



Update: Rapid Response to the Norfolk Southern Chemical Spill and Chemical Fires in East Palestine, Ohio

Andrew Whelton, Ph.D., Paula Coelho, and many more

awhelton@purdue.edu

Funded by:



open collective





Rapid public health scientific support in response to disasters

2014 Chemical Spill (WV)

2017 Tubbs Fire (CA)

2018 Camp Fire (CA)

2020 Oregon Fires (OR)

2021 Chemical Spill (HI)

2021 Marshall Fire (CO)

and others...

Key Questions:

1. What chemicals should be looked for?
2. Where did/do the chemicals go?
3. How do you return infrastructure/homes to safe use?
4. What were/are the chemical exposures?



Site visits so far

February 25-27

March 3-4

March 17-19

March 23-25

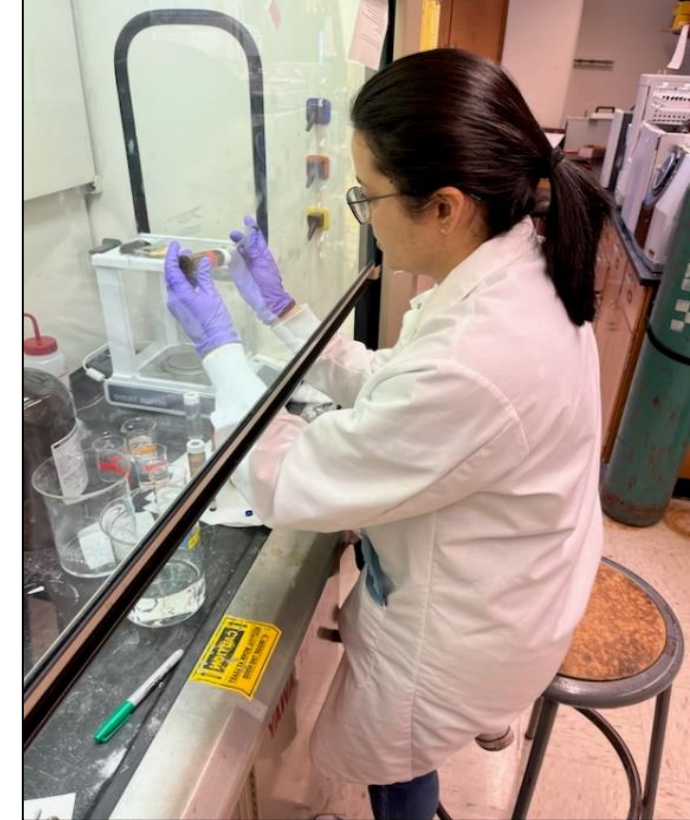
May 4-5

June 10-12

*Study is approved by the Purdue University Human
Research Protection Program,
Internal Review Board (IRB)-2023-422*

Key Questions:

1. What chemicals should be looked for?
2. Where did/do the chemicals go?
3. How do you return infrastructure/homes to safe use?
4. What were/are the chemical exposures?



Some of our investigative activities

Goal: To better understand the chemicals present and exposure pathways.

Environment

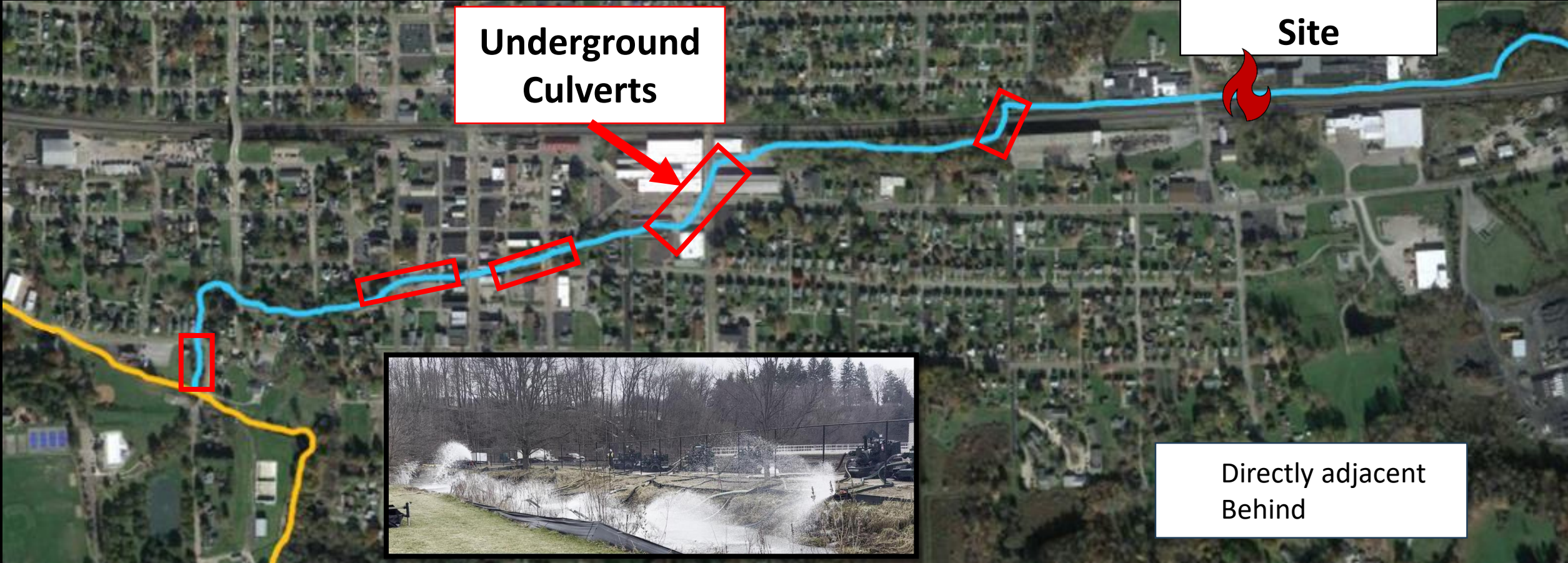
1. Atmospheric modeling to understand the initial chemical fate and open burn.
2. Creek sampling to identify chemicals released (i.e., TPH, PFAS, VOCs, SVOCs)
3. Estimated chemical biodegradability in creeks.
4. Sorbent pad analysis to understand the effectiveness of cleanup operations.
5. Evaluated the impact of aeration on chemical emission from creeks.

Buildings

1. Documented household and business owner experiences and reviewed test results.
2. Private drinking water well sampling.
3. Wipe sampled building exteriors and new vinyl siding.
4. Analyzed honey from nearby apiaries.



Contaminated creek water
flowed near and under
buildings for months, and
was blown into the air.



**Underground
Culverts**

**Derailment
Site**



Directly adjacent
Behind

After the evacuation was lifted, indoor air was contaminated for some buildings up to 4.5 months

February (3 weeks later): *“air testing had been conducted in 578 homes and no contaminants associated with the derailment were detected.”* – Governor DeWine

February, USEPA found that the Municipal Building (85 N. Market Street) was chemically contaminated. Occupant complained of illness. Investigation revealed chemicals were entered the building through drains due to vapor intrusion.

March (5-7 weeks later): Per Governor DeWine: Indoor air chemical contamination was still being caused in homes and businesses near Sulfur Run. Culverts were subjected to high-pressure washing to remove any contaminated sediment.



In March, business owners and households reached out to us along Sulfur Run and around the derailment site that reported an acrid building odor and becoming ill.

- Their buildings had been aired out multiple times.
- Occupants complained of chemical exposure symptoms.
- Occupants claimed aerators nearby were blowing chemicals into the buildings.

Feb 6 – Evacuation order

Feb 8 – Evacuation order lifted

One Case We Encountered

Feb 12 – Building A occupant commissioned commercial lab indoor air testing

Feb 14 – Norfolk Southern visit, indoor air testing with a PID. All results “<0.1 ppm.”

- “Strong, super glue, pool, fruity, unpleasant, overwhelming odors prompted the [CTEH] air monitoring team to leave the building.”

Feb 18 – Occupant commissioned commercial lab indoor air testing results came back:

- Butyl acrylate (26 ppb) → **EXCEEDED ATSDR SCREENING LEVEL OF 20 ppb**
- 2-Ethylhexyl acrylate (3 ppb), benzene (0.6 ppb), toluene (0.6 ppb), xylenes (0.4 ppb)
- Soot also found. Insurance company declared the materials a total loss

The building was unsafe and still contaminated in June. Building re-entry plan was inadequate.

Residential Air Monitoring

Resident Name			Resident Phone		
Address			Resident Present for inspection?	<input checked="" type="radio"/> Y	<input type="radio"/> N
Date		Start Time		End Time	

Time	Location Description	Analyte	Result	Comments	Sampler
		VOCs	<0.1ppm	Strong odor. No detection was found.	
		VOCs	<0.1ppm	Strong odor. No detection was found.	
		VOCs	<0.1ppm	Strong odor. No detection was found.	
		VOCs	<0.1ppm	Strong odor. No detection was found.	
		Vinyl Chloride	<0.02ppm	Strong odor. No detection was found.	

Comments: Strong odor (super glue/pool/fruity-like odor). Unpleasant, Overwhelming odor. The air monitoring team left within 10 minutes, due to the unpleasant/overwhelming odor.

Instrument MULTRAE
Gastec

SN

Cal Date

“Federal and state officials learned on March 10 that the handheld PIDs were not sensitive enough to measure the n-butyl acrylate at the public health air screening threshold set for the chemical,” said [a discussion document](#).

Officials learned the devices can detect butyl acrylate at 160 parts per billion, and EPA’s limit for “intermediate exposure,” up to a year, was 20 ppb.

“Therefore, at the time when these assessments were conducted, no data was available to determine if residents returning to their homes near the site were exposed to n-butyl acrylate above the intermediate exposure threshold of 20 ppb,” the record said.

“There is now uncertainty as to whether the results provided by the PIDs were representative of any potential chemical exposure to homes or in the community.”

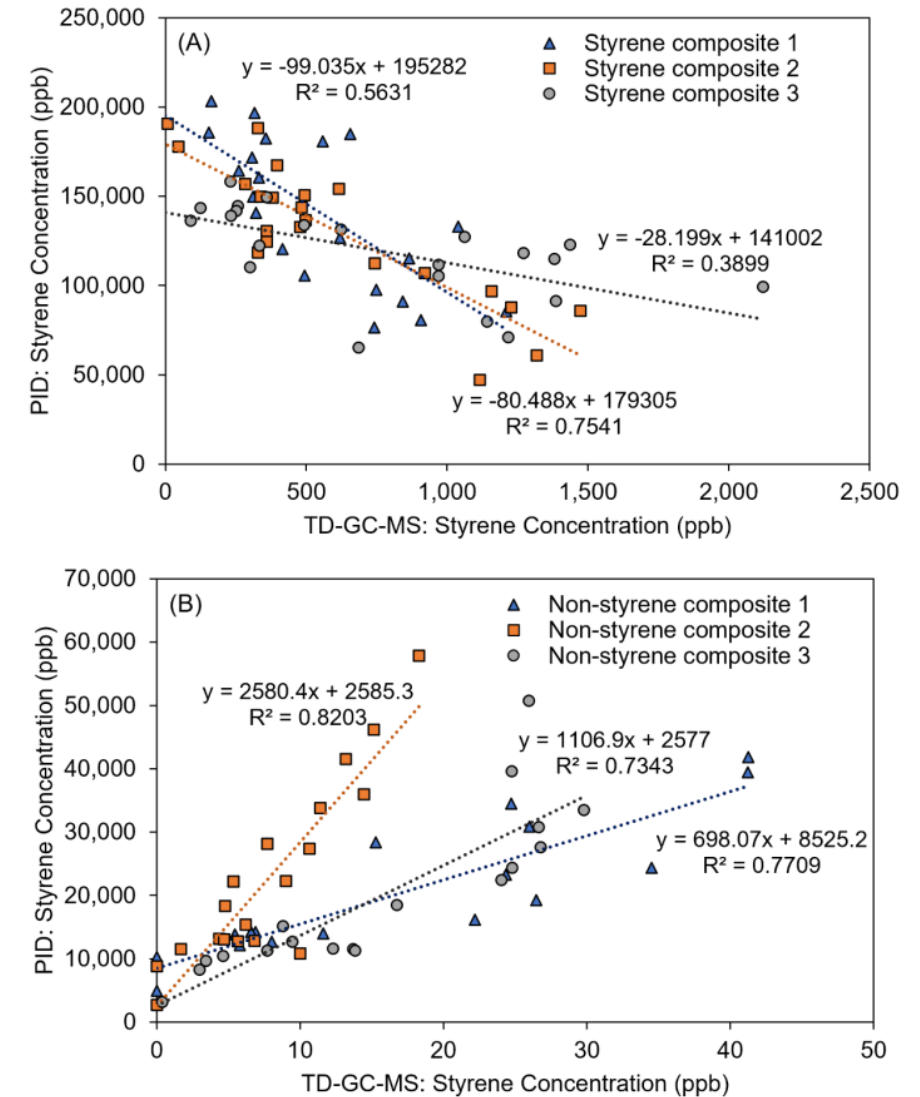


EPA promised clarity, transparency after Ohio train derailment. But some air monitors didn’t work. - Ellie Borst, Kevin Bogardus June 2023

PIDs should never have been used how they were for building safety assessments. Issues with sensitivity and reliability have been known for 10+ years

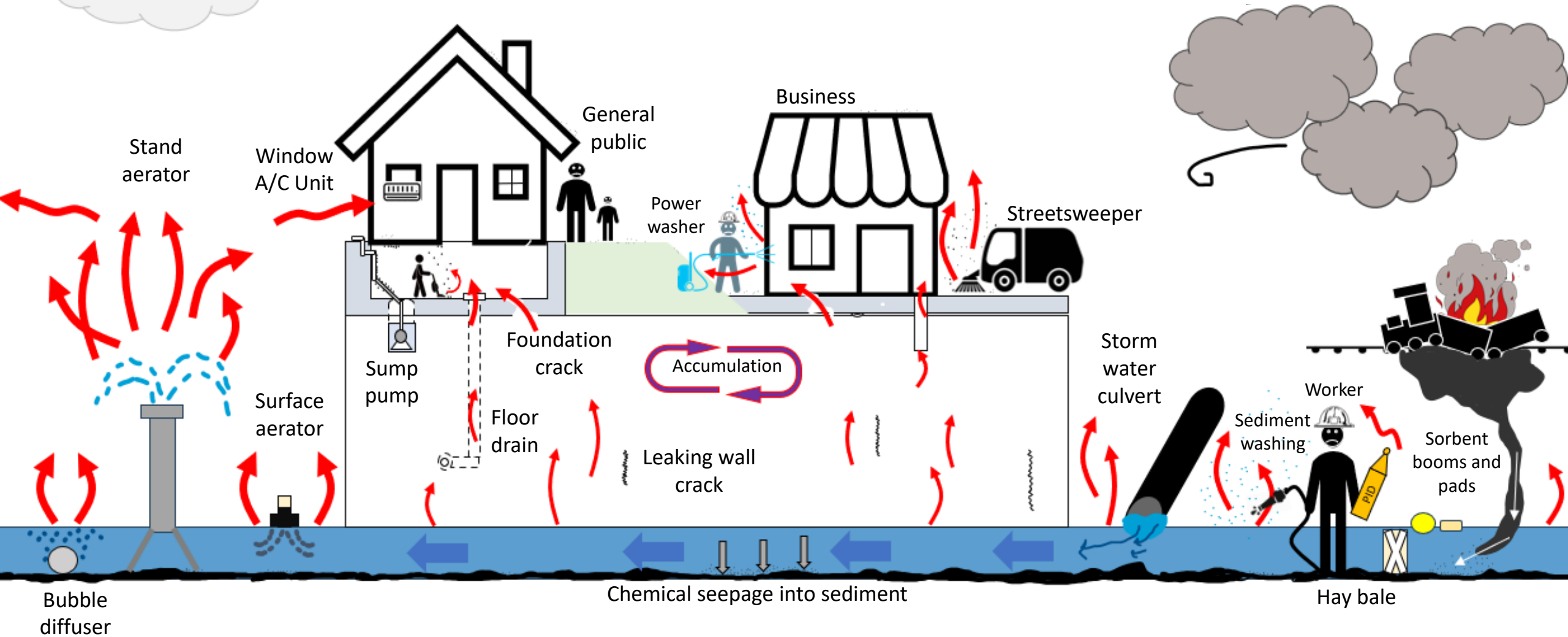
- CDC (2013) [Effect of calibration environment on the performance of direct-reading organic vapor monitors](#)
- CDC (2014) [Effect of interferents on the performance of direct-reading organic vapor monitors](#)
- CDC (2015) [Effect of calibration and environmental condition on the performance of direct-reading organic vapor monitors](#)
- Purdue (2019) [Considerations for emission monitoring and liner analysis of thermally manufactured sewer cured-in-place-pipes \(CIPP\)](#)
- Purdue (2023) [Regulatory significance of plastic manufacturing air pollution discharged into terrestrial environments and real-time sensing challenges](#)

February 2023, USEPA approved the building indoor air testing plan for Norfolk Southern.



Noh et al. 2023. ES&TL.

The BIG picture: There were multiple chemical exposure pathways immediately following the disaster and during cleanup operations.



Illness: CDC employees, US Sen. Vance Office, PA Sen. Mastriano, USEPA contractor, RR workers, residents, me, and more...

What does cleaning entail?

Once EPA has confirmed your home or office is eligible for the cleaning, a pre-cleaning interview with EPA and Norfolk Southern representatives will take place at your home or office to go over the cleaning approach as well as determine which rooms will be cleaned.

- A top-down approach, starting from the top floor and working down. Addressing habitable spaces,
- vacuuming carpets, rugs, and other soft surfaces,
- dry dusting walls and other vertical surfaces,
- wet wiping horizontal hard surfaces such as counter tops and floors.

**Cleaning
will include:**



- Move any furniture,
- open closets or drawers,
- move or clean items identified by the owner/tenant as not to be touched,
- clean any non-inhabitable rooms,
- clean the exterior of the home or office (however, any special requests can go to the Norfolk Southern Family Assistance Center).

**Cleaners
will not:**



What does cleaning entail?

Once EPA has confirmed your home or office is eligible for the cleaning, a pre-cleaning interview with EPA and Norfolk Southern representatives will take place at your home or office to go over the cleaning approach as well as determine which rooms will be cleaned.

Evidence indicates the USEPA's cleaning approach is not meant to return buildings to safe use, does not align with their past chemical disaster guidance, and encourages Norfolk Southern to make decisions about what's best for the household.

Cleaning
will include:



Cleaners
will not:



This community can be restored:

Evidence-based building decontamination

Properties closest to the disaster site and along Sulphur Run and Leslie Run were likely the most contaminated. With cleanup activities still occurring, pollutants are still being released into the air.

1. **Purpose:** To remove any residual chemical health risks from the buildings that are associated with the disaster
2. **Pollutants:** particulates (soot, dust), vapors
3. **Estimated location:** Sorption to surfaces, sorption into plastics and fabrics
4. **Begin to consider USEPA's own 1985 decon guidance:**
Guide For Decontaminating Buildings, Structures, and Equipment At Superfund Sites
5. **Conduct a rapid pilot program** to measure which techniques effective then deploy.
6. **Engage external experts** and publicly share details.

Recommended Activity
Test before cleaning (or assume dirty)
HV/AC duct and furnace cleaning
Clean fabrics
HEPA filter vacuum floors, carpets, etc.
Wet vacuum nonporous surfaces
Wipe walls, ceilings, etc.
Exterior building cleaning
Test after cleaning

Norfolk Southern encouraged some occupants to throw away items (because they were contaminated)

***Thank you to households and
business owners for reaching
out.***

***The world is a better place
when people help one
another.***

***Files and results to be
available at
www.PlumbingSafety.org***



Andrew Whelton, Ph.D., awhelton@purdue.edu

We the appreciate financial support:
<https://crowdfunding.purdue.edu/project/36991>