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## MEMORANDUM

**TO:** Patrick Goddard, Director of Facilities, Town of Lexington  
Paul B. Ash, Ph.D., Superintendent, Lexington Public Schools, Estabrook Advisory Committee

**FROM:** David L. MacIntosh, Sc.D., C.I.H., Principal Scientist  
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**DATE:** December 10, 2010

**RE:** Air Samples Collected on November 20, 2010, and Surface Samples Collected on November 11, 2010, Estabrook Elementary School (EH&E 17228)

This memorandum provides results of the most recent air, surface, and bulk sampling at Estabrook Elementary School (Estabrook). The objective of the air testing was to measure levels of polychlorinated biphenyls (PCBs) in indoor air of classrooms that have been mitigated according to the interim measures planned at this time for the entire school. The objective of the surface sampling was to evaluate the continued effectiveness of the encapsulant applied to PCB-containing caulk on windows and transite panels. The objective of the bulk sampling was to determine disposal options for a room divider removed from Room 6.

### AIR SAMPLE RESULTS

The interim measures were completed in Rooms 20, 21B, 22, 23, 24, 24D, 25, 31A, 31B, 39B, 39C, and the teacher's lounge as of Sunday, November 14, 2010. Air samples were collected in those rooms from approximately 9:00 a.m. – 4:00 p.m. on Saturday November 20, 2010. Details of the interim measures and other aspects of the current indoor environmental quality (IEQ) management plan are available in the Project Update memorandum dated October 28, 2010, and the materials distributed to the Superintendent's Advisory Committee on November 4, 2010. In brief, a mini-wall was constructed in each room to encapsulate the lower panels of the curtain wall. The mini-wall separates the panels and associated PCB-containing materials from indoor air of the classroom. In addition, I-beam chases were enclosed and specific areas related to the curtain wall were sealed with new caulk or foam insulation. Areas sealed included edges of the

mini-wall, metal-to-metal joints of aluminum framing, and original caulking at the intersection of horizontal and vertical aluminum frames.

Operating conditions for heating and ventilation during the air testing were standard for winter conditions, in accordance with the current IEQ management plan. The thermostat in each room was set to 70 degrees Fahrenheit (°F).

As shown in Table 1, PCB concentrations in indoor air of the rooms tested ranged from 25 nanograms per cubic meter ( $\text{ng m}^{-3}$ ) to  $188 \text{ ng m}^{-3}$ . These PCB concentrations are within the most conservative annual average levels for all ages suggested by the site-specific assessment ( $230 \text{ ng m}^{-3}$ ). In addition, these concentrations are well below the public health levels for annual average concentrations suggested by the U.S. Environmental Protection Agency (EPA) for children older than 6 years ( $300 \text{ ng m}^{-3}$ ) and adults ( $450 \text{ ng m}^{-3}$ ). Rooms 20, 22, 31A, and 39B were less than the EPA's suggested annual average levels for children less than 6 years old ( $100 \text{ ng m}^{-3}$ ).

Two additional rounds of testing were conducted at Estabrook on November 24 and December 2, 2010. These samples are currently being analyzed with results due to arrive on December 13 and 20, 2010 respectively.

**Table 1** Air Sample Results for Total Polychlorinated Biphenyls, Estabrook Elementary School, 117 Grove Street, Lexington, Massachusetts, July 22, 2010 – November 20, 2010\*

Sample Location	Total PCBs (ng/m <sup>3</sup> )									
	Round 1 <sup>a</sup>	Round 2 <sup>b</sup>	Round 3 <sup>c</sup>	Round 4 <sup>d</sup>	Round 5 <sup>e</sup>	Round 6 <sup>f</sup>	Round 7 <sup>g</sup>	Round 8 <sup>h</sup>	Round 9 <sup>i</sup>	Round 10 <sup>j</sup>
Room 1	299	426	118 <sup>†</sup>	63 <sup>†</sup>	76 <sup>†</sup>	153 <sup>†</sup>	145	–	116	–
Room 2	–	775	455	189	166	253 <sup>†</sup>	53	–	60	–
Room 3	–	–	–	–	–	364 <sup>†</sup>	111	–	110	–
Room 4	–	–	–	–	–	344 <sup>†</sup>	126	105	–	–
Room 5	459	736	320	196	149	209 <sup>†</sup>	67 – 90	–	128	–
Room 6	1,800	764	483	171	213	383 <sup>†</sup>	182	118 – 144	–	–
Room 7A	–	–	5.19	–	–	–	–	–	–	–
Room 11	–	–	–	–	–	–	–	–	65	–
Room 13	319	340	184	155 <sup>†</sup>	–	–	–	–	89 – 94	–
Room 19	–	–	–	–	–	–	–	–	12	–
Room 20	–	–	–	–	–	–	–	–	–	57
Room 21A	–	–	410	193	–	–	–	–	–	–
Room 21B	–	–	–	–	–	–	–	–	–	188
Room 22	–	–	–	–	–	–	–	–	–	25
Room 23	–	–	–	–	–	–	–	–	–	142
Room 24	680	601	226	173 <sup>†</sup>	–	–	–	–	–	105 – 107
Room 25	–	–	–	–	–	–	–	–	–	130
Room 26	–	–	–	79	–	–	–	–	–	–
Room 31A	562	575	444	–	–	282	–	–	–	94
Room 31B	–	–	–	–	–	–	–	–	–	135
Room 39B	–	419	–	–	–	–	–	–	–	64
Room 39C	342	495	245	100	–	–	–	–	–	125
Library	–	469	196	–	–	–	–	–	–	–
Art Room	–	–	194	–	–	–	–	–	–	–
Teacher Work Room	–	–	138	–	–	–	–	–	–	–
Teacher Lounge	–	–	–	–	–	–	–	–	–	89
Basement	–	–	227	–	–	–	–	–	–	–

**Table 1** Continued

Sample Location	Total PCBs (ng/m <sup>3</sup> )									
	Round 1 <sup>a</sup>	Round 2 <sup>b</sup>	Round 3 <sup>c</sup>	Round 4 <sup>d</sup>	Round 5 <sup>e</sup>	Round 6 <sup>f</sup>	Round 7 <sup>g</sup>	Round 8 <sup>h</sup>	Round 9 <sup>i</sup>	Round 10 <sup>j</sup>
Ceiling plenum (39C)	—	—	562	—	—	—	—	—	—	—
Psychologist Office	—	—	—	—	—	253	—	—	—	—
Outdoors	<3.79	<5.00	<4.20	<4.46	<4.32	<4.44	<5.54	<4.58	<4.60	<4.08

PCB polychlorinated biphenyl  
ng/m<sup>3</sup> nanograms per cubic meter  
— air sample not collected at that location

<sup>a</sup> Round 1 samples collected July 22, 2010, during summer conditions.

<sup>b</sup> Round 2 samples collected on August 25, 26 or 27, 2010, following removal of caulk around exterior window frame.

<sup>c</sup> Round 3 samples collected on September 6, 2010, following initial optimization of outdoor air delivery and central exhaust, unless otherwise noted.

<sup>d</sup> Round 4 samples collected on September 19, 2010 under optimization of outdoor air delivery and central exhaust, and indoor caulk encapsulation, unless otherwise noted.

<sup>e</sup> Round 5 samples collected on September 27, 2010 under optimization of outdoor air delivery and central exhaust, partial indoor caulk encapsulation, and isolation of ceiling tiles.

<sup>f</sup> Round 6 samples collected on September 29, 2010 under reduced outdoor air delivery, central exhaust, full indoor caulk encapsulation, and isolation of ceiling tiles.

<sup>g</sup> Round 7 samples collected on October 18 and 19, 2010 under isolation, encapsulation and air cleaner configurations.

<sup>h</sup> Round 8 samples collected on November 4, 2010 under winter outdoor air delivery, mini-wall, and full indoor caulk encapsulation.

<sup>i</sup> Round 9 samples collected on November 11, 2010 under winter outdoor air delivery, mini-wall, and full indoor caulk encapsulation.

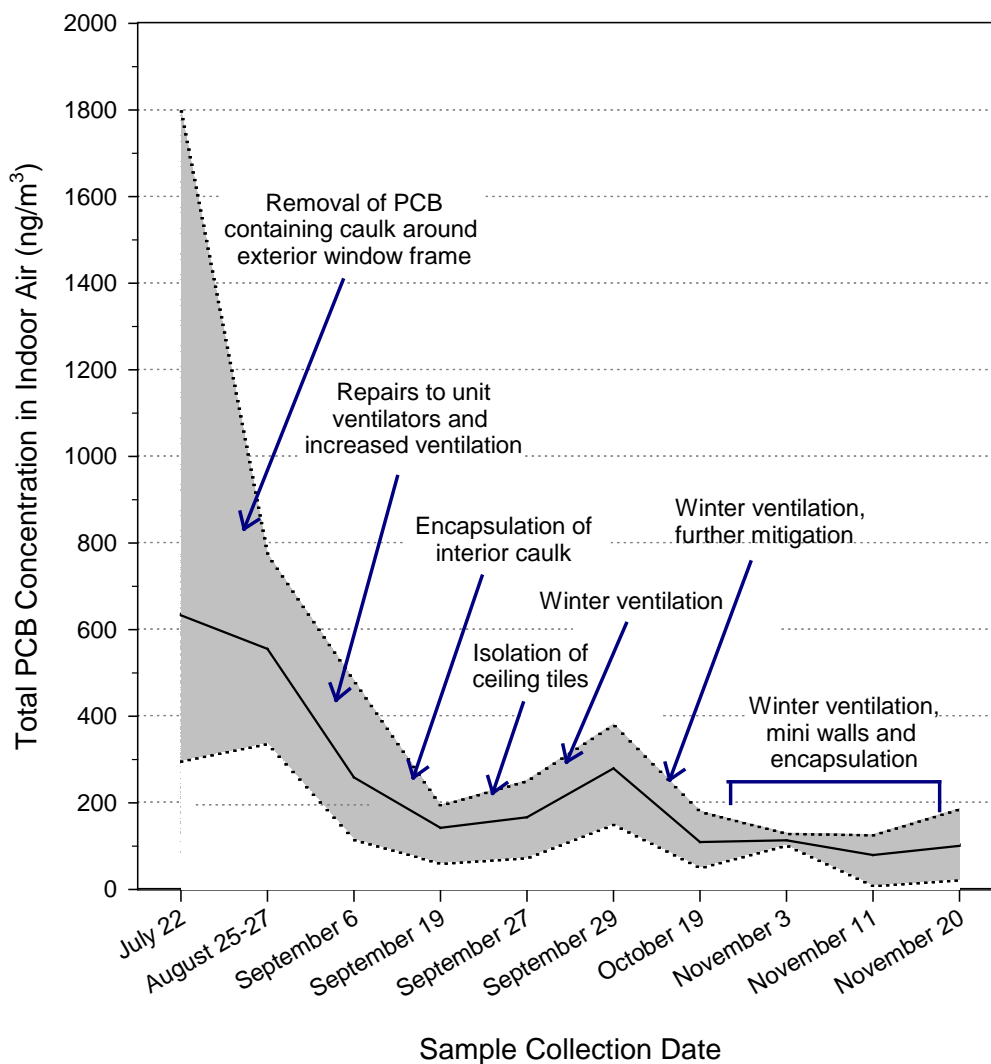
<sup>j</sup> Round 10 samples collected on November 20, 2010 under winter outdoor air delivery, mini-wall, and full indoor caulk encapsulation.

\* PCB concentration analysis performed by Alpha Analytical Inc., using U.S. Environmental Protection Agency (EPA) Method 10A (GC/MS-SIM).

† Samples collected under minimum outdoor air delivery.

‡ Sample collected with supplemental air outdoor air (1200 CFM).

A graphical summary of the PCB concentration measured in indoor air of Estabrook between July 22 and November 20, 2010, is provided in Figure 1. Indoor air PCB levels measured during Round 10 were approximately 7-fold lower than in Round 1. Similarly, a 2-fold decrease in average concentrations has been achieved since winter ventilation conditions began in late September. These observations demonstrate the effectiveness of the mitigation methods employed in the school.



**Figure 1** Average (line) and Range (shaded area) of Total PCB Concentration in Indoor Air over Time

## SURFACE SAMPLE RESULTS

Table 2 presents the interior and exterior surface sampling results used to evaluate continued efficacy of encapsulant applied to PCB-containing sealants around windows and transite panels of the school. Representative sections of the encapsulated areas were sampled using surface wipes to determine if the risk-based criterion set forth by the EPA of 1 microgram per 100 cubic centimeters ( $\mu\text{g}/100\text{ cm}^2$ ) has been maintained since encapsulation was completed in August of 2010. PCBs were not detected in the surface samples indicating that encapsulation of the interior and exterior window sealants remains effective.

<b>Table 2</b> Wipe Sample Results for Polychlorinated Biphenyls from Estabrook School, 117 Grove Street, Lexington, Massachusetts, November 11, 2010		
<b>Sample ID</b>	<b>Description</b>	<b>Aroclor 1248<sup>1,2</sup> (<math>\mu\text{g}/100\text{ cm}^2</math>)</b>
117665	Room 6, exterior window glazing	BRL <1
117666	Room 6, exterior panel caulking	BRL <1
117667	Room 6, exterior panel caulking duplicate	BRL <1
117668	Room 21A interior window glazing	BRL <1
117669	Room 21A interior panel caulking	BRL <1
117670	Field blank	BRL <1
$\mu\text{g}/100\text{ cm}^2$ micrograms per 100 square centimeters BRL            below recording limit		
<sup>1</sup> PCB concentration analysis performed by Groundwater Analytical, Inc., using U.S. Environmental Protection Agency (EPA) method 8082 (GC/ECD).		
<sup>2</sup> Aroclor 1016, 1221, 1232, 1242, 1254, and 1260 also tested. All results below reporting levels, unless noted.		

## BULK SAMPLE RESULT

Table 3 presents the bulk sample result of the Room 6 room divider. This sample was collected to characterize the material prior to disposal. The room divider was sealed in polyethylene sheeting, removed during renovation activities, and stored in a locked storage container outside of Estabrook. Sample results indicate that this room divider should be classified as PCB Bulk Product Waste as defined in Title 40 Code of Federal Regulations (CFR) Section 761.62. The Town of Lexington is receiving bids from qualified vendors for appropriate disposal of the room divider.

**Table 3** Bulk Sample Result for Polychlorinated Biphenyls from Estabrook Elementary School, 117 Grove Street, Lexington, Massachusetts, November 11, 2010

Sample ID	Description	Aroclor 1248 <sup>1,2</sup> (ppm <sub>w</sub> )	Notes
117671	Room 6, Room Divider	940*	2C (830)

ppm<sub>w</sub> parts per million by weight

<sup>1</sup> PCB concentration analysis performed by Groundwater Analytical, Inc., using U.S. Environmental Protection Agency (EPA) method 8082 (GC/ECD).

<sup>2</sup> Aroclor 1016, 1221, 1232, 1242, 1254, and 1260 also tested. All results below reporting levels, unless noted.

\* Aroclor 1254 result

2C: Confirmation concentration reported from second column quantification.

If you have any questions regarding this memorandum please do not hesitate to contact either of us at 1-800-TALK EHE (1-800-825-5343).