

Vinyl chloride, dioxin and the poisoning of East Palestine, Ohio

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Do you work at Norfolk Southern or another Class I railway? Do you live in East Palestine or a neighboring community? Tell us what you know about the Norfolk Southern disaster by filling out the form at the bottom of this article. All submissions will be kept anonymous.

More and more scientific evidence is accumulating to demonstrate the dangers facing the residents of East Palestine, Ohio, from the willful negligence and cover-up on the part of Norfolk Southern (NS) railroad, the state of Ohio and the federal government. All three are responsible in various ways for the derailment and the spilling of highly volatile and toxic chemicals into the air, streams and soil surrounding the town.

Of the 50 cars that were affected during the February 3, 2023 derailment, 11 were carrying toxic chemicals which have leaked into the small streams and storm drains in the area. Countless animals have been found dead in the vicinity of the spill. Although railroad officials had disclosed that the train had been carrying only vinyl chloride and butyl acrylate, in a letter designated as a general notice of potential liability to NS, sent by the Environmental Protection Agency (EPA), they included three other chemicals: ethylhexyl acrylate, isobutylene and ethylene glycol monobutyl ether.

To make matters worse, on February 6, after ordering an immediate evacuation surrounding the town, the contents of not just the one affected car but all five cars carrying vinyl chloride were released and lit, creating a massive thick black plume of smoke that could be seen from miles away.

It has been estimated upwards of 1.1 million pounds of the highly toxic chemical was released, which have since settled over and seeped into possibly thousands of square miles that may include the densely populated metropolitan area of Pittsburgh, Pennsylvania, which sits 50 miles due southeast. The heavy cloud of chemicals has already settled into the soil and its components are finding their way into the groundwater and streams used by farmers for their crops and livestock, both for sale and personal consumption. The chemicals then become part of the food chain.

No serious study of such carcinogens and contamination has ever truly been undertaken at an epidemiologic level to connect population health on a regional basis with such pollution. Cases like Love Canal, New York, and Hinckley, California, have become infamous because of the legal actions that were brought by these communities against the corporations that polluted the ground they were built on.

The legal victories associated with these cases are highly isolated exceptions, but the pollution is far more common than authorities would indicate. The National Priorities List updated and kept by the EPA added two additional sites in the December 22, 2022 Federal Register, bringing the total to 1,336 uncontrolled hazardous waste sites across the country.

As to the plight of East Palestine, Sil Caggiano, a hazardous materials expert, stated succinctly what many were voicing, “We basically nuked a town with chemicals so we could get a railroad open. There’s a lot of what-ifs, and we’re going to be looking at this thing five, ten, 15 and 20 years down the line and wondering, ‘Gee, cancer clusters could pop up,

you know; well water could go bad.’”

Toxicologist Stephen Lester, science director of the Center for Health, Environment & Justice (CHEJ), has worked with communities affected by dioxin contamination for more than four decades. This dates back to the late 1970s Love Canal disaster, in which long-term exposure to then undisclosed dumping of more than 22,000 tons of chemicals by Hooker Chemicals and Plastics Corporation had been happening since the 1940s and 1950s. This led to significant health problems and birth defects among residents of the affected neighborhood. After a lengthy lawsuit by 1,300 former residents of Love Canal, the companies agreed to a \$20 million settlement.

In a recent opinion piece for the *Guardian*, Lester adamantly insisted that testing for dioxin should be mandatory. Exposure to these substances can lead to an assortment of serious medical conditions and chronic health problems that include cancer.

The burning of vinyl chloride is known to generate cancer-causing compounds called dioxins. The most toxic form, – 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), is the contaminant found in the herbicide used during the Vietnam War—Agent Orange—and at Love Canal, New York, and Times Beach, Missouri (December 1982). TCDD is not manufactured but is a direct byproduct of processes that use or burn substances, such as vinyl chloride.

As the World Health Organization notes, 90 percent of human exposure to dioxins comes through the food chain, mainly meat and dairy products, fish and shellfish. These compounds can cause reproductive and developmental problems. They may have serious impacts on the immune system and have been implicated in the development of cancers.

The history behind dioxin production and dioxin poisoning is two centuries old, going back to the early industrial manufacture of various chemicals. From the 1920s until the late 1970s, polychlorinated biphenyls (PCBs), which exist in mixtures with dioxin-like PCBs, were used as lubricants and plasticizers, when Congress banned their sale and use as part of the Toxic Substance Control Act of 1976.

In 1947, an unusual disease among some cattle, who appeared emaciated and thick-skinned and which had never been seen before, was later correlated to exposure to dioxin-like compounds. In 1949, an explosion at Monsanto’s chemical plant in West Virginia led to exposure of workers to dioxin-contaminated herbicide.

Many of the workers developed a rare skin condition known as chloracne caused by exposure to these toxic agents. The case of dioxin poisoning of Ukrainian politician Viktor Yushchenko in 2004 with TCDD is a textbook case of this disease. Follow-up occupational studies found that highly exposed workers had an increase in all cancers. A decade later, feed contaminated with TCDD led to a mass die-off of commercially farmed poultry.

Agent Orange, which was used as an herbicide in the Vietnam War to remove leaves from trees and plants to reduce ground cover for the Vietnamese guerrilla forces, led to higher incidence of diabetes and

cancers among veterans who were exposed. In particular, the Institute of Medicine found there was an association between Agent Orange and various cancers like soft-tissue sarcomas, non-Hodgkin's lymphoma and chronic lymphocytic leukemia.

By 1971, it was found that TCDD was a teratogen, which meant that mothers exposed to these compounds in early pregnancy had higher risks of birth defects in their fetus. Studies of populations exposed in Taiwan in 1979 during pregnancy or breast feeding found that babies had impaired cognitive development, chronic behavioral issues and infertility.

In the 1970s and 1980s, the Great Lakes waters were polluted with PCBs, leading to significant declines among lake trout and minks. In conjunction, nursing mothers in the region were found to have had high levels of PCB concentrations in their breast milk due to consuming fish from the polluted waters.

The mechanism of action of dioxins on vertebrate species is through the activation of the Aryl hydrocarbon Receptors (AhR), which are highly conserved proteins thought to be involved in key early development of the embryo, aging, low oxygen states and biological circadian rhythms. In a manner of speaking, the dioxin "hijacks" the receptor, disrupting its ability to function.

According to one study, the health effects in humans exposed to dioxins include "cardiovascular disease, diabetes, cancer, porphyria [a rare disorder of the skin and nervous system], endometriosis, early menopause, reduced testosterone and thyroid hormones, altered immunologic response, skin, tooth and nail abnormalities, altered growth factor signaling, and altered metabolism."

Vinyl chloride is a gas under most conditions, so exposure to it comes about through inhalation. Historically, prior to the 1970s, when the newly formed Occupational Safety and Health Administration (OSHA) lowered the permissible limits from 500 to one part per million, during occupational exposures workers would complain of a variety of symptoms that included dizziness, visual disturbances, headaches, unsteady gait, including heart and respiratory failures if the exposures were chronic.

Later, exposure to vinyl chloride was linked to liver toxicity and damage. It also led to rare forms of liver cancer called hepatic angiosarcomas and has been labeled a human carcinogen by the International Agency for Research on Cancer (IARC).

As Lester notes, "The EPA is very familiar with dioxins. For more than 25 years, the agency evaluated and assessed the risks posed by exposures to dioxins. They published multiple draft reports on the health effects caused by exposure to dioxins. They published an inventory of dioxin sources and devoted an enormous amount of time to studying dioxins. The agency knows this chemical very well."

He then states, "So, why is the EPA unwilling to test for dioxins in the soil? My guess is because they know they will find it. And if they find it, they'll have to address the many questions people are asking."

Indeed, the controlled release and burn have created an environmental disaster and the residents of East Palestine and surrounding regions are the guinea pigs in what is shaping up to be another historic example in a series of environmental disasters that have afflicted the working class populations who reside by the railways and roads that transport these toxic substances unbeknownst to them.

Murray McBride, a soil and crop scientist who studies the impact of contaminants in soil and water, explained that vinyl chloride is "highly mobile" in the ground.

He said, "It is unclear how much of this volatile chemical escaped into the air or burned before entering surface waters and soil, but vinyl chloride is highly mobile in soils and water and can persist for years in groundwater. It is advisable that farmers and other residents in this area test their wells over the next few months at least for the presence of the spilled chemicals including vinyl chloride, in order to protect the health of humans and livestock. Because the combustion of vinyl chloride that

resulted from the accident may have created highly toxic dioxins, surface soils downwind of the spill site should be tested for dioxin levels particularly where food crops are to be grown."

Although residents of East Palestine were given the "all clear" sign, as soon as they entered their homes they faced a barrage of strong acrid odors which led to fits of coughing, reddened eyes and inflamed nasal passages and throats, all from inhaling the air.

Moreover, the all-clear assurances were not based on independent or official testing by Ohio state or federal officials. Instead, a private for-profit consulting firm was hired by Norfolk Southern railroad, CTEH (Center for Toxicology and Environmental Health), founded by scientists in 1997 who worked in defense of tobacco companies, according to the *Guardian*. The consultants have backed the railroad on two other occasions, including in a 2012 \$18.5 million settlement where two cleanup workers were burned in a fire.

The *Guardian* wrote, "Now known by its acronym, CTEH quickly became a go-to contractor for corporations responsible for industrial disasters. Its bread and butter are train crashes and derailments. The company has been accused repeatedly for downplaying health risks."

CTEH, which merged three years ago with the Montrose Environmental Group, has a dubious past of conducting inaccurate testing with the protection of the company hiring them in mind. They have consulted on ecological disasters as far back as 9/11, Hurricane Katrina and the BP's Deepwater Horizon oil spill in 2010, contaminating 92,500 square miles of surface water, 1,300 miles of coastline and 3,200 square miles of ocean floor.

In the immediate aftermath of the cleanup efforts, CTEH contractors presented themselves as environmental experts who quickly came into the homes of the East Palestine residents taking some readings and telling them the air was clean.

However, as environmental health professor at the University of Kentucky, Erin Haynes, told the *Guardian*, their tests "were not designed to detect the full range of dangerous chemicals the derailment may have unleashed, and they did not sample the air long enough to accurately capture the levels of chemicals they were testing for." She added, "It's almost like if you want to find nothing, you run in and run out."

In other words, the data obtained by CTEH is being used to head off any legal claims or actions against the railroad. The testing in the homes was designed by CTEH, and hotlines offered to residents for any urgent questions or concerns were being handled by CTEH.

Meanwhile, during the US Senate Committee on Environment and Public Works hearing held on March 9, 2023 on East Palestine, not one resident of the community was invited to testify or ask the witnesses, such as CEO Alan Shaw or the senators, questions as to why this derailment was not avoided and why such dangerous and toxic chemicals were allowed to be expelled to expedite resuming operations; to say nothing of demanding that the corporation and government take measures to alleviate the bleak future residents now face.



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