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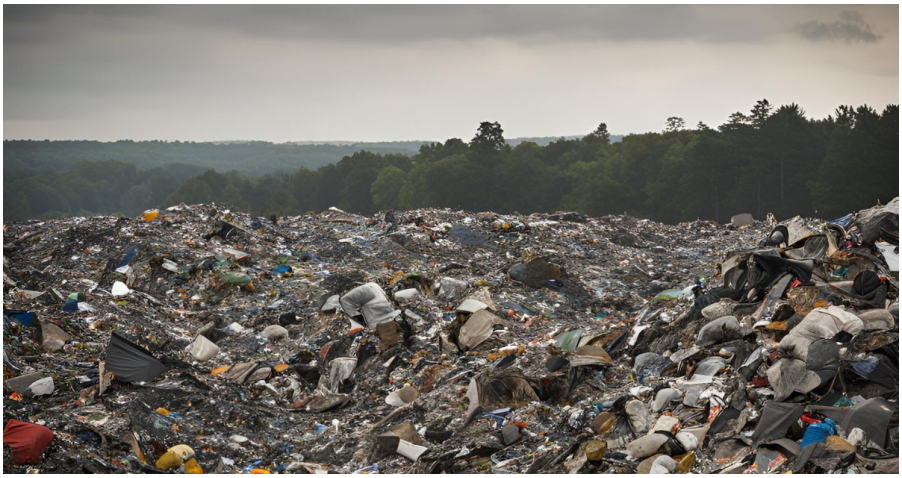
PFAS Emissions from U.S. Landfills Pose a Silent Environmental Crisis



Recent research has uncovered that up to 76% of fluorine in landfill emissions is linked to toxic PFAS, raising significant environmental and public health concerns. (Credit: AI Generated Image)

by Staff Writer | Aug 12, 2024

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Landfills in the United States have long been recognized as significant sources of pollution, contributing to various environmental and public health issues. Recent research has uncovered a particularly alarming concern: landfills are now identified as major contributors to the spread of toxic per and poly-fluoroalkyl substances (PFAS).

A New Pathway for Environmental Contamination

A study published in the journal Environmental Science & Technology Letters has revealed that PFAS, synthetic chemical compounds notorious for their persistence in the environment, are making their way into the surrounding environment through gas emissions from landfills. This discovery is especially concerning as landfill treatment systems are not designed to destroy or manage these hazardous substances, allowing them to escape into the atmosphere.

“The undisclosed and ubiquitous use of perfluoroalkyl

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and poly-fluoroalkyl substances (PFAS) in consumer products has led to a growing issue of environmental pollution, particularly within the solid waste community, where the fate of volatile (neutral) PFAS in landfilled refuse is not well understood," the authors of the study wrote. The research found that the mass of fluorine—used as a proxy for PFAS content—leaving landfills through gas emissions could be equal to or greater than the mass leaving through landfill leachate. This suggests that landfill gas, a less scrutinized byproduct, is a major pathway for PFAS mobility from landfills.

The Ubiquity and Dangers of PFAS

PFAS are a group of synthetic chemicals used to make products water, heat, and stain-resistant, including clothing, cookware, and firefighting foam. They are termed "forever chemicals" because they do not break down in the environment and accumulate in the bodies of humans and animals over time. Exposure to PFAS has been linked to a host of severe health problems, including birth defects, cancer, and liver and thyroid diseases.

The recent study assessed three municipal solid waste landfills in Florida, analyzing gas and liquid samples for PFAS content. The researchers used advanced techniques to capture and analyze 27 neutrally charged PFAS compounds from landfill gas. According to a

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press release from the American Chemical Society (ACS), the researchers "freed the compounds from the cartridges with organic solvents and analyzed the extracts for 27 neutrally charged PFAS, including fluorotelomer alcohols." They estimated that "the annual amount of fluorine (as a proxy for PFAS content) leaving the landfills through gas emissions could be similar to, or even greater than, the amount leaving through leachates."

Ashley Lin, the study's lead author and a researcher at the University of Florida, expressed alarm at the findings, stating, "The findings were definitely an alarming thing for us to see."

Current Limitations and Future Directions

While some landfill gas collection systems can capture much of the emissions, PFAS are particularly challenging to destroy. Traditional methods like flares, which burn off landfill gases, are ineffective against PFAS, often breaking them down into smaller, yet still

hazardous, compounds that are then released into the air. The study suggests that “vented gas from these sites should be considered in future mitigation and management strategies to reduce potential inhalation exposure and release to the environment.”

The Environmental Protection Agency (EPA) has acknowledged the limitations of current destruction and disposal technologies for PFAS. In its 2024 update of the interim guidance on PFAS destruction and disposal, the EPA emphasized the importance of prioritizing technologies that minimize environmental releases of PFAS. However, the agency also noted that real-world performance data for these technologies are limited, and additional research is needed to understand their effectiveness.

The EPA is actively collaborating with industry and academia to explore emerging technologies for PFAS destruction, such as mechanochemical degradation, electrochemical oxidation, and supercritical water oxidation. These technologies show promise but require further study to determine their viability on a larger scale.

Significant Environmental Challenge

The discovery of PFAS in landfill gas emissions represents a significant environmental challenge that

requires immediate attention. As the scientific community continues to unravel the complexities of PFAS contamination, it is clear that current landfill management practices are insufficient to contain these persistent pollutants. Moving forward, a combination of updated regulations, advanced treatment technologies, and ongoing research will be critical in mitigating the impact of PFAS on human health and the environment.

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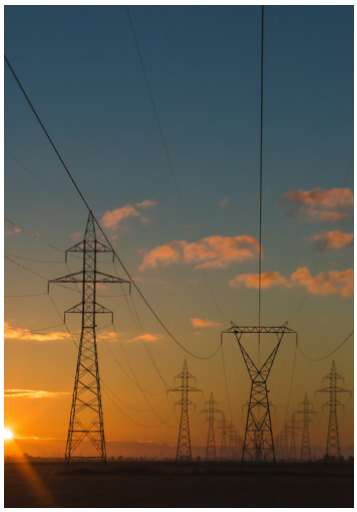

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