

Data Brief: Water

A Norfolk Southern freight train carrying hazardous materials derailed in East Palestine, OH on February 3, 2023. This is a summary of U.S. Environmental Protection Agency (EPA) and Ohio EPA samples gathered after the derailment about possible impacts on water as of April 2024.

Key Points:

- **Surface Water:** Due to inconsistent measurements across different sites and dates, it is not possible to conduct a full analysis of individual analytes to allow definitive conclusions.
- **Vinyl Chloride:** Samples were not collected consistently across different sites and times. Therefore, an evaluation of chemical detection over time is not possible using the available data.
- **Ground/Well Water:** Samples show no contaminants in raw water from the wells (ground) that feed into East Palestine's municipal water system. Test results from the combined and treated water from wells also did not find contaminants associated with the derailment. Ohio EPA samples show that all chemicals reported are below the maximum allowed concentration for drinking water.

Sampling: Surface Water

Measured by the U.S. EPA

Number of Samples: 1840

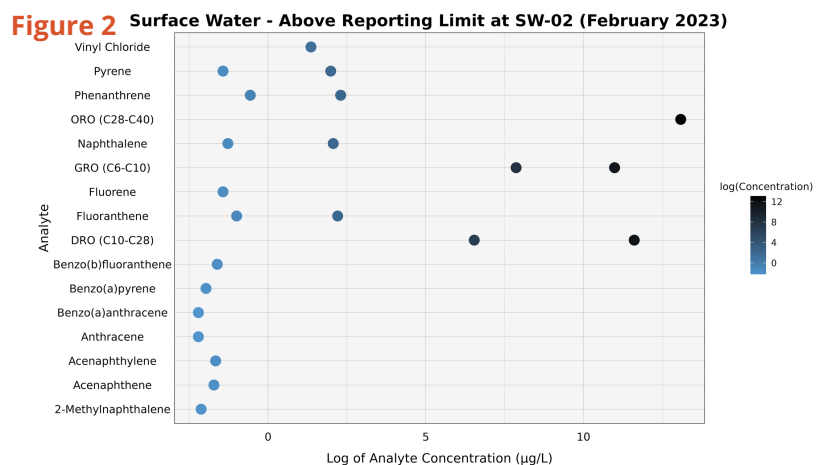
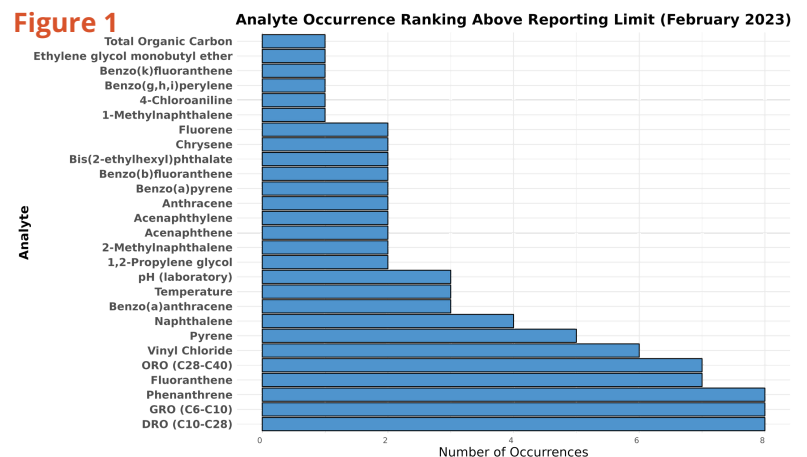
Number of Locations: 14

Number of Analytes Measured: 136

Dates: 5 days between February 4, 2023 and February 14, 2023

Reporting Limit: The minimum level at which a chemical can be reliably detected and measured.

- Of 136 chemicals reported, 23 showed a concentration above the reporting limit (see Figure 1).
- Gasoline range organics (GRO) and diesel range organics (DRO) were reported 8 times above the recording thresholds, depending on the location.
- Figure 2 shows the concentration of chemicals above the reporting limit found at one of the sampling sites (SW-02). Naphthalene, gasoline, and DROs were the chemicals showing the highest concentrations detected.



Vinyl Chloride in Surface Water

- Vinyl chloride poses major concerns given its carcinogenic and health risks associated with its exposure, including irritation of eyes, respiratory tract, and skin.
- It is highly flammable and polymerizes if exposed to heat or air.
- Across all sites, five locations had vinyl chloride concentrations above the instrument reporting limit concentration. Sites SW-02-SR and SW-01-SR had the highest concentration reported-100 times higher than sites SW-02 and SW-03.

Site	Concentration of Vinyl Chloride ($\mu\text{g/L}$)	Number of occurrences above instrument limit
SW-02	3.9	1
SW-03	1.1	2
SW01-SR	2400	1
SW02-SR	2200	1
SW03-SR	650	1

Sampling: Ground and Well Water

Measured by the U.S. EPA (ground/well water)

Number of Samples: 378

Number of Locations: 11

Number of Analytes Measured: 38

Dates: 7 days between December 5 & 19, 2023

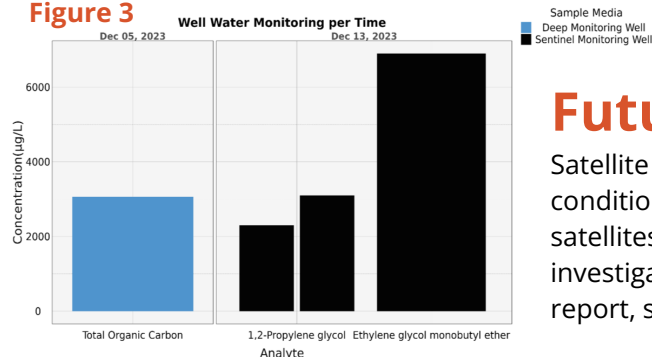
Deep Monitoring Well: A well that reaches deeper aquifers to monitor the quality and quantity of groundwater at significant depths.

Sentinel Monitoring Well: A well positioned to provide early detection of potential contamination before it impacts critical resources.

Shallow Monitoring Well: A well designed to monitor the uppermost groundwater layers, assessing near-surface environmental impacts.

- Most chemicals for ground/well water were found at a concentration below the instrument reporting limit, except for total organic carbon (TOC) in deep monitoring well, 1,2-propylene glycol, and ethylene glycol monobutyl ether in sentinel monitoring well (see Figure 3).
- Measures of TOC from deep monitoring well were only taken once and it is likely unrelated to derailment.
- In sentinel monitoring wells, the two chemicals identified above the instrument reporting limit were only detected on one of the three available dates. The concentration reported is below the hazard levels according to EPA. Any date prior to and later than Dec 13 showed regular concentrations that are below the reporting limit.

Figure 3



Measured by the Ohio EPA (ground water only)

Number of Samples: 42, 2 labs

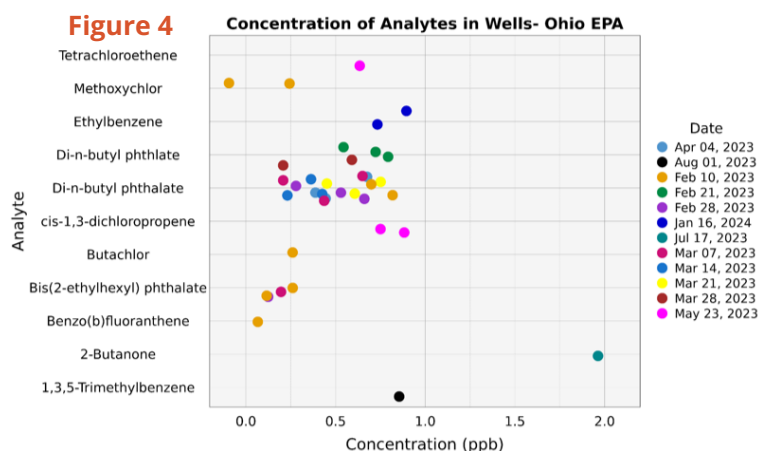
Number of Locations: 14

Number of Analytes Measured: 13

Dates: 13 days between February 10, 2023 and January 16, 2024

- Concentrations above the instrument reporting limit are shown in Figure 4.
- Some chemicals may be unrelated to the incident.
- Even though those concentrations are reported beyond the instrument limit, they are still lower than the maximum allowance for drinking water according to Ohio EPA.

Figure 4



Future Directions

Satellite data provides useful insights into environmental conditions. Given the sparsity of EPA measurement data, satellites imagery offers an excellent alternative to fully investigate the the derailment. For more details about this report, scan the QR code.

