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Health Consultation: Evaluation of Indoor Environmental Conditions and Potential Health Impacts New Bedford High School

Final Report
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QUESTIONS AND ANSWERS

1. Why did the Massachusetts Department of Public Health (MDPH) conduct an evaluation of indoor environmental conditions and potential health impacts at New Bedford High School (NBHS)?

The city of New Bedford forwarded a petition signed by 21 New Bedford High School (NBHS) teachers and 11 neighbors of NBHS and Keith Middle School (KMS) to the Massachusetts Department of Public Health's (MDPH) Bureau of Environmental Health (BEH). The petition expressed concerns about the incidence of cancer and other illnesses among residents, staff, and students, particularly as they may relate to polychlorinated biphenyl (PCB) contamination associated with a former dumpsite on which the NBHS was built, which is now part of the Parker Street Waste Site (PSWS).

2. What are PCBs?

PCBs are mixtures of up to 209 individual chemicals called "congeners" that are manmade. There are no known natural sources of PCBs. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor. PCBs are either oily liquids or solids. PCBs have no known smell or taste.

3. What were PCBs used for?

In New Bedford, PCBs were used by Aerovox and Cornell-Dubilier Electronics to make transformers, capacitors and other electrical equipment. PCBs were also used in other products like fluorescent lighting fixtures, caulking materials, elastic sealants, and old microscope and hydraulic oils. Another common use for PCBs was for dust control on unpaved roads. The manufacture of PCBs was stopped in the U.S. in 1977. However, there are still many old products with PCBs and, because they do not break down easily, they remain in the environment.

4. What did this evaluation consist of?

MDPH/BEH evaluated indoor environmental conditions and health concerns at the NBHS by conducting an indoor air quality assessment of the NBHS, reviewing the list of current and former staff members diagnosed with cancer (provided with the original petition and subsequently updated), interviewing school staff about their health and building concerns, and evaluating historical and current PCB sampling data collected from inside NBHS. In addition, MDPH/BEH offered concerned residents and school staff the opportunity to have PCBs in their blood serum measured and compared to national levels of serum PCBs in the general population.

5. What other evaluations did MDPH/BEH do?

MDPH/BEH conducted two investigations. In addition to this evaluation of the NBHS, MDPH evaluated cancer incidence and serum PCB test results for neighborhood residents of the PSWS area. A separate BEH report entitled *Health Consultation: Evaluation of Serum PCB Levels and Cancer Incidence Data, Parker Street Waste Site, New Bedford, Bristol County, Massachusetts* summarizes the 2nd investigation.

6. Did MDPH receive official public comments on the draft version of this report released in September 2011?

Yes. MDPH received a combined total of 36 pages of detailed comments from the public on both reports. In the final reports, MDPH made revisions, as warranted, based on the comments received. Each report also includes a new appendix with detailed responses to the comments received.

7. How did MDPH/BEH evaluate the indoor environmental conditions at NBHS?

Staff from MDPH/BEH's Indoor Air Quality (IAQ) Program completed a comprehensive evaluation of indoor environmental conditions at NBHS. IAQ staff evaluated the ventilation system, the potential for microbial growth in areas of the school, and other sources of indoor air quality concerns. IAQ staff measured carbon dioxide, temperature, relative humidity, particulate matter (of respirable size), and the temperature of building materials (to evaluate floor condensation potential). In addition, MDPH/BEH's Environmental Toxicology Program (ETP) staff reviewed indoor environmental testing data collected by various consulting firms between 2006 and 2011 to determine the potential for health risks associated with opportunities for PCB exposure at the school.

8. What were some of the issues identified during the IAQ program's initial inspection of NBHS?

The IAQ Program's inspection found a variety of issues that are found in schools across Massachusetts. These include the lack of adequate ventilation in many areas surveyed, and some issues that are specific to particular areas of the school, such as areas with water-damaged ceiling tiles and isolated observations of visible mold. MDPH also identified accumulated debris (such as pine needles and bird nesting materials) around many fresh air vents; this debris can block the intakes, allow moisture to accumulate, and promote mold growth if not removed. Conditions on the ground floor were identified that promote condensation on the floor. Finally, the IAQ

inspectors found that the ventilation system in the pool area is forcing air from the pool area into other buildings, causing noticeable pool treatment odors and increased humidity in these buildings.

9. Did MDPH/BEH make any recommendations in its report to address issues identified during the IAQ inspection?

MDPH/BEH made a series of recommendations to correct issues identified during the IAQ inspection that are outlined in the report.

10. Have any of the recommendations been implemented?

Yes. Based on comments received and an MDPH/BEH follow-up Indoor Air Quality inspection in August 2012, a number of steps have been taken by the City to address MDPH/BEH recommendations. Appendix H of the final report identifies the steps taken by the City to improve environmental conditions at the NBHS.

11. What kind of indoor environmental testing data did MDPH/BEH review?

During 2006 – 2008, indoor air, wipe, and bulk (or materials) samples were collected from locations inside of NBHS by the city's consultants and analyzed for PCBs. The MDPH/BEH Environmental Toxicology Program (ETP) reviewed indoor environmental sampling data for all media collected and analyzed by the city's consultants during 2006 – 2008, and also evaluated indoor air sample data that was collected in 2010, 2011 and 2012. Although MDPH/BEH/ETP reviewed data for all media, for the purposes of evaluating potential health concerns, air concentrations of PCBs are most appropriate to help evaluate possible health impacts.

12. Did MDPH/BEH note any trends or patterns in the indoor sampling data?

The ETP evaluation of indoor air data identified two trends. First, it appears that air levels of PCBs inside the school were at their lowest in April 2006, prior to the collection of bulk samples at the school. It is plausible that the process of disturbing PCB-containing materials around the school for sampling may have affected PCB concentrations in air. In comparing 20 locations that had indoor air tested for PCBs both in 2008 and in 2011, the majority of PCB levels had come down in 2011, suggesting that disturbance of bulk materials for testing may have been a factor in more elevated levels in 2008. Second, MDPH/BEH IAQ testing in 2008 demonstrated that many of the rooms with elevated PCB levels had inadequate ventilation, indicated by elevated CO2 levels and supply/exhaust vents turned off. Suboptimal ventilation may have also contributed to higher levels of PCBs in indoor air in these rooms.

13. How could NBHS staff and students be exposed to PCBs at NBHS?

The main way NBHS students and staff could be exposed to PCBs at NBHS is through inhalation. The ETP compared indoor air sampling data to the federal Agency for Toxic Substances and Disease Registry (ATSDR) health-based comparison value for PCBs in air to determine if indoor air data required further evaluation. Health-based comparison values are used as screening values by health assessors to determine the need for further evaluation. Comparison values are set well below levels that are known or anticipated to result in adverse health effects. A number of indoor air samples from multiple locations on different days of testing (before and after the school was

cleaned in 2007) were above the ATSDR comparison value and therefore required a closer evaluation. Concentrations above a comparison value do not necessarily indicate that a health threat is present, but rather indicate the need for further evaluation by assessing opportunities for exposure, including the frequency and duration of possible exposures.

14. Are PCB levels detected in indoor air at NBHS a health concern?

Based upon an exposure assessment assuming a worst case exposure scenario, MDPH/BEH does not believe that exposure to PCBs at levels detected at New Bedford High School present unusual cancer concerns for students or staff in the short- or long-term. For an adult employee, MDPH assumed that exposure occurred to the maximum detected concentration of PCBs in indoor air for 8 hours per day for 180 days per year (the entire school year) for 37 years (numbers of years of school service for the longest serving employee). For a student, MDPH assumed daily exposure to the maximum detected concentration for 8 hours per day for 4 years. To ensure that cancer risks do not increase, however, the MDPH believes that steps should be taken to reduce and/or eliminate opportunities for exposure to PCBs (for example, cleaning, regular operations and maintenance plan, etc.).

15. How did MDPH/BEH obtain information regarding staff health and indoor environmental concerns at NBHS?

MDPH/BEH obtained information about staff health and/or indoor environmental concerns from four sources: 1) BEH conducted interviews with concerned NBHS staff at the time of the IAQ school inspections; 2) as part of the PCB blood serum testing offer, an MDPH/BEH contractor, John Snow Institute, conducted exposure assessment interviews with concerned current and former NBHS staff; 3) MDPH/BEH reviewed a petition signed by NBHS staff that listed some health concerns and was sent to the former Director of the New Bedford Health Department, and; 4) MDPH/BEH reviewed supplemental information on cancer diagnoses obtained via emails distributed by a local advocacy group.

16. Were there any patterns in the types of symptoms NBHS staff reported?

The health symptoms reported among participants of this health investigation are generally those most commonly experienced in buildings with occupants reporting indoor air quality concerns. The symptoms most frequently reported by individuals at the NBHS were respiratory/irritant effects including respiratory infection, sinus congestion, or headaches. These symptoms are commonly associated with ventilation problems in buildings, although other factors (for example, odors, microbiological contamination) may also contribute.

17. How did MDPH/BEH evaluate cancer incidence among staff at NBHS?

The MDPH assessment involved evaluating the types of cancer reported among staff and students, assessing whether the cancer types share similar risk factors and characteristics, comparing the relative frequency of the reported types of cancer to what is known about the occurrence of these types of cancer in the general population of Massachusetts, and assessing if there is an unusual number of rare types of cancer among staff and students.

18. Was the overall pattern of cancer unusual?

Based upon all information available/provided, the ***overall*** pattern of cancer types among current and former NBHS staff and students appears to be consistent with that of the state as a whole. There were many different types of cancer diagnosed over more than 30 years, with the most frequent diagnoses among NBHS employees being the most common types of cancer diagnosed in the general population. The most common types of cancer diagnosed among individuals associated with the NBHS and reported to the MDPH/BEH were breast, colorectal, prostate, and lung cancer. These cancer types are the most common in the general population of Massachusetts.

19. Were there findings related to other specific types of cancer?

For the majority of the other 23 cancer types, about one or two diagnoses were reported over the 30-year time period evaluated. No unusual occurrence of a rare type of cancer was reported from the various sources of information on cancer diagnoses.

20. What was the finding related to breast cancer?

MDPH received reports of 27 women diagnosed with breast cancer over approximately 30 years. The most common type of cancer among NBHS employees, breast cancer affects an estimated 1 out of every 8 women. Based upon previous investigations of breast cancer in school populations, it appears that many schools' workforces are often primarily women. Therefore, it is not unusual to have breast cancer be the most frequently diagnosed cancer type in a school population. This information, combined with the finding that exposure to PCBs at levels detected at the NBHS does not appear to present unusual cancer concerns, makes it unlikely that the school environment played a major role in the incidence of breast cancer in the school population.

21. What is known about breast cancer?

Breast cancer is the most common cancer among women in Massachusetts and the U.S. The chance of developing invasive breast cancer at some time in a woman's life is about 1 in 8. The major risk factors for breast cancer are age; heredity (inheriting a genetic mutation for breast cancer); family history (having a mother or sister with breast cancer); early menstruation (before age 12); late menopause (after age 55); not having children; having a first child when over the age of 30; having dense breast tissue or a previous cancer diagnosis; heavier alcohol consumption; and obesity. Although there is a great deal of interest in exploring a possible link between breast cancer and exposure to certain chemicals with estrogen-like properties (such as PCBs and pesticides), no clear link has been established.

22. What is known about cancer in general in the U.S. population?

According to the American Cancer Society, cancer is the leading cause of death in Massachusetts and the U.S. Not only will one out of three women and one out of two men develop cancer in their lifetime, but cancer will affect three out of every four families.

23. Is MDPH/BEH recommending any follow-up related to the cancer findings?

No. MDPH/BEH has offered to meet with the City of New Bedford including the New Bedford School and Health Departments and the New Bedford Educator's Association to discuss the breast cancer findings and whether additional follow-up investigations could be conducted.

24. How many NBHS staff members participated in the blood serum testing for PCBs?

Sixty-four current or former NBHS staff members submitted blood samples for serum PCB analysis. One current student also submitted a blood sample for analysis. In addition, two former students that did not report living (currently or previously) in the neighborhood around the PSWS were also included. The total number of participants included in this report was 67.

25. How were the blood tests evaluated?

Individuals' results were compared to the U.S. Centers for Disease Control and Prevention (CDC) National Health and Nutrition Examination Survey (NHANES). The NHANES survey provides information on levels of chemicals in blood and urine for the U.S. population. NHANES is a nationally representative survey, and these data help determine if individuals in a specific area have been exposed to higher levels of PCBs (or other chemicals) than the general U.S. population. Most people in the U.S. have low but detectable levels of PCBs in their serum due to their widespread use.

26. What were the results of the blood tests?

Serum PCB testing conducted by MDPH/BEH showed that all participants who are current or former staff members at NBHS had serum PCB levels within the 95th percentile of serum PCB levels available from the national NHANES data. This means that serum PCB levels for these participants were within typical variation seen in the U.S. population. Consistent with national patterns, serum concentrations of PCBs in NBHS participants generally increased with age but were within typical concentrations for the U.S. population for each age group evaluated.

27. Was there any trend associated with employment at the NBHS?

No. There was no consistent pattern of increasing serum PCB levels with increasing years of employment at NBHS, suggesting that working at the school was not a primary predictor of serum PCB levels. Further, the PCB congener pattern for participants was consistent with what is typically seen in the U.S. population, suggestive of dietary sources.

28. Where can I obtain a copy of the report?

The full report is available on the MDPH website at www.mass.gov/dph/environmental_health; within the *Environmental Health Investigations* link, click on New Bedford.

29. If I have a question about the report findings, who should I contact?

Please call the MDPH Bureau of Environmental Health at 617-624-5757 or 1-800-240-4266 if you have any questions.