of the older portion of the school, but below appropriate EPA guidance levels[8]. PCBs were also detected in

[1] In 1991 all windows were replaced in the classrooms of the 100 wing (first floor) and in the cafeteria (roof top). Windows were not replaced in the 200-wing classrooms (first floor) or the kitchen (roof top).

[2] The remaining older windows (pre-1991) include those in classrooms 201, 203, 205, 207, 211 and the kitchen (note that the windows for classroom 209 were removed as part of the pilot test). In addition, the cafeteria windows are scheduled for replacement as part of this current project.

[3] In April 2011, exterior window caulking and glazing samples were first collected from the roof top area windows associated with the cafeteria/kitchen. The samples were collected by Covino Environmental Associates, Inc. and submitted to Spectrum Analytical, Inc. The samples were extracted using EPA Method 3550B/C (ultrasonic extraction) and analyzed via EPA Method 8082 for PCB. Only PCB Aroclor 1254 was detected in two of two samples at concentrations greater than 50 ppm (Table 4). In May 2011, additional samples of window caulking and masonry substrate were collected by Woodard and Curran to further delineate the extent of PCB impact. The samples were submitted to Spectrum Analytical for extraction via EPA Method 3540C and analysis of PCB via EPA Method 8082. Only PCB Aroclor 1254 was detected in 16 of 18 samples.

[4] The indoor air samples were collected and analyzed following EPA Method TO-10A.

[5] EPA has derived risk based guidance levels for PCBs in indoor air for schools. This information is provided on the EPA website in a document entitled "Public Health Levels for PCBs in Indoor School Air". The levels were developed for various age groups and range in concentration for this school setting from 100 ng/m^3 (age 3-6 years), 300 ng/m^3 (age 6-12 years) to 450 ng/m^3 (age 12-15 years and adults).

[6] The comprehensive indoor air sampling program consisted of the collection of 45 air samples, which included three duplicates and two ambient air samples. QA/QC samples consisted of two field blanks and two spikes and one blind blank.

[7] Classrooms 106 & 108.

[8] Concentrations of PCBs in indoor air were detected in the common areas, general office area and other classrooms of the older portion of the building,

the newer portion of the school, but at levels well below the guidance levels for the most sensitive receptors in the school[9].

The EPA was informed of the results and agreed with an approach to further assess and mitigate the observed impacts. This approach did not involve abatement, i.e. remediation of PCBs. It involved the elimination of potential residual sources of PCBs and the implementation of an incrementally phased pilot test procedure to determine the most successful mitigation methods that would result in a reduction in indoor air PCB concentrations to levels below the EPA published guideline values. The initial phase of the mitigation measures involved the inspection of light fixtures[10], with the removal of any non-labeled[11] or leaking[12] ballast's and/or stained[13] lighting fixtures. A total of 20 plastic light covers, 57 ballast's and 74 light fixtures[14] were removed and properly disposed[15] as part of this process. The next phase consisted of the thorough cleaning[16] of horizontal[17] and select vertical surfaces within the common areas[18] of the older portion of the building, including HEPA vacuuming of accessible areas of the individual common area room heating, ventilation and air conditioning (HVAC) air handlers. The pilot test was performed on two classrooms[19] where PCB indoor air concentrations were detected above guidance levels. In addition to the cleaning mentioned above, the unit ventilators within each pilot test classroom were cleaned of dust and dirt, the interior/exterior window caulking and exterior precast concrete window column caulking was removed, the exterior intake air louver vent caulking was removed, and in one room the entire older window unit was removed[20]. This material was removed as PCB *bulk product waste* as a source removal.

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[9] The appropriate indoor air guidance level for the majority of the school children is 300 ng/m^3. The appropriate indoor air guidance level for the children of kindergarten age, the most sensitive receptors in the school, is 100 ng/m^3. The newer portion of the school, constructed in 1991, houses the kindergarten age children. The kindergarten age children generally stay within their assigned classrooms (Rooms 300 & 302) and attend school for ½ day. PCBs were not detected at levels approaching 100 ng/m3 in the newer portion of the school. Only eight of 14 samples collected from the newer portion of the school registered a detection of PCBs, the highest value being 38.9 ng/m3. These PCB concentrations are expected to be a results of migration of indoor air from the older portion of the building.

[10] Each light fixture, within the original portion of the building constructed in 1962, was inspected by removing the light cover, bulbs and underlying metal shroud. These materials, along with the internal ballast and metal light fixture plate (attached to the ceiling) were visually inspected. The inspections were performed to determine if any unlabelled ballast or light fixture staining were present.

[11] A ballast that was not explicitly labeled as not containing PCB on the manufacturers label affixed to the ballast was considered to contain PCBs and thus was removed and disposed.

[12] Evidence of a leaking ballast is indicated by apparent burning of the ballast or light fixture or the presence of a brown/amber/black, tar-like substance on the outer casing of the ballast or light fixture.

[13] A stained lighting fixture is indicated by the presence of a brown/amber/black, tar-like substance on the surface of the fixture. If a fixture was removed due to staining, the associated ballast was removed also.

[14] A fixture includes the metal housing, associated ballast and plastic light cover.

[15] The ballast's were transported under non-hazardous waste manifest #NHWM055751 for temporary storage at the Triumvirate facility in Lowell, MA and ultimate disposal at Complete Recycling Solutions, LLC in Fall River, MA. The remainder of the materials were disposed as hazardous waste under hazardous waste manifest #005001350 FLE at EQ Wayne Disposal, Inc. in Belleview, MI.

[16] Thorough cleaning was accomplished using a combination of HEPA vacuum and wet-wipe cleaning.

[17] Horizontal surfaces generally included shelves, molding edges, stationary cabinet tops and inner shelves, top edges of chalk boards, chalk board trays, tops of doors and door casings, tops of exit signs, tops of fire alarms, top edges of lighting fixtures, soffits, floors, radiators, louver vent fins, etc.

[18] Common areas consisted of the Library Media Center, the Computer Lab, the Stage, the Cafeteria, the Kitchen, the bathrooms, and the hallways within the older portion of the building.

[19] The pilot test was performed on classrooms 209 and 106.

[20] The window unit in room 209 was removed as a final step to reduce indoor air concentrations.

Following completion of the pilot test procedures, indoor air sampling was completed. The indoor air sampling showed that no PCB levels were detected in indoor air samples above guidance values. Samples of masonry products located adjacent to caulking were collected to determine the extent that PCB had migrated into these adjacent materials. The findings indicate that PCB did migrate into these materials, but not to a substantial degree. Due to the presence of PCB in exterior caulking, soil samples were collected and evaluated for PCBs. Only the soil on the east side of the building, adjacent to the northern 100-wing classrooms, exhibited PCB concentrations >1 ppm. As a result, this soil was excavated to levels <1 ppm and the soil was properly disposed. The remediation plan proposed herein consists of the removal and disposal of the windows and caulking as PCB *bulk product waste*, encapsulation of the adjacent masonry materials PCB *remediation waste* with an epoxy coating, the thorough cleaning of the 200-wing classrooms and the followed up monitoring, maintenance and management of the indoor air and encapsulated materials. The PCB materials associated with the 100-wing rooms are not necessarily intended to be addressed as part of this plan.

1.0 INTRODUCTION

1.1 BACKGROUND

On behalf of the Town of Princeton, Environmental Compliance Services, Inc. has prepared this Risk Based Site Cleanup and Disposal Plan and Assessment Report, per the requirements of 40 CFR 761.61(c) as formal notification and certification to EPA and for EPA approval. The main intent of this report is to allow for the removal and replacement of windows. This report is intended to present the findings of assessment and mitigation efforts that have been conducted to date at the Thomas Prince School to address the detection of PCBs at the school; to present a plan that will allow for the immediate removal and installation of new windows in select rooms of the school; and, to present a risk reduction plan that will reduce the potential risk of exposure to PCBs in the areas that the windows will be replaced. The main purpose of the assessment and mitigation work performed at the Thomas Prince School is to evaluate and reduce the concentrations of PCBs in indoor air to levels below appropriate EPA Guidelines and thus reduce potential exposure to PCBs by the students, staff and visitors to the school. The Thomas Prince School is a public elementary school located in Princeton, MA, operated by the Wachusett Regional School District (WRSD) and owned by the Town of Princeton. The school typically serves approximately 380 students in the grades of kindergarten through grade 8 and has a staff of approximately 60. The school is primarily occupied by students from September through June during the general hours of 8 AM to 3 PM during weekdays.

In April 2011, during preparation for a window replacement project being performed as part of Green Repair Program administered under the MSBA, samples of window caulking and glazing material were collected and analyzed for asbestos and polychlorinated biphenyls to determine if these compounds were present in the window materials. The samples were collected by Covino Environmental Associates, Inc. of Woburn, MA on behalf of the project architect, LPBA Architects, Inc. of Boston Massachusetts. PCBs, as well as asbestos, were detected in the samples. In late June 2011, additional window caulking and masonry samples were collected to further evaluate the extent of PCBs. The samples were collected by Woodard and Curran of Andover, Massachusetts. The results confirmed the presence of PCB in window caulking and demonstrated that PCBs were also present in joint caulking. Copies of these reports are included in **Appendix A**. A locus map, showing the geographical location of the school, is presented as **Figure 1**. The Room ID Plan, showing the outline of the school and the locations of the rooms within the school, is presented as **Figure 2**.

PCBs are a synthetic chemical that were applied to products due to their resistive, insulating and softening properties including low flammability, fire resistance, chemical stability, electrical insulation, durability, resistance to degradation and use as a softener and plasticizer. They were widely used in dielectric fluids (i.e. for transformers, capacitors, fluorescent light ballasts), plasticizers, caulking, adhesives/mastic, sealants, paints, inks, dyes, PVC coating for electrical wire and components, floor finishers, lubricating and cutting oils, and many other products. Due to concerns about the toxicity and persistence of PCBs, in 1979 PCBs were essentially[21] banned for use in the United States. The EPA regulates PCBs under the Toxic Substances Control Act (TSCA), 40 CFR, part 761. Under this Act, the presence of PCBs in building materials, i.e.

[21] PCBs were banned for all uses except "totally enclosed uses" such as transformers, capacitors, vacuum pumps and hydraulic fluids.

caulking, is considered an unauthorized use.

1.2 SCHOOL DESCRIPTION

The Thomas Prince School building consists of approximately 76,000 square feet. The original portion of the school, which is the subject of this report, was constructed in 1962 and is approximately 32,000 square feet in size. An addition was added in 1991, bringing the total area of the school to approximately 76,000 square feet. As part of the 1991 renovation, the library, computer lab (room 111), room 113 and classroom 112, as well as the hallway and administrative office ceilings, were also remodeled. The majority of the school is of single story construction. The cafeteria and kitchen are two stories in height, though are single, ground level floors. Following are some general details on the construction of the older portion of the school:

- The floors of the building are primarily linoleum tile, with carpet present in the library and computer lab. These rooms were renovated as part of the 1991 construction activities and contain updated lighting, ceilings, etc.
- Excluding the library, cafeteria and kitchen, dropped ceilings are present throughout the older building. The classrooms appear to contain original, first generation dropped ceilings. All ceiling tiles in the classrooms are removable and there is no mastic present. The hallways, computer lab, room 113, the computer server room, the general office area and room 112 have updated dropped ceilings.
- The majority of the walls are of steel reinforced, concrete block construction. The exterior walls are constructed with a brick facade.
- The lighting is primarily overhead florescent lights.
- Air ventilation within each classroom (except classroom 112) is controlled by individual unit ventilators original to the building. Each classroom has a separate exhaust to roof. Separate HVAC systems are present in each of the cafeteria, computer lab and library.
- 100-wing classrooms (100-110) each contain one window per classroom. These are vinyl clad, approximately 81” x 41” in size and were installed in 1991;
- Classroom 112 contains multiple vinyl clad windows installed in 1991.
- 200-Wing classrooms (201-211) each contain two windows per classroom[22]. These are metal frame, single pane, combination fixed and hopper, approximately 81” x 41” in size and were installed in 1962 (note that the window from room 209 has been removed as part of the subject pilot testing).
- Cafeteria contains second story windows at roof top elevation on east and west sides. There are five pair of windows per side and each bank is approximately 40’ long, replaced in 1991.
- Kitchen contains second story roof top window bank over its entire north end, approximately 60’ long. These appear to be original, T-track windows installed in 1962.

1.3 CHRONOLOGY OF MILESTONE EVENTS

Following is a brief chronology of Milestone events for the project. A more detailed chronology is included in **Appendix B**.

[22] The windows from classroom 209 was removed as part of the PCB mitigation pilot test.

April 27-29, 2011

- Window caulking and glazing were sampled as part of the MSBA Green Repair Program window replacement project. PCBs were detected in these materials at concentrations greater than 50 ppm.

June 23, 2011

- Additional characterization of the caulking and substrate (concrete & brick) was performed.

August 1, 2011

- Indoor Air Samples (IAS) (1st event) were collected by ECS from classrooms 201-211. Results were greater than applicable EPA Public Health Guideline values (**Table 1**).

August 17, 2011

- Meeting with WRSD, Town of Princeton and ECS to discuss results and conceptual plan to address PCBs going forward.

August 18, 2011

- Notification made to MassDEP and MassDPH regarding PCB in indoor air. Both referred ECS to EPA.

August 20, 2011

- Comprehensive IAS (2nd event) and Wipe Sampling performed.

August 24, 2011

- Meeting with WRSD, Town of Princeton, Triumvirate Environmental, Inc. (TEI) and ECS to further discuss conceptual strategy to address PCBs detected in the school.
- Verbal notification made to the US EPA (Kimberly Tisa, Region 1 PCB Coordinator) of the detection of PCBs in window related caulking and indoor air.

August 25, 2011

- Meeting at Thomas Prince School (USEPA, WRSD, Town of Princeton, TEI, and ECS) to discuss the conceptual plan for addressing the detected PCBs.
- Public meeting with WRSD School Committee at High School

August 29, 2011

- Meeting at TPS and with Princeton Board of Selectmen (TEI and ECS);

September 1, 2011

- School opened for session. Older portion of school restricted for access by students pending completion of relevant aspects of proposed conceptual mitigation plan.

September 7, 2011

- Woodard and Curran collected soil samples from courtyard areas and in front of 100-wing rooms.

September 8 & 9, 2011

- TEI has inspected all lights in classrooms and common area rooms of the older portion of the school.
- TEI initiated cleaning several common area rooms.

September 20, 2011

- HEPA and wet wipe cleaning is complete in common area rooms and pilot test rooms.
- All ballast removed from common area rooms.
- All caulking (interior/exterior) associated with the pilot test rooms has been removed.

September 22, 2011

- ECS performed 3rd round IAS.

September 23, 2011

- ECS collected substrate building materials samples for further delineation.

September 29, 2011

- Received indoor air sampling results from September 22 sampling. All favorable except room 209 which showed no appreciable decrease.

October 4, 2011

- Students re-occupy common room areas.

October 5, 2011

- ECS met at school with TEI to inspect rooms 209 and 106 to note any differences in conditions of rooms that would have lead to unfavorable results for IA within room 209. It was determined that the most likely aspect potentially giving rise to the indoor air PCBs was the older window with exposed glazing present in room 209.

October 26 to November 8, 2011

- Continued pilot test in classroom 209 and cleaning of 100-wing classrooms.

November 8, 2011

- Indoor air samples (4th event) collected from classrooms 209 and 108. The results were favorable, being below applicable EPA Public Health Guideline values (**Table 1**).
- Cleaning of other 100-wing rooms completed by TEI.

November 11, 2011

- Status update via e-mail provided to USEPA (Kimberly Tisa) regarding the interim measures taken at this site.

November 21, 2011

- The "band" class reoccupies classroom 100.

December 27, 2011

- Completed excavation of soil adjacent to 100-wing classrooms, average 1 foot in depth. Results are favorable, all below 1 ppm cleanup level for unrestricted use.

January 2, 2012

- Excavation area is backfilled.

January 5, 2012

- Meeting at TPS (USEPA, Kim Tisa; Town of Princeton, John Lebeaux; WRSD, Thomas Pandiscio, Peter Brennan and Mary Cringon; TEI, Paul Connors & Ross Hartman; and ECS, Chuck Klingler.

2.0 SITE CHARACTERIZATION – COMPLETED ASSESSMENT AND MITIGATION ACTIVITIES

Various assessment and mitigation activities have been taken to evaluate and limit potential exposure to PCBs at the Thomas Prince School. Following is a discussion and presentation of the results of those activities.

2.1 INITIAL INDOOR AIR SAMPLING

2.1.1 August 1, 2011

Due to the detection of PCBs in the school window caulking and window glazing at concentrations greater than 50 ppm and in response to their concern for the public health of school students and staff and in adherence with published recommendations of the EPA, WRSD determined that sampling/analysis of the indoor air for PCBs was required. To evaluate potential impact to indoor air from the detected PCBs, WRSD requested ECS to conduct indoor air sampling from the classrooms that were scheduled for window replacement (classrooms 201-211). These classrooms were targeted since they contained original windows and associated window caulking that were to be removed as part of the window replacement program and were full time classrooms. On this date, ECS collected one indoor air sample from each of the aforementioned classrooms. QA/QC samples, including one duplicate, one blank & one spike, were also obtained. The samples were collected following EPA Method TO-10A procedures using low flow air sampling pumps and polyurethane foam traps, over a duration of approximately 6 hours and 40 minutes at flow rates of approximately 5 milliliters per minute (for a total volume of approximately 2 cubic meters). During this indoor air sampling round and all subsequent indoor air sampling rounds completed for the school, ECS mimicked conditions that are typically present within the school when the students are present, i.e. doors closed, unit ventilators and other HVAC systems in operation. The samples were submitted to NEA, a Division of Pace Analytical Services, Inc., Schenectady, NY, for analysis of PCB via EPA Method 8082. Concentrations of PCBs, above Public Health Levels for PCBs in Indoor School Air, were detected in each classroom sample[23]. The results are summarized in **Table 1** and the laboratory certificate is provided in **Appendix C**.

2.1.2 August 20, 2011

Based on the results of the indoor air samples collected on August 1, 2011, it was determined that a more comprehensive IAS program be initiated to determine the concentration of PCBs in indoor air throughout the entire school. Based on the original portion of the school being constructed in 1962 and the addition to the school being constructed in 1991, it was decided that a greater number of samples would be collected from the older portion of the school. On this date, indoor air samples were collected from each classroom within the older portion of the school which hadn't previously been

[23] One or more of PCB Aroclor 1221, 1248 & 1254 were detected in the samples.

sampled (classrooms 100-112), common area rooms (cafeteria, kitchen, stage, computer lab, library, hall corridors and room 113), the administration Office, the staff lounge, the electrical room and the storage room 21 for a total of 26 samples plus two duplicates.

From the newer addition, 14 indoor air samples plus one duplicate were collected from kindergarten classrooms 300 & 302, classrooms 303, 308, 402 & 404, hallway corridors and the gymnasium. Two ambient samples were also collected. Besides the duplicate, QA/QC samples also included two field blanks and two spikes. The samples were collected following EPA Method TO-10A procedures using low flow air sampling pumps and poly urethane foam traps, over a duration of approximately 6 hours and 40 minutes at flow rates of approximately 5 milliliters per minute (for a total volume of approximately 2 cubic meters). The samples were submitted to NEA, a Division of Pace Analytical Services, Inc., Schenectady, NY, for analysis of PCB via EPA Method 8082. Ten of the samples (three from the older portion of the building and seven from the newer addition) were also analyzed for PCB Homolog's via EPA Method 680. Concentrations of PCBs, above applicable[24] Public Health Levels for PCBs in Indoor School Air, were detected in only 2 of the samples. These samples were collected from classrooms within the older portion of the building (classrooms 106 & 108[25]). IAS collected from the newer addition showed appreciably lower concentrations of PCBs than those samples collected from the older portion of the building. No PCB Aroclor were detected over 30 ug/m^3 and no PCB Homolog's were detected above the laboratory practical quantitation limit (PQL) in samples from the newer portion of the school. The results are summarized in **Table 1** and the laboratory certificate is provided in **Appendix C**.

2.2 ASSESSMENT AND MITIGATION PLAN

Following the initial detection of PCB in indoor air, ECS, in conjunction with WRSD, the Town of Princeton and TEI, developed a conceptual assessment and mitigation plan with the purpose of reducing the concentrations of PCBs in indoor air and allowing for the replacement of windows as proposed under the MBAS Green Repair Program. The target concentration for PCBs in indoor air in those rooms which contained PCB levels above USEPA posted "Public Health Levels for PCBs in School Indoor Air" was reduction to levels below the guidelines applicable to the appropriate student age groups whom occupy the areas. In the areas where PCB concentrations below the appropriate levels already existed, the goal was to further reduce concentrations of PCBs in indoor air. The plan consisted of the following components.

- Complete a comprehensive indoor air sampling round throughout the entire school to determine potential exposure concentrations for PCBs in indoor air. During this indoor

[24] For the classrooms within the older portion of the school, the applicable Public Health Level for PCBs in School Indoor Air is 300 ng/m^3. This is based on the age of the students that occupy these rooms as being from 8-10 years. In the common room areas (cafeteria, computer lab and library), the applicable Public Health Level for PCBs in School Indoor Air is 100 ng/m^3.

[25] At the time of sampling, classroom 108 was divided in half by a sliding partition wall, thus an indoor air sample was collected from each half of the room. The section of the room located adjacent to the east exterior wall was identified as room 108A and the western section of the room located adjacent to the hallway was identified as room 108. The individual sample results are presented on Table 1. The sample result from the location identified as room 108 was above the school indoor air guideline value of 300 ng/m^3 and the sample result from the location identified as room 108A was below the school indoor air guideline value of 300 ng/m^3. The average concentration was below the 300 ng/m^3 guideline.

air sampling round, wipe samples would also be collected from high and low contact areas to evaluate potential exposure concentrations from potential contact of these areas[26]. The highest frequency of air samples would be concentrated in the older building (constructed circa 1962) where it had been determined that PCB caulking had been used. A lower sampling frequency was proposed for the 1991 addition due to the likely lack of use of PCB caulking during construction. The indoor air sampling and wipe sampling were completed on August 20, 2011 as described in section 2.1 & 2.3.4, respectively.

- Collect wipe samples to evaluate the condition of potential high contact and low contact surfaces. Perform a thorough cleaning of the older portion of the building.
- Inspect all fluorescent light fixtures/ballast in the older portion of the building. Upon inspection, any ballast's not labeled as non PCB containing, apparently damaged or leaking or otherwise suspected of potentially containing PCBs to be removed and replaced with new ballast's by a licensed electrician. In addition, any metal housings or plastic light covers with apparent staining from PCB ballast oil to be removed and replaced with new components.
- Evaluate the school's ventilation system to determine how air is processed throughout the school.
- Clean furniture and teaching supplies in classrooms and evaluate with wipe sampling and analysis for PCBs. Clean all rooms in older portion of the building using HEPA vacuums and wet wipe cleaning methods as appropriate.
- Restrict student access to the classrooms and other common area rooms of the older portion of the building until cleaning and further testing are performed. General administration office area and nurses room to remain open for student access as required, though access to the general administration office area by students was to be limited.
- Conduct "pilot tests" in two classrooms in which a phased approach to potential PCB exposure reduction measures would be performed to determine the mitigation measures to be implemented to effectively reduce PCB concentrations in indoor air. The two classrooms chosen were rooms 209 and 106. These classrooms both were found to contain PCBs in indoor air above the EPA guideance values.
- Perform on-going indoor air sampling.
- Assess for and manage PCB contaminated soil as may be appropriate.
- Implement EPA recommended Best Management Practices.

2.2.1 Initial Meetings with Stakeholders

On August 25, 2011, a meeting was held at the Thomas Prince School attended by the Town of Princeton, WRSD, ECS, TEI and USEPA. The conceptual assessment and mitigation plan was discussed and agreed upon. Later that evening, during a special school committee public meeting at the WRSD High School, aspects of the conceptual assessment and mitigation plan, as well as a student relocation plan, were discussed and presented to the School Committee and general public by WRSD and ECS. On August 29, 2011 ECS and TEI attended a Town of Princeton Board of Selectman meeting at

[26] High contact areas were considered locations where potential contact by children was more likely, i.e. areas that children readily could come into contact with or repeatedly touch and was generally considered to be less than six feet in height. Low contact areas were considered locations where contact by children was generally considered to be infrequent and was typically greater than six feet in height.

which again was presented the conceptual plan along with estimated costs to complete the proposed work.

2.3 MITIGATION PLAN IMPLEMENTATION

2.3.1 Student Relocation and Access Restriction

Prior to the start of school on September 1, 2011, one hundred and thirty five students (six classes of grades 3-5), along with 17 staff were relocated to the Glenwood Elementary School in Rutland, MA. Access to the majority of older portion of the building was restricted for entry and use by students. The general office area and the Nurses office remained accessible to students, though it was limited. Student and staff access was controlled to the older portion of the building by verbal communication of the access restriction to the staff and students from the Principal, by keeping the fire doors in the hallways at the entrance points to the older building closed and by the posting of "restricted" signage at these entrance points. Access to the 100-wing and 200-wing classrooms was further restricted by locking the doors to these classrooms. Access to the 200-wing classrooms currently remains restricted.

2.3.2 Light Fixture/Ballast Inspection and Removal

TE*I* performed a detailed inspection of the fluorescent lights within the older portion of the school. Any ballast that were not labeled as non PCB containing, appeared damaged or leaking or were otherwise suspected of potentially containing PCBs were removed and replaced with new ballast's by a licensed electrician. In addition, any metal housings or plastic light covers where apparent staining from PCB ballast oil (brown to black tar like substance) was observed were removed and replaced with a new light fixture components (the removal of the lighting fixture included the ballast also). A total of 57separate ballast's, 74 light fixtures and 20 plastic covers were removed and replaced. The waste ballasts were temporarily stored in properly labeled 55-gallon drums and properly disposed. A map showing the locations of the replaced lighting ballast and fixtures is presented as **Figure 3**.

2.3.3 Furniture/Materials Cleaning, Wipe Sampling/Analysis and Relocation

The furniture, exposed horizontal surfaces of other items and band instruments located within the open area of the classrooms were primarily cleaned via wet wipe wash (water and Simple Green™). If observable dust was present, the items were initially cleaned via HEPA vacuum. Once cleaned, the items were moved to the gymnasium and staged on polyethylene sheeting for temporary storage pending wipe sampling and receipt of analytical results. The items were staged in separate areas identified by classroom number for ease in identification. As the majority of the teaching materials, i.e. books, paper and other supplies, were stored in closed cabinets these items were boxed and made available to the respective teachers. Any visually observed dust was removed from these teaching materials via wet wipe or HEPA vacuum (in general, minimal dust was observed on these materials). The cafeteria tables, attached stools and folding chairs were also

cleaned via wet wipe method and staged in the hallway outside of the southern courtyard pending wipe sampling and receipt of analytical results.

Once cleaned, 10% or more of the cleaned items were sampled in accordance with USEPA recommendations[27]. Hexane was used as the organic solvent in this procedure. The samples were analyzed for PCB via EPA Method 8082, being extracted per EPA Method 3540C. The results were compared to the EPA guideline for the cleanup of PCBs on surfaces in schools of 1 ug/100 cm^2. If the sampling of one item from a subset of items resulted in a value greater than 1 ug/100 cm^2, all of the items within that subset were again cleaned and 10% of the items were again sampled. This occurred on two occasions; with the sampling of items in room 100 and the sampling of the cafeteria kitchen tables. In both circumstances, one item from each sample set produced a value greater than 1 ug/100 cm^2. Upon re-cleaning, all re-sampled items produced results less than 1 ug/100 cm^2. Refer to **Table 2** for a summary of wipe sample results. The laboratory certificates are presented in **Appendix D**. Following cleaning and receipt of favorable analytical results, some of the items were transferred along with the students to Glenwood Elementary School, some of the items were re-used at Thomas Prince School and some of the items were put in temporary storage.

2.3.4 Initial Wipe Sampling

On August 20, 2011, prior to performing cleaning of classrooms and common area rooms, wipe samples were collected from each classroom and common area rooms and other areas in the older building[28] and from select classrooms and the gymnasium in the newer addition. On August 30, 2011 wipe samples were collected from the interior of the unit ventilators in classrooms 209 and 106. On September 16, 2011, following the removal of caulking and prior to the application of epoxy sealant as part of the pilot tests performed in classrooms 209 and 106, wipe samples were collected from the concrete block[29] of the window frames. Wipe samples were collected in general conformance with USEPA requirements. The results were compared to the EPA unrestricted use guideline for the cleanup of PCBs on surfaces in schools of 1 ug/100 cm^2. The majority of the samples either did not exhibit concentrations of PCBs greater than the laboratory reporting limit of 0.1 ug/100 cm^2[30] or exhibited PCB levels less than 1 ug/100 cm^2. Only samples associated with low contact areas including lighting fixtures[31], the interior of unit

[27] As recommended by the EPA in CFR 761.123 and in the PCB Spill Cleanup Policy June 23, 1987, Revised and Clarified on April 18, 1991.

[28] Two or more samples were collected from classrooms (100-112 and 201-211) and the common areas (Corridors, Computer Lab Room 111, kitchen, cafeteria/auditorium and library) from locations considered "high contact" and "low contact" areas (as described previously).

[29] The samples were collected from the surface of the concrete block from which the PCB containing caulking had been in contact. There was no caulking present at this time. The purpose of the sampling was purely inquisitive in nature and the results are in no way being used in any form to support the rendering of decisions or opinions related to existing conditions or mitigation practices.

[30] This includes all samples collected from the newer addition.

[31] Wipe samples collected from the metal surfaces of two fluorescent light fixtures located in the 200-wing hallway exhibited levels of 2.3 & 4.1 ug/100 cm^2, respectively.

ventilators[32], the interior of a computer CPU from room 209[33], the concrete block of the window opening following caulking removal[34] and the top of a clock[35] contained PCB levels greater than 1 ug/100 cm^2. A summary of the analytical results is presented in **Table 3**. The laboratory certificates are presented in **Appendix D**.

2.3.5 Room Cleaning

Following the initial wipe sampling and indoor air sampling, the classrooms and common area rooms[36] within the older portion of the building were cleaned via combination of HEPA vacuum and wet wipe methods. However, only the common area rooms were thoroughly cleaned at this time. Thorough cleaning refers to a very meticulous cleaning of all horizontal surfaces within the room, working from the top portions of the room to the floor, using HEPA vacuum and wet wipe methods. For example, in the cafeteria, the steel I-beams on the ceiling were cleaned as well as the window sills, the light fixtures, the crown molding, the accessible interiors of the exhaust vents, the sound board on the walls (HEPA vacuum only), the curtains of the stage (HEPA vacuum), the floors, etc. In addition, the accessible interior and exterior portions of the HVAC air handlers for the common areas were cleaned via HEPA vacuum. The thorough cleaning of the common area rooms differed from the initial cleaning of the classrooms in the level of effort that was applied. Though HEPA vacuum and wet wipe methods were used during the initial cleaning, the meticulous level of detail employed was not as great. The main goal of the initial cleaning was to remove accumulated dust and dirt that remained in the room following furniture /teaching materials cleaning and removal. Except for classroom 209, the interior portions of the unit ventilators were not cleaned at this time, only the external portions. The accessible internal portion of the unit ventilator for room 209 was cleaned via HEPA vacuum.

The thorough cleaning of the common areas was completed to allow immediate re-occupancy of these common room areas by the students and staff as their access was confined to the newer portion of the school which does not include a cafeteria, a library or a computer room. Though the initial PCB indoor air concentrations within these common room areas were below the recommended EPA school indoor air guideline of 300 ng/m^3, in the best interests of the students and staff, it was determined that the thorough cleaning of these rooms to remove any accumulated dust or other deposits on horizontal surfaces was appropriate to attempt to further reduce the detected PCB indoor air concentrations. On or about September 19, 2012, thorough cleaning of the common room areas was completed.

[32] A sample collected from the interior bottom surface of the unit ventilator in room 209 exhibited a value of 113 ug/100 cm^2 and the sample from the same location within the unit ventilator in room 106 exhibited a value of 4.8 ug/100 cm^2.
[33] A wipe sample of the dust from the interior of a CPU present in room 209 exhibited a value of 3.3 ug/100 cm^2.
[34] Following the removal of interior window caulking from classroom 209 & 106, wipe samples of the cleaned, exposed concrete block substrate were collected. The samples exhibited values of 21.7 & 37.9 ug/100 cm^2 (room 209) and 17.4 ug/100 cm^2 (room 106).
[35] On August 20, 2011 a pre-cleaning sample was collected from the top surface of an elevated clock present in the kitchen which exhibited a PCB value of 1.6 ug/100 cm^2.
[36] Common area rooms include the cafeteria, kitchen, library, computer lab, the bathrooms, room 113 and the hallways.

Between late October and early November, the classrooms in the northern 100-wing (rooms 100, 102, 104, 108 and 110) were thoroughly cleaned via HEPA vacuum and wet wipe methods. Classroom 100 was re-occupied by the band class on November 21, 2011. Classrooms 106 and 209 were also thoroughly cleaned as part of the pilot tests. During this later time, the interior and exterior portions of the unit ventilators for the 100-wing classrooms and classroom 209 were cleaned using HEPA vacuum and wet wipe methods. The interior surfaces of the unit ventilators for the 200-wing classrooms were not cleaned (except for the pilot test room 209) as access to the 200-wing classrooms was to remain restricted. Note that unit ventilators are present only in the classrooms, not the common areas.

2.3.6 Post Room Cleaning Wipe Sampling

On September 16 & 22, 2011, wipe samples were collected from four[37] locations that had exhibited PCB concentrations above 1 ug/100 cm^2 during the August 20 and September 16, 2011 initial sampling. The purpose of the post room cleaning wipe sampling was to demonstrate the effectiveness of the cleaning techniques in reducing PCB concentrations. In addition, wipe samples were also collected from the epoxy sealed window frame areas in classrooms 106 and 209 where caulking had been removed as part of the pilot test. Wipe samples were collected in accordance with EPA requirements. The results were compared to the EPA unrestricted use guideline for the cleanup of PCBs on surfaces in schools of 1 ug/100 cm^2 and all results were below this value. A summary of the analytical results is presented in **Table 3**. The laboratory certificates are presented in **Appendix D**.

2.4 PILOT TESTING

2.4.1 Purpose

The purpose of the pilot testing was to evaluate various mitigation efforts that would effectively reduce the indoor air concentrations of PCBs within the classrooms to below the EPA guidance level of 300 ng/m^3. The pilot test was designed to be implemented in a phased approach to determine which specific mitigation activities could be undertaken to achieve this result. Two classrooms within the older portion of the building were selected for the pilot test, rooms 106 and room 209. Following the reduction of indoor air concentrations to favorable levels in the pilot test classrooms, the proven mitigation methods would be presented to EPA under 40 CFR section 761.61 (c) as a risk based option for consideration and approval as a mitigation approach to be implemented in the remainder of the classrooms which contained elevated PCB concentrations above EPA guidance levels, i.e. the remainder of the classrooms in the 200-wing (classrooms 201, 203, 205, 207 and 211).

[37] These areas included the top outer surface of a fluorescent light fixture located in the 200 corridor, the inside of the unit ventilators from pilot test rooms 106 and 209 and the top surface of the kitchen clock. Note that the top outer casing of an additional fluorescent lighting fixture, located in the 200 corridor, had contained a PCB concentration greater than 1 ug/100 cm^2. However, this item was not sampled following cleaning as the post-cleaning results of the aforementioned light fixture was deemed representative as it had contained a higher concentration of PCB.

As part of this process, the classrooms were thoroughly inspected to evaluate the similarities and differences in their construction to help better identify potential sources that could be contributing to the concentrations of PCBs detected in indoor air. Below is a bulleted summary in which similarities and differences of classrooms 106 and 209 (and in general, the classrooms located within the 100-wing portion and the 200-wing portion of the school) are identified:

Room 209

- Initial PCB indoor air concentration of 1,021 ng/m$^{3;}$
- Room Size – 34' N-S x 24' E-W
- Masonary block wall construction;
- Walls painted light blue;
- Lights – Fluorescent ceiling;
- Location – west side of older building, adjacent to enclosed courtyard;
- Three doors (one connected to a small glass partition adjacent to hallway corridor);
- Four structural support beams;
- Unit Ventilator with exterior air intake vent. The exterior air intake vent includes louvered cover and associated original caulking (10 LF);
- Exhaust vent to roof;
- Two original windows with original caulking (80 linear feet (LF) feet interior & exterior) and glazing compounds;
- Exterior precast concrete window columns with vertical joint caulking (33 LF);
- Approximately 40 LF of bulletin board;
- Approximately 30 LF of chalk board;
- First generation (older type) dropped ceiling;
- Linoleum tile floor.

Room 106

- Initial PCB indoor air concentration of 534 ng/m$^{3;}$
- Room Size – 25' N-S x 36' E-W
- Masonary block wall construction;
- Walls painted an off-white color;
- Lights – Fluorescent ceiling;
- Location – east side of older building, adjacent to drive through area and parking lot;
- Four doors
- Five structural support beams;
- Unit Ventilator with exterior air intake vent. The exterior air intake vent includes metal flashing and associated original caulking (10 LF);
- Exhaust vent to roof;

- One original window and newer caulking (40 total LF interior & exterior);
- Exterior precast concrete window columns with vertical joint caulking (18.5 LF);
- Approximately 20 (LF) of bulletin board;
- Approximately 20 (LF) of chalk board;
- First generation (older type) dropped ceiling;
- Linoleum tile floor;
- Sound proofing carpet type panel along one wall.

Based on a comparison of the rooms, the initial measures to be implemented consisted of the removal of window caulking (both rooms), removal of window glazing (room 209 as glazing was not present on the window in room 106), removal of caulking around exterior air intake vent (both rooms) and removal of exterior joint caulking associated with the precast concrete window columns. All contents of the rooms (furniture & teaching supplies) had been removed from the pilot test rooms prior to performing the pilot tests.

2.4.2 Caulking and Window Glazing Removal

The pilot test involved the removal of all interior/exterior window caulking (120 LF), all exterior joint caulking associated with the precast concrete window columns (51.5 LF) and the exterior caulking associated with the exterior air intake vents (20 LF) for the unit ventilators in each of the pilot test classrooms. In addition, an attempt was made to remove the window glazing from around the windows and metal window frame. Though most of the glazing was removed, it proved to be difficult to remove all of the glazing due to its secure bond to the metal window frame. All interior/exterior caulking and glazing removal was performed under negative air containment by experienced contractors in general conformance with the work plans. The containment structures were constructed of polyethylene sheeting in the immediate area of the windows. The caulking was removed via manual and mechanical methods. All visible caulking was removed. Following material removal and while still under negative pressure containment, the areas where the caulk had been removed and the glass window surfaces were cleaned via HEPA vacuum.

The caulking was also found to contain asbestos and as such, its removal was subject to the Asbestos Hazard Emergency Response Act (AHERA) and as such the removal and required monitoring and clearance sampling were completed by appropriate licensed personnel. Generated waste was disposed of under Uniform Hazardous Waste Manifest as a hazardous waste containing PCBs and asbestos. The waste was disposed of at the EQ-Wayne Disposal, Inc. in Belleville, MI under manifest # 005001350 FLE. Refer to **Appendix E** for copies of the Cleaning Specifications and PCB and Asbestos Removal Work Plans prepared by ECS for the pilot test, **Appendix F** for a copy of the asbestos Air Clearance Testing and Visual Inspection report, and **Appendix G** for waste disposal documentation.

Note that caulking present in the 100-wing classrooms was found to contain asbestos. The caulking in the 100-wing classrooms consists of an apparent newer caulking exposed at the surface, likely installed during the window replacement activities in 1991, and a grey colored caulking located beneath the white caulking. The white

colored interior and exterior window caulking was not found to contain asbestos. However, the grey caulking, observed below this white caulking on the classroom interior, was found to contain 10% Chrysotile asbestos.

2.4.3 Cleaning

Following caulking removal, the pilot test rooms were again cleaned via HEPA vacuum and wet wipe methods. This cleaning generally included all horizontal surfaces. In addition, the accessible surfaces of the interior portions of the unit ventilators were cleaned. During this initial pilot test stage, the exterior and readily accessible interior surfaces of the unit ventilators in the pilot test rooms (106 & 209) were cleaned via HEPA vacuum and wet wipe methods. There was considerable "caked on" dirt and grime on the internal metal surface of the unit ventilators below the cylindrical fan veins, thus aggressive wet wipe scrubbing was performed to remove this material.

2.4.4 Ventilation

During/following cleaning, the unit ventilators were in operation with all doors closed. In preparation for the pilot test, the unit ventilators in the pilot test rooms were balanced by the HVAC specialist responsible for their operation. In addition, the industrial blowers used to generate negative pressures for the containment structures during caulking removal activities were temporarily activated for additional ventilation.

2.4.5 Exposed Substrate Sealing with an Epoxy Coating

Following cleaning and ventilation of the room, the masonry areas where the caulking had been removed (and approximately 1-inch beyond) were sealed with two coats of Sikagard®-62, a solvent free epoxy coating. The epoxy coating was applied as a protective layer to encapsulate the exposed masonry to limit potential migration (surface migration and volatilization) of PCBs from the masonry products in the direct areas where the caulking had been located. Details on Sikagard®-62 are presented in **Appendix H**.

2.4.6 Wipe Sampling of the Epoxy Coating and Unit Ventilators

On September 22, 2011, wipe samples were collected from the surface of the applied epoxy coating and from the cleaned unit ventilators in accordance with EPA requirements. The results were compared to the EPA unrestricted use guideline for the cleanup of PCBs on surfaces in schools of 1 ug/100 cm^2 and all results were below this value. Low levels of PCBs were detected on the epoxy coating[38]. A summary of the analytical results is presented in **Table 3**. The laboratory certificates are presented in **Appendix D**.

[38] Following receipt of the indoor air sampling results collected on September 22, 2011, a closer inspection of room 209 was completed on October 5, 2011 to determine if a potential source of PCB to indoor air could be identified. It was observed that exposed window glazing compound remained between the windows and the metal frame. It is surmised that the low concentration of PCBs detected on the surface of the epoxy coating is likely the result of the exposed glazing compound that could not be removed from the windows. It was observed that outside air was passing across the exposed glazing compound between the glass window and the metal window frame.

2.5 INDOOR AIR SAMPLES – SEPTEMBER 22, 2011 (POST-PILOT TEST AND COMMON AREA ROOMS CLEANING)

Following the thorough cleaning of the common area rooms and completion of the pilot tests, indoor air sampling was performed within the older portion of the school building. On this date, indoor air samples were collected from pilot test classrooms 106 & 209, common area rooms (cafeteria, kitchen, computer lab, library, hallway corridors and room 113) and the administration Office for a total of 12 samples plus one duplicate. One ambient air sample was also collected. Besides the duplicate, QA/QC samples also included one field blank and one spike.

The samples were collected in with EPA Method TO-10A using low flow air sampling pumps and poly urethane foam traps, over a duration of approximately 6 hours and 40 minutes at flow rates of approximately 5 milliliters per minute (for a total volume of approximately 2 cubic meters). The samples were submitted to NEA, a Division of Pace Analytical Services, Inc., Schenectady, NY, for analysis of PCB Homolog's via EPA Method 680. No concentrations of PCBs were detected above applicable Public Health Levels for PCBs in Indoor School Air in any of the common room areas or the 100-wing classrooms (no results were reported above 65 ng/m^3). The IAS collected from pilot test room 209 did not show any appreciable reduction in PCB concentration from the previous sampling and remained above guidance levels at a concentration of 900.87 ng/m^3. The results are summarized in Table 1 and the laboratory certificate is included in **Appendix B**.

The IAS results indicated that the mitigation measures implemented in the common area rooms (i.e. thorough cleaning) had a significant beneficial effect in reducing indoor air concentrations of PCBs. The mitigation measures completed in classroom 106 had a beneficial effect of reducing the indoor air PCB concentration to less than 100 ng/m^3. The mitigation measures performed as part of the pilot test in room 209 did not appear to have an appreciable effect in reducing indoor air concentrations of PCBs.

2.6 STUDENT RE-OCCUPANCY – COMMON ROOM AREAS

On October 4, 2011 all students K-8, ages 5-14 years re-occupied[39] the common room areas (cafeteria, library and computer lab).

2.7 ROOM 209 PILOT TEST CONTINUATION

Due to the unfavorable laboratory analytical results obtained from the indoor air sample for classroom 209 following the initial pilot test, a continuation of the pilot test for room 209 was deemed appropriate. Since similar mitigation measures were completed for both pilot tests and the indoor air sample for classroom 106 had resulted in a favorable outcome, it was decided to re-inspect both classrooms 209 and 106 to determine if there were any noted differences in the rooms that could potentially contribute to the differences in detected PCB indoor air contamination. Thus, on October 5, 2011 representatives from ECS and TEI performed thorough inspections of classrooms 209 and 106 to determine any differences that may be evident.

[39] A student's time in these common area rooms is limited to the cafeteria for lunch and infrequent visits to the computer lab and library. Most time in school is currently spent in the newer addition. Thus, as a conservative average, a student likely spends approximately 45 minutes per day in the common room areas.

Characteristics of each classroom are presented in section 2.4.1 of this report. It was determined that the most notable difference between the two rooms that may significantly contribute to indoor air impact was that room 209 still contained older windows and that exposed, fractured glazing compound was present between the glass and window frames. On this date, ECS collected a sample of the glazing compound from a window in room 209 and submitted it for analysis of PCBs via EPA Method 8082. The result shows that 76 ppm of PCB were present in the sample. Based on these observations, ECS determined that the next phase of the pilot test for classroom 209 should include the following:

- Removal of the windows (under negative air containment) and proper disposal as PCB *bulk product waste*;
- Encapsulation of any exposed substrate following window removal with two coats of Sikagard®-62 epoxy coating;
- Thorough cleaning of the Unit Ventilator and associated floor vent. During this procedure, the veined fans/axle/motor mechanism were removed from the Unit Ventilator allowing for the thorough cleaning of this mechanism and thorough cleaning of the interior of the Unit Ventilator behind this mechanism;
- Sealing of other potential caulking joints on the interior of the rooms such as those observed around doorways and support beams with Sikagard®-62 epoxy coating;
- Thorough re-cleaning of the horizontal and vertical surfaces within the room;
- Sealing of the doorways connecting to classroom 211 and the southern portion of the hallway with polyethylene sheeting.

The set up of the negative air containment and window removal was initiated by TEI on November 2, 2011 and completed later that day. The epoxy coating, Sikagard®-62, was applied to the masonry of the window openings that had formerly been covered by the steel window frame, which now was exposed. The window openings were then covered with plywood. As a Best Management Practice measure, other caulking joints associated with the walls and doorways of the classroom were coated with Sikagard®-62 on November 4, 2011.

2.8 INDOOR AIR SAMPLING – NOVEMBER 8, 2011

Following completion of the continued pilot test in classroom 209, indoor air sampling was performed within classrooms 209 and 108. The samples were collected in conformance with EPA Method TO-10A using low flow air sampling pumps and poly urethane foam traps, over a duration of approximately 6 hours and 40 minutes at flow rates of approximately 5 milliliters per minute (for a total volume of approximately 2 cubic meters). The samples were submitted to NEA, a Division of Pace Analytical Services, Inc., Schenectady, NY, for analysis of PCB Homolog's via EPA Method 680. The analytical result obtained for classroom 209 exhibited a reduction to 171.6 ng/m^3 (from 900.87 ng/m^3) and that from classroom 108 exhibited a reduction to 25.6 ng/m^3 (from an average[40] of 265.8 ng/m^3). The results are summarized in Table 1 and the laboratory certificate is included in **Appendix B**.

[40] Average concentration of indoor air sample results from samples 108 and 108A collected on August 20, 2011. Samples 108 and 108A were collected from 2 different sections of the same room, separated by a roll away divider.

The IAS results indicate that the mitigation measures implemented in classroom 209 have resulted in the reduction of PCBs in indoor air to concentrations less than the EPA Public Health Guideline of 300 ng/m^3 and thus the goal of the pilot test program has been met.

2.9 WINDOW CAULKING AND MASONRY CHARACTERIZATION

As part of this project, sampling of caulking and masonry materials was performed to:

- determine the PCB concentrations within the interior and exterior caulking compounds associated with exterior windows located in the older building classrooms, the cafeteria and the kitchen;
- evaluate PCB concentrations within building materials, i.e. interior concrete block, exterior precast concrete window columns and exterior brick, located adjacent to the aforementioned caulking compounds.

On September 23 and October 5, 2011 and January 6, 2012, following the initial sampling performed by others, ECS collected samples of interior/exterior caulking and masonry products to further delineate the extent of PCBs in these materials[41]. Sample analytical results for PCBs from the caulking and building materials located adjacent to caulking materials are presented in **Table 4.** Asbestos results are presented in **Table 5**. The laboratory certificates are presented in **Appendix I**. Photos showing general locations from which the samples were collected are presented in following the Tables in the section labeled **Photos**.

Ten percent or greater of the units being assessed were sampled as part of the assessment program. The sampling frequency for the masonry building materials associated with the 200-wing windows, cafeteria windows and kitchen windows is as follows:

Exterior - 200-wing windows

- Precast concrete Window Column — 4 samples/12 window units
- Pebbled Concrete Window Sill — 2 sample/12 window units
- Pebbled concrete Surface just below pebbled window sill — 2 sample/12 window units
- Brick/Mortar — 8 samples/12 window units

[41] The samples were collected from interior and exterior locations of the older portion of the building in accordance with procedures as presented in EPA Region 1 Standard Operating Procedure for Sampling Porous Surfaces for PCBs, May 2011. The samples were extracted via EPA Method 3540C and analyzed for PCBs via EPA Method 8082 and the results were reported on a dry weight basis.

Interior - 200-wing windows

- Concrete Block window units — 15 samples/12

Exterior – Kitchen

- Brick — 2 samples/1 window bank
- Mortar — 1 sample/1 window bank

Interior – Kitchen

- Mortar Window Sill — 1 sample/1 window bank

Exterior – Cafeteria

- Brick — 8 samples/2 window banks
- Mortar — 2 samples/2 window banks

Interior Cafeteria

- Mortar Window Sill — 1 samples/2 window banks

The analytical results of the caulking and porous building materials indicate the following:

- The exterior caulking associated with the 200-wing classrooms contained significantly higher concentrations of PCBs than did the other caulking samples (17,800 ppm to 30,200 ppm);
- The caulking samples from interior classrooms ranged from approximately 76 ppm to 221 ppm;
- The extent of PCB contamination was defined to concentrations below 1 ppm in all exterior masonry samples collected for the 200-wing rooms, the cafeteria and the kitchen window locations;
- The extent of PCB contamination to the interior concrete block of the classrooms was defined to concentrations just above 1 ppm.
- PCBs were not detected within the interior of the cafeteria or kitchen above 1 ppm.

Cafeteria & Kitchen

- The exterior brick at the roof top windows associated with the cafeteria and the kitchen contain PCBs ranging in concentration of approximately <1ppm to 3 ppm at 1-inch distance from the window caulking perpendicular to the building. On the outward brick face (parallel to the building), PCBs were detected at concentrations **<1ppm** at a distance of 1-inch from the corner of the brick;
- The interior mortar window sill at the north end of the kitchen, at a distance of 4.5-inches from to the window bank, contains concentrations of PCBs **<1 ppm**. No caulking was observed along the interior portion of the window bank. The window appears to be the original T-track type window.
- The interior mortar window sill of cafeteria windows, at distances of 2-5 inches from the window, contains concentrations of PCBs **<1 ppm**. These windows replaced the original windows in 1991.

Classrooms 201, 205 & 211

- The exterior precast concrete window columns at classrooms 201 & 205 contain PCBs ranging from 1.03 ppm to 1.08 ppm at 1inch distance from the window caulking perpendicular to the window. At a distance of 8 inches from the caulking, along the same face of the precast concrete window column, PCBs were detected at concentrations **<1 ppm**.
- The horizontal surfaces of the exterior pebbled-concrete window sills at classrooms 201 & 205 contain PCBs ranging from 1.71 ppm to 4.72 ppm at 1inch distance from the window caulking perpendicular to the window. On the vertical surface of the pebbled-concrete, at a distance of 1 inch below the window sill, PCBs were detected at concentrations **<1 ppm.**
- The exterior brick/mortar adjacent to the outward sides of the precast concrete window columns at classrooms 201 & 211, at distances of 1-2 inches from the vertical caulked joint, contain PCBs ranging in concentration from <1 ppm to 1.95 ppm. At distances ranging from 2.5-3 inches from the vertical caulked joint, PCBs were detected in the brick/mortar at concentrations **<1 ppm**.
- The interior concrete block, perpendicular to the window at distances of ½ - 3 inches from the vertical window caulking seam, contains PCB concentrations ranging from 1.61 ppm to 3.89 ppm. On the face of the concrete block parallel to the window, at a distance of 1-3 inches from the corner of the block, PCBs were detected at ranges between **0.75 ppm** to **1.62 ppm** (of the detected values, the average is 1.18 ppm and the median is 1.2 ppm).

2.10 SOIL SAMPLING, ANALYSES, EXCAVATION AND DISPOSAL

2.10.1 Soil Sampling – Pre-Excavation

Pre-excavation and post-excavation soil sample locations are depicted on **Figures 4 and 5,** respectively. A summary of PCB soil sampling analytical results is included in **Table 6** and the laboratory certificates are provided in **Appendix J**.

Soil Sampling - September 7, 2011 -This soil sampling event was conducted by Woodard and Curran of Andover, MA who have prepared a draft report which includes details on the specifics of the sampling event and associated analysis. A summary of the event and data are provided here and the complete report is provided as **Appendix K**.

On September 7, 2011, representatives from Woodard and Curran mobilized to the school to collect soil samples to evaluate the potential presence of PCBs in soils at the base of windows and associated caulking joints opposite the 100-wing and 200-wing classrooms. Woodard and Curran collected soil samples from three distinct areas; the northern courtyard – outside of Room 203, the southern courtyard – outside of Room 209, and along the east side of the building – outside of Room 106. Each of the sample areas was located below the corresponding classroom window and/or air intake vent and associated caulking. Each window is surrounded by precast concrete window columns with vertical caulked joints separating the concrete window columns from the surrounding brick wall and a vertical caulked joint in the middle of the center concrete columns (resulting in a total of three caulked joints). Each window unit also contains window glazing

compound. The caulking and glazing compound have been determined to contain PCBs. A total of 16 soil samples were collected and submitted for laboratory extraction via EPA Method 3540C and analysis of PCBs via USEPA Method 8082.

At each of the sample areas, soil samples were collected at the base of the vertical caulked joints, near the intakes of the ventilation systems at the corresponding classrooms, and laterally perpendicular and parallel to the building in order to determine extent. Samples were collected from depths of 0 to 9 inches bgs. PCBs were detected in five of the submitted samples above laboratory detection limits. Only one sample (TP-CBS-018), collected at the base of the vertical joint of the window of Room 106 along the eastern wall of the building at a depth of 0-3 inches below grade surface (bgs), had a detection of PCBs (3.7 ppm) at a concentration above the high occupancy use clean up criteria (1 ppm) and the Massachusetts Department of Environmental Protection (MassDEP) RCS-1 reporting concentration (2 ppm). All other samples with detections of PCBs exhibited concentrations below 1 ppm.

Soil Sampling – October 26, 2011 - Due to the detection of PCBs above the high occupancy use clean up criteria in the soil sample TP-CBS-18, ECS conducted additional soil sampling along the eastern portion of the building where the windows for Rooms 100 through 110 are located. ECS collected a total of 14 soil samples (ECS-1A & 1B through ECS-7A & 7B) and submitted the samples for laboratory extraction via EPA Method 3540C and analysis of PCBs via USEPA Method 8082. The samples were collected with a stainless steel hand auger at depth intervals of 0-3 inches bgs and 6-9 inches bgs. The samples were collected at the eastern most point of the unpaved area, an approximate 2.5 foot wide area between the northern portion of the east side of the building and the paved sidewalk. The samples were collected opposite vertical caulked joints or vents as described in Table 6. In between the collection of each sample, nitrile gloves were changed and the stainless steel hand auger was decontaminated by first wiping the auger with a dry rag, and then spraying the auger with a hexane and water rinse wash. Spoiled rags were combined with the cleaning wastes that had been generated for the project. The laboratory analytical results indicate that 12 of the 14 samples contained detectable concentrations of PCBs. Only one of the samples (ECS-2B) collected at 6-9" bgs exhibited a concentration of PCBs (1.01 ppm) above the high occupancy use clean up criteria. This sample was collected opposite the north most louver vent cover for the air intake to classroom 100. Concentrations of PCBs detected in the other samples collected during the event ranged from 0.028 ppm to 0.572 ppm.

Soil Excavation and Post-Excavation Soil Sampling – December 27, 2011 - The soil excavation was performed in compliance with 40 CFR 761.61 (b), Performance Based Cleanup. All soil was disposed of according to 40 CFR 761.61(b)(i). Prior to the soil abatement project occurring, details of the initial findings and proposed plan were discussed via telephone with the EPA Region 1 Coordinator. Based on the data from the September 7, and October 26, 2011 soil sampling events, a soil excavation was conducted on December 27, 2011 in order to remove PCB impacted soil from the impacted area to the east of and adjacent to the school building. ECS personnel excavated soil from the landscaped area using hand tools and placed the soil into the bucket of a small loader which was used to deposit the soil into a lined, properly labeled 20 cubic yard roll-off container. Approximately 11.6 tons (7.7 cubic yards) of soil was removed from the

excavation area. The completed excavation area was approximately 137 feet long, 2 feet wide, and 9 to 15 inches deep. The deepest area of the excavation was the area in the vicinity of the air intake vent for classroom 100. This was the area in which a pre-excavation soil sample exhibited the highest PCB concentration at a depth of approximately 6-9 inches (ECS-2B). Following the completion of the soil excavation, all hand tools, machinery, and associated gear was cleaned using dry and wet wipe methods. The tools and associated gear used during soil removal were cleaned with water wet and dry rags to NACE Visual Standard No. 2 per the decontamination requirements per 40 CFR 761.79. All spoiled rags were transferred to the roll-off container.

Following the completion of the soil removal, post-excavation soil samples were collected from the base of the excavation. The sampling frequency was determined based on a discussion with the EPA Region 1 Coordinator and in general conformance with 40 CFR 761.280, Subpart O. A total of 28 grab soil samples were taken at 5 foot intervals along the length of the excavation. These 28 grab samples were combined into 7 composite samples consisting of 4 grab samples each (ECS-A through ECS-G) which were submitted for Spectrum Analytical, Inc. of Agawam, MA for laboratory extraction via EPA Method 3540C and laboratory analysis for PCBs by EPA Method 8082. The excavation area was left open pending the results of the laboratory analysis, but secured with four foot high, orange fencing and delineated with traffic cones. The lined roll-off container was covered and secured following the excavation work and was removed from the site by TEI the following day.

The laboratory analytical report indicated that low levels of PCBs were detected in three of the seven soil samples submitted for analysis (ECS-B, ECS-D, and ECS-F) at concentrations ranging from 0.031 ppm to 0.766 ppm. All detections of PCBs were below the high occupancy use clean up criteria of 1 ppm and as such, the excavation area was backfilled with clean gravel fill on January 3, 2012.

3.0 WASTE DISPOSITION

As part of the initial mitigation activities, the waste that was generated included fluorescent light ballast's and stained lighting fixtures, PCB containing caulking, personal protective equipment (PPE) and cleaning/decontamination materials. As part of the soil excavation and removal activities, the waste that was generated included PCB contaminated soil, associated PPE and decontamination materials. Copies of manifests are included in **Appendix G**.

- Fluorescent Light Ballast – On December 9, 2011, 550 pounds of fluorescent light ballast's, contained in two 55-gallon DOT drums, were transported by TEI (US EPA ID # MAD985286988), under Non-Hazardous Waste Manifest number NHWM055751, as a non-regulated material (exempt PCB Ballasts) to their facility in Lowell, MA (US EPA ID # MAC300013695) for temporary storage. The exempt PCB Ballast refers to their classification as a Universal Waste which is considered non-hazardous. The ultimate disposal of the ballasts was at Complete Recycling Solutions, LLC in Fall River, MA.
- Miscellaneous (caulking, PPE, miscellaneous classroom materials, decontamination materials, lighting fixtures, etc.) – On December 9, 2011, 384 kilograms of PCB *bulk product waste* stored in 4, cubic yard containers, was transported by TEI (US EPA ID # MAD985286988 and then by Franks Vacuum Service (US EPA ID # NYD982792814), under Uniform Hazardous Waste Manifest number 005001350 FLE, as NA3077, Hazardous Waste Solid, n.o.s. 9, III (Polychlorinated Biphenyls, Asbestos) to the EQ-Wayne Disposal facility in Belleville, MI (US EPA ID # MID048090633.
- Soil – On December 28, 2011, 10,505 kilograms (11.56 tons) of PCB *remediation waste* (contaminated soil), contained in a 20 cubic yard roll-off container, was transported by TEI (US EPA ID # MAD985286988), under Uniform Hazardous Waste Manifest number 005005311 FLE, as UN3432, RQ: Polychlorinated Biphenyls, solid 9, II (PCB Contaminated soil) to the CWM Chemical services facility in Model City, NY (US EPA ID# NYD049836679.

4.0 SITE CLEANUP AND RISK BASED DISPOSAL PLAN (40 CFR 761.61(C)

In accordance with 40 CFR 761.61 (c), the following is a plan to address PCB Bulk Product Waste and PCB Remediation Waste during the window removal and replacement project at the Thomas Prince School scheduled to begin in late February 2012 (February 21) and end in early March 2012. During a meeting on January 5, 2012, the US EPA waived the 30 day written notification requirement per 40 CFR 761.61 (c) (1) and (a) (3). However, the requirements of the notification per 761.61 (a)(3) remained and are thus presented within this report.

As explained previously within this document, PCBs were discovered in the interior/exterior window caulking and exterior window column joint caulking, within the older portion of the school building, in the late spring of 2011. Subsequent sampling and analysis has shown that PCBs are present within building materials (concrete block, brick and precast concrete window columns) located adjacent to the windows and associated caulking. PCBs have also been detected in the indoor air of the school, primarily in the older portion of the building where these PCB containing caulking compounds are present. The objectives of this project are to:

- Allow for the immediate removal of windows from the 200-wing classrooms, the cafeteria and the kitchen;
- Reduce the indoor air PCB concentrations in classrooms 201, 203, 205, 207 and 211 to concentrations below 300 ug/m^3;
- Simulate the mitigation measures completed as part of the pilot test, i.e. remove identified PCB *bulk product waste* and PCB *remediation waste* consisting of old windows and associated caulking materials;
- Prevent/minimize potential human exposure to PCBs that exist in the masonry materials that are located adjacent to the windows (interior/exterior) and prevent/minimize infiltration of water and erosion by encapsulating the masonry materials with two coats of a high build epoxy resin based coating (Sikagard® -62 or similar). The epoxy coating will provide high resistance to abrasion and chemical attack;
- Allow for the immediate installation of new, state-of-the-art, windows within the 200-wing classrooms, the cafeteria and the kitchen.

The project will involve classrooms 201, 203, 205, 207, 209 and 211, the cafeteria and the kitchen. Remedial work will be associated with the window removal and replacement project. It is noted that PCBs were identified in caulking and adjacent materials associated with the windows in the 100-wing classrooms of the older building (classrooms 100, 102, 104, 106, 108 and 110). These windows were formerly replaced in 1991 and are not part of this current window repair project. Though PCBs are present in the caulking and masonry materials associated with these 100-wing classrooms, it is not the intent of this plan to address these materials at this time. **The materials associated with the 100-wing classrooms will be addressed in a subsequent plan anticipated to be submitted in March 2012.**

The proposed abatement activities to be performed will consist of the following:

- Removal of the windows and associated window caulking from classrooms 201, 203 205, 207 and 211 (209 removed as part of the pilot test); cafeteria windows (east and west sides) and kitchen windows (north end);
- Removal of caulking from the outside seams of the exterior louvered air intake vent for each of classrooms 201, 203 205, 207 and 211 (209 removed as part of the pilot test);
- Application of an epoxy sealant over the areas where caulking is to be removed and to a specified distance beyond these areas
- Thorough cleaning of classrooms 201, 203 205, 207 and 211 (209 cleaned as part of the pilot test).

4.1 NATURE OF CONTAMINATION

As discussed in detail previously within this report, the PCB *bulk material waste* and *PCB remediation waste* to be addressed as part of this cleanup and disposal plan is associated with window caulking, glazing and adjacent building materials within the interior/exterior of rooms 201, 203, 205, 207, 209, 211, cafeteria and kitchen of the older portion of the Thomas Prince elementary school. (Classrooms 100, 102, 104, 106 108 and 110 contain *PCB remediation waste* consisting of caulking and adjacent building materials, though these will not be addressed as part of this clean up and disposal plan).

4.2 SUMMARY OF PROCEDURES USED TO SAMPLE CONTAMINATED AND ADJACENT AREAS

The procedures used to sample the source areas and adjacent areas consisted of the following:

Indoor Air Samples

- Indoor Air Samples were collected and analyzed following EPA Method TO-10A[42]

Caulking/Glazing Compound Samples

- Collection of bulk samples of caulking material was completed following techniques generally employed by the Building Sciences industry[43]. Samples were collected by 3 different companies as part of this work but all samples were analyzed by the same laboratory[44].

[42] Indoor air samples were collected following low flow air sampling procedures using pumps and polyurethane foam traps, over a duration of approximately 6 hours and 40 minutes at flow rates of approximately 5 milliliters per minute (for a total volume of approximately 2 cubic meters). During this indoor air sampling round and all subsequent indoor air sampling rounds completed for the school, ECS mimicked conditions that are typically present within the school when the students are present, i.e. doors closed, unit ventilators and other HVAC systems in operation. The PUF cartridges were positioned approximately four feet from the floor surface to represent the typical breathing space of children. All indoor air samples were submitted to NEA, a Division of Pace Analytical Services, Inc., Schenectady, NY. All indoor air samples collected as part of this assessment were analyzed by either EPA Method 8082 for PCB Congeners or EPA Method 680 for PCB Homolog's.

[43] AHERA asbestos sampling guidelines. These methods employ using hand tools such as a razor knife, decontaminated between subsequent sampling rounds.

[44] The following are details on the caulking samples collected as part of this assessment: 1) Samples collected by Covino in April 2011 were composite samples, analyzed via EPA Method 8082 for PCB Aroclor and extracted via EPA Method 3550 B/C (ultrasonic). The purpose of the sampling was to determine if PCBs were present within caulking; 2) Samples collected by Woodard and Curran in June 2011 were grab samples, analyzed via EPA Method 8082 for PCB Aroclor and extracted via EPA Method 3540C (soxhlet). The purpose of the sampling was to further delineate the extent of PCB impact in caulking,, and; 3) Samples collected by ECS in September and October 2011 were grab samples, analyzed via EPA Method 8082 for PCB Aroclor and extracted via EPA Method 3540C (soxhlet).

Masonry Samples (Adjacent Building Materials)

- Masonry samples were collected from interior/exterior building materials (concrete block, mortared window sills, precast concrete columns and brick) that were adjacent to observed caulking compounds associated with window units. Collection of these samples was completed following techniques generally employed by the Building Sciences industry and in accordance with EPA SOP's[45]. Samples were collected by 3 different companies as part of this work but all samples were analyzed by the same laboratory[46].

Wipe Samples

- Wipe samples were collected from pre and post cleaned furniture and other areas within rooms of the older building[47] to evaluate high contact and low contact surfaces.

4.3 LOCATION AND EXTENT OF THE IDENTIFIED CONTAMINATED AREA

The areas found to be contaminated with PCBs are associated with the windows and the interior and exterior adjacent masonry products in classrooms of the older portion of the building. PCBs in the adjacent masonry products were defined to <1 ppm within several inches of the source material caulking in all exterior areas, and interior areas associated with the cafeteria and. The interior adjacent masonry block within the 200-wing classrooms was defined to near 1 ppm. At the 200-wing classroom locations, the concentration of PCBs was shown to reduce by 50% within three inches of the source window caulking. However, based on 1) the reductions in PCB concentrations observed within a short distance from the source area, 2) the low concentrations of PCBs detected: and, 3) the observed reduction in PCBs at other locations it is expected that PCB concentrations <1 ppm would be realized within several inches of the locations of the final samples collected as part of this assessment. Additional samples to verify this will be collected following window removal. **Table 4** presents a summary of the data and the laboratory certificates are provided in **Appendix I**. Refer to the **Photos** for visual depictions of sample collection locations and PCB concentrations. A detailed summary of the location and extent of the identified waste materials is presented in **Appendix L**.

[45] USEPA. (2011). Standard Operating Procedure for Sampling Porous Surfaces for Polychlorinated Biphenyls (PCBs). The Office of Environmental Measurement and Evaluation, EPA New England – Region 1. EIA SOP_POUROUSSAMPLING, Rev 4, 05/05/11.

[46] The following are details on the masonry samples collected as part of this assessment: 1) Samples collected by Woodard and Curran in June 2011 were grab samples, analyzed via EPA Method 8082 for PCB Aroclor and extracted via EPA Method 3540C (soxhlet). The purpose of the sampling was to provide initial delineation on the extent of PCB impact to masonry materials located adjacent to caulking compounds identified as containing PCBs greater than 50 ppm, and; 2) Samples collected by ECS in September, 2011 and January, 2012 were grab samples, submitted to Spectrum Analytical, Inc., Agawam, MA and analyzed via EPA Method 8082 for PCB Aroclor and extracted via EPA Method 3540C (soxhlet). The purpose of the sampling was to further delineate the extent of PCB impact in adjacent masonry building materials.

[47] Wipe samples were collected in accordance with procedures recommended by the EPA in 40 CFR 761.123 and the PCB Spill Cleanup Policy June 23, 1987, Revised and Clarified on April 18, 1991, Wipe Sampling and double Wash/Rinse Cleanup. The wipe sampling gauze and hexane were provided to ECS by the laboratory in sealed glass containers. The initial round of wipe samples (August 20, 2011) were analyzed by NEA, a Division of Pace Analytical Services, Inc., Schenectady, NY via EPA Method 8082 for PCB Aroclor and extracted via EPA Method 3540C (soxhlet). All subsequent wipe samples were submitted to Spectrum Analytical, Inc., Agawam, MA and analyzed via EPA Method 8082 for PCB Aroclor and extracted via EPA Method 3540C (soxhlet).

4.4 CLEANUP AND DISPOSAL PLAN

This plan essentially provides for the removal of windows and associated caulking compound (*PCB bulk product waste*) and the encapsulation of adjacent materials with two coats of a high build, protective epoxy resin coating (Sikagard®-62 or similar). The dual epoxy coating will act as a protective barrier to limit potential migration of PCBs from the masonry products. The epoxy coatings will provide a high glossy film with high resistance to abrasion and chemical attack. The epoxy coatings will be placed on the exposed surfaces to provide visual verification of application[48]. The 200-wing classrooms will then be thoroughly cleaned. This work is tentatively scheduled to begin during the schools February 2012 school vacation, on or about February 21, to be completed in early March 2012.

Window Removal and Caulking Removal – 200-Wing Classrooms, Cafeteria & Kitchen

- **200-Wing Classrooms, Cafeteria and Kitchen** - Removal of the 10 windows associated with classrooms 201, 203, 205, 207 and 211, the two banks of windows in the cafeteria, the single bank of windows in the kitchen, along with the associated caulking will be completed. The caulking associated with the exterior veined air intake vent covers of the unit ventilators for the 200-wing classrooms, as well as the louvered vent covers, will be removed and replaced. This removal will be completed per the contractor work plan included as **Appendix M.** The caulking will be removed via a combination of manual and automated hand tools as required until the visual presence of caulking is not observed. Following caulking removal, the surfaces of the areas will be cleaned with via HEPA vacuum and washed with an organic solvent[49] to remove additional PCBs from the surface of the exposed area. In addition to PCBs, asbestos has been detected in the caulking and thus the removal is subject to AHERA regulations. All removal and required clearance sampling will be performed in adherence to AHERA regulations by licensed personnel.

Masonry Encapsulation – Adjacent Building Materials

- **200-Wing Classrooms - Interior** – Following removal of the windows, associated window caulking compound and cleaning of the areas, the masonry materials that were located adjacent to the window and window caulking will be encapsulated with two coats of a high build, protective epoxy resin coating[50]. The interior masonry materials will include the entire inner face of the concrete block window frame that was in contact with or adjacent to the metal window frame and window caulking, the entire center column of the interior concrete block located between the windows and the concrete block walls located to either side of the window frame and above and below the window as applicable, at a distance of 6 inches from the corner of the inner concrete block facing the window.

[48] If the surfaces are painted such that the epoxy coating is not visible for visual identification of application, it will again be applied in two coats over the newly painted surfaces at the locations specified within this plan.
[49] It is anticipated that Capsur® or equivalent will be used for this purpose. General information, including a Material Data Safety Sheet, are presented in Appendix H.
[50] Sikagard®-62 or equivalent.

To further define the extent of PCB impact to the interior block in the 200-wing classrooms, ECS will collect additional masonry samples to determine the extent of PCBs to < 1ppm. It is proposed that samples be collected at six and eight inches from the caulked joint at two of the window locations and submitted for analysis of PCB via Methods 3540C for extraction and 8082. If required, ECS will amend the proposed encapsulation to account for any required greater distance for application. The results, and if required an amendment to the plan will be submitted to EPA. It is anticipated that the sampling will be conducted during the week of February 13, 2012 and that results will be obtained the following week.

As this proposed encapsulation applies to the 200-wing classrooms which are currently restricted for occupancy, ECS requests that the window removal project not be delayed awaiting receipt of laboratory results that will demonstrate extent. Though not expected, additional epoxy coating will be applied beyond the proposed six inch distance as required to encapsulate substrate material if shown by the proposed additional sampling and analysis to be impacted with PCBs > 1ppm.

It is noted that on either side of the windows in each classroom, there are bulletin boards located within approximately 2-3 inches from the concrete block edge of the window frame. It is proposed that the epoxy coating only be applied up to these boards and not beneath them. This is justified by the following: 1) the bulletin boards are stationary items that are not anticipated to be removed; 2) the presence of the bulletin boards provides adequate protection from potential contact with the underlying concrete block; 3) the level of PCBs in the concrete block located beneath the bulletin boards is likely approaching 1 ppm based on previous sampling; 4) the area adjacent to the windows at the bulletin board is not considered a high contact area; and, 5) The main goal of the project is to reduce concentrations of PCB in indoor air to acceptable guideline levels. This was accomplished in the pilot test room 209 without the need of removing the bulletin boards located therein to encapsulate the concrete block below them. Thus, the removal of the bulletin boards to apply an epoxy coating beneath them is not warranted. To the extent feasible, the epoxy coating will be applied to the accessible concrete block above and below the boards to the six inch distance.

The sealing of other observed apparent caulking in the classrooms around door frames and structural support beams will also be covered with epoxy coating, though it is not necessarily part of this cleanup and disposal plan as the presence of PCBs in these materials has not been confirmed. The application of epoxy sealant over these areas is proposed to be completed as a best management practice (BMP).

- **200-Wing Classrooms – Exterior** - The entire surfaces of the exterior precast concrete columns and the entire surfaces of concrete present between the windows will be encapsulated with two coats of the epoxy coating[51]. The exterior window sills (pebbled concrete) and a distance of four inches from the corner edge of the exterior window sill along the horizontal face of the pebbled concrete will be sealed with the epoxy coating. The pebbled concrete that exists above the windows will be sealed in the same fashion.

[51] Sikagard®-62 or equivalent.

The vertical joint caulking along the building facing side of the precast concrete columns and the adjacent brick (to a distance of six inches from the caulking) is proposed to be sealed with two coats of the epoxy coating. Any loose or friable caulking will be removed prior to sealing. The sealing of the caulking is proposed as a cost effective, long term, temporary measure to allow the Town of Princeton to defray the costs associated with removal and disposal of the material to a later date when water proofing upgrades occur. Justifications for the sealing of the caulking follows:

Removal of the caulking would be another significant non-planned, non-budgeted expense associated with this project that the community of Princeton would come to bear. As a less intrusive, equally protective and more cost effective solution, the Town proposes to temporarily encapsulate the vertical joint caulking and defray the high costs associated with removal of the caulking to a later date. The application of an epoxy encapsulant over the caulking is a far less costly option than removing the caulking and will provide a protective barrier to prevent potential exposure to the caulking. The caulking in its present form is in good condition, with little to no readily apparent visible deterioration and no chipping or flaking. This was further indicated by soil sampling immediately beneath these caulk joints in which PCBs were not detected at concentrations > 1ppm, and in most cases not above laboratory detection limits. The application of an epoxy coating would likely further strengthen this already stable material. In addition, potential contact with these areas is very low as the windows are located within a closed off courtyard and access to the courtyard by children is controlled and limited and the application of the epoxy coating would further limit direct contact.

To monitor potential migration of PCB through the epoxy coating, the epoxy coating on these caulk joints would be evaluated on an annual basis via wipe sampling as part of the Long Term Monitoring and Maintenance Plan. The additional effort required to inspect and sample these areas would be minimal, especially in light of the fact that inspections are already required to be performed in these areas to assess the condition of other epoxy coatings.

It is assumed that the caulking surrounding the exterior air intake louver vents for the unit ventilators associated with the 200-wing classrooms is the same as the vertical joint caulking in contact with the concrete window columns and brick masonry, based on its visual appearance and assumed similar time of installation.

Therefore, following caulking removal and cleaning of the substrate associated with these louvered vents, it is proposed to seal the masonry around the louvered vents to a distance of six inches beyond the edges of the brick, parallel to the building, and on the interior edges of the brick that are perpendicular to the building. This distance is consistent with the sealing of the masonry associated with the exterior concrete window pillars.

However, ECS will also collect caulking and masonry samples from these area to determine the presence of PCBs and the extent of PCBs to < 1ppm. It is proposed that samples be collected at two, six and eight inches from the caulked joint at one of the vents and submitted for analysis of PCB via Methods 3540C for extraction and 8082. If required, ECS will amend the proposed encapsulation to account for any required greater distance for application. The results, and if required an amendment to the plan, will be

submitted to the EPA along with a revised table which presents these results. It is anticipated that the sampling will be conducted during the week of February 13, 2012 and that results will be obtained the following week.

As this proposed encapsulation applies to exterior surfaces and is not directly related to the window removal/replacement project, ECS requests that the window removal project not be delayed awaiting receipt of laboratory results demonstrating extent of PCB in the masonry product. Though not expected, additional epoxy coating will be applied beyond the proposed six inch distance as required to encapsulate substrate material shown to be impacted with PCBs > 1ppm.

- **200-Wing Classrooms – Unit Ventilator and Classroom Cleaning** – In each of the 200-wing classrooms, the unit ventilators will be thoroughly cleaned following the same methods used during the pilot testing. During the initial cleaning, the accessible interior areas of the units will be cleaned using HEPA vacuum and wet wipe methods to remove all visible dust and dirt from the units and floor intake vents. In addition, the motor/axle assembly will be removed from the unit and thoroughly wiped down using wet wipe methods. The capacitor on the motor will be inspected for potential leaks and replaced as appropriate. While the motor/axle assembly is removed, further thorough cleaning of the interior of the unit ventilator will be performed. Following reassembly, the air filters will be changed and the flow rates adjusted as appropriate to achieve optimum performance.

  Following the thorough cleaning of the unit ventilators, the classrooms will be thoroughly cleaned using HEPA vacuum and wet wipe methods. Cleaning will proceed from top down, meaning that the more elevated areas will be cleaned first, progressively working downward with final cleaning being the floor[52]. Following cleaning of interior surfaces, including unit ventilators, sampling surface wipe sampling will be performed to document that the cleaning was effective and that PCB concentrations are <1 ug/100cm^2 . It is proposed that one sample per unit ventilator interior (5), and two additional samples per classroom exposed horizontal surface (10) be collected.

- **Cafeteria/Kitchen Roof Top Windows – Exterior** – Following removal of the windows, associated window caulking compound and cleaning of the areas, the masonry materials that were located adjacent to the window and window caulking will be encapsulated with two coats of a high build, protective epoxy resin coating (Sikagard®-62 or similar). The masonry materials to be encapsulated will include the entire inner face of the inner sides of the window opening that was in contact with or adjacent to the actual window frame and window caulking (this includes the complete edges of the brick and mortar located perpendicular to the ends of the window banks). The outward facing brick and mortar, that is parallel with and adjacent to the window frame, will be sealed with the epoxy to a distance of 3 inches beyond the inner corner of the brick that is adjacent to the window frame.

[52] Elevated areas include but are not limited to the ceilings, lighting fixtures, the upper horizontal surfaces of crown molding, the upper surfaces of bulletin boards and chalk boards, the upper surfaces of door frames and doorways, the upper surfaces of clocks, speakers and other semi-stationary items. Other items to be cleaned include the exhaust vent covers and accessible duct work beneath the cover, shelves and cabinets, counter tops, etc. Following this cleaning, the walls will be wiped and the floors vacuumed.

- **Waste Disposal –** All *PCB bulk product waste* will be properly containerized, temporarily stored, labeled and disposed of by the contractor at an approved facility per the requirements set forth in 40 CFR 761.40, 761.62 and other applicable sections of the TSCA regulations. . It is assumed that all waste contains >50 ppm PCB. The waste will be stored within the appropriate sized and quantity of covered roll-off containers. The containers will be staged on the exterior of the school in an area set away from children's activities. Protective barriers will be placed around the roll-off containers to restrict access by children. It will be the responsibility of the School District to inform the children of the presence of the waste.

- **Window Boarding and Replacement** – Following completion of the tasks outlined above for the individual areas, the window areas will closed and secured. It is anticipated that insulation and plywood will be used for this purpose. It is anticipated that during the schools April 2012 vacation (beginning April 16), the new windows will be installed. Following window installation, a visual inspection of the room will be made by E CS to document evaluate the condition of the epoxy coating. Following this inspection, it is anticipated that the classrooms will be repainted as part of routine upkeep for the school. Following painting, one additional layer of epoxy coating will be applied over the previous layers of epoxy.

- **Worker Training Plan –** A worker training plan will be developed for maintenance workers or other persons that will be conducting work that could cause the epoxy encapsulate to become breached. This plan will be developed prior to the work planned to install the new windows. The plan will be submitted to EPA for review and approval.

- **Contingencies –** The presence and extent of caulking materials associated with the cafeteria and kitchen windows is believed to be limited. If additional window caulking materials are discovered during the removal of the cafeteria or kitchen window banks (i.e. at the base or tops of the windows), this material will be removed, the surfaces cleaned via HEPA vacuum and solvent wash, and the areas encapsulated with the epoxy coating specified herein. The epoxy coating will cover the area where the caulking was removed and an area up to six inches beyond on either side.

- **Reporting -** Within 60 days of the completion of all activities specified herein, a report will be submitted to EPA which details and documents the activities completed as part of this cleanup and disposal plan presented herein.

4.5 WRITTEN CERTIFICATIONS

A written, signed certification of the owner of the school, the Town of Princeton, as required by 40 CFR 761.61(a)(3)(E), is presented in **Appendix N**.

4.6 DEED RESTRICTION

As discussed with EPA and as required by 40 CFR 761.61(8), within 60 days of completing the activities described herein, the Town of Princeton is required to submit to EPA for review and approval a draft deed restriction. The deed restriction will contain a description of the extent and level of PCB contamination at the Thomas Prince School following abatement activities, a

description of the actions taken at the school and a description of the use restrictions for the school.

5.0 CONTINUED MONITORING, MAINTENANCE AND MANAGEMENT (MMM) PLAN

5.1 INDOOR AIR SAMPLING

Following window removal, encapsulation and room cleaning activities, indoor air samples will be collected from the interior of the 200-wing classrooms for verification of PCB reductions to indoor air. This sampling round will act as the initial post abatement baseline indoor air sampling. The samples will be collected and analyzed according to EPA Method TO-10A and analyzed for Homolog's. If the results of the samples for the 200-wing classrooms are below the EPA guidelines for indoor air, the rooms will be eligible to be reoccupied. If the sample results are above guidance levels for PCB in indoor air, additional actions will be taken to address and evaluate the findings potentially including re-sampling and analysis of indoor air, re-evaluation of potential sources of PCB that may be contributing to indoor air impact and evaluation of indoor air ventilation and circulation. In addition, as part of the initial post-abatement indoor air sampling, one sample will be collected from each of the cafeteria, the library, the kitchen and classrooms 100 and 106 for a total of 11 indoor air samples.

Following the initial indoor air sampling, additional sampling to monitor the PCBs in indoor air is proposed to occur on an annual basis with sampling to first be performed in October or November 2012[53]. This event represents two post remediation IAS events occurring in a one year time period. The subsequent annual IAS events will occur during similar months. It is recommended that six air samples be collected from rooms within the older portion of the school[54]. The samples will be collected and analyzed per the requirements of EPA Method TO-10A and analyzed for Homolog's.

It is anticipated that all indoor air samples will provide favorable results, i.e. no PCB concentrations will be reported above EPA guidance levels. However, if any samples produce unfavorable results, i.e. PCBs above EPA guideline values, the results will be evaluated to determine if additional, more frequent sampling will be required and/or what additional procedures should be implemented.

5.2 ENCAPSULATE MONITORING

Following application of the epoxy coating, inspections of each area of application should be completed on an annual basis, in conjunction with indoor air sampling. The inspections will consist of visual observations to determine if there are any observable breaches or failures to the epoxy coating. Any observed breaches in the integrity of the coating will be documented and repairs will be made within one week. The repairs will also be documented.

Surface wipe samples will be collected from the surface of the epoxy coatings to verify containment of PCB. The wipe samples will be collected in accordance with 40 CFR 761.123.

[53] This sampling time will provide information on indoor air quality to faculty and parents at initial occupation of the school by the children resuming classes in the fall.

[54] It is recommend that these rooms include two, 100-wing classrooms, two, 200-wing classrooms and 2 common area rooms. The sampling will include a duplicate sample and a blank for QA/QC. The quantity and frequency of sampling may increase based on results.

Approximately 715 LF of epoxy coating is expected to be applied as part of the aforementioned work. This accounts for the following:

- **162 LF** on the concrete block within the six, 200-wings classrooms;
- **262 LF** on the 24 exterior precast concrete window columns associated with the 200-wing classrooms;
- **56 LF** associated with the concrete between the windows associated with the 200-wing classrooms;
- **80 LF** on 12 exterior areas of pebbled concrete associated with the exterior window sills and areas above the windows for the 200-wing classrooms;
- **131 LF** associated with the exterior brick adjacent to the precast concrete window columns;
- **60 LF** associated with the exterior air intake vents of the 200-wing classrooms, and;
- **20 LF** associated with the Exterior roof top windows of the cafeteria and kitchen.

Excluding the interior concrete block and the exterior brick (162 LF interior block and 211 LF exterior brick), the number of physically identifiable structures that will have an epoxy coating applied will be 36 (24 precast concrete columns and 12 pebbled concrete surfaces equal to 342 LF). Thus, using a reasonably accepted sampling frequency of 10%, a total of four samples would represent the outside structures and a total of four samples would represent the interior/exterior concrete and brick walls. Thus, the following is recommended for initial and subsequent annual wipe sampling.

- Five wipe samples from the epoxy coating on the exterior masonry products are to be collected on an annual basis;
- Six wipe samples from the epoxy coating on the interior masonry products from the 200-wing classrooms are to be collected on an annual basis, one from each classroom;
- Two wipe samples from the epoxy coating applied over the exterior vertical caulked joints associated with the pre-cast concrete window columns of the 200-wing classrooms are to be collected on an annual basis;
- There was no caulk observed in association with the interior kitchen windows or at the base of the exterior windows. Upon removal of the windows, samples of the sill materials at the window/sill joint will be collected for PCB analysis. If the samples test > 1 ppm for PCB, wipe sampling of the encapsulated kitchen sills will be conducted in association with this plan. An additional wipe sample per event will be added for this purpose if required.

5.3 BEST MANAGEMENT PRACTICES

Exposure to potential PCB containing materials can greatly be reduced by implementing some simple Best Management Practices. The custodial and teaching staff at Thomas Prince School will be trained on implementing the following simple, yet effective tasks, to reduce student/staff potential exposure to PCBs. This list should be reviewed and updated as necessary.

- Have students and faculty wash hands with soap and water frequently.
- Use of vacuums with HEPA filters. This practice is already in effect and has been so prior to the discovery of PCBs at the school.
- Clean areas of dust accumulation more often. For example, these areas include window sills, floor intake vents for the unit ventilator, corners, hard to reach areas.
- Avoid dry dusting, mopping or sweeping. Use wet cloth's or HEPA vacuuming to clean surfaces.
- Improve ventilation. The unit ventilators are to be adjusted and maintained for optimum performance and should not be not be "tinkered" with by teaching staff. The storage of materials on top of the unit ventilator vents should be avoided. Filter changes (per manufacturer's recommendations or more frequent if dusty conditions require) and 1/4ly removal of dust with a HEPA vacuum should occur.
- Cafeteria/Kitchen Interior Window Sills – Though these window sills were not found to contain greater than 1 ppm of PCBs, as a conservative measure due to their location (i.e. food preparation) the sills will be encapsulated with two coats of epoxy coating as described above.
- Other caulking observed within the classrooms – Other caulking was observed within the 200-wing classrooms that was not sampled. This caulking is present adjacent to doorways and interior support beams and was observed to be in good condition. This caulking will be encapsulated with two coats of epoxy coating as described above. These areas will not be subject to wipe sampling as part of continued MMM.

5.4 MATERIALS REMOVAL OR RENOVATION

Any proposed removal or renovation potentially involving caulking or other building materials suspected of containing PCB should be evaluated by the School District. If required to be completed, this should be performed by trained personnel.

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