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A disaster politicised: The hazardous chemical incident in East Palestine, Ohio

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Abstract

The recent derailment of a train in the U.S. state of Ohio has unleashed both hazardous chemicals and toxic divisions in American politics.

Key words

Hazardous chemical incidents / disaster response / environmental health / politicisation

Introduction

On 3 February 2023, a 149-car freight train derailed outside the town of East Palestine in the U.S. state of Ohio while en route to Conway, Pennsylvania (1). Private rail operator Norfolk Southern told media outlets that 20 of the rail cars were carrying numerous volatile organic compounds (VOCs) at the time, including vinyl chloride, polyethylene, benzene, butyl acrylates and ethylene glycol (2). A number of rail cars subsequently ignited, posing serious risk of a hazardous chemical incident. Approximately 50 rail cars were involved in the derailment (3).

First responders established a 1-mile (1.6km) evacuation zone around the crash site, and fire crews managed to contain the burning material by 5 February, although they were not able to fully extinguish the blaze. Subsequently, officials became concerned with a sustained rise in temperature inside one unit nearby railcars 28-31 and railcar 55, which between them were carrying 115, 580 gallons (437517.8 L) of vinyl chloride (4). Fearing the vinyl chloride was undergoing a polymerisation reaction, crews decided to enact a controlled release of the material to avert a potentially catastrophic explosion (5). Following an expansion of the evacuation zone to 2 miles (3.2km), controlled venting began on the afternoon of 6 February, during which vinyl chloride liquid was released into constructed trenches, where the material was vaporised and burned (4). A large chemical plume became visible during the release, however, raising concerns amongst residents over long-term health effects associated with any potential exposure to by-products of the burn-off (6).

Public health concerns

Ohio Environmental Protection Agency (EPA) personnel told U.S. media that the main chemicals released during the controlled venting were vinyl chloride (VC) and butyl acrylate (1). "Vinyl chloride syndrome" has been documented since the 1970s among those who have had occupational exposure to VC, which involves symptoms such as headache, changes in vision, nausea, insomnia, peripheral

neuropathy, and weight loss (7). Sustained exposure has also exhibited a strong association with angiosarcoma of the liver, and VC is classified by U.S. authorities as a known human carcinogen (8). Less definitive evidence has shown higher levels of other cancers amongst those occupationally exposed to VC, including brain tumours and hepatocellular carcinoma, as well as lung, lymphatic and skin cancers (8). Prolonged exposure can also cause sensory-motor polyneuropathy, pyramidal, extrapyramidal, and cerebellar abnormalities; neuropsychiatric symptoms such as sleep disorders, loss of libido, headaches, and irritability; EEG alterations; and immunopathologic phenomena such as purpura and thrombocytopenia, as well as Raynaud's phenomena (8).

Occupational exposure to VC as historically described may not be applicable to the recent disaster in East Palestine. While acute exposure at high levels primarily affects the central nervous system and can result in cardio-respiratory compromise, sublethal effects resolve quickly when the person is removed from exposure to the agent (9). Of more immediate concern are the by-products that can result from the burning of vinyl chloride, including carbon monoxide, carbon dioxide and phosgene (10). The potential for phosgene to damage human health, even when only present in the air at very low levels, has prompted distress amongst members of the East Palestine community.

Anecdotal reports via local, national, and social media sources indicate some local residents have experienced symptoms consistent with low-level acute chemical exposure following the incident (11). A number of residents told media outlets of experiencing headache, sore throat, gastroenterological symptoms and skin rashes (11). Some of these symptoms are consistent with acute inhalational exposure of vinyl chloride, and were similar to those experienced by residents of Paulsboro, New Jersey, in November of 2012, following a train derailment there that also involved a consignment of vinyl chloride (12).

The U.S. Centers for Disease Control (CDC) deployed personnel from the Agency for Toxic Substances and Disease Registry to support the Ohio State Department of Health (ODH) in assessing contamination risks and to co-ordinate the response. The ODH established a Health Assessment Clinic staffed by physicians, toxicologists, and mental health clinicians in East Palestine, in collaboration with the U.S. Department of Health and Human Services, for any affected residents to attend free of charge. As of 24 February, 77 individuals had attended the Health Assessment Clinic, however no formal epidemiological report has been issued by authorities (13). Local media reported an apparent rise in skin rash presentations in the weeks following the crash (14), however health providers did not see an unusual number of patients presenting with acute respiratory illness (15).

Evidence has emerged of an increase in local wildlife mortality as a result of chemical exposure from the accident (16). The Ohio Department of Resources estimated that at least 43,000 aquatic organisms died in waterways within a 5-mile (8km) radius of the site (16). Local residents have also voiced concern over the health of pets and livestock, and subsequent impacts on food security (17). The accident is expected to have a deleterious effect on crops and local plant life, with experts from Cornell University warning that “vinyl chloride is highly mobile in soils and water”, advising farmers to test wells and soils where crops are grown (18). While Ohio Governor Mike DeWine advised residents that it is safe to return to their homes as of 8 February, an atmosphere of distrust has inhibited effective public communication efforts (19).

A disaster politicised

The Environmental Protection Agency (EPA) deployed technical specialists within hours of the incident, and conducted monitoring of air, groundwater, soil and sediment. Monitoring was coupled with detailed, real-time data visualisation available to the public (20). Questions were raised by state Senators, however, as to why the EPA was not testing for dioxins, a likely by-product of burned vinyl chloride (21). Other observers questioned the efficacy of using untargeted analysis that may not detect polycyclic aromatic hydrocarbons (PAHs), perfluoroalkyl and polyfluoroalkyl substances (PFAS) and other compounds (22). Facing mounting criticism, the EPA finally ordered Norfolk Southern to sample for dioxins on 2 March (23).

Following the accident, the EPA issued a unilateral order directing Norfolk Southern to conduct “all necessary actions associated with clean-up” (24). However, operations were ordered to pause on 25 February, after residents living near interstate disposal sites raised concerns (22). Contaminated soil from the site was to be safely disposed of at a US Ecology landfill in Belville, Michigan, and contaminated water was to be sent to a Texas

Molecular deep well injection facility in Deer Park, Texas (22). On 16 February, however, a separate train derailment occurred on a Norfolk Southern line near the Belville site (25), leading local officials to question the arrangements. On the day the clean-up was paused, at least 102,000 gallons of liquid waste (186, 112 L) and 4,500 cubic yards (3,440 cubic metres) of solid waste remained at the East Palestine site (26).

Well-founded concerns among the public over the environmental testing methodologies being used by federal authorities have been aggravated by political figures seeking to exploit the disaster for apparent personal gain (27). Fringe media outlets that have been associated with disinformation campaigns in recent years accused the U.S. federal government of wilfully suppressing information and not attending to the disaster, despite ample evidence to the contrary (27). Such exploitation of the disaster emanated particularly from disinformation actors who were prominent in misleading public discussion during the COVID-19 pandemic (28).

While the controlled venting and burning of vinyl chloride appeared to be the least dangerous course of action authorities could take following the derailment, substantial questions remain regarding the conduct of the U.S. private rail industry and its suitability for transporting potentially volatile compounds (29). In 2014, rail industry lobbyists, representing Norfolk Southern and other operators, opposed adoption of more stringent train speed limits on the basis they could “impact network fluidity” (30). The Association of American Railroads further opposed the mandatory use of electronically controlled pneumatic (ECP) brakes on trains that carry high-hazard flammable materials (30). A preliminary investigation by the National Transportation Safety Board found that an overheated axle may have been a contributing factor in the East Palestine derailment, which occurred as the train travelled at 47mph (75 km/h), below the established speed limit of 50mph (80km/h) (4). Notably, the lobbyists’ 2014 submission argued that a proposed 40mph speed limit would “dramatically impair railroad service” (30).

One month after the Norfolk Southern derailment in East Palestine, U.S. lawmakers proposed reforms to address these safety issues (31). In a rare moment of bipartisanship, Democrats and Republicans in the Senate put forward measures aimed at strengthening inspection requirements for trains carrying hazardous materials and drew up increased fines for safety breaches (31). Among the measures proposed is a mechanism obliging rail operators to inform state emergency response officials precisely what is being transported through their jurisdiction. However, the bill fell short of an earlier proposal to reduce speed limits for trains carrying hazardous materials and left more substantial regulatory reform to the Transportation Department (31). Shortly after the bill was introduced, rail industry lobbyists said they would oppose the measures (32).

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