Fairfield Public Schools
Fairfield, CT 06825

TO: Dr. David Title and Members of the Board of Education

FROM: Salvatore Morabito

DATE: April 9, 2013

RE: Woodard and Curran Assessment Report

This letter is to notify you that the Fairfield Public School District has received the Woodard and Curran Assessment of PCBs in building materials in our schools. This assessment consisted of a review of previous PCB testing data for district buildings, a review of dates of construction for various portions of the buildings, visual observation of potential primary and secondary sources of PCBs and chlorine screening of different suspect materials.

I am happy to report that the assessment notes that the spray-on fireproofing material used on the Osborn Hill gymnasium ceiling was not observed in any other school building in our district. This is an important finding as the spray-on fireproofing used at Osborn Hill is considered the predominant contributor to the indoor air issues last year at Osborn Hill.

In addition, the assessment also notes that a large majority of the suspect material samples screened negative for the presence of chlorine. The absence of chlorine within a sample is an indicator that the sample does not contain PCBs.

For a small number of samples, the chlorine screening did not yield conclusive results. The locations where the samples did not provide conclusive results will be further reviewed by the FPS facilities personnel to ascertain if additional precautionary steps are required. These additional precautionary steps could include encapsulation by painting or caulking over the material to prevent dermal contact.

This assessment report will be posted on the Fairfield Public Schools' website. The Central Office Administration and all school Principals and Headmasters will keep a copy on file per State regulations.

If you have any questions or concerns regarding the chlorine screening for PCBs, please feel free to contact me at (203) 255-7363.

Thank you.

c: Meg Brown
Central Office Administration
All Principals/Headmasters
First Selectman
BOF Chairman
RTM Moderator
Sands Cleary – Health Director

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April 4, 2013

Thomas Cullen
Director of Operations
Fairfield Public Schools
501 Kings Highway East
Fairfield, CT 06825

Re: Assessment of PCBs in Building Materials – School Buildings
Fairfield Public School District

Dear Mr. Cullen:

Woodard & Curran was retained by the Fairfield Public School District to conduct a review /screening of the potential for polychlorinated biphenyls (PCBs) to be present in the District's school buildings (Section 1.0 of this letter) and initiate the development of a near-term and long term management program based on these review findings (Section 2.0 of this letter). The building surveys focused on identifying building materials that may be suspect to contain PCBs, as PCBs were sometimes used in standard construction materials from the 1950s through the 1970s (prior to being banned and phased out of distribution by 1979).

This work initiated with a series of informational meetings conducted in November and December 2012 followed by building-specific surveys conducted throughout January and February 2013 of the District's schools. As part of the informational meetings, a handout was prepared and made available that provided general information about PCBs in building materials and potential exposures and risks. This handout is provided in Appendix A.

1.0 Screening Process

The first component of the review focused on a "screening process" and assessed the following, as described in the subsequent sections:

- 1.1 Building construction date and type, including renovations and additions;
- 1.2 Existing PCB data from several of the school buildings where building materials have been sampled as part of renovation projects;
- 1.3 Visual observations of potential primary and secondary sources for PCBs within the buildings and indicator screening (chlorine) of different suspect materials;
- 1.4 Summary and Conclusions

As per our scope of work, no laboratory testing of suspect materials was conducted during the screening process.

1.1 Building Construction Date and Type

The Fairfield School District's school buildings include: 11 elementary schools, 3 middle schools, and 2 high schools (see Table 1). All of the schools, with the exception of three schools, were built between the years 1917 and 1967, which means that thirteen of the buildings were constructed or maintained within the time period that PCBs were in use, and as such may have PCB-containing building materials. The three exceptions include McKinley Elementary School, Burr Elementary School, and Roger Ludlowe Middle School, all of which were built after 2003 and well beyond the time when PCBs were banned (1979).

In addition, sections of many of these 13 buildings were built after 1980 and many schools utilize portable classrooms; any addition post-1980 and all of the portable classrooms have a low probability for the presence PCB-containing building materials given the date of construction.

The thirteen subject buildings have generally consistent construction materials that can be characterized by:

- Brick and masonry walls,
- Steel framed interior and exterior doors,
- Metal framed windows,
- Tile flooring (vinyl in the classrooms and hallways, ceramic tile in the kitchens and some bathrooms)
- Drop ceilings with acoustic tiling.

Building construction of this type requires the use of sealants and caulking at both interior and exterior joints, i.e. metal frame to concrete block, exterior brick wall seams, etc. In typical school building settings, primary building materials that may have been manufactured with PCBs include some: caulking, sealants, ceiling tiles, and spray-on fireproofing (NOTE – although some specialty paints have been known to be manufactured with PCBs, these specialty paints are typically not specified for use in school building settings).

1.2 Schools with Previously Identified PCB-Containing Building Materials (2009-2013)

As part of recent (2009-present) renovation projects being performed at several school buildings at which potentially suspect buildings materials may be disturbed (e.g., window replacements), building material samples have been collected and analyzed for PCBs by the School District. A brief summary of the test results are provided below; these data indicate that various levels of PCBs were detected in different materials with some materials detecting PCBs ≥ 50 parts per million (ppm), the Federal regulatory threshold for PCBs, at three of the five schools. As such, these materials are being properly managed in accordance with applicable regulations.

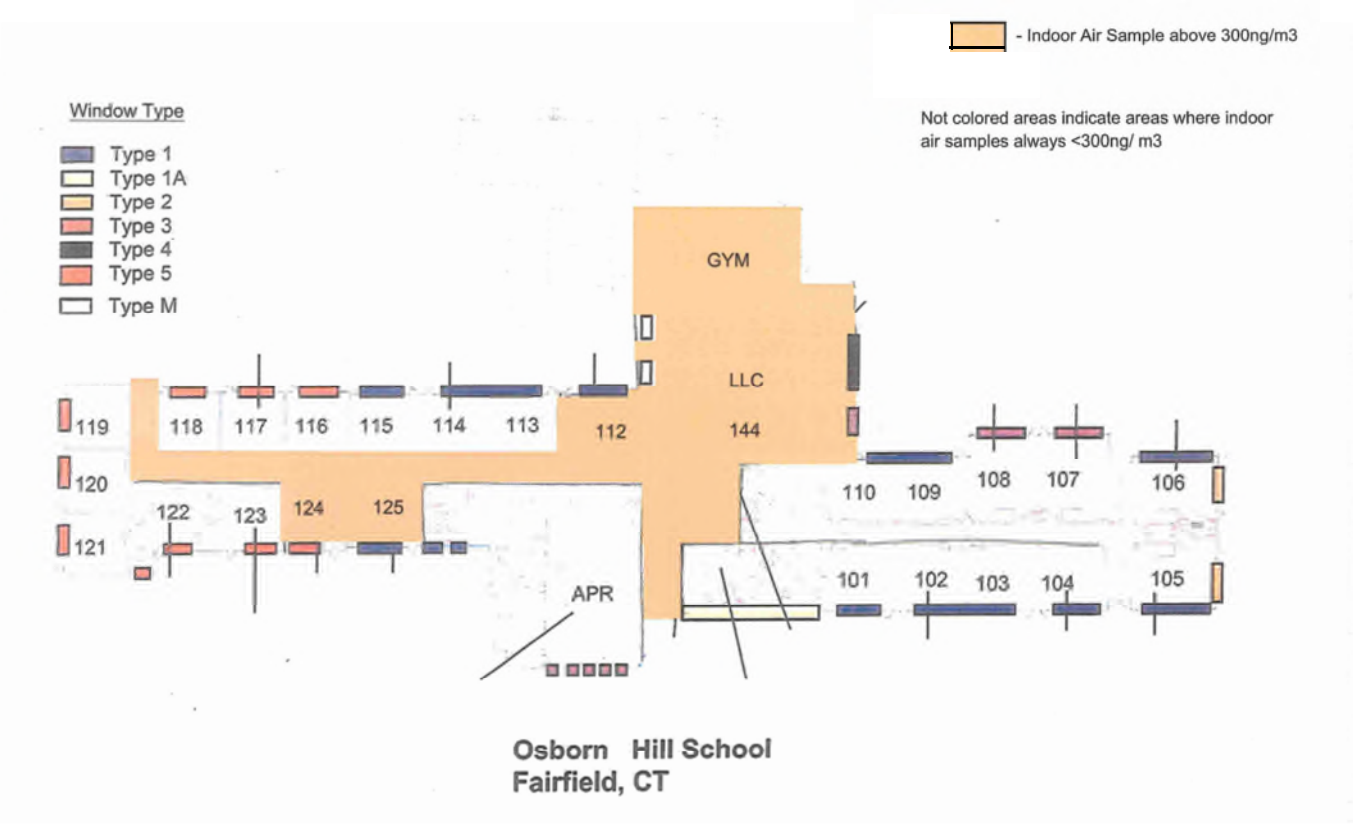
- Roger Sherman Elementary School – Windows and facade
    - Three exterior sealant samples – window frame caulking (PCBs - non detect and 1.6 ppm) and exterior expansion joint caulking (non-detect)
    - Three interior sealant samples – window caulking (non-detect), door caulking (4.3 ppm) and window glazing sealant (1.1 ppm)
- Tomlinson Middle School – Exterior doors
    - Exterior and interior door caulking – 11 samples (8 reported < 1 ppm, 1 sample at 1.4 ppm, and 2 samples at < 37 ppm PCBs)
- Stratfield Elementary School 1929 portion of the building:
    - Exterior door caulking samples (<0.82, 1.2, 10, 130, and 58,000 ppm PCBs); concrete expansion joints (<0.83, 0.93, and 19 ppm PCBs); miscellaneous sealants (<0.81, 1, and 5.2 ppm PCBs).
- Fairfield Ludlowe High School – Window replacement project
    - Window caulking and glazing samples collected from October 2011 to July 2012 (multiple events)
        - Exterior and interior caulking samples detected PCBs at concentrations up to 660,000 ppm and 4,900 ppm, respectively
        - Exterior and interior glazing sealant samples detected PCBs at concentrations up to 41,000 ppm and 72 ppm, respectively

- Adjacent building substrate and soil samples collected from July 2012 to January 2013 (multiple events)
    - PCBs detected at concentrations > 1 ppm in both substrate and soils with decreasing concentrations with distance from the windows
- Indoor air and surface samples collected from Room 203, 220, and a corridor – February 2012
    - PCBs ***not*** detected above 50 ng/m^3 in any of the three indoor air samples
    - PCBs ***not*** detected (<1 ug/100cm^2) in three of the four surface wipe samples; 1 sample detected PCBs at 1.6 ug/100cm^2 (window sill)

- Osborn Hill Elementary – Osborn Hill Elementary School has had the most extensive PCB testing and remediation to date. From March 2012 to present, numerous samples of suspected PCB source materials and other media (e.g., indoor air) have been collected for laboratory analyses. The results of this testing indicated that PCBs were detected in various materials and media, as summarized below:
    - Gymnasium Building Materials
        - Primary source - sample of spray-on fireproofing on ceiling at 30,000 ppm PCBs
        - Potential secondary sources - hardwood floor sealant up to 3,300 ppm; wall paint at 1,500 ppm; and crash-pad foam material up to 350 ppm
    - Window caulking and glazing
        - Exterior window caulking samples detected PCBs at concentrations up to 6,900 ppm
        - Exterior and interior window glazing sealants samples detected PCBs at concentrations up to 580 and 710 ppm, respectively
    - PCBs were detected in indoor air samples with the highest concentrations detected in the gym and areas immediately surrounding the gym
    - Based on the PCB concentrations, several Interim Measures were implemented including, isolation of the gym; encapsulating secondary sources (painted walls and floor sealant) with either paint or tile flooring; and cleaning ductwork
    - Post Interim Measure indoor air and surface wipe sampling show levels below acceptance criteria (Feb. 2013).

Based on a review of the available data, the ***predominant contributor to the PCBs identified within Osborn Elementary School indoor air appears to be the spray-on fireproofing material that was applied to the ceiling of the gym.*** PCBs were likely transported from the gym, through the doorway and overhead air ducts, and into adjacent areas (hallways, library). The caulking and sealants are possible secondary contributors to PCBs; however, there were several rooms where indoor air levels were always below acceptable criteria even with PCB-containing window caulking present. A floor plan showing highlighted areas where indoor air levels were above EPA's target levels (pre-Interim Measures) is provided on the next page. It was only after the gym remedial efforts were conducted that the indoor air levels in rooms proximate to the gym (and hallways) decreased.

This finding was similar to the Fairfield Ludlowe High School indoor air results with regard to the PCB containing window caulking, where ≥ 50 ppm PCB window caulking was detected; however, indoor air levels were below EPA target levels.



The existing PCB sample data collected from these five schools is consistent with that seen by other building PCB surveys conducted by Woodard & Curran, as well as others in the practice. A conceptual site model for PCBs in building materials consists of suspected source materials (e.g., caulkings and glazing sealants) typically being identified at a building given the building's construction type and date; however, not all of these materials are found to contain PCBs at elevated concentrations, even though they were installed during the timeframe when PCBs were sometimes used in these materials. In addition, even if PCBs are present in these materials at elevated concentrations, they may not be a contributing factor to PCBs in other media, such as indoor air or dust/particulates on accessible surfaces, which are the media that drive potential exposures and risk.

1.3 Building Surveys

Field surveys of each of the school buildings (or portions thereof) built before 1980 within the District were conducted in January and February 2013. During the inspections, Woodard & Curran representatives surveyed accessible areas including but not limited to classrooms, gymnasiums, auditoriums, cafeterias, maintenance rooms, and mechanical rooms. In typical school building settings, primary building materials that may have been manufactured with PCBs include: caulking, sealants, ceiling tiles, and spray-on fireproofing.

The following was conducted during the field survey at each building:

- Notes and photographs were taken of suspect PCB containing building materials, as listed above, as well as the general construction materials observed throughout the building;
- Areas were specifically noted that were visually similar to building materials identified as PCB-containing through laboratory testing at other schools;
- Samples of potentially PCB containing building materials were collected for indicator screening;
- When applicable, discussions with school staff regarding facility use and any recent maintenance activities (painting, window replacement, etc.) were conducted.

Individual building survey reports are included in Appendix B. Overall observations included the following:

- Caulking and glazing sealants were observed throughout each building, primarily associated with window and door systems and expansion joints;
- New exterior window systems were present at the following elementary schools: Jennings, Roger Sherman, Holland Hill, Riverfield, Stratfield, and Timothy Dwight;
- ***The spray-on fireproofing material at Osborn Hill gymnasium ceiling was <u>not</u> observed in any other school.*** Spray on ceiling coatings were observed in one boiler room (Tomlinson Middle School [of note, this material was installed during a renovation project conducted in the 2000s) and in one gymnasium (Timothy Dwight Elementary); however, these materials were not visually similar to the Osborn Hill material.
- A review of the Osborn Hill data indicated that a sealer applied to the stone tile flooring in a hallway was tested and found to contain PCBs. It is not known if this material was manufactured with PCBs or contained PCBs as a result of a cross-contamination effect from the gymnasium source. During the building surveys, a similar stone tile flooring was observed at Holland Hill Elementary, Jennings Elementary, Mill Hill Elementary, North Stratfield Elementary, Timothy Dwight Elementary, Fairfield Woods Middle School, Fairfield Warde High School, and Fairfield Ludlowe High School. It is not known if this visually similar flooring at these schools were covered with the same sealer used at Osborn Hill.

As indicated above, as part of the building surveys, samples of suspect building materials were collected for indicator screening. A Thermo Fisher Niton XL3t Gold X-Ray Fluorescence (XRF) analyzer was used to screen materials for chlorine as a surrogate for potential presence of PCBs. Since chlorine is present in any chlorinated organic compound, including PCBs, the absence of chlorine in a sample suggests that PCBs are not present at significant concentrations. A positive detection for chlorine does not necessarily indicate a positive presence for PCBs, because other chlorinated organics may be present in the materials (i.e., false positive results are possible).

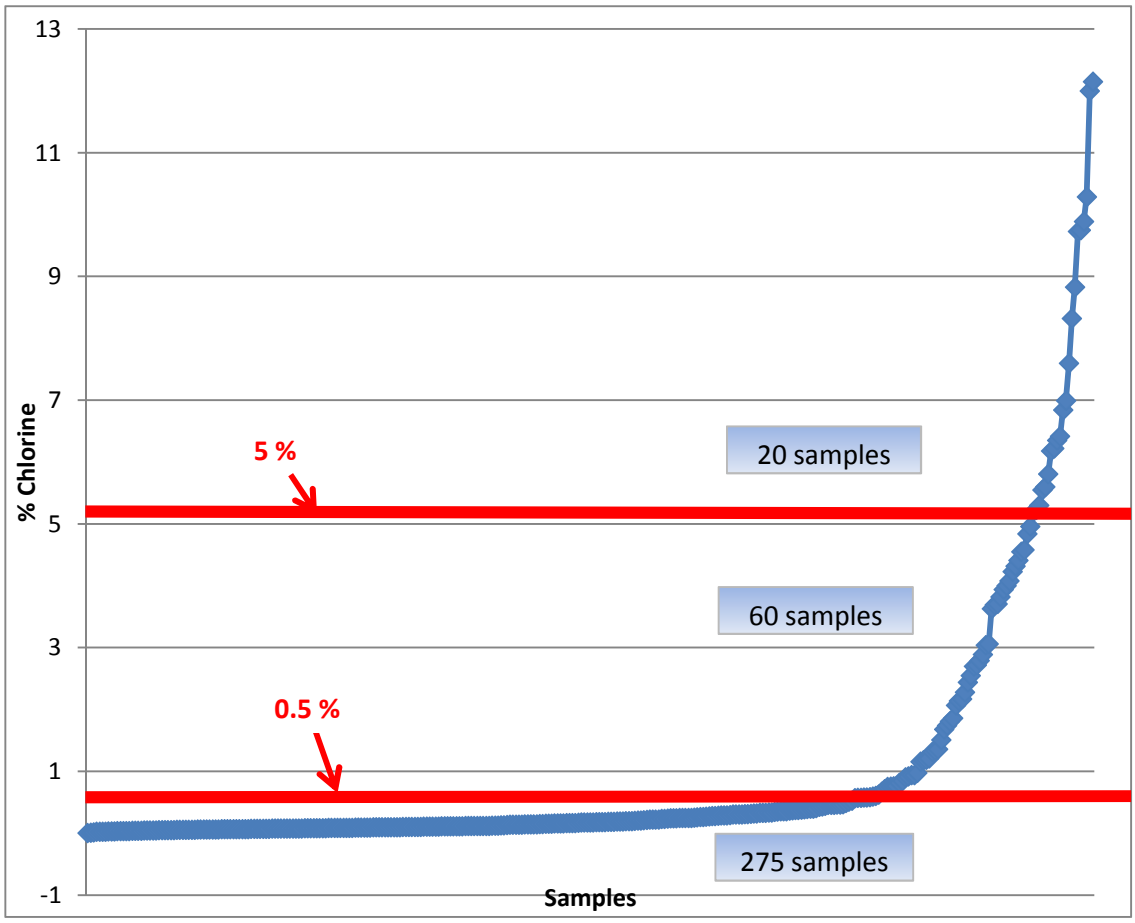
Woodard & Curran has conducted chlorine indicator screening at many buildings and have developed a database of over 200 samples where chlorine screening and total PCB laboratory testing has been completed on the same sample. This program was developed using the following QA controls:

- standard sampling methods and sample volumes;
- split samples of the "same" building material collected at the same time;
- same screening XRF instrument and laboratory analytical methods.

As such, this program provides a good data set to establish correlations between chlorine indicator screening and total PCB concentrations. Of note, this data is only applicable to caulking and sealants and is not applicable to paints, mastics, or other potentially suspect materials, primarily due to potential interferences to chlorine readings on direct masonry surfaces. The correlations established to date from this data indicate the following:

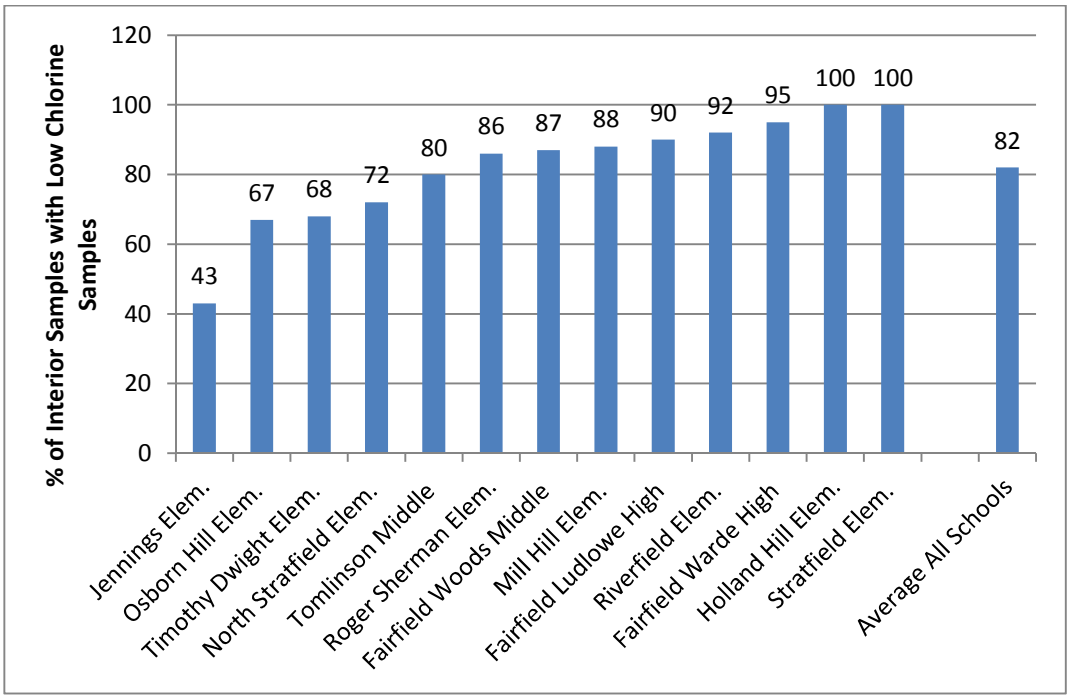
- Approximately 90% of the samples with < 0.5% chlorine detections reported PCBs at < 50 ppm, the Federal regulatory threshold for PCBs;
- Samples with chlorine levels ranging from 0.5% to 5% reported < 50 ppm PCB levels in 60% of the samples and ≥ 50 ppm PCB levels in 40% of the samples; rendering an inconclusive finding with regard to PCB concentration is this chlorine range;
- Samples with chlorine levels > 5% reported PCBs at < 50 ppm, although only a limited data set is available; some of these samples have been collected from recent (post 1990 installations), which may suggest that newer caulkings can contain chlorinated compounds (no PCBs).

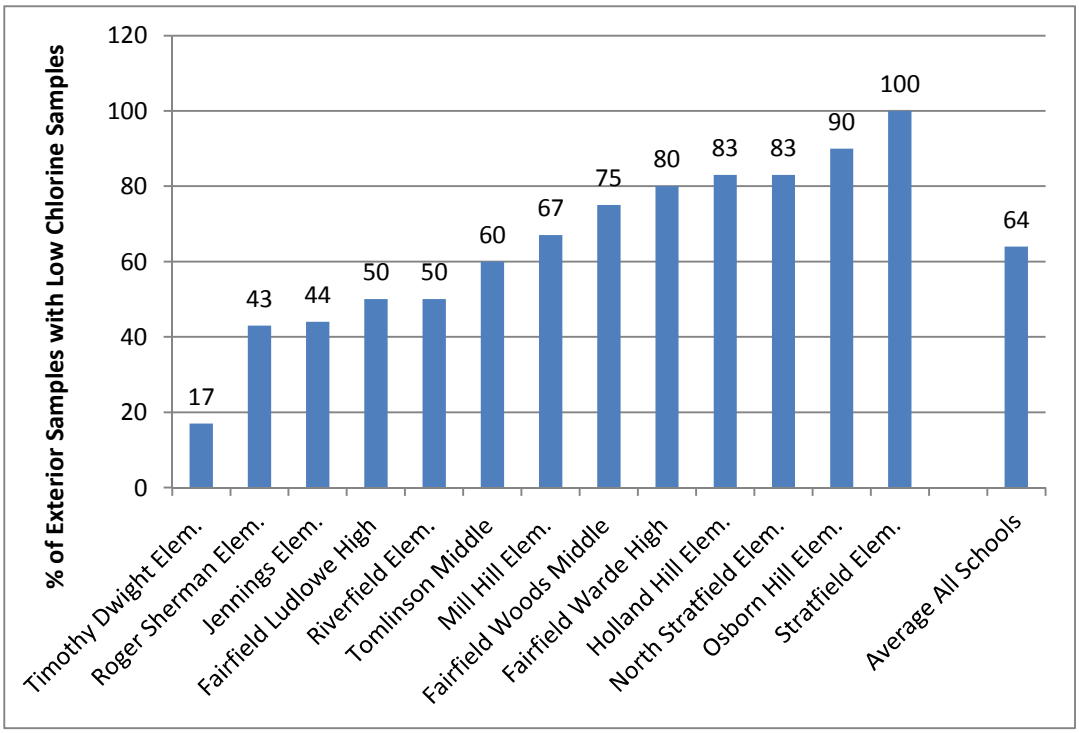
As part of the Fairfield School building surveys, 355 samples of suspect building materials were collected and field screened for chlorine. On average, about 27 samples of different materials were collected from each of the 13 buildings and screened with the XRF meter. A plot of the % chlorine levels in these samples is provided in the chart below.



As shown above, the majority (275 samples or 77%) of the Fairfield school samples were reported with chlorine levels below the 0.5% correlation level that typically corresponds to PCBs < 50 ppm. Sixty samples (17%) were reported in the 0.5 to 5% inconclusive range and 20 samples were above 5%.

A further summary of the individual building survey screening results for interior and exterior samples, respectively as a % of samples per building which were below the 0.5% level is presented on the charts below.





As indicated on the charts above, approximately 82% of the interior samples and 64% of the exterior samples collected from the schools were below the 0.5% screening level. The charts also indicate that a higher percentage of screening levels above 0.5% relative to the "average" were found in five schools (interior samples) and six schools (exterior samples). Three schools were on both lists: Jennings Elementary, Timothy Dwight Elementary, and Tomlinson Middle. A summary of the screening results for each of the buildings is presented in Appendix B.

1.4 Summary and Conclusions

Individual building screening reports for each of the school buildings have been developed and can be used to assess and initiate the development of management programs for each school. Key overall findings from the screening survey include:

- 13 of the 16 school buildings fall within the timeframe when PCBs were sometimes used in standard construction materials; however, sections of many of these 13 buildings were built after 1980 and many schools utilize portable classrooms; any addition post-1980 and all of the portable classrooms have a low probability for the presence PCB-containing building materials given the date of construction.
- As with most buildings constructed in this timeframe, given the building's construction type, building materials considered suspect for PCBs, such as caulking, sealants, etc. were observed in these 13 school buildings;
- With the exception of boiler rooms, the majority of interior facilities showed evidence of regular renovation over the history of the building (new paint, flooring, interior wall coverings, etc.), which may have removed and/or covered previous PCB containing materials, if they were present;
- Numerous types of window systems and window styles were present at individual buildings and even within rooms of buildings. Numerous windows appear to have been updated over time and repair projects (replacement sealants) are evident in some areas. Most buildings had some single-pane windows that appear to be original construction. New exterior window systems were present at the following elementary schools: Jennings, Roger Sherman, Holland Hill, Riverfield, Stratfield, and Timothy Dwight.
- ***The spray-on fireproofing material at Osborn Hill gymnasium ceiling (primary driver for indoor air PCB levels) was <u>not</u> observed in any other school.*** Spray on ceiling coatings were observed in one boiler room (Tomlinson Middle School [of note, this material was installed during a renovation project conducted in the 2000s) and in one gymnasium (Timothy Dwight Elementary); however, these materials were not visually similar to the Osborn Hill material.
- A review of the Osborn Hill data indicated that a sealer applied to the stone tile flooring in a hallway was tested and found to contain PCBs. It is not known if this material was manufactured with PCBs or contained PCBs as a result of a cross-contamination effect from the gymnasium source. During the building surveys, a similar stone tile flooring was observed at Holland Hill Elementary, Jennings Elementary, Mill Hill Elementary, North Stratfield Elementary, Timothy Dwight Elementary, Fairfield Woods Middle School, Fairfield Warde High School, and Fairfield Ludlowe High School. It is not known if this visually similar flooring at these schools were covered with the same sealer used at Osborn Hill. Due to instrument interferences, materials similar to this sealer are not amenable to the indicator chlorine screening used during this survey.
- As part of recent (2009-present) renovation projects being performed at several school buildings at which potentially suspect buildings materials may be disturbed (e.g., window replacements), building material samples have been collected and analyzed for PCBs by the School District. The existing PCB sample data collected from these five schools is consistent with that seen by other building PCB surveys conducted by Woodard & Curran, as well as others in the practice.
- As part of the building surveys, 355 samples of suspect building materials were collected and field screened for chlorine. On average, about 27 samples of different materials were collected from each of the 13 buildings and screened with the XRF meter. The majority (275 samples or 77%) of the Fairfield school samples were reported with chlorine levels below the 0.5% correlation level that typically corresponds to PCBs < 50 ppm. Sixty samples (17%) were reported in the 0.5 to 5% inconclusive range and 20 samples were above 5% (inconclusive with regard to PCB presence).

An overall conceptual site model for PCBs in building materials consists of suspected source materials (e.g., caulkings and glazing sealants) typically being identified at a building given the building's construction type and date; however, not all of these materials are found to contain PCBs at elevated concentrations, even though they were installed during the timeframe when PCBs were sometimes used in these materials. The survey and screening data collected as part of this survey supports this conceptual site model. Furthermore, even if PCBs are present in certain materials at elevated concentrations, they may not be a contributing factor to PCBs in other media, such as indoor air or surfaces, which are the media that drive potential exposures and risk. This was shown at Fairfield Ludlowe High School and Osborn Hill (PCB containing window caulking not contributing to indoor air levels over EPA target levels).

2.0 Management Program – PCBs in Building Materials

The findings of the initial screening process, as described above, serve as the starting point to develop a management program for building materials that may contain PCBs. This program can be separated into two components: 1) Near-term or Best-Management Practices; and 2) Longer-term or Material Management During Renovations.

The overall goal of the program is to minimize or eliminate potential exposures to PCB-containing materials until these materials are removed from the building during planned renovation or building improvement projects.

2.1 Near Term or Best Management Practices

It is important to make a distinction between the mere presence of a PCB-containing building material and exposure potential. As presented in EPA guidance, presence of a regulated PCB-containing material within a given building does not necessarily equate to an exposure risk. In order for this condition to occur there needs to be a complete pathway established between the source and the individual through a transport mechanism, such as direct contact/transfer or indoor air (refer to Appendix A for additional discussion).

Our initial recommendation is to follow EPA and CTDEEP recommended best management practices to reduce potential exposure to PCBs from suspect building materials in schools. These practices include:

- Improve ventilation and add exhaust fans, as needed
- Avoid direct contact with suspect materials within reasonable means
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Using vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash children's toys often
- Encourage proper hygiene amongst staff and students (i.e. wash hands with soap and water regularly, particularly before eating or drinking)

Based on the screening survey findings, additional recommendations include:

- Since a higher percentage of exterior samples screened higher for chlorine content, direct contact with areas adjacent to caulking, sealants or other suspect materials not known to be replaced after 1980 should be avoided and/or minimized; depending on locations, some sealants in these areas could be temporarily covered, if feasible;
- Continue proper management of PCB-containing materials identified during on-going renovation projects;

- Follow-up evaluations at schools not undergoing active renovation projects with PCB-containing materials include Jennings Elementary, Timothy Dwight Elementary, and Tomlinson Middle School; these three schools had a higher percentage of suspect materials that also exhibited higher chlorine concentrations in both interior and exterior samples relative to the average of all schools; activities could include more detailed inspection and survey of suspect materials with follow-up interim measures, as needed, to potentially include covering any deteriorating sealants or suspect sealants in high exposure potential areas; room or area cleaning; etc. Of note, the two elementary schools recently underwent exterior window replacement projects; therefore, these associated sealants should not be suspect for PCBs.

2.2 Longer-term or Material Management During Renovations

As indicated above, as part of building renovation activities at several schools, samples of suspect PCB-containing materials (such as caulking and sealants) have been collected and analyzed by a laboratory in order to determine presence and concentration. Several of these samples detected PCB concentrations in excess of disposal thresholds as indicated in EPA's and CTDEEP's regulations and/or guidance. As such, proper abatement specifications and plans are being developed to properly manage and dispose of off-site the subject materials as part of the renovation project. This process of properly removing and managing regulated materials during renovation projects is implemented for other regulated building materials, such as asbestos or lead-based paint.

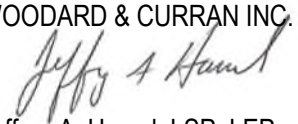
It is recommended that the School District "roll" the assessment of PCB-containing materials into the overall regulated building material program being implemented by the District for renovation projects.

It is our understanding that the following projects are being considered in the Fairfield Public School Facilities Master Plan for 2011-2020 (for the 13 schools included in the screening survey):

- Dwight Elementary – full renovations and upgrades
- Holland Hill Elementary – code updates, addition
- Jennings Elementary – code updates, addition
- Mill Hill Elementary - code updates, addition
- North Stratfield Elementary – code updates
- Riverfield Elementary – code updates
- Osborn Hill Elementary - code updates
- Sherman Elementary - code updates
- Fairfield Woods Middle – replace windows
- Fairfield Ludlowe High School – replace windows, addition
- Fairfield Warde High School – replace windows, addition

Woodard & Curran appreciates the opportunity to assist the School District on this project. If you have any questions or require further information, please feel free to email me at jhamel@woodardcurran.com or call me at (978) 557-8150.

Sincerely,
WOODARD & CURRAN INC.



Jeffrey A. Hamel, LSP, LEP
Senior Vice President

Enclosures: Table 1 – Summary of Fairfield Public School Buildings
Appendix A – Fairfield Public Schools – PCB Informational Handout
Appendix B – Building Survey Reports

Table 1

Summary of Fairfield Public School Buildings
2012-2013

School	School Address	Year Built	Year - Renovations	Bldg. Capacity	Classrooms	Enrollment 9-30-11	Main Bldg. Sq. Footage	Capacity w/Annex or Relocatables	Facility Gross Sq. Footage	Construction	Stories	Site Acreage	Existing PCB Data Summary
Stratfield Elem. School	1407 Melville Avenue	1929	1948, 1972, 2010, 2011	504	28	511	64,725	504	64,725	Brick / Masonry	2	6.76	caulking from 1929 section tested; 2 samples > 50 ppm; 1 at 58,000 ppm [exterior door caulking]
Mill Hill Elem. School	635 Mill Hill Terrace	1955	1978, 1991, 2000	378	25	459	43,229	483	47,660	Brick / Masonry	1	9.70	
Holland Hill Elem. School	105 Meadowcroft Road	1956	1978, 2001	315	23	352	42,732	399	45,236	Brick / Masonry	1	12.50	
Osborn Hill Elem. School	760 Stillson Road	1958	1969, 1981, 1997,2000, 2009	504	22	542	49,146	504	54,876	Brick / Masonry	1	10.77	multiple > 50 ppm source materials identified; IA and surface wipe samples over target levels; remediation implemented
Riverfield Elem. School	1625 Mill Plain Road	1959	1971, 2000	399	26	419	45,140	504	49,140	Brick / Masonry	1	30.00	
North Stratfield Elem. School	190 Putting Green Road	1961	1996, 2000	483	26	485	61,110	483	61,110	Brick / Masonry	1	9.60	
Timothy Dwight Elem. School	1600 Redding Road	1962	1960's, 2000	378	21	290	41,000	378	41,000	Brick / Masonry	1	31.13	
Roger Sherman Elem. School	250 Fern Street	1963	1977, 2001, 2009,2012	504	26	457	42,006	504	49,396	Brick / Masonry	1	9.70	window/door caulk tested - all < 50 ppm (ND to 4.3 ppm)
Jennings Elem. School	31 Palm Drive	1967	2000, 2002	357	24	361	45,300	378	46,100	Brick / Masonry	1	7.03	
McKinley Elem. School	60 Thompson Street	2003	N/A	504	30	453	73,425	483	73,425	Brick / Masonry	2	13.54	Excluded from Screening
Burr Elem. School	1960 Burr Street	2004	N/A	504	27	443	70,794	504	70,794	Concrete/Block/Glass	2	17.44	Excluded from Screening
Tomlinson Middle School	200 Unquowa Road	1917	1942, 1958, 1976, 2006	700	51	756	167,000	0	167,000	Brick / Masonry	3	10.78	caulking around exterior doors tested; < 50 ppm (ND)
Fairfield Woods Middle School	1115 Fairfield Woods Road	1954	1961, 1972, 1995, 2011	840	61	769	176,573	0	176,573	Brick / Masonry	2	15.53	
Roger Ludlowe Middle School	689 Unquowa Road	2003	N/A	875	68	997	200,450	0	200,450	Brick / Wood / Glass	3	19.00	Excluded from Screening
Fairfield Ludlowe High School	785 Unquowa Road	1950	1963, 1972, 1995, 2005	1400	90	1,505	295,069	0	295,069	Brick/Concrete/Wood	3	23.00	window caulking tested and found to be > 50 ppm (up to 660,000 ppm ext and 4,900 int); initial IA and wipes ND
Fairfield Warde High School	755 Melville Avenue	1955	2003, 2006	1400	90	1,338	317,827	0	317,827	Brick / Masonry	2	39.70	

APPENDIX A: FAIRFIELD PUBLIC SCHOOLS – PCB INFORMATIONAL HANDOUT

What are PCBs? How did they get into building materials?

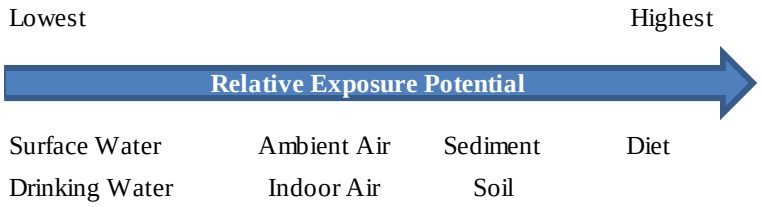
Polychlorinated biphenyls (PCBs) are manmade chemicals that were widely used in many construction materials and electrical products before 1978. PCBs were not sold as a homogenous solution of one PCB, but were rather sold as a mixture that was based upon the percent of chlorination. Aroclor 1248, 1254, and 1260 indicate the relative percentages of chlorination contained in each of these mixtures. The Aroclor mixture was produced and sold by the Monsanto Chemical Company. While other chemical companies did produce some PCBs, the amounts are minor when compared to the amount Monsanto produced ***(EPA estimates over 1.5 billion pounds of PCBs were produced in the US)***.

Their widespread use and high environmental persistence has resulted in global contamination of PCBs to our soil, air, water and food. PCBs have even been found in Arctic polar ice samples. Due to concerns about their toxicity and environmental effects, PCBs were banned by Congress in 1976 and phased out of most uses by 1978. Despite their ban, PCBs can remain present in certain older building materials, such as fluorescent light ballasts, caulks, and sealants used in construction or renovation of buildings prior to 1978 *(EPA Region 1 FAQ, PCBs in Building Materials).*

How can I be exposed to PCBs?

Because of their widespread use in a number of applications, PCBs have become a persistent and ubiquitous contaminant in the environment, and can be found throughout the United States in soil, air, water, plants and animals, as well as older building materials manufactured prior to 1978. Most of us have very low levels of PCBs that have accumulated in our bodies as a result of long-term exposures to PCBs in the environment. People may be exposed to PCBs by contacting soil or dust, or materials containing PCBs, by inhaling PCBs in indoor or outdoor air, and by ingesting PCBs through the diet. When you touch, inhale or ingest materials containing PCBs, the PCBs may be taken up and stored in your body.

In general, the highest PCB exposures occur through the diet, followed by contact with soil and sediment, whereas the lowest exposures occur through air and water – see chart below (EPA Chemical Summary: PCBs).



As an example, eating fish on a regular basis can contribute significantly to background exposure levels of PCBs. ***CT DPH has indicated that eating fish twice a week results in about the same PCB exposure as one would receive at the PCB indoor air levels EPA has set for schools*** (see further information on EPA indoor levels below).

What are the Health Effects of PCB Exposure?

Short term exposure to large amounts of PCBs can potentially cause skin conditions such as acne and rashes, as well as other conditions such as decreased liver function, neurological effects, and gastrointestinal effects. However, these types of acute toxic effects due to high levels of exposure (typically found in an industrial setting) are rare, and very unlikely to occur in a school setting.

The low levels of PCBs that are typically found in a person's body are generally not associated with adverse health effects. However, laboratory studies in animals and limited studies in humans indicate that long-term exposure to lower levels of PCBs may potentially cause health effects on the immune, reproductive, nervous and endocrine systems. PCBs have also been shown to cause cancer in animals, and are suspected to cause cancer in humans (EPA Region 1 faq; ATSDR Tox FAQs)

How are PCBs in School Buildings Assessed?

The EPA has set "Public Health Levels for PCBs in Indoor School Air." These levels are designed to be conservative (health-protective) concentrations for adults and children that keep total PCB exposures (from school and background sources) below a level at which adverse health effects are unlikely to occur.

These screening levels are expressed in units of nanograms of PCBs per cubic meter of air (ng/m^3) [see sidebar for discussion on nanograms]. The levels for different ages and school types are presented in the table below. These public health levels assume a continuous exposure during the course of the school day, and therefore are most appropriate for comparison to air testing results in classrooms where students spend most of their time.

A nanogram is a very small amount, equivalent to a billionth of one gram. One ng/m^3 is the equivalent of one billionth of one gram of a substance (in this case, PCBs) in 1,000 liters of air. A more tangible way to visualize this amount is as one-tenth of a teaspoon of salt in enough water to fill more than two olympic-sized swimming pools.

An exceedance of these screening levels does not mean that adverse effects will necessarily occur, but that further evaluation should be undertaken at the school. For example, these levels were set based upon the most sensitive health effects seen with PCB exposures in animal studies or human exposures. These effects included impacts on the immune system, ducts lubricating the eye and reproduction. EPA then divided the lowest levels that caused those effects by a safety factor of 300 to set a safe level for schools.

As an alternative to use of the default EPA screening levels, schools may consider use of a site-specific "risk-based" approach to evaluate PCB exposure.

EPA-Recommended Maximum Concentrations of PCBs in School Air

	Age	Maximum Concentrations of PCBs in School Air (ng/m^3)
Pre-School to Kindergarten	1-<2 yr	70
	2-<3 yr	70
	3-<6 yr	100
Elementary School	6-<12 yr	300
Middle School	12-<15 yr	450
High School	15-<19 yr	600
Adult	19+ yr	450

The risk-based approach considers factors that are unique to their individual school, such as room uses, age group exposures, time spent in various classrooms, etc. The site-specific risk-based approach provides more useful information on actual exposures at a school, relative to a target risk goal, and allows for better-informed risk management decisions than does use of single default screening criteria.

What does "acceptable risk" and "cancer risk" mean?

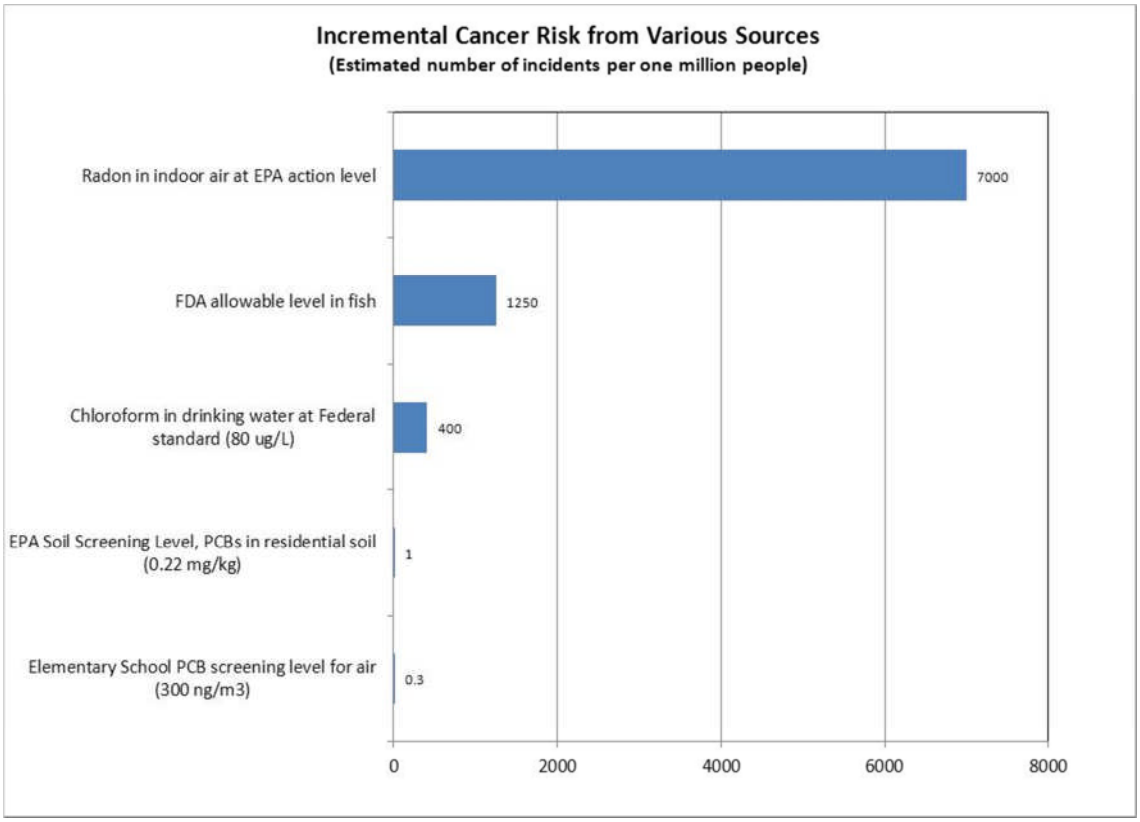
"Acceptable health risk" is a term of art used by risk assessors and regulators, who recognize that "zero risk" may be an impossible goal. We all take risks every day, in virtually all the activities in which we engage. We are all familiar with the concept of "acceptable" risk because this guides the decisions we make in our lives. Environmental regulations (for example, the "Superfund" rule) define an acceptable cancer risk as a level of risk set so low that is considered "de minimis", meaning that a lifetime exposure to a substance increases a person's chance of developing cancer by a very small fraction. For non-cancer health effects, risk is set at a level at or below conservative health-based reference levels.

The CT DPH discussed this "risk" concept using the highest levels of PCBs measured in indoor air of the classrooms and gym at the Osborn Hill School, and an exposure duration of 30 years for teachers and 6 years for students. The resulting estimated theoretical lifetime cancer risk for students and teachers is low. The highest risk comes from exposure in the gym because that is the room where indoor air PCB levels were highest. Long term exposure (30 years) to air in the gym has an estimated cancer risk of about 2 in 100,000. This means that if 100,000 people were exposed for 30 years to the highest PCB air level measured in the gym, there would be an estimated 2 additional cancers resulting from that exposure over the course of a lifetime. Estimated cancer risks are much lower for students and teachers spending time in other parts of the school where air PCB levels were lower.

It is also important to understand background cancer rates. ***According to the American Cancer Society, half of all men and one-third of all women in the US will develop cancer during their lifetime.*** This means that the estimated 2 additional cancers in 100,000 exposed persons at Osborn Hill School would be in addition to the 33,000 to 50,000 background cancers that would be expected without any PCB exposure from the school. The high background cancer rate makes it impossible to determine if an individual cancer is related to a specific PCB exposure. Also, cancer is not a single disease with each cancer having its own set of risk factors. PCBs do not cause all types of cancer and have only been associated with a few forms of cancer, most notably liver cancer.

What is the relative risk from PCB exposure compared to everyday risks?

It is not simple to show a comparison of risks from PCBs in indoor air to risks from other facets of life, because of the many differences in compounds, toxic effects, levels of exposure and numerous other factors. However, to provide some perspective on the health risk (in this case, cancer potential) from PCBs in indoor air, the following chart shows a comparison of relative cancer risk from other types of contaminants typically encountered on a daily basis.



The risk from PCBs in indoor air exposures at the EPA screening level for elementary schools is very small relative to that from some other typical exposures, such as common contaminants in drinking water and radon in indoor air of a residence.

What are the best near-term actions (i.e., best management practices) to reduce potential PCB exposures in buildings?

Where schools or other buildings were built or renovated between 1950 and 1978, EPA recommends the following best practices to minimize potential exposure:

- Improve ventilation and add exhaust fans
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Use vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash hands with soap and water often, particularly before eating

APPENDIX B: BUILDING SURVEY REPORTS

Building Survey - Holland Hill Elementary School

Introduction

As part of a district-wide school building review project, Woodard & Curran completed an on-site building survey of the Holland Hill Elementary School on January 28, 2013. The building survey focused on identifying building materials that may be suspect to contain polychlorinated biphenyls (PCBs). PCBs were sometimes used in standard construction materials from the 1950s through the 1970s. The building survey information has been used to develop a screening assessment of the potential for PCBs to be present in the building.

Building Information

Location: 105 Meadowcroft Road, Fairfield, CT

Initial Construction Date: 1956

Additions/Renovations: 1978 and 2001

Construction Type: The exterior of the building is constructed of unpainted brick and masonry with steel structural components. Interior building construction materials were observed to be consistent in most areas of the school and can be characterized as having vinyl tile flooring, painted CMU walls, and drop ceilings. Observed HVAC systems consisted of in-room radiators and overhead ductwork and vents. Windows were observed to be generally consistent across the building as well; with double-paned aluminum framed exterior windows and single-paned aluminum framed interior windows. Interior doors were observed to be primarily steel-framed with wood doors, and exterior doors were generally observed to be steel-framed with steel doors. The gymnasium was observed to have sealed wood floors, painted CMU walls with vertical steel support beams, tectum ceiling panels with painted steel support beams, and overhead ductwork and vents.

Screening Assessment

There are several key parameters evaluated as part of this screening assessment. A summary of these parameters in the context of the Holland Hill School is presented below.

Construction Date – The initial construction date of the building was 1956; therefore it falls within the timeframe of when PCBs were sometimes used in standard construction materials. The addition constructed in 1978 also falls within this timeframe. However, the building addition (Storage Room), constructed in 2001, falls outside of this range; therefore the subject building area only includes the 1956 and 1978 building construction.

Presence of Primary Suspect Materials – In typical school building settings, primary building materials that may have been manufactured with PCBs include: caulking, sealants, ceiling tiles, and spray-on fireproofing (NOTE – although some specialty paints have been known to be manufactured with PCBs, these specialty paints are typically not specified for use in school building settings). During the building survey various sealants, caulking, and window glazing sealants were observed most notably gray and white caulking along the interior and exterior window frames; painted-over sealants along door frame to CMU joints, and sealants at brick to brick/CMU joints along the building exterior. The gymnasium was observed to have tectum ceiling panels, but no spray-on fireproofing (e.g., not the same material as observed at the Osborn Hill gymnasium).

Photos of typical building sealants observed during the building survey are provided below.

Existing Data - No existing samples of suspect materials from the building have been analyzed by a laboratory to determine PCB presence and concentration.

Physical Condition and Chlorine Screening - The absence of chlorine in a certain building material is one line-of-evidence that PCBs may not be present within that building material (since chlorinated organics are a key component of PCBs). However, chlorine presence cannot be assumed to indicate PCB presence because many sealants and other building materials contain other chlorinated compounds as part of their composition. During the survey, 28 samples of various sealants, caulking, and additional materials were collected from locations throughout the building's interior and exterior. The samples were screened for chlorine content using a handheld Niton X-Ray Fluorescence (XRF) Analyzer. The results of

XRF screening are presented on Table 1 (interior) and Table 2 (exterior). A physical description of each material (brittle, pliable, exposed or covered with another coating, such as paint, etc.) is also included on the tables.

Based on chlorine screening data (via XRF) collected at other buildings, a typical percent chlorine level has been established at which below this level, subsequent bulk samples for laboratory analyses typically would not correspond to PCB levels at ≥ 50 ppm, the Federal regulatory threshold for PCB Bulk Product Waste. Correlation to higher levels of chlorine to potential PCB concentrations are inconclusive with regard to PCB presence ≥ 50 ppm since other chlorinated compounds may be present in the samples. A review of the data indicated that 100% of the interior samples and 83% of the exterior samples fell within this lower chlorine screening level.

Summary

Overall observations included the following:

- Caulking and glazing sealants were observed throughout the building, primarily associated with window and door systems and expansion joints; the majority of the sealants were observed to be intact and pliable; given the date of construction of the building, these materials are considered suspect for PCBs.
- Numerous types of window systems and window styles were present at individual buildings and even within rooms of buildings. Numerous windows appear to have been updated over time and repair projects (replacement sealants) are evident in some areas. Most buildings had some single-pane windows that appear to be original construction. New exterior window systems were present at Holland Hill.
- ***The spray-on fireproofing material at Osborn Hill gymnasium ceiling (primary driver for indoor air PCB levels) was <u>not</u> observed at the school.***
- A review of the Osborn Hill data indicated that a sealer applied to the stone tile flooring in a hallway was tested and found to contain PCBs. It is not known if this material was manufactured with PCBs or contained PCBs as a result of a cross-contamination effect from the gymnasium source. During the building surveys, similar stone tile flooring was observed at Holland Hill Elementary. It is not known if this visually similar flooring at these schools were covered with the same sealer used at Osborn Hill. A review of the data indicated that 100% of the interior samples and 83% of the exterior samples fell within this lower chlorine screening level.

Management Program – PCBs in Building Materials

The findings of the initial screening process, as described above, serve as the starting point to develop a management program for building materials that may contain PCBs. This program can be separated into two components: 1) Near-term or Best-Management Practices; and 2) Longer-term or Material Management During Renovations. The overall goal of the program is to minimize or eliminate potential exposures to PCB-containing materials until these materials are removed from the building during planned renovation or building improvement projects.

Near Term or Best Management Practices

It is important to make a distinction between the mere presence of a PCB-containing building material and exposure potential. As presented in EPA guidance, presence of a regulated PCB-containing material within a given building does not necessarily equate to an exposure risk. In order for this condition to occur there needs to be a complete pathway established between the source and the individual through a transport mechanism, such as direct contact/transfer or indoor air (refer to Appendix A for additional discussion).

Our initial recommendation is to follow EPA and CTDEEP recommended best management practices to reduce potential exposure to PCBs from suspect building materials in schools. These practices include:

- Improve ventilation and add exhaust fans, as needed
- Avoid direct contact with suspect materials within reasonable means
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Using vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash children's toys often
- Encourage proper hygiene amongst staff and students (i.e. wash hands with soap and water regularly, particularly before eating or drinking)

Based on the screening survey findings, additional recommendations include:

- Since a higher percentage of exterior samples screened higher for chlorine content, direct contact with areas adjacent to caulking, sealants or other suspect materials not known to be replaced after 1980 should be avoided and/or minimized; depending on locations, some sealants in these areas could be temporarily covered, if feasible.

Longer-term or Material Management During Renovations

As indicated above, as part of building renovation activities at several schools, samples of suspect PCB-containing materials (such as caulking and sealants) have been collected and analyzed by a laboratory in order to determine presence and concentration. Several of these samples detected PCB concentrations in excess of disposal thresholds as indicated in EPA's and CTDEEP's regulations and/or guidance. As such, proper abatement specifications and plans are being developed to properly manage and dispose of off-site the subject materials as part of the renovation project. This process of properly removing and managing regulated materials during renovation projects is implemented for other regulated building materials, such as asbestos or lead-based paint.

It is recommended that the School District "roll" the assessment of PCB-containing materials into the overall regulated building material program being implemented by the District for renovation projects. It is our understanding that the various projects are being considered in the Fairfield Public School Facilities master plan for 2011-2020 (for the 13 schools included in the screening survey. Holland Hill Elementary is being considered for code updates and a new addition.

Table 1
Interior Chlorine Screening Results - Holland Hill Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
HH-GH-007	0.0415	Gym Hall	CMU to CMU joint	Intact, Painted
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
HH-GYM-002	0.0954	Gym	Steel door frame to CMU	White, Painted
HH-GYM-003	0.0533	Gym	Steel door frame to CMU	Light Gray, Exposed
HH-GYM-004	0.2337	Gym	Steel door frame to CMU	Dark Gray, Exposed
HH-GH-006	0.163	Gym Hall	Door window to frame	Dark Gray, Intact, Exposed
HH-GH-008	0.0979	Gym Hall	Second door metal to glass replacement	Intact, some Exposed
HH-K1-009	0.1135	Room K1	Door	Exposed
HH-LMC-010	0.068	Library Media Center	Int door frame to CMU	White, Intact, Painted
HH-LH-015	0.0984	Kitchen	Metal door frame to CMU	2 layers White, Intact, Exposed
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
HH-12-001	0.1547	Room 12	Window metal to metal	Gray, Intact, Exposed
HH-20-005	0.4339	Room 20	Window frame to CMU	Gray, Intact, Exposed
HH-CAF-012	0.0834	Cafeteria/Stage	DPA window frame to CMU	Gray, Intact, Exposed
HH-KIT-013	0.1383	Kitchen	Window metal to glass	Clear, Intact, Exposed
HH-KIT-014	0.0241	Kitchen	Window metal to glass	Gray, Brittle, Exposed
'Other' Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
HH-LMC-011	0.2414	Library Media Center	Top of shelf to CMU	White, Weathered
HH-LH-016	0.0789	Library Hall	Grease on beam joint	

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on January 28, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Table 2
Exterior Chlorine Screening Results - Holland Hill Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
HH-BE-024	2.79	Building Exterior	Brick to brick	Brown, Weathered
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
HH-BE-020	0.3017	Building Exterior	Steel door single pane window wood to brick	Brown
HH-BE-021	0.4623	Building Exterior	Room K1 door wood to brick	Brittle, Painted
HH-BE-025	8.83	Building Exterior	Library Hall door	Brown over gray, Intact, Partially Exposed
HH-BE-028	0.3953	Building Exterior	Boiler room door metal to brick	Intact, Painted
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
HH-BE-017	0.0765	Building Exterior	SPA window frame to brick at office	Gray, Intact, Exposed
HH-BE-018	0.0963	Building Exterior	SPA window frame to brick at office replace	Clear
HH-BE-019	0.2682	Building Exterior	DPA window metal to brick/metal	Gray
HH-BE-022	0.332	Building Exterior	Room K1 bathroom window metal to brick	White, Brittle, Weathered
HH-BE-023	0.182	Building Exterior	Room K1 bathroom window metal to glass	Gray, Weathered
HH-BE-026	0.08	Building Exterior	Kitchen single pane, metal to metal	Gray, Weathered
HH-BE-027	0.0501	Building Exterior	Kitchen single pane, metal to brick	Intact

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on January 28, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Building Survey - Jennings Elementary School

Introduction

As part of a district-wide school building review project, Woodard & Curran completed an on-site building survey of the Jennings Elementary School on February 6, 2013. The building survey focused on identifying building materials that may be suspect to contain polychlorinated biphenyls (PCBs). PCBs were sometimes used in standard construction materials from the 1950s through the 1970s. The building survey information has been used to develop a screening assessment of the potential for PCBs to be present in the building.

Building Information

Location: 31 Palm Drive, Fairfield, CT

Initial Construction Date: 1967

Additions/Renovations: 2000 and 2002

Construction Type: The exterior of the building is constructed of unpainted brick and masonry with steel structural components. Interior building construction materials were observed to be consistent in most areas of the school and can be characterized as having vinyl tile flooring, painted CMU walls, and drop ceilings. Observed HVAC systems consisted of in-room radiators and overhead ductwork and vents. Windows were observed to be generally consistent across the building as well; with double-paned aluminum framed exterior windows and single-paned aluminum framed interior windows. Interior doors were observed to be primarily steel-framed with wood doors, and exterior doors were generally observed to be steel-framed with steel doors. The gymnasium was observed to have sealed wood floors, painted CMU walls with vertical steel support beams, and tectum ceiling panels in a drop ceiling with overhead ductwork and in-ceiling vents.

Screening Assessment

There are several key parameters evaluated as part of this screening assessment. A summary of these parameters in the context of the Jennings School is presented below.

Construction Date – The initial construction date of the building was 1967; therefore it falls within the timeframe of when PCBs were sometimes used in standard construction materials. However, the two building additions, constructed in 2000 and 2002, fall outside of this range; therefore the subject building area only includes the original building construction.

Presence of Primary Suspect Materials – In typical school building settings, primary building materials that may have been manufactured with PCBs include: caulking, sealants, ceiling tiles, and spray-on fireproofing (NOTE – although some specialty paints have been known to be manufactured with PCBs, these specialty paints are typically not specified for use in school building settings). During the building survey various sealants, caulking, and window glazing sealants were observed most notably gray and white caulking along the interior and exterior window frames; painted-over sealants along door frame to CMU joints, and sealants at brick to brick/CMU joints along the building exterior. The gymnasium was observed to have tectum ceiling panels, but no spray-on fireproofing (e.g., not the same material as observed at the Osborn Hill gymnasium).

Photos of typical building sealants observed during the building survey are provided below.

Existing Data - No existing samples of suspect materials from the building have been analyzed by a laboratory to determine PCB presence and concentration.

Physical Condition and Chlorine Screening - The absence of chlorine in a certain building material is one line-of-evidence that PCBs may not be present within that building material (since chlorinated organics are a key component of PCBs). However, chlorine presence cannot be assumed to indicate PCB presence because many sealants and other building materials contain other chlorinated compounds as part of their composition. During the survey, 30 samples of various sealants, caulking, and additional materials were collected from locations throughout the building's interior and exterior. The samples were screened for chlorine content using a handheld Niton X-Ray Fluorescence (XRF) Analyzer. The results of XRF screening are presented on Table 1 (interior) and Table 2 (exterior). A physical description of each material (brittle, pliable, exposed or covered with another coating, such as paint, etc.) is also included on the tables.

Based on chlorine screening data (via XRF) collected at other buildings, a typical percent chlorine level has been established at which below this level, subsequent bulk samples for laboratory analyses typically would not correspond to PCB levels at ≥ 50 ppm, the Federal regulatory threshold for PCB Bulk Product Waste. Correlation to higher levels of chlorine to potential PCB concentrations are inconclusive with regard to PCB presence ≥ 50 ppm since other chlorinated compounds may be present in the samples. A review of the data indicated that 43% of the interior samples and 44% of the exterior samples screened fell within this lower chlorine screening level.

Summary

Overall observations included the following:

- Caulking and glazing sealants were observed throughout the building, primarily associated with window and door systems and expansion joints; the majority of the sealants were observed to be intact and pliable; given the date of construction of the building, these materials are considered suspect for PCBs.
- Numerous types of window systems and window styles were present at individual buildings and even within rooms of buildings. Numerous windows appear to have been updated over time and repair projects (replacement sealants) are evident in some areas. Most buildings had some single-pane windows that appear to be original construction. New exterior window systems were present at Jennings.
- ***The spray-on fireproofing material at Osborn Hill gymnasium ceiling (primary driver for indoor air PCB levels) was not observed at the school.***
- A review of the Osborn Hill data indicated that a sealer applied to the stone tile flooring in a hallway was tested and found to contain PCBs. It is not known if this material was manufactured with PCBs or contained PCBs as a result of a cross-contamination effect from the gymnasium source. During the building surveys, a similar stone tile flooring was observed at Jennings Elementary. It is not known if this visually similar flooring at these schools were covered with the same sealer used at Osborn Hill.

- A review of the data indicated that 43% of the interior samples and 44% of the exterior samples screened fell within this lower chlorine screening level.

Management Program – PCBs in Building Materials

The findings of the initial screening process, as described above, serve as the starting point to develop a management program for building materials that may contain PCBs. This program can be separated into two components: 1) Near-term or Best-Management Practices; and 2) Longer-term or Material Management During Renovations. The overall goal of the program is to minimize or eliminate potential exposures to PCB-containing materials until these materials are removed from the building during planned renovation or building improvement projects.

Near Term or Best Management Practices

It is important to make a distinction between the mere presence of a PCB-containing building material and exposure potential. As presented in EPA guidance, presence of a regulated PCB-containing material within a given building does not necessarily equate to an exposure risk. In order for this condition to occur there needs to be a complete pathway established between the source and the individual through a transport mechanism, such as direct contact/transfer or indoor air (refer to Appendix A for additional discussion).

Our initial recommendation is to follow EPA and CTDEEP recommended best management practices to reduce potential exposure to PCBs from suspect building materials in schools. These practices include:

- Improve ventilation and add exhaust fans, as needed
- Avoid direct contact with suspect materials within reasonable means
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Using vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash children's toys often
- Encourage proper hygiene amongst staff and students (i.e. wash hands with soap and water regularly, particularly before eating or drinking)

Based on the screening survey findings, additional recommendations include:

- Since a higher percentage of exterior samples screened higher for chlorine content, direct contact with areas adjacent to caulking, sealants or other suspect materials not known to be replaced after 1980 should be avoided and/or minimized; depending on locations, some sealants in these areas could be temporarily covered, if feasible;

- Follow-up evaluations at Jennings Elementary. This school had a higher percentage of suspect materials that also exhibited higher chlorine concentrations in both interior and exterior samples compared to the average of all schools; activities could include more detailed inspection and survey of suspect materials with follow-up interim measures, as needed, to potentially include covering any deteriorating sealants or suspect sealants in high exposure

potential areas; room or area cleaning; etc. Of note, the two elementary schools recently underwent exterior window replacement projects; therefore, these associated sealants would not be suspect for PCBs.

Longer-term or Material Management During Renovations

As indicated above, as part of building renovation activities at several schools, samples of suspect PCB-containing materials (such as caulking and sealants) have been collected and analyzed by a laboratory in order to determine presence and concentration. Several of these samples detected PCB concentrations in excess of disposal thresholds as indicated in EPA's and CTDEEP's regulations and/or guidance. As such, proper abatement specifications and plans are being developed to properly manage and dispose of off-site the subject materials as part of the renovation project. This process of properly removing and managing regulated materials during renovation projects is implemented for other regulated building materials, such as asbestos or lead-based paint.

It is recommended that the School District "roll" the assessment of PCB-containing materials into the overall regulated building material program being implemented by the District for renovation projects. It is our understanding that various projects are being considered in the Fairfield Public School Facilities master plan for 2011-2020 (for the 13 schools included in the screening survey). Jennings Elementary is being considered for code updates and a new addition.

Table 1
Interior Chlorine Screening Results - Jennings Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
JS-CAF-019	5.3	Cafeteria	Steel support beam to CMU	Hard, Intact, Painted
JS-GYM-012	5.23	Gym	Steel support beam to CMU	Gray, Hard, Intact, Painted
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
JS-R22E-022	0.2894	Room 22 Entryway	Int door window to glass	Gray, Pliable, Intact, Exposed
JS-R22E-021	0.0343	Room 22 Entryway	Ext door window to glass	Brown, Pliable, Intact
JS-GYM-013	0.5912	Gym	Ext door, steel frame to CMU	Hard, Intact, Painted
JS-GYM-011	5.81	Gym	Int door (stage) steel frame to CMU	Hard, Intact, Painted
JS-GYM-010	2.55	Gym	Int door (stage) steel frame to CMU	Gray, Hard, Intact, Painted
JS-11-009	3.04	Room 11	Bathroom door frame to fiberboard	Gray, Brittle, Painted
JS-5-008	1.16	Room 5	Steel door frame to painted CMU	
JS-1-004	6.84	Room 1	Int door frame steel to CMU	Gray, Hard, Brittle, Painted
JS-1-003	0.5803	Room 1	Ext door frame steel to CMU	Painted, partially separated
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
JS-LMC-014	0.1178	Library Media Center	Ext DPA window frame to CMU and sill	Pliable, Intact, Exposed
JS-12-006	10.29	Room 12	Int SPA window glass to metal	Pliable, Intact, Exposed
JS-12-005	1.81	Room 12	Ext DPA window frame to CMU and sill	Gray, Pliable, Intact, Exposed
JS-1-001	0.2844	Room 1	Ext window metal frame to sill	White, Pliable, Intact, Exposed
JS-2-002	0.9063	Room 1	Ext window metal frame to CMU	Gray, Pliable, Intact, Exposed
'Other' Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
JS-BR-018	0.1507	Boiler Room	Piping	White, Pliable, Intact, Exposed
JS-BR-017	0.0315	Boiler Room	HVAC piping	Red, Hard, Intact, Exposed
JS-BR-016	0.0166	Boiler Room	HVAC piping	Red, Pliable, Intact, Exposed
JS-BR-015	0.0613	Boiler Room	Piping to CMU	Pink, Hard, Exposed
JS-5-007	0.3546	Room 5	Counter top	White, Hard, Intact, Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on February 6, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Table 2
Exterior Chlorine Screening Results - Jennings Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
JS-BE-031	0.0984	Building Exterior	Horizontal seam above concrete block	Gray, Brittle, Exposed
JS-BE-030	0.3774	Building Exterior	Guidance exterior brick to concrete	Beige, Pliable, Intact, Exposed
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
JS-BE-025	9.73	Building Exterior	Room 11 door frame to concrete	Gray over clear, Pliable, Intact, Exposed
JS-BE-024	5.2	Building Exterior	Ext door frame to unpainted brick	Gray, Pliable, Intact, Partly Painted
JS-R7E-023	4	Room 7 Entryway	Steel door frame to unpainted brick	Gray, Pliable, Intact, Painted
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
JS-BE-029	0.4681	Building Exterior	Room 10 above window lintel	White over gray, Pliable, Intact, Exposed
JS-BE-028	0.9378	Building Exterior	Room 10 above window lintel	Gray, Pliable, Exposed
JS-BE-027	6.35	Building Exterior	Room 11 DPA flashing to concrete/brick	Gray, Pliabe, Partly Exposed
JS-BE-026	0.1497	Building Exterior	Room 11 DPA window flashing to concrete	White, Pliable, Exposed

Notes:

results are reported as percent (%) chlorine.

2. Survey activities were limited to suspect sealants accessible on February 6, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Building Survey - Mill Hill Elementary School

Introduction

As part of a district-wide school building review project, Woodard & Curran completed an on-site building survey of the Mill Hill Elementary School on January 24, 2013. The building survey focused on identifying building materials that may be suspect to contain polychlorinated biphenyls (PCBs). PCBs were sometimes used in standard construction materials from the 1950s through the 1970s. The building survey information has been used to develop a screening assessment of the potential for PCBs to be present in the building.

Building Information

Location: 635 Mill Hill Terrace, Fairfield, CT

Initial Construction Date: 1955

Additions/Renovations: 1978, 1991, 2000

Construction Type: The exterior of the building is constructed of unpainted brick and masonry with steel structural components. Interior building construction materials were observed to be consistent in most areas of the school and can be characterized as having vinyl tile flooring, painted CMU walls, and drop ceilings. Observed HVAC systems consisted of in-room radiators and overhead ductwork and vents. Windows were observed to be generally consistent across the building as well; with single and double-paned aluminum framed exterior windows. Interior doors were observed to be primarily steel-framed with wood doors, and exterior doors were generally observed to be steel-framed with steel doors. The gymnasium was observed to have sealed wood floors, sealed CMU walls with vertical steel support beams, and tectum ceiling panels/painted steel beam supports with overhead ductwork and vents.

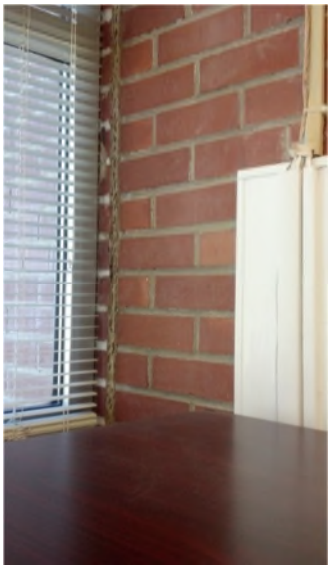
Screening Assessment

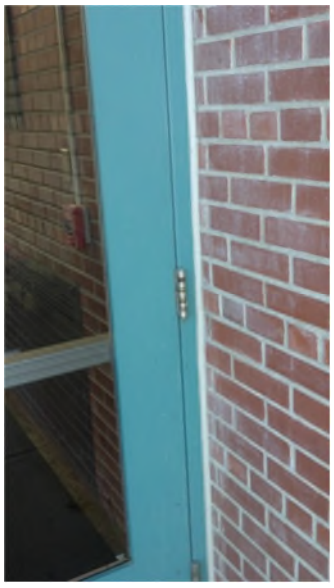
There are several key parameters evaluated as part of this screening assessment. A summary of these parameters in the context of the Mill Hill School is presented below.

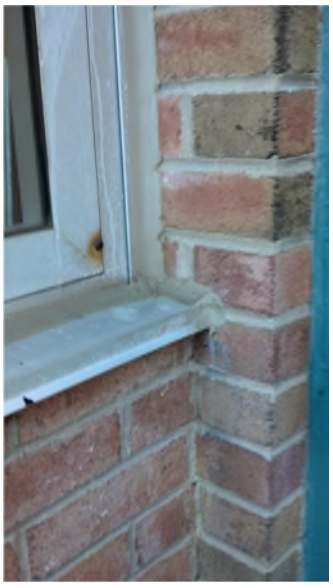
Construction Date – The initial construction date of the building was 1955; therefore it falls within the timeframe of when PCBs were sometimes used in standard construction materials. However, the two building additions/modifications, constructed in 1991 and 2000, fall outside of this range; therefore the subject building area only includes the original building construction.

Presence of Primary Suspect Materials – In typical school building settings, primary building materials that may have been manufactured with PCBs include: caulking, sealants, ceiling tiles, and spray-on fireproofing (NOTE – although some specialty paints have been known to be manufactured with PCBs, these specialty paints are typically not specified for use in school building settings). During the building survey various sealants, caulking, and window glazing sealants were observed most notably gray and white caulking along the interior and exterior window frames; painted-over sealants along door frame to CMU joints, and sealants at brick to brick/CMU joints along the building exterior. The gymnasium was observed to have tectum ceiling panels, but no spray-on fireproofing (e.g., not the same material as observed at the Osborn Hill gymnasium).

Photos of typical building sealants observed during the building survey are provided below.





Existing Data - No existing samples of suspect materials from the building have been analyzed by a laboratory to determine PCB presence and concentration.

Physical Condition and Chlorine Screening - The absence of chlorine in a certain building material is one line-of-evidence that PCBs may not be present within that building material (since chlorinated organics are a key component of PCBs). However, chlorine presence cannot be assumed to indicate PCB presence because many sealants and other building materials contain other chlorinated compounds as part of their composition. During the survey, 24 samples of various sealants, caulking, and additional materials were collected from locations throughout the building's interior and exterior. The samples were screened for chlorine content using a handheld Niton X-Ray Fluorescence (XRF) Analyzer. The results of XRF screening are presented on Table 1 (interior) and Table 2 (exterior). A physical description of each material (brittle, pliable, exposed or covered with another coating, such as paint, etc.) is also included on the tables.

Based on chlorine screening data (via XRF) collected at other buildings, a typical percent chlorine level has been established at which below this level, subsequent bulk samples for laboratory analyses typically would not correspond to PCB levels at ≥ 50 ppm, the Federal regulatory threshold for PCB Bulk Product Waste. Correlation to higher levels of chlorine to potential PCB concentrations are inconclusive with regard to PCB presence ≥ 50 ppm since other chlorinated compounds may be present in the samples. A review of the data indicated that 88% of the interior samples and 67% of the exterior samples screened fell within this lower chlorine screening level.

Summary

Overall observations included the following:

- Caulking and glazing sealants were observed throughout the building, primarily associated with window and door systems and expansion joints; the majority of the sealants were observed to be intact and pliable; given the date of construction of the building, these materials are considered suspect for PCBs.
- Numerous types of window systems and window styles were present at individual buildings and even within rooms of buildings. Numerous windows appear to have been updated over time and repair projects (replacement sealants) are evident in some areas. Most buildings had some single-pane windows that appear to be original construction.
- ***The spray-on fireproofing material at Osborn Hill gymnasium ceiling (primary driver for indoor air PCB levels) was not observed at the school.***
- A review of the Osborn Hill data indicated that a sealer applied to the stone tile flooring in a hallway was tested and found to contain PCBs. It is not known if this material was manufactured with PCBs or contained PCBs as a result of a cross-contamination effect from the gymnasium source. During the building surveys, a similar stone tile flooring was observed at Mill Hill Elementary. It is not known if this visually similar flooring at these schools were covered with the same sealer used at Osborn Hill.
- A review of the data indicated that 88% of the interior samples and 67% of the exterior samples screened fell within this lower chlorine screening level.

Management Program – PCBs in Building Materials

The findings of the initial screening process, as described above, serve as the starting point to develop a management program for building materials that may contain PCBs. This program can be separated into two components: 1) Near-term or Best-Management Practices; and 2) Longer-term or Material Management During Renovations. The overall goal of the program is to minimize or eliminate potential exposures to PCB-containing materials until these materials are removed from the building during planned renovation or building improvement projects.

Near Term or Best Management Practices

It is important to make a distinction between the mere presence of a PCB-containing building material and exposure potential. As presented in EPA guidance, presence of a regulated PCB-containing material within a given building does not necessarily equate to an exposure risk. In order for this condition to occur there needs to be a complete pathway established between the source and the individual through a transport mechanism, such as direct contact/transfer or indoor air (refer to Appendix A for additional discussion).

Our initial recommendation is to follow EPA and CTDEEP recommended best management practices to reduce potential exposure to PCBs from suspect building materials in schools. These practices include:

- Improve ventilation and add exhaust fans, as needed
- Avoid direct contact with suspect materials within reasonable means
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Using vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash children's toys often
- Encourage proper hygiene amongst staff and students (i.e. wash hands with soap and water regularly, particularly before eating or drinking)

Based on the screening survey findings, additional recommendations include:

- Since a higher percentage of exterior samples screened higher for chlorine content, direct contact with areas adjacent to caulking, sealants or other suspect materials not known to be replaced after 1980 should be avoided and/or minimized; depending on locations, some sealants in these areas could be temporarily covered, if feasible.

Longer-term or Material Management During Renovations

As indicated above, as part of building renovation activities at several schools, samples of suspect PCB-containing materials (such as caulking and sealants) have been collected and analyzed by a laboratory in

order to determine presence and concentration. Several of these samples detected PCB concentrations in excess of disposal thresholds as indicated in EPA's and CTDEEP's regulations and/or guidance. As such, proper abatement specifications and plans are being developed to properly manage and dispose of off-site the subject materials as part of the renovation project. This process of properly removing and managing regulated materials during renovation projects is implemented for other regulated building materials, such as asbestos or lead-based paint.

It is recommended that the School District "roll" the assessment of PCB-containing materials into the overall regulated building material program being implemented by the District for renovation projects. It is our understanding that various projects are being considered in the Fairfield Public School Facilities master plan for 2011-2020 (for the 13 schools included in the screening survey). Mill Hill Elementary is being considered for code updates and a new addition.

Table 1

Interior Chlorine Screening Results - Mill Hill Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
MH-GH-007	0.1641	Gym Hall	CMU to CMU	
MH-PR-010	0.5792	Principal's Office	Brick to brick	Gray
MH-25-013	0.0049	Room 25	CMU to metal beam	Pliable, Painted
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
MH-21-003	0.1046	Room 21	Metal door frame	White
MH-GH-004	0.146	Gym Hall	Metal door frame to CMU	Brittle, Painted
MH-GH-005	0.2069	Gym Hall	Metal door window to frame	Pliable, Intact, Exposed
MH-GYM-006	0.0757	Gym	Metal door frame to CMU	Painted
MH-GH-008	0.7135	Gym Hall	Metal door metal to glass	Clear sealant
MH-MR-009	0.09	Mens Room	Metal door frame to CMU/brick	Painted
MH-ME-014	0.0645	Media Center	Metal door frame to CMU	Painted
MH-ME-015	0.1612	Main Entrance	Black metal door to glass	Intact, Exposed
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
MH-21-001	0.0893	Room 21	Window frame to CMU	Weathered, Painted
MH-21-002	0.0938	Room 21	Window frame to sill	Weathered
MH-PR-011	0.0757	Principal's Office	DPA window metal to metal/sill	Gray
MH-25-012	0.2907	Room 25	Window metal to metal	Gray, Intact, Exposed
MH-AP-016	0.1252	All Purpose Room	Windows; vertical	Gray Intact
MH-AP-017	0.0952	All Purpose Room	Windows; vertical	Clear Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on January 24, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Table 2
Exterior Chlorine Screening Results - Mill Hill Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
MH-BE-022	0.056	Building Exterior	Brick to brick	Gray over foam
MH-BE-024	0.2217	Building Exterior	Entry overhang	Gray
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
MH-BE-019	0.2473	Building Exterior	Classroom doors; metal to panel	Over foam
MH-BE-020	0.5671	Building Exterior	Gym door	multiple layers
MH-BE-023	0.1654	Building Exterior	Door	thin gray coat over mortar
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
MH-BE-021	0.7536	Building Exterior	SPA window	two layers; Dark Gray, Light Gray

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on January 24, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Building Survey – North Stratfield Elementary School

Introduction

As part of a district-wide school building review project, Woodard & Curran completed an on-site building survey of the North Stratfield Elementary School on January 31, 2013. The building survey focused on identifying building materials that may be suspect to contain polychlorinated biphenyls (PCBs). PCBs were sometimes used in standard construction materials from the 1950s through the 1970s. The building survey information has been used to develop a screening assessment of the potential for PCBs to be present in the building.

Building Information

Location: 190 Putting Green Road, Fairfield, CT

Initial Construction Date: 1961

Additions/Renovations: 1996 and 2000

Construction Type: The exterior of the building is constructed of unpainted brick and masonry with steel structural components. Interior building construction materials were observed to be consistent in most areas of the school and can be characterized as having vinyl tile flooring, painted CMU walls, and drop ceilings. Observed HVAC systems consisted of in-room radiators and overhead ductwork and vents. Windows were observed to be a combination of double-paned and single-paned aluminum framed exterior windows and single-paned aluminum framed interior windows. Interior doors were observed to be primarily steel-framed with wood doors, and exterior doors were generally observed to be steel-framed with steel doors. The gymnasium was observed to have sealed wood floors, painted CMU walls with vertical steel support beams, and painted aluminum ceiling with overhead ductwork and in-ceiling vents.

Screening Assessment

There are several key parameters evaluated as part of this screening assessment. A summary of these parameters in the context of the North Stratfield School is presented below.

Construction Date – The initial construction date of the building was 1961; therefore it falls within the timeframe of when PCBs were sometimes used in standard construction materials. However, the two building additions, constructed in 1996 and 2000, fall outside of this range; therefore the subject building area only includes the original building construction.

Presence of Primary Suspect Materials – In typical school building settings, primary building materials that may have been manufactured with PCBs include: caulking, sealants, ceiling tiles, and spray-on fireproofing (NOTE – although some specialty paints have been known to be manufactured with PCBs, these specialty paints are typically not specified for use in school building settings). During the building survey various sealants, caulking, and window glazing sealants were observed most notably gray and white caulking along the interior and exterior window frames; painted-over sealants along door frame to CMU joints, and sealants at brick to brick/CMU joints along the building exterior. The gymnasium was observed to be painted aluminum with no spray-on fireproofing (e.g., not the same material as observed at the Osborn Hill gymnasium).

Photos of typical building sealants observed during the building survey are provided below.

Existing Data - No existing samples of suspect materials from the building have been analyzed by a laboratory to determine PCB presence and concentration.

Physical Condition and Chlorine Screening - The absence of chlorine in a certain building material is one line-of-evidence that PCBs may not be present within that building material (since chlorinated organics are a key component of PCBs). However, chlorine presence cannot be assumed to indicate PCB presence because many sealants and other building materials contain other chlorinated compounds as part of their composition. During the survey, 38 samples of various sealants, caulking, and additional materials were collected from locations throughout the building's interior and exterior. The samples were screened for chlorine content using a handheld Niton X-Ray Fluorescence (XRF) Analyzer. The results of XRF screening are presented on Table 1 (interior) and Table 2 (exterior). A physical description of each material (brittle, pliable, exposed or covered with another coating, such as paint, etc.) is also included on the tables.

Based on chlorine screening data (via XRF) collected at other buildings, a typical percent chlorine level has been established at which below this level, subsequent bulk samples for laboratory analyses typically would not correspond to PCB levels at ≥ 50 ppm, the Federal regulatory threshold for PCB Bulk Product Waste. Correlation to higher levels of chlorine to potential PCB concentrations are inconclusive with regard to PCB presence ≥ 50 ppm since other chlorinated compounds may be present in the samples. A review of the data indicated that 72% of the interior samples and 83% of the exterior samples fell within this lower chlorine screening level.

Summary

Overall observations included the following:

- Caulking and glazing sealants were observed throughout the building, primarily associated with window and door systems and expansion joints; the majority of the sealants were observed to be intact and pliable; given the date of construction of the building, these materials are considered suspect for PCBs.
- Numerous types of window systems and window styles were present at individual buildings and even within rooms of buildings. Numerous windows appear to have been updated over time and repair projects (replacement sealants) are evident in some areas. Most buildings had some single-pane windows that appear to be original construction.
- ***The spray-on fireproofing material at Osborn Hill gymnasium ceiling (primary driver for indoor air PCB levels) was not observed at the school.***
- A review of the Osborn Hill data indicated that a sealer applied to the stone tile flooring in a hallway was tested and found to contain PCBs. It is not known if this material was manufactured with PCBs or contained PCBs as a result of a cross-contamination effect from the gymnasium source. During the building surveys, a similar stone tile flooring was observed at North Stratfield Elementary. It is not known if this visually similar flooring at these schools were covered with the same sealer used at Osborn Hill.

- A review of the data indicated that 72% of the interior samples and 83% of the exterior samples fell within this lower chlorine screening level.

Management Program – PCBs in Building Materials

The findings of the initial screening process, as described above, serve as the starting point to develop a management program for building materials that may contain PCBs. This program can be separated into two components: 1) Near-term or Best-Management Practices; and 2) Longer-term or Material Management During Renovations. The overall goal of the program is to minimize or eliminate potential exposures to PCB-containing materials until these materials are removed from the building during planned renovation or building improvement projects.

Near Term or Best Management Practices

It is important to make a distinction between the mere presence of a PCB-containing building material and exposure potential. As presented in EPA guidance, presence of a regulated PCB-containing material within a given building does not necessarily equate to an exposure risk. In order for this condition to occur there needs to be a complete pathway established between the source and the individual through a transport mechanism, such as direct contact/transfer or indoor air (refer to Appendix A for additional discussion).

Our initial recommendation is to follow EPA and CTDEEP recommended best management practices to reduce potential exposure to PCBs from suspect building materials in schools. These practices include:

- Improve ventilation and add exhaust fans, as needed
- Avoid direct contact with suspect materials within reasonable means
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Using vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash children's toys often
- Encourage proper hygiene amongst staff and students (i.e. wash hands with soap and water regularly, particularly before eating or drinking)

Based on the screening survey findings, additional recommendations include:

- Since a higher percentage of exterior samples screened higher for chlorine content, direct contact with areas adjacent to caulking, sealants or other suspect materials not known to be replaced after 1980 should be avoided and/or minimized; depending on locations, some sealants in these areas could be temporarily covered, if feasible.

Longer-term or Material Management During Renovations

As indicated above, as part of building renovation activities at several schools, samples of suspect PCB-containing materials (such as caulking and sealants) have been collected and analyzed by a laboratory in order to determine presence and concentration. Several of these samples detected PCB concentrations

in excess of disposal thresholds as indicated in EPA's and CTDEEP's regulations and/or guidance. As such, proper abatement specifications and plans are being developed to properly manage and dispose of off-site the subject materials as part of the renovation project. This process of properly removing and managing regulated materials during renovation projects is implemented for other regulated building materials, such as asbestos or lead-based paint.

It is recommended that the School District "roll" the assessment of PCB-containing materials into the overall regulated building material program being implemented by the District for renovation projects. It is our understanding that various projects are being considered in the Fairfield Public School Facilities master plan for 2011-2020 (for the 13 schools included in the screening survey). North Stratfield Elementary is being considered for code updates.

Table 1
Interior Chlorine Screening Results - North Stratfield Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
NS-ME-001	0.1818	Main Entrance	Brick to CMU	Painted
NS-NH-002	0.1727	Nurse Hallway	CMU joint	Hard, Painted
NS-6-012	1.51	Room 6	CMU to vertical beam	Intact, Painted
NS-AC-019	0.2563	Auditorium/ Cafeteria	CMU to vertical beam	Hard, Intact, Painted
NS-GYM-034	0.0792	Gym	CMU corner joint	Dark Gray, Pliable, Intact, Painted
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
NS-16-005	0.3457	Room 16	Door frame to CMU	Gray, Intact, Painted
NS-17-006	0.5254	Room 17	Aluminum door frame to CMU	Gray, Brittle, Intact, Painted
NS-6-013	0.0462	Room 6	Int door frame to CMU	White over grout, Intact, Painted
NS-11-015	0.063	Room 11	Int door frame to CMU	White over Brown, Intact, Painted
NS-15-017	0.0654	Room 15	Int door frame to CMU lintel	White, Intact, Exposed
NS-15-018	0.7579	Room 15	door frame two sealants	Gray, Exposed, Intact
NS-AC-020	0.171	Auditorium/ Cafeteria	Aluminum door frame to CMU	Gray, Pliable, Intact, Exposed
NS-34-025	4.55	Room 34	Int door frame to CMU	Green, Hard, Painted
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
NS-20-004	4.58	Room 20	Window frame to CMU	Gray, Hard, Cracking, Painted
NS-LMCH-007	0.1729	LMC hallway	Int. SPA window glass to metal	Brittle, Exposed
NS-23-008	0.0757	Room 23	DPA window frame to wood	Gray over foam, Intact, Exposed
NS-27-009	0.0633	Room 27	Window sill to aluminum	Beige
NS-6-010	0.1027	Room 6	SPA window metal to glass	Gray, Hard, Intact
NS-6-011	0.2234	Room 6	SPA metal to CMU	
NS-11-016	0.1127	Room 11	DPA window frame to sill	Gray, Pliable, Intact, Exposed
NS-AC-021	0.0508	Auditorium/ Cafeteria	SPA window metal to glass	Pliable, Intact, Exposed
NS-AC-022	0.1107	Auditorium/ Cafeteria	SPA window metal to glass	Gray, Very Hard, Intact, Exposed
NS-PLA-023	6.42	Platform	SPA window frame to CMU	Gray, Intact, Exposed
NS-34-026	5.55	Room 34	CMU to vertical beam/window frame	Gray, Hard, Painted
NS-MC-027	0.0988	Library Media Center	DPA window frame to sill	Gray, Intact, Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on January 31, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Table 2
Exterior Chlorine Screening Results - North Stratfield Elementary School

Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
NS-BE-038	0.1191	Building Exterior	Gym storage door flashing to brick	White, Pliable, Intact, Exposed
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
NS-BE-029	0.921	Courtyard	DPA frame to steel door frame	Pliable, Intact, Exposed
NS-BE-030	0.0301	Courtyard	DPA frame to sill	Pliable, Intact, Exposed
NS-BE-033	0.1557	Courtyard	Music room window to brick	partly removed Gray, Intact, Pliable, Exposed
'Other' Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
NS-BE-035	0.0433	Building Exterior	Vent/AC at office	Pliable, Exposed
NS-BE-032	0.0796	Courtard	Roof overhang	White, Pliable, Intact, Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on January 31, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Building Survey - Osborn Hill Elementary School

Introduction

As part of a district-wide school building review project, Woodard & Curran completed an on-site building survey of the Osborn Hill Elementary School on January 18, 2013. The building survey focused on identifying building materials that may be suspect to contain polychlorinated biphenyls (PCBs). PCBs were sometimes used in standard construction materials from the 1950s through the 1970s. The building survey information has been used to develop a screening assessment of the potential for PCBs to be present in the building.

Building Information

Location: 760 Stillson, Fairfield, CT

Initial Construction Date: 1958

Additions/Renovations: 1969, 1981, 1997, 2000, and 2009

Construction Type: The exterior of the building is constructed of unpainted brick and masonry with steel structural components. Interior building construction materials were observed to be consistent in most areas of the school and can be characterized as having vinyl tile flooring, painted CMU walls, and drop ceilings. Observed HVAC systems consisted of in-room radiators and overhead ductwork and vents. Windows were observed to be generally consistent across the building as well; with single-paned aluminum framed exterior windows. Interior doors were observed to be primarily steel-framed with wood doors, and exterior doors were generally observed to be steel-framed with steel doors. The gymnasium was observed to have sealed wood floors, painted CMU walls with vertical steel support beams, tectum ceiling panels with steel support beams all coated with spray-on fireproofing, and overhead ductwork and in-wall vents leading to the library/adjacent spaces.

Screening Assessment

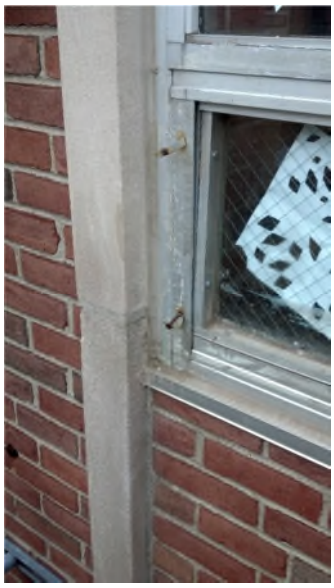
There are several key parameters evaluated as part of this screening assessment. A summary of these parameters in the context of the Osborn Hill School is presented below.

Construction Date – The initial construction date of the building was 1958; therefore it falls within the timeframe of when PCBs were sometimes used in standard construction materials. The addition constructed in 1969 also falls within that time period. However, the four building additions, constructed in 1981, 1997, 2000, and 2009, fall outside of this range; therefore the subject building area only includes the original building construction.

Presence of Primary Suspect Materials – In typical school building settings, primary building materials that may have been manufactured with PCBs include: caulking, sealants, ceiling tiles, and spray-on fireproofing (NOTE – although some specialty paints have been known to be manufactured with PCBs, these specialty paints are typically not specified for use in school building settings). During the building

survey various sealants, caulking, and window glazing sealants were observed most notably gray and white caulking along the interior and exterior window frames; painted-over sealants along door frame to CMU joints, and sealants at brick to brick/CMU joints along the building exterior. The gymnasium was observed to have tectum ceiling panels and spray-on fireproofing.

Photos of typical building sealants observed during the building survey are provided below.



Existing Data - Samples of suspect materials from the building have been analyzed by a laboratory to determine PCB presence and concentration. Osborn Hill Elementary School has had the most extensive PCB testing and remediation to date. From March 2012 to present, numerous samples of suspected PCB source materials and other media (e.g., indoor air) have been collected for laboratory analyses. The results of this testing indicated that PCBs were detected in various materials and media, as summarized below:

- Gymnasium Building Materials
  - Primary source - sample of spray-on fireproofing on ceiling at 30,000 ppm PCBs
  - Potential secondary sources - hardwood floor sealant up to 3,300 ppm; wall paint at 1,500 ppm; and crash-pad foam material up to 350 ppm
- Window caulking and glazing
  - Exterior window caulking samples detected PCBs at concentrations up to 6,900 ppm
  - Exterior and interior window glazing sealants samples detected PCBs at concentrations up to 580 and 710 ppm, respectively
- PCBs were detected in indoor air samples with the highest concentrations detected in the gym and areas immediately surrounding the gym
- Based on the PCB concentrations, several Interim Measures were implemented including, isolation of the gym; encapsulating secondary sources (painted walls and floor sealant) with either paint or tile flooring; and cleaning ductwork
- Post Interim Measure indoor air and surface wipe sampling show levels below acceptance criteria (Feb. 2013).

Based on a review of the available data, the predominant contributor to the PCBs identified in indoor air within Osborn Elementary School appears to be the spray-on fireproofing material that was applied to the ceiling of the gym. PCBs were likely transported from the gym, through the doorway and overhead air ducts, and into adjacent areas (hallways, library). The caulking and sealants are possible secondary contributors to PCBs; however, there were several rooms where indoor air levels were always below acceptable criteria even with window caulking present. It was only after the gym remedial efforts were conducted that the indoor air levels in rooms proximate to the gym (and hallways) decreased.

Physical Condition and Chlorine Screening - The absence of chlorine in a certain building material is one line-of-evidence that PCBs may not be present within that building material (since chlorinated organics are a key component of PCBs). However, chlorine presence cannot be assumed to indicate PCB presence because many sealants and other building materials contain other chlorinated compounds as part of their composition. During the survey, 31 samples of various sealants, caulking, and additional materials were collected from locations throughout the building's interior and exterior. The samples were screened for chlorine content using a handheld Niton X-Ray Fluorescence (XRF) Analyzer. The results of XRF screening are presented on Table 1 (interior) and Table 2 (exterior). A physical description of each material (brittle, pliable, exposed or covered with another coating, such as paint, etc.) is also included on the tables.

Based on chlorine screening data (via XRF) collected at other buildings, a typical percent chlorine level has been established at which below this level, subsequent bulk samples for laboratory analyses typically would not correspond to PCB levels at ≥ 50 ppm, the Federal regulatory threshold for PCB Bulk Product Waste. Correlation to higher levels of chlorine to potential PCB concentrations are inconclusive with regard to PCB presence ≥ 50 ppm since other chlorinated compounds may be present in the samples. A review of the data indicated that 67% of the interior samples and 90% of the exterior samples screened fell within this lower chlorine screening level.

Summary

Overall observations included the following:

- Caulking and glazing sealants were observed throughout the building, primarily associated with window and door systems and expansion joints; the majority of the sealants were observed to be intact and pliable; given the date of construction of the building, these materials are considered suspect for PCBs.
- Numerous types of window systems and window styles were present at individual buildings and even within rooms of buildings. Numerous windows appear to have been updated over time and repair projects (replacement sealants) are evident in some areas. Most buildings had some single-pane windows that appear to be original construction.
- The spray-on fireproofing material at Osborn Hill gymnasium ceiling is assumed to be the primary PCB source material at Osborn Hill.
- A review of the Osborn Hill data indicated that a sealer applied to the stone tile flooring in a hallway was tested and found to contain PCBs. It is not known if this material was manufactured with PCBs or contained PCBs as a result of a cross-contamination effect from the gymnasium source.
- A review of the data indicated that 67% of the interior samples and 90% of the exterior samples screened fell within this lower chlorine screening level.

Management Program – PCBs in Building Materials

The findings of the initial screening process, as described above, serve as the starting point to develop a management program for building materials that may contain PCBs. This program can be separated into two components: 1) Near-term or Best-Management Practices; and 2) Longer-term or Material Management During Renovations. The overall goal of the program is to minimize or eliminate potential exposures to PCB-containing materials until these materials are removed from the building during planned renovation or building improvement projects.

Near Term or Best Management Practices

It is important to make a distinction between the mere presence of a PCB-containing building material and exposure potential. As presented in EPA guidance, presence of a regulated PCB-containing material within a given building does not necessarily equate to an exposure risk. In order for this condition to occur there needs to be a complete pathway established between the source and the individual through

a transport mechanism, such as direct contact/transfer or indoor air (refer to Appendix A for additional discussion).

As indicated above, extensive work is being conducted at the school in regard to managing and addressing PCB-containing materials. These activities will continue as needed. In addition, our initial recommendation is to follow EPA and CTDEEP recommended best management practices to reduce potential exposure to PCBs from suspect building materials in schools. These practices include:

- Improve ventilation and add exhaust fans, as needed
- Avoid direct contact with suspect materials within reasonable means
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Using vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash children's toys often
- Encourage proper hygiene amongst staff and students (i.e. wash hands with soap and water regularly, particularly before eating or drinking)

Longer-term or Material Management During Renovations

As indicated above, as part of building renovation activities at several schools, samples of suspect PCB-containing materials (such as caulking and sealants) have been collected and analyzed by a laboratory in order to determine presence and concentration. Several of these samples detected PCB concentrations in excess of disposal thresholds as indicated in EPA's and CTDEEP's regulations and/or guidance. As such, proper abatement specifications and plans are being developed to properly manage and dispose of off-site the subject materials as part of the renovation project. This process of properly removing and managing regulated materials during renovation projects is implemented for other regulated building materials, such as asbestos or lead-based paint.

It is recommended that the School District "roll" the assessment of PCB-containing materials into the overall regulated building material program being implemented by the District for renovation projects. It is our understanding that the following projects are being considered in the Fairfield Public School Facilities master plan for 2011-2020 (for the 13 schools included in the screening survey). Osborn Hill Elementary is being considered for code updates.

Table 1
Interior Chlorine Screening Results - Osborn Hill Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
OH-GYM-007	1.32	Steel Beam	Steel to Concrete Sealant	
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
OH-GYM-008	0.052	Interior Door Caulking	Steel to Concrete Sealant	
OH-GYM-009	1.36	Interior Door Caulking	Steel to Concrete Sealant	
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
OH-M-001	12	Gym Hall Type M Window	Interior Window Glazing Metal to Glass	Black
OH-M-002	0.1251	Gym Hall Type M Window	Interior Window Glazing Metal to Glass	Clear
OH-M-003	0.1099	Gym Hall Type M Window	Interior Window Glazing Metal to Glass	
OH-M-004	0.1184	Gym Hall Type M Window	Interior Window Glazing Metal to Glass	Silver
OH-T5-001	0.0754	Spanish Room Type 5 Window	Interior Window Glazing Metal to Glass	
OH-T5-002	0.0692	Spanish Room Type 5 Window	Interior Window Caulking Metal to Metal	
OH-T5-003	0.0612	Music Room Type 5 Window	Interior Window Glazing Metal to Glass	
'Other' Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
OH-GYM-001	0.1445	Wood Floor Foam Underlayment	Foam	
OH-GYM-006	0.2	Crash Pad Foam	Foam Padding	
OH-GYM-010	0.0822	Wood Floor	Foam to Concrete Sealant	
OH-GYM-011	1.21	Spray-on Ceiling	Fireproofing Material	Black side
OH-GYM-012	0.6248	Spray-on Ceiling	Fireproofing Material	White Side

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on January 18, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Table 2

Exterior Chlorine Screening Results - Osborn Hill Elementary School

Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
OH-M-005	0.0345	Gym Hall Type M Window	Exterior Window Glazing Metal to Glass	Silver
OH-M-006	0.0931	Gym Hall Type M Window	Exterior Window Glazing Metal to Glass	Clear
OH-M-007	0.0349	Gym Hall Type M Window	Exterior Window Caulking Metal to Metal	Gray
OH-M-008	0.1103	Gym Hall Type M Window	Exterior Window Glazing Metal to Glass	White
OH-M-009	1.68	Gym Hall Type M Window	Exterior Window Caulking Metal to Metal	Tan, 2 layers
OH-M-010	0.0341	Gym Hall Type M Window	Exterior Window Glazing Metal to Glass	Clear
OH-T5-004	0.1425	Building Exterior	Exterior Window Caulking Metal to Concrete	2 Layers Tan
OH-T5-005	0.0308	Building Exterior	Exterior Window Glazing Metal to Glass	
OH-T5-006	ND	Building Exterior	Exterior Window Glazing Metal to Glass	White
OH-T5-007	0.0314	Building Exterior	Exterior Window Caulking Metal to Metal	White

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on January 18, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Building Survey - Riverfield Elementary School

Introduction

As part of a district-wide school building review project, Woodard & Curran completed an on-site building survey of the Riverfield Elementary School on January 30, 2013. The building survey focused on identifying building materials that may be suspect to contain polychlorinated biphenyls (PCBs). PCBs were sometimes used in standard construction materials from the 1950s through the 1970s. The building survey information has been used to develop a screening assessment of the potential for PCBs to be present in the building.

Building Information

Location: 1625 Mill Plain Road, Fairfield, CT

Initial Construction Date: 1959

Additions/Renovations: 1971 and 2000

Construction Type: The exterior of the building is constructed of unpainted brick and masonry with steel structural components. Interior building construction materials were observed to be consistent in most areas of the school and can be characterized as having vinyl tile flooring, painted CMU walls, and drop ceilings. Observed HVAC systems consisted of in-room radiators and overhead ductwork and vents. Windows were observed to be generally consistent across the building as well; with double-paned aluminum framed exterior windows and single-paned aluminum framed interior windows. Interior doors were observed to be primarily steel-framed with wood doors, and exterior doors were generally observed to be steel-framed with steel doors. The gymnasium was observed to have sealed wood floors, painted CMU walls with vertical steel support beams, and tectum ceiling panels and exposed structural metal with exposed overhead ductwork and vents.

Screening Assessment

There are several key parameters evaluated as part of this screening assessment. A summary of these parameters in the context of the Riverfield School is presented below.

Construction Date – The initial construction date of the building was 1959 and the primary addition was built in 1971; therefore it falls within the timeframe of when PCBs were sometimes used in standard construction materials. However, the second building addition, constructed in 2000, falls outside of this range; therefore the subject building area only includes the original building construction and the 1971 addition.

Presence of Primary Suspect Materials – In typical school building settings, primary building materials that may have been manufactured with PCBs include: caulking, sealants, ceiling tiles, and spray-on fireproofing (NOTE – although some specialty paints have been known to be manufactured with PCBs, these specialty paints are typically not specified for use in school building settings). During the building survey various sealants, caulking, and window glazing sealants were observed most notably gray and white caulking along the interior and exterior window frames; painted-over sealants along door frame to CMU joints, and sealants at brick to brick/CMU joints along the building exterior. The gymnasium was observed to have tectum ceiling panels, but no spray-on fireproofing (e.g., not the same material as observed at the Osborn Hill gymnasium).

Photos of typical building sealants observed during the building survey are provided below.

Existing Data - No existing samples of suspect materials from the building have been analyzed by a laboratory to determine PCB presence and concentration.

Physical Condition and Chlorine Screening - The absence of chlorine in a certain building material is one line-of-evidence that PCBs may not be present within that building material (since chlorinated organics are a key component of PCBs). However, chlorine presence cannot be assumed to indicate PCB presence because many sealants and other building materials contain other chlorinated compounds as part of their composition. During the survey, 35 samples of various sealants, caulking, and additional materials were collected from locations throughout the building's interior and exterior. The samples were screened for chlorine content using a handheld Niton X-Ray Fluorescence (XRF) Analyzer. The results of XRF screening are presented on Table 1 (interior) and Table 2 (exterior). A physical description of each material (brittle, pliable, exposed or covered with another coating, such as paint, etc.) is also included on the tables.

Based on chlorine screening data (via XRF) collected at other buildings, a typical percent chlorine level has been established at which below this level, subsequent bulk samples for laboratory analyses typically would not correspond to PCB levels at ≥ 50 ppm, the Federal regulatory threshold for PCB Bulk Product Waste. Correlation to higher levels of chlorine to potential PCB concentrations are inconclusive with regard to PCB presence ≥ 50 ppm since other chlorinated compounds may be present in the samples. A review of the data indicated that 92% of the interior samples and 50% of the exterior samples screened fell within this lower chlorine screening level.

Summary

Overall observations included the following:

- Caulking and glazing sealants were observed throughout the building, primarily associated with window and door systems and expansion joints; the majority of the sealants were observed to be intact and pliable; given the date of construction of the building, these materials are considered suspect for PCBs.
- Numerous types of window systems and window styles were present at individual buildings and even within rooms of buildings. Numerous windows appear to have been updated over time and repair projects (replacement sealants) are evident in some areas. Most buildings had some single-pane windows that appear to be original construction. New exterior window systems were present at Riverfield.
- ***The spray-on fireproofing material at Osborn Hill gymnasium ceiling (primary driver for indoor air PCB levels) was not observed at the school.***
- The stone tile flooring, reportedly to contain PCBs in the floor sealant at Osborn Hill, was **not** observed at Riverfield Elementary.
- A review of the data indicated that 92% of the interior samples and 50% of the exterior samples screened fell within this lower chlorine screening level.

Management Program – PCBs in Building Materials

The findings of the initial screening process, as described above, serve as the starting point to develop a management program for building materials that may contain PCBs. This program can be separated into two components: 1) Near-term or Best-Management Practices; and 2) Longer-term or Material Management During Renovations. The overall goal of the program is to minimize or eliminate potential exposures to PCB-containing materials until these materials are removed from the building during planned renovation or building improvement projects.

Near Term or Best Management Practices

It is important to make a distinction between the mere presence of a PCB-containing building material and exposure potential. As presented in EPA guidance, presence of a regulated PCB-containing material within a given building does not necessarily equate to an exposure risk. In order for this condition to occur there needs to be a complete pathway established between the source and the individual through a transport mechanism, such as direct contact/transfer or indoor air (refer to Appendix A for additional discussion).

Our initial recommendation is to follow EPA and CTDEEP recommended best management practices to reduce potential exposure to PCBs from suspect building materials in schools. These practices include:

- Improve ventilation and add exhaust fans, as needed
- Avoid direct contact with suspect materials within reasonable means
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Using vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash children's toys often
- Encourage proper hygiene amongst staff and students (i.e. wash hands with soap and water regularly, particularly before eating or drinking)

Based on the screening survey findings, additional recommendations include:

- Since a higher percentage of exterior samples screened higher for chlorine content, direct contact with areas adjacent to caulking, sealants or other suspect materials not known to be replaced after 1980 should be avoided and/or minimized; depending on locations, some sealants in these areas could be temporarily covered, if feasible.

Longer-term or Material Management During Renovations

As indicated above, as part of building renovation activities at several schools, samples of suspect PCB-containing materials (such as caulking and sealants) have been collected and analyzed by a laboratory in order to determine presence and concentration. Several of these samples detected PCB concentrations in excess of disposal thresholds as indicated in EPA's and CTDEEP's regulations and/or guidance. As such, proper abatement specifications and plans are being developed to properly manage and dispose

of off-site the subject materials as part of the renovation project. This process of properly removing and managing regulated materials during renovation projects is implemented for other regulated building materials, such as asbestos or lead-based paint.

It is recommended that the School District "roll" the assessment of PCB-containing materials into the overall regulated building material program being implemented by the District for renovation projects. It is our understanding that various projects are being considered in the Fairfield Public School Facilities master plan for 2011-2020 (for the 13 schools included in the screening survey). Riverfield Elementary is being considered for code updates.

Table 1
Interior Chlorine Screening Results - Riverfield Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
RS-JO-004	0.302	Room JO	Wall expansion joint CMU to metal	Gray, Intact, Painted
RS-R23H-013	0.3315	Room 23 Hallway	Block to Block	Intact, Painted
RS-6-017	0.1152	Room 6	Wall to metal beam	Gray, Intact, Painted
RS-8-018	0.0928	Room 8	CMU to brick	Tan, Worn, Painted
RS-R9H-019	0.1027	Room 9 Hallway	Brick to CMU joint	Beige over Black, Intact, Exposed
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
RS-BR-001	0.2385	Boiler Room	Int door metal frame to CMU	Gray, Intact, Painted
RS-JO-005	0.1428	Room JO	Door frame to CMU	Intact, Painted
RS-ME-006	0.2907	Main Entrance	Steel door frame to brick	Gray, Intact, Painted
RS-2-009	0.1052	Room 2	Door frame metal to metal	Gray
RS-R2H-011	0.3018	Room 2 Hallway	Door frame to CMU	Gray, Intact, Painted
RS-21-014	0.2786	Room 21	Door frame to CMU (bathroom)	Gray, Intact, Painted
RS-7-015	0.2511	Room 7	Door frame to CMU	Intact, Painted
RS-6-016	0.0737	Room 6	Ext door frame to CMU	Intact, Exposed
RS-KIT-022	0.409	Kitchen	Ext door metal to glass	Intact, Exposed
RS-GYM-023	3.69	Gym Hall	Door frame to brick	Intact, Painted
RS-GYM-024	0.3048	Gym	Steel door frame to CMU	Intact, Partly Exposed
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
RS-JO-003	0.355	Room JO	DPA window metal to metal/CMU	White, Intact, Exposed
RS-ME-007	0.0657	Main Entrance	Window metal to glass	Black silicone, Intact, Painted
RS-2-008	0.0364	Room 2	DPA window metal to sill	Gray, Intact, Exposed
RS-25-012	0.076	Room 25	Window metal to metal at door frame	Gray, Worn, Exposed
RS-R9H-020	0.117	Room 9 Hallway	Window metal to glass (replacement)	Silicone, Intact, Partly Exposed
RS-LMC-021	6.99	Library Media Center	Window frame to brick	Brittle, Exposed
RS-CR-025	0.3172	Conference Room	Window frame to sill	Black, Brittle, Exposed
'Other' Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
RS-BR-002	0.0699	Boiler Room	Duct	Red, Intact, Exposed
RS-3-010	0.1052	Room 3	Metal to metal panel	Black, Intact, Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on January 30, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Table 2
Exterior Chlorine Screening Results - Riverfield Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
RS-BE-027	3.06	Building Exterior	Brick to main entrance overhang	Brittle, Partly Exposed
RS-BE-029	3.63	Building Exterior	Brick to brick	Black over Gray, Intact, Exposed
RS-BE-031	2.28	Building Exterior	Brick to brick	Gray, Exposed
RS-BE-032	0.5098	Building Exterior	Brick to brick on gym	Black, Intact, Exposed
RS-BE-034	0.2013	Building Exterior	Brick to brick on gym	Brown, Intact, Exposed
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
RS-BE-028	0.184	Building Exterior	Aluminium door frame to window frame	Gray, Intact, Exposed
RS-BE-030	4.23	Building Exterior	Room 9 steel door frame to brick	Brown over Gray, Intact, Partially Exposed
RS-BE-033	0.2422	Building Exterior	Steel door frame to brick	Gray, Intact, Painted
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
RS-BE-026	0.3954	Building Exterior	DPA window metal to metal/brick	Intact, Exposed
'Other' Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
RS-BE-035	0.0947	Building Exterior	Brick to vent	Multilple layers, Weathered, Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on January 30, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Building Survey – Roger Sherman Elementary School

Introduction

As part of a district-wide school building review project, Woodard & Curran completed an on-site building survey of the Roger Sherman Elementary School on February 4, 2013. The building survey focused on identifying building materials that may be suspect to contain polychlorinated biphenyls (PCBs). PCBs were sometimes used in standard construction materials from the 1950s through the 1970s. The building survey information has been used to develop a screening assessment of the potential for PCBs to be present in the building.

Building Information

Location: 250 Fern Street, Fairfield, CT

Initial Construction Date: 1963

Additions/Renovations: 1977, 2001, 2009, and 2012

Construction Type: The exterior of the building is constructed of unpainted brick and masonry with steel structural components. Interior building construction materials were observed to be consistent in most areas of the school and can be characterized as having vinyl tile flooring, painted CMU walls, and drop ceilings. Observed HVAC systems consisted of in-room radiators and overhead ductwork and vents. Windows were observed to be generally consistent across the building as well; with double-paned aluminum framed exterior windows and single-paned aluminum framed interior windows. Interior doors were observed to be primarily steel-framed with wood doors, and exterior doors were generally observed to be steel-framed with steel doors. The gymnasium was observed to have sealed wood floors, painted CMU walls with vertical steel support beams, wood paneling, in-wall vents and wall mounted radiators, and tectum ceiling panels between exposed steel beams.

Screening Assessment

There are several key parameters evaluated as part of this screening assessment. A summary of these parameters in the context of the Roger Sherman Elementary School is presented below.

Construction Date – The initial construction date of the building was 1963; therefore it falls within the timeframe of when PCBs were sometimes used in standard construction materials. One of the building renovations also falls within this timeframe. However, the three building renovations constructed in 2001, 2009, and 2012, fall outside of this range; therefore the subject building area only includes the original building construction and the 1977 renovation.

Presence of Primary Suspect Materials – In typical school building settings, primary building materials that may have been manufactured with PCBs include: caulking, sealants, ceiling tiles, and spray-on fireproofing (NOTE – although some specialty paints have been known to be manufactured with PCBs, these specialty paints are typically not specified for use in school building settings). During the building survey various sealants, caulking, and window glazing sealants were observed most notably gray and white caulking along the interior and exterior window frames; painted-over sealants along door frame to CMU joints, and sealants at brick to brick/CMU joints along the building exterior. The gymnasium was observed to have tectum ceiling panels, but no spray-on fireproofing (e.g., not the same material as observed at the Osborn Hill gymnasium).

Photos of typical building sealants observed during the building survey are provided below.

Existing Data – Previous samples of suspect materials detected PCBs. Three exterior sealant samples were collected including window frame caulking (PCBs - non detect and 1.6 ppm) and exterior expansion joint caulking (non-detect). Three interior sealant samples were collected including window caulking (non-detect), door caulking (4.3 ppm) and window glazing sealant (1.1 ppm). These concentrations are well below the 50 ppm Federal regulatory threshold for PCB Bulk Product Waste.

Physical Condition and Chlorine Screening - The absence of chlorine in a certain building material is one line-of-evidence that PCBs may not be present within that building material (since chlorinated organics are a key component of PCBs). However, chlorine presence cannot be assumed to indicate PCB presence because many sealants and other building materials contain other chlorinated compounds as part of their composition. During the survey, 29 samples of various sealants, caulking, and additional materials were collected from locations throughout the building's interior and exterior. The samples were screened for chlorine content using a handheld Niton X-Ray Fluorescence (XRF) Analyzer. The results of XRF screening are presented on Table 1 (interior) and Table 2 (exterior). A physical description of each material (brittle, pliable, exposed or covered with another coating, such as paint, etc.) is also included on the tables.

Based on chlorine screening data (via XRF) collected at other buildings, a typical percent chlorine level has been established at which below this level, subsequent bulk samples for laboratory analyses typically would not correspond to PCB levels at ≥ 50 ppm, the Federal regulatory threshold for PCB Bulk Product Waste. Correlation to higher levels of chlorine to potential PCB concentrations are inconclusive with regard to PCB presence ≥ 50 ppm since other chlorinated compounds may be present in the samples. A review of the data indicated that 86% of the interior samples and 43% of the exterior samples screened fell within this lower chlorine screening level.

Summary

Overall observations included the following:

- Caulking and glazing sealants were observed throughout the building, primarily associated with window and door systems and expansion joints; the majority of the sealants were observed to be intact and pliable; given the date of construction of the building, these materials are considered suspect for PCBs.
- Numerous types of window systems and window styles were present at individual buildings and even within rooms of buildings. Numerous windows appear to have been updated over time and repair projects (replacement sealants) are evident in some areas. Most buildings had some single-pane windows that appear to be original construction. New exterior window systems were present at Roger Sherman.
- ***The spray-on fireproofing material at Osborn Hill gymnasium ceiling (primary driver for indoor air PCB levels) was <u>not</u> observed at the school.***
- The stone tile flooring, reportedly to contain PCBs in the floor sealant at Osborn Hill, was **<u>not</u>** observed at Roger Sherman Elementary.
- A review of the data indicated that 86% of the interior samples and 43% of the exterior samples screened fell within this lower chlorine screening level.

Management Program – PCBs in Building Materials

The findings of the initial screening process, as described above, serve as the starting point to develop a management program for building materials that may contain PCBs. This program can be separated into two components: 1) Near-term or Best-Management Practices; and 2) Longer-term or Material Management During Renovations. The overall goal of the program is to minimize or eliminate potential exposures to PCB-containing materials until these materials are removed from the building during planned renovation or building improvement projects.

Near Term or Best Management Practices

It is important to make a distinction between the mere presence of a PCB-containing building material and exposure potential. As presented in EPA guidance, presence of a regulated PCB-containing material within a given building does not necessarily equate to an exposure risk. In order for this condition to occur there needs to be a complete pathway established between the source and the individual through a transport mechanism, such as direct contact/transfer or indoor air (refer to Appendix A for additional discussion).

Our initial recommendation is to follow EPA and CTDEEP recommended best management practices to reduce potential exposure to PCBs from suspect building materials in schools. These practices include:

- Improve ventilation and add exhaust fans, as needed
- Avoid direct contact with suspect materials within reasonable means
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Using vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash children's toys often
- Encourage proper hygiene amongst staff and students (i.e. wash hands with soap and water regularly, particularly before eating or drinking)

Based on the screening survey findings, additional recommendations include:

- Since a higher percentage of exterior samples screened higher for chlorine content, direct contact with areas adjacent to caulking, sealants or other suspect materials not known to be replaced after 1980 should be avoided and/or minimized; depending on locations, some sealants in these areas could be temporarily covered, if feasible.

Longer-term or Material Management During Renovations

As indicated above, as part of building renovation activities at several schools, samples of suspect PCB-containing materials (such as caulking and sealants) have been collected and analyzed by a laboratory in order to determine presence and concentration. Several of these samples detected PCB concentrations in excess of disposal thresholds as indicated in EPA's and CTDEEP's regulations and/or guidance. As such, proper abatement specifications and plans are being developed to properly manage and dispose

of off-site the subject materials as part of the renovation project. This process of properly removing and managing regulated materials during renovation projects is implemented for other regulated building materials, such as asbestos or lead-based paint.

It is recommended that the School District "roll" the assessment of PCB-containing materials into the overall regulated building material program being implemented by the District for renovation projects. It is our understanding that various projects are being considered in the Fairfield Public School Facilities master plan for 2011-2020. Roger Sherman Elementary is being considered for code updates.

Table 1
Interior Chlorine Screening Results - Roger Sherman Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
ROG-1-002	4.08	Room 1	vertical steel beam to CMU	Semi-Pliable, Brittle, Exposed
ROG-8-006	0.0534	Room 8	vertical steel beam to CMU	Painted, Hard, Intact
ROG-CR-010	0.1359	Conf. Room	Wood to CMU joint	White/Yellow, Pliable, Intact, Painted
ROG-OH-011	0.1048	Offices	CMU to drywall	White, Pliable, Intact, Painted
ROG-BR-015	0.3356	Boiler Room	Painted wall to brick	Black, Brittle, Exposed
ROG-APR-017	5.6	APR/Stage	Steel vert. beam to CMU	Gray, Brittle, Painted
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
ROG-1-003	4.96	Room 1	Ext steel door frame to CMU	Brittle, Exposed
ROG-7-004	0.0869	Room 7	Int steel frame door to painted CMU	Hard, Intact, Exposed
ROG-8-005	0.1382	Room 8	Ext door frame	Painted, Hard, Intact
ROG-MC-008	0.0859	Media Center	Steel door frame to painted CMU	Pliable, Intact, Painted
ROG-JR-012	0.3181	Custodian	Ext steel door frame to CMU	Gray, Hard, Intact, Painted
ROG-R8E-020	0.1173	Entrance: Room 8	Steel door frame to brick	Hard, Brittle, Exposed
ROG-ME-021	0.0844	Main Entrance	Steel door to CMU	
ROG-GYM-029	0.0836	GYM	Ext door frame to CMU	Gray, Pliable, Intact, Exposed
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
ROG-1-001	0.2058	Room 1	Metal frame to sill and frame to CMU	Pliable, Intact, Exposed
ROG-MC-009	0.0667	Media Center	Metal frame to sill on small office windows	Gray, Pliable, Intact, Exposed
ROG-GH-018	0.1457	Gym Hall	Glass to steel frame	Black/gray, Pliable, Intact, Exposed
ROG-GH-019	0.138	Gym Hall	Glass to steel frame replacement	Pliable, Intact, Exposed
'Other' Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
ROG-10-007	0.0364	Room 10	Around water fountain	Pliable, Intact, Exposed
ROG-JR-013	0.087	Custodian	Pipe to wall joint	Red, Pliable, Exposed
ROG-JR-014	0.0763	Boiler Room	Pipe to wall joint	Dark Red, Brittle, Exposed
ROG-BR-016	0.1126	Boiler Room	Pipe to CMU	Red, Brittle, Intact, Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on February 4, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Table 2

Exterior Chlorine Screening Results - Roger Sherman Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
ROG-CY-024	2.89	Courtyard	Brick to brick	Gray, Hard, Weathered, Exposed
ROG-BE-026	0.1551	Building Exterior	Concrete to brick	Brown, Pliable, Intact, Exposed
ROG-BE-028	12.15	Building Exterior	Red brick to white brick	Gray, Pliable, Intact, Exposed
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
ROG-CY-022	2.72	Courtyard	Steel door to brick	White, Brittle, Exposed
ROG-BE-027	1.74	Building Exterior	Brick to steel door frame	Pliable, Intact, Exposed
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
ROG-CY-023	0.079	Courtyard	DPA window frame to brick	Gray, Pliable, Intact, Exposed
ROG-BE-025	0.061	Building Exterior	DPA window frame to brick	Gray, Pliable, Intact, Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on February 4, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Building Survey – Stratfield Elementary School

Introduction

As part of a district-wide school building review project, Woodard & Curran completed an on-site building survey of the Jennings Elementary School on January 23, 2013. The building survey focused on identifying building materials that may be suspect to contain polychlorinated biphenyls (PCBs). PCBs were sometimes used in standard construction materials from the 1950s through the 1970s. The building survey information has been used to develop a screening assessment of the potential for PCBs to be present in the building.

Building Information

Location: 1407 Melville Avenue

Initial Construction Date: 1929

Additions/Renovations: 1947, 1972, 2010, 2011

Construction Type: The exterior of the building is constructed of unpainted brick and masonry with steel structural components. Interior building construction materials were observed to be consistent in most areas of the school and can be characterized as having vinyl tile flooring, painted CMU/brick walls (some with a plaster coating), and drop ceilings. Observed HVAC systems consisted of in-room radiators and overhead ductwork and vents. Windows were observed to be generally consistent across the building as well; with double-paned aluminum framed exterior windows. Interior doors were observed to be primarily steel-framed with wood doors, and exterior doors were generally observed to be steel-framed with steel doors. The gymnasium was observed to have sealed wood floors, painted CMU walls with vertical steel support beams, and tectum ceiling panels in a drop ceiling with overhead ductwork and in-ceiling vents.

Screening Assessment

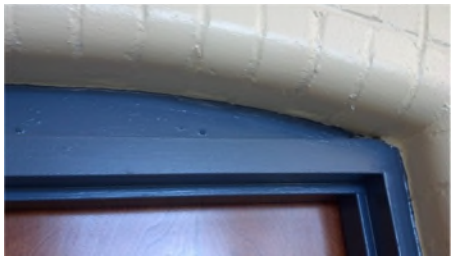
There are several key parameters evaluated as part of this screening assessment. A summary of these parameters in the context of the Jennings School is presented below.

Construction Date – The initial construction date of the building was 1929; therefore it was built prior to the timeframe of when PCBs were sometimes used in standard construction materials. However, the two building additions, constructed in 1947 and 1972, fall inside of the PCB timeframe. The subject building area only includes the original building construction.

Presence of Primary Suspect Materials – In typical school building settings, primary building materials that may have been manufactured with PCBs include: caulking, sealants, ceiling tiles, and spray-on

fireproofing (NOTE – although some specialty paints have been known to be manufactured with PCBs, these specialty paints are typically not specified for use in school building settings). During the building survey various sealants, caulking, and window glazing sealants were observed most notably gray, brown, and white caulking along the interior and exterior window frames; painted-over sealants along door frame to CMU joints, and sealants at brick to brick/CMU joints along the building exterior. The gymnasium was observed to have tectum ceiling panels, but no spray-on fireproofing (e.g., not the same material as observed at the Osborn Hill gymnasium).

Photos of typical building sealants observed during the building survey are provided below.



Existing Data - Samples of suspect materials from the building have been analyzed by a laboratory to determine PCB presence and concentration as part of an exterior door replacement project. Samples were collected from caulking and sealants around the door. The results are as follows:

- Exterior door caulking samples (<0.82, 1.2, 10, 130, and 58,000 ppm PCBs); concrete expansion joints (<0.83, 0.93, and 19 ppm PCBs); miscellaneous sealants (<0.81, 1, and 5.2 ppm PCBs).

Two of these samples had concentrations that exceed the 50 ppm Federal regulatory threshold for PCB Bulk Product Waste and as such, those materials are being managed accordingly.

Physical Condition and Chlorine Screening - The absence of chlorine in a certain building material is one line-of-evidence that PCBs may not be present within that building material (since chlorinated organics are a key component of PCBs). However, chlorine presence cannot be assumed to indicate PCB presence because many sealants and other building materials contain other chlorinated compounds as part of their composition. During the survey, 20 samples of various sealants, caulking, and additional materials were collected from locations throughout the building's interior and exterior. The samples were screened for chlorine content using a handheld Niton X-Ray Fluorescence (XRF) Analyzer. The results of XRF screening are presented on Table 1 (interior) and Table 2 (exterior). A physical description of each material (brittle, pliable, exposed or covered with another coating, such as paint, etc.) is also included on the tables.

Based on chlorine screening data (via XRF) collected at other buildings, a typical percent chlorine level has been established at which below this level, subsequent bulk samples for laboratory analyses typically would not correspond to PCB levels at ≥ 50 ppm, the Federal regulatory threshold for PCB Bulk Product Waste. Correlation to higher levels of chlorine to potential PCB concentrations are inconclusive with regard to PCB presence ≥ 50 ppm since other chlorinated compounds may be present in the samples. A review of the data indicated that 100% of the interior and exterior samples screened fell below this lower chlorine screening level.

Summary

Overall observations included the following:

- Caulking and glazing sealants were observed throughout the building, primarily associated with window and door systems and expansion joints; the majority of the sealants were observed to be intact and pliable; given the date of construction of the building, these materials are by default considered suspect for PCBs.
- Numerous types of window systems and window styles were present at individual buildings and even within rooms of buildings. Numerous windows appear to have been updated over time and repair projects (replacement sealants) are evident in some areas. Most buildings had some single-pane windows that appear to be original construction. New exterior window systems were present at Roger Sherman.
- ***The spray-on fireproofing material at Osborn Hill gymnasium ceiling (primary driver for indoor air PCB levels) was not observed at the school.***
- The stone tile flooring, reportedly to contain PCBs in the floor sealant at Osborn Hill, was **not** observed at Stratfield Elementary.
- A review of the data indicated that 100% of the interior and exterior samples screened fell below this lower chlorine screening level.

Management Program – PCBs in Building Materials

The findings of the initial screening process, as described above, serve as the starting point to develop a management program for building materials that may contain PCBs. This program can be separated into two components: 1) Near-term or Best-Management Practices; and 2) Longer-term or Material Management During Renovations. The overall goal of the program is to minimize or eliminate potential

exposures to PCB-containing materials until these materials are removed from the building during planned renovation or building improvement projects.

Near Term or Best Management Practices

It is important to make a distinction between the mere presence of a PCB-containing building material and exposure potential. As presented in EPA guidance, presence of a regulated PCB-containing material within a given building does not necessarily equate to an exposure risk. In order for this condition to occur there needs to be a complete pathway established between the source and the individual through a transport mechanism, such as direct contact/transfer or indoor air (refer to Appendix A for additional discussion).

Our initial recommendation is to follow EPA and CTDEEP recommended best management practices to reduce potential exposure to PCBs from suspect building materials in schools. These practices include:

- Improve ventilation and add exhaust fans, as needed
- Avoid direct contact with suspect materials within reasonable means
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Using vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash children's toys often
- Encourage proper hygiene amongst staff and students (i.e. wash hands with soap and water regularly, particularly before eating or drinking)

Longer-term or Material Management During Renovations

As indicated above, as part of building renovation activities at several schools, samples of suspect PCB-containing materials (such as caulking and sealants) have been collected and analyzed by a laboratory in order to determine presence and concentration. Several of these samples detected PCB concentrations in excess of disposal thresholds as indicated in EPA's and CTDEEP's regulations and/or guidance. As such, proper abatement specifications and plans are being developed to properly manage and dispose of off-site the subject materials as part of the renovation project. This process of properly removing and managing regulated materials during renovation projects is implemented for other regulated building materials, such as asbestos or lead-based paint.

It is recommended that the School District "roll" the assessment of PCB-containing materials into the overall regulated building material program being implemented by the District for renovation projects. It is our understanding that the following projects are being considered in the Fairfield Public School Facilities master plan for 2011-2020 (for the 13 schools included in the screening survey). No projects are scheduled for Stratfield at this time.

Table 1
Interior Chlorine Screening Results - Stratfield Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
SE-LMC-013	0.2412	Library Media Center	Stairwell metal to brick wall	Cracking, Exposed
Door Caulking Screening Results				
Sample ID	**%**	**Location**	**Materials**	**Description**
SE-KH-001	0.089	Room 204 Hallway	Courtyard door metal frame	Black, Intact
SE-RA-002	0.0578	3rd hallway 300-301	Roof access metal door frame to CMU	Painted
SE-RA-003	0.4295	3rd hallway 300-301	Roof access metal door frame to CMU	Exposed
SE-RA-004	0.0584	3rd hallway 300-301	Above door lintel: metal to CMU	
SE-200MED-006	0.0734	Across from 200m	Exit door metal frame to CMU	Gray, brittle
SE-200MED-007	0.3109	Across from 200m	Exit door glass to metal	Gray/green
SE-103-010	0.0648	Room 103	Metal door frame to brick	White
SE-LMC-011	0.0635	Library Media Center	Ext metal door to concrete	
SE-LMC-012	0.1256	Library Media Center	Ext metal door to glass	Brown putty
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
SE-200M-005	0.1878	200m	Metal window frame to CMU	Black
SE-LMC-014	0.1633	Library Media Center	Stairwell windows	Light gray
SE-CK-017	0.186	Kitchen	Windows	White
'Other' Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
SE-GYM-008	0.1157	Gym stage	Pipe to wall	Red
SE-GYM-009	0.0602	Gym stage	Pipe to wall	Yellow
SE-BR-015	0.0473	Boiler Room	Pipe to wall in crawlspace	Red
SE-300A-016	0.0261	Room 300A	Pipe	

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on January 23, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Table 2
Exterior Chlorine Screening Results - Stratfield Elementary School

Sample ID	Chlorine Screening by XRF[1]	Location	Materials	Description
SE-BE-018	0.106	Building Exterior	Not Noted	Not Noted
SE-BE-019	0	Building Exterior	Not Noted	Not Noted
SE-BE-020	0.0898	Building Exterior	Not Noted	Not Noted

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on January 23, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Building Survey - Timothy Dwight Elementary School

Introduction

As part of a district-wide school building review project, Woodard & Curran completed an on-site building survey of the Timothy Dwight Elementary School on February 1, 2013. The building survey focused on identifying building materials that may be suspect to contain polychlorinated biphenyls (PCBs). PCBs were sometimes used in standard construction materials from the 1950s through the 1970s. The building survey information has been used to develop a screening assessment of the potential for PCBs to be present in the building.

Building Information

Location: 1600 Redding Road, Fairfield, CT

Initial Construction Date: 1962

Additions/Renovations: 1969, 2000

Construction Type: The exterior of the building is constructed of unpainted brick and masonry with steel structural components. Interior building construction materials were observed to be consistent in most areas of the school and can be characterized as having vinyl tile flooring, painted CMU walls, and drop ceilings. Observed HVAC systems consisted of in-room radiators and overhead ductwork and vents. Windows were observed to be generally consistent across the building as well; with double-paned aluminum framed exterior windows and single-paned aluminum framed interior windows. Interior doors were observed to be primarily steel-framed with wood doors, and exterior doors were generally observed to be steel-framed with steel doors. The gymnasium was observed to have sealed wood floors, painted CMU walls with vertical steel support beams, and a wood panel drop ceiling with ductwork and in-ceiling vents.

Screening Assessment

There are several key parameters evaluated as part of this screening assessment. A summary of these parameters in the context of the Timothy Dwight School is presented below.

Construction Date – The initial construction date of the building was 1962, followed by a major addition in 1969; therefore it falls within the timeframe of when PCBs were sometimes used in standard construction materials. However, the small building addition, constructed in 2000, falls outside of this range; therefore the subject building area only includes the original building construction.

Presence of Primary Suspect Materials – In typical school building settings, primary building materials that may have been manufactured with PCBs include: caulking, sealants, ceiling tiles, and spray-on fireproofing (NOTE – although some specialty paints have been known to be manufactured with PCBs, these specialty paints are typically not specified for use in school building settings). During the building survey various sealants, caulking, and window glazing sealants were observed most notably gray and white caulking along the interior and exterior window frames; painted-over sealants along door frame to CMU joints, and sealants at brick to brick/CMU joints along the building exterior. The gymnasium was observed to have a wood panel drop ceiling with a metal structure and ductwork above. Spray-on fireproofing was observed on the metal structure through an opening in the drop ceiling. The spray-on fireproofing was not visibly similar to the material observed at Osborn Hill Elementary (e.g., not the same material as observed at the Osborn Hill gymnasium). The material was not accessible for the preliminary chlorine screening.

Photos of typical building sealants observed during the building survey are provided below.

Spray-on fireproofing above gym ceiling

Existing Data - No existing samples of suspect materials from the building have been analyzed by a laboratory to determine PCB presence and concentration.

Physical Condition and Chlorine Screening - The absence of chlorine in a certain building material is one line-of-evidence that PCBs may not be present within that building material (since chlorinated organics are a key component of PCBs). However, chlorine presence cannot be assumed to indicate PCB presence because many sealants and other building materials contain other chlorinated compounds as part of their composition. During the survey, 28 samples of various sealants, caulking, and additional materials were collected from locations throughout the building's interior and exterior. The samples were screened for chlorine content using a handheld Niton X-Ray Fluorescence (XRF) Analyzer. The results of XRF screening are presented on Table 1 (interior) and Table 2 (exterior). A physical description of each material (brittle, pliable, exposed or covered with another coating, such as paint, etc.) is also included on the tables.

Based on chlorine screening data (via XRF) collected at other buildings, a typical percent chlorine level has been established at which below this level, subsequent bulk samples for laboratory analyses typically would not correspond to PCB levels at ≥ 50 ppm, the Federal regulatory threshold for PCB Bulk Product Waste. Correlation to higher levels of chlorine to potential PCB concentrations are inconclusive with regard to PCB presence ≥ 50 ppm since other chlorinated compounds may be present in the samples. A review of the data indicated that 68% of the interior samples and 17% of the exterior samples screened fell within this lower chlorine screening level.

Summary

Overall observations included the following:

- Caulking and glazing sealants were observed throughout the building, primarily associated with window and door systems and expansion joints; the majority of the sealants were observed to be intact and pliable; given the date of construction of the building, these materials are considered suspect for PCBs.
- Numerous types of window systems and window styles were present at individual buildings and even within rooms of buildings. Numerous windows appear to have been updated over time and repair projects (replacement sealants) are evident in some areas. Most buildings had some single-pane windows that appear to be original construction. New exterior window systems were present at Timothy Dwight.
- ***The spray-on fireproofing material at Osborn Hill gymnasium ceiling (primary driver for indoor air PCB levels) was not observed in any other school.*** Spray on ceiling coatings were observed in one gymnasium; however, these materials were not visually similar to the Osborn Hill material.
- A review of the Osborn Hill data indicated that a sealer applied to the stone tile flooring in a hallway was tested and found to contain PCBs. It is not known if this material was manufactured with PCBs or contained PCBs as a result of a cross-contamination effect from the gymnasium source. During the building surveys, a similar stone tile flooring was observed at

Timothy Dwight Elementary. It is not known if this visually similar flooring at these schools were covered with the same sealer used at Osborn Hill.

- A review of the data indicated that 68% of the interior samples and 17% of the exterior samples screened fell within this lower chlorine screening level.

Management Program – PCBs in Building Materials

The findings of the initial screening process, as described above, serve as the starting point to develop a management program for building materials that may contain PCBs. This program can be separated into two components: 1) Near-term or Best-Management Practices; and 2) Longer-term or Material Management During Renovations. The overall goal of the program is to minimize or eliminate potential exposures to PCB-containing materials until these materials are removed from the building during planned renovation or building improvement projects.

Near Term or Best Management Practices

It is important to make a distinction between the mere presence of a PCB-containing building material and exposure potential. As presented in EPA guidance, presence of a regulated PCB-containing material within a given building does not necessarily equate to an exposure risk. In order for this condition to occur there needs to be a complete pathway established between the source and the individual through a transport mechanism, such as direct contact/transfer or indoor air (refer to Appendix A for additional discussion).

Our initial recommendation is to follow EPA and CTDEEP recommended best management practices to reduce potential exposure to PCBs from suspect building materials in schools. These practices include:

- Improve ventilation and add exhaust fans, as needed
- Avoid direct contact with suspect materials within reasonable means
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Using vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash children's toys often
- Encourage proper hygiene amongst staff and students (i.e. wash hands with soap and water regularly, particularly before eating or drinking)

Based on the screening survey findings, additional recommendations include:

- Since a higher percentage of exterior samples screened higher for chlorine content, direct contact with areas adjacent to caulking, sealants or other suspect materials not known to be replaced after 1980 should be avoided and/or minimized; depending on locations, some sealants in these areas could be temporarily covered, if feasible;

- Follow-up evaluations at Timothy Dwight Elementary; this school had a higher percentage of suspect materials that also exhibited higher chlorine concentrations in both interior and exterior samples relative to the average of all schools; activities could include more detailed inspection

and survey of suspect materials with follow-up interim measures, as needed, to potentially include covering any deteriorating sealants or suspect sealants in high exposure potential areas; room or area cleaning; etc. of note, the two elementary schools recently underwent exterior window replacement projects; therefore, these associated sealants would not be suspect for PCBs.

Longer-term or Material Management During Renovations

As indicated above, as part of building renovation activities at several schools, samples of suspect PCB-containing materials (such as caulking and sealants) have been collected and analyzed by a laboratory in order to determine presence and concentration. Several of these samples detected PCB concentrations in excess of disposal thresholds as indicated in EPA's and CTDEEP's regulations and/or guidance. As such, proper abatement specifications and plans are being developed to properly manage and dispose of off-site the subject materials as part of the renovation project. This process of properly removing and managing regulated materials during renovation projects is implemented for other regulated building materials, such as asbestos or lead-based paint.

It is recommended that the School District "roll" the assessment of PCB-containing materials into the overall regulated building material program being implemented by the District for renovation projects. It is our understanding that the following projects are being considered in the Fairfield Public School Facilities master plan for 2011-2020 (for the 13 schools included in the screening survey). No projects are planned for Timothy Dwight at this time.

Table 1
Interior Chlorine Screening Results - Timothy Dwight Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
TD-21-011	4.84	Room 21	CMU to steel beam	Intact, Painted
TD-17-014	2.14	Room 20/ Room 17	CMU to door beam (vertical)	Gray, Brittle, Painted
TD-18-016	3.82	Room 19/ Room 18	CMU to steel beam	
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
TD-APR-003	0.0848	All Purpose Room	Steel door window metal to glass	Silicone, Pliable, Intact, Exposed
TD-APR-004	4.32	All Purpose Room	Steel door frame to CMU	
TD-7-006	0.2485	Room 7	Ext door frame to CMU	Hard, Intact, Painted
TD-7-009	0.2778	Room 7	Int door frame to CMU	Brittle, Chipping, Painted
TD-21-010	0.8487	Room 21	Int door frame to CMU	Hard, Painted
TD-17-015	0.2742	Room 20/ Room 17	Door frame to CMU	Pliable, Intact, Exposed
TD-GH-019	0.1956	Gym Entrance/ Hall	Steel frame to CMU	Hard, Intact, Painted
TD-GH-018	0.136	Gym Entrance/ Hall	Steel frame to glass	Gray, Brittle, Painted
TD-BR-020	0.1897	Boiler Room	Steel door frame to CMU	White, Pliable, Painted
TD-ME-022	0.0863	Main Entrance	Int door frame to brick	Beige, Brittle, Painted
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
Door Caulking Screening Results	0.2309	All Purpose Room	DPA window metal to metal/black sill	Beige, Pliable, Intact, Exposed
TD-APR-002	0.2949	All Purpose Room	DPA window sill joint	Black, Pliable, Intact, Exposed
TD-7-007	0.5737	Room 7	Sill to sill	Black, Pliable, Intact, Exposed
TD-7-008	0.5835	Room 7	Ext window metal to metal/sill	Beige, Pliable, Intact, Exposed
TD-15-012	0.1216	Room K2/ Room 15	Ext window metal to metal	Beige, Intact, Exposed
TD-K2-013	0.1316	Room K2/ Room 15	Sill to sill	Intact, Exposed
'Other' Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
TD-APR-005	0.4921	All Purpose Room	Fiberboard material (from Bill)	Exposed
TD-FR-017	0.1086	Faculty Room	Sink edge	
TD-BR-021	0.0391	Boiler Room	Pipe	Red, Pliable, Intact, Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on February 1, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Table 2
Chlorine Screening Results - Timothy Dwight Elementary School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
TD-GYM-028	2.7	Building Exterior	vertical steel beam to CMU	Gray, semi-pliable, Intact, Painted
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
TD-BE-024	4.41	Building Exterior	APR steel door frame to brick	
TD-BE-026	2.17	Building Exterior	Gym hall door frame to brick	Gray, Pliable, Intact, Exposed
TD-BE-027	0.6015	Building Exterior	Classroom frame to brick	Brittle, Painted
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
TD-BE-023	0.0572	Building Exterior	DPA window	Beige, Pliable, Intact, Exposed
'Other' Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
TD-BE-025	1.34	Building Exterior	Vent to brick	Brittle, Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on February 1, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Building Survey – Fairfield Woods Middle School

Introduction

As part of a district-wide school building review project, Woodard & Curran completed an on-site building survey of the Fairfield Woods Middle School on February 20, 2013. The building survey focused on identifying building materials that may be suspect to contain polychlorinated biphenyls (PCBs). PCBs were sometimes used in standard construction materials from the 1950s through the 1970s. The building survey information has been used to develop a screening assessment of the potential for PCBs to be present in the building.

Building Information

Location: 1115 Fairfield Woods Road

Initial Construction Date: 1954

Additions/Renovations: 1961, 1972, 1995, and 2011

Construction Type: The exterior of the building is constructed of unpainted brick and masonry with steel and wood structural components. Interior building construction materials were observed to be consistent in most areas of the school and can be characterized as having vinyl tile flooring, painted CMU/drywall/plaster walls, and drop ceilings. Observed HVAC systems consisted of in-room radiators and overhead ductwork and vents. Windows were observed to be generally consistent across the building as well; with double-paned aluminum framed exterior windows and some single-paned aluminum framed interior windows. Interior doors were observed to be primarily steel-framed with wood doors, and exterior doors were generally observed to be steel-framed with steel doors. The building has two gymnasiums. The gymnasium was observed to have sealed wood floors, painted CMU and panel walls with vertical steel support beams, painted steel ceiling, and overhead ductwork and in-ceiling vents.

Screening Assessment

There are several key parameters evaluated as part of this screening assessment. A summary of these parameters in the context of the Fairfield Woods School is presented below.

Construction Date – The initial construction date of the building was 1954; therefore falls within the timeframe of when PCBs were sometimes used in standard construction materials. It is assumed to have been maintained and in use throughout the timeframe. Also, additions were added in 1961 and 1972 which fall within the timeframe. There were additions constructed in 1995 and 2011, which fall outside of this range; therefore the subject building area only includes the original building construction and additions through 1972.

Presence of Primary Suspect Materials – In typical school building settings, primary building materials that may have been manufactured with PCBs include: caulking, sealants, ceiling tiles, and spray-on

fireproofing (NOTE – although some specialty paints have been known to be manufactured with PCBs, these specialty paints are typically not specified for use in school building settings). During the building survey various sealants, caulking, and window glazing sealants were observed most notably gray and white caulking along the interior and exterior window frames; painted-over sealants along door frame to CMU joints, and sealants at brick to brick/CMU joints along the building exterior.

Photos of typical building sealants observed during the building survey are provided below.

Existing Data – No existing samples of suspect materials from the building have been analyzed by a laboratory to determine PCB presence and concentration.

Physical Condition and Chlorine Screening - The absence of chlorine in a certain building material is one line-of-evidence that PCBs may not be present within that building material (since chlorinated organics are a key component of PCBs). However, chlorine presence cannot be assumed to indicate PCB presence because many sealants and other building materials contain other chlorinated compounds as part of their composition. During the survey, 19 samples of various sealants, caulking, and additional materials were collected from locations throughout the building's interior and exterior. The samples were screened for chlorine content using a handheld Niton X-Ray Fluorescence (XRF) Analyzer. The results of XRF screening are presented on Table 1 (interior) and Table 2 (exterior). A physical description of each material (brittle, pliable, exposed or covered with another coating, such as paint, etc.) is also included on the tables.

Based on chlorine screening data (via XRF) collected at other buildings, a typical percent chlorine level has been established at which below this level, subsequent bulk samples for laboratory analyses typically would not correspond to PCB levels at ≥ 50 ppm, the Federal regulatory threshold for PCB Bulk Product Waste. Correlation to higher levels of chlorine to potential PCB concentrations are inconclusive with regard to PCB presence ≥ 50 ppm since other chlorinated compounds may be present in the samples. A review of the data indicated that 87% of the interior samples and 75% of the exterior samples screened fell within this lower chlorine screening level.

Summary

Overall observations included the following:

- Caulking and glazing sealants were observed throughout the building, primarily associated with window and door systems and expansion joints; the majority of the sealants were observed to be intact and pliable; given the date of construction of the building, these materials are considered suspect for PCBs.
- Numerous types of window systems and window styles were present at individual buildings and even within rooms of buildings. Numerous windows appear to have been updated over time and repair projects (replacement sealants) are evident in some areas. Most buildings had some single-pane windows that appear to be original construction.
- ***The spray-on fireproofing material at Osborn Hill gymnasium ceiling (primary driver for indoor air PCB levels) was <u>not</u> observed at the school.***
- A review of the Osborn Hill data indicated that a sealer applied to the stone tile flooring in a hallway was tested and found to contain PCBs. It is not known if this material was manufactured with PCBs or contained PCBs as a result of a cross-contamination effect from the gymnasium source. During the building survey, a similar stone tile flooring was observed at Fairfield Woods Middle School. It is not known if this visually similar flooring at these schools were covered with the same sealer used at Osborn Hill.
- A review of the data indicated that 87% of the interior samples and 75% of the exterior samples screened fell within this lower chlorine screening level.

Management Program – PCBs in Building Materials

The findings of the initial screening process, as described above, serve as the starting point to develop a management program for building materials that may contain PCBs. This program can be separated into two components: 1) Near-term or Best-Management Practices; and 2) Longer-term or Material Management During Renovations. The overall goal of the program is to minimize or eliminate potential exposures to PCB-containing materials until these materials are removed from the building during planned renovation or building improvement projects.

<u>Near Term or Best Management Practices</u>

It is important to make a distinction between the mere presence of a PCB-containing building material and exposure potential. As presented in EPA guidance, presence of a regulated PCB-containing material within a given building does not necessarily equate to an exposure risk. In order for this condition to occur there needs to be a complete pathway established between the source and the individual through

a transport mechanism, such as direct contact/transfer or indoor air (refer to Appendix A for additional discussion).

Our initial recommendation is to follow EPA and CTDEEP recommended best management practices to reduce potential exposure to PCBs from suspect building materials in schools. These practices include:

- Improve ventilation and add exhaust fans, as needed
- Avoid direct contact with suspect materials within reasonable means
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Using vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash children's toys often
- Encourage proper hygiene amongst staff and students (i.e. wash hands with soap and water regularly, particularly before eating or drinking)

Based on the screening survey findings, additional recommendations include:

- Since a higher percentage of exterior samples screened higher for chlorine content, direct contact with areas adjacent to caulking, sealants or other suspect materials not known to be replaced after 1980 should be avoided and/or minimized; depending on locations, some sealants in these areas could be temporarily covered, if feasible.

Longer-term or Material Management During Renovations

As indicated above, as part of building renovation activities at several schools, samples of suspect PCB-containing materials (such as caulking and sealants) have been collected and analyzed by a laboratory in order to determine presence and concentration. Several of these samples detected PCB concentrations in excess of disposal thresholds as indicated in EPA's and CTDEEP's regulations and/or guidance. As such, proper abatement specifications and plans are being developed to properly manage and dispose of off-site the subject materials as part of the renovation project. This process of properly removing and managing regulated materials during renovation projects is implemented for other regulated building materials, such as asbestos or lead-based paint.

It is recommended that the School District "roll" the assessment of PCB-containing materials into the overall regulated building material program being implemented by the District for renovation projects. It is our understanding that the various projects are being considered in the Fairfield Public School Facilities master plan for 2011-2020. Fairfield Woods Middle is being considered for replacement windows.

Table 1
Interior Chlorine Screening Results - Fairfield Woods Middle School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
FWMS-200-004	0.0386	Room 200	CMU to textured block	Red, Pliable, Intact, Painted
FWMS-001-009	0.0518	Room 001	CMU to steel support beam	White, Brittle, Hard, Painted
FWMS-A129-012	0.815	Room A129	Beam to CMU	Silver, Pliable, Intact, Exposed
FWMS-A112H-013	0.0644	Room A112 Hallway	CMU block seam	Intact, Pliable, Painted
FWMS-LMC-014	0.0409	Library Media Center	CMU seam	White, Pliable, Intact, Painted
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
FWMS-216-002	0.332	Room 216	Int steel door frame to wall	White, Pliable, Intact, Painted
FWMS-A148-008	0.061	Room A148	Ext door frame to metal	White, Pliable, Intact, Painted
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
FWMS-216-001	0.0752	Room 216	T1 DPA window frame to wall	White, Pliable, Intact, Exposed
FWMS-206-003	0.0884	Room 206	T1 DPA window frame to CMU	White, Pliable, Intact, Painted
FWMS-52-005	0.7642	Stairwell 2/3	T1 DPA window frame to CMU	White, Pliable, Intact, Exposed
FWMS-B121-007	0.1043	Room B121	T1 DPA window frame to sill	Gray over White, Pliable over Hard, Exposed
FWMS-001-010	0.0573	Room 001	T2 SPA window glass to frame	Gray, Hard, Brittle, Exposed
FWMS-001-011	0.1141	Room 001	T2 SPA window glass to frame replacement	
FWMS-C102C-015	0.0793	C102C Cafeteria	T2 SPA Int window frame to brick	White, Pliable, Intact, Painted
'Other' Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
FWMS-B134H-006	0.0711	Room B134 Hallway	Locker base to tile	Gray, Pliable, Intact, Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on February 20, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Table 2
Exterior Chlorine Screening Results - Fairfield Woods Middle School

Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
FWMS-BE-017	2.44	Building Exterior	Steel door to brick 1959	Gray over Beige, Hard, Painted, Intact
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
FWMS-BE-016	0.0565	Building Exterior	T2 SPA window frame to brick	Beige over Gray, Pliable, Intact, Exposed
FWMS-BE-019	0.0514	Building Exterior	T1 DPA window frame to brick	White, Pliable, Exposed
'Other' Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
FWMS-BE-018	0.0445	Building Exterior	Vent	Brown, Pliable, Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on February 20, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Building Survey – Tomlinson Middle School

Introduction

As part of a district-wide school building review project, Woodard & Curran completed an on-site building survey of the Tomlinson Middle School on February 13, 2013. The building survey focused on identifying building materials that may be suspect to contain polychlorinated biphenyls (PCBs). PCBs were sometimes used in standard construction materials from the 1950s through the 1970s. The building survey information has been used to develop a screening assessment of the potential for PCBs to be present in the building.

Building Information

Location: 200 Unquowa Road, Fairfield, CT

Initial Construction Date: 1917

Additions/Renovations: 1942, 1958, 1976, 2006

Construction Type: The exterior of the building is constructed of unpainted brick and masonry with steel and wood structural components. Interior building construction materials were observed to be consistent in most areas of the school and can be characterized as having vinyl tile flooring, painted CMU/drywall/plaster walls, and drop ceilings. Observed HVAC systems consisted of in-room radiators and overhead ductwork and vents. Windows were observed to be generally consistent across the building as well; with double-paned aluminum framed exterior windows (multiple types) and single-paned aluminum framed interior windows. Interior doors were observed to be primarily steel-framed with wood doors, and exterior doors were generally observed to be steel-framed with steel doors. The building has two gymnasiums. The primary gymnasium was observed to have sealed wood floors, painted CMU walls with vertical steel support beams, tectum ceiling panels with painted steel supports, and overhead ductwork and in-ceiling vents. The auxiliary gymnasium was observed to have sealed wood floors, painted CMU/brick/plaster walls with vertical steel support beams, a painted wood and steel beam ceiling, and overhead ductwork and in-ceiling vents.

Screening Assessment

There are several key parameters evaluated as part of this screening assessment. A summary of these parameters in the context of the Tomlinson School is presented below.

Construction Date – The initial construction date of the building was 1917; therefore it was built prior the timeframe of when PCBs were sometimes used in standard construction materials. It is assumed to have been maintained and in use throughout the timeframe. Also, additions were added in 1942, 1958, and1976 which fall within the timeframe. There was a large addition, constructed in 2006, and this falls outside of this range; therefore the subject building area only includes the original building construction and additions through 1976.

Presence of Primary Suspect Materials – In typical school building settings, primary building materials that may have been manufactured with PCBs include: caulking, sealants, ceiling tiles, and spray-on fireproofing (NOTE – although some specialty paints have been known to be manufactured with PCBs, these specialty paints are typically not specified for use in school building settings). During the building survey various sealants, caulking, and window glazing sealants were observed most notably gray and white caulking along the interior and exterior window frames; painted-over sealants along door frame to CMU joints, and sealants at brick to brick/CMU joints along the building exterior. The gymnasium was observed to have tectum ceiling panels, but no spray-on fireproofing (e.g., not the same material as observed at the Osborn Hill gymnasium). A spray-on material was identified on the ceiling of the boiler room, but was not visually similar to the material observed at Osborn Hill.

Photos of typical building sealants observed during the building survey are provided below.

Existing Data - Existing samples of suspect materials were collected from the building exterior in association with a 2012 exterior door replacement project, and have been analyzed by a laboratory to determine PCB presence and concentration. PCBs were detected in at least on sample; however, no samples were identified at ≥ 50 ppm. Eleven samples of exterior and interior door caulking (8 reported < 1 ppm, 1 sample at 1.4 ppm, and 2 samples at < 37 ppm PCBs).

Physical Condition and Chlorine Screening - The absence of chlorine in a certain building material is one line-of-evidence that PCBs may not be present within that building material (since chlorinated organics are a key component of PCBs). However, chlorine presence cannot be assumed to indicate PCB presence because many sealants and other building materials contain other chlorinated compounds as part of their composition. During the survey, 22 samples of various sealants, caulking, and additional materials were collected from locations throughout the building's interior and exterior. The samples were screened for chlorine content using a handheld Niton X-Ray Fluorescence (XRF) Analyzer. The results of XRF screening are presented on Table 1 (interior) and Table 2 (exterior). A physical description of each material (brittle, pliable, exposed or covered with another coating, such as paint, etc.) is also included on the tables.

Based on chlorine screening data (via XRF) collected at other buildings, a typical percent chlorine level has been established at which below this level, subsequent bulk samples for laboratory analyses typically would not correspond to PCB levels at ≥ 50 ppm, the Federal regulatory threshold for PCB Bulk Product Waste. Correlation to higher levels of chlorine to potential PCB concentrations are inconclusive with regard to PCB presence ≥ 50 ppm since other chlorinated compounds may be present in the samples. A review of the data indicated that 80% of the interior samples and 60% of the exterior samples screened fell within this lower chlorine screening level.

Summary

Overall observations included the following:

- Caulking and glazing sealants were observed throughout the building, primarily associated with window and door systems and expansion joints; the majority of the sealants were observed to be intact and pliable; given the date of construction of the building, these materials are considered suspect for PCBs.
- Numerous types of window systems and window styles were present at individual buildings and even within rooms of buildings. Numerous windows appear to have been updated over time and repair projects (replacement sealants) are evident in some areas. Most buildings had some single-pane windows that appear to be original construction.
- ***The spray-on fireproofing material at Osborn Hill gymnasium ceiling (primary driver for indoor air PCB levels) was not observed at the school.*** Spray on ceiling coatings were observed in one boiler room (of note, this material was installed during a renovation project conducted in the 2000s).
- The stone tile flooring, reportedly to contain PCBs in the floor sealant at Osborn Hill, was **not** observed at Tomlinson Middle School.

- A review of the data indicated that 80% of the interior samples and 60% of the exterior samples screened fell within this lower chlorine screening level.

Management Program – PCBs in Building Materials

The findings of the initial screening process, as described above, serve as the starting point to develop a management program for building materials that may contain PCBs. This program can be separated into two components: 1) Near-term or Best-Management Practices; and 2) Longer-term or Material Management During Renovations. The overall goal of the program is to minimize or eliminate potential exposures to PCB-containing materials until these materials are removed from the building during planned renovation or building improvement projects.

Near Term or Best Management Practices

It is important to make a distinction between the mere presence of a PCB-containing building material and exposure potential. As presented in EPA guidance, presence of a regulated PCB-containing material within a given building does not necessarily equate to an exposure risk. In order for this condition to occur there needs to be a complete pathway established between the source and the individual through a transport mechanism, such as direct contact/transfer or indoor air (refer to Appendix A for additional discussion).

Our initial recommendation is to follow EPA and CTDEEP recommended best management practices to reduce potential exposure to PCBs from suspect building materials in schools. These practices include:

- Improve ventilation and add exhaust fans, as needed
- Avoid direct contact with suspect materials within reasonable means
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Using vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash children's toys often
- Encourage proper hygiene amongst staff and students (i.e. wash hands with soap and water regularly, particularly before eating or drinking)

Based on the screening survey findings, additional recommendations include:

- Since a higher percentage of exterior samples screened higher for chlorine content, direct contact with areas adjacent to caulking, sealants or other suspect materials not known to be replaced after 1980 should be avoided and/or minimized; depending on locations, some sealants in these areas could be temporarily covered, if feasible;

- Follow-up evaluations at Tomlinson Middle School; this school had a higher percentage of suspect materials that also exhibited higher chlorine concentrations in both interior and exterior samples relative to the average of all schools; activities could include more detailed inspection and survey of suspect materials with follow-up interim measures, as needed, to potentially include covering any deteriorating sealants or suspect sealants in high exposure potential areas;

room or area cleaning; etc. of note, the two elementary schools recently underwent exterior window replacement projects; therefore, these associated sealants would not be suspect for PCBs.

Longer-term or Material Management During Renovations

As indicated above, as part of building renovation activities at several schools, samples of suspect PCB-containing materials (such as caulking and sealants) have been collected and analyzed by a laboratory in order to determine presence and concentration. Several of these samples detected PCB concentrations in excess of disposal thresholds as indicated in EPA's and CTDEEP's regulations and/or guidance. As such, proper abatement specifications and plans are being developed to properly manage and dispose of off-site the subject materials as part of the renovation project. This process of properly removing and managing regulated materials during renovation projects is implemented for other regulated building materials, such as asbestos or lead-based paint.

It is recommended that the School District "roll" the assessment of PCB-containing materials into the overall regulated building material program being implemented by the District for renovation projects. It is our understanding that the following projects are being considered in the Fairfield Public School Facilities master plan for 2011-2020 (for the 13 schools included in the screening survey). An exterior door replacement project is scheduled for this school.

Table 1
Interior Chlorine Screening Results - Tomlinson Middle School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
TS-344-005	0.0659	Room 344	Drywall to plaster seam	White, Intact, Painted
TS-LMCH-007	0.113	LMC Hallway	CMU wall joint	Intact, Painted
TS-247-009	0.0908	Room 247 Aux Gym	Brick to CMU	Brittle, Painted
TS-282-011	0.3653	Room 282	Brick to drywall	White, Pliable, Intact, Exposed
TS-BE-017	0.0975	Gym	CMU wall to support beam	Hard, Intact, Painted
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
TS-316-002	0.0307	Room 316	Steel door frame to CMU	Intact, Pliable, Painted
TS-AUD-012	0.3935	Auditorium/Stage	Doorframe to upper wood lintel	Gray, Pliable, Intact, Painted
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
TS-316-001	0.1895	Room 316	T2 window glass to frame	Black, Pliable, Intact, Exposed
TS-LMCH-006	0.2211	LMC Hallway	T2 Interior windows	Intact, Exposed
TS-247-008	0.3742	Room 247 Aux Gym	T2 exterior window frame to brick	Black, Pliable, Intact, Exposed
TS-216-010	0.6716	Room 216	T2 Window frame to brick	Black, Pliable, Intact, Exposed
TS-ST4-013	3.94	Stairwell #4	Steel frame window to CMU	Pliable, Intact, Painted
'Other' Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
TS-351-003	0.082	Room 351	Pipe through floor	Red, Intact, Exposed
TS-344-004	0.0342	Room 344	Radiator to plaster	White, Intact, Exposed
TS-R103H-14	0.0998	Room 103 Hallway	Drywall to locker	White, Pliable, Intact, Exposed
TS-BAND-015	0.0779	Band Room	Fiberboard wall panel	Intact, Exposed
TS-BE-016	0.075	Room 170 Boiler Room	Ceiling Spray Insulation	Intact, Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on February 13, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Table 2
Exterior Chlorine Screening Results - Tomlinson Middle School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
TS-BE-018	2.07	Building Exterior	Brick building seam	Black, Pliable, Intact, Exposed
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
TS-BE-019	0.115	Building Exterior	Gym Entrance steel to steel	Pliable, Intact, Painted
TS-BE-020	0.9379	Building Exterior	Gym Entrance steel to brick	Pliable, Intact, Painted
TS-BE-022	0.142	Building Exterior	Entrance wood to brick	Weathered, Exposed
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
TS-BE-021	0.0109	Building Exterior	T2 exterior window frame to brick	Gray, Pliable, Intact, Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on February 13, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Building Survey – Fairfield Ludlowe High School

Introduction

As part of a district-wide school building review project, Woodard & Curran completed an on-site building survey of the Fairfield Ludlowe High School on February 14, 2013. The building survey focused on identifying building materials that may be suspect to contain polychlorinated biphenyls (PCBs). PCBs were sometimes used in standard construction materials from the 1950s through the 1970s. The building survey information has been used to develop a screening assessment of the potential for PCBs to be present in the building.

Building Information

Location: 785 Unquowa Road

Initial Construction Date: 1950

Additions/Renovations: 1963, 1972, 1995, and 2005

Construction Type: The exterior of the building is constructed of unpainted brick/stone and masonry with steel and wood structural components. Interior building construction materials were observed to be consistent in most areas of the school and can be characterized as having vinyl tile flooring, painted CMU/drywall walls, and drop ceilings. Observed HVAC systems consisted of in-room radiators and overhead ductwork and vents. Windows were observed to be generally consistent across the building as well; with double-paned aluminum framed exterior windows, and some single-paned aluminum framed exterior windows. Interior doors were observed to be primarily steel-framed with wood doors, and exterior doors were generally observed to be steel-framed with steel doors. The building has two gymnasiums. The auxiliary gymnasium was observed to have sealed wood floors, painted CMU and panel walls with vertical steel support beams, painted steel ceiling, and overhead ductwork and in-ceiling vents.

Screening Assessment

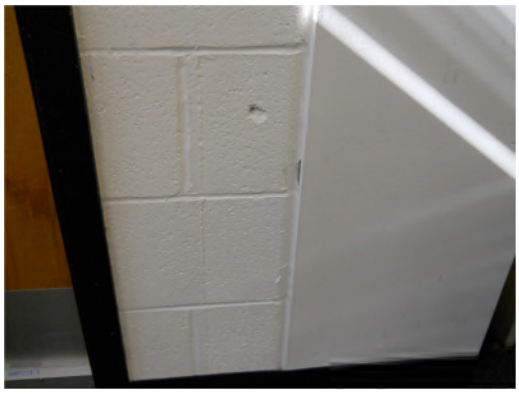
There are several key parameters evaluated as part of this screening assessment. A summary of these parameters in the context of the Fairfield Ludlowe School is presented below.

Construction Date – The initial construction date of the building was 1954; therefore falls within the timeframe of when PCBs were sometimes used in standard construction materials. It is assumed to have been maintained and in use throughout the timeframe. Also, additions were added in 1961 and 1972 which fall within the timeframe. There were additions constructed in 1995 and 2011, which fall outside of this range; therefore the subject building area only includes the original building construction and additions through 1972.

Presence of Primary Suspect Materials – In typical school building settings, primary building materials that may have been manufactured with PCBs include: caulking, sealants, ceiling tiles, and spray-on

fireproofing (NOTE – although some specialty paints have been known to be manufactured with PCBs, these specialty paints are typically not specified for use in school building settings). During the building survey various sealants, caulking, and window glazing sealants were observed most notably gray and white caulking along the interior and exterior window frames; painted-over sealants along door frame to CMU joints, and sealants at brick to brick/CMU joints along the building exterior.

Photos of typical building sealants observed during the building survey are provided below.



Existing Data – Samples of suspect materials from the building have been analyzed by a laboratory to determine PCB presence and concentration. Samples were collected as part of a pre-renovation hazardous materials survey. Initial sampling was conducted in October 2011 and follow-up sampling was conducted April 2012 through December 2012. Results included the following:

- Window caulking and glazing samples collected from October 2011 to July 2012 (multiple events)
  - Exterior and interior caulking samples detected PCBs at concentrations up to 660,000 ppm and 4,900 ppm, respectively
  - Exterior and interior glazing sealant samples detected PCBs at concentrations up to 41,000 ppm and 72 ppm, respectively
- Adjacent building substrate and soil samples collected from July 2012 to January 2013 (multiple events)

        - PCBs detected at concentrations > 1 ppm in both substrate and soils with decreasing concentrations with distance from the windows
    - Indoor air and surface samples collected Room 203, 220, and corridor – February 2012
        - PCBs not detected above 50 ng/m^3 in any of the three indoor air samples
        - PCBs not detected (<1 ug/100cm^2) in three of the four samples; 1 sample detected PCBs at 1.6 ug/100cm^2 (window sill)

Several of these concentrations exceed the 50 ppm Federal regulatory threshold for PCB Bulk Product Waste.

Physical Condition and Chlorine Screening - The absence of chlorine in a certain building material is one line-of-evidence that PCBs may not be present within that building material (since chlorinated organics are a key component of PCBs). However, chlorine presence cannot be assumed to indicate PCB presence because many sealants and other building materials contain other chlorinated compounds as part of their composition. During the survey, 29 samples of various sealants, caulking, and additional materials were collected from locations throughout the building's interior and exterior. The samples were screened for chlorine content using a handheld Niton X-Ray Fluorescence (XRF) Analyzer. The results of XRF screening are presented on Table 1 (interior) and Table 2 (exterior). A physical description of each material (brittle, pliable, exposed or covered with another coating, such as paint, etc.) is also included on the tables.

Based on chlorine screening data (via XRF) collected at other buildings, a typical percent chlorine level has been established at which below this level, subsequent bulk samples for laboratory analyses typically would not correspond to PCB levels at ≥ 50 ppm, the Federal regulatory threshold for PCB Bulk Product Waste. Correlation to higher levels of chlorine to potential PCB concentrations are inconclusive with regard to PCB presence ≥ 50 ppm since other chlorinated compounds may be present in the samples. A review of the data indicated that 90% of the interior samples and 50% of the exterior samples screened fell within this lower chlorine screening level.

Summary

Overall observations included the following:

- Caulking and glazing sealants were observed throughout the building, primarily associated with window and door systems and expansion joints; the majority of the sealants were observed to be intact and pliable; given the date of construction of the building, these materials are considered suspect for PCBs.
- Numerous types of window systems and window styles were present at individual buildings and even within rooms of buildings. Numerous windows appear to have been updated over time and repair projects (replacement sealants) are evident in some areas. Most buildings had some single-pane windows that appear to be original construction.
- ***The spray-on fireproofing material at Osborn Hill gymnasium ceiling (primary driver for indoor air PCB levels) was not observed at the school.***

- A review of the Osborn Hill data indicated that a sealer applied to the stone tile flooring in a hallway was tested and found to contain PCBs. It is not known if this material was manufactured with PCBs or contained PCBs as a result of a cross-contamination effect from the gymnasium source. During the building surveys, a similar stone tile flooring was observed at Fairfield Ludlowe High School. It is not known if this visually similar flooring at these schools were covered with the same sealer used at Osborn Hill.
- A review of the data indicated that 90% of the interior samples and 50% of the exterior samples screened fell within this lower chlorine screening level.

Management Program – PCBs in Building Materials

The findings of the initial screening process, as described above, serve as the starting point to develop a management program for building materials that may contain PCBs. This program can be separated into two components: 1) Near-term or Best-Management Practices; and 2) Longer-term or Material Management During Renovations. The overall goal of the program is to minimize or eliminate potential exposures to PCB-containing materials until these materials are removed from the building during planned renovation or building improvement projects.

Near Term or Best Management Practices

It is important to make a distinction between the mere presence of a PCB-containing building material and exposure potential. As presented in EPA guidance, presence of a regulated PCB-containing material within a given building does not necessarily equate to an exposure risk. In order for this condition to occur there needs to be a complete pathway established between the source and the individual through a transport mechanism, such as direct contact/transfer or indoor air (refer to Appendix A for additional discussion).

As indicated above, the proper management of PCB-containing materials is being completed as part of on-going renovations and will continue to do so, as needed.

Our additional initial recommendation is to follow EPA and CTDEEP recommended best management practices to reduce potential exposure to PCBs from suspect building materials in schools. These practices include:

- Improve ventilation and add exhaust fans, as needed
- Avoid direct contact with suspect materials within reasonable means
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Using vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash children's toys often
- Encourage proper hygiene amongst staff and students (i.e. wash hands with soap and water regularly, particularly before eating or drinking)

Based on the screening survey findings, additional recommendations include:

- Since a higher percentage of exterior samples screened higher for chlorine content, direct contact with areas adjacent to caulking, sealants or other suspect materials not known to be replaced after 1980 should be avoided and/or minimized; depending on locations, some sealants in these areas could be temporarily covered, if feasible,

Longer-term or Material Management During Renovations

As indicated above, as part of building renovation activities at several schools, samples of suspect PCB-containing materials (such as caulking and sealants) have been collected and analyzed by a laboratory in order to determine presence and concentration. Several of these samples detected PCB concentrations in excess of disposal thresholds as indicated in EPA's and CTDEEP's regulations and/or guidance. As such, proper abatement specifications and plans are being developed to properly manage and dispose of off-site the subject materials as part of the renovation project. This process of properly removing and managing regulated materials during renovation projects is implemented for other regulated building materials, such as asbestos or lead-based paint.

It is recommended that the School District "roll" the assessment of PCB-containing materials into the overall regulated building material program being implemented by the District for renovation projects. It is our understanding that various projects are being considered in the Fairfield Public School Facilities master plan for 2011-2020 (for the 13 schools included in the screening survey). Fairfield Ludlowe High School is being considered for replacement windows and a new addition.

Table 1
Interior Chlorine Screening Results - Fairfield Ludlowe High School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
FLHS-106-001	1.19	Room 106 Aux Gym	CMU to CMU	Gray, Brittle, Intact, Painted
FLHS-106H-003	3.71	Room 106 Hallway	Vertical CMU seam	Gray, Hard, Intact, Painted
FLHS-121-004	6.18	Room 121	CMU to steel support beam AND SPA window	Gray, Hard, Intact, Painted
FLHS-121-005	0.0649	Room 121	CMU to drywall joint	White, Pliable, Intact, Painted
FLHS-R242C-011	0.2174	Room 242 Connector	CMU wall to steel beam vertical seam	Pliable, Intact, Painted
FLHS-347-018	0.1722	Room 347	Steel support beam to CMU	White, Pliable, Intact, Painted
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
FLHS-106-002	0.1094	Room 106 Aux Gym	Steel doorframe to upper lintel	White, Pliable, Intact, Exposed
FLHS-CYE-006	0.0724	Courtyard Entrance	Steel door frame to painted brick	Pliable, Intact, Painted
FLHS-CYE-007	0.2453	Courtyard Entrance	Door window metal to glass	Black, Pliable, Intact, Exposed
FLHS-314-020	0.4605	Room 314	Door upper panel to CMU	White, Pliable, Intact
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
FLHS-123-008	0.025	Room 123	T2 window to CMU	Gray, Pliable, Exposed
FLHS-R223H-009	0.1581	Room 223 Hallway	T5 window metal to CMU	Gray, Pliable, Intact, Exposed
FLHS-225-010		Room 225	T6 window metal to glass	Brittle, Exposed
FLHS-220-012	0.1125	Room 220	Window frame to sill	Gray, Pliable, Weathered, Exposed
FLHS-276-013	0.0258	Room 276	T3 window	Silver, Pliable, Intact, Exposed
FLHS-ST10-014	0.1849	Stairwell #10	T9 window	Pliable, Intact, Exposed
FLHS-ST10-015	0.3351	Stairwell #10	T9 window frame to brick	Hard, Intact, Partially Painted
FLHS-347-016	0.0327	Room 347	T10 window frame to sill	Gray, Brittle, Intact, Exposed
FLHS-347-017	0.2225	Room 347	T10 window frame to brick	Brown, Pliable, Intact, Exposed
FLHS-314-019	0.1045	Room 314	T4 window frame to CMU	Gray, Pliable, Intact, Exposed
'Other' Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
FLHS-CAF-021	0.1254	Cafeteria	Radiator to CMU wall	White, Pliable, Intact

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on February 14, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Table 2
Exterior Chlorine Screening Results - Fairfield Ludlowe High School

Wall Seam Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
FLHS-BE-026	9.89	Building Exterior	Brick to brick seam Room 145	Gray, Pliable, Exposed
FLHS-BE-027	0.0497	Building Exterior	Cafeteria brick to frame	Gray, Pliable, Intact, Exposed
FLHS-BE-028	6.22	Building Exterior	Brick to brick seam Room 125	Pliable, Intact, Exposed
Door Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
FLHS-BE-025	0.4628	Building Exterior	Stairwell 10 ext door frame to brick	Pliable, Weathered, Exposed
Window Caulking Screening Results				
Sample ID	**Chlorine Screening by XRF[1]**	**Location**	**Materials**	**Description**
FLHS-BE-022	8.32	Building Exterior	Rm 256 window ext frame to brick	Gray, Pliable, Exposed
FLHS-BE-023	0.0718	Building Exterior	Rm 256 window ext frame to sill	Gray, Pliable, Exposed
FLHS-BE-024	0.385	Building Exterior	Rm 276 window ext frame to brick/metal	Pliable, Weathered, Exposed
FLHS-BE-029	1.86	Building Exterior	SPA to brick shop ext.	Gray/Silver, Pliable, Intact, Exposed

Notes:

1. The X-Ray Fluorescence (XRF) screening test was performed ex-situ using a ThermoFisher Niton XL3t GOLDD+ XRF analyzer; results are reported as percent (%) chlorine.
2. Survey activities were limited to suspect sealants accessible on February 14, 2013
3. CMU - Concrete Masonry Unit
4. Int - Interior
5. Ext - Exterior
6. DPA - Double-Paned Aluminum Window Frame
7. SPA - Single-Paned Aluminum Window Frame

Building Survey – Fairfield Warde High School

Introduction

As part of a district-wide school building review project, Woodard & Curran completed an on-site building survey of the Fairfield Warde High School on February 15, 2013. The building survey focused on identifying building materials that may be suspect to contain polychlorinated biphenyls (PCBs). PCBs were sometimes used in standard construction materials from the 1950s through the 1970s. The building survey information has been used to develop a screening assessment of the potential for PCBs to be present in the building.

Building Information

Location: 755 Melville Road

Initial Construction Date: 1955

Additions/Renovations: 2003 and 2006

Construction Type: The exterior of the building is constructed of unpainted brick/stone and masonry with steel and wood structural components. Interior building construction materials were observed to be consistent in most areas of the school and can be characterized as having vinyl tile flooring, painted CMU/drywall walls, and drop ceilings. Observed HVAC systems consisted of in-room radiators and overhead ductwork and vents. Windows were observed to be generally consistent across the building as well; with single-paned aluminum framed exterior windows, and some single-paned aluminum framed exterior windows. Interior doors were observed to be primarily steel-framed with wood doors, and exterior doors were generally observed to be steel-framed with steel doors. The building has two gymnasiums. The "large" gymnasium was observed to have sealed wood floors, painted CMU and panel walls with vertical steel support beams, tectum panel ceiling with painted steel ceiling, and overhead ductwork and in-ceiling vents. The "small" was observed to have sealed wood floors, painted CMU/brick and panel walls with vertical steel support beams, tectum panel ceiling with painted steel ceiling, and overhead ductwork and in-ceiling vents

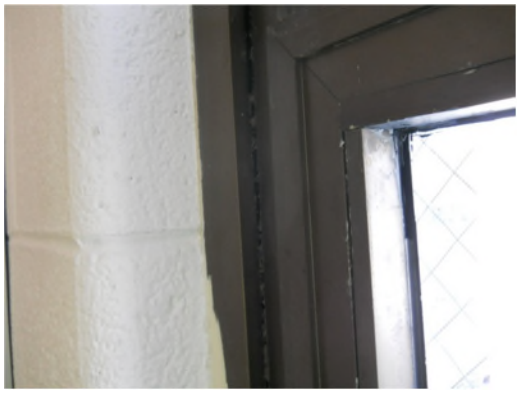
Screening Assessment

There are several key parameters evaluated as part of this screening assessment. A summary of these parameters in the context of the Fairfield Warde School is presented below.

Construction Date – The initial construction date of the building was 1955; therefore falls within the timeframe of when PCBs were sometimes used in standard construction materials. It is assumed to have been maintained and in use throughout the timeframe. There were additions constructed in 2003 and 2006, which fall outside of this range; therefore the subject building area only includes the original building construction.

Presence of Primary Suspect Materials – In typical school building settings, primary building materials that may have been manufactured with PCBs include: caulking, sealants, ceiling tiles, and spray-on fireproofing (NOTE – although some specialty paints have been known to be manufactured with PCBs, these specialty paints are typically not specified for use in school building settings). During the building survey various sealants, caulking, and window glazing sealants were observed most notably gray and white caulking along the interior and exterior window frames; painted-over sealants along door frame to CMU joints, and sealants at brick to brick/CMU joints along the building exterior.

Photos of typical building sealants observed during the building survey are provided below.



Existing Data – No existing samples of suspect materials from the building have been analyzed by a laboratory to determine PCB presence and concentration.

Physical Condition and Chlorine Screening - The absence of chlorine in a certain building material is one line-of-evidence that PCBs may not be present within that building material (since chlorinated organics are a key component of PCBs). However, chlorine presence cannot be assumed to indicate PCB presence because many sealants and other building materials contain other chlorinated compounds as part of their composition. During the survey, 31 samples of various sealants, caulking, and additional materials were collected from locations throughout the building's interior and exterior. The samples were screened for chlorine content using a handheld Niton X-Ray Fluorescence (XRF) Analyzer. The results of XRF screening are presented on Table 1 (interior) and Table 2 (exterior). A physical description of each

material (brittle, pliable, exposed or covered with another coating, such as paint, etc.) is also included on the tables.

Based on chlorine screening data (via XRF) collected at other buildings, a typical percent chlorine level has been established at which below this level, subsequent bulk samples for laboratory analyses typically would not correspond to PCB levels at ≥ 50 ppm, the Federal regulatory threshold for PCB Bulk Product Waste. Correlation to higher levels of chlorine to potential PCB concentrations are inconclusive with regard to PCB presence ≥ 50 ppm since other chlorinated compounds may be present in the samples. A review of the data indicated that 95% of the interior samples and 80% of the exterior samples screened fell within this lower chlorine screening level.

Summary

Overall observations included the following:

- Caulking and glazing sealants were observed throughout the building, primarily associated with window and door systems and expansion joints; the majority of the sealants were observed to be intact and pliable; given the date of construction of the building, these materials are considered suspect for PCBs.
- Numerous types of window systems and window styles were present at individual buildings and even within rooms of buildings. Numerous windows appear to have been updated over time and repair projects (replacement sealants) are evident in some areas. Most buildings had some single-pane windows that appear to be original construction.
- ***The spray-on fireproofing material at Osborn Hill gymnasium ceiling (primary driver for indoor air PCB levels) was <u>not</u> observed at the school.***
- A review of the Osborn Hill data indicated that a sealer applied to the stone tile flooring in a hallway was tested and found to contain PCBs. It is not known if this material was manufactured with PCBs or contained PCBs as a result of a cross-contamination effect from the gymnasium source. During the building surveys, a similar stone tile flooring was observed at Fairfield Warde High School. It is not known if this visually similar flooring at these schools were covered with the same sealer used at Osborn Hill.
- A review of the data indicated that 95% of the interior samples and 80% of the exterior samples screened fell within this lower chlorine screening level.

Management Program – PCBs in Building Materials

The findings of the initial screening process, as described above, serve as the starting point to develop a management program for building materials that may contain PCBs. This program can be separated into two components: 1) Near-term or Best-Management Practices; and 2) Longer-term or Material Management During Renovations. The overall goal of the program is to minimize or eliminate potential exposures to PCB-containing materials until these materials are removed from the building during planned renovation or building improvement projects.

<u>Near Term or Best Management Practices</u>

It is important to make a distinction between the mere presence of a PCB-containing building material and exposure potential. As presented in EPA guidance, presence of a regulated PCB-containing material

within a given building does not necessarily equate to an exposure risk. In order for this condition to occur there needs to be a complete pathway established between the source and the individual through a transport mechanism, such as direct contact/transfer or indoor air (refer to Appendix A for additional discussion).

Our initial recommendation is to follow EPA and CTDEEP recommended best management practices to reduce potential exposure to PCBs from suspect building materials in schools. These practices include:

- Improve ventilation and add exhaust fans, as needed
- Avoid direct contact with suspect materials within reasonable means
- Clean frequently to reduce dust and residue inside buildings
- Use a wet or damp cloth or mop to clean surfaces
- Using vacuums with high efficiency particulate air filters
- Do not sweep with dry brooms; minimize the use of dusters near areas with caulk
- Wash children's toys often
- Encourage proper hygiene amongst staff and students (i.e. wash hands with soap and water regularly, particularly before eating or drinking)

Based on the screening survey findings, additional recommendations include:

- Since a higher percentage of exterior samples screened higher for chlorine content, direct contact with areas adjacent to caulking, sealants or other suspect materials not known to be replaced after 1980 should be avoided and/or minimized; depending on locations, some sealants in these areas could be temporarily covered, if feasible.

Longer-term or Material Management During Renovations

As indicated above, as part of building renovation activities at several schools, samples of suspect PCB-containing materials (such as caulking and sealants) have been collected and analyzed by a laboratory in order to determine presence and concentration. Several of these samples detected PCB concentrations in excess of disposal thresholds as indicated in EPA's and CTDEEP's regulations and/or guidance. As such, proper abatement specifications and plans are being developed to properly manage and dispose of off-site the subject materials as part of the renovation project. This process of properly removing and managing regulated materials during renovation projects is implemented for other regulated building materials, such as asbestos or lead-based paint.

It is recommended that the School District "roll" the assessment of PCB-containing materials into the overall regulated building material program being implemented by the District for renovation projects. It is our understanding that the following projects are being considered in the Fairfield Public School Facilities master plan for 2011-2020 (for the 13 schools included in the screening survey). A window replacement project is planned at this location.

Table 1

Interior Chlorine Screening Results - Fairfield Warde High School

Wall Seam Screening Results				
Sample ID	**%**	**Location**	**Materials**	**Description**
FWHS-NEE-009	0.2602	Northeast Entrance	Brick to brick seam	Beige over silver, Partially intact, Exposed
FWHS-LG-015	0.1283	Large Gym	vertical steel to CMU joint	Gray, Hard, Intact, Painted
FWHS-SG-017	0.2621	Small Gym	vertical steel to CMU joint	White, Pliable, Intact, Painted
FWHS-MEH-019	0.1202	Main Entrance Hallway	Brick to brick seam	Brown, Hard
Door Caulking Screening Results				
Sample ID	**%**	**Location**	**Materials**	**Description**
FWHS-F42-001	0.095	Room 42	Steel door frame to CMU	White, Pliable, Intact, Painted
FWHS-F39H-005	0.2484	Room F39 Hallway	Door frame to CMU	White, Pliable, Intact, Painted
FWHS-T16-011	0.4424	Room T16	Steel door frame to CMU	White, Pliable, Intact, Painted
FWHS-T11H-012	0.1737	Room T11 Hallway	Steel door frame to CMU	White, Pliable, Intact, Painted
FWHS-GH-014	0.5728	Gym Hallway	Boys locker door frame to unpainted brick	Hard, Intact, Exposed
FWHS-LG-016	0.1978	Large Gym	Steel door frame to CMU	Black, Pliable, Intact, Painted
FWHS-AUD-018	0.2465	Auditorium/Stage	Door frame of changing room to CMU	Black, Pliable, Painted
Window Caulking Screening Results				
Sample ID	**%**	**Location**	**Materials**	**Description**
FWHS-F42-002	0.358	Room 42	T1 SPA window frame to CMU	White, Pliable, Intact, Painted
FWHS-F42-003	0.0498	Room 42	T1 SPA window glass to metal lower pane	Pliable, Intact, Exposed
FWHS-F42-004	0.2123	Room 42	T1 SPA window glass to metal upper pane	Gray, Hard, Intact, Exposed
FWHS-F39H-006	0.3516	Room F39 Hallway	T2 SPA window metal to glass	Gray, Pliable, Intact
FWHS-F22-007	0.3832	Room F22	T3 Ext window metal to CMU/metal	Gray
FWHS-SEE-008	0.1077	Southeast Entrance	T4 SPA window frame to brick	Pliable, Intact, Exposed
FWHS-T16-010	0.1615	Room T16	T5 window metal to glass	Pliable, Intact, Exposed
FWHS-MEH-021	0.1574		T4 SPA window frame to brick	Gray, Pliable, Intact, Exposed
'Other' Caulking Screening Results				
Sample ID	**%**	**Location**	**Materials**	**Description**
FWHS-BAS-013	0.0772	Basement	Duct	Red, Intact, Exposed

Notes:

1. CMU - Concrete Masonry Unit
2. Int - Interior
3. Ext - Exterior
4. DPA - Double-Paned Aluminum Window Frame
5. SPA - Single-Paned Aluminum Window Frame

Table 2

Exterior Chlorine Screening Results - Fairfield Warde High School

Wall Seam Screening Results				
Sample ID	**%**	**Location**	**Materials**	**Description**
FWHS-BE-023	0.3148	Building Exterior	Brick to brick seam; Townsend House office	Gray, Pliable, Intact, Exposed
FWHS-BE-031	0.06	Building Exterior	Brick to brick seam	Beige, Pliable, Intact
Door Caulking Screening Results				
Sample ID	**%**	**Location**	**Materials**	**Description**
FWHS-BE-024	1.18	Building Exterior	Door frame to brick; Fitts House	Brown/Gray, Pliable, Intact, Exposed
FWHS-BE-027	0.1163	Building Exterior	Basement door	Hard, Weathered, Painted
FWHS-BE-030	0.1734	Building Exterior	Door frame	Weathered, Exposed
Window Caulking Screening Results				
Sample ID	**%**	**Location**	**Materials**	**Description**
FWHS-BE-022	0.1798	Building Exterior	T4 SPA window glass to metal	Gray, Pliable, Intact, Exposed
FWHS-BE-025	9.75	Building Exterior	Window frame to brick	Brown, Pliable, Intact, Exposed
FWHS-BE-026	0.1198	Building Exterior	Window metal to glass	Brown, Pliable, Intact, Exposed
FWHS-BE-028	0.144	Building Exterior	Sill to brick	Hard, Weathere, Exposed
'Other' Caulking Screening Results				
Sample ID	**%**	**Location**	**Materials**	**Description**
FWHS-BE-029	0.0913	Building Exterior	Vent	Pink, Pliable, Weathered, Exposed

Notes:

1. CMU - Concrete Masonry Unit
2. Int - Interior
3. Ext - Exterior
4. DPA - Double-Paned Aluminum Window Frame
5. SPA - Single-Paned Aluminum Window Frame