Hidden Cost of Plastic:
Toxic and Radioactive Oil and Gas Waste

EARTHWORKS

Oil and gas waste is sometimes referred to as the "Achilles Heel" of the industry: a vulnerability that carries with it great risk. There is far more toxic waste than the industry has places to put it, and disposal has already led to pollution that poses a risk to any community where waste operations take place.

THE ONLY WAY TO REDUCE THE CREATION OF THIS RADIOACTIVE WASTE IS TO REDUCE PLASTIC PRODUCTION, A GLOBAL PLASTICS TREATY THAT DOES NOT MANDATE A REDUCTION IN PLASTIC PRODUCTION DOES NOT MEANINGFULLY ADDRESS THE UPSTREAM HARMS OF PLASTICS.

Plastic and Petrochemicals Create More Upstream Oil and Gas Waste

- 99% of plastics are made from fossil fuels and over the past decade petrochemical expansion in the United States has been used as an explicit lifeline to continue and expand fossil fuel extraction.
- The United States produces more oil and natural gas than any other nation in the world. Two of the highest producing shale fields are the Marcellus Shale in Appalachia and the Permian Basin in Texas and New Mexico.
- This increase and expansion in fossil fuel extraction to feed plastic production comes with an unavoidable byproduct: toxic oil and gas waste, which contains carcinogens, heavy metals, and radioactive materials. This radioactive waste is often ignored in conversations around the plastic crisis and the human and environmental harms of plastic production

Industry's Radioactive Waste Problem

- Oil and gas development is known to bring radioactivity to the surface through produced water, drill cuttings, and drilling muds, and can also result in radioactive deposits in sludges and scale that accumulate on pipes and equipment. This is a particular concern with the development of the Marcellus Shale, primarily located under parts of Ohio, Pennsylvania, and West Virginia which contains considerably higher levels of radioactivity than many other formations.
- The potentially high levels of radioactivity in drilling waste have been primarily documented with regard to produced water and flowback. According to a 2011 review of sampling data by the US Geological Survey, the median total radium activity for produced water from the Marcellus Shale was 2,460 picocuries per liter (piC/L), compared to 1,011 piC/L for the non-shale samples. For comparison, the federal total radium limit for industrial effluent is 60 picocuries per liter (pCi/L) and the drinking water limit is 5 pCi/L of combined radium (Ra-226 and Ra-228).
- Investigations have found that treatment plants servicing oil and gas operators are often unable to remove radium and other contaminants (such as barium and strontium), likely because of the high salinity of the wastewater.

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Hazardous Waste Classified as Non-Hazardous

- In 1976, recognizing the dangers posed to public health and the environment by industrial waste, US Congress passed the Resource Conservation and Recovery Act (RCRA). This federal law establishes the framework for the regulation of hazardous and non-hazardous waste. Four years later, in 1980, Congress amended RCRA to exempt oil and gas waste from hazardous regulations pending a review by the EPA. Despite the EPA's finding that oil and gas wastes "contain a wide variety of hazardous constituents" and that "regulatory gaps exist," the agency chose not to classify oil and gas waste as hazardous waste.

- The controversial exemption enables the oil and gas industry to dispose of harmful waste with hazardous components without following the more rigorous safeguards in place for the disposal of hazardous waste from other industries. Even with over 30 years of research about the toxic impacts of the industry's waste since the exemption, it is far from being handled properly. The hazardous waste regulations under RCRA still do not apply to oil and gas development waste today, in 2024. Consequently, oil and gas waste is categorized as non-hazardous and its management is largely handled by state laws that also exempt it from "hazardous" classifications. As a result, there is little consistency in tracking, testing, and monitoring requirements for oil and gas waste in the United States

Possible Exposure Pathways

The public can be exposed to radioactive oil and gas waste via several exposure pathways:

Wastewater on roads	In at least 13 states across the country, oil and gas wastewater is spread on roads for dust and ice control. According to a study at Penn State University, the practice concluded: "Release of a known carcinogen (e.g., radium) from roads treated with O&G wastewaters has been largely ignored. In Pennsylvania from 2008 to 2014, spreading O&G wastewater on roads released over 4 times more radium to the environment (320 millicuries) than O&G wastewater treatment facilities and 200 times more radium than spill events."
Discharge to waterways	Researchers have found accumulations of radium up to 650 times higher in river sediments where treated conventional oil and gas wastewater is discharged than the levels detected at sampling locations directly upstream. According to a Duke University study released in January 2018, even though "conventional oil and gas wastewater is treated to reduce its radium content," this has not prevented "high levels of radioactive build-up in the stream sediments" over time.
Landfills, pits, and spreading	Landfills, pits, and spreading Wherever radioactive waste is buried or spread, rainwater can leach toxins into the surrounding landscape, including groundwater. In many oil and gas states, waste can be buried on site or spread over land with minimal testing that generally does not include radioactive materials.
Pipe scale	Pipes used in oil and gas fields collect radioactive scale that can become airborne during pipe cleaning. Without proper safety gear, workers can be exposed by breathing, eating, drinking and standing near contaminated pipes and other equipment.

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Case Study: Fairmont Brine

There is a fracking waste site in Fairmont, West Virginia which opened in 2009 with the purpose of turning this radioactive waste into products such as road salt but by 2015 the company had disappeared leaving the radioactive site behind. In 2016 the truth came to light that Fairmont Brine's permit downplayed the amount of radioactive elements, especially radium-226. In 2019, a WV Department of Environmental Protection spokesperson told a reporter that the agency does not monitor for radioactivity at frack waste treatment plants – this does not mean that radionuclides are prohibited but that they are not regulated by the WVDEP. Run-off from this facility flows towards the largest city in the county and beyond that threatens to contaminate the Monongahela River, a source of drinking water for Pittsburgh.

In 2023, an explosion rocked the abandoned Fairmont Brine processing plant and the community received mixed messages about the risk as reports from the West Virginia Department of Environmental Protection said there was no contamination.

Over the summer of 2023 advocates and scientists visited the site finding it shockingly easy to access the abandoned waste water ponds which maxed out their geiger counter. The geiger county read around 7,000 counts per minute or just under 2 millirems per hour. The abandoned site was littered with bathing suits, beer cans, and other evidence teens and community members spent time at the site, potentially swimming in the radioactive waste. **When the readings were taken there were no gates, guards, and not even a "no trespassing" sign.** The small yellow radioactive notices blended into the graffiti on the site.

Photo of pools of waste at Fairmont Brine. There appears to be a mattress floating n the water. Photo taken by Esteban Fernandez for the Times West Virginia

As of February 2024 the US Environmental Protection Agency confirmed additional safety measures were implemented at the site including fences and locks on the gates in addition to no trespassing signs installed in October 2023. Testing and monitoring of the site by federal and state agencies is ongoing. All of this was prompted by grassroots scientists and advocates investigating the site and raising concerns around community safety.

Fairmont Brine is just one story of mishandled radioactive waste out of many concerning examples and an indication of what is in store for communities if plastic production and fossil fuel extraction continue.

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