

RESEARCH REPORT

Toxic Cargo

HOW RAIL TRANSPORT OF VINYL CHLORIDE PUTS MILLIONS AT RISK, AN ANALYSIS ONE YEAR AFTER THE OHIO TRAIN DERAILMENT

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By

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INTRODUCTION

Nearly one year ago today, on February 3, 2023, five train cars containing 887,400 pounds (115,000 gallons) of vinyl chloride^{1 2 a}, the key building block for polyvinyl chloride (PVC) plastic, derailed and were subsequently burned, setting off a major environmental health disaster that sickened area residents and first responders³, killed wildlife⁴, and contaminated East Palestine, Ohio and surrounding communities.⁵ A similar disaster struck Paulsboro, New Jersey in 2012. In both cases, the train cars carrying cancer-causing vinyl chloride were on their way to plastics manufacturing plants in New Jersey owned by OxyVinyls (a subsidiary of Occidental Petroleum)^{1 6}, where factories make PVC plastic for flooring and other building materials sold at major retailers like The Home Depot. According to the company, OxyVinyls is the largest vinyl chloride monomer (VCM) producer in the United States and the third-largest polyvinyl chloride (PVC) supplier in the United States.⁶

OxyVinyls played a central role in these two disasters for one important reason—it supplies PVC plants located far from its Texas petrochemical plants that manufacture vinyl chloride, forcing it to rely on dangerous rail transport of the highly hazardous chemical. With vinyl chloride production in Texas and OxyVinyls-supplied PVC plants in New Jersey, Illinois, and Ontario, OxyVinyls is responsible for the transport of rail cars filled with vinyl chloride across an enormous distance and through a number of major and minor population centers, putting communities across the country at risk.

We set out to quantify this hazard: at any given time, how many rail cars with vinyl chloride are en route from OxyVinyls plants in Texas to its factories in other states and provinces? How much of this hazardous chemical is transported every year, and how many people are put at risk? While PVC's hazards go far beyond the dangers of rail transport, our investigation is the first time the public is learning the extent to which this particular supply chain poses a risk to communities across much of the U.S.—and the identities of those communities.

To better understand the magnitude of this hazard, we established the most likely rail routes for shipping of vinyl chloride from two OxyVinyls plants in Texas to four PVC factories in New Jersey, Illinois, and Ontario. Using information sources including mapping data from the Bureau of Transportation Statistics, as well as rail company route maps, photos, repair reports, and other sources, we established the most likely routes. We put this route information together with travel time and the annual PVC production capacity of these factories to estimate the number of vinyl chloride tank cars needed to supply these four factories (see [Material Research's Methodology \(PDF\)](#) for more detail).

^a EPA's East Palestine records list five tank cars carrying 178,150; 178,300; 177,250; 177,600 ; and 176,100 pounds of vinyl chloride monomer (VCM) in each car. See pages 5-6 of <https://www.epa.gov/system/files/documents/2023-02/02%2021%2023%20Norfolk%20Southern%20Removal%20UAO%20-%20Signature%201-508checked.pdf>

KEY FINDINGS

- **We estimate that up to 36 million pounds of vinyl chloride travels on more than 200 rail cars across nearly 2,000 miles of U.S. railways at any given moment.** These shipments supply OxyVinyls and Orbia PVC plastics factories in New Jersey, Illinois, and Niagara Falls, Ontario. Over the course of a year, an estimated 8,595 rail cars carry approximately 1.5 billion pounds of vinyl chloride from OxyVinyls, the nation's top producer of the chemical, to these plastics plants.
- **The rail shipment of vinyl chloride to make PVC plastic puts more than three million people at risk, including communities from Texas to New Jersey.** We identified the route from OxyVinyls vinyl chloride plants in Texas to the PVC factories in New Jersey as the vinyl plastics industry's longest in the U.S. OxyVinyls shipments along this route traverse at least eight major cities including Houston, TX; Philadelphia, PA; San Antonio, TX; Austin, TX; Pittsburgh, PA; Toledo, OH; Fort Wayne, IN; Little Rock, AR; and hundreds of other cities and towns. We estimate more than three million people live, and about 670,000 children attend more than 1,500 schools, within one mile of the train route between Texas and New Jersey. The U.S. Department of Transportation (DOT) recommends an initial evacuation of one mile in all directions in the event of a major vinyl chloride rail derailment and fire.
- **Vinyl chloride is used to manufacture PVC building products sold at The Home Depot and other retailers:** OxyVinyls sells PVC to companies that make PVC building materials for retailers like The Home Depot. OxyVinyls supplies businesses like AHF, which makes Armstrong vinyl flooring in Pennsylvania and Illinois and sells Armstrong brand flooring through The Home Depot.
- **Making vinyl chloride and PVC releases toxic air and climate pollution:** The facilities that make vinyl chloride and PVC are contributing to significant air pollution as well as climate change. In 2022, OxyVinyls and its joint venture partner, Orbia, ranked as the country's third and fifth leading sources of vinyl chloride air pollution. Orbia and OxyVinyls' VCM operations in Texas, Illinois, and New Jersey reported releasing 61,774 pounds of vinyl chloride into the air and EPA calculates they released 3,339,604 metric tons of greenhouse gases in 2022. These plastics plants have also violated federal environmental regulations; every OxyVinyls and Orbia plant in this investigation has been out of compliance with Clean Air, Clean Water, or other federal environmental regulations within the last 18 months.

PVC: THE POISON PLASTIC

Before PVC plastic products arrive at retailers like The Home Depot, vinyl chloride holds serious danger both for communities where it is manufactured and for the millions of people who live near the rail lines traveled by these hazardous tank cars. While not all vinyl chloride is shipped by rail in the U.S, these rail shipments pose serious risks to nearby communities across the U.S.

Vinyl chloride is the basic building block chemical for making PVC plastic. The International Agency for Research on Cancer (IARC), U.S. Department of Health and Human Services (HHS), and the U.S. Environmental Protection Agency (EPA) have all identified vinyl chloride as a known human carcinogen. It is associated with liver cancer, lung cancer, brain cancer, lymphoma, leukemia, breast cancer, and numerous other health problems.^{7 8}

This train transport of vinyl chloride is just one of the many serious environmental health hazards of PVC's lifecycle. According to EPA estimates based on company reports, PVC plastics companies produced 10 to 20 billion pounds of vinyl chloride in the U.S. in 2019⁹, often in low-income communities and communities of color.¹⁰ Numerous other highly hazardous chemicals are used or released during the production, use, and disposal of PVC plastic, including chlorine gas, asbestos, mercury, ethylene dichloride, phthalates, bisphenol A (BPA), organotins, heavy metals, chlorinated paraffins, dioxins and furans, and numerous other additives and chlorinated byproducts.¹¹⁻¹⁷

This new investigation follows our 2023 report PVC Poison Plastic, which found that PVC plastics plants reported releasing more than 400,000 pounds of vinyl chloride into the air in 2021, posing risks to downwind vulnerable communities. The report included interactive maps of the vinyl chloride, PVC plastic, and disposal facilities in the U.S. and found that many of these plants are located in low-income communities and communities of color. Of the U.S. residents who live within three miles of a vinyl chloride, PVC manufacturing, or PVC waste disposal facility, the report found that 63% are people of color, compared to 41% nationwide. The report also found that residents of these areas earn 37% below the national average.

This investigation comes one month after the U.S. EPA announced it is taking the first step to prioritize vinyl chloride under the Toxic Substances Control Act (TSCA) for potential regulatory action, and at a time when numerous U.S. states are expected to reintroduce laws to ban PVC in packaging and other products.¹⁸

HOW MUCH VINYL CHLORIDE IS SHIPPED FROM OXYVINYLS AROUND THE U.S. EVERY YEAR?

While 16 factories around North America¹⁹⁻²⁴ b produce PVC from vinyl chloride, those located far from clusters of petrochemical production must rely on rail transport. OxyVinyls, with vinyl chloride production in Texas and PVC manufacture with its business partner Orbia in Illinois, New Jersey, and Ontario, is the company producing PVC the farthest from its vinyl chloride sources.

Oxyvinyls' supply chain is dangerously long, as evidenced by the rail disasters in East Palestine, Ohio and Paulsboro, New Jersey.

We mapped the most likely rail routes from OxyVinyls' Houston-area and Ingleside, Texas vinyl chloride plants to the four destinations: Orbia in Henry, IL; OxyVinyls and Orbia in Pedricktown, NJ; and OxyVinyls in Niagara Falls, ON. Then, pairing those likely routes and associated travel times with the approximate demand for vinyl chloride for each plant, we created an estimate for the number of rail cars filled with vinyl chloride traveling to each of those plants.

The table below summarizes the estimated number of train cars and the quantity of vinyl chloride shipped by rail from OxyVinyls across the country daily and on an annual basis. The average tank car (based on information in manifests for deliveries in the East Palestine and Paulsboro disasters) carries 177,111 pounds of vinyl chloride.^{1 25} c See the Material Research's Methodology (PDF) for detailed calculations behind this table.

^b Orbia - Altamira (Mexico): <https://www.orbia.com/4a0e15/siteassets/6.-sustainability/sustainability-reports/2013/desarrollosustentable2013.pdf>; Orbia - Henry and Pedricktown: <https://www.vestolit.com/about-us-2/region-sites/us/>; Formosa - Baton Rouge and Point Comfort: <https://www.fpcusa.com/about-formosa/our-operations/>; Occidental - Pedricktown, Pasadena, Deer Park, Niagara Falls ON: <https://www.oxy.com/operations/essential-chemistry/doing-business-with-oxychem/manufacturing-sites/>; Shin-Etsu - Plaquemine, Addis, Freeport: https://www.shintech.com/cgi-bin/rtbin/sbpg/rt_hdln_dsply2.cgi?Autoincrement=000005&value_6=About%20Us; Westlake - Calvert City, Geismar, Plaquemine, Aberdeen <https://www.westlake.com/chlorovinyls/pvc-resin>

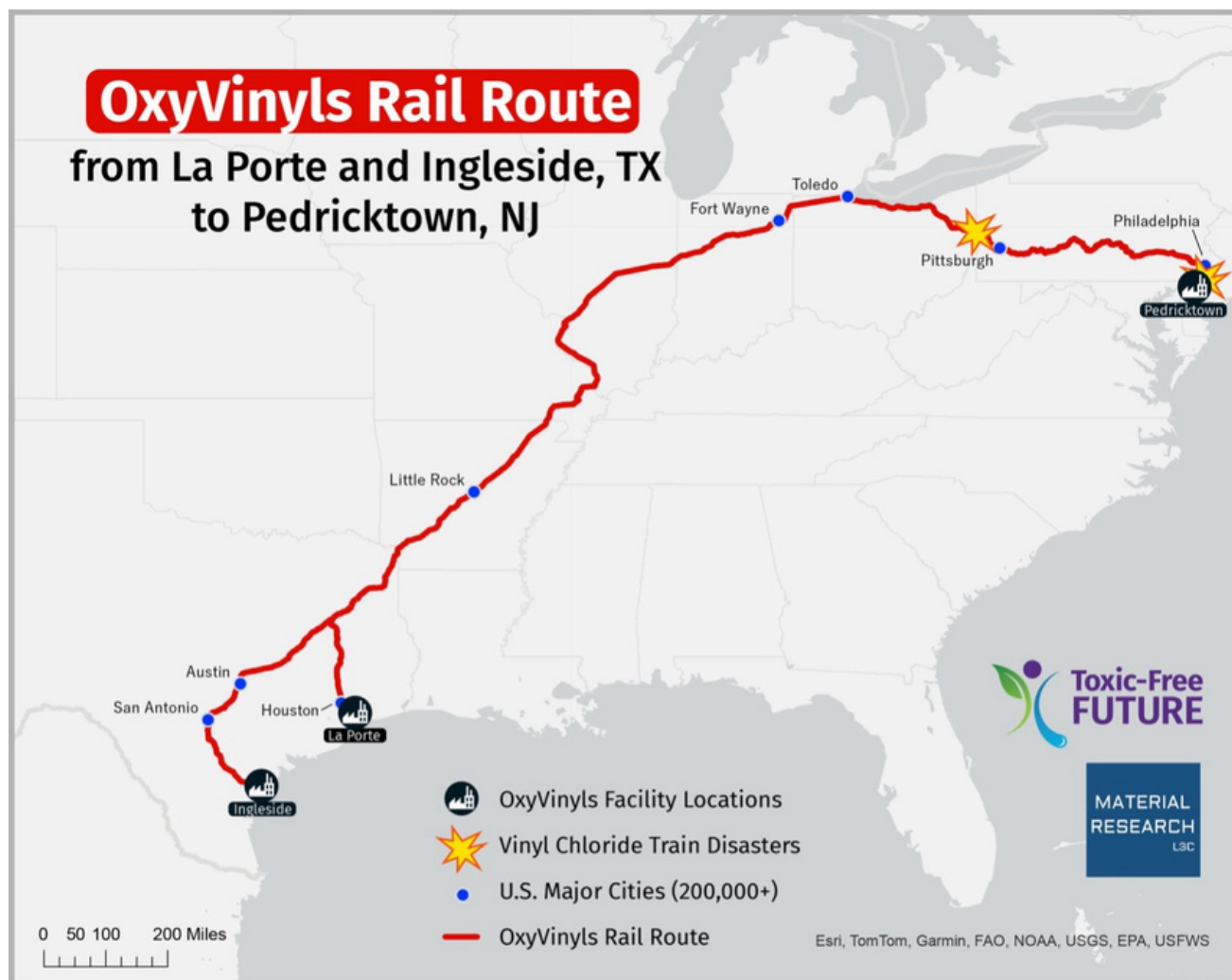
^c The National Transportation Safety Board published four bills of lading from the Paulsboro disaster. The cars carried 175,050, 175,950, 176,500, and 179,100 pounds of VCM. [https://data.nts.gov/Docket/?NTSBNumber=DCA-13-MR-002\(exhibit 222\) EPA's East Palestine records list four tank cars carrying 178,150, 178,300, 177,250 and 177,600 pounds VCM. https://www.epa.gov/system/files/documents/2023-02/02%2021%2023%20Norfolk%20Southern%20Removal%20UAO%20-%20Signature%201-508checked.pdf](https://data.nts.gov/Docket/?NTSBNumber=DCA-13-MR-002(exhibit%20222)EPA's%20East%20Palestine%20records%20list%20four%20tank%20cars%20carrying%20178,150,%20178,300,%20177,250%20and%20177,600%20pounds%20of%20VCM.%20https://www.epa.gov/system/files/documents/2023-02/02%2021%2023%20Norfolk%20Southern%20Removal%20UAO%20-%20Signature%201-508checked.pdf)

Table 1: Estimated OxyVinyls Rail Deliveries of Vinyl Chloride Monomer (VCM) to PVC Plastics Plants

PVC Plant and Location	Maximum VCM Demand (pounds per day)	Maximum VCM Tank Cars Demand (per day)	Travel Time From La Porte, Texas^d to Destination	Maximum Tanks En Route	Pounds of VCM on Tracks at Any Moment	Maximum Number of VCM Tank Car Deliveries (per year)
OxyVinyls - Pedricktown, NJ	1,353,425	7.64	9.9 days	75.64	13,398,907	2,788.60
Orbia - Pedricktown, NJ	408,000	2.30	9.9 days	22.77	4,039,200	839.50
Orbia - Henry, IL	293,479	1.66	5.0 days	8.32	1,466,479	605.90
OxyVinyls - Niagara Falls, ON	2,116,438	11.95	8.4 days	1..038	17,778,076	4,361.75
TOTAL	4,171,342 pounds of vinyl chloride per day	23.55 vinyl chloride tank cars per day (containing an estimated 177,111 pounds each)	-	207.11 tank cars en route at any moment	36,681,458 pounds of vinyl chloride on cars at any moment	8,595.75 vinyl chloride tank cars transported annually

^d Calculations are based upon sourcing from OxyVinyls' La Porte/Deer Park complex, near Houston. However, OTMA car repair records, visual evidence, and other reports show that OxyVinyls' other VCM plant in Ingleside, TX also supplies distant PVC plants, though less frequently than La Porte. The Ingleside plant is near Corpus Christi, more than 200 miles southwest of La Porte, so trains from this plant would travel over a longer route.

MAPS: THE TOXIC VINYL CHLORIDE TRAIN ROUTE FROM TEXAS TO NEW JERSEY



As noted above, we mapped the most likely rail routes from OxyVinyls' vinyl chloride plants in Texas to their destination PVC factories. The longest route—and the one associated with two disasters in the last dozen years—is the route to Pedricktown, New Jersey, where OxyVinyls and its partner company Orbia both manufacture PVC.

The map reveals for the first time the most likely train route that vinyl chloride travels from OxyVinyls plants in Texas through hundreds of towns along 1,979 miles of tracks through major cities including Houston, TX; Philadelphia, PA; San Antonio, TX; Austin, TX; Pittsburgh, PA; Toledo, OH; Fort Wayne, IN; Little Rock, AR; and many other cities and towns. See [Material Research's Methodology \(PDF\)](#) for a detailed description of how this map was created and for population calculations.

Communities and children at risk

People who live, work, or attend schools near these rail lines face serious risks in the event of a major disaster, as was seen in East Palestine, Ohio and Paulsboro, New Jersey. In the event of a major vinyl chloride rail spill or fire, the Department of Transportation (DOT) Emergency Response Guidebook (ERG) recommends an initial downwind evacuation of 1/2 mile in the event of a large vinyl chloride spill, and an initial evacuation of one mile in all directions if a rail car involving vinyl chloride is involved in a fire.²⁶

Nationwide, we estimate that more than three million people live within a mile of this train route, and an estimated 672,660 children attend 1,525 schools (1,249 public schools and 276 private schools) within a mile of the train route between Texas and New Jersey. These people are at risk in the event of a catastrophic train wreck, as was seen in East Palestine, Ohio and Paulsboro, New Jersey.

We evaluated the most populated cities along the OxyVinyls train routes, obtaining information about the number of people living within one mile of a point the route crosses the city as well as the racial composition.^e The numbers we present therefore represent a low-end estimate of the number of people living and the number of schools near the train route in these eight major cities. We found that in the eight largest cities, at least 158,465 people live within a mile of the train route and 67 schools are also located in close proximity to the tracks. In some cases, such as in Philadelphia, San Antonio, and Houston, most people living near the vinyl chloride train route are people of color.

The results of our analysis are as follows, with cities having the largest population near the trail route listed first:

- **Philadelphia, PA** - Residences of 60,432 people and 18 schools are located within a one-mile radius of the vinyl chloride train route through Philadelphia; 95% of this population are people of color, compared to the national average of 41%.²⁷

^e A point was chosen along the route within the given city (with a population of 200,000 or more) based on the route's proximity to the center of the city. A one-mile radius was set around the given point. The latitude and longitude were entered into the [EPA EJ screen tool](#) to collect demographic information. The [public school](#) and [private school](#) data were sourced through the [National Center for Education Statistics](#), which collects its data from the U.S. Census Bureau's American Community Survey.

[illegible]

Schools: **15 public, 3 private**



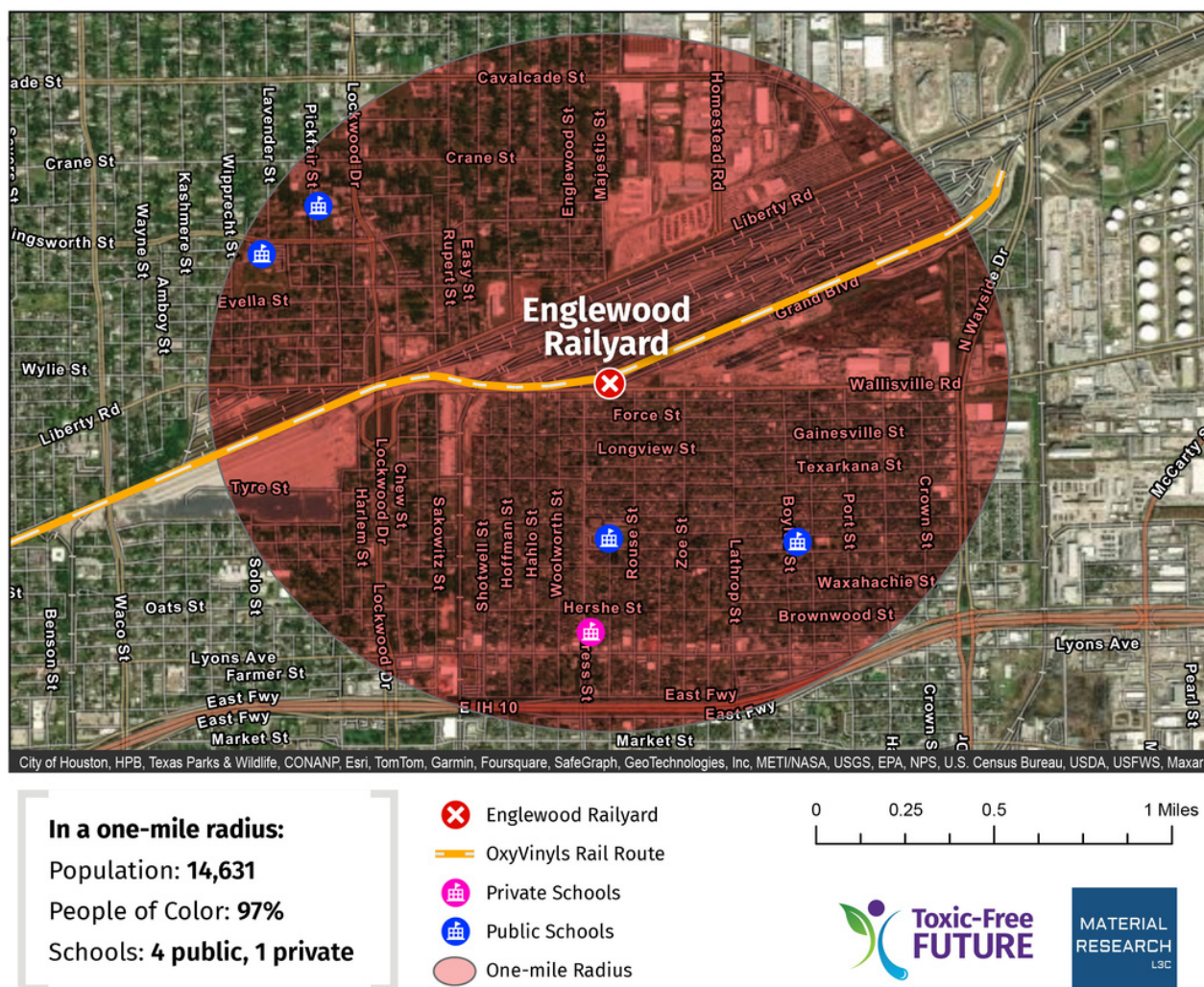
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- **Houston, TX** - Residences of 14,631 people and five schools are located within a one-mile radius of the vinyl chloride train route through Houston; 97% of this population are people of color.³¹

Englewood Railyard in Houston, TX

Along the OxyVinyls Train Route – Demographic Analysis



- **Toledo, OH** - Residences of 11,259 people and four schools are located within a one-mile radius of the vinyl chloride train route through Toledo; 49% of this population are people of color.³²
- **Fort Wayne, IN** - Residences of 10,170 people and five schools are located within a one-mile radius of the vinyl chloride train route through Fort Wayne; 35% of this population are people of color.³³
- **Little Rock, AR** - Residences of 3,550 people and five schools are located within a one-mile radius of the vinyl chloride train route through Little Rock; 39% of this population are people of color.³⁴

RECENT VINYL CHLORIDE TRAIN DISASTERS

Vinyl Chloride train disasters in Ohio and New Jersey

Past disasters have proven that the shipment of vinyl chloride poses major health risks to first responders and families who live near train tracks. In the last 12 years, two major train disasters involving vinyl chloride led to the evacuation of towns in East Palestine, Ohio and Paulsboro, New Jersey, sickening hundreds of residents with many ending up in hospital emergency rooms.

The 2023 East Palestine vinyl chloride train disaster



Photo source: Rickray - stock.adobe.com

Five train cars carrying 887,400 pounds (115,000 gallons) of vinyl chloride from OxyVinyls derailed in East Palestine, Ohio on February 3, 2023. Tank cars loaded with toxic chemicals burned for days, releasing toxic chemicals into the air and sickening hundreds of residents and first responders.³⁵⁻³⁷ After the train cars derailed and were intentionally burned, schools and roads were closed and approximately 1,500-2,000 residents³⁸ in a two square mile area³⁹ in East Palestine and nearby Pennsylvania were ordered to evacuate. Others were encouraged to shelter in place.⁴⁰

In the weeks that followed the catastrophe, an ATSDR/Ohio Department of Health ACE41 health survey was conducted and documented that both first responders and residents experienced health symptoms following the vinyl

chloride catastrophe, including stuffy nose/sinus congestion and burning nose or throat for first responders, and headaches, coughing, and irritation/pain/burning eyes for nearby residents, among other symptoms.³⁶ Even seven of the 15 CDC staff who were surveying area residents in the impacted area reported symptoms including sore throat, headache, coughing, and nausea, symptoms similar to those of residents.⁴²

Today, some residents of East Palestine have remained relocated⁴³, and many still suffer from health problems they believe are attributable to exposure to vinyl chloride and other chemicals from the fire.^f Many residents and community groups, such as the Unity Council for the East Palestine Train Derailment, have been calling on President Biden to issue an emergency declaration so that residents can access more services and relief.⁴⁴ Only time will tell what the long-term human health impacts are of the disaster.

The 2012 Paulsboro, NJ vinyl chloride disaster



Photo source: NTSB

^f Personal communication between Mike Schade and Jami Wallace of the Unity Council for the East Palestine Train Derailment. December 2023.

In 2012, three OxyVinyls railcars containing vinyl chloride from Texas plunged from a bridge in Paulsboro, New Jersey. One car was punctured and released a reported 180,000 pounds^{45 g} (more than 20,000 gallons) of vinyl chloride, creating a vinyl chloride vapor cloud that sickened scores of emergency responders and area residents.^{46 47} More than 250 residents and first responders visited the emergency room at area hospitals following the disaster.⁴⁸ A New Jersey Department of Health study found that, “A high proportion of Paulsboro residents experienced symptoms consistent with exposure to vinyl chloride released from the train derailment site.”⁴⁸ Very high concentrations of vinyl chloride were released into the air of the community, with even life-threatening levels in the immediate area.⁴⁹

Both disasters involved vinyl chloride headed to the same PVC plastics factory

In both cases, the vinyl chloride cars derailed on the way to OxyVinyls in Pedricktown, New Jersey^{1 45 h}, where OxyVinyls makes PVC, used in building materials sold at retailers like The Home Depot.

^g This was reported from the Delaware Valley Early Warning System to NJ DEP on the day of the derailment, stating that “Vinyl chloride car was compromised releasing 180,000 pounds of material into the atmosphere.” Source: page 75 of the NTSB report on the Paulsboro incident. National Transportation Safety Board. Accident Report. Conrail Freight Train Derailment with Vinyl Chloride Release Paulsboro, New Jersey November 30, 2012. Available online: <https://www.nts.gov/investigations/AccidentReports/Reports/RAR1401.pdf>

^h See the manifest on page 45 of <https://www.epa.gov/system/files/documents/2023-02/02%2021%2023%20Norfolk%20Southern%20Removal%20UAO%20-%20Signature%201-508checked.pdf>

FROM RAIL CARS TO THE HOME DEPOT

The Home Depot and PVC

The number one use of PVC is in building materials⁵⁰ [†], and The Home Depot is the largest home improvement retailer in the U.S. and world.⁵¹

At the end of the line, plastic resins from the OxyVinyls and Orbia North American PVC factories that receive vinyl chloride by rail are undoubtedly found in products such as luxury vinyl tile (LVT) flooring sold at major building retailers like The Home Depot.

OxyVinyls and Orbia's PVC resins from Pedricktown are made into building materials by corporations like AHF, which sells Armstrong brand flooring through The Home Depot.⁵²⁻⁵⁴ [‡] As of late 2023, The Home Depot online catalog listed more than 50 styles of Armstrong vinyl flooring made in the U.S., under the brand names "Excelon Imperial"⁵⁵ and "Bruce."⁵⁶

As the largest home improvement chain in the U.S. and world, The Home Depot has a responsibility to protect communities, consumers, workers, wildlife, and the environment from pollution resulting from the manufacturing, transportation, use, and disposal of PVC by phasing it out of building materials and packaging and selling safer options. By tackling PVC, The Home Depot would make significant progress implementing its safer Chemical Strategy⁵⁷, realize its climate goals, and help mitigate growing business risks associated with selling hazardous chemicals and plastics in products and packaging.

[†] According to the Vinyl Institute, which represents the largest producers of vinyl chloride and PVC in the U.S., "Approximately 70 percent of PVC is used in building and construction applications." Source: <https://www.vinylinfo.org/uses/building-and-construction/>

[‡] OxyVinyls has provided PVC resins to Armstrong flooring manufacturing plants for decades, and to the Lancaster, PA factory in particular since the 1970s. See <https://www.toxicdocs.org/d/byorjye8qLy492w7wdR7x8K16?lightbox=1>. See also <https://www.floorcoveringweekly.com/main/features/ahf-products-expands-its-us-footprint-39087>. Armstrong's vinyl flooring manufacturing plants were acquired by AHF in 2022 when Armstrong went into bankruptcy. AHF maintained the Armstrong Flooring brand and continues to sell vinyl flooring under that name. Court filings from the bankruptcy proceedings, dated September 2022, show that Armstrong's agreements with OxyVinyls and Orbia and with The Home Depot were acquired by AHF. See <https://document.epiq11.com/document/getdocumentbycode?docId=4100014&projectCode=ARF&source=DM>

WHERE DOES IT ALL START?

FRACKING AND VINYL CHLORIDE PRODUCTION IN TEXAS

To make vinyl chloride, OxyVinyls relies on hazardous extraction and production methods in obtaining its key ingredients: ethylene, made from fracked natural gas, and chlorine gas. The production process drives demand for fracking, releases greenhouse gases, and pollutes communities where factories are located.

The raw materials for vinyl chloride come from the Permian Basin (West Texas and New Mexico), where Occidental Petroleum (the parent company of OxyVinyls) uses hydraulic fracturing to extract natural gas liquids. Its processing plants and pipelines deliver gas liquids to Occidental's petrochemical plants on the Gulf Coast of Texas, where it makes vinyl chloride.⁵⁸⁻⁶¹ ^k To make vinyl chloride, factories react chlorine gas with ethylene (made from fracked natural gas) to produce ethylene dichloride. Ethylene dichloride is further processed to create vinyl chloride monomer (VCM).⁶²

The vinyl plastics industry has been expanding in recent years, increasing demand for fracked natural gas. In 2017, OxyVinyls and its partner Orbia opened a \$1.5 billion ethane cracker at its Ingleside facility near Corpus Christi⁶³ to convert natural gas liquids into ethylene. OxyVinyls also sources ethylene from crackers owned by others.⁶⁴ ^l Orbia consumes vinyl chloride from Ingleside at its PVC plants in Illinois, New Jersey, Mexico, and Colombia.⁶⁵ ^m

^k Natural Gas Annual Respondent Query System (EIA-757 Data through 2017), spreadsheet downloaded from: <https://www.eia.gov/naturalgas/ngqs/#?report=RP9&year1=2017&year2=2017&company=Name>; and <https://investor.nustarenergy.com/news-releases/news-release-details/nustar-announces-agreement-occidental-petroleum-transport> and <https://www.currentargus.com/story/news/local/2018/02/22/oxy-transloading-frac-sand-facility-opens-carlsbad-regional-expansion/364306002/> and <https://www.currentargus.com/story/news/2022/10/28/occidental-petroleum-agrees-to-6-5-million-for-fixes-for-air-pollution/69594074007/>

^l "Equistar supplies virtually all of the ethylene requirements (up to 2.55 billion pounds per year) for OxyChem's chlor-alkali business and OxyVinyls' business," according to an Occidental Petroleum annual report (2001). <https://occidentalpharmaceutical.com/node/19971/html>

^m <https://www.digitalrefining.com/news/1001135/mexichem-signs-mou-with-oxy> and Mexico and Colombia customs records as published in Datamyne (subscription required).

Vinyl chloride and climate pollution

Besides helping to maintain and increase demand for fracked natural gas, vinyl chloride manufacture pollutes air with toxic chemicals and greenhouse gases. In 2022, OxyVinyls and its joint venture partner, Orbia, ranked as the country's third and fifth leading sources of vinyl chloride air pollution. Together, Orbia and OxyVinyls' VCM operations in Texas, Illinois, and New Jersey reported releasing 61,774,974 pounds of vinyl chloride into the air.⁶⁶ From company reports, EPA calculates they also released 3,339,604 metric tons of greenhouse gases in 2022.^{67, n}

Every U.S. OxyVinyls and Orbia plant in this investigation has been out of compliance with Clean Air, Clean Water, or other federal environmental regulations within the last 18 months.⁶⁸⁻⁷⁰ ° See Table 2 below for more details.

ⁿ As measured equivalent to the global warming potential of carbon dioxide and reported in EPA's Facility Level Information on Greenhouse Gases Tool (FLIGHT) database, https://ghgdata.epa.gov/ghgp/main.do?site_preference=normal

° Facility profiles at [Fencelinedata.org](https://fencelinedata.org): Occidental Chemical, <https://fencelinedata.org/companies/9ac53268-af63-4c24-a3ea-3c507fd10eb5>; Occidental Petroleum, <https://fencelinedata.org/companies/9ac542ad-df71-4ef8-b276-c01b00d41049>; and Orbia (formerly named Mexichem), <https://fencelinedata.org/companies/9ac5aaae-c27c-41e6-8ebe-568fb498e3b8>

Table 2: Vinyl chloride and greenhouse gas pollution from vinyl chloride and PVC factories evaluated in this investigation

Vinyl Chloride and PVC Plants	Products	Greenhouse Gas Pollution (Carbon Dioxide Equivalent), Metric Tons	Vinyl Chloride Air Pollution, Pounds	Violations Since June 2022
		2022	2022	
OxyVinyls - La Porte, TX	Chlorine, vinyl chloride	1,272,875	6,146	Clean Air Act, Clean Water Act
OxyVinyls - Ingleside/Gregory, TX	Ethylene, chlorine, vinyl chloride	1,878,740	12,351	Clean Water Act
OxyVinyls - Deer Park, TX	Chlorine, vinyl chloride, PVC resins	133,925	3,800	Resource Conservation and Recovery Act (RCRA)
Orbia - Henry, IL	PVC resins	26,344	18,728	Clean Air Act
Orbia - Pedricktown, NJ	PVC resins	27,720	18,020	Clean Water Act
OxyVinyls - Pedricktown, NJ	PVC resins	Not listed	2,729	Clean Water Act
TOTAL		3,339,604 metric tons	61,774 pounds	

Sources: U.S. EPA Toxics Release Inventory and U.S. EPA Facility Level Information on Greenhouse Gases Tool (FLIGHT) database, and the EPA ECHO Database via fencelinedata.org.

Future expansion of the PVC industry in the U.S.?

Concerns over PVC production expanding in the U.S. are growing. As a result of a new law preventing the import of vinyl manufactured with forced labor, there are indications that vinyl flooring imports plummeted in 2023. U.S. Customs began detaining vinyl flooring products that weren't documented free of forced labor from the Xinjiang region of China. Now, companies like AHF are “reshoring” production.⁷¹ ^P Orbia plans to build a new 1.1 million ton vinyl chloride and PVC plant somewhere in the U.S. by the year 2028.⁷² OxyVinyls is investing \$1.1 billion in updating its La Porte operation.⁷³ If government agencies keep approving OxyVinyls’ applications—or worse, approve Orbia’s plans for a giant new PVC factory somewhere in the U.S.— it will result in the continued production of this poison plastic.

Another East Palestine or Paulsboro disaster, or worse, is inevitable, as long as OxyVinyls’ vinyl chloride trains keep rolling to plastics factories to make PVC building materials and other products.

^P See <https://www.fcnews.net/2023/04/as-uflpa-detentions-soar-retailers-advised-to-brace-for-impact/> and <https://www.floordaily.net/flooring-news/vinyl-flooring-imports-declined-by-481-in-march-due-largely-to-uflpa>. Built On Repression, an investigation by Sheffield Hallam University and Material Research L3C reveals how flooring sold in the U.S. contains PVC made in facilities controlled by the government of China, in which thousands of Uyghur people worked as forced laborers. An accompanying investigation in *The Intercept* focused on flooring sold in The Home Depot. Subsequent action by U.S. Customs and Border Protection, under the Uyghur Forced Labor Protection Act, led to a nearly 50% decline in vinyl flooring imports from China. By March 2023, according to Material Research’s analysis of U.S. International Trade Commission data. From year-to-year, by March 2023, imports declined 49% from 68 million square meters to 35 million square meters. (Source: US ITC Dataweb, HTS Code 391810)

RECOMMENDATIONS

Safer Solutions

A new approach for protecting individuals and communities from the harmful effects of toxic pollution and plastics is urgently needed. In order to address environmental justice concerns, the climate crisis, and plastics pollution, governments and companies should adopt comprehensive safer chemicals policies to reduce and eliminate the production, use, and disposal of toxic chemicals like vinyl chloride and plastics like PVC and advance the use of safer chemicals and materials. The elements needed to achieve healthier, sustainable products and materials include:

- **Full transparency and disclosure:** disclose the presence, quantity, and hazards of chemicals and plastics produced and used throughout global supply chains.
- **A phase-out of the use and production of the most dangerous chemicals and plastics:** chemicals and plastics made from chemicals that are persistent bioaccumulative toxic (PBT) or that can cause cancer and other serious health impacts must be phased out.
- **Investments in the safest chemicals and materials:** ensure substitutes to the most hazardous chemicals and plastics are safer and fill data gaps on chemical hazards, using tools to assess chemical and material hazards such as GreenScreen™ and ChemFORWARD.
- **Corporate accountability and environmental justice:** hold polluters accountable for cleaning up contamination, restoring community health, and providing safe and clean jobs.

Recommendations for The Home Depot

We applaud The Home Depot's sustainability commitments over the last 10 years to restrict toxic chemicals in its supply chain, from phasing out phthalates in flooring to banning methylene chloride and NMP in paint removal products to reducing polyvinyl chloride (PVC) plastic in packaging.^{57 74} These efforts have demonstrated The Home Depot's leadership in addressing toxic chemicals in building materials. The Home Depot has an opportunity to show leadership once again.

Safer alternatives to PVC are readily available, from linoleum flooring to fiber-cement siding to recycled copper piping.⁷⁵ Healthy Building Network's [product guidance](#) is a great place to start to learn about safer product alternatives. Given The Home Depot's market stature, it is well-positioned to transform the building industry away from PVC and towards healthier materials that are safer for its customers and environment. We urge The Home Depot to take the following steps:

- 1. PVC phase-out commitment:** Once short and medium-term solutions are identified, announce and implement a clear timeline to phase out PVC in building materials and to complete the elimination of PVC in both private-label and brand-name packaging.
- 2. Increase and feature shelf space for safer alternatives:** In the interim, increase and promote the availability of safer alternatives to PVC in your stores, especially those identified as safer by Healthy Building Network's product guidance.
- 3. Impact investment:** Invest financial resources to identify, develop, evaluate, and scale other safer alternatives to PVC building materials and packaging.
- 4. Educate your customers about safer alternatives:** Develop and launch a program to educate your customers, especially professional contractors, about the environmental health hazards of PVC and the benefits of alternatives.
- 5. Lobby in support of governmental policies** to ban PVC plastic and support the scaling of the production of safer, effective solutions at the state and national levels.

Recommendations for governments

Action is needed at all levels of government to phase out vinyl chloride and PVC plastic packaging, building materials, and other products. Governments should also use their purchasing power to avoid PVC products and choose safer options. We urge the following actions:

- 1. EPA should ban vinyl chloride under the Toxic Substances Control Act (TSCA).** EPA recently took the first step in prioritizing vinyl chloride under TSCA for risk evaluation. The agency should expeditiously evaluate all hazards posed by vinyl chloride to communities, workers, and consumers and ban the production of vinyl chloride and use in PVC.
- 2. States should ban vinyl chloride and PVC and invest in scaling safer solutions.** States have been leading the way on chemical policies for more than a decade. Numerous states will be proposing bans on PVC packaging in 2024. The state of Washington is proposing to address all chlorinated substances under its landmark Safer Products for Washington law, which should include vinyl chloride and PVC. States should also invest in research and filling data gaps to identify and scale safer solutions.
- 3. Local, state, and federal governments should avoid purchasing PVC.** The largest uses of PVC are building materials such as pipes, flooring, and wall coverings. Safer alternatives are available, and governments should be purchasing these safer solutions.
- 4. The Biden administration should support a strong global plastics treaty.** A global treaty that addresses the serious public health and environmental threats from chemical and plastic production is urgent. The administration should support reducing plastics production and immediately phasing out the most hazardous plastics and chemical additives.

METHODOLOGY

See the accompanying [Material Research Methodology \(PDF\)](#) created by Material Research for Toxic-Free Future, which describes the methodology for creating the maps of the train route and quantifying the shipments of vinyl chloride from OxyVinyls to PVC plants in New Jersey, Illinois, and Ontario.

CREDITS

Authors: Toxic-Free Future and Material Research

Data Analysis and Mapping: The investigation was based on data analysis by the team at [Material Research](#). Maps were created by Selena Sillari of Material Research and further designed by [Winking Fish](#).

About Toxic-Free Future

Toxic-Free Future is a national leader in environmental health research and advocacy. Through the power of science, education, and activism, Toxic-Free Future drives strong laws and corporate responsibility that protect the health of all people and the planet.

Find resources to protect your family and the environment from toxic chemicals at toxicfreefuture.org.

About Material Research L3C

Since 2019 Material Research L3C has worked with many of the world's leading journalists and environmental health and social justice organizations. Our collaborations have increased common understanding about the origins of toxic pollution and inequity.

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