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Evaluation of Serum PCB Levels and Cancer Incidence (1982-2006) Parker Street Waste Site, New Bedford

Final Report
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QUESTIONS AND ANSWERS

1. Why did the Massachusetts Department of Public Health (MDPH) conduct an evaluation of serum PCB levels and cancer incidence in the neighborhood around the Parker Street Waste Site (PSWS) in New Bedford?

The city of New Bedford Health Department 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 offered concerned residents and school staff the opportunity to have the levels of PCBs in their blood serum measured to determine whether patterns might suggest that residence and/or occupation or attendance at the schools played a primary role in PCB exposures. Also, MDPH/BEH completed a review of the incidence of nine types of cancer that were either of particular concern to residents or school staff or, based on the medical literature, were suggested as possibly being associated with exposure to the major contaminants of concern at the PSWS. The cancer review included the five census tracts that surround the PSWS (6509, 6510.01, 6510.02, 6511, and 6515). The review of cancer was also conducted for the city of New Bedford as a whole. See the attached map.

5. What other evaluations did MDPH do?

MDPH/BEH conducted two different evaluations. A separate evaluation of indoor environmental conditions and health concerns at NBHS was conducted. The results of the indoor environmental evaluation of NBHS, cancer incidence evaluation of school staff, and a summary of the serum test results for current and former NBHS employees are provided in a separate BEH report entitled *Evaluation of Indoor Environmental Conditions and Potential Health Impacts, New Bedford High School*.

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 many residents participated in the blood serum testing for PCBs?

Out of the 91 participants that consented to and submitted blood samples, 45 individuals were current or former residents in the PSWS neighborhood or had spent a significant amount of time at the PSWS. The remaining participants were not residents of the PSWS neighborhood but were affiliated with either the NBHS or KMS. As mentioned, the serum results for students and employees of the NBHS and KMS are summarized in a separate school report.

8. How did MDPH determine if serum PCB levels in the PSWS neighborhood were unusual or not?

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.

9. What were the results of the blood tests?

Serum PCB testing conducted by BEH showed that the majority of participants tested have serum PCB levels within the 95th percentile of serum PCB levels available from the national NHANES data. Three of the 45 participants had results that exceeded the NHANES 95th percentile. Thus, serum PCB results for 42 of the 45 participants were within the typical variation seen in the U.S. population, and the serum PCB concentrations for three of the 45 participants were above the typical range.

10. Was there any trend associated with living in the neighborhood around the PSWS?

Consistent with national patterns, serum concentrations of PCBs in participants generally increased with age but were within typical concentrations for the U.S. population for each age group evaluated. There was no consistent pattern of increasing serum PCB levels with increasing years of residence in the neighborhood around the PSWS, suggesting that location of residence was not a primary predictor of serum PCB levels. Further, the PCB congener patterns for each age group evaluated were consistent with what is typically seen in the U.S. population, which is more suggestive of dietary sources.

11. What data were used to evaluate the incidence of cancer in the neighborhood around the PSWS?

To evaluate the incidence of cancer in the neighborhood around the PSWS, MDPH used data from the Massachusetts Cancer Registry (MCR), a division of the MDPH Bureau of Health Information, Statistics, Research, and Evaluation. The MCR has been collecting reports of new cancer diagnoses among Massachusetts residents since 1982. The 25-year period 1982-2006 is the period for which the most recent and complete statewide cancer incidence data were available at the time of analysis to calculate incidence rates.

12. How does MDPH/BEH determine if cancer patterns at the neighborhood level are unusual?

Cancer incidence rates were first calculated for the community of New Bedford as a whole and then for the five census tracts (6509, 6510.01, 6510.02, 6511, and 6515) surrounding the PSWS. The census tract is a smaller geographic area and gives a better picture of cancer occurrence within a neighborhood.

13. What is a census tract?

A census tract is a geographic subdivision of a city or town designated by the U.S. Census Bureau. Census tracts usually contain between 1,500 and 8,000 persons and are designed to be homogenous with respect to population characteristics.

14. How did MDPH/BEH calculate the cancer incidence rates for New Bedford and the five census tracts of interest?

To determine whether an elevation in cancer incidence occurred among individuals diagnosed with cancer in New Bedford or the five census tracts surrounding the PSWS, cancer incidence data were tabulated by gender according to 18 age groups to compare the *observed* number of cancer

diagnoses to the number that would be *expected* based on the statewide cancer rate. A statistic called a Standardized Incidence Ratio (SIR) was calculated for five time periods: 1982-1986, 1987-1991, 1992-1996, 1997-2001, and 2002-2006, in order to evaluate trends in cancer incidence in comparison to the statewide cancer experience.

15. How does MDPH/BEH evaluate cancer patterns?

In addition to calculating actual cancer incidence rates, MDPH evaluates the geographic patterns of the residences of individuals diagnosed with cancer and the dates of diagnosis. Age and gender patterns for the specific cancer type, information on cancer subtypes and tumor stage at diagnosis, and available risk factor information from the MCR (such as usual occupation and tobacco use history) are also evaluated. All of this information is used to assess whether cancer rates are elevated, whether the patterns of specific cancer types appear unusual, and whether any common factor (environmental or non-environmental) appears to be related to cancer in the city or census tract.

16. What types of cancer were studied and why?

Nine cancer types were evaluated in this investigation, including cancers of the biliary tract (the tube that connects the liver to the small intestine), bladder, breast, colon/rectum, gallbladder, liver/intrahepatic bile duct (IBD), and lung and bronchus as well as melanoma and non-Hodgkin lymphoma. The nine cancer types included in this evaluation were selected for two reasons: 1) because of their possible association with exposure to PCBs, as reported in the scientific/medical literature, and 2) the concerns of residents of suspected elevations of some cancer types.

17. How did MDPH/BEH review the temporal and geographic distribution of cancer incidence in New Bedford and the census tracts around the PSWS?

Year of diagnosis was reviewed for individuals diagnosed with particular types of cancer in New Bedford, to assess if any patterns existed (e.g., was there a large number of residents diagnosed with the same type of cancer in a short period of time?). In addition, the address at the time of diagnosis for individuals diagnosed with cancer in these communities was mapped using a computerized geographic information system (GIS). This allowed for an evaluation of the spatial distribution of where individuals lived at diagnosis, to assess any possible concentrations of diagnoses in any one neighborhood and in relation to the PSWS. This evaluation also included consideration of densely populated areas.

18. What did the study find regarding the incidence of cancer in New Bedford as a whole?

Some elevations in some types of cancer were seen, particularly lung cancer in males. Lung cancer incidence in males was elevated mainly between 1997 and 2006. However, for the most part, no consistent trends or elevations in cancer incidence rates emerged over time.

19. Upon closer examination, did the incidence of lung cancer in New Bedford appear unusual?

City-wide, lung cancer incidence in males was statistically significantly elevated during two time periods, 1997-2001 and 2002-2006. Based on smoking history information reported to the

Massachusetts Cancer Registry, it appears that, as is commonly seen, smoking played a role in the incidence of this cancer in New Bedford males.

20. What did the study find regarding the incidence of cancer in the two census tracts closest to the PSWS?

The Parker Street Waste Site is located in CT 6510.02 and extends into CT 6515 on its southerly boundary. With the exception of an elevation in colorectal cancer and non-Hodgkin lymphoma during one time period in census tract 6515, the incidence of the majority of cancer types was approximately as expected. No consistent trends were seen in the incidence of any particular type of cancer over the 25-year span. The incidence of liver cancer, the type of cancer with the strongest association with exposure to PCBs, was approximately the same as the expected rate. Therefore, for the two census tracts in closest proximity to the Parker Street Waste Site, the incidence rates of those types of cancer possibly associated with exposure to PCBs does not appear to be unusual based on comparisons to the cancer experience of Massachusetts as a whole.

21. Did the geographic pattern of colorectal cancer and non-Hodgkin lymphoma in census tract 6515 appear unusual?

Although both colorectal cancer and non-Hodgkin lymphoma were statistically significantly elevated in one time period, these elevations did not persist over time and did not represent a consistent pattern. For the 1997-2001 time period, eight diagnoses of non-Hodgkin lymphoma (NHL) were observed compared to approximately three expected. The incidence of NHL was as expected or less than expected throughout the other time periods. With the exception of the most current time period, the incidence of colorectal cancer was approximately as expected throughout the other time periods.

22. Were there any statistically significant elevations in cancer incidence in the other census tracts around the PSWS for any of the time periods?

Yes, a statistically significant elevation in the incidence of colorectal cancer was observed in census tract 6510.01 during 1992-1996. However, closer examination of risk factor information for colorectal cancer as well as spatial and temporal patterns did not reveal any unusual patterns or suggest that a common environmental factor played a primary role in these cancer diagnoses.

23. Was the geographic distribution of cancer incidence unusual in New Bedford or in the five census tracts around the PSWS?

The analysis of the geographic distribution of residence at diagnosis for individuals diagnosed with the nine cancer types evaluated in New Bedford and the five census tracts around the PSWS did not reveal any usual spatial patterns that would suggest a common factor (environmental or non-environmental) played a primary role in cancer diagnoses among these individuals.

24. Does MDPH recommend any follow-up?

MDPH recommends that the New Bedford Health Department work with the MDPH Comprehensive Cancer Prevention and Control Program to increase awareness of the importance of early screening for both breast and colorectal cancers.

25. 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.

26. 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.

Location of Census Tracts, New Bedford, Massachusetts