EBC Emerging Contaminants Program

Identifying and Addressing Risks from PCBs in Building Materials
Welcome

Frank Ricciardi

Chair, EBC PCB & Emerging Contaminants Subcommittee

Vice President
Weston & Sampson
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Environmental Business Council of New England
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McLane
Middleton

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Introduction and Overview: What You Will Learn

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Ransom Consulting, Inc.
Reoccupancy Testing – Regulatory Requirements and Achieving Compliance

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Team Leader, PCB Technical Lead
Weston & Sampson
Reoccupancy Testing – Regulatory Requirements and Achieving Compliance

EBC
May 10, 2019
Topics

• Quantifying Risk Following PCB Abatement Activities
• Standards and Methods to Demonstrate Compliance
• Case Study and Lessons Learned
Agenda

• History of Use
• Risk-Based Standards
• Air Sampling Methods
• Reporting Limits
• Case Study
History of Use

• PCBs sold for use in building materials from 1950s to 1972
  – Materials remained in stock -1950 to 1980 construction is suspect

• PCBs enhanced material properties and lengthened useful lifetime

• Approximately 115,000,000 pounds of PCBs sold for use in building materials
Post-Abatement Reoccupancy

- Air sampling required by EPA Region 1 following PCB abatement activities
- Demonstration that risk of continued use is acceptable
- Compliance standard based upon use
- Different standards for school, industry and residential use
School Standards

<table>
<thead>
<tr>
<th>Age</th>
<th>1-&lt;2</th>
<th>2-&lt;3</th>
<th>3-&lt;6</th>
<th>6-&lt;12</th>
<th>12-&lt;15</th>
<th>15-&lt;19</th>
<th>&gt;19</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCB (ng/m³)</td>
<td>100</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>500</td>
<td>600</td>
<td>500</td>
</tr>
</tbody>
</table>

- Exposure Levels for Evaluating PCBs in School Indoor Air
- Developed based upon risk assessment
- Exposure timeframes are specific to school use
- Not suitable for other use scenarios
## Work Place Standard

<table>
<thead>
<tr>
<th>PCB (ng/m³)</th>
<th>21</th>
<th>PCB (High Risk)</th>
</tr>
</thead>
</table>

- EPA Region IX Regional Screening Level (RSL)
- Composite Worker Indoor Air
- Developed based upon same risk assessment
- TR = 1E-06 and THQ = 1
### Residential Standard

<table>
<thead>
<tr>
<th>PCB (ng/m³)</th>
<th>4.9</th>
<th>PCB (High Risk)</th>
</tr>
</thead>
</table>

- EPA Region IX Regional Screening Level
- Residential Indoor Air
- Developed based upon same risk assessment
- TR = 1E-06 and THQ = 1
- Typically rounded up to 5 ng/m³
Methods

• Low Volume
  – EPA Method TO-4A
  – Suitable for Indoor Air Testing
  – EPA Method 680 (PCBs by Homologs)

• High Volume
  – EPA Method TO-10A
  – Overkill for Indoor Air Testing
  – Ambient Air or Detailed Risk Assessment
  – EPA Method 1668 (PCBs by Congeners)
Reporting Limits

- Important, Very Important
- Lab Reports Total Mass/Sampling Device
- Amount of Air Sampled will Determine Reporting Limits for Comparison to Risk Standard
  - Sample Minimum of 2 m$^3$, (~7 hrs @ 5 L/min)
  - Recommend 4-5 m$^3$
- For Non-Detect, ½ RL May Not Be Acceptable
Case Study

- Residential Facility
- PCBs Found in Paints and Caulks
- Abatement Performed, Facility Cleaned and Painted
- Reoccupancy Air Testing Performed
- Facility Recleaned and Air Exchanges Performed
Case Study

- Volatilization, Really?
- Percentages of Homologs in Air Samples do not Match Percentages in Parent Aroclor
- Percentages of Homologs in Air Samples Change with Time
Case Study

- Sample Results, Average of Two Data Points Each Event
- Abatement (November)
- Cleaning and Painting (February)
- Another Cleaning (April) and Air Exchanges for Three Weeks
Case Study

- Sample Results, Average of Two Data Points Each Event
- Abatement (October)
- Cleaning and Painting (February)
- Another Cleaning (April) and Air Exchanges for Three Weeks

![Graph showing air quality data for Building B over time, with peaks and troughs indicating changes in chemical levels from March 13, 2018 to December 11, 2018.]
Lessons Learned

• Jump in air concentrations following abatement
  – Common
  – MA DPH gave paper on this observation
  – Reason ???

• Don’t rush reoccupancy air sampling
Lessons Learned

• Additional Cleaning
  – Abatement with NPE important but that prevents more dust in abatement area
  – Recommended if dust considered to be present
  – Check duct work, above ceilings
  – Additional disturbance to system, don’t rush to sample following cleaning
Lessons Learned

• Air Exchanges
  – Recommended if air handling system malfunctioning or not present
  – Removal of minimal mass
    • 1,000 CFM at 100 ng/m$^3$ = 0.0033 pounds/year
  – Where does the makeup air come from?
  – Turn off the AC if you can
Summary

- Reoccupancy Testing
  - Choose the Correct Standard
  - Choose the Correct Sampling Procedure and Analysis
  - Cleanliness and Time are Important Factors
  - Air Exchanges and Temperature Lesser
Weston & Sampson
transform your environment
Comparison of Passive and Active Air Sampling (PAAS) Method for PCBs

Gary Hunt

Vice President and Principal Scientist

TRC
Comparison of Passive and Active Air Sampling (PAAS) Methods for PCBs – A Pilot Study in New York City Schools

Friday, May 10, 2019

McLane Middleton
300 Trade Center, 7th Floor, Woburn, MA

Presented By
Gary Hunt, QEP
TRC Environmental Corporation
Lowell MA 01854

EBC Emerging Contaminants Program
Identifying and Addressing Risks from PCBs in Building Materials
Topics of Discussion

1. PCBs – General Background
2. NYC Pilot Study
3. Ballast and Caulking – PCB Sources
4. Secondary ("Sink") Sources
5. PAAS Pilot Study Description
6. PAAS Methodology
7. PCB Results
8. Quality Assurance / Quality Control
9. Recommendations for Further Study and Data Analyses Plans
PCBs In General

• 1.4 billion pounds of PCBs produced in U.S. between 1925 and 1978.

• Used in consumer products, electrical equipment, and building materials.

• Beginning in 1950, caulk containing PCBs was used in constructing and renovating buildings throughout the entire country.

• Congress banned the manufacture of PCBs in 1978 (TSCA).

• EPA issued its first national guidance on PCBs in caulk in September 2009.
Some Attractive Properties –
Aroclor 1248-CIRCA 1956

- Fire Resistant
- Non Drying
- Inert/Stability
- Heat Transfer
- Electrical Resistivity
- Water Insoluble
- Soluble in Organics
- Adheres to Surfaces
- Low Costs
- Long Life Time
Domestic Uses of PCBs (1930 – 1975) (Based upon sales records)

Source: USEPA PCBs in the US – Industrial Use and Environmental Distribution, February 1976 (EPA 560/6-76-005)
Pilot Study Background – New York City

- The City reached an agreement with EPA to conduct a pilot study of five New York City school buildings to further evaluate the risk and management of PCB Caulk.
  - The ultimate goal of the Pilot Study is to develop a citywide approach for assessing and managing PCB Caulk in schools built between 1950 and 1978.

- First and only study in the U.S. of this scope and magnitude.
PCB Ballasts

Typical ballast in a NYC school fluorescent light fixture
### PCB Containing Fluorescent Light Ballast Survey Results NYC Pilot Study Schools

<table>
<thead>
<tr>
<th>School</th>
<th>Ballasts Not Containing PCBs</th>
<th>Ballasts Likely Containing PCBs</th>
<th>Total Ballasts in School</th>
<th>% Ballasts Likely Containing PCBs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>310</td>
<td>417</td>
<td>727</td>
<td>57%</td>
</tr>
<tr>
<td>2</td>
<td>114</td>
<td>373</td>
<td>487</td>
<td>77%</td>
</tr>
<tr>
<td>3</td>
<td>344</td>
<td>275</td>
<td>619</td>
<td>44%</td>
</tr>
<tr>
<td>4</td>
<td>48</td>
<td>879</td>
<td>927</td>
<td>95%</td>
</tr>
</tbody>
</table>

Source: EPA/600/R-12/051
Room Air Concentrations – Post Ballast Failure (“Burns Out”) Event vs. Time

During Ballast Failure Event – 11,600 ng/m³
After 12 months – 200 ng/m³

Source: MacLeod 1981 EST (Vol. 15 No. 8)
EPA Test Chamber Results – Ballast “Burst” Event Aroclor 1254 Concentrations and Emission Rates Over Time

Reference: Guo Z et al USEPA EPA/600/R-11/156 October 2011 Tables 4.15 and 4.16
Typical PCB Caulk Locations

- Door Frames
- Bathroom Fixtures
- Window Casings
PCB Interior Caulk
NYC Schools Pilot Study Results

Source: EPA/600/R-12/051
SOME FEATURES

• Adsorb PCBs overtime emitted into room air from Primary Sources.
• Once Primary Sources are removed, sink sources will continue to re-emit sorbed PCBs.

PAINTS

• Important Source.
• Represent Large Surface Areas.
• High Concentrations – NYC Schools (median 39.1ppm/143 samples).
Estimated Total PCB Emission Rates
School Gymnasium

- 1360 ng/m³ – PCBs Room Air Measured
- 460 ng/m³ – Max PCBs Predicted Caulk Emissions (AER = 0.5)
- 900 ng/m³ – PCBs Non Caulk Sources (Balance)
- 1162 µg/hr – PCBs Non Caulk Predicted Emissions (All Sources)

Estimated Total PCB Emission Rates – Comparison of Primary and Selected Secondary Sources – School 2 Gymnasium (Adapted from Figure 4-5. EPA/600/R-12/051 September 2012).
PAAS Pilot Study—Purpose and Objectives

• Side-by-side comparison of passive and active sampling methods in actual school settings.

• Assess whether a passive sampling method for PCBs could be used as a cost effective approach in lieu of active sampling for measurement of PCBs in schools.

• Comparison of total PCB concentrations resulting from both Aroclor and congener- specific analyses.
Study Design – Key Features

- Side-by-side contemporaneous sampling events with both passive and active sampling methods (EPA Method TO-10A).

- Screening level measurements performed using active method at two (2) of five (5) NYC pilot schools expected to have PCB concentrations in the range of 50-500 ng/m³.

- PAAS study conducted over a six (6) day period employing both sampling methods.

- Analyses performed using both Aroclor® method (SW-846 8082A) and PCB congener method (EPA Method 1668A).
### School A

<table>
<thead>
<tr>
<th>Sampling Location</th>
<th>Total PCBs (ng/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room 118 (therapist office)</td>
<td>49.8</td>
</tr>
<tr>
<td>East Stairs (top half-landing)</td>
<td>205.8</td>
</tr>
</tbody>
</table>

### School B

<table>
<thead>
<tr>
<th>Sampling Location</th>
<th>Total PCBs (ng/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast Stairs B (top half-landing)</td>
<td>400</td>
</tr>
<tr>
<td>Southwest Stairs D (top half-landing)</td>
<td>478</td>
</tr>
</tbody>
</table>

*Schools and locations were acceptable for use in the PAAS Study. Results in the range of 50-500 ng/m³*
Active Sampling Method Description

- SKC Air Check ® XR-5000 Personal Pump.
- Flow rate 2.5 lpm.
- 48-hour sampling period.
- Samples in series 3 x 48 hrs = 6-day passive sampling duration.
- 7.2 m3 / event x 3 = 21.6 m3 total.
Passive Sampling Method Description

- TISCH Model TE-200-PAS (2 dome design)
- PUF disks 5.5-inch diameter x 0.5-inch depth
- Sampling rate 0.8 m³/day* = 4.8 m³ (6-day event)

*Hazrati and Harrad, Calibration of polyurethane foam (PUF) disk passive air samplers for quantitative measurement of polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs): Factors influencing sampling rates, Chemosphere 67 (2007).
Sampling Locations

Samplers were deployed at each of the eight (8) locations as follows:

• Two collocated passive samplers in the center of the room or mounted to the stairwell wall at approximately 4½ feet (breathing zone height), one for PCB Aroclor→analysis and one for PCB congener analysis.

• Two collocated active samplers in the center of the room or near stairwell at approximately 4½ feet (breathing zone height), one for PCB Aroclor→analysis and one for PCB congener analysis.

• One passive sampler mounted on the wall at an elevation of approximately 8 feet above floor level for PCB Aroclor→analysis to evaluate impact of placement on results (vs. breathing height).
School A Classroom Sampling Locations

Passive samplers at breathing height (Aroclor and congener analyses)

Active samplers at breathing height (Aroclor and congener analyses)

Passive sampler at elevation (8 ft.) for PCB Aroclor analyses.
School B Passive/Active Stairwell Location

TISCH Model TE-200-PAS
(5.5 inch x 0.5 inch PUF Pad)
School B Passive/Active Stairwell Location – Breathing Height

Collocated Samplers
(2 Aroclor; 1 Congener)
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Instrument</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>Dickson TP 425</td>
<td>Monitored continuously at each sampling location.</td>
</tr>
<tr>
<td>Humidity</td>
<td>Dickson TP 425</td>
<td>Monitored continuously at each sampling location.</td>
</tr>
<tr>
<td>Barometric Pressure</td>
<td>Extech SD 700</td>
<td>Monitored at one representative location in each school.</td>
</tr>
<tr>
<td>Air Flow</td>
<td>TSI 964 Straight Air Velocity Probe</td>
<td>Room exhaust vents; near passive sampler inlets.</td>
</tr>
</tbody>
</table>
## QA/QC Measures

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Duplicates</td>
<td>Collocated Samples; One pair active and one pair passive at each school; PCB Aroclor&lt;sup&gt;→&lt;/sup&gt; analyses only.</td>
<td>RPD &lt; 30% for all pairs; met QAPP criteria.</td>
</tr>
<tr>
<td>Breakthrough Checks</td>
<td>One sample per school active only; separate analyses PCB Aroclors&lt;sup&gt;→&lt;/sup&gt; front and back half PUF.</td>
<td>≤ 100 ng / Trap back half; met QAPP criteria.</td>
</tr>
<tr>
<td>Field Spikes</td>
<td>PUF cartridges spiked with Aroclor&lt;sup&gt;→&lt;/sup&gt; 1254 in lab, sent to field and no air drawn over cartridge; one per school.</td>
<td>Aroclor&lt;sup&gt;→&lt;/sup&gt; 1254 Percent recovery met QAPP criteria (50-150%).</td>
</tr>
<tr>
<td>Field Blanks</td>
<td>One field blank per school for each method (active and passive) PCB Aroclor&lt;sup&gt;→&lt;/sup&gt; analyses performed.</td>
<td>PCB Aroclors&lt;sup&gt;→&lt;/sup&gt; not detected.</td>
</tr>
<tr>
<td>Field Surrogate</td>
<td>All passive and active sample media pre-spiked with DCB. Percent recovery data used to evaluate collection efficiency.</td>
<td>All surrogate percent recovery data met QAPP criteria.</td>
</tr>
</tbody>
</table>
## Summary of PCB Congener Results (EPA Method 1668A)

<table>
<thead>
<tr>
<th>Location</th>
<th>Total PCB Concentration (ng/m³)</th>
<th>RPD %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School A Locations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Room 118 (therapist office)</td>
<td>75.5</td>
<td>23.5</td>
</tr>
<tr>
<td>East Stairs (top half-landing)</td>
<td>171</td>
<td>111</td>
</tr>
<tr>
<td>North Stairs (top half-landing)</td>
<td>97.2</td>
<td>110</td>
</tr>
<tr>
<td>West Stairs (top half-landing)</td>
<td>103</td>
<td>93.3</td>
</tr>
<tr>
<td><strong>School B Locations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast Stairs B (top half-landing)</td>
<td>198</td>
<td>210</td>
</tr>
<tr>
<td>Southeast Stairs A (top half-landing)</td>
<td>229</td>
<td>329</td>
</tr>
<tr>
<td>Northwest Stairs C (top half-landing)</td>
<td>164</td>
<td>178</td>
</tr>
<tr>
<td>Southwest Stairs D (top half-landing)</td>
<td>233</td>
<td>333</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: ng/m³ - nanograms per cubic meter.
PCBs - Polychlorinated Biphenyls.

% RPD = \[rac{\text{ABS Passive} - \text{Active}}{\text{Active} + \text{Passive}} / 2\] x 100.
# Comparison of PCB Aroclor Results – Collocated Samples

<table>
<thead>
<tr>
<th>Location</th>
<th>Sample Type</th>
<th>ng/m³</th>
<th>% RPD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School A</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Stairs Landing</td>
<td>Active</td>
<td>236</td>
<td>228</td>
</tr>
<tr>
<td>West Stairs Landing</td>
<td>Passive</td>
<td>95.3</td>
<td>112</td>
</tr>
<tr>
<td><strong>School B</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northwest Stairs C Landing</td>
<td>Active</td>
<td>310</td>
<td>282</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Avg: 296</td>
</tr>
<tr>
<td><strong>School B</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northwest Stairs C Landing</td>
<td>Passive</td>
<td>260</td>
<td>269</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Avg: 265</td>
</tr>
</tbody>
</table>

% RPD = \[\frac{\text{ABS}(X_2-X_1)}{X_2 + X_1 / 2}\] x 100
## Comparison of Precision Results (% RPD) Types of Active / Passive Collocated Sample Pairs

<table>
<thead>
<tr>
<th>Type</th>
<th>% RPD</th>
<th>Type</th>
<th>% RPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active School A</td>
<td>3.4</td>
<td>Active Average (A/B)</td>
<td>6.5</td>
</tr>
<tr>
<td>Active School B</td>
<td>9.5</td>
<td>Passive Average (A/B)</td>
<td>9.8</td>
</tr>
<tr>
<td>Passive School A</td>
<td>16.1</td>
<td>School B Active vs. Passive (Average Values)</td>
<td>11.0</td>
</tr>
<tr>
<td>Passive School B</td>
<td>3.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Some Future Plans and Further Data Analyses

- Do congener-specific data support Aroclor 1254 identification (Method 8082)?
- Do congener-specific data provide any evidence that high molecular weight PCB congeners that are likely particle bound are not represented in passive samples?
- Use results from active samples to develop a correction factor for passive samples (calibrate passive samplers).
- Did sampler placement affect results? Sampler at breathing height vs. sampler at elevation (8 ft).
- Side-by-side comparison of both types of TISCH passive samplers (TE-200-PAS and TE-300-PAS).
Acknowledgements

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• PACE Analytical
Questions?

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School Building Selection for Further Investigation and Prioritization for Study

Some Criteria to Consider

- Construction Vintage (1950-1978)
- Presence of PCB Containing Ballast Lighting Fixtures – (Visual Inspection/Signage/Leakage/Records)
- Age of Occupant Student Population (Kindergarten > Elementary > Middle School > High School)
- Indoor Air Concentration – PCBs
- Caulk in Place – Physical Condition
- Ventilation System – Status – Adequate AER to Improve Indoor Air Quality
Comparison of Passive and Active Air Sampling (PAAS) Method for PCBs

Matthew Preston
Chief Infrastructure Manager
AND
Greg Mackey
EHS Manager, EnviroVantage
Emerging Contaminants Program
PCB Air Sampling and Encapsulation Panel:
PCB Encapsulation Discussion

Presented by:

EnviroVantage
ASBESTOS ABATEMENT. REMEDIATION. DEMOLITION.

May 10, 2019
Sample Project: Paint

• Removal of 3000 sqft of PCB-contaminated paint present on horizontal and vertical surfaces in the north and south gallery hallways on the third floor of the 1970s Building;

• Encapsulation of areas where PCB-contaminated paint was removed using two dissimilarly colored epoxy coatings (Sika 62 Epoxy Coating) or other approved alternative method;
Sample Project: Caulking

- Removal of PCB-contaminated caulking present between the concrete panel joints in the north and south gallery hallways on the third floor of the 1970s Building;

- Encapsulation of areas where PCB-contaminated caulking was removed from interior and accessible exterior concrete surfaces (window openings/sills, door frames, concrete panel joints, air exhaust vents), using two dissimilarly colored epoxy coatings (Sika 62 Epoxy Coating) or other approved alternative method;

- Detailed cleaning of surfaces/materials in additional areas to abate potentially PCB-contaminated dust.
Surface Preparation Methods:

- Shot blasting
- Eco Scarifying
- Water jetting w/ vacuum recovery
- Chemical stripping – paint
Cost Analysis: Surface Preparation for 3000 sqft

Sand blasting
- 10-15k – labor, containment, mobilization, PPE,
- Double part epoxy – Sika 62 - $1000/10 gallons. 160sq ft/gallon
- $17,000 - $20,000

Hydroblaster
- $12-13k labor + disposal
- 1000/10 gallons. 160sq ft/gallon
- $3,750 materials – 6000 sqft total
- $16,000-$17,000: The advantage with Hydro Blast is the efficiency or time savings.

Chemical Stripping
- Pirana 4 – no mechanical means
- Materials - $350 – 5 gallon bucket
- Labor – Determined by required schedule
- $26,500.00: Much more time/labor intensive.

Eco-scarifying
- This is similar to sand blasting with less waste due to not introducing blast media. $16,000.00

Encapsulation no surface prep
- ¼ inch diamond plate $100/32 sq ft. $9,375.00
- Labor and equipment $6,500.00
- $15,875.00
Encapsulation Methods:
Sika 670 product – 2 Part Epoxy System – 2 Coats – Different Colors

• Sika 670W Clear is a clear, water-based acrylic protective coating. Sika 670W Clear prevents moisture ingress, is water vapor permeable, and provides an excellent carbonation barrier. Where to use protective coating for exposed aggregate surfaces, concrete, masonry and brick. Application on vertical, overhead and Horizontal (non-traffic bearing) surfaces.


Encapsulation Cost Analysis Considerations:

- All coverage is dependent on porosity of substrate. In addition, allowance must be made for surface profile. Unavoidable variation in application thickness, loss and waste. Normal coating system is one coat minimum at a total nominal dry film thickness of 2.3 mils. The total number of coats depends on the porosity of the substrate. On very porous substrates, two coats will typically be required. Packaging 5 gallon, re-closable plastic pails

- Ordering, receiving, installation. 2 hours to mix

- Unused Sika670 needs to be part of a hazardous waste pick up program

- Cost of blades on a scarifier

- Additional effects running a fossil fuel engine. Pneumatic lines

- Audio metric readings – air compressors on site, fuel cost, potential secondary containment cost

- Barrier for noise reduction – occupied space or working off hours – OT costs

- Not smooth – need a finish

- Not for heavy industrial use
Encapsulation Alternative: Diamond Plate

3/16" DIA. SCREW ANCHORS @ 16" OC INTO CMU PRIOR TO REMOVING THE WALL BELOW (TYP)

CONT. 358T200-43 TRACK FOR EXG 4" CMU OR CUSTOM-FORMED CONT. 18 GA. X 5 5/8" WIDE X 2" FLANGE FOR 6" CMU (TYP)

3/16" DIA. SCREW ANCHORS @ 16" OC INTO CONCRETE SLAB ABOVE. LOCATE SCREWS AS CLOSE TO THE BENT PORTION OF COLD-FORMED MATERIAL AS POSSIBLE BUT NO FURTHER THAN 3/4" FROM FACE OF CMU (TYP)

CONT. 16 GAUGE, L-SHAPED COLD-FORMED GALVANIZED MATERIAL. SHORT LEG TO BE 1 1/4"; LONG LEG TO BE FIELD DETERMINED (EXTEND TO BOTTOM OF CUT COURSE) (INSTALL ON EACH SIDE OF CMU)

3/16" DIA. SCREW ANCHORS @ 24" OC INTO CMU THROUGH BOTH LAYERS OF COLD-FORMED MATERIAL AFTER REMOVING THE WALL BELOW (TYP)

NOTE: COAT ALL EXPOSED CAULKING WITH TWO SPRAYED COATS OF SHERWIN WILLIAMS PRO INDUSTRIAL PRE-CATALYZED WATERBASED EPOXY, EXTENDING AT LEAST 3" BEYOND THE LIMITS OF THE CAULKING IN BOTH DIRECTIONS.

¼ in Diamond Plate – $100 for 32sqft
Lifecycle:

• In 2006, a School planned to replace the original windows of the 1970s Building with energy-efficient windows. While it was in the process of doing so, the window caulking surrounding the metal window frames was found to contain PCBs. PCBs, identified as Aroclors 1254 and 1262, were detected in each of the four caulking samples at total concentrations ranging from 9,420 to 40,300 milligrams per kilogram (mg/kg). These same Aroclors were also detected in the samples of the underlying concrete at total concentrations ranging from 1,549 to 6,050 mg/kg.

• Between December 2006 and April 2010, the School, with the assistance an Environmental Consultant and under the guidance, approval and oversight of the U.S. EPA, completed a range of assessment and risk reduction activities at the 1970s Building to address PCB-contaminated building materials that included window caulking and materials, doorway caulking and materials, caulking around building panels and exterior vents, and sound-damping insulation.

• Between August 1 and 12, 2011, and pursuant to the Risk-Based Approval, the School and Environmental Consultant oversaw the following abatement activities:
  • Removal of PCB-contaminated caulking present between the concrete panel joints in the north and south gallery hallways on the third floor of the 1970s Building;
  • Encapsulation of areas where PCB-contaminated caulking was removed from interior and accessible exterior concrete surfaces (window openings/sills, door frames, concrete panel joints, air exhaust vents), using two dissimilarly colored epoxy coatings
  • Detailed cleaning of surfaces/materials in the library to abate potentially PCB-contaminated dust.

• Immediately following the encapsulation of affected surfaces, wipe samples from 45 locations were collected. PCBs were not detected in the samples at concentrations above 1 µg/100 cm².

• Since 2011, completed annual inspections of the encapsulated surfaces, repaired damaged coated surfaces and collected indoor air samples. Some observations:
  • In 2014, we noted a fair amount of deterioration of the epoxy coatings in some areas;
  • During the December 2017 inspection, we observed a fair amount of damaged epoxy coatings. So, in April 2018, we repaired the affected surfaces (see second photo log).
  • During the last inspection, completed on August 23, 2018, we collected wipe samples from 10 encapsulated surfaces. PCBs were not detected in the wipe samples at concentrations above the laboratory reporting limit of 0.5 µg/100 cm².
Thank You.

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Moderated Discussion

Moderator: Tim Snay, Ransom Consulting, Inc.

Panelists:
• Malcolm Beeler, Weston & Sampson
• Gary Hunt, TRC
• Greg Mackey, EnviroVantage
• Matthew Preston, EnviroVantage