Letter Health Consultation

Cancer Incidence Analysis: ZIP Code 19153

(Includes Eastwick Residential Areas)

Philadelphia, Philadelphia County, Pennsylvania

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Prepared By:

Pennsylvania Department of Health
Division of Environmental Health Epidemiology
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pennsylvania
DEPARTMENT OF HEALTH

To: Josh Barber, Remedial Project Manager, and Carrie Deitzel, Community Involvement Coordinator, US Environmental Protection Agency (Region 3)

From: Pauline Risser-Clemens, Health Assessor,
Health Assessment Program, Division of Environmental Health Epidemiology

Subject: Cancer incidence analysis for the Eastwick community and follow-up actions and recommendations

In response to a request from the U.S. Environmental Protection Agency Region 3 (EPA) and the Eastwick residents, the Pennsylvania Department of Health (PADOH) investigated concerns about elevated rates of cancer in the Eastwick residential area of Philadelphia. PADOH performed a cancer incidence analysis, which is contained in this letter health consultation (LHC). The purpose of this LHC is to provide an explanation and summary of PADOH's most current cancer incidence analysis for the Eastwick community, and to provide relevant public health findings and recommendations.

Eastwick area residents that have participated in recent public meetings related to the Lower Darby Creek Area (LDCA) Superfund Site believe exposures related, at least in part, to contaminants at the Clearview Landfill, have resulted in increased cancer risks in their community. The Clearview Landfill is part of the larger LDCA Site. Since 2007, representatives from PADOH and the Agency of Toxic Substances and Disease Registry (ATSDR) have attended several EPA public meetings regarding the Clearview Landfill in order to address this community's concerns. In 2007 and again in 2011, PADOH presented reviews of the state's cancer registry data to EPA and to the community.

Purpose and Health Issues

PADOH's top priority is to ensure residents living near the former Clearview Landfill have the best information to safeguard their health. ATSDR provides technical assistance and funding, through a cooperative agreement to PADOH, to help identify and evaluate environmental health threats to communities by: using the best available science, taking responsive public health actions, and providing trusted health information. While this LHC was supported by a cooperative agreement, it has not been reviewed and cleared by ATSDR. The conclusions and recommendations presented in this LHC document are based on an analysis of the data and information made available to the PADOH within a limited time frame. The availability of additional sampling data, new information and/or changes in site conditions could affect the conclusions and recommendations. More information about ATSDR is available online at www.atsdr.cdc.gov.

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Background

The Clearview Landfill site (the site) is located at 83rd Street and Buist Avenue in Philadelphia. The former Clearview Landfill was an unpermitted Philadelphia municipal waste landfill that operated between the late 1950s and early 1970s. The Eastwick neighborhoods (a residential area) and the Eastwick Recreational City Park (city park) are located adjacent to the Clearview Landfill (see Attachment A). Some of the Eastwick homes and the city park are located within the historic landfill footprint (former landfill areas); however, no contiguous landfill wastes were found by EPA in the Eastwick neighborhoods or city park [1]. Before the homes were built in this area, wastes were excavated and moved from the Philadelphia County portion of the site to the Delaware County portion, where excavated materials were subsequently placed, graded and partially covered with fill [1]. As a result, the present Clearview Landfill lies almost entirely within Delaware County, and the Eastwick neighborhood and city park lie within Philadelphia County [1].

In 2000, EPA began conducting environmental sampling in the city park. Samples were collected and analyzed for a complete list of analytes [1]. In 2000 and 2001, the Federal Emergency Management Agency (FEMA) also collected soil samples from the Eastwick residential areas in response to flooding [2]. Since 2001, EPA has performed a number of sampling events at the site [1]. In 2003 and 2004, EPA performed extensive sampling in the Eastwick neighborhood right-of-ways and city park (Philadelphia County). In 2006, EPA received legal access to sample on the Clearview Landfill (Delaware County). In 2010 and 2011, EPA performed precautionary testing of indoor air of some homes located within the historical landfill footprint and a recreational center located in the city park [1]. PADOH has reviewed the FEMA and EPA reports, including EPA's 2011 Remedial Investigation report.

Cancer Data Review

The PADOH Bureau of Epidemiology, Division of Community Health Epidemiology, obtained data from the Pennsylvania Cancer Registry (PCR), which is a comprehensive database of all cancers diagnosed in Pennsylvania residents [3]. Since 1985, the PCR has collected patient-specific cancer data that include geographic location, date of diagnosis, and cancer type. PADOH reviewed the cancer registry data for the Philadelphia ZIP code 19153 to investigate community concerns. To determine if the rates are statistically elevated, the ZIP code is the standard unit of measurement because the denominator is well defined and the analysis can generate statistically significant results for a small geographic area. Multiple-year data are generally used in analyses because cases collected in a single year are subject to a large amount of chance variation compared to a longer interval.

For the analysis, PADOH compared the cancer rates in ZIP code 19153, which includes Eastwick, to Pennsylvania rates from the PCR over a 17 year period beginning in 1992 through 2008 (Attachment B: Table 1). The latest year of final validated data in the PCR is 2008. To analyze potential local variations, PADOH also compared the cancer rates for all of Philadelphia County to statewide rates for the same timeframe (Attachment B: Table 2). The 2000 U.S. census was the source of basic population data [4]. Cancer cases were tabulated in accordance with ICD-10 (site coding definitions used by the PADOH Bureau of Health Statistics and Research to

prepare PCR annual reports) [3]. The data were further standardized to eliminate possible effects due to differences in gender and age between the study area, and the rest of the Commonwealth. Statewide incidence rates were used to calculate the expected number of cases that would have occurred if the study area had incidence rates similar to the rest of the state. The statistical significance of the indirectly age-adjusted incidence rates was calculated in accordance with the methodology recommended by Selven et al [5]. For this LHC, the number of cancers refers to the number of primary cancer sites reported, not the number of people, as some individuals may have more than one cancer during the period of interest.

To determine if the cancer rates are elevated, the "observed cases" are the number of cancers reported to the PCR for the ZIP code 19153 area. The "expected cases" represent the number of cases expected to occur if this area experienced rates of cancer similar to the rest of Pennsylvania during the study period. The ratio of observed cases to expected cases is known as the standardized incidence ratio (SIR). A SIR of 1.0 means the observed number is exactly the same as the expected number. A SIR greater than 1.0 means there is a higher number than expected. Conversely, a SIR less than 1.0 means there is a lower number of cases than expected. The deviation from 1.0 represents the percentage above or below the expected (i.e. a SIR of 1.05 means there is a 5% excess). Statistical formulas (Z-test) are then applied to determine whether the difference is considered statistically significant. The difference is said to be statistically significant if it is greater than what would be expected to happen by chance alone. In common practice, a statistically significant finding means that the probability that the observed number of cases could have happened by chance alone is 5% or less.

A "cancer cluster" is defined as an occurrence of a greater than expected number of cases of cancer within a group of people, a geographic area or a period of time. This definition does not imply causality. Cancer clusters generally involve: larger numbers of cases than expected of one type of cancer, rather than several different types; a rare type of cancer, rather than common types; or an increased number of cases of a certain type of cancer in an age group that is not usually affected by that type of cancer [6].

Results and Discussion

PADOH compared the cancer rates in the Zip Code 19153 area, which includes the Eastwick neighborhoods adjacent to the Clearview Landfill, to the Pennsylvania statewide rates (see Attachment B: Table 1). Overall, for ZIP code 19153 there were 1,215 cancer cases reported during the period 1992 through 2008. Based on statewide cancer rates, a total of 1,149 cancers cases were expected to occur in residents of ZIP code 19153. This represents a SIR of 1.06 or 6% higher than expected and this excess is statistically significant. Among the specific cancer types, statistically significant excesses were found for stomach, liver, lung, and prostate cancer.

To further assess the findings, Philadelphia County was compared to the Pennsylvania statewide rates (see Attachment B: Table 2). The total observed number of cancer cases in Philadelphia County (1992 through 2008) was 148,273 compared to 134,257 expected based on this statewide rate. The resulting SIR for all cancer sites is 1.10 or 10% higher than expected. This difference is statistically significant. Statistically significant excesses were also found for Philadelphia County residents for stomach, liver, lung, and prostate cancer. *Therefore, the excess cancers*

seen in Zip Code 19153, which includes Eastwick, are not unique to the location; similar patterns and levels of cancer are seen throughout Philadelphia County.

The cancer types (stomach, liver, lung, and prostate) found at a statistically higher rate than expected in ZIP code 19153 are not ones that are closely linked to environmental chemical hazards, except for liver cancer. There are a number of environmental exposures that have been identified to produce liver cancer. However, liver cancer is most often associated with viral hepatitis or excess consumption of alcohol. Stomach cancer has been linked to diet and infectious agents and lung cancer is most clearly related to smoking. Risk factors for prostate cancer, other than age, are poorly understood. Cancer is a common illness and its occurrence in a population usually increases with age [7]. It is notable that the cancer types responsible for the excess incidence seen in Zip Code 19153 can be prevented through lifestyle changes such as smoking cessation, reductions in alcohol intake, improved diet, and exercise, along with regular cancer screenings.

According to the American Cancer Society, 44.29% of the U.S. population will develop some form of cancer in their lifetime [8]. Generally, cancer rates in Pennsylvania tend to be slightly higher than those nationally [9]. As noted, cancer rates in Philadelphia tend to be higher that those elsewhere in Pennsylvania.

Cancer Data Review Limitations

Health outcome data evaluations, such as the cancer incidence analysis described in this LHC, are measures of disease occurrence in a defined population. Such evaluations can help to provide an overall picture of community health, and can potentially identify or confirm excess disease in a community. Elevated rates of a particular disease do not imply the finding is caused by hazardous substances in the environment. There are many limitations to any statistical analysis that examines the relationship between environmental exposures and chronic diseases such as cancer:

- The PCR is considered to be highly reliable. However, the quality of the analysis is directly related to the accuracy of the information in this reporting system.
- This cancer data review can only determine whether there is an abnormal rate of cancer in the study area. Cause and effect relationships cannot be established because many factors may contribute to the observation. These include heredity, lifestyle, exposures from other sources, occupational exposures, and other unrecognized factors.
- The PCR uses only the residence of the individual at the time he or she was diagnosed with the disease. Information on previous residence and length of residency are not included in the PCR. Population mobility and changes in population could affect the results of this analysis.
- Since cancer can take decades to develop, the current health outcome data reflect past exposures and may not reflect to current conditions or risks.

Conclusions and Recommendations

Based on a review of the cancer incidence data for ZIP code 19153 (which includes the Eastwick residential area), for Philadelphia County, and for the rest of the state, PADOH concludes the following. There is a statistically significant 6% elevation in the incidence of cancer seen in Zip

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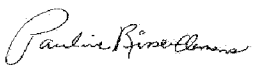
Code 19153, which includes the Eastwick neighborhoods, when compared to the rest of Pennsylvania. However, the excess seen in Zip Code 19153 is actually ***less*** than the 10% excess observed in the rest of Philadelphia County. Furthermore, the cancer types (stomach, liver, lung, and prostate cancer) that contribute to the excess in Zip Code 19153 are the same types that produce the excess seen everywhere else in Philadelphia. Therefore, the patterns of cancer observed in Zip Code 19153 are no different than those seen in Philadelphia. *This leads to a conclusion that there is not an exposure or risk that is unique to Zip Code 19153 that is contributing to the rates or patterns of cancer observed in residents of this area.*

Sincerely,



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References

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Attachment A:

Map Source: U.S. Environmental Protection Agency Region 3 (EPA). EPA Region 3 RPM Josh Barber, Philadelphia, Pennsylvania.

Attachment B: Tables

Table 1 – Statistically significant elevated cancer incidence (1992 through 2008) for Zip Code 19153 (compared to the Pennsylvania rates)

Cancer types	*Observed cases*	*Expected cases*	*SIR*	*Percent more cases than expected*
All	1215	1149.23	1.06	6
Stomach	29	16.75	1.73	73
Liver	23	11.03	2.09	109
Lung	198	160.65	1.23	23
Prostate	225	171.8	1.31	31

Table key:

SIR = Standardized Incidence Ratio

Source: Pennsylvania Department of Health. PA. 2011. Cancer Registry (PCR).

Table 2 – Statistically significant rates of cancer incidence (1992 through 2008) for Philadelphia County (compared to Pennsylvania rates)

Cancer types	*Observed cases*	*Expected cases*	*SIR*	*Percent more cases than expected*
All	148273	134257.5	1.10	10
Stomach	3017	2036.53	1.51	51
Liver	2401	1270.61	1.89	89
Lung	23975	18633.08	1.29	29
Prostate	22593	18892.55	1.20	20

Table key:

SIR = Standardized Incidence Ratio

Note: Only the statistically significant cancer types are listed in this table of Philadelphia County rates that were found in ZIP code 19153 (for comparison purposes). Other types of cancers were found to be significant in Philadelphia County; however these are not listed in this table.

Source: Pennsylvania Department of Health. PA. 2011. Cancer Registry (PCR).

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