

***Executive Summary***  
**Keystone Sanitary Landfill**  
Dunmore  
Lackawanna County  
Pennsylvania

**Background**

The Keystone Sanitary Landfill (KSL) is an active municipal solid waste collection site located at 249 Dunham Drive, Dunmore, Lackawanna County, Pennsylvania. The landfill is within Dunmore and Throop boroughs adjacent to Interstate 81 and Casey Highway (US Route 6). The KSL spans approximately 1,000 acres and is one of the largest active landfills in Pennsylvania. The KSL is permitted and regulated by the Pennsylvania Department of Environmental Protection (PADEP). The landfill currently receives approximately 7,000 tons of waste per day from Pennsylvania, New York, New Jersey, and Connecticut. The accepted waste is composed of approximately 77% municipal solid wastes, 10% drill cuttings from fracking, 6% sludge and residual wastes, 4% flood wastes, and 3% construction and demolition wastes. On March 20, 2014, the KSL submitted a proposal to PADEP to expand the landfill's disposal capacity by approximately 134 million cubic yards.

**Purpose**

On February 17, 2015, the Pennsylvania Department of Health (PADOH) received a request from a Pennsylvania state representative and members of Friends of Lackawanna (a local non-profit organization committed to protecting the health and safety of the local community) to conduct an environmental health study/evaluation of air quality surrounding the landfill. Based on these requests, PADOH and the Agency for Toxic Substance and Disease Registry (ATSDR) began collaboration with PADEP to determine the air quality at and near the landfill community locations.

**Community Concerns**

Since February 2015, PADOH and ATSDR have been interacting with the community regarding their concerns over potential environmental contamination due to landfill operations and proposed expansion application. The community has environmental concerns related to noise, odors, dust, and toxic chemicals in the air due to landfill operations. Community members are also concerned that certain health conditions may be associated with the landfill, including cancers, immune system disorders, nervous system disorders, birth defects, liver problems, skin problems, respiratory illnesses, muscular problems, nosebleeds, and headaches. Many community members who live near the landfill oppose the expansion of the landfill.

**Methods**

In April 2015, June 2015, and March 2016, PADEP conducted initial screening procedures using a mobile analytical unit (MAU) at six locations to determine the presence of airborne chemicals

at and near the KSL. PADOH conducted a preliminary review of the MAU data using health-based comparison values (CVs), which are conservative screening values used to identify contaminants for further evaluation. Concentrations above a CV will not necessarily be harmful. Following the review of the MAU screening data along with a review of recent KSL gas analytical data and literature on common landfill gas chemicals, PADOH, ATSDR, and PADEP selected chemicals that would be specifically targeted for more rigorous sampling and analytical procedures.

From January 2016 to April 2016, PADEP conducted 24-hour ambient air sampling events every third day at three different sampling locations. The three air sampling locations were Sherwood Park, located approximately one half mile (0.5 mile) southwest of the landfill property; Mid Valley High School, located approximately three quarters of a mile (0.75 mile) north-northwest of the landfill property; and a point along the perimeter of the KSL, located approximately 400 feet north of the landfill's main administrative office building.

A total of 90 samples were collected using summa canisters and charcoal tubes. A total of 87 valid samples were evaluated. The samples were analyzed for 75 volatile organic compounds (VOCs), 20 reduced sulfur compounds (RSCs), 3 carbonyls/aldehydes compounds (acetaldehyde, formaldehyde, and acrolein), ammonia, methanol, methylamine, and triethylamine. All samples were analyzed by PADEP's contractor, Australian Laboratory Services.

PADOH and ATSDR also reviewed relevant cancer data (2005-2014) for the six zip codes (18434, 18447, 18509, 18510, 18512, and 18519) surrounding the KSL for the following types of cancer: bladder, brain, breast, cervix, colon, esophagus, Hodgkin's lymphoma, kidney, larynx, leukemia, liver, lung, melanoma, non-Hodgkin's lymphoma, oral cavity, ovary, pancreas, prostate, stomach, testis, thyroid, uterus and other cancer types. Cancer incidence rate comparisons were made with the rest of the state.

## **Conclusions**

PADOH and ATSDR evaluated the available environmental data and reached the following conclusions:

1. Chronic (long-term) exposure to the chemicals detected in ambient air near the landfill at all locations is not expected to cause cancer or harmful non-cancer health effects. Benzene and formaldehyde were detected above ATSDR Cancer Risk Evaluation Guides (CREGs); however, the cancer risk estimates for these two contaminants were low and within the U.S. Environmental Protection Agency's (EPA) target cancer risk range of 1 in 1,000,000 to 1 in 10,000. These pollutants are commonly found in outdoor air and the estimated cancer risks at all three locations were less than the estimated cancer risk associated with national average ambient remote/rural outdoor air.
2. The maximum detected one-day concentrations of four chemicals exceeded acute (short-term) CVs during the three-month monitoring period. Three methylamine detections, one ammonia detection, three acetaldehyde detections, and one hydrogen sulfide detection exceeded health-based screening values. Short-term exposure to these chemicals at the

maximum measured levels could have possibly caused temporary health effects for sensitive populations. Temporary health effects could include mild irritation of the eyes, nose, throat, skin and respiratory tract.

3. Based on the particulate matter (PM<sub>2.5</sub>) results from the Scranton air monitoring station, PADOH and ATSDR conclude that breathing the levels of PM<sub>2.5</sub> detected when the results are averaged over a long term (months or a year or more) is not expected to harm people's health. However, PADOH and ATSDR conclude that there were peak short-term (daily or 24-hour) PM<sub>2.5</sub> exposure concentrations that could cause temporary health effects, including airway irritation, difficulty breathing, reduced lung function, irregular heartbeat, and asthma aggravation.
4. A data gap exists for assessing current and future potential exposures from subsurface vapor migration from the landfill to residences (i.e., vapor intrusion). Planned changes in landfill operations such as excavation, liner construction, and landfilling in an area closer to the Swinick community could impact future subsurface vapor migration pathways.
5. Compared to the state rate, incidence rates for the six zip codes combined were significantly lower for breast cancer, melanoma, non-Hodgkin's lymphoma and prostate cancer and significantly higher for cancer of the larynx. There is limited information supporting the link between laryngeal cancer and environmental contamination from landfills.

## **Recommendations**

PADOH and ATSDR recommend that PADEP:

- continue to oversee landfill activities and enforce landfill permit regulations, including nuisance odor rules;
- consider a fence line air monitoring program that includes publicly accessible real-time results for selected limited analytes as part of the landfill's future permit requirements;
- make publicly available the response and oversight activities that PADEP has conducted at the landfill;
- conduct timely responses to nuisance odor complaints;
- consider maintaining and posting an odor complaint log; and
- consider working with the landfill to perform vapor intrusion investigations in the Swinick community to evaluate current indoor air levels of volatile organic compounds and to ensure that conditions do not change in the future after new operations commence in the landfill area.

PADOH and ATSDR recommend that landfill authorities consider best practices for minimizing gull populations near KSL, including minimizing the open working face of the landfill to the extent feasible.

PADOH and ATSDR recommend that involved state and federal agencies continue to emphasize to local authorities and community members that property owners should install and properly maintain carbon monoxide monitors in this area.

PADOH and ATSDR recommend that residents monitor air quality alerts for the area and take protective actions as needed.

## **Next Steps**

PADOH and ATSDR will:

- continue to assist PADEP, when requested, with evaluation of additional environmental data from the landfill and surrounding communities;
- share this report, when published, with nearby residents and interested stakeholders, and summarize its findings and recommendations;
- solicit public comments on this report as well as collect any additional health concerns and address both in the final report; and
- hold an open house to explain the findings to the residents.

## **Limitations of the Findings**

PADOH and ATSDR identified the following limitations and uncertainties in the sampling and the subsequent public health evaluation:

- The air sampling does not represent air quality if the landfill expands its operations.
- Not every contaminant potentially associated with emissions from a landfill was included in the analyte list, and several contaminants had analytical detection limits above the ATSDR comparison values (CVs) and/or odor thresholds. In addition, a common odor causing landfill contaminant (hydrogen sulfide) was detected at high levels during one of the MAU monitoring periods, but was not detected during the community-based air monitoring. This observed difference in our monitoring datasets warrants further evaluation if strong sulfur odors are observed in the community in the future. Further, the data on acrolein was not included for further evaluation given the established data quality concerns.
- The community-based air monitoring occurred only for a three-month duration. The three months monitoring may not represent the full range of exposures that might occur throughout a full year.
- The available monitoring locations in the community were not in the direction of prevailing winds coming from the landfill. Therefore, the contaminants related to landfill emissions were likely not detected at the community monitoring locations except in the less frequent times that winds were blowing opposite the prevailing direction. Lastly, sampling data were not collected at background locations for comparison to monitoring locations closest to the site.