

BACKGROUND

In March 2020, the Pennsylvania Department of Health (PADOH) was informed that residents living near mushroom farms in southern Chester County, Pennsylvania were experiencing headaches, increases in asthma events, unpleasant smells, and other concerns. In response to resident complaints and a legislator request, the Pennsylvania Department of Environmental Protection (PADEP) began to monitor the air for hydrogen sulfide (H₂S) gas outdoors near mushroom operations.

PADEP set up two air monitors near mushroom composting operations: the “West Grove Monitor” at Avon Grove Charter School in London Grove Township and the “Landenberg Monitor” at New Garden Township Town Hall in New Garden Township. PADEP set up a third air monitor, the “New Garden Airport Monitor,” at New Garden Airport in New Garden Township. In February 2023, PADEP shared with PADOH the H₂S data collected on an hourly basis at these three monitors from August 2021-December 2022.

WHAT DID THE PENNSYLVANIA DEPARTMENT OF HEALTH DO?

Using standard public health assessment methods, the PADOH evaluated the H₂S data for levels that might cause health effects to people living in nearby residential communities and prepared a report. PADOH evaluated the data and considers how long an individual might need to be exposed in order to experience a health effect. PADOH considered acute (up to 14 days), intermediate (15-364 days), and chronic (a year or longer) exposures. For example, if you were exposed to a certain level of H₂S for 5 days, this would be considered an acute exposure, but if the exposure lasted 3 years, that would be considered a chronic exposure. PADOH also evaluated whether common H₂S odor thresholds were being exceeded. An odor threshold is the level at which someone can smell a certain chemical, and H₂S gas smells like rotten eggs. The effect H₂S has on each person can be very different. Some people may have an effect and others might not be affected at all.

PADOH evaluated the **potential** for non-cancer health effects from the H₂S levels in outdoor air. H₂S exposure has not been shown to cause cancer in humans.

Non-cancer health effects refer to health effects that are not related to cancer. Effects from H₂S exposure can range from mild to severe. Examples of non-cancer health effects from exposure to low levels of H₂S can include irritation to the eyes, nose, or throat, and/or difficulty breathing for some people with asthma or chronic respiratory conditions. Exposure to low levels of H₂S in air can also cause headaches, poor memory, tiredness, and balance problems. Exposure to very high levels of H₂S in air can cause loss of consciousness.

WHAT WERE THE MAIN FINDINGS?

- PADOH found that the highest H₂S levels at the West Grove and Landenberg monitors occurred during nighttime or very early morning hours on certain days. On these certain days and hours, the hourly H₂S levels at these monitors were close to levels that could negatively affect adults with asthma if exposed for 30 minutes. The levels used to make this determination are levels established by scientific studies. This means that H₂S levels may have led to short-term respiratory effects in some people during days and hours when H₂S levels were highest. People most likely to have been affected include sensitive populations such as children or older adults, or people with chronic respiratory conditions such as asthma. Because of the *potential* for health effects from acute exposures (exposures up to 14 days), **PADOH considers this an acute health hazard for short-term respiratory effects, particularly in sensitive populations.**

- **PADOH found that H₂S levels were regularly above levels where a nearby population can smell H₂S.** Some people can have a strong reaction to unpleasant environmental odors and some people may not have a reaction. The levels observed were high enough to potentially cause symptoms or conditions related to the smell of H₂S, such as headache, nausea, fatigue, or stress in some people. This may occur more in those people who have strong reactions to odors.
- **PADOH found that exposures of longer duration were unlikely to cause longer-term health effects.** The levels of H₂S in this area when averaged over longer periods of time were lower than levels where longer-term harmful health effects might occur. However, more research is needed to understand health effects from long-term low-level exposure in the general population, which includes sensitive populations.
- **The highest H₂S levels at the West Grove and Landenberg monitors were found during nighttime or very early morning hours and during the fall months.** Because mushroom growing occurs year-round, the detected H₂S levels are potentially influenced by seasonal changes and weather patterns that affect how H₂S moves in the environment once it is released into air. In addition, H₂S and other sulfur-based gases are heavier than air and tend to build up closer to the ground during late evening, nighttime, or early morning hours, when winds are generally calmer.

LIMITATIONS

There are some limitations, or weaknesses, that impact the findings of our overall health assessment. These limitations may include times when data may be missing or unavailable, chemicals that were not analyzed, or locations without data.

1. PADOH's conclusions are based on hourly H₂S data and not data representing shorter-term exposures (less than an hour). H₂S at very high levels can cause severe health effects. These effects can occur from very high H₂S exposures that are less than an hour. The hourly H₂S levels at the three monitors were much lower than levels known to cause severe health effects. This suggests that very high levels of H₂S in shorter duration are unlikely to occur.
2. PADOH received a large amount of data from PADEP, but each monitor had several days or weeks of invalid data, most commonly from the West Grove Monitor. Occurrences of invalid data are common for hourly monitoring. PADOH did not use invalid data in its evaluation.
3. At the time of PADOH's evaluation, there were no data on wind-speed, wind-direction, or humidity at each monitor, which may have provided further insight into area H₂S levels.
4. PADOH conclusions are based on outdoor H₂S levels and not on other gases, such as other sulfur-based gases that are often in air along with H₂S and can also affect health.

RECOMMENDATIONS

PADOH issues recommendations to best protect public health. The recommendations are not meant to specify risk management decisions or actions. Based on its evaluation, PADOH recommends the following:

1. Facilities suspected of high H₂S emissions engage in best practices and engineering controls to reduce odors, which might include an air monitoring plan to see if best practices or engineering controls produce lower H₂S emissions.
2. Efforts be made to significantly reduce area H₂S of this region to lower levels, and/or ensure H₂S emissions are located away from residential areas to protect public health.
3. Entities or community partners consider outdoor air monitoring to see if odor and health effect levels are being exceeded near homes or workplaces. Any collected data should be shared with stakeholders and the community.
4. Residents consult their physicians if experiencing health issues. Residents can try staying indoors when outdoor odors are bothersome and/or leaving the area for a few hours, if possible.

NEXT STEPS

PADOH intends to participate in meetings with stakeholders, community members, and/or interagency partners, if requested, to discuss outdoor H₂S levels, data sources, efforts to reduce emissions, and/or additional updates or concerns in this area.

Questions? Contact us:

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Electronically:

<https://forms.health.pa.gov/environmental-health-concern>