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To: Pat Goddard, Director of Facilities, Town of Lexington
Paul Ash, Superintendent, Lexington Public Schools
Estabrook Advisory Committee

From: David MacIntosh

Date: October 12, 2010

RE: Air Samples Collected on September 28-29, 2010, Estabrook Elementary School

Results for the sixth and most recent round of air samples collected at Estabrook Elementary School on September 28 - 29, 2010 are summarized in this memorandum. Air samples were obtained in Room 31A and the Psychologist Office (September 28, 2010) and Rooms 1, 2, 3, 4, 5, and 6 (September 29, 2010). One additional pair of duplicate indoor air samples was collected, yielding a total of 7 duplicate pairs with an updated precision of 9.3%.

Concentrations of PCBs in indoor air of Room 31A and the Psychologist's office were obtained to increase the number of rooms sampled to date under maximum ventilation conditions. As shown in Table 1, the PCB concentrations in indoor air of Room 31A and the Psychologist's office on September 28, 2010 were 282 and 253 nanograms per cubic meter (ng/m³), respectively. The outdoor air flow rate in Room 31A was 540 cubic feet per minute (cfm), equivalent to an air exchange rate of 4.1 per hour (h⁻¹). The Psychologist's office is one of several rooms located in the interior of the school. These rooms have been inspected and primary PCB-containing construction materials have yet to be found in these spaces. Ventilation rates have not been ascertained for interior rooms to date.

Concentrations of PCBs in indoor air of Rooms 1 – 6 were measured on September 29, 2010 to evaluate levels of PCBs in indoor air when ventilation rates were reduced from the maximum flow rates during which previous tests were conducted. Prior to collection of the most recent round of air samples, all interior beads of PCB-containing caulk on transite panels located below the ceiling plenum were encapsulated following a methodology accepted by the U.S. Environmental Protection Agency. The ventilation rate in Room 2 was 390 cfm during Round 6, compared to 550 cfm during previous testing. Similarly, the ventilation rate in Room 5 was 450 cfm during Round 6, compared to 600 cfm in previous tests. Ventilation rates during Round 6

were unchanged from previous tests for Room 1 and Room 6. Rooms 3 and 4 had not been tested previously, but had been operating at ventilation rates of 560 and 500 cfm since September 11, 2010. Prior to Round 6, ventilation rates were lowered to 310 cfm for Room 3 and 300 cfm for Room 4.

Results of the Round 6 sampling are provided in Table 1. Concentrations in Rooms 2 and 5 were 253 ng/m³ and 209 ng/m³, respectively, increases from Round 5 directly comparable to the reduction in ventilation rate between Round 5 and Round 6. Concentrations in Rooms 1 and 6 increased to 153 and 383 ng/m³, respectively, levels approximately two times greater than measured in Round 5. The concentrations in Room 3 and Room 4 were very similar, both approximately 350 ng/m³.

The results from this round of testing in Rooms 2 and 5 are consistent with previous measurements during periods of reduced ventilation. In contrast, the results for Room 1 and Room 6 indicate the influence of factors not directly related to ventilation. In EH&E's experience with PCBs in buildings, influential factors other than ventilation have included direct heating and solar load. The effects of these factors on levels of PCBs in indoor air of the School warrant further investigation. In addition, the site-specific risk assessment for PCBs should be used to aid interpretation of the indoor air sampling results.

Table 1 Air Sample Results for Polychlorinated Biphenyls as Total Homologs, Estabrook Elementary School, 117 Grove Street, Lexington, Massachusetts, July 22, 2010 – September 29, 2010*

Sample Location	PCBs in Air as Total Homologs (ng/m ³)					
	Round 1 ^a	Round 2 ^b	Round 3 ^c	Round 4 ^d	Round 5 ^e	Round 6 ^f
Room 1	299	426	118 [†]	63 [‡]	76 [‡]	153 [‡]
Room 2	–	775	455	189	166	253 [†]
Room 3	–	–	–	–	–	364 [†]
Room 4	–	–	–	–	–	344 [†]
Room 5	459	736	320	196	149	209 [†]
Room 6	1,800	764	483	171	213	383
Room 7A	–	–	5.19	–	–	–
Room 13	319	340	184	155 [†]	–	–
Room 21A	–	–	410	193	–	–
Room 24	680	601	226	173 [†]	–	–
Room 26	–	–	–	79	–	–
Room 31A	562	575	444	–	–	282
Room 39B	–	419	–	–	–	–
Room 39C	342	495	245	100	–	–
Library	–	469	196	–	–	–
Art Room	–	–	194	–	–	–
Teacher Work Room	–	–	138	–	–	–
Basement	–	–	227	–	–	–
Ceiling plenum (39C)	–	–	562	–	–	–
Psychologist Office	–	–	–	–	–	253
Outdoors	<3.79	<5.00	<4.20	<4.46	<4.32	<4.44
Air Sample Obtained Between False Ceiling and Drop Ceiling – Round 5 Only						
Room 1	–	–	–	–	265	–
Room 2	–	–	–	–	287	–
Room 5	–	–	–	–	571	–
Room 6	–	–	–	–	526	–

PCB polychlorinated biphenyl

ng/m³ nanograms per cubic meter

– air sample not collected at that location

^a Round 1 samples collected July 22, 2010, during summer conditions.

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

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

^d Round 4 samples collected on September 19, 2010 with optimization of outdoor air delivery and central exhaust, and indoor caulk encapsulation, unless otherwise noted.

^e Round 5 samples collected on September 27, 2010 with optimization of outdoor air delivery and central exhaust, partial indoor caulk encapsulation, and isolation of ceiling tiles.

^f Round 6 samples collected on September 28 or 29, 2010 with ventilation as noted, central exhaust, full indoor caulk encapsulation, and isolation of ceiling tiles.

[†] Samples collected with reduced outdoor air delivery.

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

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