ENVIRONMENTAL HEALTH PROJECT
DEFENDING PUBLIC HEALTH SINCE 2012

Air Pollution Health Hazards from Non-Hazardous Waste Landfills

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For more detailed information on this topic, refer to the accompanying blog post. You can access all of EHP's fact sheets, including this one, here. Fact sheets are free to print, distribute, and share.

Municipal solid waste landfills, or sanitary landfills, are designated to receive common trash items, such as food waste, packaging, household goods, waste from local businesses, and certain non-hazardous industrial materials. **The decomposing waste in these landfills produces gases that contribute to local air pollution**. In certain states, such as Pennsylvania and Ohio, **these landfills are also permitted to accept toxic waste from oil and gas industries**, despite being designated *non-hazardous* waste landfills.[1] Oil and gas drilling waste contains radioactive materials that are mostly spread through leachate, a landfill byproduct created when toxic substances leach into water, such as rainwater and runoff. But landfill gas, mainly composed of methane and carbon dioxide, is more likely to contain volatile organic compounds (VOCs) and hydrogen sulfide when toxic oil and gas waste is among the decomposing landfill materials.[2]

In addition to the hazards posed by the waste itself, diesel-powered trucks and compactors at landfill sites emit health-harming pollution. Weather patterns may cause particulates to drift to nearby residential areas, or high winds may carry pollutants to areas where landfill gases would not typically be encountered. During the warm season, decomposition accelerates with higher temperatures, increasing landfill gases and odors too. **Nearby communities may experience health symptoms from inhaling landfill gases**, causing

- respiratory irritation,
- exacerbation of asthma, and
- possible neurological or carcinogenic risks over the long term.

The following chart details individual pollutants and their health risks.

Pollutant Type	Characteristics	Short-Term Effects	Long-Term Health Risks
Volatile Organic Compounds (VOCs) This category includes benzene, toluene, vinyl chloride, and hydrogen sulfide (H_2S), chemicals that are linked to cancer, headaches, nausea, and respiratory irritation. Flaring of landfill gases can also emit VOCs (BTEX, alkanes), in addition to NO_x and $PM_{2.5}$, from incomplete flaring.[3]	VOC concentrations can fluctuate daily with weather, wind, and operational activity.[4]	Headaches, nausea, eye and throat irritation	Cancer, neurological damage, liver/kidney disease[5]
Fine Particulate Matter ($PM_{2.5}$) and Dust PM is the composition of tiny liquid and solid particles found in the air we breathe. For more information refer to EHP's Particulate Matter and Shale Gas Development fact sheet.	• Are created through vehicle movement, waste compaction, and tipping operations. • Can travel deep into the lungs, worsening asthma, COPD, and heart disease.[6]	Coughing, shortness of breath, asthma attacks	Chronic bronchitis, heart disease, premature death[7]
Methane and CO_2 Methane is a potent greenhouse gas with 80 times the heat-trapping power of CO_2, a significant greenhouse gas, over a 20-year time span.[8] Methane leaks also co-emit VOCs (above), which severely impact nearby air quality.	Methane production increases with higher temperatures, such as the summer months, as landfill waste decomposes more quickly.[9]	Dizziness, fatigue, suffocation at high concentrations	Aggravates respiratory illness; fire/explosion risk (methane)[10]
PFAS (Perfluoroalkyl and Polyfluoroalkyl Substances) This category describes a select group of toxic substances that has been linked to a wide variety of health conditions like cancers, endocrine disruption, and increased susceptibility to infectious diseases.	• Are found in many consumer goods disposed of in landfills. • Escape into both landfill gas and leachate, contaminating air and water. • Are not removed by standard landfill treatment systems (e.g. leachate liners, coverings, some gas control systems, and chemicals to accelerate bioreactions), allowing continuous emissions and long-term exposure.[11]	None immediately noticeable	Hormone disruption, immune suppression, reproductive toxicity, cancer
Odors Odors can be unpleasant in the best of circumstances but may also represent the presence of harmful compounds, with risk depending on the chemicals present, intensity of exposure, and duration of exposure.	• May result from hydrogen sulfide, ammonia, and decomposing organic waste. • Are most common in summer and low-wind conditions, when pollutants can linger close to the ground.	Headaches, stress, sleep disruption	Mental health impacts from chronic nuisance exposure[13]

What you can do

For Community Members

Understand ways you can track and limit pollution exposures, such as:

- Filter or ventilate indoor spaces when possible but avoid opening windows during odor events.
- Report odor events to your city, county, or state-level environmental protection department. Emergency contacts, local and state legislators, organizations, and resources are available at EHP's Where to Turn Directory.
- Keep a symptom diary that notes the times, weather, and smells you experience; share it with your medical provider. For more information, please refer to EHP's fact sheets: Tips for Talking with a Health Care Professional, and How to Talk with Pediatric Health Professionals.
- Consult EHP's free Compounds of Concern tool, a searchable, interactive database of the symptoms and health impacts associated with chemical compounds commonly found in industrial air pollution. This tool can help those living near polluting facilities to understand what compound(s) may be causing their individual health symptoms, and to help advocates understand the health risks linked to air pollutants emitted from facilities.
- Champion waste reduction and composting programs to minimize landfill use in the first place.

For Landfill Operators

Explore proactive measures to reduce negative public health impacts, such as:

- Stop accepting oil and gas waste if you haven't already.
- Implement continuous emissions monitoring for VOCs, methane, and $PM_{2.5}$.
- Conduct PFAS testing of landfill gas and leachate.
- Install onsite pollution control devices to reduce air and water pollution.
- Publicly disclose waste sources and landfill operation logs.

Endnotes

[1]United States Environmental Protection Agency. (2026). Management of oil and gas exploration and production waste. https://www.epa.gov/hw/management-oil-and-gas-exploration-and-production-waste

[2]Agency for Toxic Substances and Disease Registry. (2001). Landfill gas basics. *Landfill Gas Primer*. Center for Disease Control. https://www.atsdr.cdc.gov/hac/landfill/html/ch2.html

[3]Ibid.

[4]Ibid.

[5]Pan, Q., Liu, Q., Zheng, J., Li, Y., Xiang, S., Sun, X., He, X. (2023). Volatile and semi-volatile organic compounds in landfill gas: Composition characteristics and health risks. *Environment International*, 174, 107886. https://doi.org/10.1016/j.envint.2023.107886

[6]Environmental Defense Fund. (2026). America's hidden landfill emissions. https://landfills.edf.org/

[7]Njoku, P. O., Edokpayi, J. N., & Odiyo, J. O. (2019). Health and environmental risks of residents living close to a landfill: A case study of Thohoyandou Landfill, Limpopo Province, South Africa. *International Journal of Environmental Research and Public Health*, 16(12), 2125. https://doi.org/10.3390/ijerph16122125

[8]Garthwaite, J. (2021). Methane and climate change. Stanford University: Doerr School of Sustainability. https://sustainability.stanford.edu/news/methane-and-climate-change-0

[9]Cusworth, D. H., Duren, R. M., Ayasse, A. K., Jiorle, R., Howell, K., Aubrey, A., Green, R. O., Eastwood, M. L., Chapman, J. W., Thorpe, A. K., Heckler, J., Asner, G. P., Smith, M. L., Thoma, E., Krause, M. J., Heins, D., & Thorneloe, S. (2024). Quantifying methane emissions from United States landfills. *Science*, 383(6690), 1499–1504. https://doi.org/10.1126/science.adi7735

[10]Njoku, P. O., Edokpayi, J. N., & Odiyo, J. O., Health and environmental risks of residents living close to a landfill.

[11]United States Environmental Protection Agency. (2025). Sustainable materials management: Non-hazardous materials and waste management hierarchy. https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy#Treatment

[12]Agency for Toxic Substances and Disease Registry, Landfill gas basics.

[13]Environmental Defense Fund, America's hidden landfill emissions.

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