EXHIBIT E

FACTUAL SUMMARY AND EXPERT OPINIONS REPORT

Plaintiff(s): CeramFab, Inc., CeramSource, Inc, Yonggong, LLC, WYG Refractories, LLC and CeramSource, Inc.

vs.

Defendant(s): Norfolk Southern Corporation and Norfolk Southern Railway Company (Defendants).

In the U.S. District Court for the Northern District of Ohio

Case No. 4:2023cv02206.

Prepared for:

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April 6, 2026

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1.0 QUALIFICATIONS:

I am President of EES Group, Inc. (Engineering & Expert Services, Inc.). I started EES Group, Inc. in 1996, ultimately having offices in Ohio (Columbus and Cleveland) and in Florida (Pompano Beach). In 2015, I sold the Ohio portion of EES Group, Inc. while retaining Florida operations. Prior to starting EES Group, Inc. in 1996, I was the Manager of Residential and Commercial Technology at Columbia Energy and a Senior Research Engineer at Battelle. I have ~45 years of forensic engineering, environmental health and safety, and energy experience. Since 2002, I have completed or supervised over 7,000 engineering forensic and health and safety projects for nearly 100 clients. This culminated in the writing of a Forensic Engineering textbook targeted at assessing claims for the insurance industry (Forensic Engineering: Damage Assessments for Residential and Commercial Structures, January 3, 2013, CRC Press publication; 2nd Edition published in 2022).

My health and safety experience has focused on projects for the legal community (expert witness), the insurance industry, institutions, and the private sector. This expertise covers the area of Professional Engineering (PE's in six states – FL, KY, OH, PA, TX, and WV), Industrial Hygiene (registered Certified Industrial Hygienist - CIH) and safety (registered Certified Safety Professional - CSP). As a CIH, I investigate the causes/solutions of an individual's sickness, impaired health, and discomfort at work and in the home. As a CSP, I investigate situations primarily arising out of possible Occupational Safety and Health Administration (OSHA) violations associated with workplace injuries. In other cases, this extends to customers injured at facilities where they are working or shopping. Finally, I am a certified Asbestos Evaluation Specialist in Ohio.

I have been disclosed in ~400 expert witness cases to date, with a primary focus on exposure to organic chemicals, inorganic chemicals, pesticides, PFOA, PFAS, mold, bacteria (Legionella), heat, and bio-toxins; OSHA workplace compliance (chemical exposures, amputations, and slips, trips and falls, and building envelope systems). I have also supported/testified on building envelopes, water cause and origin, structural, and roof damage claims.

The American Industrial Hygiene Association (AIHA), defines the field of Industrial Hygiene as (https://www.aiha.org/about-ih/Pages/default.aspx):

> "That science and art devoted to the anticipation, recognition, evaluation and control of those environmental factors or stressors arising in or from the workplace, which may cause sickness, impaired health and well-being, or significant discomfort among workers or among the citizens of the community."

The AIHA defines an Industrial Hygienist (https://www.aiha.org/about - aiha/Press/Documents/What%20is%20IH.pdf).pdf) as:

> "Scientists and engineers committed to protecting the health and safety of people in the workplace and the community."

As a CIH, I am qualified by education, training, experience, and examination in the following disciplines (https://gobgc.org/cih/):

- Air Sampling & Instrumentation
- Analytical Chemistry
- Basic Science
- Biohazards
- Biostatistics & Epidemiology
- Community Exposure
- Engineering Controls/Ventilation
- Ergonomics
- Health Risk Analysis & Hazard Communication
- Industrial Hygiene/OEHS Program Management
- Noise
- Non-Engineering Controls
- Radiation – Ionizing and Non-ionizing
- Thermal Stressors
- Toxicology
- Work Environments & Industrial Processes

My rates, terms, and conditions are defined in my Retention Agreement executed with the retention attorney for this case.

2.0 SCOPE OF WORK AND OVERALL OPINIONS:

My overall Scope of Work and Overall Opinions are outlined below:

2.1 Scope of Work:

My overall Scope of Work included the following elements:

- Summarize likely contaminants released from the February 3, 2023 Norfolk Southern (NS) train derailment in East Palestine and the subsequent decision to blow up (vent) and burn contents in five derailed vinyl chloride tank cars on February 6, 2023.
- Summarize potential flaws in Norfolk Southern (NS) / Arcadis sampling programs and cleanup activities.
- Summarize criticisms in Arcadis' CeramFab Delineation Report and efforts to blame others (i.e., the empty chair defenses).

- Summarize results of sampling data taken on behalf of plaintiffs at/near Plaintiff properties.

2.2 Overall Opinions:

My overall opinions, to a reasonable degree of scientific certainty, regarding Defendants and their contractors are as follows:

- A significant number of hazardous chemicals were released from the February 3, 2023, NS train derailment event in East Palestine and the subsequent decision to blow up (vent) and burn contents in five derailed vinyl chloride tank cars on February 6, 2023.
- The NS/Arcadis sampling plans were inherently flawed and not designed to determine actual contaminants at the time of their release and at locations where they likely deposited.
- Actual remediation methods were also inherently flawed and likely to lead to ongoing exposures.
- NS/Arcadis' delineation report blaming others for contamination at/near the Plaintiff's property is flawed and is essentially pure speculation.
- A review of data collected at and around the Plaintiffs' properties shows substantial contamination of the facilities surface soils and surface waters at/near the Plaintiff's properties.
- Based on the sampling data reviewed, and the contaminates released from the NS derailment and vent & burn activities, Plaintiffs' properties were contaminated.
- The contamination found on Plaintiffs' properties was a direct and proximate result of NS's derailment and vent & burn activities.

3.0 GENERAL STATEMENT ON RELIANCE MATERIALS:

In preparing this report, many papers and reports regarding completion of exposure assessments, relevant exposure literature, and related regulations have been relied upon. Additionally, as is customary in my field, I have also at times relied upon the work, statements, and opinions of other experts or researchers. Some of them are listed below.

- ACGIH's Documentation of the TLVs and BEIs, 7th Edition.
- Daugherty, Jack, Assessment of Chemical Exposures – Calculation Methods for Environmental Professionals, CRC Press LLC, 1998.
- Ignacio, Joselito S. and William H. Bullock, 2006, A Strategy for Assessing and Managing Occupational Exposures, Third Edition, American Industrial Hygiene Association (AIHA) Press.
- Jayjack, Chapter 2 in The Occupational Environment: Its Evaluation, Control, and Management edited by DiNardi, AIHA Press, 2003.

- Keil, Charles B. editor, 2000, Mathematical Models for Estimating Occupational Exposure to Chemicals, AIHA Exposure Assessment Strategies Committee – Modeling Subcommittee, AIHA Press.
- Mulhausen, John R. and Joseph Damiano, 1998, A Strategy for Assessing and Managing Occupational Exposures, Second Edition, American Industrial Hygiene Association (AIHA) Press.
- Patty's Industrial Toxicology Handbooks, Sixth Edition, 2012.
- Patty's Toxicology, Volume 4, Fifth Edition, John Wiley & Sons, Inc., 2001.
- OSHA Regulations. These and other pertinent OSHA standards are summarized in Table 2-1 below.

Table 2-1: Applicable OSHA Standards Reviewed

OSHA Requirement	Standard
General Industry Standard	Sections 5(a)(1) and 5(a)(2)
General PPE	29 CFR 1910.132
Respiratory protection	29 CFR 1910.134
Permissible exposure limit and controls	29 CFR 1910.1000
Respirable crystalline silica – General Industry	29 CFR 1910.1153
Respirable crystalline silica - Construction	29 CFR 1926.1153
Hazard Communication	29 CFR 1910.1200
Safety and Health Regulations for Construction - Occupational Health and Environmental Controls - Ventilation	29 CFR 1926.57

- Shreve, R.N., and J.A. Brink, Jr. 1977, Chemical Process Industries, 4th ed. McGraw-Hill Book Company, New York, NY.
- http://www.osha.gov/dts/chemicalsampling/toc/toc_chemsamp.html.

Codes, Standards, and Guidelines considered as part of this case are listed below:

- 29 CFR 1910.119 – Process Safety Management of Highly Hazardous Chemicals.
- 29 CFR 1926.57– Safety and Health Regulations for Construction - Occupational Health and Environmental Controls – Ventilation.
- 40 CFR 700 – Toxic Substances Control Act (TSCA).
- ANSI/AIHA Z9.1-2006, American National Standard for Ventilation and Control of Airborne Contaminants During Open-Surface Tank Operations.
- ANSI Z88.2-1969, American National Standard – Practices for Respiratory Protection.
- ANSI Z88.2-1980, American National Standard – Practices for Respiratory Protection.

- ANSI Z88.6-1984, American National Standard for Respiratory Protection – Respirator Use – Physical Qualifications for Personnel.
- ANSI/AIHA Z88.6-2006, American National Standard for Respiratory Protection – Respirator Use – Physical Qualifications for Personnel.
- ANSI Z129.1-2000, American National Standard for Hazardous Industrial Chemicals – Precautionary Labeling.
- ANSI Z129.1-1976, American National Standard for Hazardous Industrial Chemicals – Precautionary Labeling.
- ANSI Z129.1-1982, American National Standard for Hazardous Industrial Chemicals – Precautionary Labeling.
- ANSI Z129.1-1988, American National Standard for Hazardous Industrial Chemicals – Precautionary Labeling.
- ANSI Z129.1-1994, American National Standard for Hazardous Industrial Chemicals – Precautionary Labeling.
- Manual L-1, A Guide for the Preparation of Warning Labels for Hazardous Chemicals, 1945 and subsequent Editions. Manufacturing Chemists' Association of the United States.
- ANSI Z400.1-2003, American National Standard for Hazardous Industrial Chemicals – Material Safety Data Sheets – Preparation (Draft).
- ANSI Z400.1-1998, American National Standard for Hazardous Industrial Chemicals – Material Safety Data Sheets – Preparation.
- NIOSH Guide to Industrial Respiratory Protection, DHHS Publication No. 87-116, September 1, 1987.
- September 22, 2023 OSHA Guidance: Respirable Crystalline Silica Focused Inspection Initiative in the Engineered Stone Fabrication and Installation Industries and September 25, 2023 Press Release Guidance from the Department of Labor announces enforcement, compliance initiative to protect workers from silica exposure in engineered stone fabrication, installation. [1,2]
- www.osha.gov: Health & Safety\HAZCOM\CPL 02-02-038 - CPL 2-2 38D - Inspection Procedures for the Hazard Communication Standard.htm.
- www.osha.gov: Docket No. 86-0681.

Exhibits and information received and reviewed to date from counsel and others are listed as exhibits in Appendix A. An Overview of US EPA Sampling Results for Benzene & Vinyl Chloride is presented in Appendix B. A summary of Exhibit 100 SDS Summary and Extractions is provided in Appendix C. A summary of sampling data and analyses considered in provided in Appendix D. A copy of my recent curriculum vitae and a copy of my disclosed cases can be found in Appendix E. A copy of my Retention Agreement with the Cory Watson law firm is provided in Appendix F.

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[1] https://www.osha.gov/news/newsreleases/national/09252023.

[2] https://www.osha.gov/laws-regs/standardinterpretations/2023-09-22

Finally, I have also relied upon my knowledge and experience as a professional Certified Industrial Hygienist (C.I.H.), Certified Safety Professional (C.S.P.), and Professional Engineer (P.E.: FL, KY, OH, PA, TX, and WV).

I reserve the right to update my opinions based on additional information reviewed, or received (e.g., depositions) for review.

4.0 BACKGROUND INFORMATION REGARDING THE FEBRUARY 3, 2023, NS TRAIN DERAILMENT IN EAST PALESTINE, OH:

Background information regarding the February 3, 2023, train derailment and subsequent consequences resulting in widespread contamination of East Palestine and surrounding areas follows:

4.1 Summary of Details Regarding the February 3, 2023 Derailment of the NS Train in East Palestine, OH.

The National Safety Transportation Safety Board (NTSB), in their July 19, 2024, Accident Investigation Summary Report HQ-2023-1813 (Exhibit 14, pg. 2; Exhibit 16, pg. 1), reported that:

> "On February 3, 2023, at 8:54 pm EST, Norfolk Southern (NS) Train 32N derailed at Milepost (MP) 49.5 on main track 1 of NS's Fort Wayne Line Subdivision of the Keystone Division in East Palestine, Ohio. The train was 9,309 feet long, configured with two head-end locomotives and one distributed-power locomotive, and was hauling 149 freight cars, including 20 tank cars containing hazardous materials."
>
> "Thirty-eight cars derailed, including 11 of the 20 tank cars containing hazardous materials. Three of those tank cars were breached in the derailment, fueling a fire that damaged an additional 12 cars (none of which were carrying hazardous materials)."

The derailment was ultimately the result of a failed wheel bearing on covered hopper car GPLX 75465 (the 23rd car in the train) "Thirty-eight cars derailed, beginning with GPLX 75465.7 A fire ignited as a result of the overheated, failed journal bearing on GPLX 75465 and damaged an additional 12 cars (the cars in position 63 through 74 of the consist)" (Exhibit 14, pgs. 2, 4-6). This car, GPLX 75465, was a covered hopper car carrying polyethylene (Exhibit 19 & 29).

Tank cars carrying hazardous materials involved in derailment are summarized in Table 4-1 (Exhibit 14, pgs. 9-11; see also Exhibit 101 – Train car manifests):

Table 4-1: Tank Cars Carrying Hazardous Materials Involved in Derailment

Train Position (Exhibit 101)	Car Number	Car Specification	Product	Hazard Class No.	Car Damage Summary / Product Loss
28 (026)	TILX 402025	DOT105J300W	Vinyl Chloride, Stabilized	2.1	No Leak
29 (027)	OCPX 80235	DOT105J300W	Vinyl Chloride, Stabilized	2.1	No Leak, Melted aluminum housing cover
30 (028)	OCPX 80179	DOT105J300W	Vinyl Chloride, Stabilized	2.1	No Leak, Melted aluminum housing cover

Train Position (Exhibit 101)	Car Number	Car Specification	Product	Hazard Class No.	Car Damage Summary / Product Loss
31 (029)	GATX 95098	DOT105J300W	Vinyl Chloride, Stabilized	2.1	No Leak, Melted aluminum housing cover
36 (034)	SHPX 211226	DOT111S100W 1	Combustible Liquid, N.O.S. (Ethylene Glycol Monobutyl Ether)	3, PG III	Entire Load, B-end head cracked, open bottom outlet valve
38 (036)	DOWX 73168	DOT111S100W 1	Combustible Liquid N.O.S. (2-Ethyl Hexyl Acrylate)	3, PG III	Partial Load; B-end head cracked, A-end head puncture
49 (047)	NATX 35844	DOT105J300W	Isobutylene	2.1	No Leak, fire damage only
50 (048)	UTLX 205907	DOT111A100W 1	Butyl Acrylates, Stabilized	3, PG III	Entire load, A/B-end head punctures; manway gasket burned
55 (053)	OCPX 80370	DOT105J300W	Vinyl Chloride, Stabilized	2.1	No Leak
59 (057)	DPRX 259013	DOT111A100W 1	Benzene (Residue)	3, PG II	No Leak, Fire damage only
60 (058)	DPRX 258671	DOT111A100W 1	Benzene (Residue)	3, PG II	No Leak, Fire damage only

"Notably, three specification DOT 111 tank cars were breached in the derailment resulting in the release of product upon impact (i.e., the cars in positions 36, 38, and 50 noted in Table 3 above). In particular, the DOT 111 tank car in position 50 (containing butyl acrylates, a flammable liquid) was punctured and, as a result, released its contents, which ignited and formed a pool fire. Notably, that tank car was a general-purpose DOT 111 tank car that was not equipped with a jacket, tank head puncture resistance system, or thermal protection system. *In addition, an adjacent hopper car containing non-hazardous plastic pellets was also breached, with the plastic pellets igniting and helping to sustain the pool fire.* The long burning pool fire then impinged on the DOT 105 tank cars containing vinyl chloride, another flammable gas."

Note that the benzene tank cars were empty but contained benzene residue (Exhibit 101, Bates NS-CA-000001618-1619).

Capacities of these tank cars are summarized in Table 4-2 (Exhibit 35, pgs. 6-7):

Table 4-2: Tank Car Capacities Carrying Hazardous Materials Involved in the Derailment

Car # - Exh. 35 (XX) – Exh. 101	Car ID	Contents	Capacity	Hazard class
28 (026)	TILX 402025	Vinyl chloride (stabilized)	25,800 US gallons (98,000 ℓ)	2.1 (flammable gas)
29 (027)	OCPX 80235	Vinyl chloride (stabilized)	25,800 US gallons (98,000 ℓ)	2.1 (flammable gas)
30 (028)	OCPX 80179	Vinyl chloride (stabilized)	25,800 US gallons (98,000 ℓ)	2.1 (flammable gas)

Car # - Exh. 35 (XX) – Exh. 101	Car ID	Contents	Capacity	Hazard class
31 (029)	GATX 95098	Vinyl chloride (stabilized)	25,800 US gallons (98,000 ℓ)	2.1 (flammable gas)
36 (034)	SHPX 211226	2-Butoxyethanol	30,110 US gallons (114,000 ℓ	Combustible liquid
38 (036)	DOWX 73168	2-Ethylhexyl acrylate	25,800 US gallons (98,000 ℓ)	Combustible liquid
49 (047)	NATX 35844	Isobutylene	30,110 US gallons (114,000 ℓ)	2.1 (flammable gas)
50 (048)	UTLX 205907	Butyl acrylate (stabilized)	30,110 US gallons (114,000 ℓ)	3 (flammable liquid)
55 (053)	OCPX 80370	Vinyl chloride (stabilized)	25,800 US gallons (98,000 ℓ)	2.1 (flammable gas)
59 (057)	DPRX 259013	Benzene	30,110 US gallons (114,000 ℓ)	3 (flammable liquid)
60 (058)	DPRX 258671	Benzene	30,110 US gallons (114,000 ℓ)	3 (flammable liquid)

This is the available information on the positions of the individual tank cars with hazardous chemicals of concern (by NS) following the derailment.

Note the statement that an adjacent car with plastic pellets was ignited (see also pg. 11).

An aerial photo of the derailment site before car removals is shown in Figure 4-1 (Exhibit 35):

Figure 4-1: Derailed Train Cars – View to North/Northeast – CeramFab Building on Lower Left

A preliminary manifest released by NS on/about February 19, 2023, and later removed, is shown in Figures 4-2 and 4-3 (Exhibit 19, see also Exhibits 28-29):

LINE #	CAR ID	LOAD/MTY	CAR TYPE	COMMODITY	TANK CAR SPEC	UN ID	HAZ CLASS	Status of Car
23	ARSX 4145	LOADED	HOPPER	POLYPROPYLENE				Not in derailment pile
24	BRKX 66738	LOADED	HOPPER	POLYPROPYLENE				Not in derailment pile
25	GPLX 75465	LOADED	HOPPER	POLYETHYLENE				lading destroyed by fire
26	ECUX 860375	LOADED	HOPPER	POLYETHYLENE				lading destroyed by fire
27	UTLX 684543	EMPTY	TANK CAR	residue lube oil	DOT 117J100W			scrap pending C&P
28	TILX 402025	LOADED	TANK CAR	VINYL CHLORIDE, STABILIZED	DOT 105J300W	UN1086	2.1 (FLAMMABLE GAS)	car did not leak/cars vent product through the PRD and ignited/vent and burn performed
29	OCPX 80235	LOADED	TANK CAR	VINYL CHLORIDE, STABILIZED	DOT 105J300W	UN1086	2.1 (FLAMMABLE GAS)	car did not leak/cars vent product through the PRD and ignited/vent and burn performed
30	OCPX 80179	LOADED	TANK CAR	VINYL CHLORIDE, STABILIZED	DOT 105J300W	UN1086	2.1 (FLAMMABLE GAS)	car did not leak/cars vent product through the PRD and ignited/vent and burn performed
31	GATX 95098	LOADED	TANK CAR	VINYL CHLORIDE, STABILIZED	DOT 105J300W	UN1086	2.1 (FLAMMABLE GAS)	vent product through the PRD and ignited/vent and burn
32	RACX 51629	LOADED	TANK CAR	DIPROPYLENE GLLYCOL	DOT 111A100W1			fire impingement/no signs of tank breach
33	LYBX 5191	LOADED	TANK CAR	PROPYLENE GLYCOL	DOT 117J100W			flame impingement, no tank breach found
34	RACX 51435	LOADED	TANK CAR	PROPYLENE GLYCOL	DOT 111A100W1			tank breached/lost most of load
35	UTLX 671772	LOADED	TANK CAR	DIETHYLENE GLYCOL	DOT 111A100W1			had small leak from BOV, unknown amount of product in car
36	SHPX 211226	LOADED	TANK CAR	COMBUSTIBLE LIQ., NOS (ETHYLENE GLYCOL MONOBUTYL ETHER)	DOT 111S100W1	NA1993	COMBUSTIBE LIQUID	unknown status
37	TILX 331319	LOADED	HOPPER	SEMOLINA				in pile, destroyed by fire
38	DOWX 73168	LOADED	TANK CAR	COMBUSTIBLE LIQ., NOS (ETHYLHEXYL ACRYLATE)	DOT 111S100W1	NA1993	COMBUSTIBE LIQUID	Car breached on head end/amount of product still in car pending
39	ROIX 57036	LOADED	HOPPER	POLYVINYL				burned
40	NCUX 40057	LOADED	HOPPER	POLYVINYL				actively burning
41	UTLX 100055	LOADED	TANK CAR	PETROLEUM LUBE OIL	DOT 111A100W1			double comp car/both breached/entire load lost
42	XOMX 110664	LOADED	TANK CAR	PETROLEUM LUBE OIL	211A100W1			tank breached/lost most of load
43	UTLX 684798	LOADED	TANK CAR	PETROLEUM LUBE OIL	DOT 117J100W			flame impinged, may have had a small leak/will be determinec when car is off loaded
44	UTLX 671310	LOADED	TANK CAR	PETROLEUM LUBE OIL	DOT 111A100W1			flame impinged, small leak from top fittings, unknown amount left in tank
45	CERX 30072	LOADED	TANK CAR	POLYPROPYL GLYCOL	DOT 111A100W1			flame impinged, tank breached/ most of load lost
46	SHPX 211106	LOADED	TANK CAR	PROPYLENE GLYCOL	DOT 111S100W1			flame impinged, no signs of breach
47	NATX 231335	LOADED	TANK CAR	DIETHYLENE GLYCOL	DOT 111A100W1			flame impinged, tank breached/ load lost
48	UTLX 671913	LOADED	TANK CAR	DIETHYLENE GLYCOL	DOT 111A100W1			flame impinged, lost unknown amount at this time from damaged BOV
49	NATX 35844	LOADED	TANK CAR	ISOBUTYLENE	DOT 105J300W	UN1055	2.1 (FLAMMABLE GAS)	some flame impingement/no signs of breach
50	UTLX 205907	LOADED	TANK CAR	BUTYL ACRYLATES, STABILIZED	DOT 111A100W1	UN 2348	3 (FLAMMABLE LIQUID)	Head breach/lost entire load (spill& fire)
51	UTLX 661296	LOADED	TANK CAR	PETRO OIL, NEC	DOT 111A100W1			flame impinged, small leak from VRV stopped, car still loaded

Figure 4-2: Preliminary Derailed Train Manifest Released by NS (Exhibit 19)

52	COCX 287059	LOADED	TANK CAR	ADDITIVES, FUEL	DOT 111A100W1			of breach
53	ROIX 59396	LOADED	HOPPER	POLYVINYL				involved in fire
54	ROIX 57782	LOADED	HOPPER	POLYVINYL				involved in fire
55	OCPX 80370	LOADED	TANK CAR	VINYL CHLORIDE, STABILIZED	DOT 105J300W	UN 1086	2.1 (FLAMMABLE GAS)	car did not leak/cars vent product through the PRD and ignited/vent and burn performed
56	TBOX 640019	LOADED	BOX CAR	BALLS,CTN,MEDCL				burning or has burned
57	BKTY 152621	LOADED	BOX CAR	SHEET STEEL				burning or has burned
58	LINX 7278	LOADED	BOX CAR	VEGTABLE, FROZEN				burning or has burned
59	DPRX 259013	EMPTY	TANK CAR	BENZENE	DOT 111A100W1	UN 1114	3 (FLAMMABLE LIQUID)	damaged, fire impinged/ no breach
60	DPRX 258671	EMPTY	TANK CAR	BENZENE	DOT 111A100W1	UN 1114	3 (FLAMMABLE LIQUID)	damaged, fire impinged/ no breach
61	XOMX 110236	LOADED	TANK CAR	PARAFFIN WAX	DOT 211A100W1			flame impingement/no signs of breach
62	ELTX 7458	LOADED	HOPPER	FLAKES, POWDER				burned, extinguished
63	ELTX 3421	LOADED	HOPPER	FLAKES, POWDER		b		in line, upright, impinged
64	NDYX 892049	LOADED	HOPPER	HYDRAULIC CEMENT				
65	TTGX 953815	LOADED	AUTORACK	AUTOS PASSENGER				
66	TBOX 889334	LOADED	BOX CAR	MALT LIQUORS				
67	NOKL 603412	LOADED	BOX CAR	MALT LIQUORS				
68	NS 472751	LOADED	BOX CAR	MALT LIQUORS				
69	TBOX 676291	LOADED	BOX CAR	MALT LIQUORS				
70	TBOX 670331	LOADED	BOX CAR	MALT LIQUORS				
71	TBOX 662599	LOADED	BOX CAR	MALT LIQUORS				
72	KCS 112405	LOADED	BOX CAR	MALT LIQUORS				
73	TBOX 666771	LOADED	BOX CAR	MALT LIQUORS				
74	TBOX 664264	LOADED	BOX CAR	MALT LIQUORS				

Figure 4-3: Preliminary Derailed Train Manifest Released by NS – Continued (Exhibit 19)

Figures 4-2 and 4-3 provide more information on the contents of other cars, including car 25, the car with the failed wheel bearing that resulted in derailment. This car, and the adjacent car #26, contained polyethylene. Both car contents (#25 and #26) were reportedly destroyed by the fire.

However, one conflict observed between the NTSB report and these earlier manifests is that the cars adjacent to the butyl acrylates car (#50) initially were reported to contain isobutylene (#49) and petro oil (#51), not plastic pellets. Note that cars #53 and #54 were reported to contain “polyvinyl”, which reportedly burned.

Further, in a February 21, 2023 US EPA memorandum (https://www.epa.gov/system/files/documents/2023-03/Action%20Memo%20%28REDACTED%29%20-%20East%20Palestine%20Derailment%20ER%20-%2020230221.pdf – Exhibit 169), the car numbers differ from those values listed in the manifest cited in Figures 4-2 & 4-3 above and Table 4-2. The car locations from this later memorandum are shown in Figure 4-4:

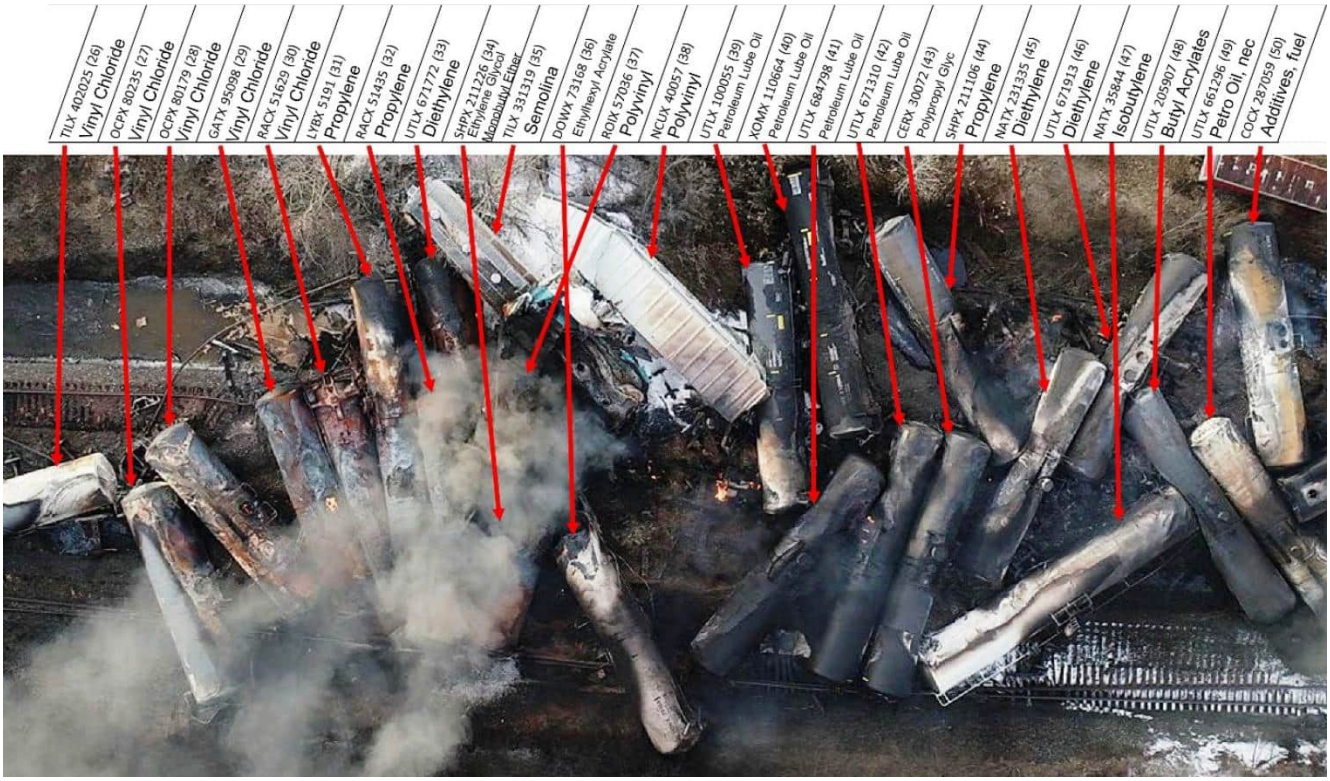


Figure 4-4: Identification of Railroad Tank Cars Involved in February 3, 2023 Derailment (from EPA 2-21-2023 memo)

Polyvinyl ("In addition to the five tankers of vinyl chloride gas, there were also four hoppers of polyvinyl involved in the fire. The term is not a precise one, but indicates a polymerized vinyl compound, and most likely refers to polyvinyl chloride (PVC), a common plastic used in pipes and a variety of other applications & shortcut term for PVC - Polyvinyl chloride (alternatively: poly(vinyl chloride), [Exh. 33-34] colloquial: vinyl [Exh. 32] or polyvinyl; abbreviated: PVC [Exh. 32]) is the world's third-most widely produced synthetic polymer of plastic (after polyethylene and polypropylene).) (Exhibits 30 – 31 and 32-34: https://storymaps.arcgis.com/stories/f7a19620002a41aabaff6c16ae2b2562).

[***Thus, in addition to the release/burning of 5 tanker cars of vinyl chloride, two hopper cars of polyvinyl chloride pellets also burned from the date of the derailment***.]

4.2 Summary of Details Regarding the Ignition and Burning of Five Derailed Vinyl Chloride (VC) Tank Cars on February 6, 2025.

The National Safety Transportation Board (NTSB) reported during this time that:

> "The five VCM tank cars were not mechanically breached during the derailment, but over the next day, four of these tank cars were exposed to fires and released material from pressure relief devices. These releases ceased on the afternoon of February 4" (Exhibit 16, pg. 1).

> "On February 6, 2024, as the pool fire continued to burn, engulfing additional tank cars, NS and its contractors recommended the Incident Commander approve the execution of a vent and burn operation on the five DOT-105 tank cars carrying vinyl chloride (the cars in positions 28, 29, 30, 31, and 55 of the consist). Notably, these DOT 105 tank cars were not breached…" (Exhibit 14, pg. 10).
>
> "Acting on information provided by NS and its contractors that a dangerous chemical reaction was occurring within a VCM tank car, the incident commander managing the response chose to expand the evacuation zone and perform a vent and burn (a deliberate breach of a tank car) on all five derailed VCM tank cars. ***The incident commander was not aware of dissenting opinions the VCM shipper had provided to NS and its contractors***. A contractor hired by NS breached the VCM tank cars at 4:37 p.m. on February 6, releasing and igniting their lading" (Exhibit 16, pg. 1).

An area, ~2 miles in length and ~1 mile, was evacuated to the southeast of the derailment/burn site, will be shown later, was not likely in the correct direction (Figure 4-5):

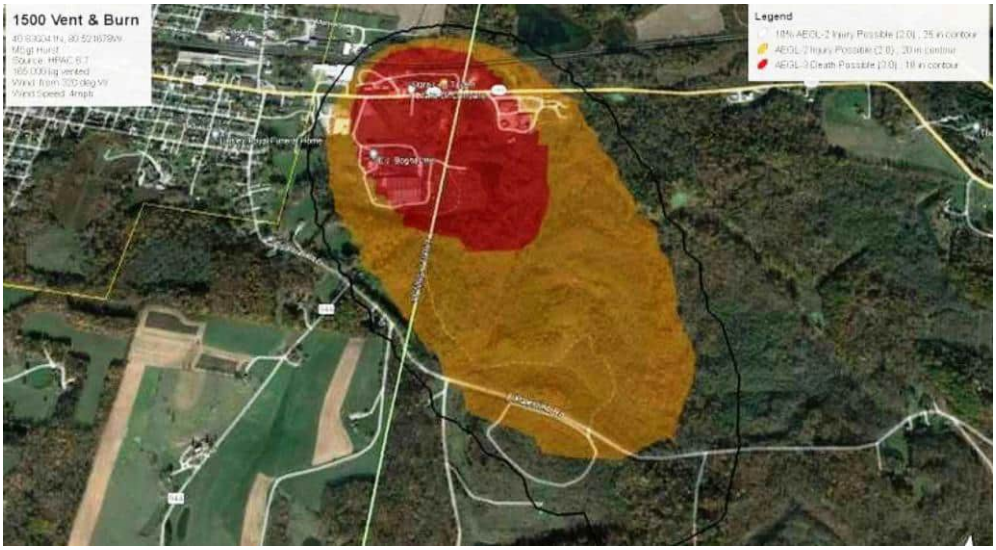


Figure 4-5: February 6, 2023 Evacuation Zone

Photos of the plume rising vertically from the resulting fire are shown in Figure 4-6:

Figure 4-6: Photograph of "Controlled Burn" Fire from East Palestine, OH – February 6, 2023 – Note Vertical/Capped Plume (from: https://abcnews.go.com/US/train-derails-flames-ohio-causes-half-town-evacuate/story?id=96892580)

A remarkable view of the "controlled burn" from an airplane is shown in Figure 4-7:

The picture taken from the sky by Jared McLuhan during flight AA1313 on February 6, 2023. McLuhan was on the passenger plane flying from Denver to Philadelphia when he captured the picture of the sky above East Palestine, Ohio just moments after a controlled explosion was ordered on the train that derailed there three days prior.

JARED MCLUHAN

Figure 4-7: Photograph of "Controlled Burn" Fire from East Palestine, OH – February 6, 2023 – Note Dark Area in the Clouds Below (from https://www.newsweek.com/plane-passenger-photo-smoke-plume-ohio-train-derailment-1781722)

The five VC were breached using explosives (see Figure 4-8) and the released contents ignited with flares.

Figure 4-8: Burned VC Tank Cars with Holes from Explosives (Petty Photos)

"***The vent and burn resulted in a mushroom cloud that towered over the town and surrounding area***" (Exhibit 15).

Later, the NTSB, consistent with my opinions in February of 2023 as a chemical engineer, conclusively determined the burns were not necessary and instead was based on faulty and incomplete recommendations provided by NS (Exhibit 15):

> "NTSB investigators, speaking at an NTSB board meeting held Tuesday at East Palestine High School, said the decision by the local incident commander three days later to conduct a vent and burn of the contents of the tank cars carrying vinyl chloride monomer was based on incomplete and misleading information provided by Norfolk Southern officials and contractors. ***The vent and burn was not necessary to prevent a tank car failure, NTSB investigators found***.
>
> According to the Federal Railroad Administration, ***a vent and burn procedure should be a last resort, used when a tank car is about to fail***. Norfolk Southern rejected three other removal methods and began planning for a vent and burn shortly after the derailment, investigators found.

The NTSB noted that (Exhibit 15): "***A lack of accurate, timely and comprehensive information passed to local incident commanders and state officials***" resulted in the unnecessary burn decision. Regarding the VC tank cars, NTSB reported that (Exhibit 16, pgs. 2-3):

> "The VCM in the derailed DOT 105 tank cars remained in a stabilized environment (that is, *was unable to undergo polymerization*, a potentially dangerous chemical reaction) until those tank cars were deliberately breached with explosives (the vent and burn

procedure). On-scene temperature trends did not indicate that a polymerization reaction was occurring and postaccident examinations confirmed this. ***The vent and burn procedure was not necessary to prevent a polymerization induced explosion***. One source of information about polymerization consulted by NS and its contractors, the Chlorine Institute's Pamphlet 171, included misleading information about signs of polymerization. *NS and its contractors continued to describe polymerization as an imminent threat when expert opinions and available evidence should have led them to reconsider their course of action*. ***NS compromised the integrity of the decision to vent and burn the tank cars by not communicating expertise and dissenting opinions to the incident commander making the final decision. This failure to communicate completely and accurately with the incident commander was unjustified***. ***The high local and environmental impacts of a vent and burn decision demonstrate the need for federal guidance about when to conduct a vent and burn***."

NTSB further wrote that:

"…contributing to the severity of the hazardous materials release were (1) ***the failure of Norfolk Southern Railway and its contractors to communicate relevant expertise and dissenting opinions to the incident commander and (2) the inaccurate representation by Norfolk Southern Railway and its contractors that the tank cars were at risk of catastrophic failure from a polymerization reaction, which created unwarranted urgency and led to the unnecessary decision to vent and burn five derailed vinyl chloride monomer tank cars to prevent a polymerization-induced tank car rupture. Contributing to the exposure of emergency responders and the public to post derailment hazards were (1) Norfolk Southern Railway's delay in transmitting the train consist information to emergency responders*** and (2) the state of Ohio's insufficient training requirements for volunteer firefighters."

Additional accounts and summaries of this train derailment by date are provided in Exhibits 20-26 and 35.

5.0 CONTAMINANTS RELEASED INTO THE ENVIRONMENT AND COMMUNITY FROM THE DERAILMENT, FIRES, AND DETONATION/FIRE OF THE VC TANK CAR CONTENTS:

This section summarizes likely chemicals released during the derailment and also during the subsequent fire(s).

5.1 Chemicals Likely Released as a Result of the Derailment:

From Figures 4-2 and 4-3, the following chemicals were likely, or possibly, released as a result of the derailment:

- Benzene
- Butyl Acrylates
- Dipropylene Glycol
- Ethylene Glycol Monobutyl Ether
- Ethyl Hexyl Acrylate

- Fuel Additives (not specified)
- Isobutylene
- Petroleum Lube Oil
- Polyvinyl (i.e., PVC)
- Propylene Glycol
- Residue Lube Oil
- Vinyl Chloride.

5.2 Combustion Products Released:

From Figures 4-2 and 4-3, the following chemicals were reported to have been burned as a result of the derailment:

- Polyethylene
- Polypropylene
- Polyvinyl (i.e., PVC)
- Residue Lube Oil
- Vinyl Chloride.

Of most concern would be the chlorinated hydrocarbons such as Polyvinyl (PVC) and Vinyl Chloride. Note that the PVC would have been burning for upwards of three days (February 3, 2023 to February 6, 2023) prior to the five vinyl chloride tank cars being penetrated with explosives and burned using flares on February 6, 2023). Combustion products from the burning of vinyl chloride (and PVC) are illustrated in Figure 5-1 (see for example Exhibits 69-71):

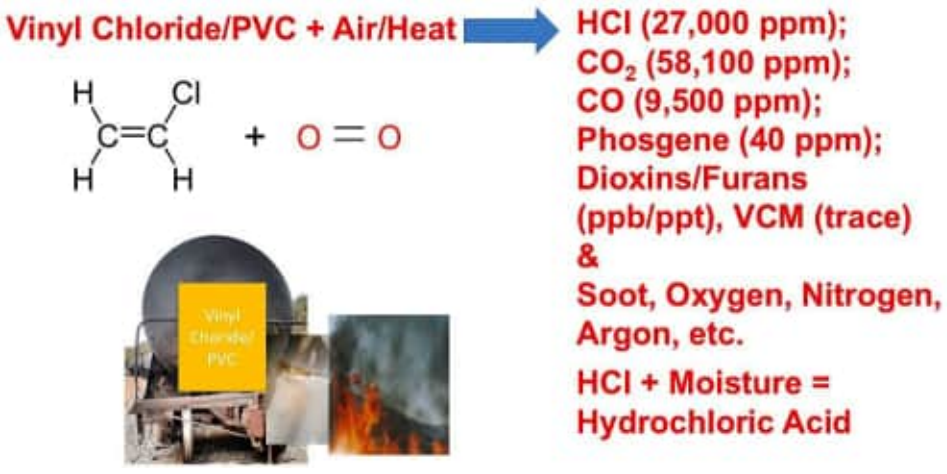


Figure 5-1: Illustration of Combustion Products from Combustion of Vinyl Chloride

Note that one of the combustion products of PVC and vinyl chloride includes dioxins.

Information regarding many of these chemicals of concern is provide in Exhibit 77.

5.3 Likely Contaminant Exposure Pathways:

The classes of contaminants released would have been categorized as follows:

- Volatile Organic Compounds (VOCs+).
- Semi-Volatile Organic Compounds / Polyaromatic Hydrocarbons (SVOCs+/ PAHs).
- Glycols.
- Dioxins/Furans.

VOCs are defined by the US EPA as (https://www.epa.gov/indoor-air-quality-iaq/technical-overview-volatile-organic-compounds):

- "Volatile organic compounds, or VOCs are organic chemical compounds whose composition makes it possible for them to evaporate under normal indoor atmospheric conditions of temperature and pressure."
- "A VOC is any organic compound having an initial boiling point less than or equal to 250° C [482° F] measured at a standard atmospheric pressure of 101.3 kPa [1 atmosphere or 14.69 psi]." Alternatively, VOCs are compounds with boiling points up to between 240° C & 260° C [464° F to 500° F].

SVOCs are defined by the US EPA as (https://www.epa.gov/indoor-air-quality-iaq/technical-overview-volatile-organic-compounds#:~:text=Very%20volatile%20organic%20compounds%20(VVOCs,dust%2C%20furnishings%20and%20building%20materials.):

- Semi-Volatile organic compounds, or SVOCs are organic chemical compounds any organic compound having an initial boiling point greater than 240° C & 260° C [464° F to 500° F] and less than 380° C & 400° C [716° F to 752° F] measured at a standard atmospheric pressure of 101.3 kPa [1 atmosphere or 14.69 psi].
- "Common SVOCs include polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), phthalates, and pesticides."

Thus, the sampling approach used by me for soil/sediment and water samples is shown in Tables 5-1 and 5-2:

Table 5-1: Soils and Sediment Sampling Media, Substances and Methods Used:

Media (#)	Analyze For	Method
(1) Terracore Kit – 4 jars	VOCs – all std. plus - Acrolein - Butyl acrylates - Ethylhexyl acrylate - Isobutylene - Phosgene	8260 D

Media (#)	Analyze For	Method
	- Vinyl chloride	
(1) 4-oz. wide mouth glass jar – full jar	SVOCs – all std. plus - Ethylene Glycol Monobutyl Ether (EGME)	8270 E
(1) 4-oz. wide mouth glass jar – full jar	Glycols – all std. plus - Diethylene glycol - Propylene glycol	8015 C
(1) 4-oz. wide mouth glass jar – full jar	Dioxins and Furans	8290 A

Table 5-2: Water Sampling Media, Substances and Methods Used:

Media (#)	Analyze For	Method
(3) 40 mℓ vials with HCl preservative – fill to top / no air	VOCs – all std. plus - Acrolein - Butyl acrylates - Ethylhexyl acrylate - Isobutylene - Phosgene - Vinyl chloride	8260 D
(2) 2 liter amber jars – fill completely	SVOCs – all std. plus - Ethylene Glycol Monobutyl Ether (EGME)	8270 E
(3) 40 mℓ vials – no preservative – fill to top / no air	Glycols – all std. plus - Diethylene glycol - Propylene glycol	8015 C
(2) 2 liter amber jars – fill completely	Dioxins and Furans	8290 A

Sampled compounds included standard VOCs and SVOCs plus non-typical compounds based on train manifests. Sampling media/methods were provided and specified by Eurofins Laboratory.

The classes of contaminants released would flow to:

- Atmosphere (e.g., VOCs).
- Surface Waters and Possibly Ground Waters and Surface Soils (e.g, SVOCs/PAHs, Glycols, and Dioxin/Furans).

VOCs in the air would need to be sampled for in the first few days after the derailment or they will be lost to dilution, dissipation, and/or rain events. Thus, it would be critical for NS and/or their contractors to monitor for VOCs immediately with instrumentation capable of monitoring specific VOCs at parts per billion (ppb) levels. Otherwise, such information is lost.

Unfortunately, NS and/or their subcontractors did not do this. They monitored VOCs using photo ionization detectors (PIDs) measuring for total (not specific) VOCs at ppm

levels (factor of 1,000 higher than needed). Illustrations of these measurements, taken from homeowner records, are shown in Figures 5-2 to 5-5:

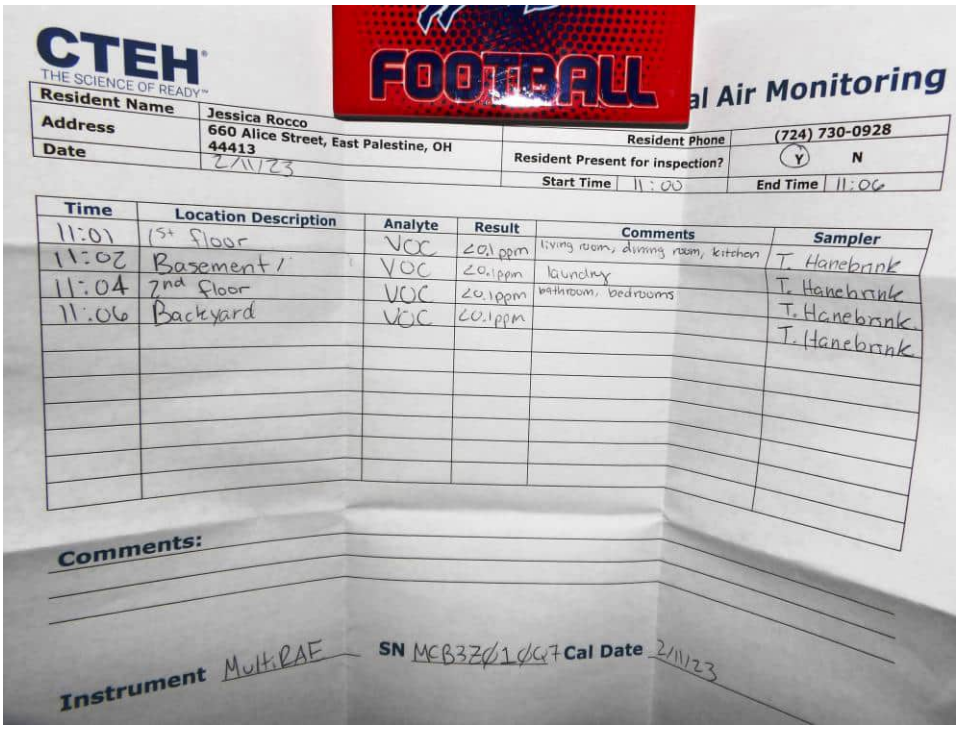


Figure 5-2: CTEH Monitoring at Home on 600 Alice, East Palestine, OH - February 11, 2023 Using MultiRAE PID

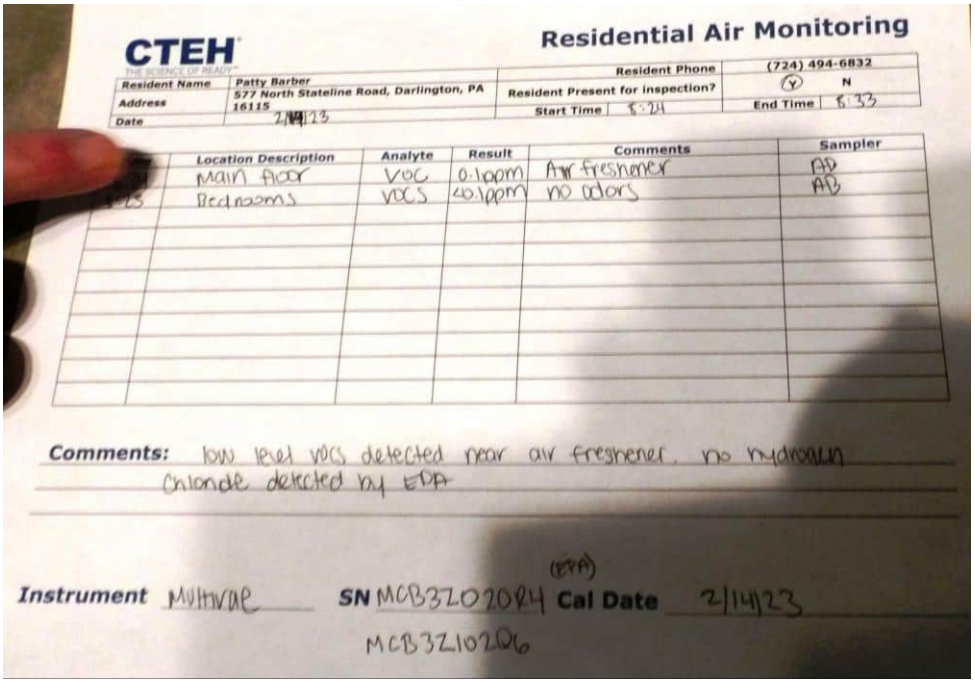


Figure 5-3: CTEH Monitoring at Home on 500 N. Stateline Rd., Darlington, PA - February 14, 2023 Using MultiRAE PID

Oddly, in this Figure, the analyst notes that the higher reading of 40.1 total VOCs was detected near an air freshener, speculating that this was the cause of the higher reading.

In both cases, the readings taken were for total VOCs, not specific VOCs and taken at ppm (parts per million) levels.

Note that based on results like these, the US EPA told the public on February 18, 2023 (Exhibit 72) that: "U.S. EPA also continues to assist indoor air screenings in homes. To date, 525 homes have been screened with no exceedances for residential air quality standards."

While they are relying on NS for this work, this statement is arguably false since no specific VOCs are being monitored and the level at which they are monitored is at the ppm level. From Figure 5-3, one result is 40.1 ppm, but we do not know what specific organics are contained in this total hydrocarbon measurement. Certainly if 1 ppm of this total were benzene, that would be of great concern.

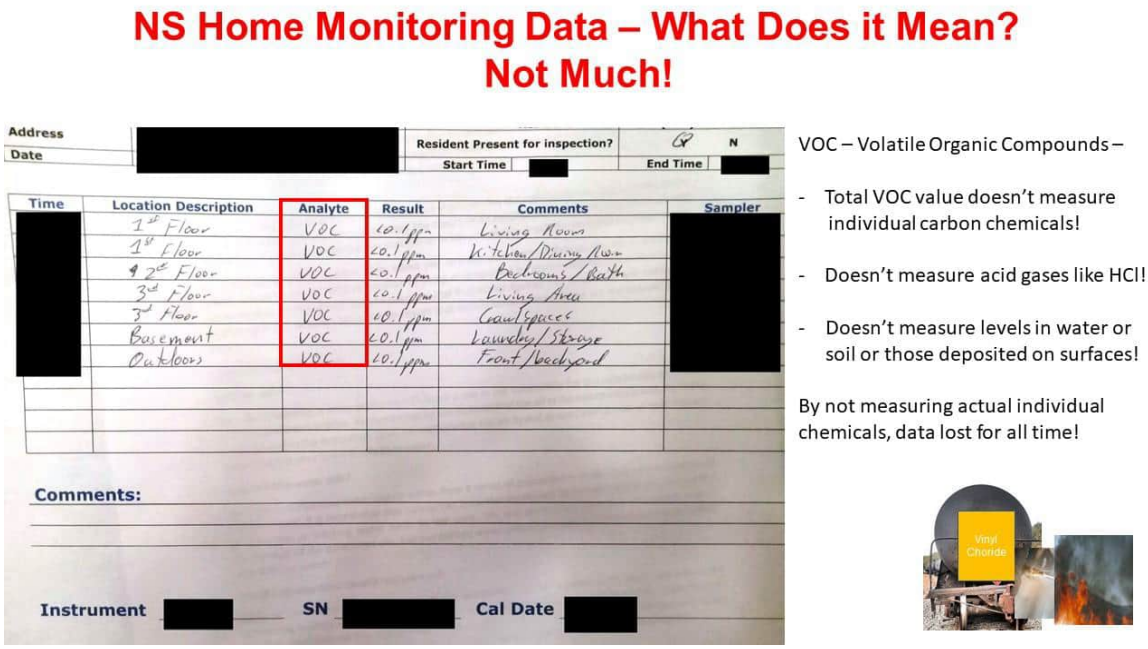
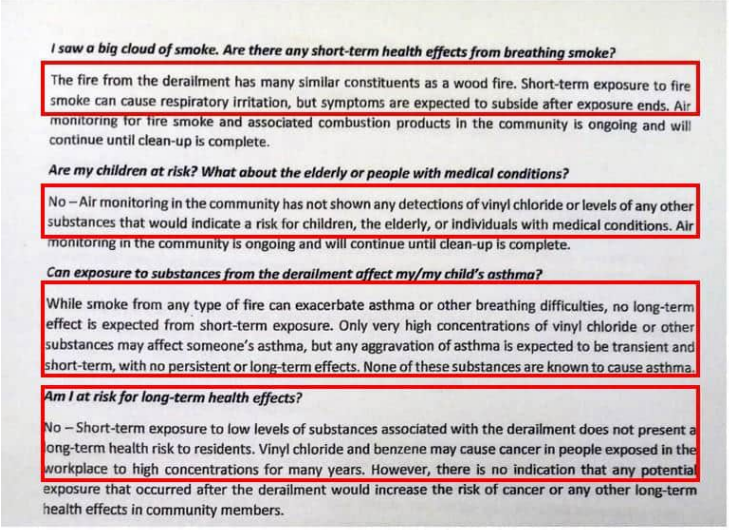


Figure 5-4: Illustration of Homeowner Monitoring Results by NS with Petty Commentary

NS's Q&As in their late February 2023 publications to the public, along with Petty commentary, follow:

NS Q & A's – What Do they Say? - Not Much/Misleading!



I saw a big cloud of smoke. Are there any short-term health effects from breathing smoke?

The fire from the derailment has many similar constituents as a wood fire. Short-term exposure to fire smoke can cause respiratory irritation, but symptoms are expected to subside after exposure ends. Air monitoring for fire smoke and associated combustion products in the community is ongoing and will continue until clean-up is complete.

Are my children at risk? What about the elderly or people with medical conditions?

No – Air monitoring in the community has not shown any detections of vinyl chloride or levels of any other substances that would indicate a risk for children, the elderly, or individuals with medical conditions. Air monitoring in the community is ongoing and will continue until clean-up is complete.

Can exposure to substances from the derailment affect my/my child's asthma?

While smoke from any type of fire can exacerbate asthma or other breathing difficulties, no long-term effect is expected from short-term exposure. Only very high concentrations of vinyl chloride or other substances may affect someone's asthma, but any aggravation of asthma is expected to be transient and short-term, with no persistent or long-term effects. None of these substances are known to cause asthma.

Am I at risk for long-term health effects?

No – Short-term exposure to low levels of substances associated with the derailment does not present a long-term health risk to residents. Vinyl chloride and benzene may cause cancer in people exposed in the workplace to high concentrations for many years. However, there is no indication that any potential exposure that occurred after the derailment would increase the risk of cancer or any other long-term health effects in community members.

Not the same as smoke from a wood fire & impacts from these chemicals not just respiratory irritation.

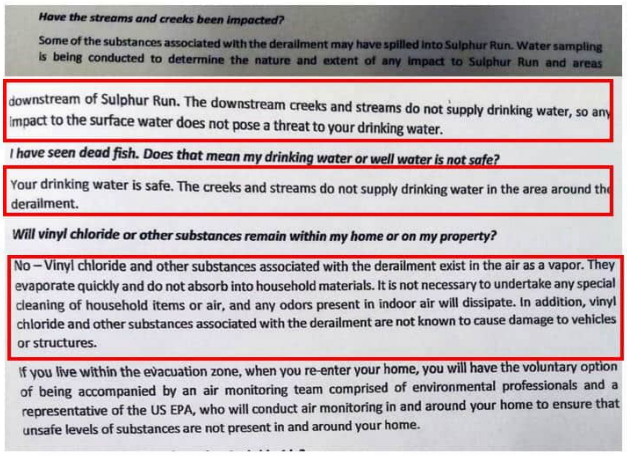
May not have complete picture of air emissions; what about other toxics? What about chemicals in waters and soils?

They simply do not know long term effects whether from short-term or long-term exposures.

Again, this statement is premature; they simply do not know. The term "high" conc. is undefined and a meaningless statement.

Figure 5-5: NS's Q&A to the Public with Petty Commentary

NS Q & A's – What Do they Say? - Not Much/Misleading!



Have the streams and creeks been impacted?

Some of the substances associated with the derailment may have spilled into Sulphur Run. Water sampling is being conducted to determine the nature and extent of any impact to Sulphur Run and areas downstream of Sulphur Run. The downstream creeks and streams do not supply drinking water, so any impact to the surface water does not pose a threat to your drinking water.

I have seen dead fish. Does that mean my drinking water or well water is not safe?

Your drinking water is safe. The creeks and streams do not supply drinking water in the area around the derailment.

Will vinyl chloride or other substances remain within my home or on my property?

No – Vinyl chloride and other substances associated with the derailment exist in the air as a vapor. They evaporate quickly and do not absorb into household materials. It is not necessary to undertake any special cleaning of household items or air, and any odors present in indoor air will dissipate. In addition, vinyl chloride and other substances associated with the derailment are not known to cause damage to vehicles or structures.

If you live within the evacuation zone, when you re-enter your home, you will have the voluntary option of being accompanied by an air monitoring team comprised of environmental professionals and a representative of the US EPA, who will conduct air monitoring in and around your home to ensure that unsafe levels of substances are not present in and around your home.

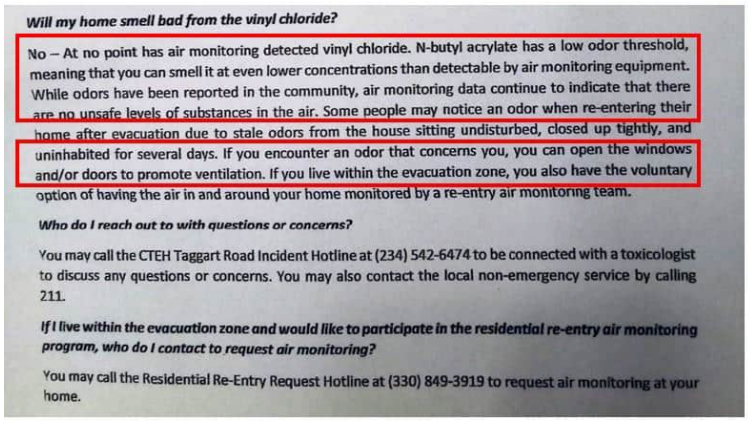
Again, these statement are premature; they simply do not know long-term impacts of all these chemicals in soils and waters on drinking water – Why suggest folks use bottled water then?

These statements are premature and in part simply not true, some of the other substances that may have been released are not volatile (e.g., glycols).
HCl / hydrochloric acid certainly can damage car (and other) surfaces.

Short-term air monitoring (i.e., chemicals from the air) is likely not the sole route of exposure. Also depends on what is monitored (RE: VOCs)

Figure 5-6: NS's Q&A to the Public with Petty Commentary – cont.

NS Q & A's – What Do they Say? - Not Much and Misleading!



Will my home smell bad from the vinyl chloride?

No – At no point has air monitoring detected vinyl chloride. N-butyl acrylate has a low odor threshold, meaning that you can smell it at even lower concentrations than detectable by air monitoring equipment. While odors have been reported in the community, air monitoring data continue to indicate that there are no unsafe levels of substances in the air. Some people may notice an odor when re-entering their home after evacuation due to stale odors from the house sitting undisturbed, closed up tightly, and uninhabited for several days. If you encounter an odor that concerns you, you can open the windows and/or doors to promote ventilation. If you live within the evacuation zone, you also have the voluntary option of having the air in and around your home monitored by a re-entry air monitoring team.

Who do I reach out to with questions or concerns?

You may call the CTEH Taggart Road Incident Hotline at (234) 542-6474 to be connected with a toxicologist to discuss any questions or concerns. You may also contact the local non-emergency service by calling 211.

If I live within the evacuation zone and would like to participate in the residential re-entry air monitoring program, who do I contact to request air monitoring?

You may call the Residential Re-Entry Request Hotline at (330) 849-3919 to request air monitoring at your home.

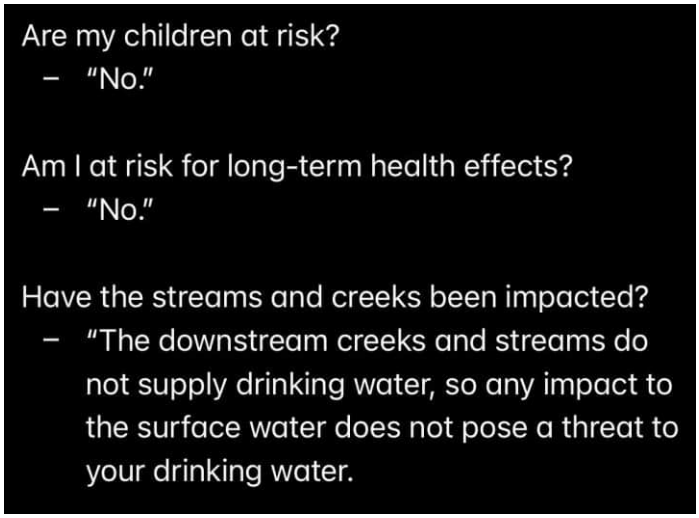
With some exceptions (e.g., benzene) odor is typically not used to determine exposures. Moreover, once you smell it you have been exposed – not getting it back out of you. Odor measurements the least desirable way to monitor exposures.

Statement does not address HCl / hydrochloric acid and other chemicals not monitored?

Finally, one can't know about vinyl chloride or any other organic compound if only measuring total VOCs – measurement doesn't provide individual chemicals of concern. Only a small portion of the tests appear to actually measured vinyl chloride.

Figure 5-7: NS's Q&A to the Public with Petty Commentary – cont.

Also, NS states, and in my opinion provided, unsupportable speculation that everyone is safe, in the following public statements:



Are my children at risk?
- "No."

Am I at risk for long-term health effects?
- "No."

Have the streams and creeks been impacted?
- "The downstream creeks and streams do not supply drinking water, so any impact to the surface water does not pose a threat to your drinking water.

Figure 5-8: NS's Q&A to the Public – cont.

The statements made in Figure 5-8 in February 2023, were at best, premature, or, at worst, false.

Nevertheless, since my team did not arrive on-site until February 20, 2023, our focus was on surface (soils and waters) measurements, and not air measurements since nearly two weeks had passed since air emissions had occurred.

6.0 CRITICISMS OF NS & ARCADIS' OVERALL SAMPLING PROGRAM:

Criticisms of NS/Arcadis' air sampling activities for VOCs in air were addressed in Section 5; this section focuses on criticisms of their sampling plans and programs for testing of VOCs, SVOCs/PAHs, and Dioxins in soils and waters.

6.1 Wind Direction – Impact on NS/Arcadis' Sampling Program:

NS and Arcadis appear not to have taken actual wind directions at the time of the VC tank car burns on February 6, 2023, adding not only to my criticism that the burn should not have taken place since the evacuation zone was to the wrong direction (i.e., extended to the SE), but NS doubled down by focusing their sampling program on this same (~1 mile x ~2 mile) evacuation zone. I have criticized this decision in my September 21, 2024, declaration to the Government Accountability Office (see Exhibit 73) and explained at length why this was likely to result in a false summary of NS's sampling findings. This is further detailed below.

In their March 6, 2023 sampling program (Exhibit 36, later revised), NS/Arcadis proposed that the majority of sampling be completed in the evacuation zone to the southeast of East Palestine, OH (Figure 6-1):

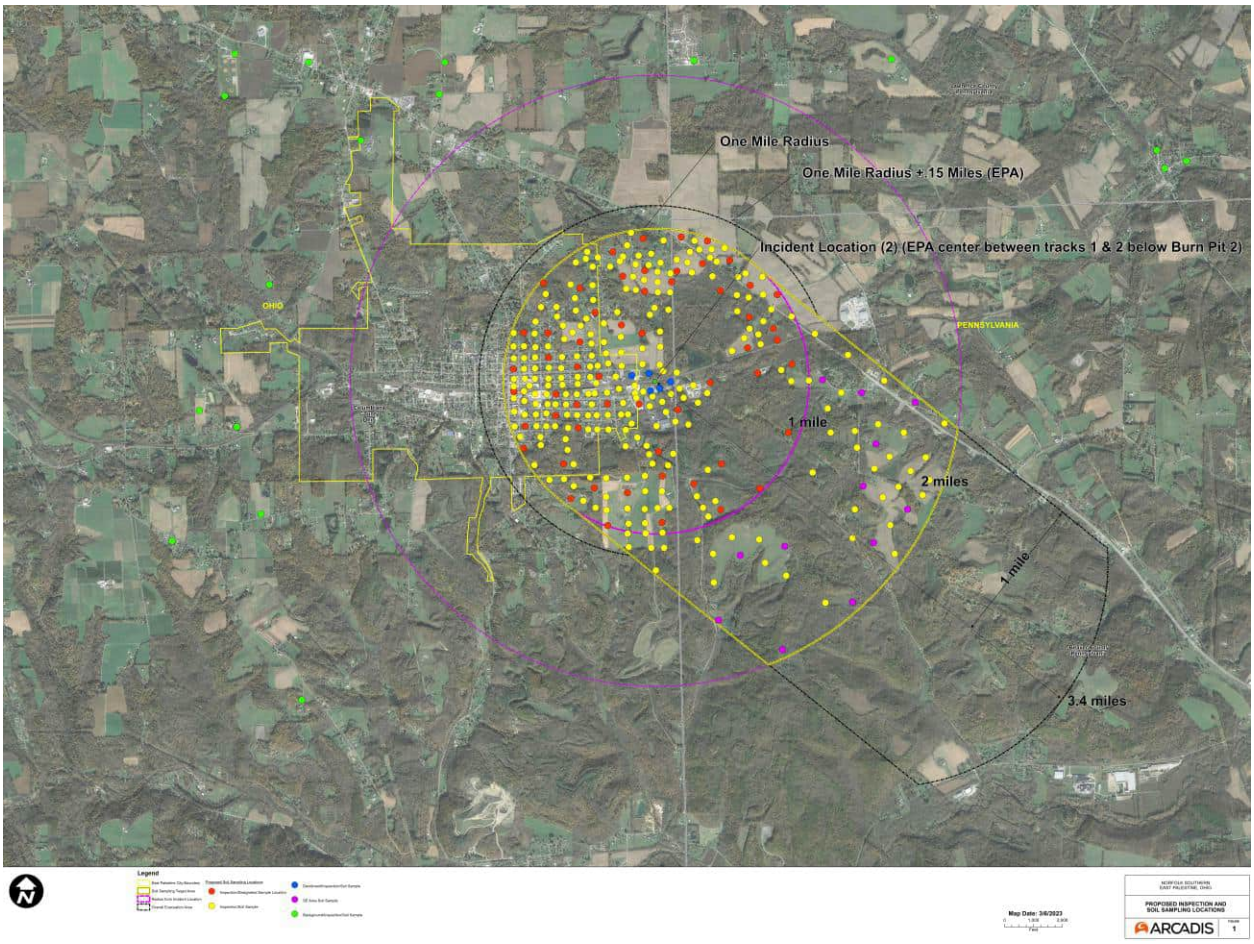


Figure 6-1: Arcadis's Soil Sampling Locations – Focus on Evacuation Zone – Background Green Dots (Exhibit 36).

Note that the green sampling dots mostly to the west and north are labeled background locations. Now, if the winds were actually mostly calm or from the south, the background samples would have been elevated the highest and in the direction that the burn plume traveled and the red, yellow, and purple sampling locations would either be more likely background or similar to the other samples should the plume have settled

over the entire area. This would result in the NS/Arcadis background samples having higher levels which would cause them to conclude that background levels were higher than where they assumed that the plume traveled. Moreover, the majority of sampling would be in the wrong areas.

Arcadis makes this point explicitly regarding background sampling in Exhibit 36, pg. 4:

> "***Background Areas:***
>
> *Samples will be collected from a minimum of 16 background locations* ***outside the 1- by 2-mile area, and upwind*** *from the incident site at the time of the vent and burn based on consultation with USEPA*. Approximate proposed locations are shown on **Figure 1** (in green) and represent the following land use types: residential, agricultural, commercial, and special use. Four samples are proposed to be collected from each of these four land use types, totaling 32 background samples. Final locations may be modified in the field based on access.

Note that this Arcadis plan (Exhibit 36) was belatedly revised on April 5, 2023 and yet no-one apparently accounted for actual wind directions during the time of the burn.

Based on an analysis of wind directions completed in March 2023 (Exhibit 40), and illustrated in Figure 6-2 developed later, NS evacuated, and focused sampling, in the wrong direction:

Actual Wind Direction(s) vs Evacuation Zone During February 6, 2023 Burn

(Analysis by Stephen Petty, September 11, 2024)

Output:

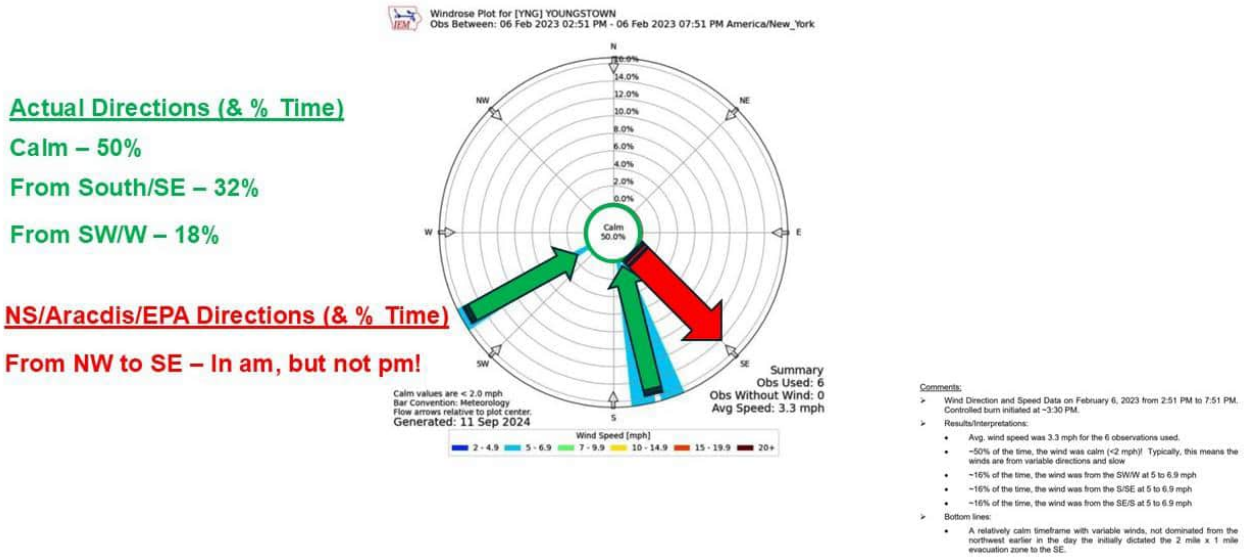


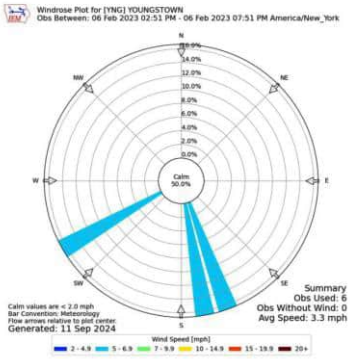
Figure 6-2: Petty Illustration of Wind Directions

As illustrated in Figure 6-2, the winds on February 6, 2023 were from the northwest to the southeast up until around noon and then went calm or from the southwest to the southeast during the time of the burn.

The basis for Figure 6-2 is shown in part, in Figure 6-3:

(Analysis by Stephen Petty, September 11, 2024)

Output:



Comments:

- Wind Direction and Speed Data on February 6, 2023 from 2:51 PM to 7:51 PM. Controlled burn initiated at ~3:30 PM.
- Results/Interpretations:
  - Avg. wind speed was 3.3 mph for the 6 observations used.
  - ~50% of the time, the wind was calm (<2 mph)! Typically, this means the winds are from variable directions and slow
  - ~16% of the time, the wind was from the SW/W at 5 to 6.9 mph
  - ~16% of the time, the wind was from the S/SE at 5 to 6.9 mph
  - ~16% of the time, the wind was from the SE/S at 5 to 6.9 mph
- Bottom lines:
  - A relatively calm timeframe with variable winds, not dominated from the northwest earlier in the day the initially dictated the 2 mile x 1 mile evacuation zone to the SE.

Figure 6-3: Petty Illustration of Wind Directions on February 6, 2023 During Time of Burn – Youngstown, OH Station

Note from Exhibit 40, that analyses of hourly wind data from both Youngtown, OH and Pittsburgh, PA show similar patterns.

The plaintiff's expert (Richard J. Schuhmann, Ph.D. – Exhibit 75), in his September 6, 2024 Declaration, illustrated this point, but to a broader degree of time (February 3, 2023 – 9:00 PM to February 7, 2023 - midnight) using their SCICHEM modeling, as shown in Figure 6-3:

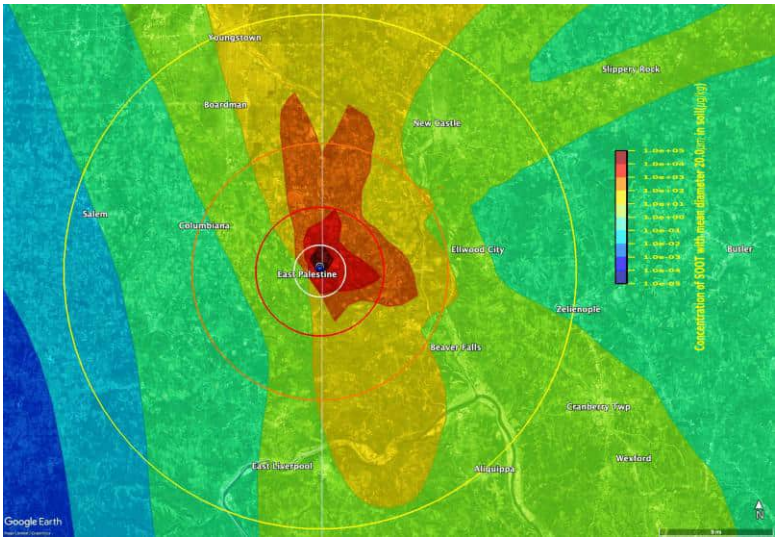


Figure 6-4: Schuhmann's Illustration of Wind Directions (February 3, 2023 – 9:00 PM to February 7, 2023 – midnight)

Despite a timeframe far exceeding the actual February 6, 2023 VC tank car burn period, the major directions for winds were from the south to the north.

Note that the actual NS/Arcadis sampling followed this early plan (Exhibit 95) as indicated by actual sampling plots of sample locations as of April 18, 2023 (Figure 6-5):

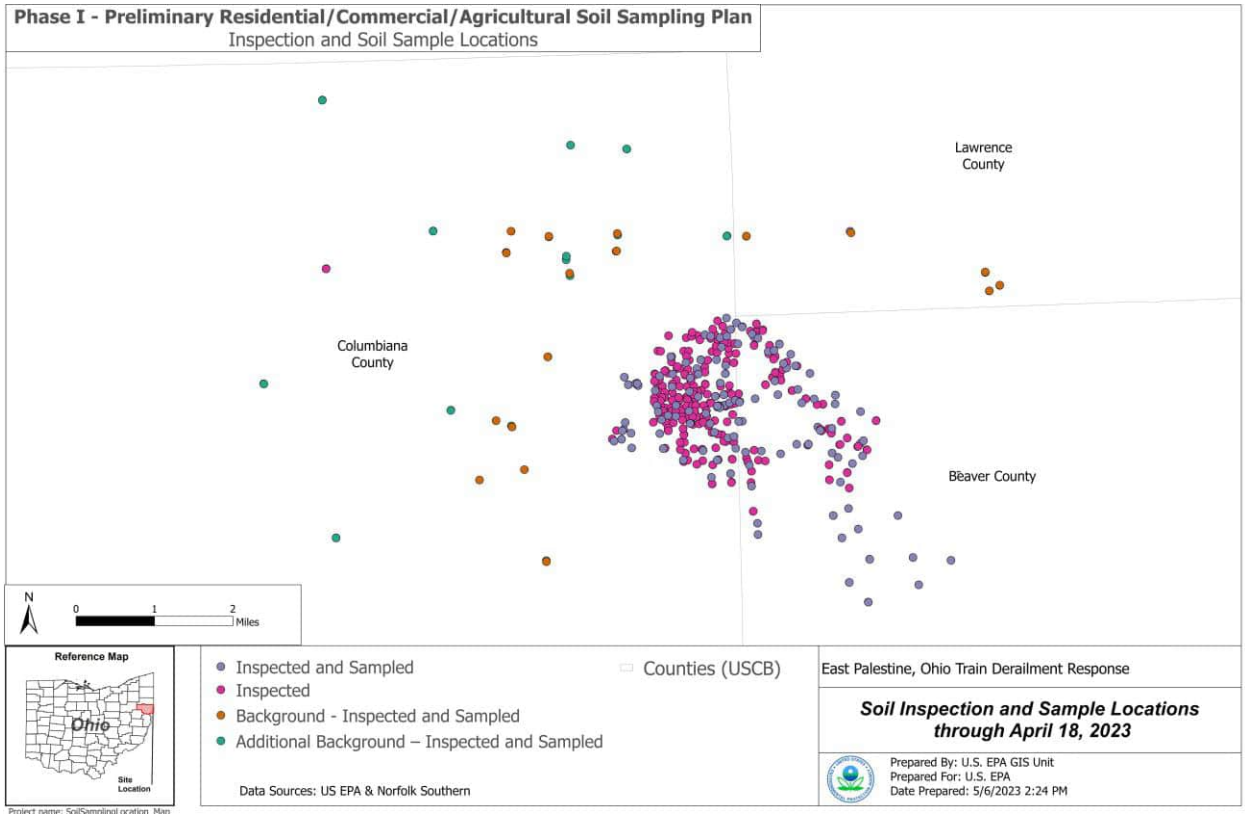
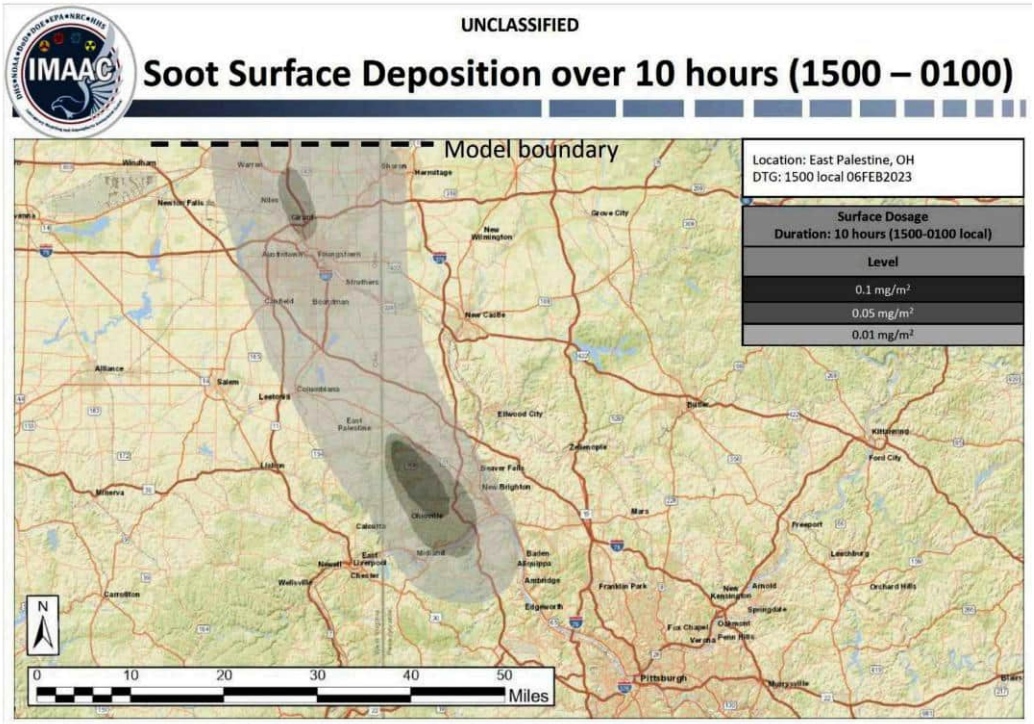


Figure 6-5: NS/Arcadis Sampling Locations as of April 18, 2023

Note from Figure 6-5 that NS/Arcadis are still assigning most of the background samples to the west, northwest, north, and northeast and completing most of their sampling in the evacuation zone to the southeast.

The US EPA, in documents dated May 31, 2023 (Exhibit 93) and July 31, 2025 (Exhibit 91), finally produced a wind model based on soot that differs significantly from the direction used to set sampling activities in March/April 2023 (Figure 6-6):



East Palestine Train Derailment Soot Surface Deposition Map (IMAAC Retrospective Analysis)

Figure 6-6: US EPA Soot Plumb Modeling Results
(February 6, 2023 – 3:00 PM to February 7, 2024 – 1:00 AM)

The report indicated that the modeling made the following assumptions:

> "*For the analysis, it was assumed that at the train derailment location 90% of the total available mass of vinyl chloride and 90% of the total available mass of other compounds (ethylene glycol, ethyl hexyl acrylate, butyl acrylate) was burned*. This is because some material was initially spilled prior to the vent and burn operation. The burn was specified to occur over a duration of six hours on February 6, 2023. ***Soot deposition was calculated to last over the course of ten hours (six hours of burning plus four hours of transport after burning). Soot falls out of the air as it cools down***."

Thus, the burn occurred in their model from 3:00 PM until 9:00 PM and then modeling was continued for another four hours.

The NS/Arcadis Phase I sampling report summarizing these sampling results (Exhibit 88) being first issued on May 19, 2023, prior to the soot modeling report was issued. It was revised three times later, with the later revisions issued on October 22, 2024. As shown in Figures 6-7 through 6-9, it appears that the flaws mentioned earlier remained in the sampling plan:

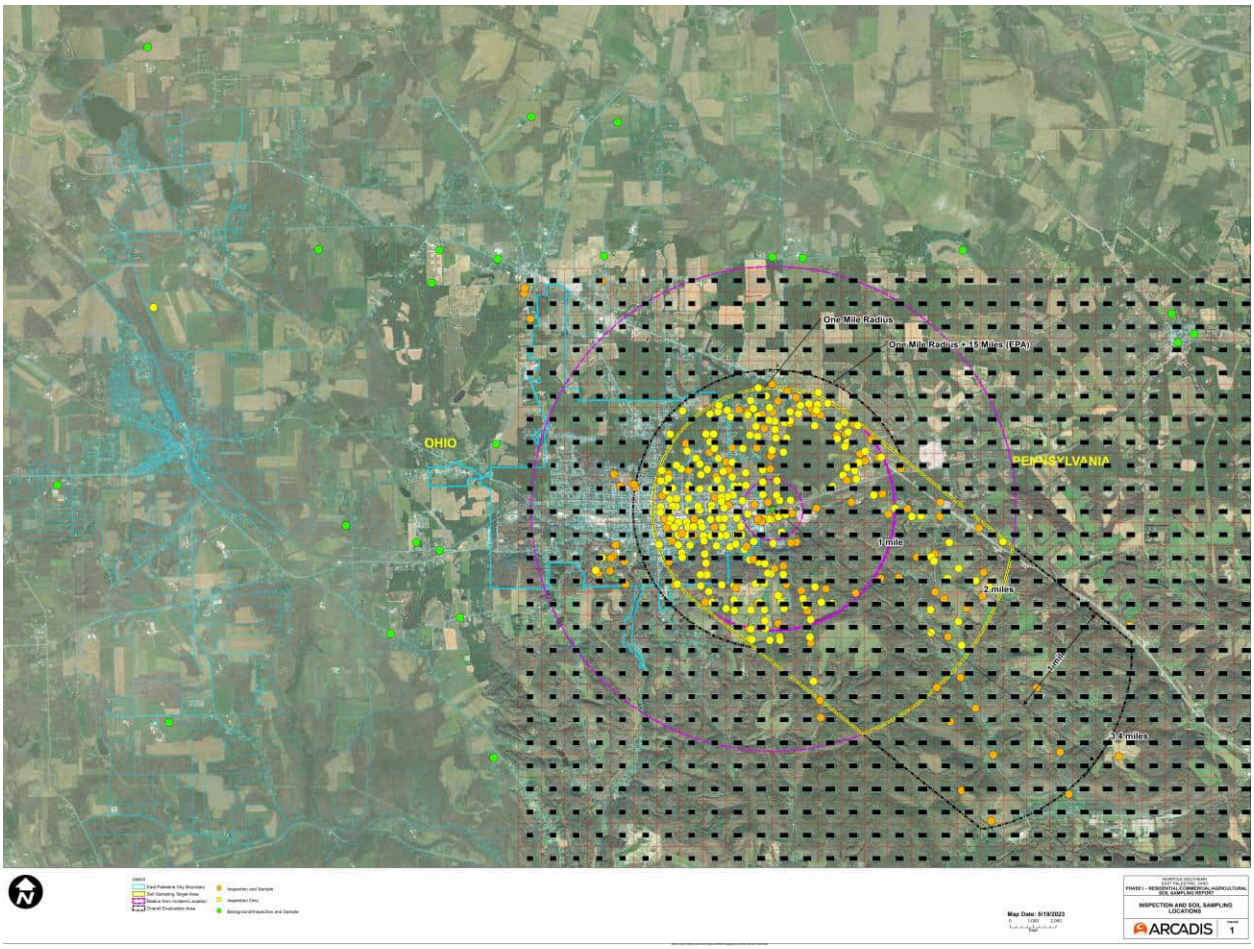


Figure 6-7: NS/Arcadis Sampling Locations (Exhibit 88, Figure 1, pg. 70) – Note Background Locations Still Mostly to West and North

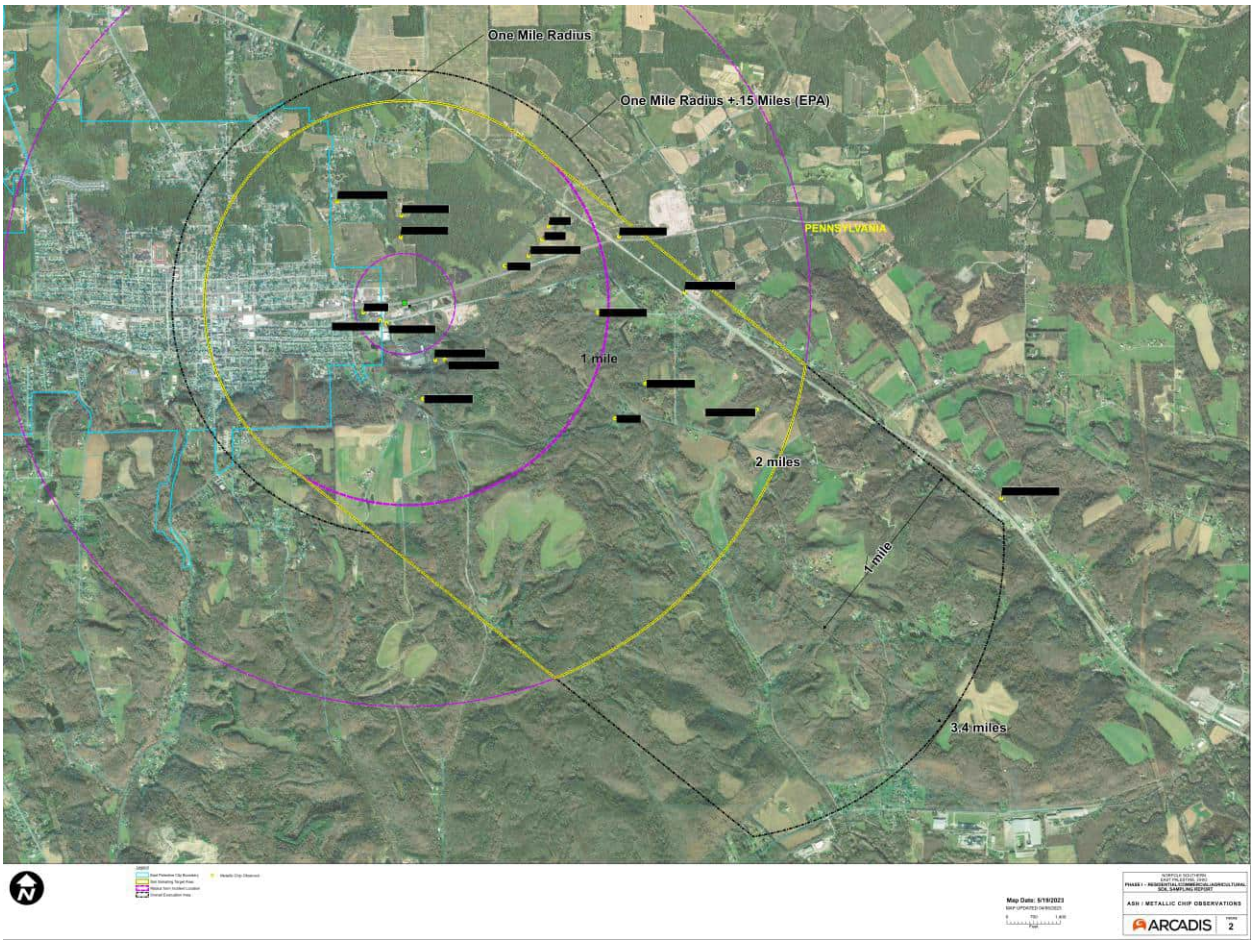


Figure 6-8: NS/Arcadis Ash/Metal Chip Locations (Exhibit 88, Figure 2, pg. 69) – Note Mostly Locally or to the East, North, and South – Calls into Question Background Sample Locations

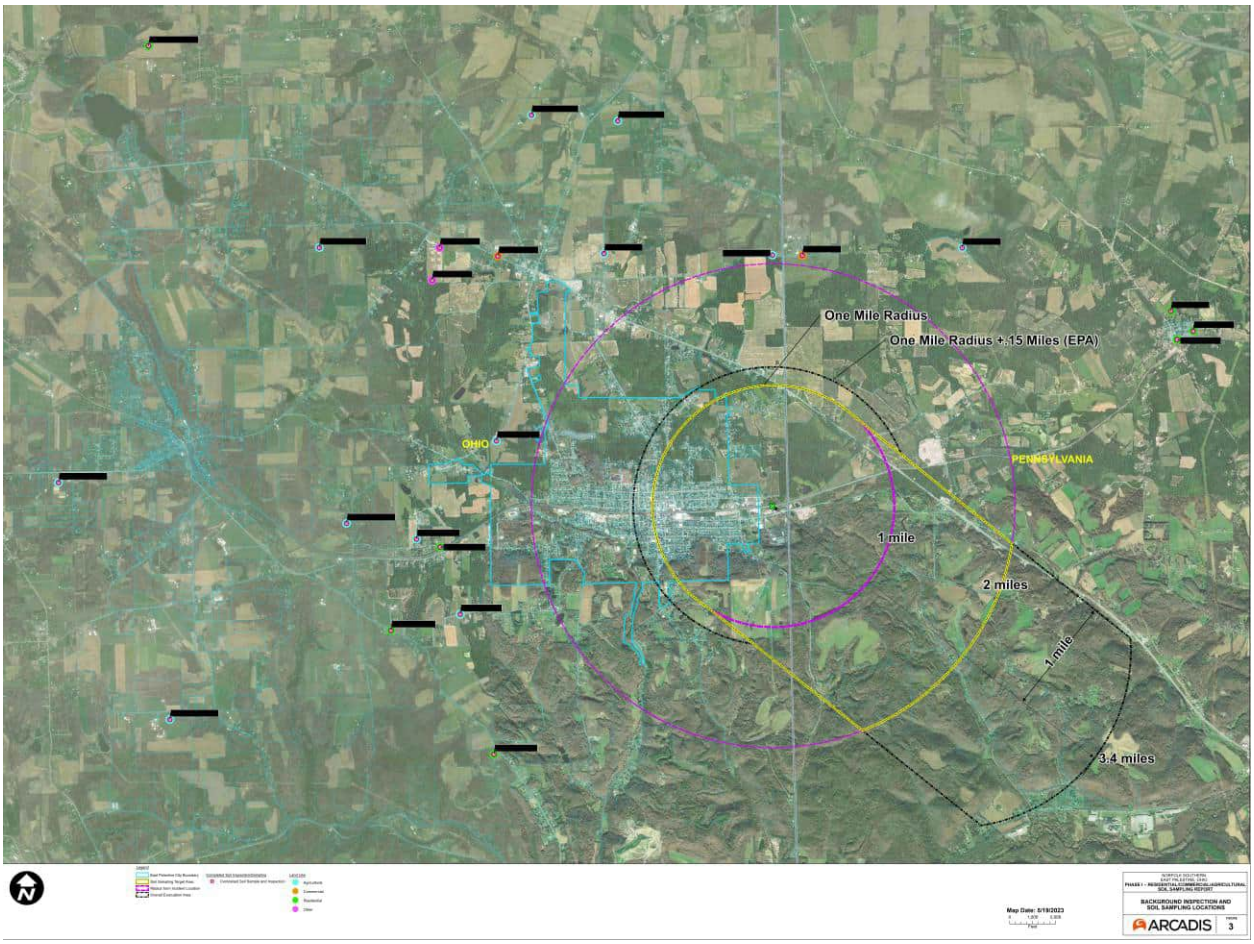


Figure 6-9: NS/Arcadis Background Sampling Locations (Exhibit 88, Figure 3, pg. 70) – Note Background Locations Still Mostly to West and North

Thus, despite wind modeling and ash/metallic debris locations, NS/Arcadis continued to focus sampling in the evacuation zone to the southeast and assume background samples were to the west and north.

Note that the US EPA (Exhibit 91) observed that: “As a result of the model, the Phase 1 Residential/Commercial/Agricultural Soil Sampling Plan was amended to target properties in the area of highest estimated soot concentration. The Pennsylvania Department of Environmental Protection (PA DEP), in coordination with EPA, expanded sampling efforts even further.”

Finally, many photographs taken at the time show the plume rising nearly straight up (see Figures 6-10 and 6-11) below (from Exhibit 38):

Figure 6-10: Nearly Vertical Smoke Plume from VC Tank Burnings (from https://www.ntsb.gov/investigations/Pages/RRD23MR005.aspx):

The picture taken from the sky by Jared McLuhan during flight AA1313 on February 6, 2023. McLuhan was on the passenger plane flying from Denver to Philadelphia when he captured the picture of the sky above East Palestine, Ohio just moments after a controlled explosion was ordered on the train that derailed there three days prior.

JARED MCLUHAN

Figure 6-11: Nearly Vertical Smoke Plume from VC Tank Burnings (from https://www.newsweek.com/plane-passenger-photo-smoke-plume-ohio-train-derailment-1781722)

Thus, I conclude that the NS/Arcadis sampling plan for surface/subsurface soil and water samples was fundamentally flawed by improperly accounting for actual wind directions and by effectively reversing downwind and upwind sampling locations resulting in misassigned background sample locations.

6.2 NS/Arcadis Soil Sampling Program – Focus on Subsurface Sampling from Surface Deposited Contaminants:

NS and Arcadis soil sampling program was outlined in Exhibit 36:

> "Two sampling increments will be collected at these locations (i.e., 0 to 1 in and 1 to 6 in)" (pg. 4)

and also on pg. 5:

> "Soil samples will be collected at the following intervals from a single shallow boring:

- Surface soil: surficial scrape of visually impacted materials, or 0 to 1 in if impacted materials are not observed
- Subsurface soil: below visually impacted materials to 6 in, or 1 in to 6 in *if there is not ash*."

This implies that if ash were not observed at a given soil location, sub-surface soil samples would be taken from 1" to 6" below ground surface (bgs). This overall approach is further defined in the report Figure labeled Appendix D (see Figure 6-12 below):

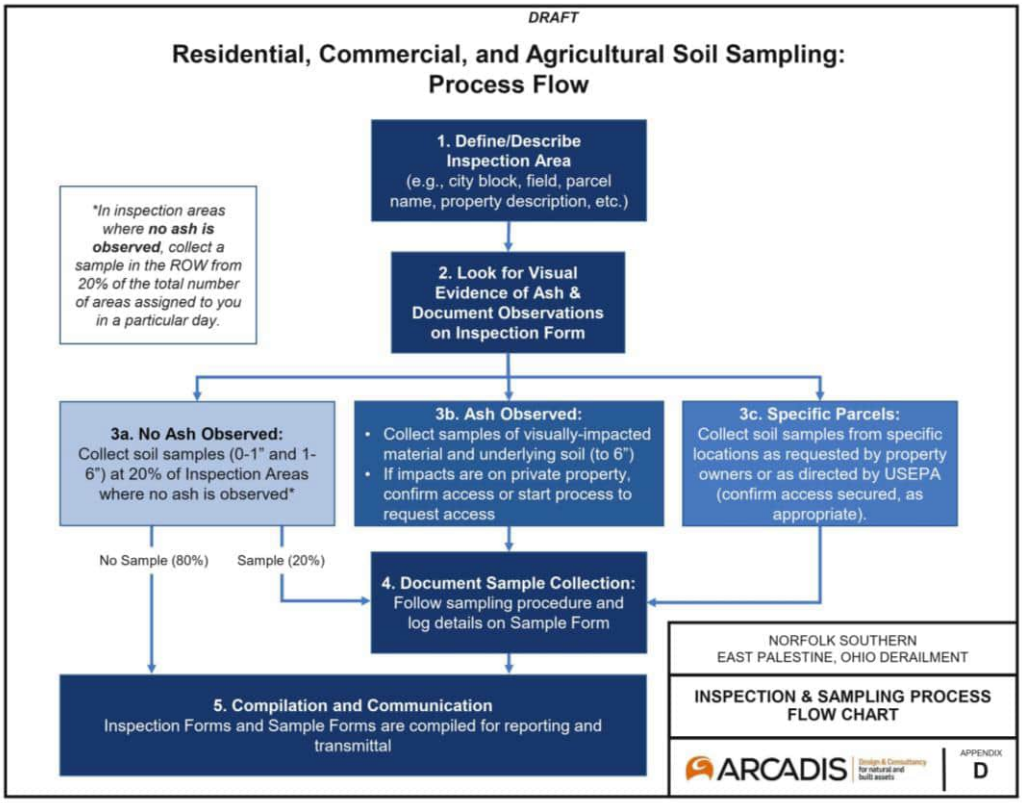


Figure 6-12: Arcadis's Soil Sampling Protocol – Appendix D Figure (Exhibit 36)

Based on a review of these statements and Figure 6-10, one can conclude that over 50% of the soil samples collected will be subsurface samples.

One could have done a series of a few tests to determine the extent to which deposited contaminants had leached downwards into the soil, but it is unlikely in the short-term contaminants would have moved very far. This approach would have defined how far down to sample and likely led to more surface sampling.

This decision to sample deep was also criticized internally at US EPA by Dr. Gullett in a March 6, 2023, e-mail (Exhibit 143) where he stated: "Chlorinated dioxins/furans are virtually insoluble in water. Even if it rained, it'd be extremely unlikely that they'd be in the soil 6" deep (Figure 6-13):

Message

From: Gullett, Brian [Gullett.Brian@epa.gov]
Sent: 3/6/2023 8:58:18 PM
To: Ramaly, Todd (he/him/his) [ramaly.todd@epa.gov]; Spells, Charlene [Spells.Charlene@epa.gov]; Mooney, Charlotte [Mooney.Charlotte@epa.gov]; Linak, Bill [Linak.Bill@epa.gov]; Lemieux, Paul [Lemieux.Paul@epa.gov]
CC: Arrazola, Ignacio [arrazola.ignacio@epa.gov]; Dixit, Naeha [dixit.naeha@epa.gov]
Subject: RE: EPTD site: Confidential: Attorney Work Product/Attorney-Client Privileged Communication

Todd,
Chlorinated dioxins/furans are virtually insoluble in water. Even if it rained, it'd be extremely unlikely that they'd be in the soil 6" deep.
Brian

Brian K. Gullett, Ph.D. (gŭ /'LET/)
Center for Environmental Measurement and Modeling (E343-04)
Office of Research and Development
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711
gullett.brian@epa.gov
919-541-1534 Office
Ex. 6 Personal Privacy (PP) Mobile

Figure 6-13: US EPA March 6, 2023, Internal E-Mail (Exhibits 143) Questioning Sampling to 6"

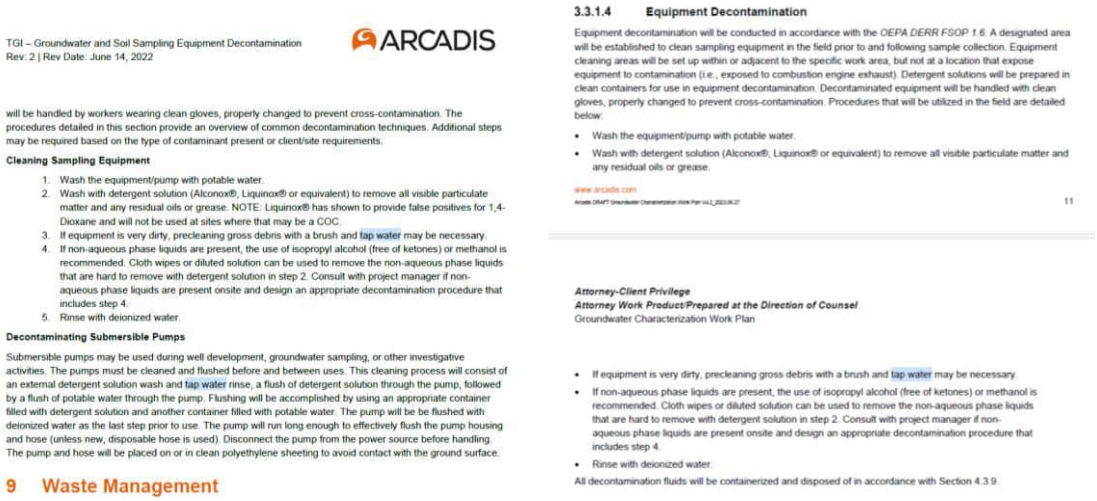
Nevertheless, sampling down to 6" bgs was implemented (see Exhibit 88).

Also, the use of visible ash as an indicator of surface deposition seems flawed as other contaminants other than visible ash likely were deposited during this burn event.

Thus, in my opinion, the soil sampling priorities should have been on surface soil sampling, and in the direction of the winds, following the burn event.

6.3 Arcadis Cleaning Protocol – Use of Tap Water Rather than Distilled Water:

Arcadis, in their sampling protocols, in all but one case, state that tools are to be cleaned using potable water or tap water - Exhibit 36 (see also Exhibit 55, pg. 12 and Section 7.2 - Figure 6-14 and Exhibit 152 – Sampling Equipment, pg. 5 & 7):



TGI – Groundwater and Soil Sampling Equipment Decontamination
Rev: 2 | Rev Date: June 14, 2022

ARCADIS

will be handled by workers wearing clean gloves, properly changed to prevent cross-contamination. The procedures detailed in this section provide an overview of common decontamination techniques. Additional steps may be required based on the type of contaminant present or client/site requirements.

Cleaning Sampling Equipment

1. Wash the equipment/pump with potable water.
2. Wash with detergent solution (Alconox®, Liquinox® or equivalent) to remove all visible particulate matter and any residual oils or grease. NOTE: Liquinox® has shown to provide false positives for 1,4-Dioxane and will not be used at sites where that may be a COC.
3. If equipment is very dirty, precleaning gross debris with a brush and tap water may be necessary.
4. If non-aqueous phase liquids are present, the use of isopropyl alcohol (free of ketones) or methanol is recommended. Cloth wipes or diluted solution can be used to remove the non-aqueous phase liquids that are hard to remove with detergent solution in step 2. Consult with project manager if non-aqueous phase liquids are present onsite and design an appropriate decontamination procedure that includes step 4.
5. Rinse with deionized water.

Decontaminating Submersible Pumps

Submersible pumps may be used during well development, groundwater sampling, or other investigative activities. The pumps must be cleaned and flushed before and between uses. This cleaning process will consist of an external detergent solution wash and tap water rinse, a flush of detergent solution through the pump, followed by a flush of potable water through the pump. Flushing will be accomplished by using an appropriate container filled with detergent solution and another container filled with potable water. The pump will be be flushed with deionized water as the last step prior to use. The pump will run long enough to effectively flush the pump housing and hose (unless new, disposable hose is used). Disconnect the pump from the power source before handling. The pump and hose will be placed on or in clean polyethylene sheeting to avoid contact with the ground surface.

9 Waste Management

3.3.1.4 Equipment Decontamination

Equipment decontamination will be conducted in accordance with the *OEPA DERR FSOP 1.6*. A designated area will be established to clean sampling equipment in the field prior to and following sample collection. Equipment cleaning areas will be set up within or adjacent to the specific work area, but not at a location that expose equipment to contamination (i.e., exposed to combustion engine exhaust). Detergent solutions will be prepared in clean containers for use in equipment decontamination. Decontaminated equipment will be handled with clean gloves, properly changed to prevent cross-contamination. Procedures that will be utilized in the field are detailed below:

- Wash the equipment/pump with potable water.
- Wash with detergent solution (Alconox®, Liquinox® or equivalent) to remove all visible particulate matter and any residual oils or grease.

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Attorney-Client Privilege
Attorney Work Product/Prepared at the Direction of Counsel
Groundwater Characterization Work Plan

- If equipment is very dirty, precleaning gross debris with a brush and tap water may be necessary.
- If non-aqueous phase liquids are present, the use of isopropyl alcohol (free of ketones) or methanol is recommended. Cloth wipes or diluted solution can be used to remove the non-aqueous phase liquids that are hard to remove with detergent solution in step 2. Consult with project manager if non-aqueous phase liquids are present onsite and design an appropriate decontamination procedure that includes step 4.
- Rinse with deionized water.

All decontamination fluids will be containerized and disposed of in accordance with Section 4.3.9.

Figure 6-14: Arcadis's Soil Sampling Protocol – Use Tap Water to Clean Tools (Exhibits 36)

Use of potable, or tap, water cannot be ruled out as being contaminated. If trying to measure contaminants to ppb or less, the samples could be contaminated with the potable or tap water unless one tested these same waters and subtracted out contaminants of concern from these waters in the sample results. Distilled water is a better choice for cleaning sampling equipment.

Oddly, when developing a sampling protocol for PFASs, Arcadis recommends cleaning field equipment, states "b. Rinse two times with distilled water or deionized water" (Exhibit 144, pg. 2). Why the change of protocol just for PFAS sampling is unexplained. Note that Stantec, another contractor, recommend cleaning glassware with distilled water – Exhibit 147, Section 6.1.

6.4 Arcadis/NS Sample Storage Protocol – Placing / Mixing Soils in Plastic Bags & Lack of Sampler's Name on Chain of Custody Forms:

Arcadis/NS, in their report summarizing findings (Exhibit 88) from their March/April 2023 sampling, apparently first places soil samples in plastic bags before placing them in glass sample jars (e.g., Figures 6-15 and 6-16):

Figure 6-15: Arcadis's Soil Sampling Protocol – First, Place Soil Samples in Plastic Bags and then in Glass Jars (Exhibit 88, pgs. 109 and 93)

Figure 6-16: Arcadis's Soil Sampling Protocol – First, Place Soil Samples in Plastic Bags and then in Glass Jars (Exhibit 88, pgs. 130 and 110)

From photos produced throughout Exhibit 88, it appears that soil samples were first placed in plastic bags, and then removed from the plastic bags, and then partially placed in glass containers. This approach using plastic bags for soil samples can be observed in Arcadis' TGI – Soil Drilling and Sample Collection - Rev: #2 Protocol with a revision date of April 8, 2022 (Exhibit 152, pgs. 202-222).

Why this was done is not known; Eurofins always provided glass sample jars for SVOC and dioxin/furan samples based on my experience when sampling in East Palestine, OH.

Based on my own experience, this use of plastic bags may be a holdover when collecting soil boring samples for VOCs from petroleum contaminated (e.g., UST sites). This is done to allow the vapors to fill the vapor space in a plastic bag and then to sample for VOCs using a PID for total hydrocarbons. Samples are typically placed in bags for each 2-foot boring increment and the two highest PID VOC bags are sent in for analysis.

A review of Arcadis's sampling plan guidance, before and after this period, shows a confusing array of recommendations and tends to support the fact they were using a sampling method with plastic bags for SVOCs rather than for VOCs:

Arcadis / Norfolk Southern soil sampling plans, in order of issuance, are listed, and pertinent language provided, below:

A. March 6, 2023 (Exhibit 165): This plan delineates between plastic bags being used for PID/VOC sampling vs. lab jars being used for soil. In section 4.1 number 7 it states: "***Collect soil samples at appropriate intervals and transfer to the appropriate laboratory-supplied containers.***" In section 4.1 number 8 it states: "***Collect representative portions of each sampling interval into Ziplock bags and screen the soil using a photo-ionization detector (PID) equipped with a 10.6 eV lamp. Record PID readings."***

B. September 7, 2023 (Exhibit 76): Section 6 c it states: **"*Following soil description, the soil sample will be containerized in laboratory supplied, methodology compliant laboratory bottles/jars.*"**– and there is no mention of plastic bags or PID's.

C. October 22, 2024 (Exhibit 88): Under Section 4.1 number 7, the plan states: "***Collect soil from the designated vertical interval of the shallow boring created at the selected soil sampling location, and place into a Ziploc bag (or similar bag). Screen the soil using a photo-ionization detector (PID) equipped with a 10.6 electron volt lamp. Record PID readings. Homogenize the soil sample, then transfer to the appropriate laboratory-supplied containers."***

[Note: The March 6, 2023 Sampling Plan would have been the Arcadis/NS Sampling Plan in place during the March 2023 sampling illustrated in Figures 6-15 & 6-16. Thus, the collected samples were not placed in "*appropriate laboratory-supplied containers" which for SVOC soil samples would have been glass containers. But instead, they were first placed in plastic bags. Regardless, the language used over time is inconsistent and confusing. This process of first placing SVOC samples (including dioxins) in plastic bags has at least two critical flaws as detailed below:*]

1. The Chains of Custody do not reflect the samples first being placed in plastic bags rather than the Eurofin's supplied glass containers. Thus, the lab has no way of knowing the samples were in plastic bags before being placed in their containers. This is critical since the lab often will warn the sampler of problems (e.g., temperature, fully filled container, etc.) with their process during sample intake. This feedback loop between the sampler and the lab is broken since the lab never knows about possible impacts to the sample being placed in plastic before it was placed in their container.

2. Placing SVOC soil samples in plastic bags has the potential for soil spoilation when measuring for dioxins in ppt either from leaching from the plastic or absorption of contaminant into the plastic. This is why an inert material such as glass is the recommended container to be used for soil samples from Eurofins, and other labs, for these samples. In fact, SVOC soil sampling guidance found on the NIEHS (National Institute of Environmental Health Sciences) NIH (National Institute of Health) web portal (Exhibit 166) recommends against the use of plastic when sampling soils for SVOCs:

   1.0 Considerations:

   1.1 Potential sources of SVOC cross-contamination in the typical sampling environment include water used during drilling or decontamination, materials used within the sampling environment, sampling equipment, field clothing and personal protective equipment (PPE), and the environment itself. Wash hands thoroughly before sampling.

   1.2 All samples must be clearly labeled by site, number of sample, and status as field blank (FB) or lab blank (LB).

   1.3 ***To ensure sample integrity, it is required that an accurate written record (chain-of custody) be available to trace the possession and handling of samples <u>from the moment of collection</u> through analysis and final disposition***.

   1.4 When collecting samples for SVOC analysis, avoid contact with the following items prior to collecting samples:

1.4.1 Any product made from plastic

1.4.2 Any petroleum based product

1.5 *Containers that ARE acceptable for sample collection include:*

- *Pre-cleaned certified glass containers (amber bottles are preferred)*
- Cleaned per EPA guidelines for semi-volatiles, pesticides, PCBs
- With polypropylene cap with PTFE faced foamed polyethylene liner

1.6 ***Containers that are NOT acceptable for sample collection include:***

1.6.1 ***Plastic containers.***

It is my opinion, based on this guidance, and from my experience sampling SVOCs (relatively non-volatile samples), that the use of plastic bags by Arcadis/NS for collecting soil samples, should not have occurred. One cannot trust the sample results unless the impact of plastic on the sample results is known because the plastic could potentially either absorb some of the contaminants in the sample or contribute plasticizers to the sample itself. Further, nothing in the chain-of-custody documents suggests Arcadis/NS alerted that lab (i.e., Eurofins) that the samples were first placed in plastic bags when collected, or that the effects of the plastic bags on the samples were factored. Thus, the chain of custody was broken and incomplete for these samples.

6.5 Arcadis/NS Sample Chain of Custody Forms – No Sampler Listed – Broken CoC:

In their October 22, 2024 NS/Arcadis Report, Phase I – Residential, Commercial/Agricultural Soil Sampling Report - Revision 3 (Exhibit 88), about half of the Chain of Custody forms listed in the report do not list the name of the sampler (see examples without, and with, samplers listed in Exhibits 167 and 168). Examples of CoC's with no sampler listed (see Exhibit 167 for 14 examples) are illustrated from Exhibit 88 in Figure 6-17 to 6-18):

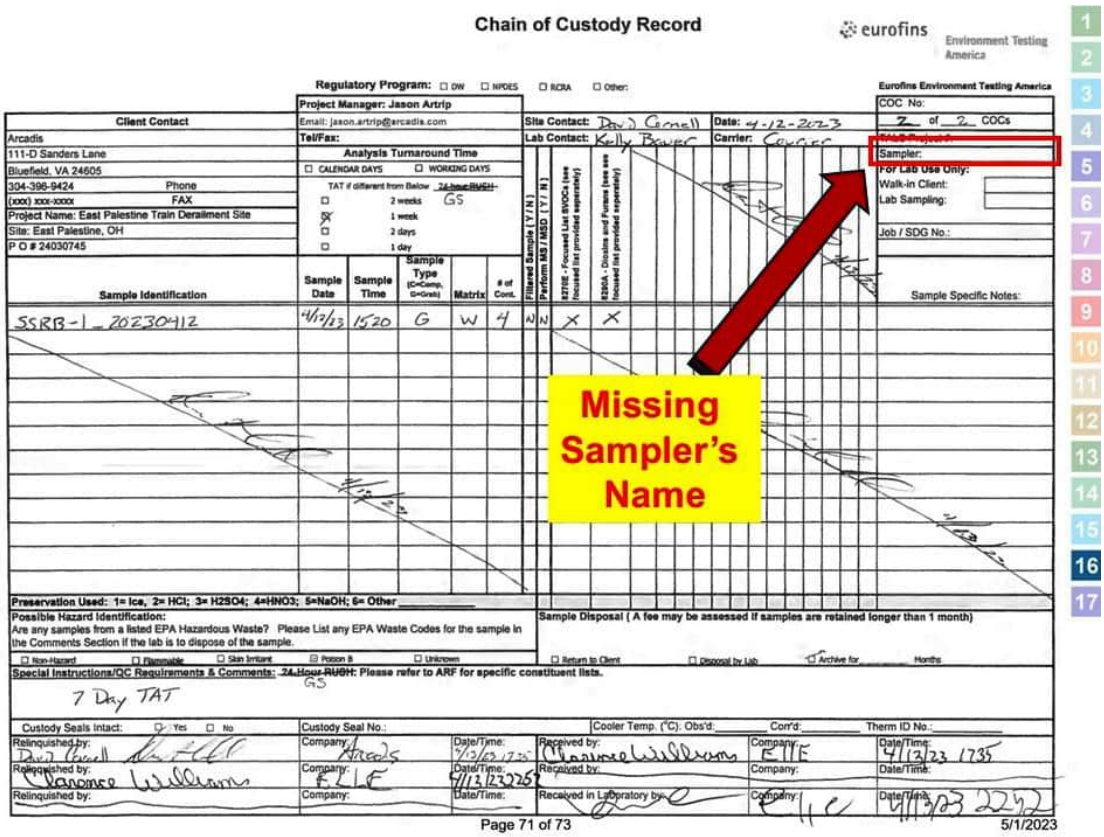


Figure 6-17: Arcadis's CoC – No Sampler is Listed

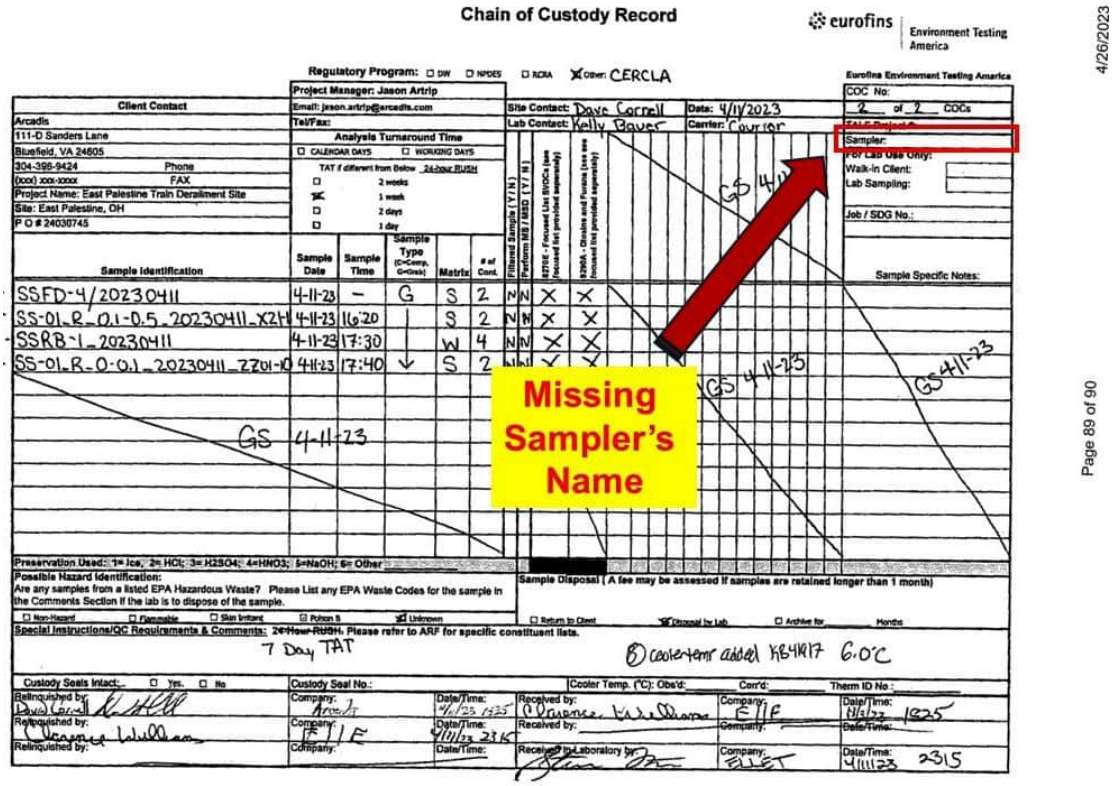


Figure 6-18: Arcadis's CoC – No Sampler is Listed

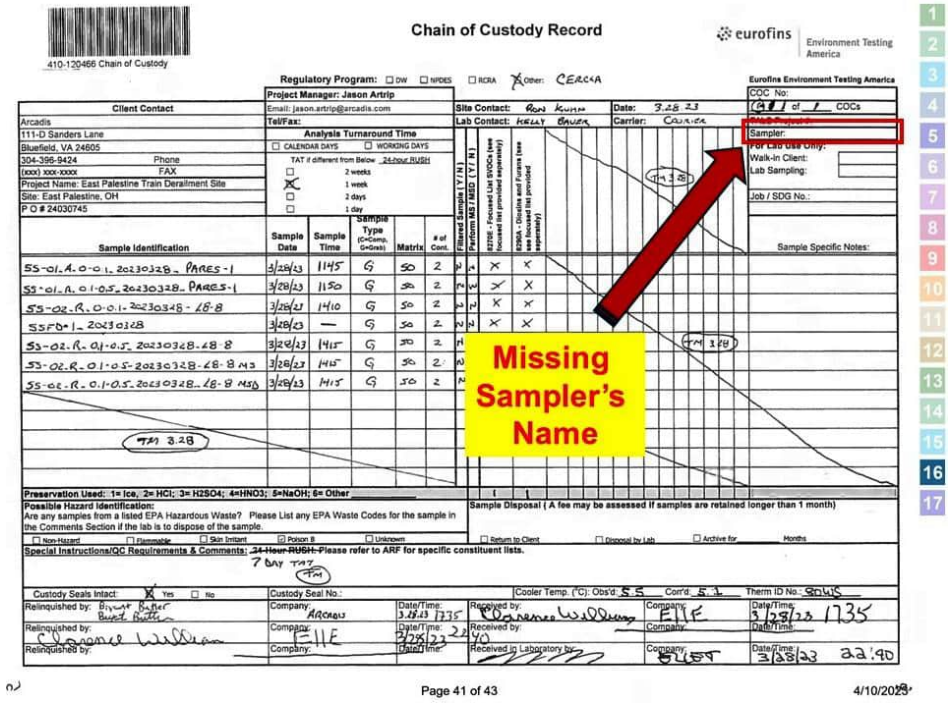


Figure 6-19: Arcadis's CoC – No Sampler is Listed

An example from Exhibit 168 where the sampler is listed is shown in Figure 6-20:

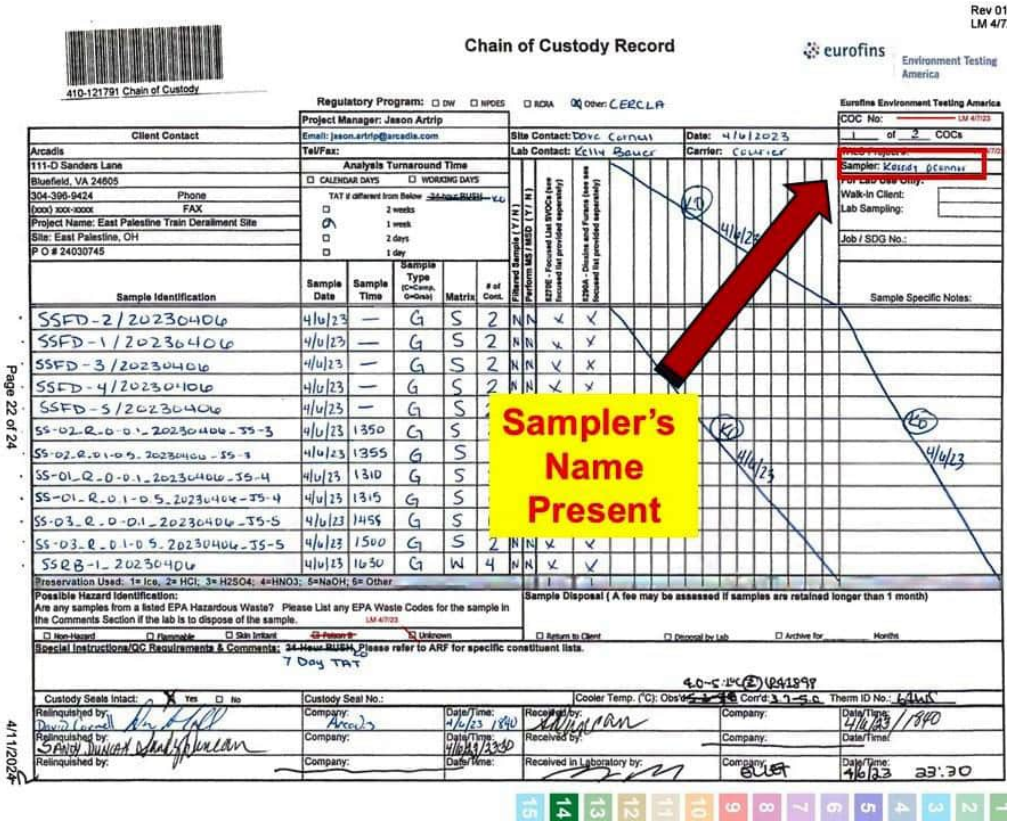


Figure 6-20: Arcadis's CoC – Sampler is Listed

Note that from the examples listed in Figures 6-17 through 6-19 where no sampler's name is provided, one cannot know who sampled, what were their qualifications and most importantly know the individual sampler so they might be questioned as to how they took, sampled, stored and/or processed any given sample before it was released to the lab (i.e., Eurofins) for analyses. Again, this calls into question the validity of the Arcadis/NS samples and their results.

Even in Figure 6-20, where the sampler is named, that person is different from the initially listed person on the bottom of the CoC signature block. Technically this is a break in the Chain of Custody as well.

7.0 CRITICISMS OF ARCADIS' DELINEATION REPORT (EXHIBIT 60):

Initially, it should be noted that it appears NS/Arcadis only request Level 2 (vs Level 4) reports for both their Phase I sampling reporting (Exhibit 88) and their Delineation sampling reporting (Exhibit 60). This affects one's ability to use sample data falling between the RL and MDL and negatively affects ones ability to report values at these levels that would be above EPA RSLs. The effect of this is that values between the RL and MDL are often set by the laboratory reviewer at the RL rather than the actual value.

Note that this delineation report does not address collateral contamination from collection, loading, and transportation of contaminated soils and waters from the site. As early as November 13, 2023, 16,070 loads of soils totaling 174,857 tons of soils had been removed from the site (Exhibit 154 – day 294). In addition, 564,070 gallons of contaminated water had been collected in six tanks.

Nevertheless, as illustrated in this section, NS and Arcadis essentially argue that any contamination found at the CeramFab site is either i) de-minimus, or ii) from other pre-derailment sources. This argument is despite multiple pathways for contamination to reach the facility in their August 29, 2023, report (Exhibit 152) entitled "Characterization Work Plan for Derailment – Area Soil" (Figures 7-1 through 7-3):

4.4 Vapor Intrusion Assessment

Based on reported odors in the Strohecker and CeramFab buildings, ambient air, indoor air, and sub-slab vapor sampling will be conducted under this Plan for these buildings. Sampling will also be conducted at Brave Industries and US Stoneware, north of the mainlines. If through the subsurface conveyance work additional vapor intrusion evaluation needs are identified, additional buildings may be addressed through a similar process following discussion with the regulatory stakeholders. The following tasks will be completed:

Figure 7-1: Section 4.4 – Odor Reports in the Building (Exhibit 152, pg. 20

Area	Description and History	Known Features	Investigation Questions[3]	Analytes for Sampling
CATEGORY 1 Areas likely impacted by the derailment and removal action is required. Initial removal of impacted soil will occur along with the Appendix D – Main Line Interim Soil Removal Plan or at the direction of on-site operational personnel				
Car Scrapping 3 (Figure 3)	Area was used for car scrapping following the derailment. Area has been expanded to include the excavated outline of the Burn Pits along the area between the burn pits. Northern side of area was used for waste soil stockpiling. Zoning: Industrial and Other Industrial (unoccupied)	North of tracks. Topography falls south to the tracks and west to Brave Industries. The north is bound by a ditch that runs between the Area and a pond. The ditch is now dry but previously conveyed water from the wetlands to the east into the North Ditch. Perched groundwater is known present with a thickness of approximately 2-3 feet above the till based on one soil boring in the area.	Post excavation: Do residual materials remain in soils below the initial investigation because of the car scrapping activities and burn pit? Refer to Underground Features in Category 2 for additional investigation.	Post Excavation: VOC SVOC PFAS No dioxins/furans - surficial as soil has been or will be removed under Appendix D work.[1]
Car Scrapping 4 (Figure 4)	Area was used for car scrapping following the derailment. Use during the source removal included waste storage pending transport, truck washing, truck covering, material staging, and support zones. Zoning: Industrial and Open	South of tracks. Surface flow prior to derailment appeared to be northward toward the track and west toward the CeramFab building. A water drainage feature referred to as the "crock" exists in the southwestern portion of this area. During the waste storage period, a ditch was constructed on the western boundary near the CeramFab building in a location where a buried corrugated steel pipe and catch basins conveyed water to the South Ditch. The catch basin system in CeramFab also conveyed roof drainage, basement sump drainage, and parking area drainage south of CeramFab building. Perched groundwater is known present with a thickness that varies from east to west.	Post excavation: Do residual materials remain in soils below the initial investigation because of the car scrapping/waste storage activities? Refer to Underground Features in Category 2 for additional investigation.	Post Excavation: VOC SVOC PFAS No dioxins/furans - surficial soil has been or will be removed under Appendix D work.[1]
Ditch East of Car Scrapping 4 (Figure 5)	Firefighting water and released commodities collected in portions of this ditch during the initial response. Zoning: NS ROW	Immediately south of tracks. Surface flow is into the ditch, with the ditch flowing to the west.	Post excavation: Do residual materials remain in soils because of activities?	Post Excavation: VOC SVOC PFAS No dioxins/furans - surficial soil has been or will be removed under Appendix D work.[1]
South Ditch (east of Pleasant) (Figure 6	Area conveyed flow of materials during the derailment. Following the derailment, the ditch may also have carried contact stormwater and perched groundwater. Zoning: NS Right-Of-Way (ROW), Industrial Warehouse, Other Industrial Structures, and Medium Manufacturing and Assembly	Immediately south of tracks. Topography falls from surrounding areas into the South Ditch, with the ditch flowing to the west. Some known piping north of the CeramFab building that may have conveyed roof drainage into the ditch. Current piping installed to temporarily transport "crock" water to the wastewater treatment plant (WWTP) also flows through this ditch.	Post excavation: Do residual materials remain in soils below the initial investigation because of the activities? Refer to Underground Features in Category 2 for additional investigation.	Post Excavation: VOC SVOC PFAS No dioxins/furans-surficial soil has been or will be removed under Appendix D work.[1]
South Ditch	Area conveyed flow of materials during	Immediately south of tracks	Post excavation: Do residual materials	Post Excavation:

Figure 7-2: CATEGORY 1 Areas likely impacted by the derailment and removal action is required. Initial removal of impacted soil will occur along with the Appendix D – Main Line Interim Soil Removal Plan or at the direction of on-site operational personnel (Exhibit 152, pg. 42)

Area	Description and History	Features	Investigation Questions	Analytes for Sampling
CATEGORY 2: These areas may have been impacted by the derailment and immediate response				
Wetland Phase 1 (Figure 23)	Infrared imagery from Ohio state police helicopter reportedly showed warm area in wetland during response. Ohio EPA requested assessment of this area as a result. Initial approach is to assess surface soil near wetland boundary for signs of impact. May be appropriate to integrate with sediment sampling work plan. Zoning: Industrial	Potential flow from derailment site to the northeast overland to wetland. Wetland also connects under tracks near state line to south ditch. Wetland area is part of a general topographic high near the state line and a hydrologic divide (i.e., eastern end of the East Palestine valley area).	Are there indications of unacceptable risks to human health or ecological receptors in the wetland area? Is further investigation of the wetland area warranted?	VOC SVOC No PFAS[2] Dioxins/furans
Underground Features (Figure 24)	Underground features have been identified as part of response activities and potential unknown subsurface features may be present. Known features are summarized herein.	Other Areas: Areas that generally originate from the Category 1 areas or areas with reported building odors will be the initial focus of the investigation. Where known; they are summarized below.	Other: Are there additional unknown potential subsurface features that could have conveyed impacted fluids to other areas?	VOC SVOC PFAS No dioxins/furans, as this work targets subsurface features and subsurface transport of dioxins/furans in soil is expected to be minimal, if any. Vapor Intrusion sampling will be performed in areas where the subsurface sampling, surface sampling, and conveyance piping evaluation indicate VI sampling is appropriate.
	CeramFab: Surface drainage from the south of CeramFab (coming off Taggart Street and parking lot) is conveyed to catch basins and through below grade stormwater piping to the South Ditch (through the Car Scrapping 2 area). A foundation sump on the eastern end of the building conveyed water out of the eastern wall of CeramFab and into a stormwater pipe that flowed around the north side of CeramFab and into South Ditch. Roof drains also are connected to this system.	CeramFab: Closed RCRA site where welded finish steel products and metal plating occurs. Flow from the parking lot piping is believed to be to the north and west based on catch basin monitoring during the early response. Surface soil is not expected to be impacted on this property.	CeramFab known network: Is the condition of this piping essentially intact such that if product or impacted water was encountered it was contained?	
	Car Scrapping 4: A portion of the CeramFab catch basin and conveyance system was removed and replaced with a ditch to help manage perched water from the Car Scrapping 4 area.	Car Scrapping 4: Includes the portion of the removed CeramFab catch basin system and abuts to the CeramFab building. The "crock" in this area has been piped to a ditch east of CeramFab which drains to the South Ditch. Before response efforts the crock was piped to the CeramFab piping network.	Car Scrapping 4: Do the conveyances from this area have the potential to have impacted other areas?	
	South Ditch East of Pleasant: Conveyances that lie to the north and south of CeramFab converge at a manhole on the eastern extent of this area. The water conveyed though these conveyances drain into South Ditch. The western terminus of this area is a clay pipe that flows under Pleasant Drive.	South Ditch East of Pleasant: The existing piping in this area is to be removed as part of the South Ditch removal.	South Ditch East of Pleasant: Do the conveyances or utilities from this area have the potential to have impacted other areas, including any vapor in buildings?	

Figure 7-3: CATEGORY 2: These areas may have been impacted by the derailment and immediate response (Exhibit 152, pg. 45)

Specific criticisms of NS/Arcadis' CeramFab July 17, 2025 Delineation Report (Exhibit 60 and Exhibits 60-1 through 60-6) making such claims that the derailment was not likely the source of contaminant on the CeramFab site, follows:

7.1 Proximity of Derailment and Initial NS Dioxin Results:

Aerial maps following the derailment illustrate just how close (feet) the derailment and spilled cleaned-up materials were to the Plaintiffs properties (Figures 7-4 and 7-5):

Figure 7-4: Petty Drawing of Derailment Area and Plaintiff Properties: WYG – 193 N. James St. & CeramFab Building – 900 E Taggart St, East Palestine, OH

Figure 7-5: Train Derailment to NE of CeramFab Building (Blue with White Roofing) – 900 E Taggart St, East Palestine, OH (Exhibit 43, Figure 1-1)

As illustrated later in this Section, Arcadis argues that pollutants would not have impacted this building. However, as shown in Figure 7-6, the local groundwater flow is

to the west/southwest or toward/under the CeramFab building from the major derailment/clean-up areas (see also Exhibit 151, Figures 1, 4-6):

Figure 7-6: Arcadis Drawing of Derailment Area Groundwater Flow Direction to SW (see lower left) (Exhibit 55)

Thus, released contaminants to the north and east would likely flow toward the Plaintiff's buildings.

Early Dioxin Results:

NS/Arcadis apparently took some dioxin measurements early on at/near the derailment on soil stacks, but at relatively low rates after March 16, 2023 (Figure 7-7):

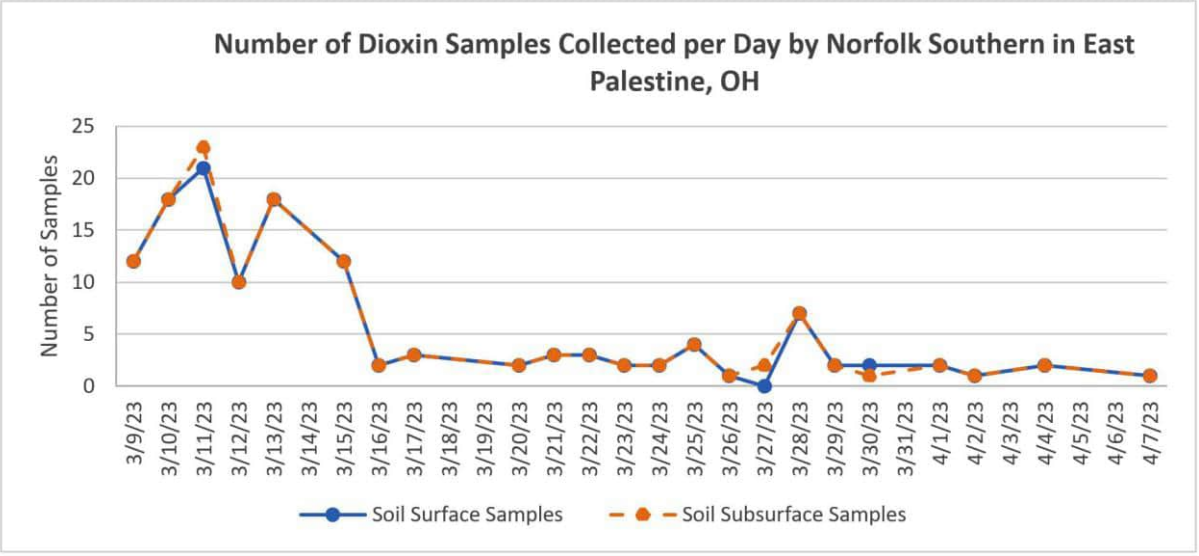


Figure 7-7: N-S/Arcadis Dioxin Sampling Rates in East Palestine, OH with Time (Exhibit 74)

A single sample appears to have been reported in the delineation report (Exhibit 60) and is discussed later in Section 7-5.

The Arcadis dioxin results from seven (7) dioxin composite samples from excavated and stockpiled soils samples contained in their April 18, 2023, Waste Management Plan report (Exhibit 53; for first sample, see also Exhibit 82) were as follows.

- WC-WS1-COMP (A1-A5)
- WC-WS2-COMP (01-07)
- WC-WS2-COMP (08-14)
- WC-WS1-COMP (B1-B5)
- WC-WS-NORTH-COMP (1-5)
- WC-TW-COMP (TW-6 to TW-10)
- WC-S. TRACK- SP2-COMP 06-10.

Exactly where these samples were taken is not provided in the report, but approximate areas for stockpiles 1 and 2 can be estimated from Figures 7-8 to 7-10:

Figure 7-8: Excavations Areas 1 and 2 in East Palestine, OH (Exhibit 53)

Figure 7-9: Locations of Waste Staging Piles 1 through 4 in East Palestine, OH (Exhibit 53)

Figure 7-10: NS/Arcadis Proposed Sampling Locations in Area 1 and Area 2 Waste Staging Piles (Exhibit 53)

7.2 Benzene/VOC Data:

NS and Arcadis took numerous samples for VOCs, including benzene, but concluded that the benzene found beneath and in the CeramFab building was from sources other than the train derailment (Exhibit 2). Arcadis makes the following statements in their June 17, 2025 Delineation Memo Report (Exhibit 60) regarding benzene contamination at CeramFab (Exhibit 2, pg. 3, Bates NS-CeramFab000976-977):

> "*Benzene concentrations exceeded the VISL [vapor intrusion screening level] at one interior air location in the northeast corner of the building, CER-IA-13, collected during the third sampling event* (but was not detected in the second sampling event, detected less than the VISL during the first and fourth sampling events, and was less than the VISL in the paired sub-slab location during the first sampling event). *Benzene was also above VISL at four sub-slab soil gas locations spread across the building: CER-SS-03 and CER-SS-14, collected during the second event; and CERSS-09 and CER-SS-11, collected during the first, third, and fourth events (but was not detected greater than the VISL in the paired indoor air locations).* ***Given that the benzene exceedances in sub-slab soil gas are isolated, they are likely not associated with derailment activities. Benzene concentrations in ambient samples were below the benzene VISL during all four events***
>
> ***The chemical inventory (also provided in Attachment 4) completed during the sampling events and the active, industrial nature of the facility indicate that the benzene VISL exceedances in air are associated with background sources. Benzene and/or benzene derivatives are a component of numerous products identified within the facility during each of the four sampling events such as hydraulic oil, lubricant, coolant, brake cleaner, paint, and mineral spirits*** (Arcadis 2024j, 2024s, 2024dd, and 2024gg)."

There is also a suggestion from information presented in the report that contamination may be from the Leake Oil property (Footnote 1 on Bates NS-CeramFab000972 & NS-CeramFab000979):

> "[1] The CROCK was an existing subsurface drainage that operated to prevent flooding on the Leake Oil property east of CeramFab. The drainage from the CROCK was directed to the South Ditch. Note that this discharge was in existence prior to the derailment. During the response, the water was directed to the water treatment system until its discharge back to the South Ditch was approved by Ohio Environmental Protection Agency."
>
> "Land Use: The CeramFab Area lies between the railroad tracks immediately to the north and Taggart Street immediately to the south and extends from the Leake Oil West Area on the east to N. Pleasant Drive on the west."

It should be noted that it is my opinion, based on the following responses, that Arcadis's claim that benzene observed in the subsurface and inside the CeramFab building is not from the derailment is almost pure speculation with little apparent effort to perform basic homework on their alternative claims for the source(s) of the benzene observed. My responses follow:

7.2.1 Response #1 – Arcadis' Claim that Benzene Present in the Subsurface and Inside Building is Due to the "Industrial Nature" of the Facility:

In reviewing the report, one cannot determine what Arcadis meant by "Industrial Nature" of the facility as it relates to benzene. Fundamentally, the facility makes ceramic items and ceramics are not known to contain benzene. This statement appears to be a proverbial "throw away" statement with no supporting evidence leading one to conclude at best it is a speculative statement and at worse simply false. Defendants' speculative arguments are also directly refuted by the testimony of Kevin Smith, a former general manager at CeramFab, who testified (Exhibit 157) that "we work with all nonhazardous materials there." Mr. Smith also testified that they worked with no vinyl chloride, benzene, hydrocarbons, aldehydes, or dioxins at CeramFab. (February 26, 2026, Deposition of Kevin Smith – pgs./lines: 162:10-163:8):

Exhibit 157 – February Deposition of Kevin Smith (pgs. 162-163):

Q. *Were you aware of any Benzene on the property prior to the derailment?*
A. ***No.***

Q. Were you aware of any – *were you aware of any materials that you worked with at the facility involving Benzene*?
A. ***No. We work with all nonhazardous materials there***.

Q. That was going to be my next question. *Were you aware of any hazardous materials you worked with?*
A. ***No.***

Q. *Did you work with any hazardous materials?*
A. ***No.***

Q. *Were you aware of any vinyl chloride that was being used in the building prior to the derailment?*
A. ***No.***

Q. *Were you aware of any aldehydes that you were working with –*
A. ***No.***
Q. *-- prior to the derailment?*

Q. *Were you aware of any dioxins on or around the property prior to the derailment?*
A. ***No.***

As shown from his deposition testimony, Mr. Smith, who was the General Manager at the CeramFab facility was not aware of any historical presence of benzene, vinyl chloride, aldehydes, or dioxins; any hazardous materials despite NS/Arcadis claims these contaminants were from sources other than the derailment.

7.2.2 Response #2 – Arcadis' Claim that Benzene Present in the Subsurface and Inside Building is Due to an Inventory of Products Found in the Building (e.g., such as hydraulic oil, lubricant, coolant, brake cleaner, paint, and mineral spirits):

In reviewing the report, one cannot find what efforts Arcadis made to determine if any of these mentioned products contain benzene. A basic step would have been to pull the Material Safety Data Sheets (MSDSs) or the Safety Data Sheets (SDSs) required for usage after July 2015 and review the ingredients for benzene. No evidence suggests that this simple effort was ever completed. In fact, none of the SDSs provided (Exhibit 100; see Extractions in Appendix C) are associated with products identified in this building and NS has admitted they do not have any CeramFab product SDSs (Exhibit 102; see also Exhibit 100). And despite the 30(b)(6) representative, Justin Gaudi, testifying that the normal "procedure" is to pull SDSs (March 5, 2026, Deposition of Justin Gaudi 95:5-95:23, 102:10-102:13), he could not see where any were included in the delineation memorandum (Id. at 99:3-99:12), he was not sure where they would have been saved (Id. at 99:13-99:24), but that if any SDS of this type that was pulled, then it would have been provided to NS (99:25-103:15). However, NS's counsel later confirmed that no such SDS reports exist within NS' possession (Exhibit 102). This casts serious doubt on whether the SDSs described were pulled at all when Arcadis was making these alternative source arguments.

As an expert who has completed upwards of ~200 benzene cases and reviewed the benzene content of hundreds of products over the past 25 years, I am not aware of benzene ever being present in hydraulic oil, lubricants, or coolant. If the paint was a water-based latex paint, it would not contain benzene. Benzene levels in the remaining products, if any, would be at very low levels as contaminants in other ingredients (e.g., toluene).

Moreover, since the products are in containers, some exposure (i.e., usage) analysis would need to be completed to show presence of benzene from these products in the building (assuming benzene were even in the named products). No such analyses could be identified in this Arcadis delineation report, and no testing was ever conducted on the benzene samples found to determine if it matched the alleged alternative sources Arcadis argued.

Again, this statement argument as a basis for benzene in/under the building does not appear to be supported by basic homework and analysis leading one to conclude that it is, at best, a highly speculative statement and, at worse, simply false.

7.2.3 Response #3 – Arcadis' Suggestion that Benzene in Subsurface and Inside Building is from the Leake Oil Site:

The Arcadis delineation report suggests that the benzene found might also be from the Leake Oil site. Yet again, basic homework, and the requisite scientific rigor needed to make such a claim, was not completed to effectively rule this in, or out.

In early 2023, I reviewed/wrote to the Ohio Department of Commerce BUSTR (Bureau of Underground Storage Regulations to investigate whether or not past leaks from leaking/removed USTs might be a source of BTEX (benzene, toluene, ethylbenzene and toluene), gasoline or diesel at/near the derailment site. This effort consisted of the following steps:

- Researching the BUSTR statewide database to identify any files for Columbiana County where East Palestine is located.
- Reduce the list to those sites in/near East Palestine, OH (Exhibit 65).
- Plot identified sites on a map (Exhibit 66).
- Pull available files from BUSTR (Exhibits 48-49) where available and write BUSTR for copies of files not readily available (Exhibits 62-64) which they provided.

The listing of sites identified in East Palestine, OH, site files requested from BUSTR, and a plot of those sites, are provided in Tables 7-1 and 7-2 and Figure 7-11, below (from Exhibits 65 and 66):

Table 7-1 – BUSTR Sites in East Palestine (Exhibit 65)

FACILITY NAME	FACILITY ADDRESS	LATITUDE	LONGITUDE
ASTRA RENTAL CENTER	300 S MARKET ST	40.82847	-80.5396
BLOSCO IRON & STEEL INC	1000 E TAGGART ST	40.83479	-80.5253
BOTT FORD-MERCURY, INC.	79 W CLARK ST	40.83596	-80.5409
CERTIFIED OIL CO. #335	15 MARKET ST	40.8399	-80.5441
CIRCLE K #5232	190 N MARKET ST	40.83507	-80.5396
CIRCLE K #5232	190 N MARKET ST	40.83507	-80.5396
CIRCLE K #5232	190 N MARKET ST	40.83507	-80.5396
CITY OF EAST PALESTINE	75 E MAIN ST	40.83246	-80.5384
CLOSED SERVICE STATION	77 E TAGGART ST	40.83506	-80.5382
COLUMBIANA COACH LINES, INC.	101 Thomas St.	40.83413	-80.5455
COLUMBIANA COACH LINES, INC.	101 Thomas St.	40.83413	-80.5455
E PALESTINE CITY GARAGE	90 VINE ST	40.83384	-80.5477
EAST PALESTINE CITY SCHOOLS	360 W GRANT ST	40.8393	-80.5461
EAST PALESTINE MARATHON	212 N MARKET ST	40.83545	-80.5397

FACILITY NAME	FACILITY ADDRESS	LATITUDE	LONGITUDE
EAST PALESTINE MARATHON	212 N MARKET ST	40.83545	-80.5397
FORMER TRIPLE L TRUCKING CO., INC.	448 E TAGGART ST	40.83464	-80.5315
FORMER TRIPLE L TRUCKING CO., INC.	448 E TAGGART ST	40.83464	-80.5315
IEROPOLI LAUNDRY MAT	54 E REBECCA ST	40.83434	-80.5389
INSUL CO. INC.	1517 PARK AVE	40.8399	-80.5441
LEAKE OIL CO., INC.	1020 E TAGGART ST	40.8352	-80.5213
LEAKE OIL CO., INC.	1020 E TAGGART ST	40.8352	-80.5213
LEAKE OPIL INC #2	268 N MARKET ST	40.83617	-80.5399
LEAKE OPIL INC #2	268 N MARKET ST	40.83617	-80.5399
LEAKE OPIL INC #2	268 N MARKET ST	40.83617	-80.5399
LEAKE SERVICE CENTER	723 BACON AVE	40.83316	-80.5523
PARKSIDE RESTURANT	333 W MAIN ST	40.83266	-80.5458
TOM'S WHOLESALE TIRES	66 E MAIN ST	40.83273	-80.5388

Table 7-2 – BUSTR File Request Sites in East Palestine (Exhibit 65)

County	Release #	Facility Name	Facility Address	Facility City	Facility State	Facility Zip	LTF Status	FRStatus	Release Date	Facility Status	Priority	Review Date	Class	Latitude	Longitude
Columbiana	15000129-N00001	CIRCLE K #5232	190 N MARKET ST	EAST PALESTINE	OH	44413	1 SUS/CON from regulated UST	DIS: a release is disproved	7/1/1996	Inactive	2	6/4/2002	D	40.83507	-80.5396
Columbiana	15000129-N00002	CIRCLE K #5232	190 N MARKET ST	EAST PALESTINE	OH	44413	6 Closure of regulated UST	NFA: No Further Action	9/1/2005	Inactive		10/5/2005	D	40.83507	-80.5396
Columbiana	15000129-N00003	CIRCLE K #5232	190 N MARKET ST	EAST PALESTINE	OH	44413	6 Closure of regulated UST	NFA: No Further Action	1/27/2022	Inactive		5/13/2022	D	40.83507	-80.5396
Columbiana	15000113-N00001	FORMER TRIPLE L TRUCKING CO., INC.	448 E TAGGART ST	EAST PALESTINE	OH	44413	1 SUS/CON from regulated UST	NFA: No Further Action	9/30/1994	Inactive	2	8/20/1996	D	40.83464	-80.5315
Columbiana	15000113-N00002	FORMER TRIPLE L TRUCKING CO., INC.	448 E TAGGART ST	EAST PALESTINE	OH	44413	1 SUS/CON from regulated UST	T1S: Tier 1 Source Investigation	4/13/2023	Active	2	5/8/2023	A	40.83464	-80.5315
Columbiana	15008549-N00001	SWIFT MART INC	50023 ST RT 14	EAST PALESTINE	OH	44413	1 SUS/CON from regulated UST	TR1: T1S Required (Prior SB/MW Installed)	10/8/1992	Active	2	4/22/2022	E	40.86411	-80.556
Columbiana	15008549-N00002	SWIFT MART INC	50023 ST RT 14	EAST PALESTINE	OH	44413	1 SUS/CON from regulated UST	T2E: Tier 2 Evaluation	3/7/2018	Active	2	1/17/2023	D	40.86411	-80.556
Columbiana	15008549-N00003	SWIFT MART INC	50023 ST RT 14	EAST PALESTINE	OH	44413	6 Closure of regulated UST	NFA: No Further Action	7/12/2021	Inactive	2	11/30/2021	D	40.86411	-80.556

Note that the Leake Oil reports were pulled separately (Exhibits 45-46).

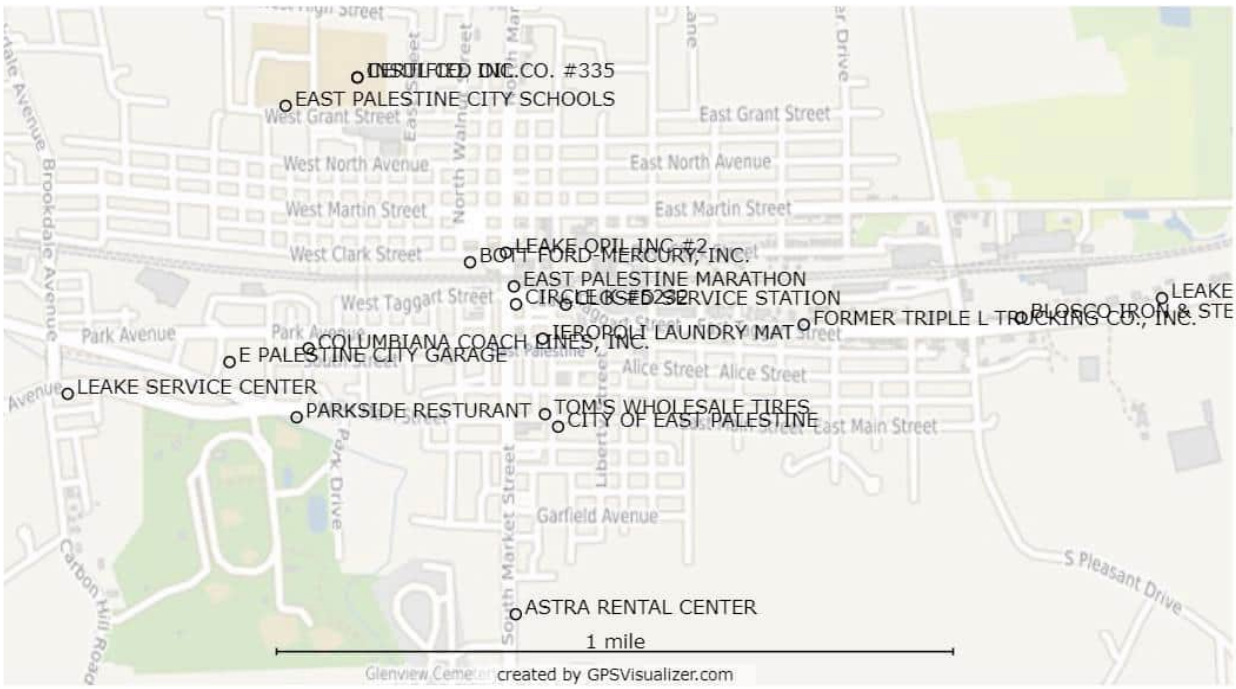


Figure 7-11: BUSTR UST Sites in/near East Palestine, OH (Exhibit 66)

The 1020 E Taggart Leake site appeared to be the only site that was up-gradient (above the direction of groundwater flow) from CeramFab building. A review of the 1995 and 1998 1020 E Taggart Leake Oil BUSTR file reports showed no detectable chemical limits in the soil or groundwater (Figure 7-12) and the fact that the tanks were in yellow clay.

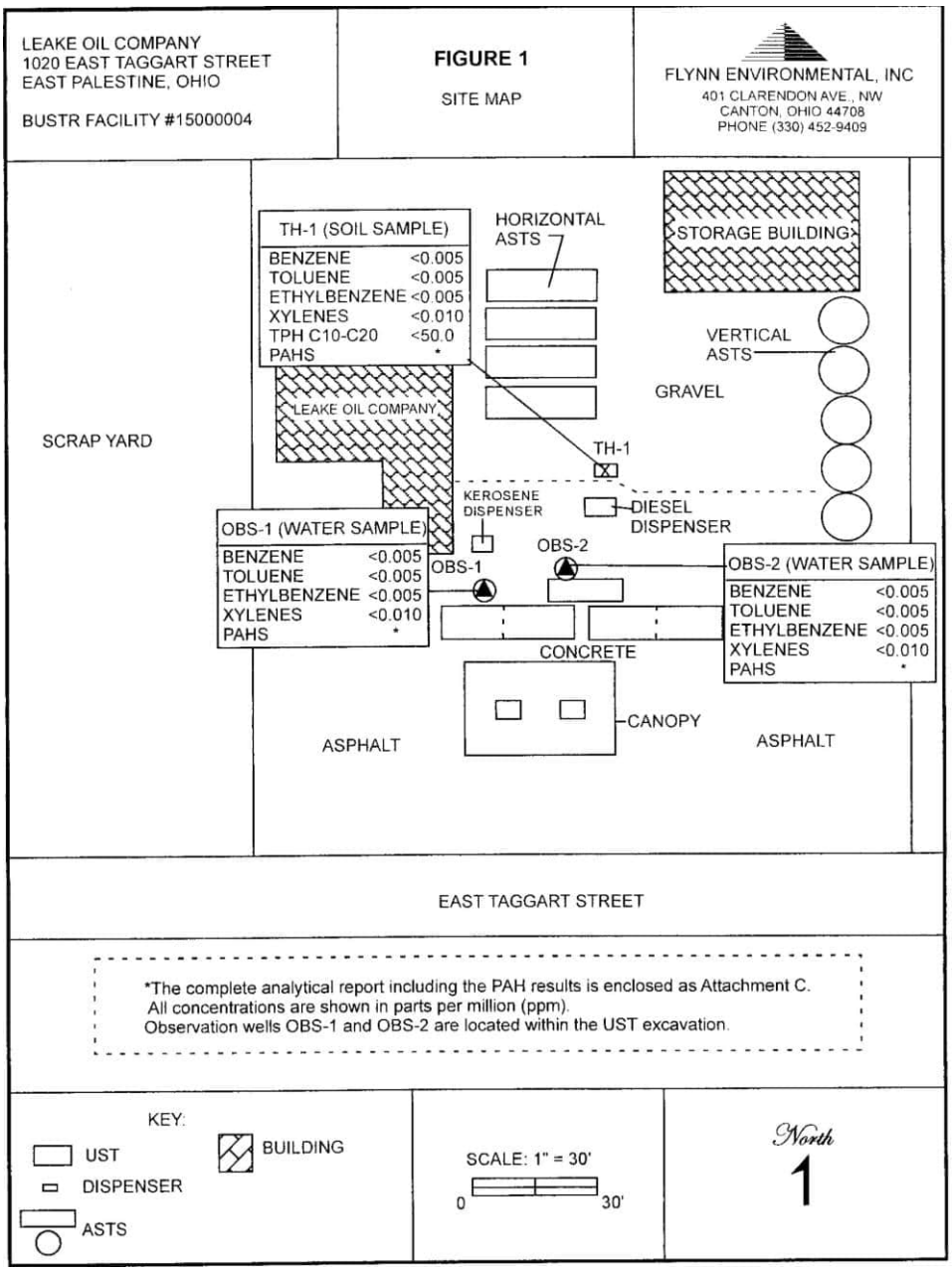
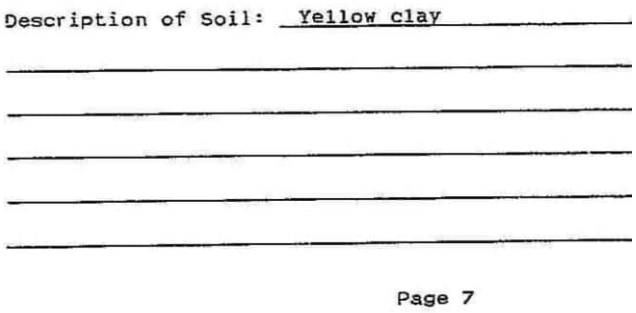


Figure 7-12: 1020 E Taggart Leake Oil Reported Chemical Results in Soil and Waters (Exhibit 49 – Report Figure 1)

Note in Figure 7-12 that all measured values for BTEX and PAHs values were below detection limits resulting in the site file being closed. Thus, these tanks were not likely a source of benzene as suggested by Arcadis.

Further, the geology (see also boring logs in next Section) surrounding the tanks was reported to be yellow clay (Figure 7-13) – clay soils are not conducive for movement of groundwaters.


Description of Soil: Yellow clay

Page 7

Figure 7-13: 1020 E Taggart Leake Oil Site – Soil Type – Yellow Clay (Exhibit 48 – Pg. 7)

In addition, ~20 years of Toxic Release Inventory (TRI) records for Columbiana County, and surrounding counties, were downloaded. These were used to summarize facilities reporting releases and documenting what those releases were (chemical and reported release amounts) (Exhibits 45 and 46). No evidence of benzene releases that might affect the site were noted.

No direct evidence was found in the Arcadis report that BUSTR or TRI databases were searched to determine if external facilities such as the Leake facility were potential sources of benzene. Additionally, when NS' 30(b)(6) deponent, Christopher Hunsicker, was questioned on any Leake Oil connection to CeramFab, he testified that he believed a BUSTR report was pulled for that location but, "I don't think we're making any connection between the CeramFab property or the Leake Oil property on how they impacted each other or may, or may not, have impacted each other." (February 20, 2026, Deposition of Christopher Hunsicker at Exhibit 158, pgs/lines.155:14-156:17). This directly contradicts Arcadis' own speculative arguments on the same.

7.2.4 Response #4 – Benzene in Subsurface and Inside Building but Not in Ambient Air Means it is from Other Sources Other Than the Derailment:

The logic behind the following statement made by Arcadis was hard to follow and lacked the scientific rigor necessary to make such a claim:

"*Benzene concentrations exceeded the VISL [vapor intrusion screening level] at one interior air location in the northeast corner of the building, CER-IA-13, collected during the third sampling event* (but was not detected in the second sampling event, detected less than the VISL during the first and fourth sampling events, and was less than the VISL in the paired sub-slab location during the first sampling event). *Benzene was also above VISL at four sub-slab soil gas locations spread across the building: CER-SS-03 and CER-SS-14, collected during the second event; and CERSS-09 and CER-SS-11, collected during the first, third, and fourth events (but was not detected greater than the VISL in the paired indoor air locations).* ***Given that the benzene exceedances in sub-slab soil gas are isolated, they are likely not associated with derailment activities***."

One would expect to have observed more benzene in the subsurface soils than in the air above the slab in the building due to dilution effects and suggests a sub-surface source(s) of benzene. To simply speculatively conclude that the benzene exceedances

in the sub-soil gases are not associated with the derailment activities because they are isolated is inherently illogical. Instead, this observed finding would more logically be the result of changes in local soils below the slab through which the benzene was trying to move; the benzene would simply follow the paths of least resistance.

Moreover, my sampling of VOCs, found benzene in surface water samples near the facility (Table 7-3):

Table 7-3 – Petty Sampling Results for Benzene and Other VOCS/SVOCS and Glycols in East Palestine

Loc. #	Sample Description	GPS Sample(s) Location	Type of Sample	Sample Number(s)	Analysis Performed	VOCs (soils in µg/kg and waters in µg/ℓ)						Non-PAH SVOCs (soils in µg/kg and waters in µg/ℓ)	Glycols (soils in µg/kg and waters in µg/ℓ)	
Petty Sample Round #1						Benzene	2-Ethylhexyl Acrylate	N-Butyl Acrylate	Iso-butylene	Methyl Acetate	Vinyl Chloride	2-Butoxy Ethanol	Diethylene Glycol	Propylene Glycol
1	Soil samples taken behind the bldg. near RR tracks.	[40º 50' 9" N & 80º 32' 21" W]	Terra Core Kit - Soils	S-1	8260 D - VOCs	**160**	92			670				
			Soil	S-1-2	8270 E - SVOCs									
			Soil	S-1-3	8015 C - Glycols									
			Soil	S-1-4	8290 A - Dioxins/Furans									
3	Soil samples taken from soil stockpile with RR ties.	[40º 50' 9" N & 80º 31' 9" W]	Terra Core Kit - Soils	S-3	8260 D - VOCs	**99**	300			1,000				
			Soil	S-3-2	8270 E - SVOCs									
			Soil	S-3-3	8015 C - Glycols									
			Soil	S-3-4	8290 A - Dioxins/Furans									
21A	Soil samples on west side of bank of Sulphur Run where it exits from railroad yard.	[40º 50' 7" N & 80º 32' 15" W]	Terra Core Kit - Soils	S-21A	8260 D - VOCs									
			Soil	S-21A-2	8270 E - SVOCs									
			Soil	S-21A-3	8015 C - Glycols									
			Soil	S-21A-4	8290 A - Dioxins/Furans									
21B	Sediment soil samples of Sulphur Run where it exits from railroad yard.	[40º 50' 7" N & 80º 32' 15" W]	Terra Core Kit - Soils	S-21B	8260 D - VOCs									
			Soil	S-21B-2	8270 E - SVOCs									
			Soil	S-21B-3	8015 C - Glycols									
			Soil	S-21B-4	8290 A - Dioxins/Furans									
25A-25D	Soils Samples S of S Track and S Bank of Ditch/ Pond	[40º 50' 9" N & 80º 31' 20" W]	Terra Core Kit - Soils	S-25A	8260 D - VOCs	**470**	15,000					~1,900,000	8,400,000	
			Soil	S-25A-2	8270 E - SVOCs									
			Soil	S-25A-3	8015 C - Glycols									

Loc. #	Sample Description	GPS Sample(s) Location	Type of Sample	Sample Number(s)	Analysis Performed	VOCs (soils in µg/kg and waters in µg/ℓ)						Non-PAH SVOCs (soils in µg/kg and waters in µg/ℓ)	Glycols (soils in µg/kg and waters in µg/ℓ)	
Petty Sample Round #1						Benzene	2-Ethylhexyl Acrylate	N-Butyl Acrylate	Iso-butylene	Methyl Acetate	Vinyl Chloride	2-Butoxy Ethanol	Diethylene Glycol	Propylene Glycol
			Soil	S-25A-4	8290 A - Dioxins/Furans									
	Sediment Soil Samples S of S Track and Ditch/ Pond		Terra Core Kit - Soils	S-2BA	8260 D - VOCs	**22**	22		7			~4,200,000	5,400,000	
			Soil	S-25B-2	8270 E - SVOCs									
			Soil	S-25B-3	8015 C - Glycols									
			Soil	S-25B-4	8290 A - Dioxins/Furans									
	Water Samples S of S Track and from Ditch/ Pond		Water	W-25A-1a/1b/1c	8260 D - VOCs	**7**	25	11	1.3			~2,300,000	27,000,000	52,000
			Water	W-25A-2A/2B	8270 E - SVOCs									
			Water	W-25A-3a/3b/3c	8015 C - Glycols									
			Water	W-25A-4A/4B	8290 A - Dioxins/Furans									
	Soil Samples S of S Tracks and Just North of Black Plastic Area to SW	[40º 50' 9" N & 80º 31' 21" W]	Terra Core Kit - Soils	S-25C	8260 D - VOCs			31,000		3,100		10,000	210,000	
			Soil	S-25C-2	8270 E - SVOCs									
			Soil	S-25C-3	8015 C - Glycols									
			Soil	S-25C-4	8290 A - Dioxins/Furans									
	Soils Near Pond and Damaged Tank Car Well South of Tracks – S Entrance Road Area from Taggart	[40º 50' 7" N & 80º 31' 20" W]	Terra Core Kit - Soils	S-25D	8260 D - VOCs		2,100,000					95,000	100,000	450,000
			Soil	S-25D-2	8270 E - SVOCs									
			Soil	S-25D-3	8015 C - Glycols									
			Soil	S-25D-4	8290 A - Dioxins/Furans									
	Water from Surface Puddle/ Pond and Damaged Tank Car Well South of Tracks – S		Water	W-25B-1a/1b/1c	8260 D - VOCs	**0.96**			1.9			~5,500.000	110,000	540,000
			Water	W-25B-2A/2B	8270 E - SVOCs									
			Water	W-25B-3a/3b/3c	8015 C - Glycols									

Loc. #	Sample Description	GPS Sample(s) Location	Type of Sample	Sample Number(s)	Analysis Performed	VOCs (soils in µg/kg and waters in µg/ℓ)						Non-PAH SVOCs (soils in µg/kg and waters in µg/ℓ)	Glycols (soils in µg/kg and waters in µg/ℓ)	
Petty Sample Round #1						Benzene	2-Ethylhexyl Acrylate	N-Butyl Acrylate	Iso-butylene	Methyl Acetate	Vinyl Chloride	2-Butoxy Ethanol	Diethylene Glycol	Propylene Glycol
	Entrance Road Area from Taggart		Water	W-25B-4A/4B	8290 A - Dioxins/Furans									
27	RR Yard – After South Track Removed – Eastern most soil stockpile S of tracks - W end.	[40º 50' 10" N & 80º 31' 11" W]	Terra Core Kit - Soils	S-27A	8260 D - VOCs		1,700,000					350,000	2,800,000	3,900,000
			Soil	S-27A-2	8270 E - SVOCs									
			Soil	S-27A-3	8015 C - Glycols									
			Soil	S-27A-4	8290 A - Dioxins/Furans									
	RR Yard – After South Track Removed – Central soil stockpile S of tracks -still E of S entry road – E end.	[40º 50' 9" N & 80º 31' 13" W]	Terra Core Kit - Soils	S-27B	8260 D - VOCs	**280**				3,100			99,000	
			Soil	S-27B-2	8270 E - SVOCs									
			Soil	S-27B-3	8015 C - Glycols									
			Soil	S-27B-4	8290 A - Dioxins/Furans									
	RR Yard – After S Track Removed – Near E soil stockpile S of tracks -still E of S entry road - W end.	[40º 50' 7" N & 80º 31' 16" W]	Terra Core Kit - Soils	S-27C	8260 D - VOCs		110,000					7,100	4,500,000	380,000
			Soil	S-27C-2	8270 E - SVOCs									
			Soil	S-27C-3	8015 C - Glycols									
			Soil	S-27C-4	8290 A - Dioxins/Furans									
	RR Yard – After South Track Removed – Under removed track and upper ballast – Location 1 – Lots of gravel.	[40º 50' 6" N & 80º 31' 20" W]	Terra Core Kit - Soils	S-27D	8260 D - VOCs							8,300		
			Soil	S-27D-2	8270 E - SVOCs									
			Soil	S-27D-3	8015 C - Glycols									
			Soil	S-27D-4	8290 A - Dioxins/Furans									
	RR Yard – After South Track Removed – Under removed track and upper ballast – Location 2 – Lots	[40º 50' 10" N & 80º 31' 18" W]	Terra Core Kit - Soils	S-27E	8260 D - VOCs		43,000					240,000	150,000	1,000,000
			Soil	S-27E-2	8270 E - SVOCs									
			Soil	S-27E-3	8015 C - Glycols									

Loc. #	Sample Description	GPS Sample(s) Location	Type of Sample	Sample Number(s)	Analysis Performed	VOCs (soils in µg/kg and waters in µg/ℓ)						Non-PAH SVOCs (soils in µg/kg and waters in µg/ℓ)	Glycols (soils in µg/kg and waters in µg/ℓ)	
Petty Sample Round #1						**Benzene**	**2-Ethylhexyl Acrylate**	**N-Butyl Acrylate**	**Iso-butylene**	**Methyl Acetate**	**Vinyl Chloride**	**2-Butoxy Ethanol**	**Diethylene Glycol**	**Propylene Glycol**
	of gravel		Soil	S-27E-4	8290 A - Dioxins/Furans									
	RR Yard – After South Track Removed – Gravel layer removed down to clay Location 1 – Only removed E 1/3rd – sampled W end of excavation	[40º 50' 6" N & 80º 31' 19" W]	Terra Core Kit - Soils	S-27F	8260 D - VOCs	**94**				840		890,000	930,000	
			Soil	S-27F-2	8270 E - SVOCs									
			Soil	S-27F-3	8015 C - Glycols									
			Soil	S-27F-4	8290 A - Dioxins/Furans									
	RR Yard – After S Track Removed – Gravel layer removed down to clay Location 2 – Only removed E 1/3rd – sampled central bottom of excavation – thin dark layer.	[40º 50' 6" N & 80º 31' 19" W] - ~50' east of location #1	Terra Core Kit - Soils	S-27G	8260 D - VOCs	**110**				380		45,000	140,000	
			Soil	S-27G-2	8270 E - SVOCs									
			Soil	S-27G-3	8015 C - Glycols									
			Soil	S-27G-4	8290 A - Dioxins/Furans									
	RR Yard – After S Track Removed – Gravel layer removed down to clay Location 2 – Only removed E 1/3rd – sampled water from W bottom end of excavation – thin dark layer.	[40º 50' 6" N & 80º 31' 19" W] - ~50' east of location #1	Water	W-27-1a/1b/1c	8260 D - VOCs	**3**	32	9.6	0.99		2.3	~490,000	2,900,000	76,000
			Water	W-27-4a	8270 E - SVOCs									
			Water	W-27-3a/3b/3c	8015 C - Glycols									
			Water	W-27A-1	8290 A - Dioxins/Furans									
Petty Sample Round #2														
70	Soils from S bank, west end of excavation (West End of Excavation of North Track – Just south of two blue large water storage tanks).	[40º 50' 9.12" N & 80º 31' 37.74" W]	Terra Core Kit - Soils	S-70-1	8260 D - VOCs									
			Soil	S-70-2	8270 E - SVOCs									
			Soil	S-70-3	8015 C - Glycols									
			Soil	S-70-4	8290 A - Dioxins/Furans									
	Water from bottom of west end of		Water	W-70-1a/1b/1c	8260 D - VOCs		17	97		9.4		800	2,600,000	110,000

Loc. #	Sample Description	GPS Sample(s) Location	Type of Sample	Sample Number(s)	Analysis Performed	VOCs (soils in µg/kg and waters in µg/ℓ)						Non-PAH SVOCs (soils in µg/kg and waters in µg/ℓ)	Glycols (soils in µg/kg and waters in µg/ℓ)	
Petty Sample Round #1						Benzene	2-Ethylhexyl Acrylate	N-Butyl Acrylate	Iso-butylene	Methyl Acetate	Vinyl Chloride	2-Butoxy Ethanol	Diethylene Glycol	Propylene Glycol
	excavation		Water	W-70-2A/2B	8270 E - SVOCs									
			Water	W-70-3a/3b/3c	8015 C - Glycols									
			Water	W-70-4A/4B	8290 A - Dioxins/Furans									
71	Soil samples taken ~100' east of Soil Sample #70 (Eastern-Most End of Excavation of North Track – Excavation only on west end for ~150')	[40º 50' 9.24" N & 80º 31' 36.54" W]	Terra Core Kit - Soils	S-71-1	8260 D - VOCs									
			Soil	S-71-2	8270 E - SVOCs									
			Soil	S-71-3	8015 C - Glycols									
			Soil	S-71-4	8290 A - Dioxins/Furans									
72	Water sample taken just east of the excavator that was ~150 east of the west end excavation (ust East of the West End of Excavation of North Track – Water in Ditch Between Tracks)	[40º 50' 9.18" N & 80º 31' 34.56" W]	Water	W-72-1a/1b/1c	8260 D - VOCs									
			Water	W-72 2A/2B	8270 E - SVOCs									
			Water	W-72-3a/3b/3c	8015 C - Glycols			8.8		2.1	1.2	4,100	450,000	23,000
			Water	W-72-4A/4B	8290 A - Dioxins/Furans									
72	Soil samples from N edge berm (Not same location was Water Samples #72).	[40º 50' 10.4" N & 80º 31' 16.4" W]	Terra Core Kit - Soils	S-72-1	8260 D - VOCs									
			Soil	S-72-2	8270 E - SVOCs		36,000				2,600	8,000		
			Soil	S-72-3	8015 C - Glycols									
			Soil	S-72-4	8290 A - Dioxins/Furans									
73	Soil samples from N edge berm (N side of removed North Track – Next Sample West from Far East End).	[40º 50' 10.3" N & 80º 31' 17.1" W]	Terra Core Kit - Soils	S-73-1	8260 D - VOCs									
			Soil	S-73-2	8270 E - SVOCs		8,400					2,700		
			Soil	S-73-3	8015 C - Glycols									
			Soil	S-73-4	8290 A - Dioxins/Furans									

Loc. #	Sample Description	GPS Sample(s) Location	Type of Sample	Sample Number(s)	Analysis Performed	VOCs (soils in µg/kg and waters in µg/ℓ)						Non-PAH SVOCs (soils in µg/kg and waters in µg/ℓ)	Glycols (soils in µg/kg and waters in µg/ℓ)	
Petty Sample Round #1						Benzene	2-Ethylhexyl Acrylate	N-Butyl Acrylate	Iso-butylene	Methyl Acetate	Vinyl Chloride	2-Butoxy Ethanol	Diethylene Glycol	Propylene Glycol
74	Soil samples from N edge berm (N side of removed North Track – Next Sample West from Soil Sample #73).	[40º 50' 10.1" N & 80º 31' 18.6" W]	Terra Core Kit - Soils	S-74-1	8260 D - VOCs		59,000					10,000		
			Soil	S-74-2	8270 E - SVOCs									
			Soil	S-74-3	8015 C - Glycols									
			Soil	S-74-4	8290 A - Dioxins/Furans									
75	Soil samples from N edge berm (N side of removed North Track – Next Sample West from Soil Sample #74).	[40º 50' 9.9" N & 80º 31' 20.3" W]	Terra Core Kit - Soils	S-75-1	8260 D - VOCs							730		
			Soil	S-75-2	8270 E - SVOCs									
			Soil	S-75-3	8015 C - Glycols									
			Soil	S-75-4	8290 A - Dioxins/Furans									
76	Soil samples from N edge berm (N side of removed North Track – Next Sample West from Soil Sample #75).	[40º 50' 10.0" N & 80º 31' 21.0" W]	Terra Core Kit - Soils	S-76-1	8260 D - VOCs		340,000				11,000	13,000	34,000	
			Soil	S-76-2	8270 E - SVOCs									
			Soil	S-76-3	8015 C - Glycols									
			Soil	S-76-4	8290 A - Dioxins/Furans									
77	Soil samples from N edge berm (N side of removed North Track – Next Sample West from Soil Sample #76).	[40º 50' 9.9" N & 80º 31' 21.8" W]	Terra Core Kit - Soils	S-77-1	8260 D - VOCs		730,000				15,000	4,500	8,000	
			Soil	S-77-2	8270 E - SVOCs									
			Soil	S-77-3	8015 C - Glycols									
			Soil	S-77-4	8290 A - Dioxins/Furans									
78	Soil samples from N edge berm (N side of removed North Track – Next Sample West from Soil Sample #77).	[40º 50' 10.0" N & 80º 31' 22.4" W]	Terra Core Kit - Soils	S-78-1	8260 D - VOCs									
			Soil	S-78-2	8270 E - SVOCs									
			Soil	S-78-3	8015 C - Glycols									
			Soil	S-78-4	8290 A - Dioxins/Furans									

Loc. #	Sample Description	GPS Sample(s) Location	Type of Sample	Sample Number(s)	Analysis Performed	VOCs (soils in µg/kg and waters in µg/ℓ)						Non-PAH SVOCs (soils in µg/kg and waters in µg/ℓ)	Glycols (soils in µg/kg and waters in µg/ℓ)	
Petty Sample Round #1						Benzene	2-Ethylhexyl Acrylate	N-Butyl Acrylate	Iso-butylene	Methyl Acetate	Vinyl Chloride	2-Butoxy Ethanol	Diethylene Glycol	Propylene Glycol
79	Soil samples from N edge berm (Essentially same location as Water Samples #74) (N side of removed North Track – Next Sample West from Soil Sample #78).	[40º 50' 10.1" N & 80º 31' 23.0" W]	Terra Core Kit - Soils	S-79-1	8260 D - VOCs		160,000					12,000	89,000	170,000
			Soil	S-79-2	8270 E - SVOCs									
			Soil	S-79-3	8015 C - Glycols									
			Soil	S-79-4	8290 A - Dioxins/Furans									
74	Surface water samples from depression filled with water near north side of north track (Essentially same location as Soil Samples #79) (So-called burn pit).	[40º 50' 10.1" N & 80º 31' 23.8" W]	Water	W-74-1a/1b/1c	8260 D - VOCs	**2.6**	4,300	77	1.5	4.7	1,200	~18,000	270,000	2,300,000
			Water	W-74a-2a/2b	8270 E - SVOCs									
			Water	W-74-3a/3b/3c	8015 C - Glycols									
			Water	W-74-4a/4b	8290 A - Dioxins/Furans									
80	Soil samples from N edge berm (N side of removed North Track) (North side of peak of berm just SE of burn pit).	[40º 50' 9.9" N & 80º 31' 23.6" W]	Terra Core Kit - Soils	S-80-1	8260 D - VOCs									
			Soil	S-80-2	8270 E - SVOCs									
			Soil	S-80-3	8015 C - Glycols									
			Soil	S-80-4	8290 A - Dioxins/Furans									
81	Soil samples from near water sample detailed below (Essentially same location as Water Samples #76) (N side of removed North Track) (Culvert exit west of so-called burn pit).	[40º 50' 10.0" N & 80º 31' 24.5" W]	Terra Core Kit - Soils	S-81-1	8260 D - VOCs		16,000					5,100	21,000	
			Soil	S-81-2	8270 E - SVOCs									
			Soil	S-81-3	8015 C - Glycols									
			Soil	S-81-4	8290 A - Dioxins/Furans									
76	Surface water samples from depression filled with water near	[40º 50' 10.0" N & 80º 31' 24.5" W]	Water	W-76-1a/1b/1c	8260 D - VOCs	**10**	28		1		140	590		
			Water	W-76a-2a/2b	8270 E - SVOCs									

Loc. #	Sample Description	GPS Sample(s) Location	Type of Sample	Sample Number(s)	Analysis Performed	VOCs (soils in µg/kg and waters in µg/ℓ)						Non-PAH SVOCs (soils in µg/kg and waters in µg/ℓ)	Glycols (soils in µg/kg and waters in µg/ℓ)	
Petty Sample Round #1						Benzene	2-Ethylhexyl Acrylate	N-Butyl Acrylate	Iso-butylene	Methyl Acetate	Vinyl Chloride	2-Butoxy Ethanol	Diethylene Glycol	Propylene Glycol
	north side of north track (Essentially same location as Soil Samples #81) (N side of removed North Track) (Culvert exit west of so-called burn pit).		Water	W-76-3a/3b/3c	8015 C - Glycols									
			Water	W-76-4a/4b	8290 A - Dioxins/Furans									
82	Soil samples from N edge berm (N side of removed North Track – Next Sample West from Soil Sample #81)	[40º 50' 9.9" N & 80º 31' 24.7" W]	Terra Core Kit - Soils	S-82-1	8260 D - VOCs	**1.3**	3.3		1		6.4	330		
			Soil	S-82-2	8270 E - SVOCs									
			Soil	S-82-3	8015 C - Glycols									
			Soil	S-78-4	8290 A - Dioxins/Furans									

As shown in Table 7-3, benzene was found in numerous soil and water samples at/near the derailment location.

Supportive, and perhaps more compelling evidence that the derailment contaminated the site was the very high levels of 2-Ethylhexyl Acrylate, N-Butyl Acrylate, Vinyl Chloride, Diethylene Glycol and Propylene Glycol known to have been carried by the derailed train are observed in Table 7-10. Very high levels (i.e., thousands of parts per billion) of 2-ethylhexyl acrylate, N-butyl acetate and vinyl chloride are observed in these results.

A considerable number of water samples were collected by NS/Arcadis on March 6, 2023 (Exhibit 86) and rush order analyzed for VOCs. Benzene, vinyl chloride, 2-Ethylhexyl Acrylate, and n-Butyl Acrylate sample results are summarized in Table 7-4:

Table 7-4 – VOC Water Contaminants Measured by NS on March 6, 2023

Results in µg/ℓ)	Sample Number / Sample Location*								
	WC-257204	WC-251478	WC-251321	WC-251633	WC-256094	WC-251091	WC-251079	WC-251782	WC-538B
Benzene	-	-	-	-	3.9	3.7	-	-	-
Vinyl Chloride	6.2	6.4	8.1	11	5.8	62	2.8	-	-
2-Ethyl Hexyl Acrylate	18	27	23	6.8	300	220	55	-	-
n-Butyl Acrylate	130	1,500	330	35	77	2,600	5,600	1,200	49,000

This report does not list specific locations where these water samples were taken. However, n-Butyl Acrylate was observed in all eight samples, while vinyl chloride and 2-ethyl hexyl acrylate were observed in 75% of the samples.

A considerable number of soil samples were also taken in the “North Ditch” on March 20-21, 2023 (Exhibit 83) and analyzed for VOCs. Benzene and vinyl chloride sample results are summarized in Tables 7-5 to 7-7:

Table 7-5 – VOC Contaminants Measured in “North Ditch” by NS

Results in mg/kg)	Sample Number / Sample Location*								
	240-180684-1 WC-WS-NORTH-01 (4-5)	240-180684-2 WC-WS-NORTH-02 (6-7)	240-180684-3 WC-WS-NORTH-03 (7-8)	240-180684-4 WC-WS-NORTH-04 (4-5)	240-180684-5 WC-WS-NORTH-05 (5-6)	240-180684-6 WC-WS-NORTH-COMP (1-5)	240-180684-7 WC-WS-NORTH-06 (5-6)	240-180684-8 WC-WS-NORTH-07 (3-4)	240-180684-9 WC-WS-NORTH-08 (3-4)
Benzene	3.4	1.8	2.2	2.7	55	*0.078*	2.1	12	19
Vinyl Chloride	9.2	1.7	1.4	2.4	85	*0.11*	5.6	10	0.44

*Note that methyl-tert-butyl ether (MTBE) not observed.

Table 7-6 – VOC Contaminants Measured in "North Ditch" by NS – cont.

Results in mg/kg)	Sample Number / Sample Location*								
	240-180684-10 WC-WS-NORTH-09 (3-4)	240-180684-11 WC-WS-NORTH-10 (2-3)	240-180684-12 WC-WS-NORTH-COMP (6-10)	240-180684-13 WC-SB2650-N. DITCH	240-180684-14 WC-SB1692-N. DITCH	240-180684-15 WC-SB2598-N. DITCH	240-180684-16 WC-SB1852-N. DITCH	240-180684-17 WC-SB1865-N. DITCH	240-180684-18 WC-COMP1-N. DITCH
Benzene	11	53	0.35	-	-	-	-	-	-
Vinyl Chloride	0.18 J	-	0.087	-	-	-	0.23 J	0.083	-

*Note that methyl-tert-butyl ether (MTBE) not observed.

Table 7-7 – VOC Contaminants Measured in "North Ditch" by NS – cont.

Results in mg/kg)	Sample Number / Sample Location*						
	240-180684-19 WC-SB2621-N. DITCH	240-180684-20 WC-SB1634-N. DITCH	240-180684-21 WC-SB2624-N. DITCH	240-180684-22 WC-SB2474-N. DITCH	240-180684-23 WC-SB2405-N. DITCH	240-180684-24 WC-COMP2-N. DITCH	240-180684-25 WC-RT1538A-ST. SWEEPINGS
Benzene	-	-	-	-	-	-	0.091 J
Vinyl Chloride	3.2	0.14	-	-	-	-	-

*Note that methyl-tert-butyl ether (MTBE) not observed.

Note that the composite sample values grossly under-report individual samples from which they were composed calling into question the compositing methodology. However, benzene was found in the soil samples and vinyl chloride was found in most of the soil and ditch sample results.

Soil samples were also collected by NS/Arcadis on the west end of the south track on March 14, 2023 (Exhibit 85). Results for some of these VOCs are summarized in Tables 7-8 and 7-9:

Table 7-8 – VOC Soil Contaminants Measured by NS on March 14, 2023

Results in µg/ℓ)	Sample Number / Sample Location							
	240-181894-1 WC-S. TRK-WEST-01 (2-4)	240-181894-2 WC-S. TRK-WEST-02 (6-8)	240-181894-3 WC-S. TRK-WEST-03 (2-4)	240-181894-4 WC-S. TRK-WEST-04 (4-6)	240-181894-5 WC-S. TRK-WEST-05 (4-6)	240-181894-6 WC-S. TRK-WEST-06 (6-8)	240-181894-7 WC-S. TRK-WEST-07 (8-10)	240-181894-8 WC-S. TRK-WEST-COMP (01-07)
Benzene	-	-	-	-	-	-	0.19 J	-
Vinyl Chloride	0.78	-	-	-	-	-	-	-
2-Ethyl Hexyl Acrylate	170 J	40	-	-	-	6.0	-	-
n-Butyl Acrylate	680	11	-	28	9.0	11.0	1,200	-

Table 7-9 – VOC Soil Contaminants Measured by NS on March 14, 2023 – cont.

Results in µg/ℓ)	Sample Number / Sample Location							
	240-181894-9 WC-S. TRK-WEST-08 (8-10)	240-181894-10 WC-S. TRK-WEST-09 (10-12	240-181894-11 WC-S. TRK-WEST-10 (10-12)	240-181894-12 WC-S. TRK-WEST-11 (12-14)	240-181894-13 WC-S. TRK-WEST-12 (12-14)	240-181894-14 WC-S. TRK-WEST-13 (14-16)	240-181894-15 WC-S. TRK-WEST-14 (14-16)	240-181894-16 WC-S. TRK-WEST-COMP (08-14)
Benzene	-	-	-	-	0.12 J	-	0.068 J	-
Vinyl Chloride	-	-	-	0.24 J	2.2	-	0.25 J	0.0075 J F2
2-Ethyl Hexyl Acrylate	98	99	11	130	190	160	720	-
n-Butyl Acrylate	25	41	3.3 J	40	67	61	340	-

Again, it is noteworthy that the two composite samples basically have none of the components measured in the seven samples from which they were comprised which were contaminated. Most of the samples contained 2-Ethyl Hexyl Acrylates and n-Butyl Acrylate, with some containing either benzene or vinyl chloride, suggesting contamination from the derailment. Note also that most of these samples were taken well below the ground surface, as much as 16' below ground surface (bgs) where it would be less likely that surface deposited materials reached those depths. Nevertheless, some of these contaminants have moved upwards of 16' bgs.

Measurement of the sediments at the CeramFab building by GEL also showed the presence of vinyl chloride in the standing storm water (SSW-2) of 1.79 µg/ℓ (Exhibit 170).

Note for vinyl chloride that the drinking water MCL is 2.0 µg/ℓ (see Table 8-3) and that most of the sample results shown above for vinyl chloride meet, or exceed, the MCL.

Finally, a review of the US EPA East Palestine sample results database was completed on April 18, 2023 following downloading of the files on April 17, 2023 (Exhibits 78-80). As a result of this review, the following observations were made:

General Observations:

- By far the most data available are air sample results (~20,760 values).
- By far the fewest data samples available are for sediments and soils (~510 values and ~640 values respectively). Both were only sampled for 1 day (2/8/23 and 2/10/23 respectively). Dioxins were not reported.
- In between these times, there were several water sample results provided; ~1,840 sample results were available.

Chemicals Present by Matrix:

Chemicals present by matrix are listed as "LOTS" – essentially always detected; "Lots" – most of the time observed; "Some" – approaching 25% of the time observed and "Few" occasionally observed.

Air Sample Results:

LOTS

- *1,1,2 Trichlorotrifluoroethane*
- *Carbon Tetrachloride*
- *Toluene*
- *Trans-1,2-Dichloromethane*
- *Trichlorofluoromethane*
- *Vinyl chloride*

Lots

- *1,2 Dichloroethane*
- *1,4 Dichlorobenzene*
- *Acetone*
- *Benzene*
- *Chloromethane*
- *Dichlorofluoromethane*
- *Methylene chloride*
- *Xylene(s)*

Some

- *1,2,4 Trimethylbenzene*
- *1,3 Butadiene*
- *Acrolein*
- *Ethanol*
- *Ethylbenzene*
- *Styrene*
- *Tetrachloromethane*
- *Trichloroethane*

Few

- *1,3,5 Trimethylbenzene*

Note that no MTBE (methyl-tert-butyl-ether) was found which is a signature for gasolines from ~1985 until ~2000, so BTEX was probably not from gasolines.

Also, lots of chlorinated compounds were reported, suggesting chlorinated combustion products were formed during the burn.

Water Sample Results:

Lots

- *Bis (2-ethylhexyl) phthalate*
- *DRO – Diesel range organics with carbon #s from C10 to C28)*
- *GRO – Gasoline range organics from C6 to C10*
- *ORO – C28 to C40*
- *Vinyl chloride*

Sediment Sample Results:

Lots

- *Acetone*
- *Benzene*
- *DRO*
- *GRO*
- *ORO*
- *Vinyl chloride*

Some

- *PAHs – poly aromatic hydrocarbons (e.g., benzo(a) pyrene, chrysene, etc.).*

Soil Sample Results:

Lots

- *Acetone*
- *Benzene*
- *DRO*
- *GRO*
- *ORO*
- *Methylcyclohexane*
- *Vinyl chloride*

Some

- *PAHs – poly aromatic hydrocarbons (e.g., benzo(a) pyrene, chrysene, etc.).*

An illustration of this data for both benzene and vinyl chloride for air, soil/sediment and water sample results are provided in Tables B-1, B-2, and B-3 respectively in Appendix B. Significant hits for both benzene and for vinyl chloride are illustrated in these results.

Note that Arcadis, in an October 20, 2023, memo regarding "Draft Agencies Comments on East Palestine Derailment Site Amendment to Appendix I Work Plan: North Ditch Seep Investigation and Operational Tactic Memo" (Exhibit 149), received comments regarding contamination of seep waters. Two comments were that: "4. The August 8 and 17 ground water sampling results should acknowledge that butyl was detected in the seep water" and "6. The purpose should focus on the source of the seep and why vinyl chloride and butyl acrylate are present – now" suggesting NS knew that seep waters have been contaminated as a result of the derailment.

The comments also acknowledged that contamination from the ditches along the tracks was the source of Sulfur Run contamination: "8. Imagery of the top of the till layer of the north and south main lines, prior to ballast replacement, should be included in the follow-up memo. This imagery should display the cuts from the south ditch to north ditch. Comments should address the relationship of the cuts to the seeps. *This imagery is important in that it displays that historically drainage was directed from the south ditch to the north ditch which flows to Sulfur Run*." It is also important because Plaintiffs' second property, the WYG building on N. James, is immediately adjacent to the downstream flow of Sulfur Run.

7.3 SVOC/PAH Data:

NS and Arcadis took numerous samples for VOCs, including benzene, but concluded that the benzene found beneath and in the CeramFab building was from sources other than the train derailment (Exhibit 2). Arcadis, makes the following statements in their June 17, 2025 Delineation Memo Report regarding SVOC contamination at CeramFab (Exhibit 2, pg. 3, Bates NS-CeramFab000979, 980-981):

> "***Site investigation activities associated with the approved work plans demonstrate that certain semi-volatile organic compounds (SVOCs),*** dioxins, and per- and polyfluoroalkyl substances (PFAS) ***are present in soil samples at levels that exceed the screening levels***. ***Based on research of the current and former use and field observations (e.g., coal, other fill materials) in the derailment area as presented in the following subsections, the SVOC concentrations represent pre-derailment background conditions from both natural conditions and historical and current anthropogenic contributions common in urban and industrial areas***."
>
> "**Local Land Uses:** The Village of East Palestine (Village) was founded in 1828 and incorporated in 1875 (East Palestine 2025). ***Its geological setting has been a major influence on its industrial history:*** the mixture of clay-rich shale deposits for raw materials ***and shallow coal beds*** for fuel made the area a natural location to produce pottery, ceramics, and coal (East Palestine 2025). The nearby success of the rubber industry in Akron, Ohio also sparked attempts at rival rubber manufacturers in East Palestine (Kaufman 1936). In general, these industries dominated the businesses of the Village from the 1870s to the middle of the mid-1900s (East Palestine 2025)."
>
> "**Coal and/or Fill Presence:** *East Palestine is situated within the eastern Ohio coal belt, and geologic maps indicate*: 1) shallow coal layers (beds) are present throughout the

area; ***and 2) areas proximal to the CeramFab Area have been surface mined for coal (see Figure 3***). *Historically, the surficial/shallow coal deposits were mined and used by the community from the 1800s to early/mid-1900s, and the deeper coals were later mined by industry*. Sanborn maps of the area indicate that the industrial sites along the railroad tracks utilized coal as a fuel through at least the 1920s, and it is likely that the Village's residences and industry (including the historical operations at CeramFab) used coal as fuel through the mid-1900s. ***The CeramFab Area is proximal to the former State Line Coal Company and National Fireproofing Company*** (Figure 3), and the post card shown as *Figure 4 provides a visual of the significant presence of coal in the area in the early 1900s*. Given the extensive presence of coal, it is also likely that airborne coal dust and ash were distributed throughout the Village when coal was in use or transported. Coal and coal combustion byproducts contain polycyclic aromatic hydrocarbons (PAHs) and PAH-like SVOCs, such as 1,1-biphenyl and dibenzofuran (Stout and Emsbo-Mattingly 2008)."

Figures 3 and 5 from this report are reproduced in Figure 7-14 below:

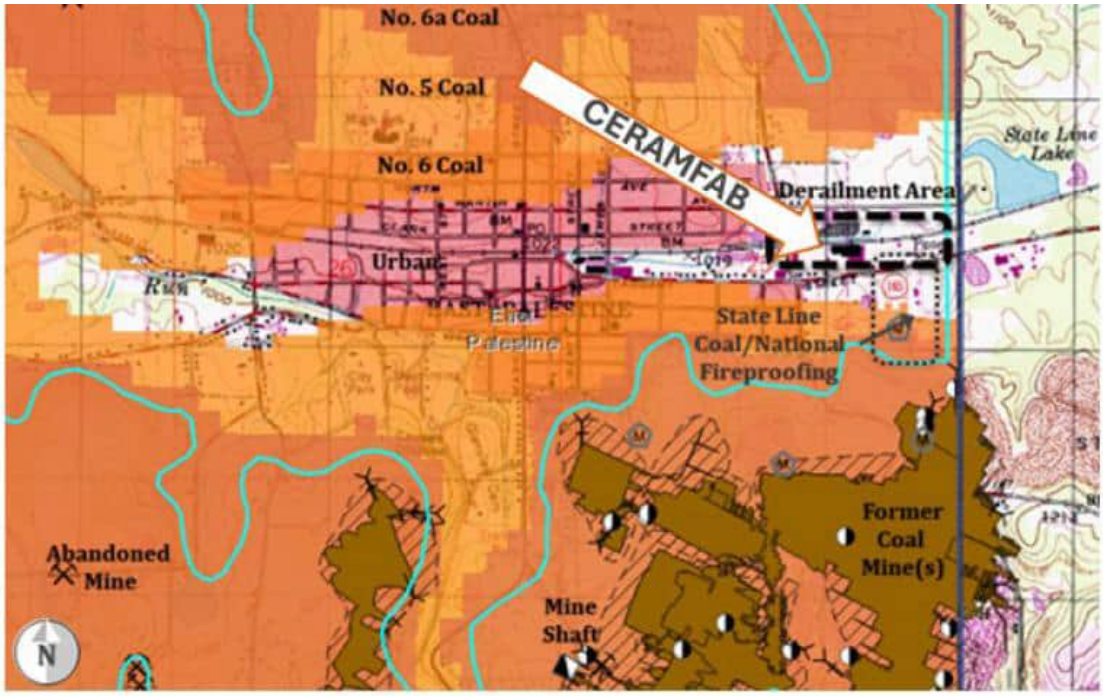


Figure 3 – Shallow coal beds and mines, near East Palestine, OH (Ohio Department of Natural Resources 2024). Note proximity of State Line Coal.

Figure 5 – Undated post card (circa 1910) showing the State Line Coal Company and National Fireproofing Company (https://www.ebay.com/itm/374888673576)

Figure 7-14: Figures 3 and 5 from Exhibit 2

"**4.2.1 Coal and Fill Summary:** ***The pervasive historical use and observations of coal, as well as the potential for exhaust from burning of coal, is an LOE that the SVOC concentrations observed are not associated with the derailment***."

It should be noted that it is my opinion, based on the following responses, that Arcadis's claim that the SVOCs (and PAHs) observed in sample results at/near the CeramFab building are from coal and not from the derailment is pure speculation and inconsistent with local surface geology and their own soil borings. My responses follow:

7.3.1 Response #1 – Arcadis' Claim that SVOCs Present in the Subsurface and Inside Building are Due to Coal and Fill Materials in Proximal Locations Near the CeramFab Facility Based on a Sanborn Map (Figure 3 above):

Sanborn maps are designed to show surface features over time, not local surface geology or subsurface geology. Surface geology information is readily available from the Ohio Department of Natural Resources (Exhibit 17) as illustrated in Figure 7-15 below:

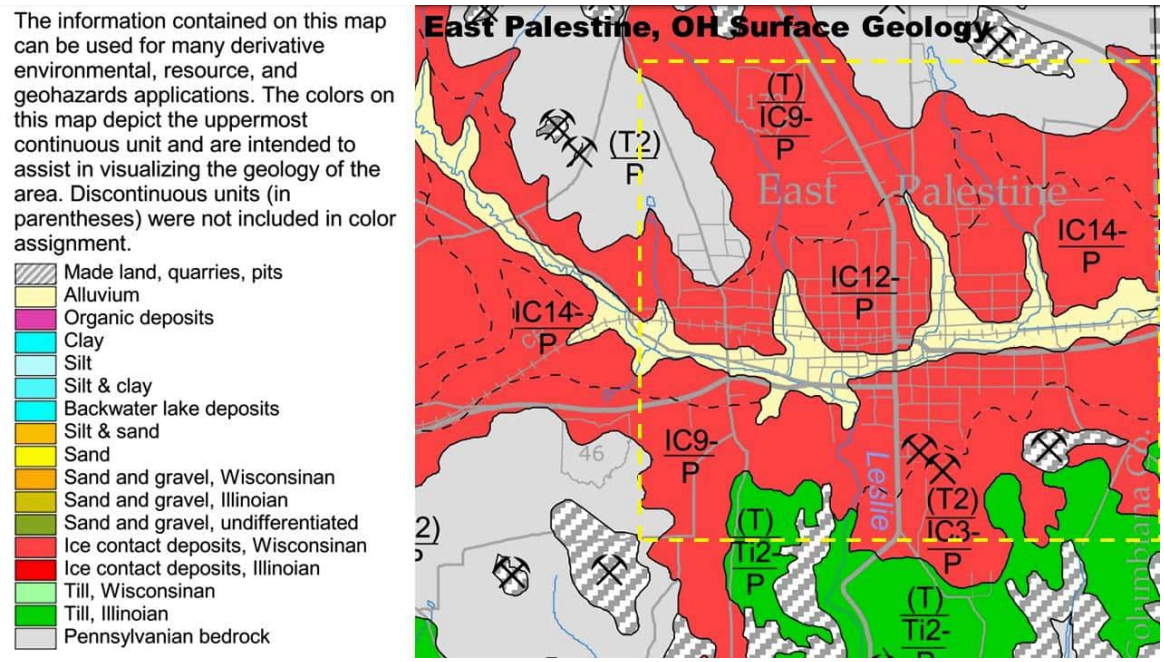


Figure 7-15: Surface Geology At/Near East Palestine, OH (Exhibit 17)

No coal deposits are indicated on this ODNR State of Ohio surface map for the East Palestine, OH area.

Moreover, a series of soil boring logs were presented in Arcadis' June 27, 2023 Groundwater Characterization Work Plan (Exhibit 55) that illustrate no coal being struck in any of the local borings down to ~70+' below ground surface (bgs). The overall map of well locations is shown in Figure 7-16:

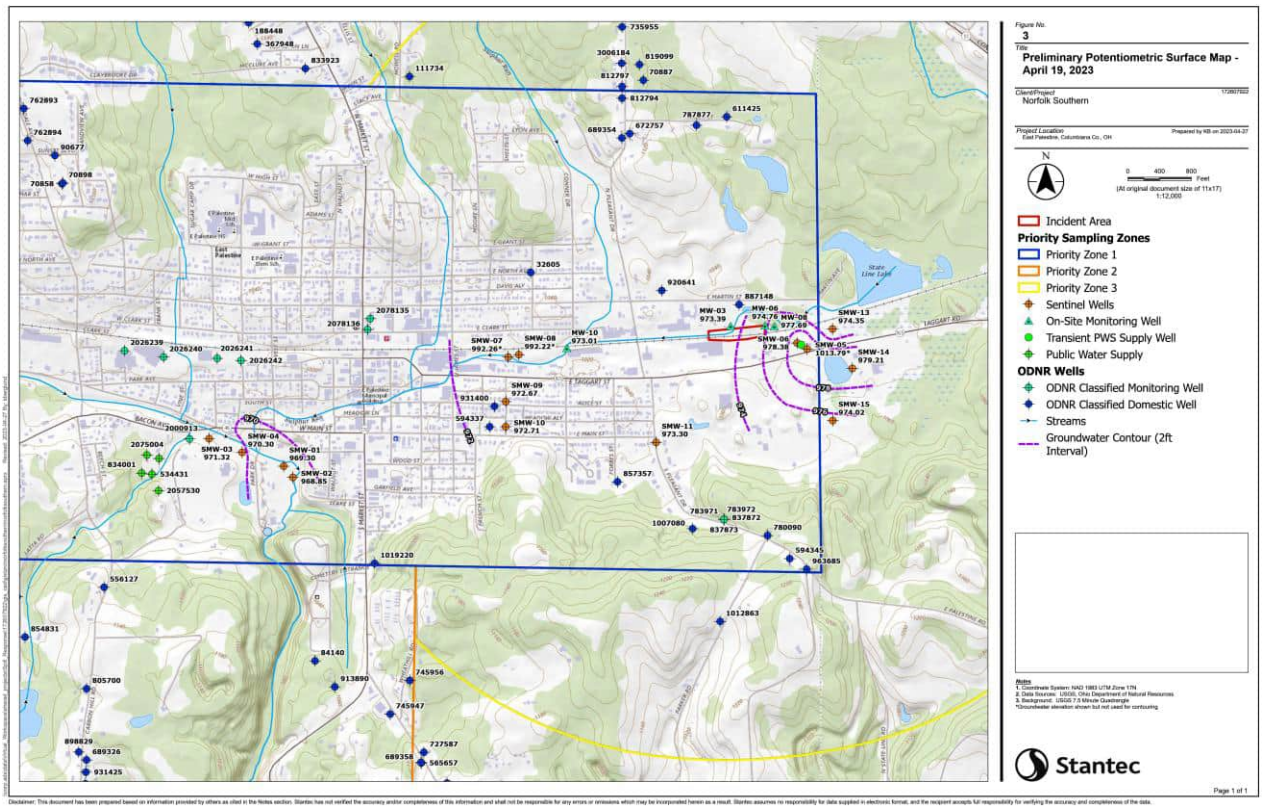


Figure 7-16: Soil Boring Locations in East Palestine, OH (Exhibit 55)

Monitoring Wells (MW) 3, 6, and 8 and SMW 6 and 8 are in nearest proximity to the CeramFab building (withing a couple to a few hundred feet).

Contained with Arcadis's June 27, 2023 Groundwater Characterization Work Plan are boring logs for six borings. Two sets of these borings are reproduced in Figures 7-17 to 7-24:

ARCADIS

Soil Boring and Construction Log

Boring No.: SB-03/MW-03

Sheet: 1 of 4

Client Name: Norfolk Southern
Project Number: 30169714
Project Name: East Palestine Train Derailment

Date Started: 03-05-2023
Date Completed: 03-06-2023
Total Depth: 72.0 ft bgs

Logger: Clair Lueke
Reviewer: Evan Green

Depth (feet)	Soil Sample ID	Water Sample ID	Rec. (ft)	Screening (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
0							Brown Silty fine SAND, little fine Gravel, trace roots, loose, wet [Topsoil and Fill].	(0-5 ft) Boring hand cleared to 5' bgs.
1				0.4			Strong brown fine SAND, trace fine subangular Gravel, trace Organics (roots), hard, dry, non-plastic.	
2								
3				0.4				
4								
5			1	1.4			Strong brown SILT, little fine Sand, trace fine subangular Gravel, mottled, hard, dry, non-plastic, no odor.	
6			1	0.5				
7			1	0.8				
8	SB-03(8-9)/20230305		1	2.7			CLAY, little Silt, little fine Sand, wet, cohesive, soft, low plasticity.	
9							Silty fine SAND, cohesive, dense, wet.	
10			1	0.6			Strong brown SILT, little Clay, cohesive, very stiff, dry (moist at 11.5' bgs), low plasticity, no odor.	
11			1	0.4			Brown Silty CLAY, little well rounded Cobble from 14.7 - 16.4' bgs, trace coarse Sand, mottled, cohesive, very stiff, dry, medium plasticity, no odor.	
12			1	0.3				
13			4	0.4				
14								
15				0.3				
16								
17				0.3				
18								
19			4	0.7			Strong brown CLAY, little Silt, trace fine subangular Gravel, cohesive, dry, very stiff, medium plasticity, no odor.	
20								

Construction Details

4" Stainless Steel Protective Casing

Sand Drain (0-1' bgs.)

2" PVC Casing

Bentonite-Cemenet Grout (0-57' bgs).

Drilling Co.: HD Drilling
Driller: Mike Mchar
Helper: None
Drill Rig: Track-Mounted Rotary Sonic
Remarks: Horizontal survey in U.S. feet refrenced to Ohio State Plane North Zone. Elevations are in U.S. feet refrenced to NAVD88.

Drilling Method: Rotary Sonic
Sampling Dimensions (ft): 5
First Encountered Water (ft bgs): 8
Static Water Level (ft bgs): NA
Top of Casing Elev: 1031.54
Surface Elev: 1028.90
North Coor: 432320.30
East Coor: 2515463.59

Figure 7-17: Soil Boring Logs for MW 3 – 0 to 20 ft. bgs

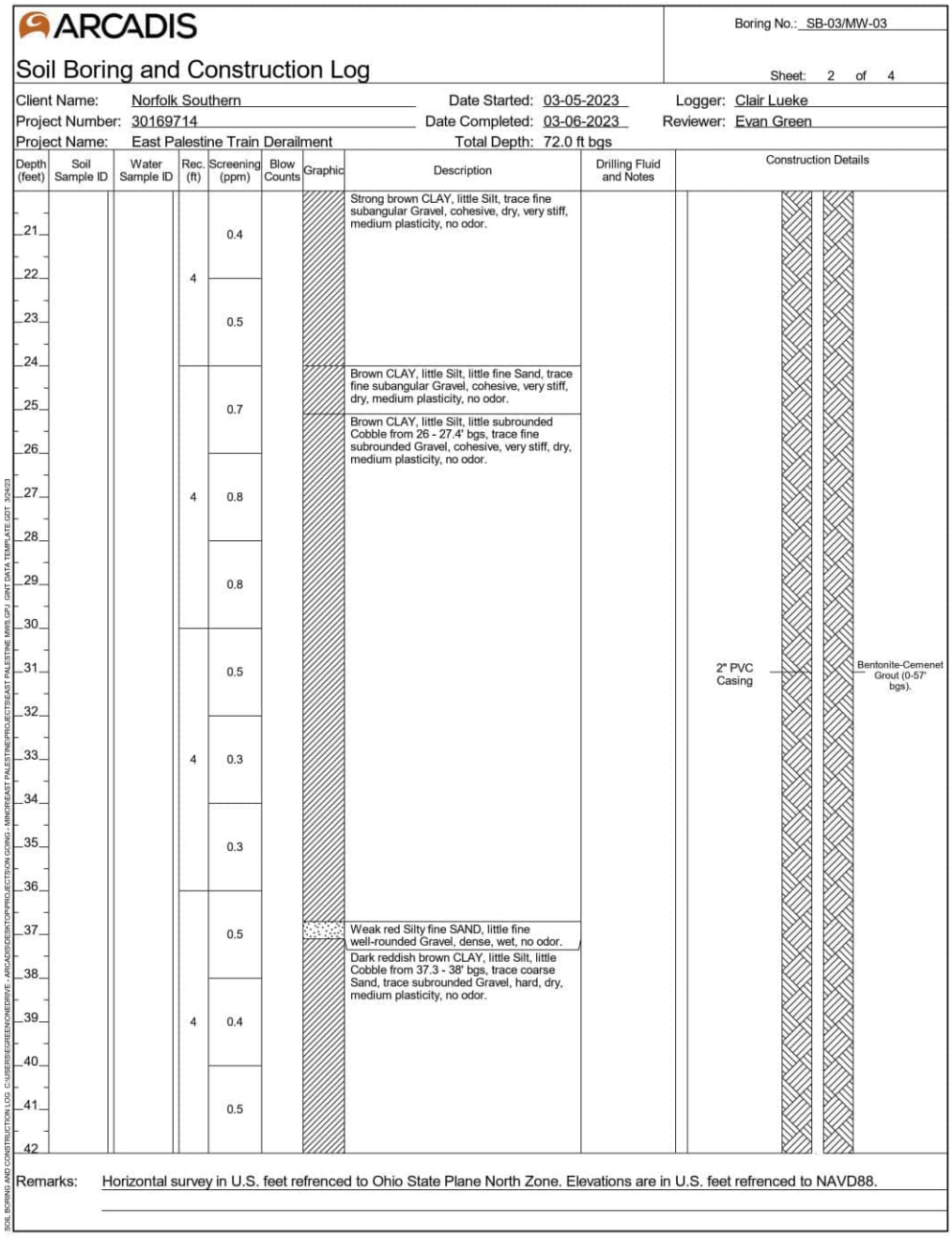


Figure 7-18: Soil Boring Logs for MW 3 – 20 to 42 ft. bgs

ARCADIS

Soil Boring and Construction Log

Boring No.: SB-03/MW-03

Sheet: 3 of 4

Client Name: Norfolk Southern
Project Number: 30169714
Project Name: East Palestine Train Derailment

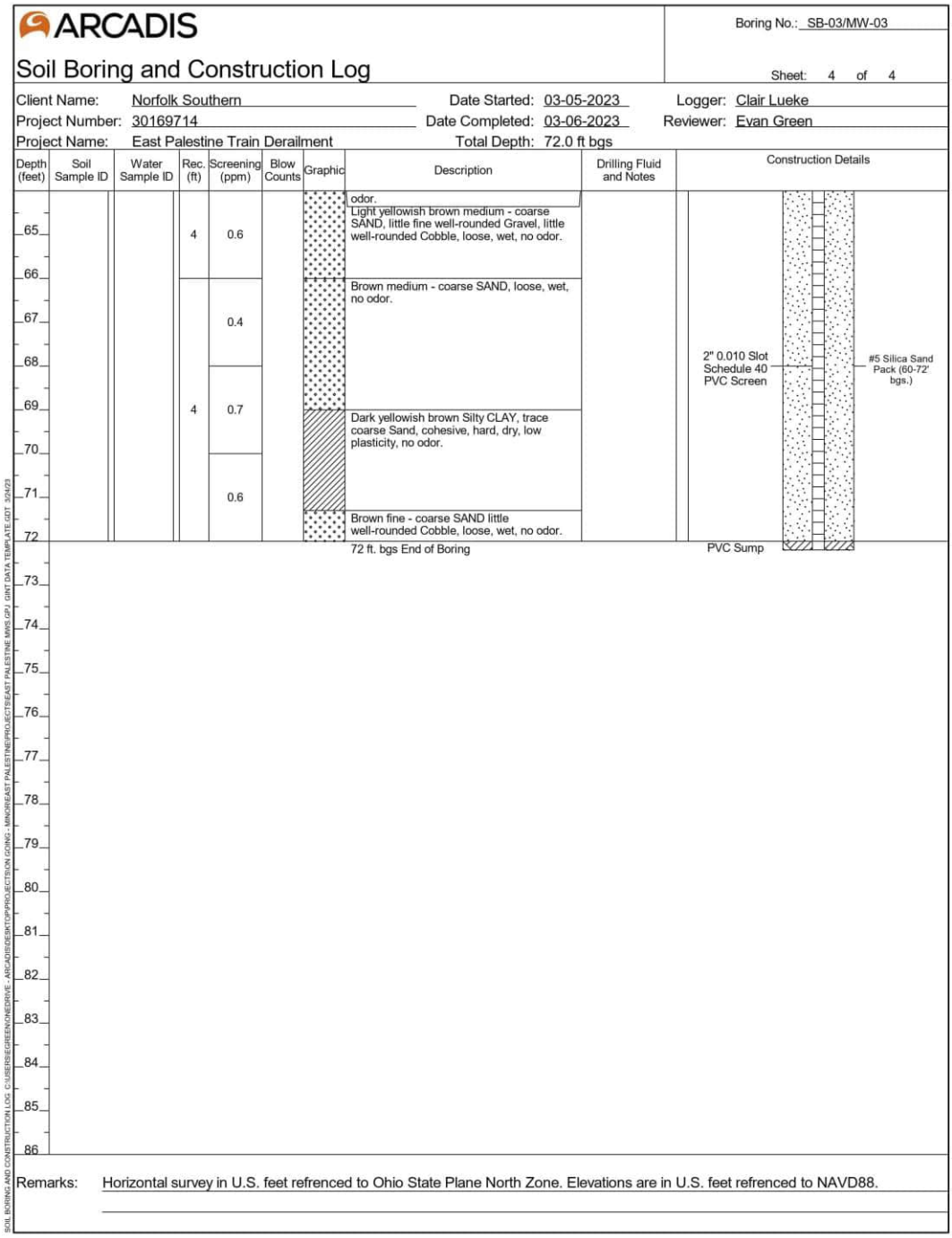
Date Started: 03-05-2023
Date Completed: 03-06-2023
Total Depth: 72.0 ft bgs

Logger: Clair Lueke
Reviewer: Evan Green

Depth (feet)	Soil Sample ID	Water Sample ID	Rec. (ft)	Screening (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes	Construction Details
43				0.8			Strong brown CLAY, little Silt, trace fine - coarse Sand, trace subrounded Gravel, cohesive, dry, hard, medium plasticity, no odor.		
44									
45			4	0.7					
46									
47				0.8					
48									
49				0.3					Bentonite-Cemenet Grout (0-57' bgs).
50									
51			4	0.5					
52									2" PVC Casing
53				0.3			Brown fine - medium SAND, little fine well-rounded Gravel, dense, moist, no odor.		
54									
55				0.5			SAND, little Silt, trace fine well-rounded Gravel, loose, moist.		
56									
57			4	0.4			Brown Silty CLAY, trace fine well-rounded Gravel, cohesive, hard, dry, no odor.		
58									
59				0.5					Bentonite Seal (57-60' bgs.)
60									
61	SB-03(60-62)/20230306			0.4					
62			4				Brown fine - medium SAND, little Silt, trace fine Gravel, very dense, wet, no odor.		#5 Silica Sand Pack (60-72' bgs.)
63				0.7			Dark yellowish brown Clayey SILT, little coarse Sand, trace fine well-rounded Gravel, cohesive, hard, moist, non-platic, no		2" 0.010 Slot Schedule 40 PVC Screen
64									

Remarks: Horizontal survey in U.S. feet refrenced to Ohio State Plane North Zone. Elevations are in U.S. feet refrenced to NAVD88.

Figure 7-19: Soil Boring Logs for MW 3 – 42 to 64 ft. bgs



ARCADIS

Soil Boring and Construction Log

Boring No.: SB-03/MW-03

Sheet: 4 of 4

Client Name: Norfolk Southern
Project Number: 30169714
Project Name: East Palestine Train Derailment

Date Started: 03-05-2023
Date Completed: 03-06-2023
Total Depth: 72.0 ft bgs

Logger: Clair Lueke
Reviewer: Evan Green

Depth (feet)	Soil Sample ID	Water Sample ID	Rec. (ft)	Screening (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes	Construction Details
							odor.		
65			4	0.6			Light yellowish brown medium - coarse SAND, little fine well-rounded Gravel, little well-rounded Cobble, loose, wet, no odor.		
66									
67				0.4			Brown medium - coarse SAND, loose, wet, no odor.		
68									2" 0.010 Slot Schedule 40 PVC Screen; #5 Silica Sand Pack (60-72' bgs.)
69			4	0.7					
70							Dark yellowish brown Silty CLAY, trace coarse Sand, cohesive, hard, dry, low plasticity, no odor.		
71				0.6					
72							Brown fine - coarse SAND little well-rounded Cobble, loose, wet, no odor.		
							72 ft. bgs End of Boring		PVC Sump
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									
85									
86									

Remarks: Horizontal survey in U.S. feet refrenced to Ohio State Plane North Zone. Elevations are in U.S. feet refrenced to NAVD88.

SOIL BORING AND CONSTRUCTION LOG C:\USERS\EGREEN\ONEDRIVE - ARCADIS\DESKTOP\PROJECTS\ON GOING - MINOR\EAST PALESTINE\PROJECTS\EAST PALESTINE MWS.GPJ GINT DATA TEMPLATE.GDT 3/24/23

Figure 7-20: Soil Boring Logs for MW 3 – 64 to 72 ft. bgs

ARCADIS

Soil Boring and Construction Log

Boring No.: SB-06/MW-06

Sheet: 1 of 4

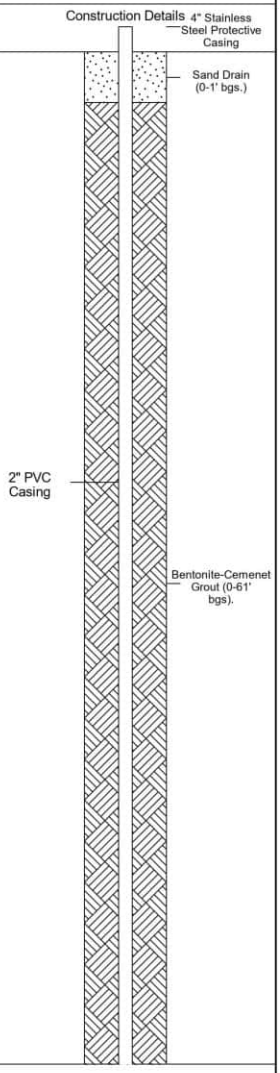
Client Name: Norfolk Southern
Project Number: 30169714
Project Name: East Palestine Train Derailment

Date Started: 03-01-2023
Date Completed: 03-02-2023
Total Depth: 75.0 ft bgs

Logger: Clair Lueke
Reviewer: Evan Green

Depth (feet)	Soil Sample ID	Water Sample ID	Rec. (ft)	Screening (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes
0							Dark brown fine SAND, little Organics (roots), loose, moist [Topsoil].	(0-5 ft) Boring hand cleared to 5' bgs.
1				0.3			Brown fine - medium SAND, medium stiff, moist, low plasticity.	
2								
3				0.5				
4							Brown Silty CLAY, little Organics (roots), cohesive, stiff, moist, medium plasticity, no odor.	
5								
6			1	0.7			Brown Silty CLAY, light gray mottling at 2.2' bgs, cohesive, stiff, moist, high plasticity, no odor.	
7	SB-06(6-7)/20230301		1	1.3				
8			1	0.9			Brown Silty fine GRAVEL, little medium - coarse Sand, dense, wet.	
9			1	0.9			Strong brown Silty fine SAND, little sub-rounded Gravel, very dense, wet, no odor.	
10			1	0.4			Brown Silty fine GRAVEL, little coarse Sand, dense, wet, no odor.	
11			1	0.7			Strong brown Silty fine SAND, trace Clay after 10.5' bgs, very dense, dry, no odor.	
12			1	0.7			Brown SILT, some fine sub-rounded Gravel, trace Clay, trace fine Sand, stiff, dry, low plasticity, no odor.	
13			1	0.3			Brown SILT, little Clay, little fine well-rounded Gravel, trace fine Sand, light gray mottling, cohesive, dry, low plasticity.	
14			1	0.5			Brown SILT, little Clay, little fine Sand, little fine well-rounded Gravel, non-cohesive, dry, non-plastic, no odor.	
15			2	0.5				
16								
17			2	0.3				
18								
19			1					
20			5	0.5			Brown CLAY, little Silt, cohesive, soft, moist, high plasticity.	

Construction Details



Drilling Co.: HD Drilling
Driller: Mike Mchar
Helper: None
Drill Rig: Track-Mounted Rotary Sonic
Remarks: Horizontal survey in U.S. feet refrenced to Ohio State Plane North Zone. Elevations are in U.S. feet refrenced to NAVD88.

Drilling Method: Rotary Sonic
Sampling Dimensions (ft): 5
First Encountered Water (ft bgs): 7
Static Water Level (ft bgs): NA
Top of Casing Elev: 1039.22
Surface Elev: 1036.39
North Coor: 432333.36
East Coor: 2515896.13

Figure 7-21: Soil Boring Logs for MW 6 – 0 to 20 ft. bgs

ARCADIS

Soil Boring and Construction Log

Boring No.: SB-06/MW-06

Sheet: 2 of 4

Client Name: Norfolk Southern
Project Number: 30169714
Project Name: East Palestine Train Derailment

Date Started: 03-01-2023
Date Completed: 03-02-2023
Total Depth: 75.0 ft bgs

Logger: Clair Lueke
Reviewer: Evan Green

Depth (feet)	Soil Sample ID	Water Sample ID	Rec. (ft)	Screening (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes	Construction Details
21				0.5			Brown SILT, little Clay, little fine sub-rounded Gravel, non-cohesive, dry, non-plastic, no odor.		
22			5				Dark yellowish brown fine SAND, very dense, moist.		
23				0.6			Brown SILT, little Clay, little sub-rounded Gravel, trace fine Sand, non-cohesive, hard, dry, no odor.		
24									
25				0.3					
26									
27			6	0.4					
28									
29				0.9					
30									
31				0.6					2" PVC Casing; Bentonite-Cemenet Grout (0-61' bgs).
32									
33			6	0.5					
34									
35				0.5					
36									
37				0.7			Brown Silty CLAY, little fine sub-rounded Gravel, trace fine Sand, non-cohesive, hard, dry, non-plastic, no odor.		
38									
39			6	0.2					
40									
41				0.1					
42									

Remarks: Horizontal survey in U.S. feet refrenced to Ohio State Plane North Zone. Elevations are in U.S. feet refrenced to NAVD88.

Figure 7-22: Soil Boring Logs for MW 6 – 20 to 42 ft. bgs

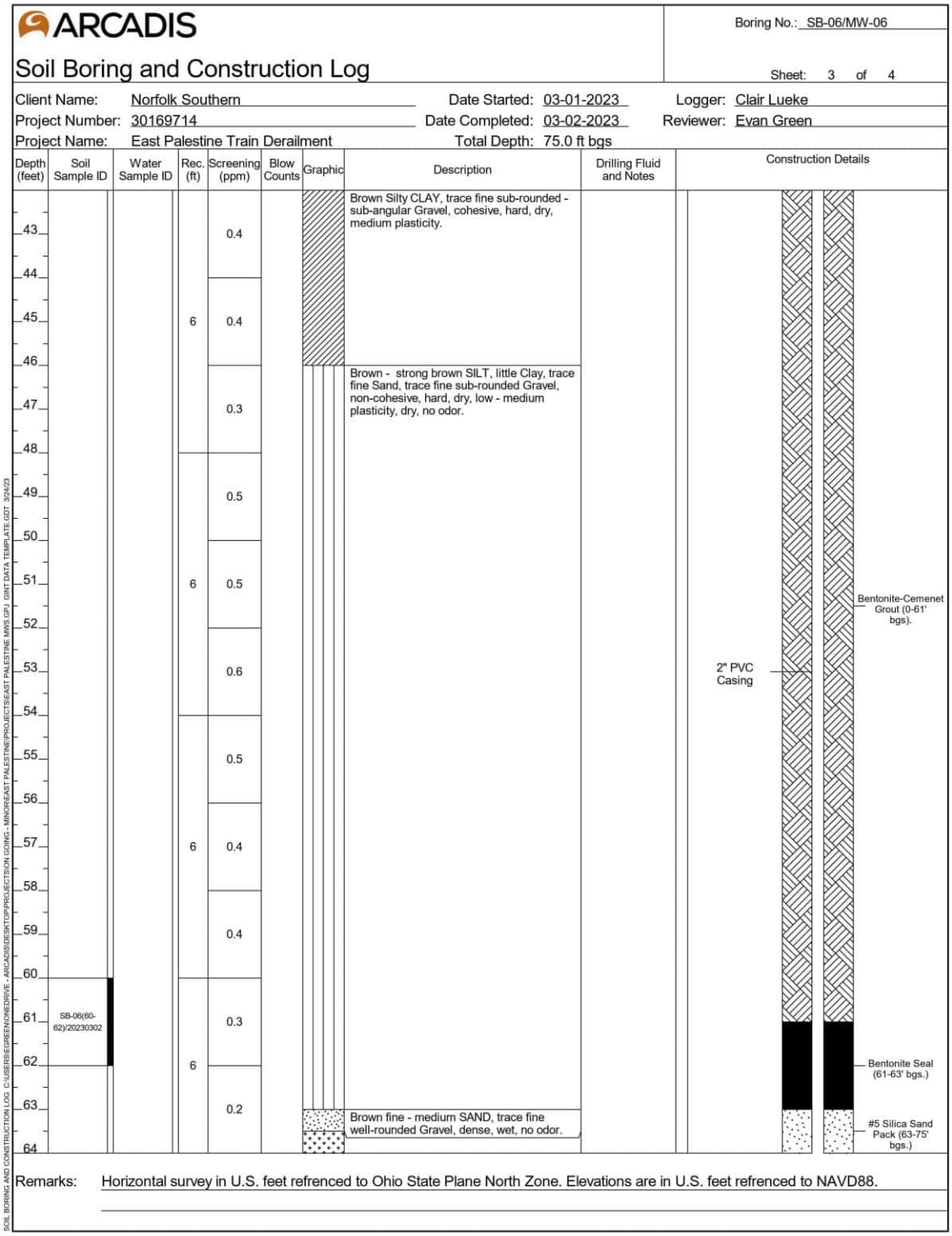
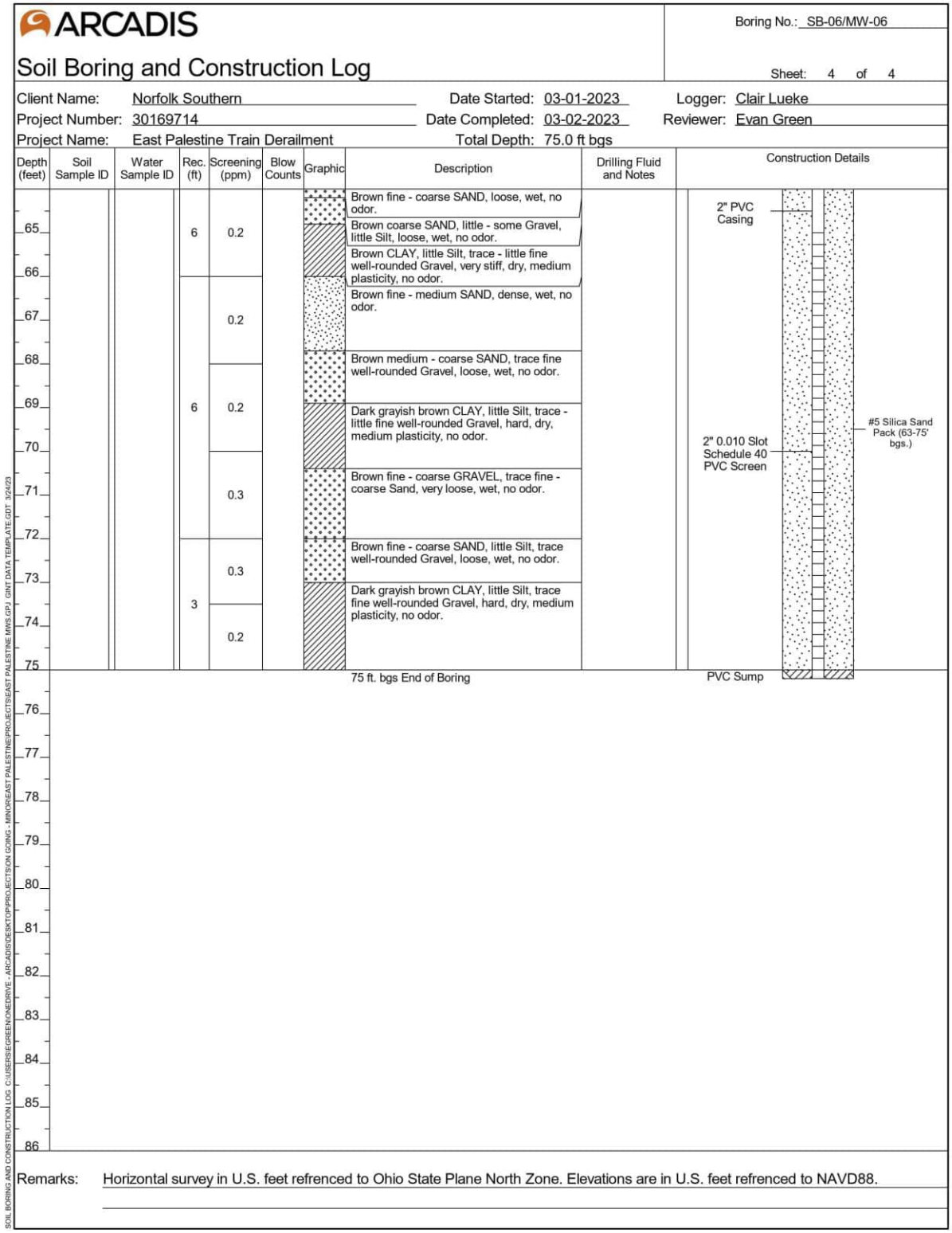


Figure 7-23: Soil Boring Logs for MW 6 – 42 to 64 ft. bgs



ARCADIS

Soil Boring and Construction Log

Boring No.: SB-06/MW-06

Sheet: 4 of 4

Client Name: Norfolk Southern
Project Number: 30169714
Project Name: East Palestine Train Derailment

Date Started: 03-01-2023
Date Completed: 03-02-2023
Total Depth: 75.0 ft bgs

Logger: Clair Lueke
Reviewer: Evan Green

Depth (feet)	Soil Sample ID	Water Sample ID	Rec. (ft)	Screening (ppm)	Blow Counts	Graphic	Description	Drilling Fluid and Notes	Construction Details
65			6	0.2			Brown fine - coarse SAND, loose, wet, no odor.		2" PVC Casing
							Brown coarse SAND, little - some Gravel, little Silt, loose, wet, no odor.		
66							Brown CLAY, little Silt, trace - little fine well-rounded Gravel, very stiff, dry, medium plasticity, no odor.		
67				0.2			Brown fine - medium SAND, dense, wet, no odor.		
68							Brown medium - coarse SAND, trace fine well-rounded Gravel, loose, wet, no odor.		
69			6	0.2			Dark grayish brown CLAY, little Silt, trace - little fine well-rounded Gravel, hard, dry, medium plasticity, no odor.		
70									2" 0.010 Slot Schedule 40 PVC Screen
71				0.3			Brown fine - coarse GRAVEL, trace fine - coarse Sand, very loose, wet, no odor.		#5 Silica Sand Pack (63-75' bgs.)
72									
73			3	0.3			Brown fine - coarse SAND, little Silt, trace well-rounded Gravel, loose, wet, no odor.		
74				0.2			Dark grayish brown CLAY, little Silt, trace fine well-rounded Gravel, hard, dry, medium plasticity, no odor.		
75							75 ft. bgs End of Boring		PVC Sump
76									
77									
78									
79									
80									
81									
82									
83									
84									
85									
86									

Remarks: Horizontal survey in U.S. feet refrenced to Ohio State Plane North Zone. Elevations are in U.S. feet refrenced to NAVD88.

SOIL BORING AND CONSTRUCTION LOG C:\USERS\EGREEN\ONEDRIVE - ARCADIS\DESKTOP\PROJECTS\ON GOING - MINOR\EAST PALESTINE\PROJECTS\EAST PALESTINE MWS.GPJ GINT DATA TEMPLATE.GDT 3/24/23

Figure 7-24: Soil Boring Logs for MW 6 – 64 to 75 ft. bgs

Note that predominant materials encountered were sands and clays, but no coal appears to be present on any of these boring logs down to depths of ~75'.

Since these logs have Arcadis' logo on them, they obviously had access to this information in preparing the CeramFab delineation report but apparently chose not to utilize it.

Moreover, NS/Arcadis knew that clay formed a confining base below the tracks containing perched waters " 10. *The elevation top of the clay unit forming the base of the perched aquifer* should be contoured in areas based on soil boring logs and elevations of piezometers and monitoring wells to the north and south of the site" (Exhibit 149 and Exhibit 150). These perched waters were found to be between ~4' and 12' bgs and typically above clay in shallow (STW designations) wells (Exhibit 150, pg. 2).

7.3.2 SVOCs Present in the Subsurface and Inside Building are Due to Coal and Fill Materials in Proximal Locations Near the CeramFab Facility Based on Arcadis Figure 4 above:

Despite statements made in their delineation report, nothing in Figure 4 identifies where it is located relative to the CeramFab facility and the suggestion that it deposited SVOCs from coal operations at this site is refuted in the boring logs references, and illustrated above.

Actual data taken from surface waters to the east and west of the CeramFab building on March 1, 2023 (Exhibit 84) demonstrate the presence of tank-car specific materials (Table 7-10):

Table 7-10 – Contaminants Measured At/Near the Plaintiff Facilities by NS

Results in mg/ℓ) or PPM	Sample Location /Sample Number					RLs	MDLs
	Blue Building [CeramFab] West (Sample #: WC-257204).	Blue Building [CeramFab] East (Sample #: WC-251060)	Clark (Sample #: WC-251079).	Pleasant (Sample #: WC-251633).	Gas Station (Sample #: WC-251478).		
Butyl acrylate	9.6	24	0.22	0.47	0.24	2.0 / 4.2 / 0.050 / 0.10 / 0.040	0.46 / 0.96 / 0.011 / 0.023 / 0.0092
2-Ethylhexyl acrylate	0.045	0.21 J	0.22	0.18	0.046	0.01 / 0.40 / 0.050 / 0.10 / 0.040	0.00056 / 0.13 / 0.017 / 0.033 / 0.013
2-Butoxyethanol	-	1.6	12	5.4	11	- / 0.40 / 4. / 0.80 / 1.6	' - / 0.11 / 1.1 / 0.21 / 0.42
Benzene	-	-	0.00098 J	0.0016	-	.- / - / 0.0010 / 0.0010 / -	.- / - / 0.00042 / 0.00042 / -
Vinyl Chloride	-	-	0.0011	0.0046	-	.- / - / 0.0010 / 0.0010 / -	.- / - / 0.00045 / 0.00045 / -

Moreover, May 7, 2023 Ohio EPA Field Investigation Findings suggest contaminates present near the CeramFab building and other locations (Exhibit 145, pg. 1) when they write in part:

Location	OEPA Field Observation	Is Action Required?
Ditch West of Wrecking Site Along CeramFab (Zone 1)	Water with sheen in ditch. Water being pumped via piping to south ditch west of CeramFab. Pump leaking, overflowing into containment, and re-entering ditch. Need to address pump.	Yes
CeramFab Catch Basin (Zone 3)	No Pumping.	No
South Ditch West of CeramFab. (Zone 3)	Sheen on water in ditch. Water from west side of CeramFab being pumped into ditch. Vacuum truck present but not pumping. Pump leaking oil and releasing oil and releasing outside of containment.	Yes
N. Please Rd. Center and North Ditch. (Zone 4)	Vacuum truck present but not pumping at RR crossing. Large accumulation of muddy water with sheen on road at Pleasant Rd RR crossing. Water entering into backfilled track excavation. Drag out due to traffic driving through standing water. Alerted vac operator to accumulation who then started pumping. Need continued management of water. NS notified. Track excavation water and N ditch being pumped into eastern modular tank.	Yes

Numerous issues related to Waste Staging Piles in Zone 1 also noted.

A copy of the map of the Zones cited is reproduced as Figure 7-25:

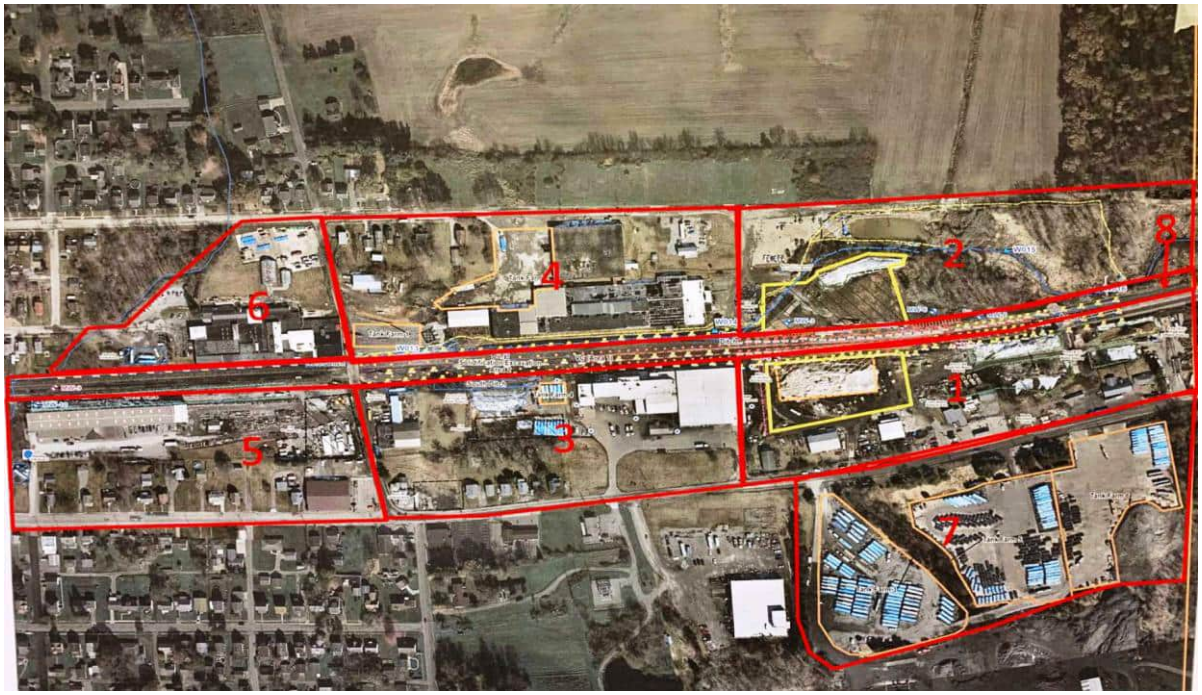


Figure 7-25: Ohio EPA East Palestine Derailment Zones (Exhibit 145)

Releases of contaminated water to surface soils near Tank Farm 3 from May 7, 2023 are shown in Figure 7-26:

NAME:	Photo #7

Taken by:	Frank Zingales
Date:	5/7/2023
Description	Provenance of sheen from Tank Farm 3

NAME:	Photo #8

Taken by:	Frank Zingales
Date:	5/7/2023
Description	Provenance of sheen from Tank Farm 3

Figure 7-26: Ohio EPA Photos of Contaminant Release to Soils Near Tank Farm 3 (Exhibit 145)

7.3.3 Arcadis' Claim that SVOCs Present in the Subsurface and Inside Building are Due to Fill Materials:

Arcadis, in their January 11, 2024 Main Line Interim Soil Removal Plan Addendum for Backfill and Restoration Report (Exhibit 57, pg. 8) discuss the fill material being used as follows:

> "For the purposes of this discussion, ***material from the off-site borrow source(s) is generally categorized as either general fill or topsoil. General fill is considered as any native soil that is not topsoil and has a United Soil Classification System (USCS) that is not GW, GP, PT, OH, or OL***. General fill will be used in areas that may require a material with a higher fines content (i.e., passing the #200 sieve). Such areas are generally those directly beneath topsoil."

Nothing in this report, or description of borrowed fill materials, suggests the presence of coal.

Moreover, in a cross-section drawing provided in Arcadis' April 14, 2023 Main Line Interim Soil Removal Plan, Amendment 3, the presence of coal, or older fill materials, is not indicated (Figure 7-27):

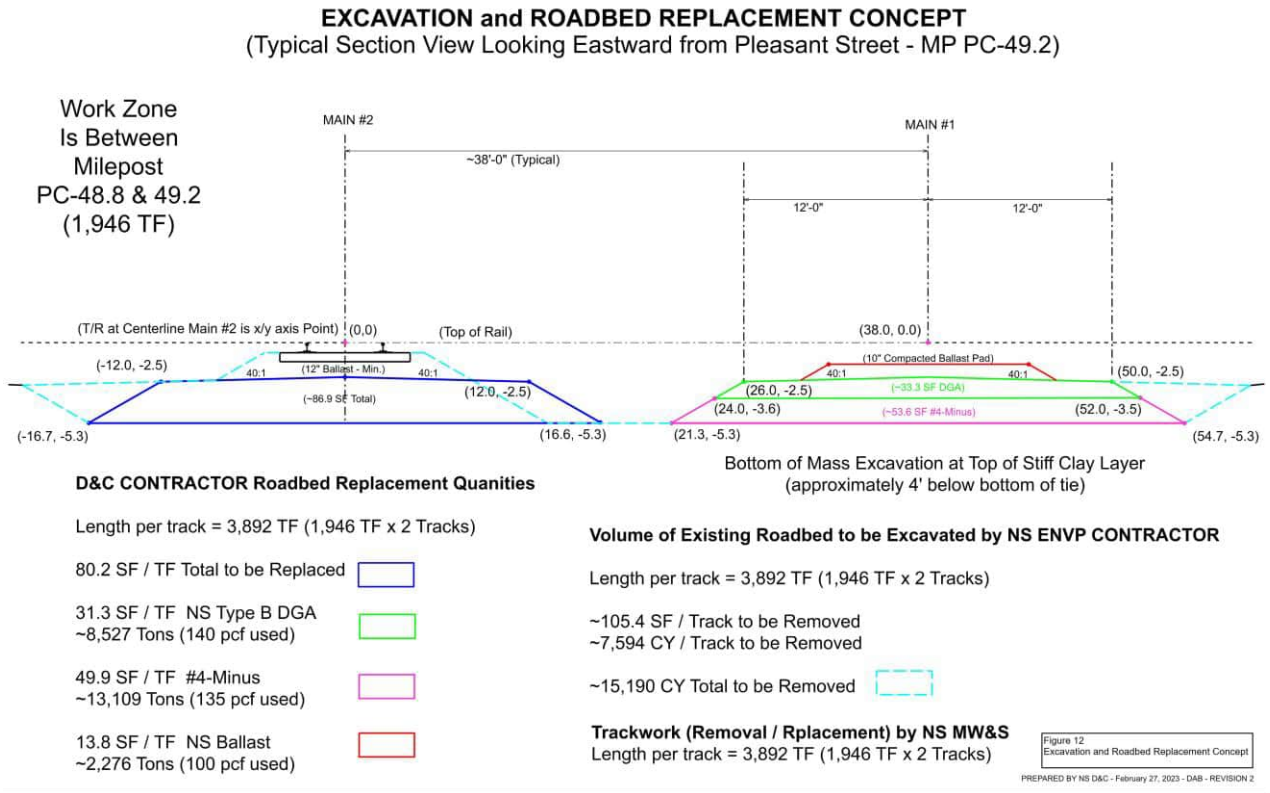


Figure 7-27: Fill Plan Diagrams (Exhibit 57 – Fig. 12)

Only stiff clay is shown below the gravel and ballast in Figure 7-27; this is again consistent with the boring logs and UST report cited earlier and again contradicts Defendants' speculative arguments.

7.3.4 Arcadis' Claim that VOCs Present in the Subsurface and Inside Building are Due to Coal and Fill Materials in Proximal Locations Near the CeramFab Facility Despite Sampling Results Showing SVOCs and Glycols at/near the Derailment Location:

Despite statements made in their delineation report, actual sampling results at/near the derailment site, and at/near Plaintiffs' property, show high levels of contaminants associated (e.g., 2-Butoxy Ethanol, Diethylene Glycol and Propylene Glycol) with materials carried by the derailed train (Table 7-11):

Table 7-11 – Petty Sampling Results for SVOCs and Glycols in East Palestine

Loc. #	Sample Description	GPS Sample(s) Location	Type of Sample	Sample Number(s)	Analysis Performed	Non-PAH SVOCs (soils in µg/kg and waters in µg/ℓ)	Glycols (soils in µg/kg and waters in µg/ℓ)	
Petty Sample Round #1						2-Butoxy Ethanol	Diethylene Glycol	Propylene Glycol
25A-25D	Soils Samples S of S Track and S Bank of Ditch/ Pond	[40º 50' 9" N & 80º 31' 20" W]	Terra Core Kit - Soils	S-25A	8260 D - VOCs	~1,900,000	8,400,000	
			Soil	S-25A-2	8270 E - SVOCs			

Loc. #	Sample Description	GPS Sample(s) Location	Type of Sample	Sample Number(s)	Analysis Performed	Non-PAH SVOCs (soils in µg/kg and waters in µg/ℓ)	Glycols (soils in µg/kg and waters in µg/ℓ)	
			Soil	S-25A-3	8015 C - Glycols			
			Soil	S-25A-4	8290 A - Dioxins/Furans			
	Sediment Soil Samples S of S Track and Ditch/ Pond		Terra Core Kit - Soils	S-2BA	8260 D - VOCs	~4,200,000	5,400,000	
			Soil	S-25B-2	8270 E - SVOCs			
			Soil	S-25B-3	8015 C - Glycols			
			Soil	S-25B-4	8290 A - Dioxins/Furans			
	Water Samples S of S Track and from Ditch/ Pond		Water	W-25A-1a/1b/1c	8260 D - VOCs	~2,300,000	27,000,000	52,000
			Water	W-25A-2A/2B	8270 E - SVOCs			
			Water	W-25A-3a/3b/3c	8015 C - Glycols			
			Water	W-25A-4A/4B	8290 A - Dioxins/Furans			
	Soil Samples S of S Tracks and Just North of Black Plastic Area to SW	[40º 50' 9" N & 80º 31' 21" W]	Terra Core Kit - Soils	S-25C	8260 D - VOCs	10,000	210,000	
			Soil	S-25C-2	8270 E - SVOCs			
			Soil	S-25C-3	8015 C - Glycols			
			Soil	S-25C-4	8290 A - Dioxins/Furans			
	Soils Near Pond and Damaged Tank Car Well South of Tracks – S Entrance Road Area from Taggart	[40º 50' 7" N & 80º 31' 20" W]	Terra Core Kit - Soils	S-25D	8260 D - VOCs	95,000	100,000	450,000
			Soil	S-25D-2	8270 E - SVOCs			
			Soil	S-25D-3	8015 C - Glycols			
			Soil	S-25D-4	8290 A - Dioxins/Furans			
	Water from Surface Puddle/ Pond and Damaged Tank Car Well South of Tracks – S Entrance Road Area from Taggart		Water	W-25B-1a/1b/1c	8260 D - VOCs	~5,500.000	110,000	540,000
			Water	W-25B-2A/2B	8270 E - SVOCs			
			Water	W-25B-3a/3b/3c	8015 C - Glycols			
			Water	W-25B-4A/4B	8290 A - Dioxins/Furans			
27	RR Yard – After South Track Removed – Eastern most soil stock pile S of tracks - W end.	[40º 50' 10" N & 80º 31' 11" W]	Terra Core Kit - Soils	S-27A	8260 D - VOCs	350,000	2,800,000	3,900,000
			Soil	S-27A-2	8270 E - SVOCs			
			Soil	S-27A-3	8015 C - Glycols			
			Soil	S-27A-4	8290 A - Dioxins/Furans			
	RR Yard – After South Track Removed – Central soil stock pile S of tracks - still E of S entry road – E end.	[40º 50' 9" N & 80º 31' 13" W]	Terra Core Kit - Soils	S-27B	8260 D - VOCs		99,000	
			Soil	S-27B-2	8270 E - SVOCs			
			Soil	S-27B-3	8015 C - Glycols			
			Soil	S-27B-4	8290 A - Dioxins/Furans			
	RR Yard – After S Track Removed – Near E soil stock pile S of tracks -still E of S entry road - W end.	[40º 50' 7" N & 80º 31' 16" W]	Terra Core Kit - Soils	S-27C	8260 D - VOCs	7,100	4,500,000	380,000
			Soil	S-27C-2	8270 E - SVOCs			
			Soil	S-27C-3	8015 C - Glycols			
			Soil	S-27C-4	8290 A - Dioxins/Furans			
	RR Yard – After South Track Removed – Under removed track and upper ballast – Location 1 – Lots of gravel.	[40º 50' 6" N & 80º 31' 20" W]	Terra Core Kit - Soils	S-27D	8260 D - VOCs	8,300		
			Soil	S-27D-2	8270 E - SVOCs			
			Soil	S-27D-3	8015 C - Glycols			
			Soil	S-27D-4	8290 A - Dioxins/Furans			

Loc. #	Sample Description	GPS Sample(s) Location	Type of Sample	Sample Number(s)	Analysis Performed	Non-PAH SVOCs (soils in µg/kg and waters in µg/ℓ)	Glycols (soils in µg/kg and waters in µg/ℓ)	
	RR Yard – After South Track Removed – Under removed track and upper ballast – Location 2 – Lots of gravel	[40º 50' 10" N & 80º 31' 18" W]	Terra Core Kit - Soils	S-27E	8260 D - VOCs	240,000	150,000	1,000,000
			Soil	S-27E-2	8270 E - SVOCs			
			Soil	S-27E-3	8015 C - Glycols			
			Soil	S-27E-4	8290 A - Dioxins/Furans			
	RR Yard – After South Track Removed – Gravel layer removed down to clay Location 1 – Only removed E 1/3rd – sampled W end of excavation	[40º 50' 6" N & 80º 31' 19" W]	Terra Core Kit - Soils	S-27F	8260 D - VOCs	890,000	930,000	
			Soil	S-27F-2	8270 E - SVOCs			
			Soil	S-27F-3	8015 C - Glycols			
			Soil	S-27F-4	8290 A - Dioxins/Furans			
	RR Yard – After S Track Removed – Gravel layer removed down to clay Location 2 – Only removed E 1/3rd – sampled central bottom of excavation – thin dark layer.	[40º 50' 6" N & 80º 31' 19" W] - ~50' east of location #1	Terra Core Kit - Soils	S-27G	8260 D - VOCs	45,000	140,000	
			Soil	S-27G-2	8270 E - SVOCs			
			Soil	S-27G-3	8015 C - Glycols			
			Soil	S-27G-4	8290 A - Dioxins/Furans			
	RR Yard – After S Track Removed – Gravel layer removed down to clay Location 2 – Only removed E 1/3rd – sampled water from W bottom end of excavation – thin dark layer.	[40º 50' 6" N & 80º 31' 19" W] - ~50' east of location #1	Water	W-27-1a/1b/1c	8260 D - VOCs	~490,000	2,900,000	76,000
			Water	W-27-4a	8270 E - SVOCs			
			Water	W-27-3a/3b/3c	8015 C - Glycols			
			Water	W-27A-1	8290 A - Dioxins/Furans			
Petty Sample Round #2								
70	Water from bottom of west end of excavation	[40º 50' 9.12" N & 80º 31' 37.74" W]	Water	W-70-1a/1b/1c	8260 D - VOCs	800	2,600,000	110,000
			Water	W-70-2A/2B	8270 E - SVOCs			
			Water	W-70-3a/3b/3c	8015 C - Glycols			
			Water	W-70-4A/4B	8290 A - Dioxins/Furans			
72	Water sample taken just east of the excavator that was ~150 east of the west end excavation (ust East of the West End of Excavation of North Track – Water in Ditch Between Tracks)	[40º 50' 9.18" N & 80º 31' 34.56" W]	Water	W-72-1a/1b/1c	8260 D - VOCs	4,100	450,000	23,000
			Water	W-72 2A/2B	8270 E - SVOCs			
			Water	W-72-3a/3b/3c	8015 C - Glycols			
			Water	W-72-4A/4B	8290 A - Dioxins/Furans			
72	Soil samples from N edge berm (Not same location was Water Samples #72).	[40º 50' 10.4" N & 80º 31' 16.4" W]	Terra Core Kit - Soils	S-72-1	8260 D - VOCs	8,000		
			Soil	S-72-2	8270 E - SVOCs			
			Soil	S-72-3	8015 C - Glycols			
			Soil	S-72-4	8290 A - Dioxins/Furans			
73	Soil samples from N edge berm (N side of removed North Track – Next Sample West from Far East End).	[40º 50' 10.3" N & 80º 31' 17.1" W]	Terra Core Kit - Soils	S-73-1	8260 D - VOCs	2,700		
			Soil	S-73-2	8270 E - SVOCs			
			Soil	S-73-3	8015 C - Glycols			
			Soil	S-73-4	8290 A - Dioxins/Furans			
74	Soil samples from N edge berm (N side of removed North Track – Next Sample West from Soil Sample #73).	[40º 50' 10.1" N & 80º 31' 18.6" W]	Terra Core Kit - Soils	S-74-1	8260 D - VOCs	10,000		
			Soil	S-74-2	8270 E - SVOCs			
			Soil	S-74-3	8015 C - Glycols			
			Soil	S-74-4	8290 A - Dioxins/Furans			
75	Soil samples from N edge berm (N side of removed	[40º 50' 9.9" N & 80º 31'	Terra Core Kit - Soils	S-75-1	8260 D - VOCs	730		

Loc. #	Sample Description	GPS Sample(s) Location	Type of Sample	Sample Number(s)	Analysis Performed	Non-PAH SVOCs (soils in µg/kg and waters in µg/ℓ)	Glycols (soils in µg/kg and waters in µg/ℓ)	
	North Track – Next Sample West from Soil Sample #74).	20.3" W]	Soil	S-75-2	8270 E - SVOCs			
			Soil	S-75-3	8015 C - Glycols			
			Soil	S-75-4	8290 A - Dioxins/Furans			
76	Soil samples from N edge berm (N side of removed North Track – Next Sample West from Soil Sample #75).	[40º 50' 10.0" N & 80º 31' 21.0" W]	Terra Core Kit - Soils	S-76-1	8260 D - VOCs	13,000	34,000	
			Soil	S-76-2	8270 E - SVOCs			
			Soil	S-76-3	8015 C - Glycols			
			Soil	S-76-4	8290 A - Dioxins/Furans			
77	Soil samples from N edge berm (N side of removed North Track – Next Sample West from Soil Sample #76).	[40º 50' 9.9" N & 80º 31' 21.8" W]	Terra Core Kit - Soils	S-77-1	8260 D - VOCs	4,500	8,000	
			Soil	S-77-2	8270 E - SVOCs			
			Soil	S-77-3	8015 C - Glycols			
			Soil	S-77-4	8290 A - Dioxins/Furans			
79	Soil samples from N edge berm (Essentially same location as Water Samples #74) (N side of removed North Track – Next Sample West from Soil Sample #78).	[40º 50' 10.1" N & 80º 31' 23.0" W]	Terra Core Kit - Soils	S-79-1	8260 D - VOCs	12,000	89,000	170,000
			Soil	S-79-2	8270 E - SVOCs			
			Soil	S-79-3	8015 C - Glycols			
			Soil	S-79-4	8290 A - Dioxins/Furans			
74	Surface water samples from depression filled with water near north side of north track (Essentially same location as Soil Samples #79) (So-called burn pit).	[40º 50' 10.1" N & 80º 31' 23.8" W]	Water	W-74-1a/1b/1c	8260 D - VOCs	~18,000	270,000	2,300,000
			Water	W-74a-2a/2b	8270 E - SVOCs			
			Water	W-74-3a/3b/3c	8015 C - Glycols			
			Water	W-74-4a/4b	8290 A - Dioxins/Furans			
81	Soil samples from near water sample detailed below (Essentially same location as Water Samples #76) (N side of removed North Track) (Culvert exit west of so-called burn pit).	[40º 50' 10.0" N & 80º 31' 24.5" W]	Terra Core Kit - Soils	S-81-1	8260 D - VOCs	5,100	21,000	
			Soil	S-81-2	8270 E - SVOCs			
			Soil	S-81-3	8015 C - Glycols			
			Soil	S-81-4	8290 A - Dioxins/Furans			
76	Surface water samples from depression filled with water near north side of north track (Essentially same location as Soil Samples #81) (N side of removed North Track) (Culvert exit west of so-called burn pit).	[40º 50' 10.0" N & 80º 31' 24.5" W]	Water	W-76-1a/1b/1c	8260 D - VOCs	590		
			Water	W-76a-2a/2b	8270 E - SVOCs			
			Water	W-76-3a/3b/3c	8015 C - Glycols			
			Water	W-76-4a/4b	8290 A - Dioxins/Furans			
82	Soil samples from N edge berm (N side of removed North Track – Next Sample West from Soil Sample #81)	[40º 50' 9.9" N & 80º 31' 24.7" W]	Terra Core Kit - Soils	S-82-1	8260 D - VOCs	330		
			Soil	S-82-2	8270 E - SVOCs			
			Soil	S-82-3	8015 C - Glycols			
			Soil	S-82-4	8290 A - Dioxins/Furans			

Detailed plaintiff expert(s) PAH sampling results will also be summarized and discussed later in this report.

NS/Arcadis themselves, also show several SVOC sample results, including those for benzo(a)pyrene, above RSLs in Exhibit 151, Figure 4 – Soil Analytical Results – Shallow Well Locations (Figure 7-28):

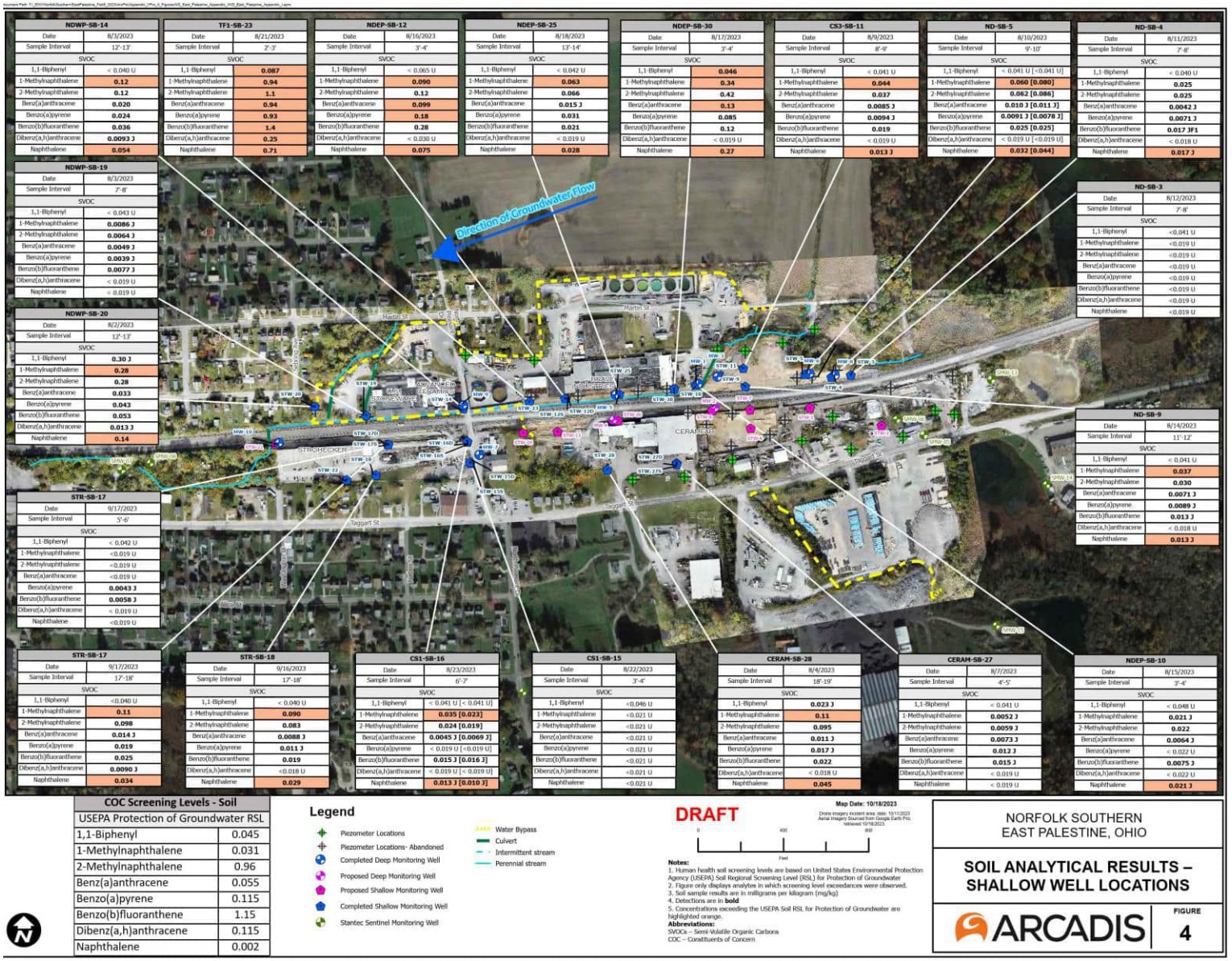


Figure 7-28:– Boring / Well Locations & Soil Analytical Results – Shallow Well Locations (Exhibit 151, Figure 4)

Note that similar arguments have been made by Arcadis in their CeramFab Delineation Report regarding Dioxins/Furans – that they are not associated with the derailment. However, this argument is inconsistent with the chemistry of uncontrolled burning chlorinated hydrocarbons, with Arcadis' own early dioxin data presented earlier, and a detailed review of four sets of Plaintiff expert(s) dioxin date discussed later.

7.4 Arcadis' Claim Regarding PFAS/PFOS Data Present on Plaintiffs' Property:

Arcadis, makes the following statement in their June 17, 2025 Delineation Memo Report regarding PFAS/PFOA contamination at CeramFab (Exhibit 2, pg. 3, Bates NS-CeramFab000972-973):

> "As presented in the Sitewide Occurrence of PFAS Constituents (PFAS Memo, Arcadis, 2025c), the investigation programs at the Site included sampling for certain PFAS in soil, sediment, and groundwater even though PFAS was not known to be released from the derailment. Rather, *the investigation was performed because it was reported that aqueous film forming foam (AFFF) was used by fire fighters during the response to the derailment*. The application area of the AFFF was reported to be at the Pleasant Drive crossing of the railroad tracks. Because older AFFF product may contain PFAS compounds, the various work plans included investigation for specific PFAS compounds. Through correspondence with the manufacturer of the AFFF that was used in response to the derailment, T-Storm F787BP AR-AFFF (T-Storm), ***only one PFAS compound sampled for in the investigation, perfluorooctanoic acid (PFOA), could have been present or derived from the T-Storm reportedly applied at the Pleasant Street crossing.*** The findings within the PFAS Memo demonstrate that 1) the detections of PFAS constituents found throughout the investigation area are inconsistent with those related solely to the application of T-Storm, 2) only PFOA could be related to T-Storm and the highest concentration is found topographically upgradient from the Pleasant Street crossing application areas, and 3) *there is inconclusive evidence to suggest that the PFOA found in Site media is from the derailment response*.
>
> "**Conclusions and Requests for Concurrences:** ***PFAS exceedances of RSLs were observed sporadically in the subsurface samples collected in the CeramFab Area***. In accordance with the April 2025 PFAS Memo conclusions, ***the only PFAS constituent that might be related to firefighting foam used during the derailment is PFOA***. ***Therefore, other PFAS constituents (Table 2e) above regulatory limits cannot be related to the derailment.*** In addition, PFOA is found widespread throughout the derailment footprint including around subsurface conveyances not connected to Category 1A areas or upgradient of connections to the Category 1A areas. *As such, there is inconclusive evidence to suggest PFOA is from the derailment area and therefore no further action is required for PFOA.*

My opinion regarding this indeterminant opinion regarding the sources(s) of the PFASs or PFOAs reflects a lack of the most basic understanding by NS/Arcadis of known chemistry/literature regarding these substances:

7.4.1 Response #1 – Arcadis' statement that "the only PFAS constituent that might be related to firefighting foam used during the derailment is PFOA" reflects a lack of understanding of PFAS chemistry:

First, PFOA is one of the PFASs which is a broader category of chlorinated hydrocarbons than just PFOA.

Perfluorinated Hydrocarbons - General:

The topic of perfluorinated hydrocarbons is quite confusing to lay people simply because of the breadth and complexity of substances covered by this terminology. In the simplest sense, these are substances where the hydrogen (H) atoms normally attached to a chain of carbon (C) atoms (i.e., hydrocarbons) are replaced by fluorine (F) atoms (i.e., fluorocarbons). Then complexity lies in the number and arrangement of carbon atoms tied together as well as the introduction of nitrogen (N), oxygen (O), and sulfur (S) atoms present in some of these chemicals.

Work by the Organization for Economic Co-operation and Development (OECD), illustrates definitions of perfluorinated hydrocarbons based on how they are manufactured and the term PFAS (Per- and Polyfluoroalkyl Substances) often used to described many of these types of substances (Figure 7-29):

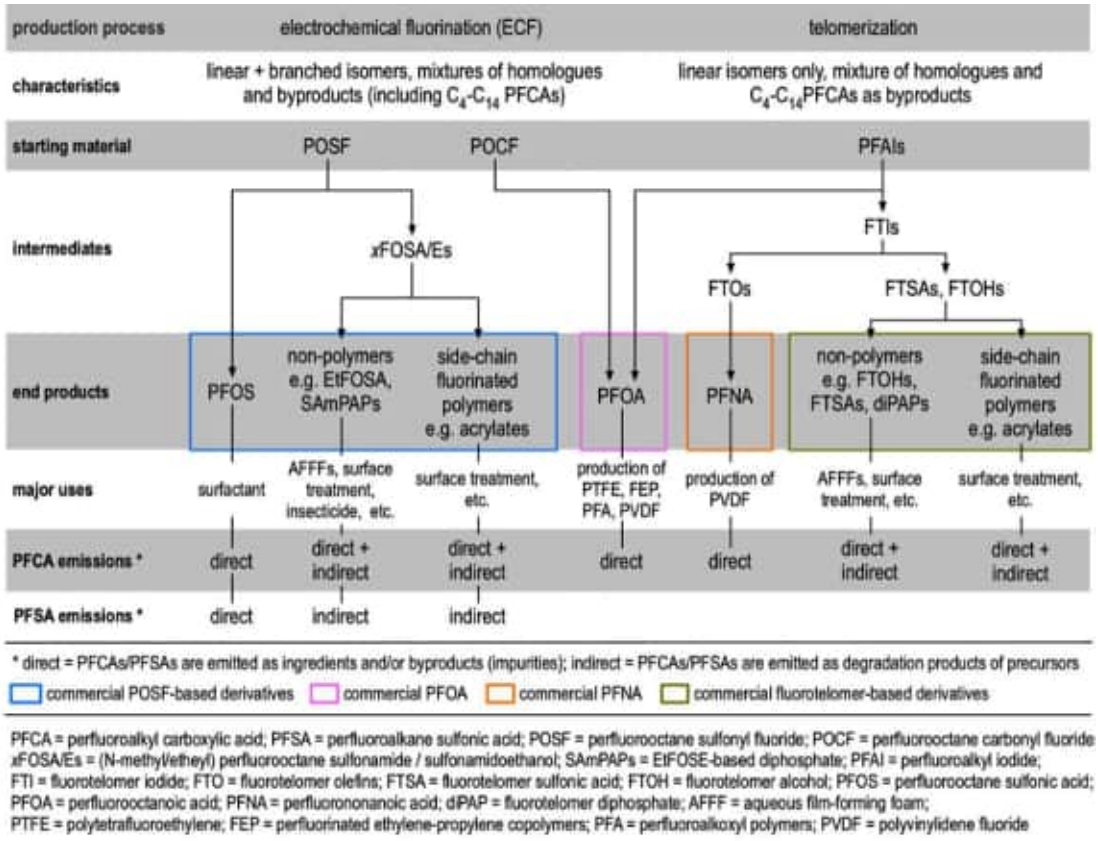


Figure 7-29: Perfluorochemicals Produced by Manufacturing Process (from https://www.oecd.org/chemicalsafety/Working%20Towards%20a%20Global%20Emission%20Inventory%20of%20PFASS.pdf)

As one can see from Figure 7-29, perfluorinated chemicals have been manufactured from two primary processes: i) electrochemical fluorination (ECF) and telomerization. The ECF process was patented and developed originally by Dr. Simon and that technology acquired and further developed by 3M in the 1940s; this involves use of electricity in chemical cells to produce these types of products. Telomerization is a chemical process developed in the 1970s in which two monomers (short-chained carbon-chained chemicals) are reacted to form perfluorinated chemicals. ECF processes produce a mixture of even- and odd- numbered carbon chain lengths of approximately 70% linear and 30% branched substances whereas telomerization yields mainly even numbered, straight carbon chain isomers.

[Thus, Arcadis could have characterized the PFOA through testing based on relative branching of the chain chemistry to determine the extent the chemistry was branched which determines the source and dates when the product might have been produced. There is no indication this was done, so it is speculation to suggest it came from historic sources without performing more due diligence.]

PFOS, AFFF, PFOA, and other products were produced using the ECF process and PFOA, AFFF, and other products were produced using the telomerization process.

Products produced by technology and fluorochemical(s) with time are illustrated in Figure 7-30:

<table>
<tr><td rowspan="2">PFAS[1]</td><td colspan="8">Development Time Period</td></tr>
<tr><td>1930s</td><td>1940s</td><td>1950s</td><td>1960s</td><td>1970s</td><td>1980s</td><td>1990s</td><td>2000s</td></tr>
<tr><td>PTFE</td><td>Invented</td><td colspan="2">Non-Stick Coatings</td><td></td><td colspan="2">Waterproof Fabrics</td><td></td><td></td></tr>
<tr><td>PFOS</td><td></td><td>Initial Production</td><td>Stain & Water Resistant Products</td><td>Firefighting foam</td><td></td><td></td><td></td><td rowspan="3">U.S. Reduction of PFOS, PFOA, PFNA (and other select PFAS[2])</td></tr>
<tr><td>PFOA</td><td></td><td colspan="2">Initial Production</td><td colspan="2">Protective Coatings</td><td></td><td></td></tr>
<tr><td>PFNA</td><td></td><td></td><td></td><td></td><td>Initial Production</td><td colspan="2">Architectural Resins</td></tr>
<tr><td>Fluoro-telomers</td><td></td><td></td><td></td><td></td><td>Initial Production</td><td colspan="2">Firefighting Foams</td><td>Predominant form of firefighting foam</td></tr>
<tr><td>Dominant Process[3]</td><td></td><td colspan="6">Electrochemical Fluorination (ECF)</td><td>Fluoro-telomerization (shorter chain ECF)</td></tr>
<tr><td colspan="3">Pre-Invention of Chemistry /</td><td colspan="3">Initial Chemical Synthesis / Production</td><td colspan="3">Commercial Products Introduced and Used</td></tr>
<tr><td colspan="9">Notes:
1. This table includes fluoropolymers, PFAAs, and fluorotelomers. PTFE (polytetrafluoroethylene) is a fluoropolymer. PFOS, PFOA, and PFNA (perfluorononanoic acid) are PFAAs.
2. Refer to Section 3.4.
3. The dominant manufacturing process is shown in the table; note, however, that ECF and fluorotelomerization have both been, and continue to be, used for the production of select PFAS.</td></tr>
<tr><td colspan="9">Sources: Prevedouros et al. 2006; Concawe 2016; Chemours 2017; Gore-Tex 2017; US Naval Research Academy 2017</td></tr>
</table>

Figure 7-30: Perfluorochemicals Produced by Manufacturing Process (from https://pfas-1.itrcweb.org/fact_sheets_page/pfas_fact_sheet_history_and_use__4_8_20.pdf)

The term PFAS is a broad term, is often used, and represents a large grouping of classes of fluorochemicals as is illustrated in Figure 7-31

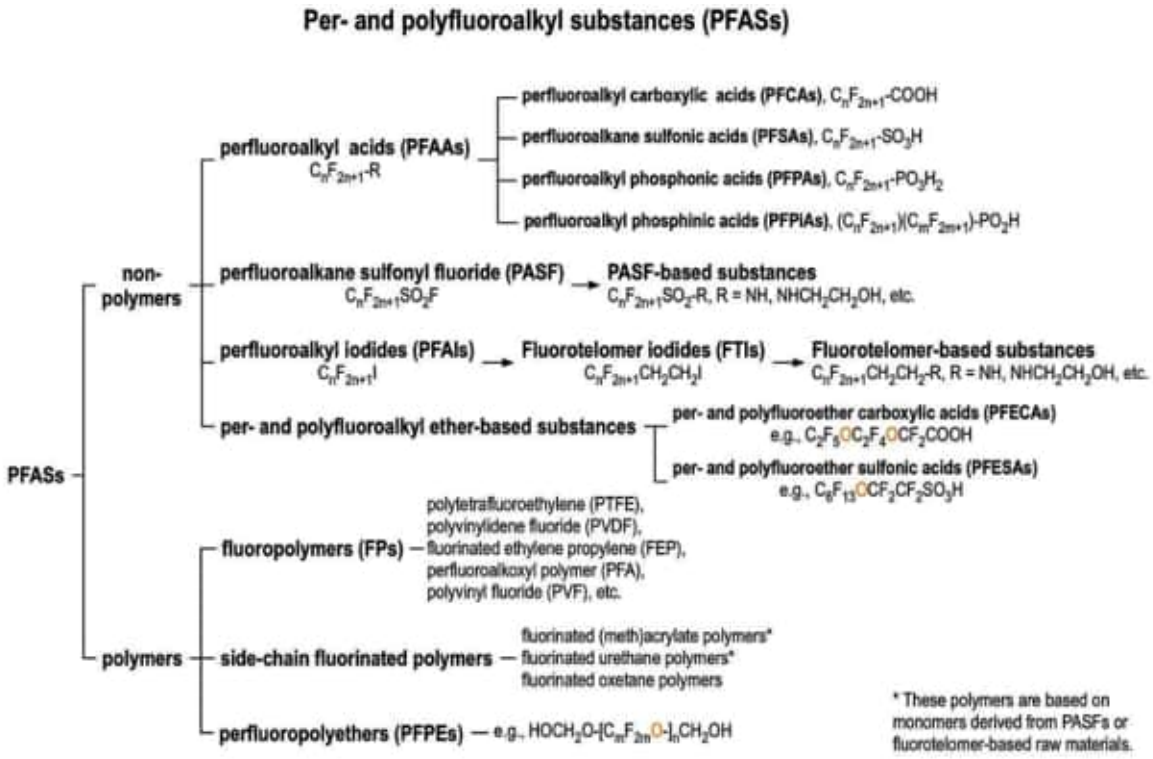


Figure 7-31: PFAS Chemicals (from https://www.oecd.org/chemicalsafety/Working%20Towards%20a%20Global%20Emission%20Inventory%20of%20PFASS.pdf)

As one can see from Figure 7-31, PFAS refers to dozens, if not hundreds, of chemicals.

Firefighting Foams and Aqueous Film-Forming Foams (AFFFs):

"There are two major classes of firefighting foams: Class A and Class B. Class A foams were developed in the 1980s for fighting wildfires. They are also used to fight structure fires. *Class B foams are any firefighting foams that have been designed to effectively extinguish flammable and combustible liquids and gases; petroleum greases, tars, oils and gasoline; and solvents and alcohols. Class B foams can be synthetic foams, including aqueous film-forming foam (AFFF) or alcohol-resistant aqueous film-forming foam (AR-AFFF)*, or protein foams.

How perfluorinated chemicals used in firefighting foams reach the environment is illustrated in part in Figure 7-32:

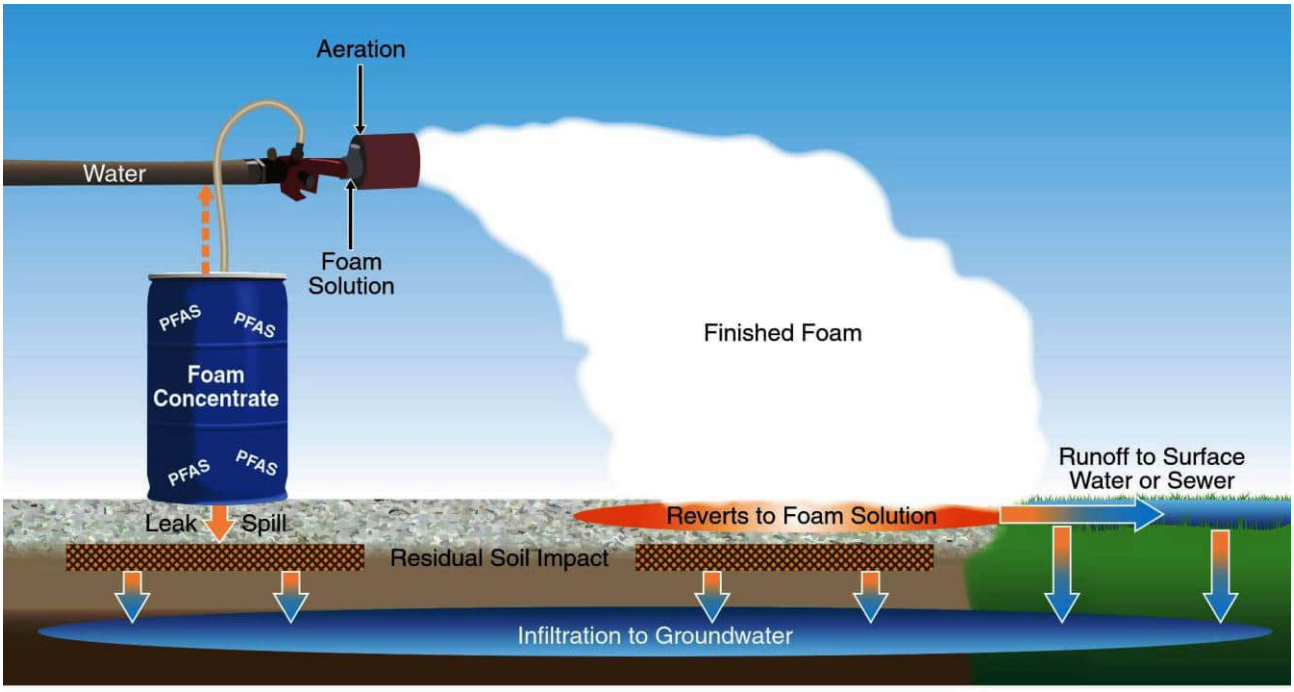


Figure 4-1. Release of firefighting foam
(Source: Adapted from figure by J. Hale, Kleinfelder, used with permission)

Figure 7-32: How AFFF's are Used and Reach the Environment (from https://pfas-1.itrcweb.org/fact_sheets_page/pfas_fact_sheet_history_and_use__4_8_20.pdf)

Note that Figure 7-32 refers to the AFFF containing PFAS, not PFOA. PFOA is either a contaminant in the AFFF ingredients and/or forms as a degradation product of PFASs.

AFFF foams contain fluorosurfactants and they are widely used. Per- and polyfluoroalkyl substances (PFAS) are the active ingredients in fluorosurfactants (https://pfas-1.itrcweb.org/fact_sheets_page/PFAS_Fact_Sheet_AFFF_April2020.pdf).

All Class B foams are not the same and can be divided into two broad categories from a per- and polyfluoroalkyl substances (PFAS) perspective; i) fluorinated foams that contain PFAS, and ii) fluorine-free foams that do not contain PFAS (Figure 7-33):

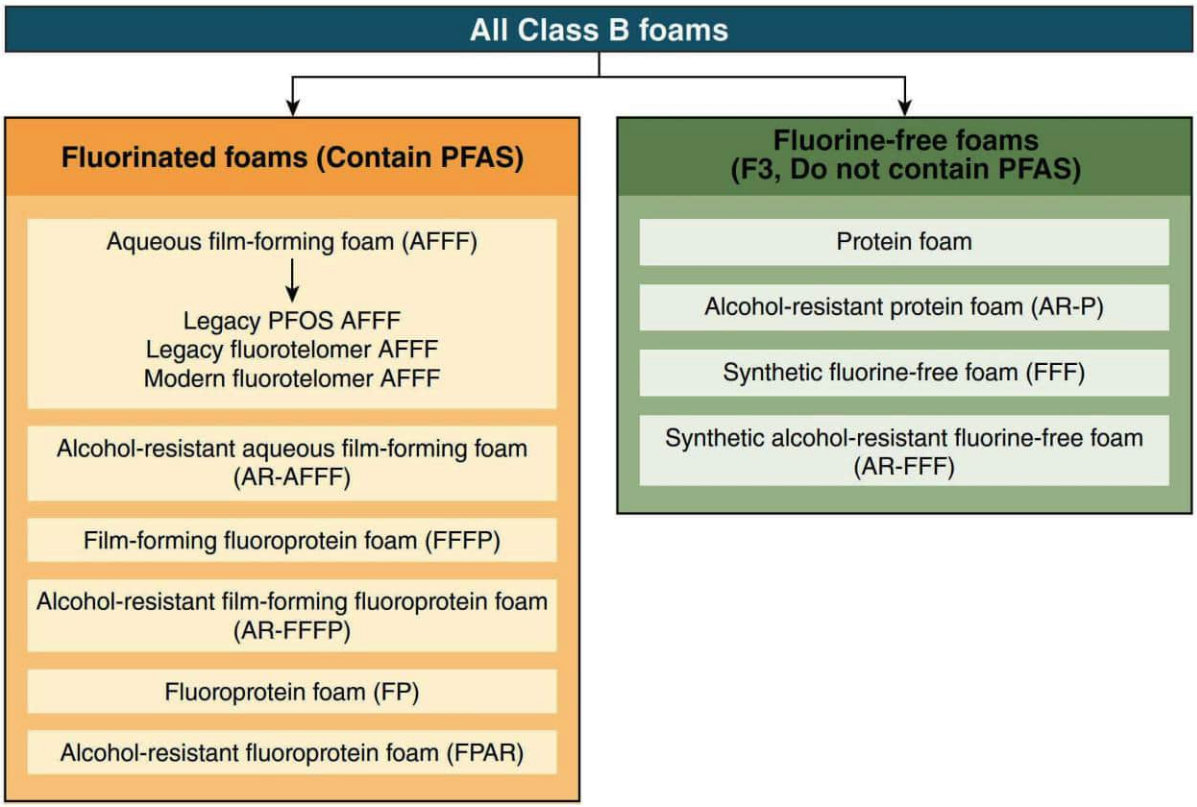


Figure 7-33: Class B Foams Classification (from https://pfas-1.itrcweb.org/fact_sheets_page/ PFAS_Fact_Sheet_AFFF_April2020.pdf)

"The vast majority of Class B firefighting foam that is currently in stock or service in the United States were AFFF or AR-AFFF. All AFFF products contain PFAS" (https://pfas-1.itrcweb.org/fact_sheets_page/PFAS_Fact_Sheet_AFFF_April2020.pdf).

[Arcadis' statement that the only PFAS was PFOA seems highly unlikely knowing PFAS chemistry and the fact that PFOA either is a trace ingredient in the AFFF-forming ingredients or forms later through the slow degradation process.]

7.4.2 Response #1 – Arcadis' statement that "the only PFAS constituent that might be related to firefighting foam used during the derailment is PFOA" is not reflected in analytical results:

From Exhibit 53 (original Eurofins report – Exhibit 87), two sets of PFAS/PFOA data were found in Exhibit 53, but results were available for a single composite water sample from water tanks despite the report stating other sampling was planned/completed.

The PFAS results shown from Exhibit 87 (and 53) were taken right after the burn from on February 9, 2026 (Table 7-12).

Table 7-12 – PFAS/PFOA Sampling Results (Exhibits 53 and 87)

Sample Number(s)	Sample Description	Date of Sample	Media	Method #	RL	MDL	Results in ng/ℓ	
							Perfluoro-octanesulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)
WC-Composite (01 to 05)	Composite from 5 temporary storage tanks.*	2/9/2023	Water	537 IDA	2.1 / 2.1	0.31 / 0.52	8.7 & 8.2 (RA)	9.4 & 9.8(RA)
WC-251060 – Blue Building East	Grab	3/1/2023	Water	No results reported in analytical report.				

*Consistent with language in Exhibit 53, pg. 6 "Collected samples from five of the original 10 temporary storage tanks generated following the derailment. One composite sample was generated by the lab and submitted for PFAS/PFOS analyses." (RA is re-analyses of the same sample – see definitions in Section 3 of Exhibit 87).

Staging piles 1A, 1B, 2, North, Roll Off Boxes, and the lab also supposedly had composite soil samples analyzed for PFAS/PFOA, but results could not be found (Exhibit 53, pgs. 5-6).

Other language from Exhibit 53 regarding PFAS/PFOA sampling follows:

> "During response activities, approximately 40 gallons of T-storm aqueous film forming foam (AFFF) concentrate was utilized by the local fire department to control the fire prior to NS arrival at the scene. The local fire department was not able to confirm the location where the AFFF was utilized. A SDS for the AFFF is included in Attachment 1. The composition of the AFFF is listed in Section 3 of the SDS. *Based on the SDS and knowledge of the product, this brand of AFFF contains per-and polyfluoroalkyl substances known as PFAS and PFOA*" (Exhibit 53, pg. 3)

[Note that this language is inconsistent with the Arcadis report language that the only PFAS was PFOA, as well as the PFAS chemistry outlined earlier in this section.]

Finally, from the February 14, 2023 TM Deer Park Services Limited Partnership WASTE PROFILE report contained in Exhibit 53, the amount of fire-fighting foam was addressed in a Table footnote to their report:

> **"PROCESS OF GENERATION**: *Derailment involving 5 railcars of unused commercial grade vinyl chloride (VC). Derailment also involved releases of butyl acrylate, ethyl hexyl acrylate, 2-butoxyethyl acetate, ethylene glycol monobutyl ether acetate, lube oil, and isobutylene*. Waste stream is water generated from interceptor trenches, dams & surface puddles and may contain any/all of the released products (SDS attached). Based on gauging data waste stream contains < 0.02" of LNAPL. Waste determination based on generator knowledge of chemicals released, concentrations of VC & Flashpoint in other frac tanks. ***During response ~ 40 gal PFAS containing AFFF was used. During first week of response activities 200K gallons of water was generated (40 gal AFFF/200K gal water = 0.02% AFFF)***"

Also, PFAS levels in water were measured one of the following five (5) locations on March 1, 2023 (Exhibit 84):

- Blue Building [CeramFab] West (sample #: WC-257204).
- Blue Building [CeramFab] East (sample #: WC-251060) – only PFAS sample per CoC.
- Clark (sample #: WC-251079).
- Pleasant (sample #: WC-251633).
- Gas Station (sample #: WC-251478).

No precise coordinates were provided.

From the chain of custody, PFAS analyses were only requested for the Blue Building East sample. However, a review of the laboratory report does not find any sample results for PFASs for that sample.

Also, for a series of soils collected from the "North Ditch" on February 20, 2023, one composite sample, WC-WS-NORTH-COMP (1-5) was analyzed for PFASs; results are summarized in Table 7-13:

Table 7-13 – PFAS/PFOA Sampling Results (Exhibit 84)

Sample Number(s)	Sample Description	Date of Sample	Media	Method #	RL	MDL	Results in ng/g	
							Perfluoro-octanesulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)
WC-WS-NORTH-COMP (1-5)	Composite from 5 north ditch samples	2/20/2023	Soil	537 IDA	0.70	0.24	0.71 J	-

Note that only PFOS was found, not PFOA.

In addition, significant PFAS analyses were reported in the Arcadis delineation report (Exhibit 60 and 60-2). PFAS products analyzed for included:

- HFPODA
- Perfluorobutanesulfonic acid
- Perfluorobutanoic acid
- Perfluorohexanesulfonic acid
- Perfluorohexanoic acid
- Perfluorononanoic acid
- Perfluorooctanesulfonic acid
- Perfluorooctanoic acid (PFOA).

While many of the samples reported values below detection limits, when found (Exhibit 60-2), the PFAS products identified were:

- HFPODA – most often observed.
- Pefluorobutanoic acid – rarely observed.
- Perfluorohexanoic acid – most often observed.
- Perfluorononanoic acid – rarely observed.
- Perfluorooctanesulfonic acid – also often observed.

- Perfluorooctanoic acid – sometimes observed.

Again, the Arcadis report statement that "the only PFAS constituent that might be related to firefighting foam used during the derailment is PFOA" belies PFAS chemistry and the observance of six (6) PFASs in their delineation report.

The net result from these analyses is my opinion that the that PFAS found locally would likely be from the fire-fighting foams used during the post-derailment events. Moreover, Arcadis did not employ reliable source identification methods available to trace the source(s) of the PFASs found (e.g., relative branch chaining of PFOA for example; supplier/manufacturer chemistry used, supplier/manufacturer ingredients used to manufacture AFFFs). And a review of SDSs would not generate this information by themselves.

7.5 Dioxin/Furan Data:

In their July 17, 2025, Delineation Report (Exhibit 60), NS/Arcadis curiously did chose not to comment directly on the implications of the analytical results, such as whether or not they exceeded the TEQ [Dioxin TEQ (Toxic Equivalency)] of 4.8 set in Table 3, footnote 7 in their September 7, 2023, Soil Characterization Work Plan (Exhibit 76), so these calculations were instead completed by this author for the seven samples (Tables 7-14 to 7-20):

Table 7-14 – TEQ Analysis for Sample WC-WS1-COMP (A1-A5)

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDD	220	ng/kg	5.7	2.3		0.01	2.2
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDF	180	ng/Kg	5.7	2.3		0.01	1.8
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	1,2,3,4,7,8,9-HpCDF	44	ng/Kg	5.7	2.3		0.01	0.4
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDD	27	ng/Kg	5.7	2.3		0.1	2.7
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDF	78	ng/Kg	5.7	2.3		0.1	7.8
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDD	42	ng/Kg	5.7	2.3		0.1	4.2
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDF	66	ng/Kg	5.7	2.3		0.1	6.6
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDD	33	ng/Kg	5.7	2.3		0.1	3.3
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDF	33	ng/Kg	5.7	2.3		0.1	3.3
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	1,2,3,7,8-PeCDD	28	ng/Kg	5.7	2.3		1	28.0
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	1,2,3,7,8-PeCDF	51	ng/Kg	5.7	2.3		0.03	1.5
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	2,3,4,6,7,8-HxCDF	52	ng/Kg	5.7	2.3		0.1	5.2
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	2,3,4,7,8-PeCDF	57	ng/Kg	5.7	2.3		0.1	5.7
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	2,3,7,8-TCDD	5	ng/Kg	1.1	0.23		1	5.0
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	2,3,7,8-TCDF	23	ng/Kg	1.1	0.23		0.03	0.7
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	OCDD	1,100	ng/Kg	11	2.3		0.003	3.3
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	OCDF	220	ng/Kg	11	2.3		0.003	0.7
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	Total HpCDD	520	ng/Kg	5.7	2.3			
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	Total HpCDF	320	ng/Kg	5.7	2.3			
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	Total HxCDD	290	ng/Kg	5.7	2.3			
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	Total HxCDF	480	ng/Kg	5.7	2.3			
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	Total PeCDD	170	ng/Kg	5.7	2.3			
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	Total PeCDF	450	ng/Kg	5.7	2.3			
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	Total TCDD	81	ng/Kg	1.1	0.23	I		

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-WS1-COMP (A1-A5)	2/17/2023	Solid	SW8290A	Total TCDF	490	ng/Kg	1.1	0.23	I		
Total TEQ:											**82.4**

From Table 7-14, the TEQ result from Feb. 17, 2023 5 Sample Composite from the March 8, 2023 Eurofins Report (Exh. 53) of 82.4 was well above the TEQ Screening Level of 4.8.

Table 7-15: TEQ Analysis for Sample WC-WS2-COMP (01-07)

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDD	110	ng/kg	5.9	2.4		0.01	1.1
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDF	14	ng/Kg	5.9	2.4		0.01	0.1
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	1,2,3,4,7,8,9-HpCDF		ng/Kg	5.9	2.4		0.01	0.0
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDD		ng/Kg	5.9	2.4	J	0.1	0.0
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDF		ng/Kg	5.9	2.4		0.1	0.0
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDD	2.9	ng/Kg	5.9	2.4		0.1	0.3
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDF		ng/Kg	5.9	2.4		0.1	0.0
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDD		ng/Kg	5.9	2.4		0.1	0.0
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDF		ng/Kg	5.9	2.4		0.1	0.0
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	1,2,3,7,8-PeCDD		ng/Kg	5.9	2.4		1	0.0
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	1,2,3,7,8-PeCDF		ng/Kg	5.9	2.4		0.03	0.0
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	2,3,4,6,7,8-HxCDF		ng/Kg	5.9	2.4		0.1	0.0
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	2,3,4,7,8-PeCDF		ng/Kg	5.9	2.4		0.1	0.0
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	2,3,7,8-TCDD		ng/Kg	1.2	0.24		1	0.0
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	2,3,7,8-TCDF	0.77	ng/Kg	1.2	0.24	J	0.03	0.0
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	OCDD	1,100	ng/Kg	12	2.4		0.003	3.3
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	OCDF	48	ng/Kg	12	2.4		0.003	0.1
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	Total HpCDD	360	ng/Kg	5.9	2.4			
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	Total HpCDF	43	ng/Kg	5.9	2.4	I		
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	Total HxCDD	53	ng/Kg	5.9	2.4	I		
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	Total HxCDF	24	ng/Kg	5.9	2.4	I		
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	Total PeCDD	12	ng/Kg	5.9	2.4	I		
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	Total PeCDF	13	ng/Kg	5.9	2.4	I		
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	Total TCDD	10	ng/Kg	1.2	0.24	I		

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-WS2-COMP (01-07)	2/18/2023	Solid	SW8290A	Total TCDF	14	ng/Kg	1.2	0.24	I		
Total TEQ:											**5.0**

From Table 7-15, the TEQ result from Feb. 18, 2023 7 Sample Composite from the March 10, 2023 Eurofins Report (Exh. 53) of 5.0 was above the TEQ Screening Level of 4.8.

Table 7-16: TEQ Analysis for Sample WC-WS2-COMP (08-14)

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDD	110	ng/kg	6.2	2.5		0.01	1.1
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDF	20	ng/Kg	6.2	2.5		0.01	0.2
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	1,2,3,4,7,8,9-HpCDF		ng/Kg	6.2	2.5		0.01	0.0
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDD		ng/Kg	6.2	2.5		0.1	0.0
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDF	3.1	ng/Kg	6.2	2.5	J	0.1	0.3
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDD	3.2	ng/Kg	6.2	2.5	J	0.1	0.3
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDF	2.6	ng/Kg	6.2	2.5	J	0.1	0.3
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDD		ng/Kg	6.2	2.5		0.1	0.0
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDF		ng/Kg	6.2	2.5		0.1	0.0
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	1,2,3,7,8-PeCDD		ng/Kg	6.2	2.5		1	0.0
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	1,2,3,7,8-PeCDF	2.8	ng/Kg	6.2	2.5	J	0.03	0.1
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	2,3,4,6,7,8-HxCDF		ng/Kg	6.2	2.5		0.1	0.0
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	2,3,4,7,8-PeCDF		ng/Kg	6.2	2.5		0.1	0.0
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	2,3,7,8-TCDD		ng/Kg	1.2	0.25		1	0.0
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	2,3,7,8-TCDF	0.96	ng/Kg	1.2	0.25	J	0.03	0.0
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	OCDD	1,100	ng/Kg	12	2.5		0.003	3.3
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	OCDF	51	ng/Kg	12	2.5		0.003	0.2
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	Total HpCDD	340	ng/Kg	6.2	2.5			
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	Total HpCDF	52	ng/Kg	6.2	2.5			
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	Total HxCDD	50	ng/Kg	6.2	2.5			
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	Total HxCDF	30	ng/Kg	6.2	2.5			
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	Total PeCDD	14	ng/Kg	6.2	2.5	I		
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	Total PeCDF	19	ng/Kg	6.2	2.5	I		
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	Total TCDD	9.8	ng/Kg	1.2	0.25	I		

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-WS2-COMP (08-14)	2/18/2023	Solid	SW8290A	Total TCDF	21	ng/Kg	1.2	0.25	I		
Total TEQ:											**5.8**

From Table 7-16, the TEQ result from Feb. 18, 2023 7 Sample Composite from the March 10, 2023 Eurofins Report (Exh. 53) of 5.8 was above the TEQ Screening Level of 4.8.

Table 7-17 – TEQ Analysis for Sample WC-WS1-COMP (A1-A5)

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDD	290	ng/kg	6.2	2.5		0.01	2.9
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDF	330	ng/Kg	6.2	2.5		0.01	3.3
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	1,2,3,4,7,8,9-HpCDF	55	ng/Kg	6.2	2.5		0.01	0.6
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDD	17	ng/Kg	6.2	2.5		0.1	1.7
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDF	94	ng/Kg	6.2	2.5		0.1	9.4
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDD	41	ng/Kg	6.2	2.5		0.1	4.1
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDF	76	ng/Kg	6.2	2.5		0.1	7.6
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDD	21	ng/Kg	6.2	2.5		0.1	2.1
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDF	21	ng/Kg	6.2	2.5		0.1	2.1
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	1,2,3,7,8-PeCDD	19	ng/Kg	6.2	2.5		1	19.0
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	1,2,3,7,8-PeCDF	49	ng/Kg	6.2	2.5		0.03	1.5
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	2,3,4,6,7,8-HxCDF	48	ng/Kg	6.2	2.5		0.1	4.8
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	2,3,4,7,8-PeCDF	57	ng/Kg	6.2	2.5		0.1	5.7
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	2,3,7,8-TCDD	2.1	ng/Kg	1.2	0.25		1	2.1
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	2,3,7,8-TCDF	20	ng/Kg	1.2	0.25		0.03	0.6
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	OCDD	1,400	ng/Kg	12	2.5		0.003	4.2
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	OCDF	650	ng/Kg	12	2.5		0.003	2.0
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	Total HpCDD	630	ng/Kg	6.2	2.5			
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	Total HpCDF	550	ng/Kg	6.2	2.5			
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	Total HxCDD	340	ng/Kg	6.2	2.5			
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	Total HxCDF	590	ng/Kg	6.2	2.5			
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	Total PeCDD	220	ng/Kg	6.2	2.5			
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	Total PeCDF	540	ng/Kg	6.2	2.5			
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	Total TCDD	97.0	ng/Kg	1.2	0.25	I		

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-WS1-COMP (B1-B5)	2/18/2023	Solid	SW8290A	Total TCDF	540	ng/Kg	1.2	0.25			
Total TEQ:											**73.6**

From Table 7-17, the TEQ result from Feb. 18, 2023 5 Sample Composite from the March 10, 2023 Eurofins Report (Exh. 53) of 73.6 was well above the TEQ Screening Level of 4.8.

Table 7-18 – TEQ Analysis for Sample WC-WS-NORTH-COMP (1-5)

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDD	220	ng/kg	6.1	2.5		0.01	2.2
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDF	61	ng/Kg	6.1	2.5		0.01	0.6
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	1,2,3,4,7,8,9-HpCDF	8	ng/Kg	6.1	2.5		0.01	0.1
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDD	5.6	ng/Kg	6.1	2.5	J	0.1	0.6
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDF	18	ng/Kg	6.1	2.5		0.1	1.8
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDD	13	ng/Kg	6.1	2.5		0.1	1.3
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDF	16	ng/Kg	6.1	2.5		0.1	1.6
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDD	11	ng/Kg	6.1	2.5		0.1	1.1
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDF	5.2	ng/Kg	6.1	2.5	J	0.1	0.5
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	1,2,3,7,8-PeCDD	5.5	ng/Kg	6.1	2.5	J	1	5.5
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	1,2,3,7,8-PeCDF	11	ng/Kg	6.1	2.5		0.03	0.3
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	2,3,4,6,7,8-HxCDF	16	ng/Kg	6.1	2.5		0.1	1.6
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	2,3,4,7,8-PeCDF	25	ng/Kg	6.1	2.5		0.1	2.5
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	2,3,7,8-TCDD	0.98	ng/Kg	1.2	0.25	J, I	1	1.0
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	2,3,7,8-TCDF	4.7	ng/Kg	1.2	0.25		0.03	0.1
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	OCDD	1,300	ng/Kg	12	2.5		0.003	3.9
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	OCDF	84	ng/Kg	12	2.5		0.003	0.3
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	Total HpCDD	410	ng/Kg	6.1	2.5			
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	Total HpCDF	130	ng/Kg	6.1	2.5			
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	Total HxCDD	110	ng/Kg	6.1	2.5			
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	Total HxCDF	180	ng/Kg	6.1	2.5			
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	Total PeCDD	63	ng/Kg	6.1	2.5	I		
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	Total PeCDF	250	ng/Kg	6.1	2.5			
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	Total TCDD	37.0	ng/Kg	1.2	0.25	I		

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-WS-NORTH-COMP (1-5)	2/20/2023	Solid	SW8290A	Total TCDF	160	ng/Kg	1.2	0.25			
Total TEQ:											**25.0**

From Table 7-18, the TEQ result from Feb. 20, 2023 5 Sample Composite from the March 10, 2023 Eurofins Report (Exh. 53) of 25.0 was well above the TEQ Screening Level of 4.8.

Table 7-19 – TEQ Analysis for Sample WC-TW-COMP (TW-6 - TW-10)

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDD	140	ng/kg	6.5	2.6		0.01	1.4
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDF	83	ng/Kg	6.5	2.6		0.01	0.8
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	1,2,3,4,7,8,9-HpCDF	5.9	ng/Kg	6.5	2.6	J	0.01	0.1
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDD	5.2	ng/Kg	6.5	2.6	J	0.1	0.5
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDF	13	ng/Kg	6.5	2.6		0.1	1.3
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDD	8	ng/Kg	6.5	2.6		0.1	0.8
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDF	11	ng/Kg	6.5	2.6		0.1	1.1
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDD	5.1	ng/Kg	6.5	2.6	J, I	0.1	0.5
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDF	3.2	ng/Kg	6.5	2.6	J	0.1	0.3
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	1,2,3,7,8-PeCDD	5.6	ng/Kg	6.5	2.6	J, I	1	5.6
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	1,2,3,7,8-PeCDF	8	ng/Kg	6.5	2.6		0.03	0.2
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	2,3,4,6,7,8-HxCDF	10	ng/Kg	6.5	2.6		0.1	1.0
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	2,3,4,7,8-PeCDF	14	ng/Kg	6.5	2.6		0.1	1.4
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	2,3,7,8-TCDD	1.70	ng/Kg	1.3	0.26		1	1.7
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	2,3,7,8-TCDF	3.8	ng/Kg	1.3	0.26		0.03	0.1
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	OCDD	1,500	ng/Kg	13	2.6		0.003	4.5
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	OCDF	110	ng/Kg	13	2.6		0.003	0.3
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	Total HpCDD	310	ng/Kg	6.5	2.6			
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	Total HpCDF	180	ng/Kg	6.5	2.6			
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	Total HxCDD	83	ng/Kg	6.5	2.6	I		
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	Total HxCDF	130	ng/Kg	6.5	2.6	I		
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	Total PeCDD	34	ng/Kg	6.5	2.6	I		
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	Total PeCDF	91	ng/Kg	6.5	2.6			
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	Total TCDD	30.0	ng/Kg	1.3	0.26	I		

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-TW-COMP (TW-6 - TW-10)	2/25/2023	Solid	SW8290A	Total TCDF	86	ng/Kg	1.3	0.26	I		
Total TEQ:											**21.7**

From Table 7-19, the TEQ result from Feb. 25, 2023 5 Sample Composite from the March 10, 2023 Eurofins Report (Exh. 53) of 21.7 was well above the TEQ Screening Level of 4.8.

Table 7-20 – TEQ Analysis for Sample WC-TW-COMP (TW-6 - TW-10)

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDD	35	ng/kg	5.8	0.061	B	0.01	0.4
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDF	65	ng/Kg	5.8	0.042	B	0.01	0.7
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	1,2,3,4,7,8,9-HpCDF	13	ng/Kg	5.8	0.056	B	0.01	0.1
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDD	1.5	ng/Kg	5.8	0.043	J	0.1	0.2
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDF	18	ng/Kg	5.8	0.16	B	0.1	1.8
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDD	2.6	ng/Kg	5.8	0.046	J	0.1	0.3
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDF	13	ng/Kg	5.8	0.15		0.1	1.3
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDD	2.1	ng/Kg	5.8	0.042	J, B	0.1	0.2
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDF	4.0	ng/Kg	5.8	0.18	J, B	0.1	0.4
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	1,2,3,7,8-PeCDD	1.7	ng/Kg	5.8	0.038	J, I, B	1	1.7
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	1,2,3,7,8-PeCDF	5.9	ng/Kg	5.8	0.12		0.03	0.2
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	2,3,4,6,7,8-HxCDF	8.8	ng/Kg	5.8	0.14	B	0.1	0.9
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	2,3,4,7,8-PeCDF	9.1	ng/Kg	5.8	0.093	B	0.1	0.9
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	2,3,7,8-TCDD	0.57	ng/Kg	1.2	0.018	J, B	1	0.6
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	2,3,7,8-TCDF	2.1	ng/Kg	1.2	0.074		0.03	0.1
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	OCDD	200	ng/Kg	12	0.08	B	0.003	0.6
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	OCDF	100	ng/Kg	12	0.052	B	0.003	0.3
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	Total HpCDD	81	ng/Kg	5.9	0.061	B		
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	Total HpCDF	110	ng/Kg	5.8	0.049	B		
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	Total HxCDD	32	ng/Kg	5.8	0.044	B		
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	Total HxCDF	110	ng/Kg	5.8	0.26	J, B		
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	Total PeCDD	20	ng/Kg	5.8	0.038	I, B		
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	Total PeCDF	100	ng/Kg	5.8	0.11	I, B		
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	Total TCDD	12	ng/Kg	1.2	0.018	I, B		

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-S. TRACK-SP2-COMP 06-10	3/24/2023	Solid	SW8290A	Total TCDF	48	ng/Kg	1.2	0.074	I, B		
Total TEQ:											**10.5**

From Table 7-20, the TEQ result from March 24, 2023 5 Sample Composite from the April 4, 2023 Eurofins Report (Exh. 53) of 10.5 was above the TEQ Screening Level of 4.8.

Note that all seven samples had calculated TEQs above 4.8 suggesting significant contamination of soils removed, stockpiled, and disposed of near the site of the derailment. These contaminated soils were then loaded on trucks where any materials released during loading and transport would impact the communities where this occurred and ultimately the landfills or other locations where these soils were disposed of.

Since these were composite samples, it is likely surface values would have been even higher. More importantly, these soils were almost all at/near the CeramFab building in stockpiles and were excavated, piled, stored, loaded on trucks, and transported for weeks, if not months.

Despite this information, Arcadis, makes the following statements in their June 17, 2025 Delineation Memo Report regarding dioxin contamination at CeramFab (Exhibit 2, pg. 3, Bates NS-CeramFab000972):

> "***Site investigation activities associated with the approved work plans demonstrate that certain semi-volatile organic compounds (SVOCs), dioxins, and per- and polyfluoroalkyl substances (PFAS) are present in soil samples at levels that exceed the screening levels***. Based on research of the current and former use and field observations (e.g., ***coal, other fill materials***) in the derailment area as presented in the following subsections, the SVOC concentrations represent pre-derailment background conditions from both natural conditions and historical and current anthropogenic contributions common in urban and industrial areas. These background conditions inform delineation
>
> "***Additionally, the limited dioxin (Toxicity Equivalence Factors for Human Health Risk [TEQ*** EPQ HH]) and PFAS ***exceedances appear to be associated with historical operations***."

Based on the dioxin analysis just shown on mostly locally stockpiled analyses, along with my own sampling and/or analyses summarized later, this statement regarding dioxins being present from past operations other than the derailment appears to be, at best, pure speculation and not supported by the evidence (e.g., locations, concentrations/levels and timing). At worst, it was a knowingly false statement.

Arcadis, in their June 17, 2025 Delineation Memo Report regarding Dioxin/Furan sampling and sampling results, provided very little data (see Exhibit 60-1). The total number of samples, and resulting analyses, were:

- 1 Soil Sample: CS2-DU3-A / 410-171090-31 and,
- 4 blanks (2 rinsate and 2 field)

These samples were collected on May 6-7, 2024.

The overall sample location appears to be just west of the CeramFab building (Figure 7-34):

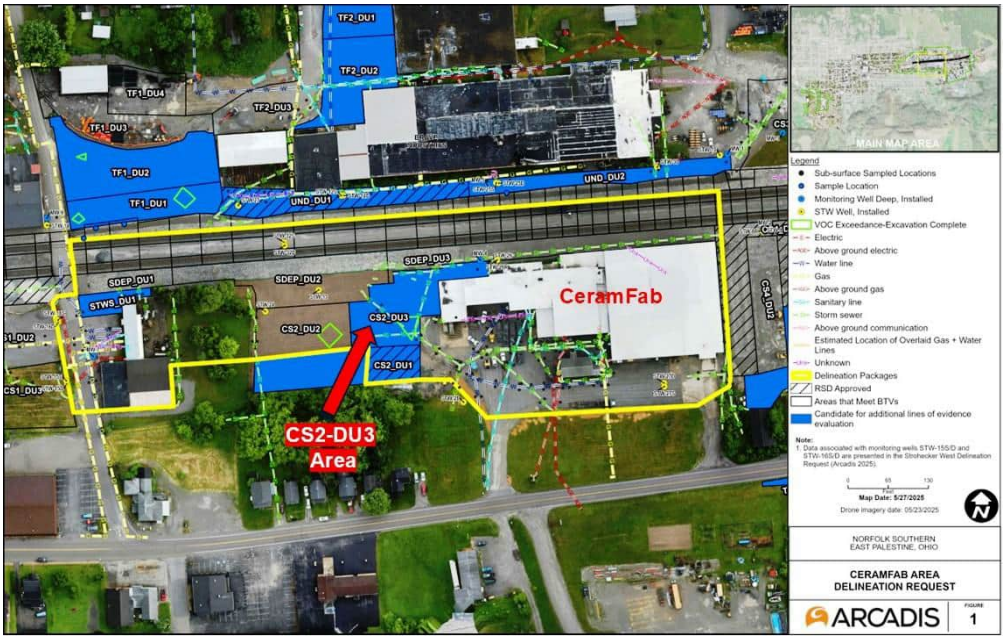


Figure 7-34: Overall Location of Sample CS2-DU3 (Figure from Exhibit 60)

The location of the composite dioxin sample west of the CeramFab building is shown in Figure 7-35:

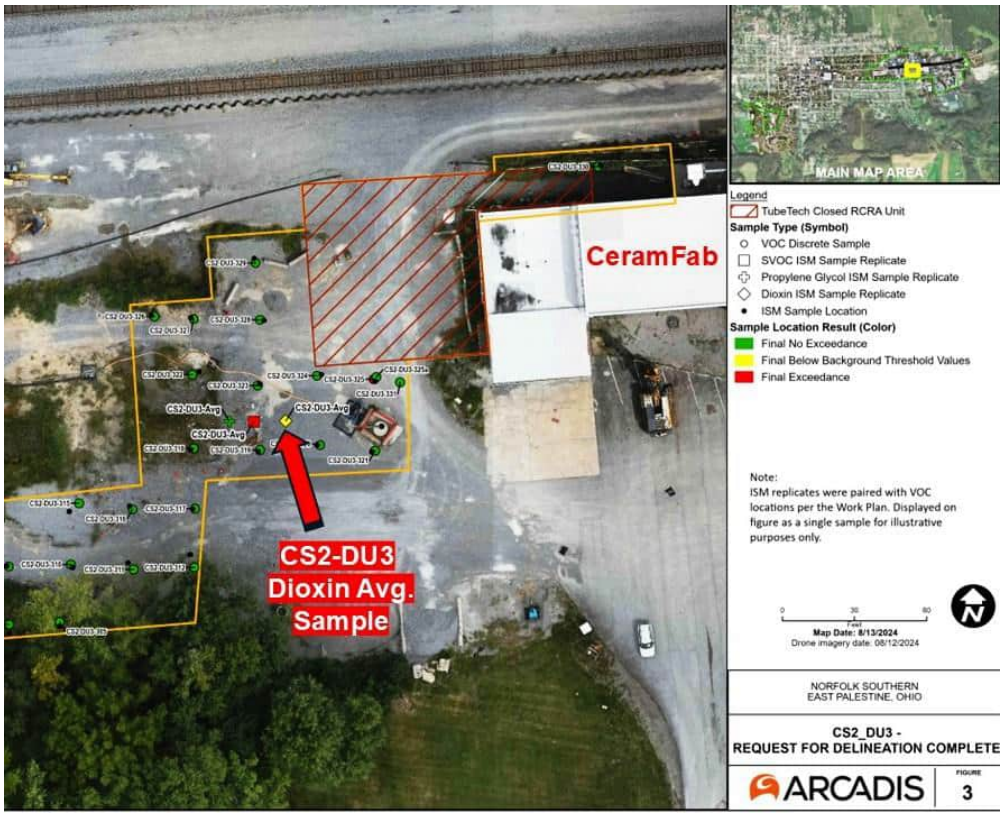


Figure 7-35: Specific Location of Sample CS2-DU3-A (Figure from Exhibit 60)

Note that lack of focus on dioxins seems to stem from early, incorrect, views that dioxins are of less concern and the need to later sample for them is driven by community

concerns (Exhibit 97) and reflected in the following language presented in a March 2023 brochure to the community:

> "*EPA heard directly from East Palestine area farmers and families who are concerned about dioxins*. We want to be clear that the input and perspective of the East Palestine community is essential to our ongoing response efforts. **EPA has been monitoring the air, soil, and water for "indicator chemicals" that would likely appear if dioxins had been formed after the vent and burn.** ***Test results to date and other data suggest a low probability for a risk to health from dioxin from this incident***. *However, to address concerns from agricultural stakeholders and residents, EPA is requiring Norfolk Southern to sample directly for dioxins, focusing on soils to help identify if dioxins are present and attributable to the incident*."

Nevertheless, from Figure 7-35, the "A" in the sample designation appears to imply it was a composite or average sample.

Thus, only one dioxin soil sample appears to have been reported in the Arcadis delineation report (Exhibit 60). The TEQ analysis for that sample was not provided, but was calculated in Table 7-21 as follows:

Table 7-21 – TEQ Analysis for Sample CS2-DU3-A (Lab ID #: 410-171090-31)

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ*	TEF_i Contrib.
CS2-DU3-A	5/7/2024	Solid	SW8290A	1,2,3,4,6,7,8-HpCDD	100	ng/kg	2.0	2.0		0.01	1.0
CS2-DU3-A	5/7/2024	Solid	SW8290A	1,2,3,4,6,7,8-HpCDF	61	ng/Kg	2.0	2.0		0.01	0.6
CS2-DU3-A	5/7/2024	Solid	SW8290A	1,2,3,4,7,8,9-HpCDF	10	ng/Kg	2.0	2.0		0.01	0.1
CS2-DU3-A	5/7/2024	Solid	SW8290A	1,2,3,4,7,8-HxCDD		ng/Kg	2.0	2.0	U	0.1	0.0
CS2-DU3-A	5/7/2024	Solid	SW8290A	1,2,3,4,7,8-HxCDF	11	ng/Kg	2.0	2.0		0.1	1.1
CS2-DU3-A	5/7/2024	Solid	SW8290A	1,2,3,6,7,8-HxCDD	5.3	ng/Kg	2.0	2.0		0.1	0.5
CS2-DU3-A	5/7/2024	Solid	SW8290A	1,2,3,6,7,8-HxCDF	6.9	ng/Kg	2.0	2.0		0.1	0.7
CS2-DU3-A	5/7/2024	Solid	SW8290A	1,2,3,7,8,9-HxCDD	3.7	ng/Kg	2.0	2.0	J	0.1	0.4
CS2-DU3-A	5/7/2024	Solid	SW8290A	1,2,3,7,8,9-HxCDF	4.1	ng/Kg	2.0	2.0	J	0.1	0.4
CS2-DU3-A	5/7/2024	Solid	SW8290A	1,2,3,7,8-PeCDD		ng/Kg	2.0	2.0	U	1	0.0
CS2-DU3-A	5/7/2024	Solid	SW8290A	1,2,3,7,8-PeCDF	4.6	ng/Kg	2.0	2.0	J	0.03	0.1
CS2-DU3-A	5/7/2024	Solid	SW8290A	2,3,4,6,7,8-HxCDF	7.4	ng/Kg	2.0	2.0		0.1	0.7
CS2-DU3-A	5/7/2024	Solid	SW8290A	2,3,4,7,8-PeCDF	6.7	ng/Kg	2.0	2.0		0.1	0.7
CS2-DU3-A	5/7/2024	Solid	SW8290A	2,3,7,8-TCDD	0.26	ng/Kg	0.2	0.2	J	1	0.3
CS2-DU3-A	5/7/2024	Solid	SW8290A	2,3,7,8-TCDF	7.2	ng/Kg	0.2	0.2		0.03	0.2
CS2-DU3-A	5/7/2024	Solid	SW8290A	OCDD	1,100	ng/Kg	2.0	2.0	J	0.003	3.3
CS2-DU3-A	5/7/2024	Solid	SW8290A	OCDF	150	ng/Kg	2.0	2.0		0.003	0.5
Total TEQ:											**10.6**

- See Section 9.3 for discussion of TEF_i factors.

From Table 7-21, the TEQ result from a May 7, 2024 sample (Exhibit 60) of 10.6 was above the TEQ Screening Level of 4.8.

The MDL values being used to set the RL values suggest that only Level 2 (vs Level 4) reporting was available by the lab quality reviewers. This despite the Arcadis February 3, 2023 QAPP stating data were to be reported at Level 4 (QAPP WORKSHEET #36 – DATA VALIDATION PROCEDURES) – "Data Deliverable Requirements: Level IV (PDF)1, EQUIS 4-file format (EDD) (Exhibit 155, pg.110).

Note that this single composite sample had a calculated TEQ of 10.6, or above the Arcadis screening level of 4.8, suggesting significant contamination of soils still remained at/near the site of the derailment over 15 months later.

In looking at the coding in Figure 7-35, the dioxin value is coded in a yellow diamond with the notation "Final Below Background Threshold Values." Yet "Values" were not calculated, only a single composite sample appears to have been taken based on the graphics in Figure 7-35 and the laboratory report in Exhibit 60. Moreover, the TEQ, not apparently calculated by Arcadis, was above their specified TEQ of 4.8 at 10.6 - so how it was determined to be below background threshold values appears to be inconsistent with their approach to analyzing Dioxin/Furan sample data using TEQs.

More importantly, regarding the CeramFab property delineation and dioxins/furans, it is not possible to delineate the site with a single sample!

Another composite single dioxin soil sample was reported by NS/Arcadis in their sample results for soils on the west end of the south track (Exhibit 85). The TEQ analysis for that sample was also not provided by NS/Arcadis, but was calculated in Table 7-22 as follows:

Table 7-22 – TEQ Analysis for Sample WC-S. TRK-WEST-COMP (01-07) (Lab ID #: 240-181-894-8)

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDD	140	ng/kg	6.0	0.1700	B	0.01	1.4
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	1,2,3,4,6,7,8-HpCDF	25	ng/Kg	6.0	0.0780	B	0.01	0.3
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	1,2,3,4,7,8,9-HpCDF	5.3	ng/Kg	6.0	0.1000	J, B	0.01	0.1
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDD	6.0	ng/Kg	6.0	0.0500	B	0.1	0.6
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	1,2,3,4,7,8-HxCDF	7.1	ng/Kg	6.0	0.0940		0.1	0.7
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDD	7.4	ng/Kg	6.0	0.0450	B	0.1	0.7
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	1,2,3,6,7,8-HxCDF	5.5	ng/Kg	6.0	0.0870	J, B	0.1	0.6
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDD	5.4	ng/Kg	6.0	0.0440	J, B	0.1	0.5
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	1,2,3,7,8,9-HxCDF	5.1	ng/Kg	6.0	0.1100	J, B	0.1	0.5
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	1,2,3,7,8-PeCDD	4.1	ng/Kg	6.0	0.0520	J, I, B	1	4.1
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	1,2,3,7,8-PeCDF	3.9	ng/Kg	6.0	0.0770	J, I, B	0.03	0.1
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	2,3,4,6,7,8-HxCDF	5.8	ng/Kg	6.0	0.0880	J, B	0.1	0.6
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	2,3,4,7,8-PeCDF	6.6	ng/Kg	6.0	0.0600	B	0.1	0.7
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	2,3,7,8-TCDD	1.9	ng/Kg	1.2	0.0580		1	1.9
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	2,3,7,8-TCDF	1.9	ng/Kg	1.2	0.2000	B	0.03	0.1
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	OCDD	1,100	ng/Kg	6.0	0.2200	B	0.003	3.3
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	OCDF	81	ng/Kg	6.0	0.0890	B	0.003	0.2
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	Total HpCDD	140	ng/Kg	6.0	0.1700	B		
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	Total HpCDF	75	ng/Kg	6.0	0.0910	B		
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	Total HxCDD	72	ng/Kg	6.0	0.0460	I, B		
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	Total HxCDF	57	ng/Kg	6.0	0.0940	I, B		
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	Total PeCDD	14	ng/Kg	6.0	0.0520	I, B		
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	Total PeCDF	47	ng/Kg	6.0	0.0680	I, B		
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	Total TCDD	7	ng/Kg	1.2	0.0580	I, B		

Sample #	Date	Matrix	Analysis Method	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Lab. Qual.	TEF_i Factors for Total TEQ	TEF_i Contrib.
WC-S. TRK-WEST-COMP (01-07)	3/14/2023	Solid	SW8290A	Total TCDF	13.0	ng/Kg	1.2	0.2000	I, B		
Total TEQ:											**16.3**

From Table 7-22, the TEQ result from a March 14, 2023 composite soil sample (Exhibit 85) of 16.3 was above the TEQ Screening Level of 4.8.

Note that this single composite sample had a calculated TEQ of 16.3, or above the Arcadis screening level of 4.8 suggesting again, that significant contamination of soils remained at/near the site of the derailment.

Also, on October 22, 2024, US EPA released an NS/Arcadis Report, Phase I – Residential, Commercial/Agricultural Soil Sampling Report – Rev. 3 (Exhibit 88). The scope of the project was noted as follows:

> "The work efforts were conducted from March 9, 2023 to April 14, 2023. The work efforts were completed in accordance with the:
>
> - Phase I Preliminary Residential/Commercial/Agricultural Soil Sampling Plan, approved by USEPA on March 7, 2023
> - Revised Phase I Preliminary Residential/Commercial/Agricultural Soil Sampling Plan, approved by USEPA on April 6, 2023".

Thus, the samples were collected as per the Sampling Plan outlined in Exhibit 36 and did not account for wind directions during the burn (see Section 6-1 and 6-2).

Nevertheless, consistent with our observations discussed in Section 8 below, NS, Arcadis and the Ohio/Pennsylvania University Research Consortium (Exhibits 89-90) have found considerable dioxin contamination above residential risk limits (Figure 7-36 and 7-37):

Ohio/Pennsylvania University Research Consortium

Data Brief: Dioxins and Furans

A Norfolk Southern freight train carrying hazardous materials derailed in East Palestine, OH on February 3, 2023. This is a summary about dioxins and furans in soil samples we gathered after the derailment.

Key Points:

- **Of samples collected at 27 sites in East Palestine, two had concentrations of dioxins and furans above a 1-in-1 million risk of developing non-cancer diseases over 30 years of daily exposure; 13 had above a 1-in-1 million risk of developing cancer over 30 years of daily exposure.**
- **We found a higher percentage of samples with concentrations above the 1-in-1 million cancer risk threshold than Norfolk Southern and the EPA.**

What was the purpose?

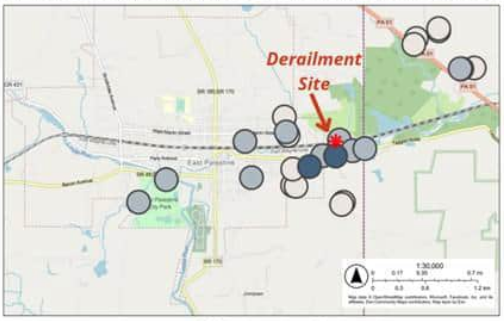
We found out that EPA and Norfolk Southern measured some high values of **dioxins and furans**, which are known to cause cancer and do not break down easily. We independently obtained soil samples and tested them to see if we also found high values that could pose a risk of cancer to the East Palestine community.

What did we do?

Soil samples were collected in East Palestine by the Louisiana State University Superfund Research Center and Kent State University in August, 2023 at 27 sites, most of which are shown on the map below with their approximate locations (exact locations masked for resident privacy).

Soil Sample Locations and Regional Screening Levels, August 2023

- Above the non-cancer Regional Screening Level, or "RSL": 51 pg/g, the soil concentration with a 1-in-1 million risk of developing diseases other than cancer over 30 years of daily exposure; collected at roadside and commercial properties
- Above the cancer RSL: 4.8 pg/g, the soil concentration with a 1-in-1 million risk of developing cancer over 30 years of daily exposure but lower than the non-cancer RSL.
- Below RSL



What did we find?

Dioxins and furans were detected at all 27 sites. Some types of dioxins and furans are more toxic than others, and we took this into account by calculating Toxic Equivalency (TEQ). Higher values of TEQ were found near the derailment site compared with the soil collected 4 miles to the west or 1 mile to the northeast of the derailment site.

Figure 7-36: Ohio/Pennsylvania University Research Consortium – Page 1 (Exhibit 89)

Ohio/Pennsylvania University Research Consortium

Soil Samples and Regional Screening Levels, August 2023

Dioxin Range		Disease Risk	Number of samples
●	> 51 pg/g	More than 1-in-1 million risk of non-cancer diseases if exposed ever day over 30 years	2 (7.4%)
●	4.8 - 51 pg/g (RSL)	More than 1-in-1 million risk of cancer if exposed ever day over 30 years	11 (41%)
○	< 4.8 pg/g	Less than 1-in-1 million risk of cancer if exposed ever day over 30 years	14 (52%)

How can you use this information?

You can use this information to decide if you are comfortable with the level of cancer risk for outdoor activities like gardening, sports, or play, if you live in these areas.

How did our data compare with Norfolk Southern and EPA?

Soil samples were obtained in separate efforts by Norfolk Southern (263 samples), the U.S. Environmental Protection Agency (138 samples), and the Louisiana State University-Kent State University research team (27 samples). Data from Norfolk-Southern and U.S. EPA were collected in similar areas to LSU-KSU in March and April 2023, and obtained from U.S. EPA's website. All three data sets are shown together here. LSU-KSU found a higher percentage of samples above the 1-in-1 million cancer risk threshold (48%) compared to Norfolk Southern and U.S. EPA.

Soil Sampling Details from Norfolk Southern, U.S. EPA, and LSU-KSU

	Norfolk Southern		EPA		LSU-KSU
Depth	0-1 inch	1-6 inch	0-1 inch	1-6 inch	0-6 inch
Count	131	132	64	74	27
Average TEQ (pg/g)	18.6	13.5	24.2	26.8	15.8
TEQ Range (pg/g)	0.0012-662	0.00093-667	0-520	0-670	0.19-88.2
Number above 1-in-1 million cancer risk	47 (36%)	41 (31%)	21 (33%)	23 (31%)	13 (48%)
Number above 1-in-1 million non-cancer risk	8 (6.1%)	4 (3.0%)	6 (9.4%)	5 (6.8%)	2 (7.4%)

If you have questions about the data or this analysis, please email Dr. Jennifer Richmond-Bryant at North Carolina State University, jrbryan3@ncsu.edu. Data were collected by the LSU Superfund Research Center in partnership with Kent State University and reviewed by the OH/PA University Research Consortium.

LSU SUPERFUND Research Program · NC STATE UNIVERSITY College of Natural Resources · CHHE · CASE WESTERN RESERVE UNIVERSITY · THE OHIO STATE UNIVERSITY · KENT STATE UNIVERSITY · University of Pittsburgh

Figure 7-37: Ohio/Pennsylvania University Research Consortium – Page 2 (Exhibit 89)

As illustrated in Figure 7-37, 30% to 36% of the NS/EPA dioxin samples exceeded the cancer risk or TEQ of ≥4.8 pg/g and 48% of the LSU-KSU samples exceeded this rate. Even the non-cancer risk levels (TEQ ≥ 51 pg/g) were exceeded in 3.0% to 9.4% of the dioxin samples taken.

In their paper, the Ohio/Pennsylvania University Research Consortium (Exhibit 90) plotted all three sets of data (Figure 7-38):

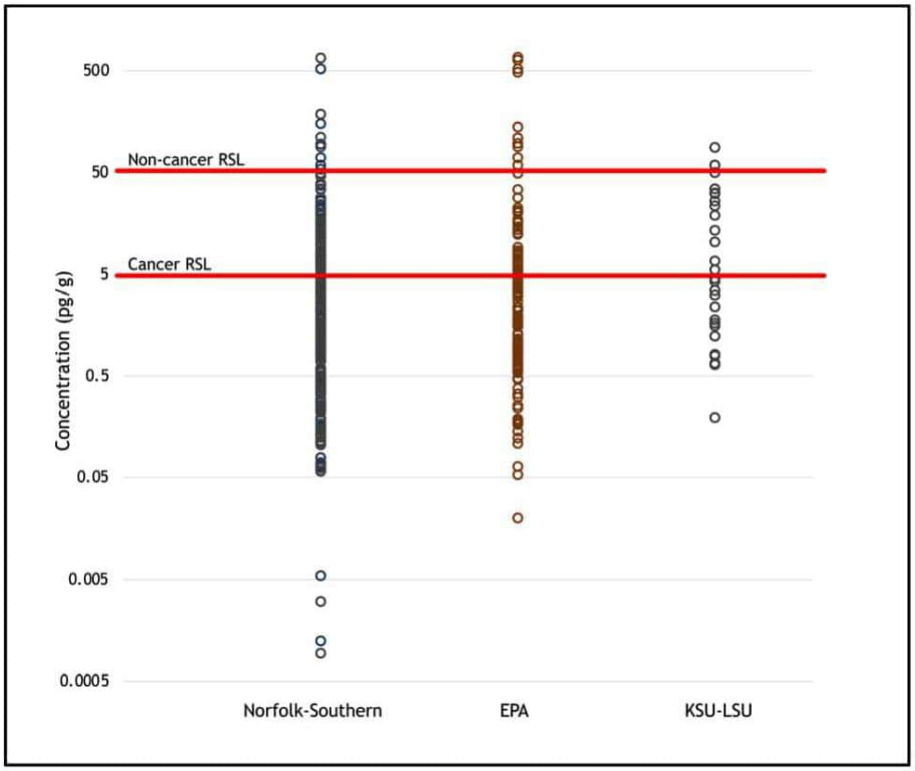


Fig. 2 Dioxin/furan TEQ values for samples collected by Norfolk Southern and U.S. EPA as well as the samples collected by LSU/KSU. Cancer RSL (4.8 pg g^{-1}) and noncancer RSL (51.0 pg g^{-1}) are included for visualization, and TEQ data are presented on a log scale.

Figure 7-38: Ohio/Pennsylvania University Research Consortium – Plots of NS, EPA, and LSU-KSU Dioxin TEQ Sample Data (Exhibit 90)

Also, in their paper, the Ohio/Pennsylvania University Research Consortium (Exhibit 90) suggests that these elevated risk levels are associated with the derailment (Figure 7-39):

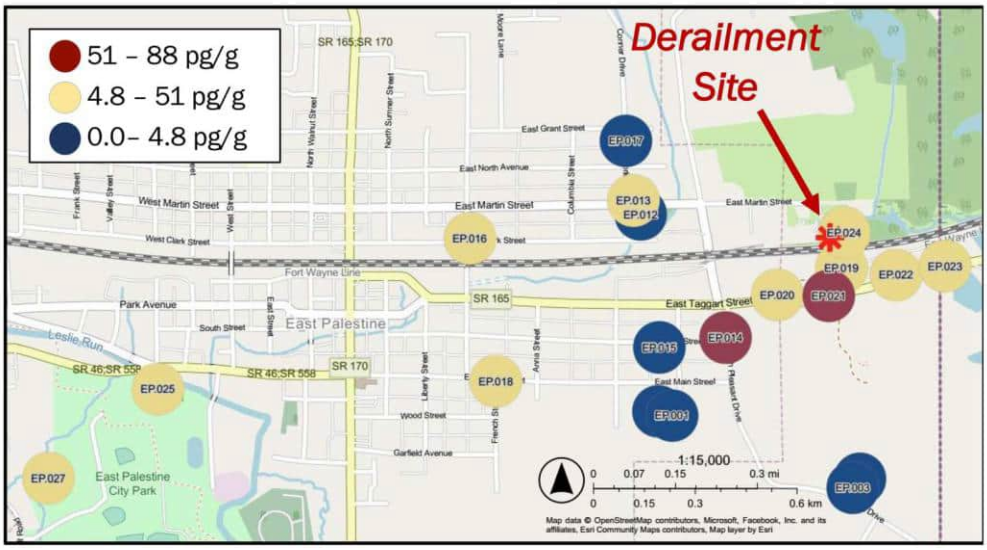


Fig. 3 Map of TEQ values observed on samples collected in the East Palestine sampling effort. Location markers were intentionally enlarged to maintain privacy. The asterisk denotes the derailment site.

Figure 7-39: Plot of Ohio/Pennsylvania University Research Consortium Dioxin Sample TEQ Data (Exhibit 90)

The authors noted that:

> "***Measured TEQ values were found to be elevated in proximity to the site of the derailment and vented burn***.
>
> "Samples collected by the authors for the East Palestine post-incident dataset presented a mean TEQ value of 15.8 pg g-1, a median TEQ of 4.5 pg g-1, a minimum TEQ of 0.2 pg g-1, and a maximum TEQ of 88.2 pg g-1. ***Mean and median TEQ values for the East Palestine soil samples were higher than the values reported at 75% of the locations included in the Urban et al. review***."

Interestingly, the authors evaluated the concept of environmentally persistent free radicals (ENPRs) and their association with dioxins. The authors studied this because:

> "EPFRs form primarily through combustion processes that result in the interaction of chemical compounds and transition metals. The structure of these radicals allows for resonance stabilization, thereby substantially increasing the observed lifetime, resulting in radicals that are stable in soils for up to years. The presence of these radicals in soils provides a vehicle for human interaction, as soil is a primary component of both indoor and outdoor dust, which is commonly inhaled. Additionally, EPFRs and dioxins/furans present in soils were once airborne particles that deposited onto the soil, indicating the risk of inhalation prior to deposition was also present. Upon inhalation, EPFRs are commonly associated with several adverse health conditions, including pulmonary and cardiovascular ailments."

The results of their EPFR calculations for these same samples are reproduced in Figure 7-40:

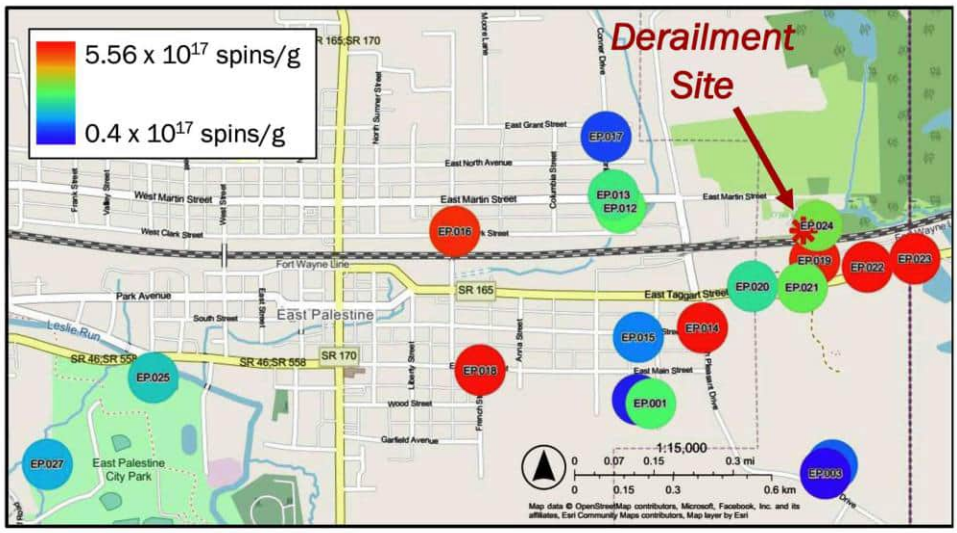


Fig. 4 Map of EPFR concentrations observed on samples collected in the East Palestine sampling effort. Location markers were intentionally enlarged to maintain privacy. The asterisk denotes the derailment site. Sites EP.019–EP.024 are referred to as the "restricted zone".

Figure 7-40: Plot of Ohio/Pennsylvania University Research Consortium Dioxin Sample EPFR Data (Exhibit 90)

The authors comment on these findings as follows:

> "*The observations of elevated levels of both EPFRs and dioxin/ furans near the derailment site (<0.30 mi) and their correlations are noteworthy*. ***These findings point toward a two-pronged risk to the community of East Palestine, as it is known that both EPFRs and dioxin/furans are persistent compounds, directly connected to significant health impacts. This work shows statistically significant correlations between soil concentrations of EPFRs and TEQ, along with statistically significant associations between EPFR concentration and some dioxin/furan congeners***."

8.0 OVERVIEW OF NS AND US EPA SCREENING LEVELS FOR POTENTIAL CHEMICALS OF CONCERN:

NS and Arcadis, and through them the US EPA relied on various risked-based screening levels in developing screening levels used for comparison purposes against levels measured in the air, soils, and waters. A summary of the basis for these screening levels follows:

8.1 Overview of Screening Levels:

Two sets of screening levels include the levels proposed in Norfolk Southern's sampling plan (Table 8-1 – Exhibit 94, Bates: ED_013980L_00001401-00117) and in the US EPA's generic screening criteria (Table 8-2 – see https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables):

Table 8-1: Norfolk Southern's Sampling Plan Screening Levels (mg/kg) – from Exhibit 94 & Figure 8-1)

Chemical Name	CAS#	Intermediate		Chronic	
		Screening level (mg/kg)	Source	Screening level (mg/kg)	Source
Acenaphthylene	208-96-8	NSL		NSL	
Acenaphthene	83-32-9	1,200	EPA RSL*	1,200	EPA RSL **
Anthracene	120-12-7	5,980	EPA RSL*	5,980	EPA RSL **
benz[a]anthracene	56-55-3	1.1	EPA RSL*	1.1	EPA RSL **
Benzo[b]anthracene	205-99-2	NSL		NSL	
Benzo[a]pyrene	50-32-8	1.4	EPA RSL*	0.12	EPA RSL **
Benzo[e]pyrene	192-97-2	0.57	EPA RSL*	0.57	EPA RSL **
Benzo[b]fluoranthene	205-99-2	14	EPA RSL*	1.2	EPA RSL **
Benzo[g,h,i]perylene	191-24-2	NSL		NSL	
Benzo[k]fluoranthene	207-08-9	140	EPA RSL*	12	EPA RSL **
Chrysene	218-01-9	1,390	EPA RSL*	12	EPA RSL **
Dibenz[a,h]anthracene	53-70-3	1.4	EPA RSL*	0.12	EPA RSL **
fluoranthene	206-44-0	598	EPA RSL*	59.8	EPA RSL **
fluorene	86-73-7	239	EPA RSL*	2,390	EPA RSL **
Indeno[1,2,3-cd]pyrene	193-39-5	14	EPA RSL*	1.2	EPA RSL **
2-methylnaphthalene	91-57-6	24	EPA RSL*	24	EPA RSL **
Phenanthrene	85-01-8	NSL		NS	
Pyrene	129-00-0	1,790	EPA RSL*	1,790	EPA RSL **
Naphthalene	91-20-3	14	EPA RSL*	2	EPA RSL **
Phenol	59-50-7	1,900	EPA RSL*	1,900	EPA RSL **
4-Chlorophenyl phenyl ether	7005-72-3	NSL		NSL	
4-chloro-3methylphenol	59-50-7	632	EPA RSL*	632	EPA RSL **
2-Chlorophenol	95-57-8	39	EPA RSL*	39	EPA RSL **
2,4-Dichlorophenol	120-83-2	126	EPA RSL*	126	EPA RSL **
Pentachlorophenol	87-86-5	8.6	EPA RSL*	1.02	EPA RSL **
2,3,4,6-Tetrachlorophenol	58-90-2	63	EPA RSL*	63	EPA RSL **
2,4,5-Trichlorophenol	95-95-4	1,900	EPA RSL*	1,900	EPA RSL **
2,4,6-Trichlorophenol	88-06-2	32	EPA RSL*	32	EPA RSL **
Hexachlorobenzene	118-74-1	0.078	EPA RSL*	0.078	EPA RSL **
Pentachlorobenzene	608-93-5	63	EPA RSL*	63	EPA RSL **
1,2,4,5-Tetrachlorobenzene	95-94-3	0.24	EPA RSL*	0.24	EPA RSL **
1,2,3-Trichlorobenzene	87-61-6	6.3	EPA RSL*	6.3	EPA RSL **
1,2,4-Trichlorobenzene	120-82-1	30	EPA RSL*	5.8	EPA RSL **
2,3,7,8-tetrachlorodibenzo-p-dioxin	1746-01-6	4.8E-06	EPA RSL*	4.8E-06	EPA RSL **
1,2,3,7,8-pentachlorodibenzo-p-dioxin	40321-76-4	4.8E-06	EPA RSL*	4.8E-06	EPA RSL **

Chemical Name	CAS#	Intermediate		Chronic	
		Screening level (mg/kg)	Source	Screening level (mg/kg)	Source
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	39227-28-6	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	57653-85-7	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	19408-74-3	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	35822-46-9	0.00048	EPA RSL*	0.00048	EPA RSL **
1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin	3268-87-9	0.016	EPA RSL*	0.016	EPA RSL **
2,3,7,8-tetrachlorodibenzofuran	51207-31-9	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,7,8-pentachlorodibenzofuran	57117-41-6	0.00016	EPA RSL*	0.00016	EPA RSL **
2,3,4,7,8-pentachlorodibenzofuran	57117-31-4	0.000016	EPA RSL*	0.000016	EPA RSL **
1,2,3,6,7,8-hexachlorodibenzofuran	57117-44-9	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,7,8,9-hexachlorodibenzofuran	72918-21-9	0.000048	EPA RSL*	0.000048	EPA RSL **
2,3,4,6,7,8-hexachlorodibenzofuran	60851-34-5	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,4,6,7,8-heptachlorodibenzofuran	67562-39-4	0.00048	EPA RSL*	0.00048	EPA RSL **
1,2,3,4,6,8,9-heptachlorodibenzofuran	69698-58-4	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,4,7,8-hexachlorodibenzofuran	70648-26-9	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,4,6,7,8,9-octachlorodibenzofuran	39001-02-0	0.0016	EPA RSL*	0.0016	EPA RSL **

Screening levels based upon a non-cancer Total Hazard Quotient (THQ) of 0.1 and Excess Lifetime Cancer Risk (ELCR) of $1x10^{-6}$ as proposed by Norfolk Southern.

* Indicates a single year exposure for a child 2 to 6 years old.

** Indicates a 26-year residential exposure.

Note that one can select values from US EPA's generic risk assessment Tables based on a THQ of 0.1 or 1; Norfolk Southern selected soil screening level values based on a THQ of 0.1. The risk values listed used terms:

- Intermediate Risk Screening Levels – based on 1 year of a child's exposure from ages 2 to 6, and
- Chronic Risk Screening Levels – based on 26 years of adult exposure.

NS/Arcadis March 6, 2023 provided a Table (Exhibit 94, Bates ED_013980L_00001401-00117) (Figure 8-1):

		Intermediate		Chronic	
Chemical Name	CAS#	Screening level mg/kg	Source	Screening level mg/kg	Source
Acenaphthylene	208-96-8	NSL		NSL	
Acenaphthene	83-32-9	1200	EPA RSL*	1200	EPA RSL **
Anthracene	120-12-7	5980	EPA RSL*	5980	EPA RSL **
benz[a]anthracene	56-55-3	1.1	EPA RSL*	1.1	EPA RSL **
Benzo[b]anthracene	205-99-2	NSL		NSL	
Benzo[a]pyrene	50-32-8	1.4	EPA RSL*	0.12	EPA RSL **
Benzo[e]pyrene	192-97-2	0.57	EPA RSL*	0.57	EPA RSL **
Benzo[b]fluoranthene	205-99-2	14	EPA RSL*	1.2	EPA RSL **
Benzo[g,h,i]perylene	191-24-2	NSL		NSL	
Benzo[k]fluoranthene	207-08-9	140	EPA RSL*	12	EPA RSL **
Chrysene	218-01-9	1390	EPA RSL*	12	EPA RSL **
Dibenz[a,h]anthracene	53-70-3	1.4	EPA RSL*	0.12	EPA RSL **
fluoranthene	206-44-0	598	EPA RSL*	59.8	EPA RSL **
fluorene	86-73-7	239	EPA RSL*	2390	EPA RSL **
Indeno[1,2,3-cd]pyrene	193-39-5	14	EPA RSL*	1.2	EPA RSL **
2-methylnaphthalene	91-57-6	24	EPA RSL*	24	EPA RSL **
Phenanthrene	85-01-8	NSL		NS	
Pyrene	129-00-0	1790	EPA RSL*	1790	EPA RSL **
Naphthalene	91-20-3	14	EPA RSL*	2	EPA RSL **
Phenol	59-50-7	1900	EPA RSL*	1900	EPA RSL **
4-Chlorophenyl phenyl ether	7005-72-3	NSL		NSL	
4-chloro-3methylphenol	59-50-7	632	EPA RSL*	632	EPA RSL **
2-Chlorophenol	95-57-8	39	EPA RSL*	39	EPA RSL **
2,4-Dichlorophenol	120-83-2	126	EPA RSL*	126	EPA RSL **
Pentachlorophenol	87-86-5	8.6	EPA RSL*	1.02	EPA RSL **
2,3,4,6-Tetrachlorophenol	58-90-2	63	EPA RSL*	63	EPA RSL **
2,4,5-Trichlorophenol	95-95-4	1900	EPA RSL*	1900	EPA RSL **
2,4,6-Trichlorophenol	88-06-2	32	EPA RSL*	32	EPA RSL **
Hexachlorobenzene	118-74-1	0.078	EPA RSL*	0.078	EPA RSL **
Pentachlorobenzene	608-93-5	63	EPA RSL*	63	EPA RSL **
1,2,4,5-Tetrachlorobenzene	95-94-3	0.24	EPA RSL*	0.24	EPA RSL **
1,2,3-Trichlorobenzene	87-61-6	6.3	EPA RSL*	6.3	EPA RSL **
1,2,4-Trichlorobenzene	120-82-1	30	EPA RSL*	5.8	EPA RSL **
2,3,7,8-tetrachlorodibenzo-p-dioxin	1746-01-6	4.8E-06	EPA RSL*	4.8E-06	EPA RSL **
1,2,3,7,8-pentachlorodibenzo-p-dioxin	40321-76-4	4.8E-06	EPA RSL*	4.8E-06	EPA RSL **
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	39227-28-6	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	57653-85-7	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	19408-74-3	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	35822-46-9	0.00048	EPA RSL*	0.00048	EPA RSL **
1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin	3268-87-9	0.016	EPA RSL*	0.016	EPA RSL **
2,3,7,8-tetrachlorodibenzofuran	51207-31-9	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,7,8-pentachlorodibenzofuran	57117-41-6	0.00016	EPA RSL*	0.00016	EPA RSL **
2,3,4,7,8-pentachlorodibenzofuran	57117-31-4	0.000016	EPA RSL*	0.000016	EPA RSL **
1,2,3,6,7,8-hexachlorodibenzofuran	57117-44-9	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,7,8,9-hexachlorodibenzofuran	72918-21-9	0.000048	EPA RSL*	0.000048	EPA RSL **
2,3,4,6,7,8-hexachlorodibenzofuran	60851-34-5	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,4,6,7,8-heptachlorodibenzofuran	67562-39-4	0.00048	EPA RSL*	0.00048	EPA RSL **
1,2,3,4,6,8,9-heptachlorodibenzofuran	69698-58-4	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,4,7,8-hexachlorodibenzofuran	70648-26-9	0.000048	EPA RSL*	0.000048	EPA RSL **
1,2,3,4,6,7,8,9-octachlorodibenzofuran	39001-02-0	0.0016	EPA RSL*	0.0016	EPA RSL **

Screening levels based upon a non cancer HQ of 0.1 or an ELCR of 1x10-6 as propsed by Norfolk Southern

* Indicates a single year exposure for a child 2 to 6 years old

** Indicates a 26 year residential exposure

Figure 8-1: NS/Arcadis March 6, 2023 Sampling Plan Screening Levels (Exhibit 94, Bates ED_013980L_00001401-00117)

As seen in Figure 8-1, for dioxins and dioxin-like substances, Norfolk Southern used the same soil screening values for intermediate and chronic exposures. No data was provided for water screening level values.

[The intermediate risk screen levels based on 1 year of a child's exposure do not seem to be conservative nor reflect the potential for more than 1 year of exposure to these chemicals.]

The soil screening level values shown in Table 8-1 are in units of mg/kg whereas most of the soil results from NS/Arcadis sampling results are in units of micrograms/kilogram (µg/kg). Since there are 1,000 micrograms in a milligram, data in Table 8-2 can be readily converted to micrograms per kilogram (Table 8-2):

Table 8-2: Norfolk Southern's Sampling Plan Screening Levels (µg/kg)

Chemical Name	CAS#	Intermediate		Chronic	
		Screening level (µg/kg)	Source	Screening level (µg/kg)	Source
Acenaphthylene	208-96-8	NSL		NSL	
Acenaphthene	83-32-9	1,200,000	EPA RSL*	1,200,000	EPA RSL **
Anthracene	120-12-7	5,980,000	EPA RSL*	5,980,000	EPA RSL **
benz[a]anthracene	56-55-3	1,100	EPA RSL*	1,100	EPA RSL **
Benzo[b]anthracene	205-99-2	NSL		NSL	
Benzo[a]pyrene	50-32-8	1,400	EPA RSL*	120	EPA RSL **
Benzo[e]pyrene	192-97-2	570	EPA RSL*	570	EPA RSL **
Benzo[b]fluoranthene	205-99-2	14,000	EPA RSL*	1,200	EPA RSL **
Benzo[g,h,i]perylene	191-24-2	NSL		NSL	
Benzo[k]fluoranthene	207-08-9	140,000	EPA RSL*	12,000	EPA RSL **
Chrysene	218-01-9	1,390,000	EPA RSL*	12,000	EPA RSL **
Dibenz[a,h]anthracene	53-70-3	1,400	EPA RSL*	120	EPA RSL **
fluoranthene	206-44-0	598,000	EPA RSL*	59,800	EPA RSL **
fluorene	86-73-7	239,000	EPA RSL*	2,390,000	EPA RSL **
Indeno[1,2,3-cd]pyrene	193-39-5	14,000	EPA RSL*	1,200	EPA RSL **
2-methylnaphthalene	91-57-6	24,000	EPA RSL*	24,000	EPA RSL **
Phenanthrene	85-01-8	NSL		NSL	
Pyrene	129-00-0	1,790,000	EPA RSL*	1,790,000	EPA RSL **
Naphthalene	91-20-3	14,000	EPA RSL*	2,000	EPA RSL **
Phenol	59-50-7	1,900,000	EPA RSL*	1,900,000	EPA RSL **
4-Chlorophenyl phenyl ether	7005-72-3	NSL		NSL	
4-chloro-3methylphenol	59-50-7	632,000	EPA RSL*	632,000	EPA RSL **
2-Chlorophenol	95-57-8	39,000	EPA RSL*	39,000	EPA RSL **
2,4-Dichlorophenol	120-83-2	126,000	EPA RSL*	126,000	EPA RSL **
Pentachlorophenol	87-86-5	8,600	EPA RSL*	1,020	EPA RSL **
2,3,4,6-Tetrachlorophenol	58-90-2	63,000	EPA RSL*	63,000	EPA RSL **

Chemical Name	CAS#	Intermediate		Chronic	
		Screening level (µg/kg)	Source	Screening level (µg/kg)	Source
2,4,5-Trichlorophenol	95-95-4	1,900,000	EPA RSL*	1,900,000	EPA RSL **
2,4,6-Trichlorophenol	88-06-2	32,000	EPA RSL*	32,000	EPA RSL **
Hexachlorobenzene	118-74-1	78	EPA RSL*	78	EPA RSL **
Pentachlorobenzene	608-93-5	63,000	EPA RSL*	63,000	EPA RSL **
1,2,4,5-Tetrachlorobenzene	95-94-3	240	EPA RSL*	240	EPA RSL **
1,2,3-Trichlorobenzene	87-61-6	6,300	EPA RSL*	6,300	EPA RSL **
1,2,4-Trichlorobenzene	120-82-1	30,000	EPA RSL*	5,800	EPA RSL **
2,3,7,8-tetrachlorodibenzo-p-dioxin	1746-01-6	0.0048	EPA RSL*	0.0048	EPA RSL **
1,2,3,7,8-pentachlorodibenzo-p-dioxin	40321-76-4	0.0048	EPA RSL*	0.0048	EPA RSL **
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	39227-28-6	0.0480	EPA RSL*	0.0480	EPA RSL **
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	57653-85-7	0.0480	EPA RSL*	0.0480	EPA RSL **
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	19408-74-3	0.0480	EPA RSL*	0.0480	EPA RSL **
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	35822-46-9	0.4800	EPA RSL*	0.4800	EPA RSL **
1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin	3268-87-9	16.0000	EPA RSL*	16.0000	EPA RSL **
2,3,7,8-tetrachlorodibenzofuran	51207-31-9	0.0480	EPA RSL*	0.0480	EPA RSL **
1,2,3,7,8-pentachlorodibenzofuran	57117-41-6	0.1600	EPA RSL*	0.1600	EPA RSL **
2,3,4,7,8-pentachlorodibenzofuran	57117-31-4	0.0160	EPA RSL*	0.0160	EPA RSL **
1,2,3,6,7,8-hexachlorodibenzofuran	57117-44-9	0.0480	EPA RSL*	0.0480	EPA RSL **
1,2,3,7,8,9-hexachlorodibenzofuran	72918-21-9	0.0480	EPA RSL*	0.0480	EPA RSL **
2,3,4,6,7,8-hexachlorodibenzofuran	60851-34-5	0.0480	EPA RSL*	0.0480	EPA RSL **
1,2,3,4,6,7,8-heptachlorodibenzofuran	67562-39-4	0.4800	EPA RSL*	0.4800	EPA RSL **
1,2,3,4,6,8,9-heptachlorodibenzofuran	69698-58-4	0.0480	EPA RSL*	0.0480	EPA RSL **
1,2,3,4,7,8-hexachlorodibenzofuran	70648-26-9	0.0480	EPA RSL*	0.0480	EPA RSL **
1,2,3,4,6,7,8,9-octachlorodibenzofuran	39001-02-0	1.6000	EPA RSL*	1.6000	EPA RSL **

Screening levels based upon a non-cancer Total Hazard Quotient (THQ) of 0.1 and Excess Lifetime Cancer Risk (ELCR) of $1x10^{-6}$ as proposed by Norfolk Southern.

* Indicates a single year exposure for a child 2 to 6 years old

** Indicates a 26-year residential exposure

The US EPA Generic Screen Levels reported for many chemicals (see https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables), based on a THQ of 0.1 (same as that used by Norfolk Southern) and an ELCR of 1×10^{-6} is reproduced as Table 8-3:

Table 8-3: US EPA Generic Screening Levels

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m³)	key	Industrial Air (µg/m³)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Acephate	30560-19-1	1.9E+03	n	2.5E+04	n					6.0E-01	n		1.3E-01	n	
Acetaldehyde	75-07-0	8.2E+03	n	3.4E+04	n	9.4E-01	n	3.9E+00	n	1.9E+00	n		3.8E-01	n	
Acetochlor	34256-82-1	1.3E+05	n	1.6E+06	n					3.5E+01	n		2.8E+01	n	
Acetone	67-64-1	7.0E+06	n	1.1E+08	nm					1.8E+03	n		3.7E+02	n	
Acetone Cyanohydrin	75-86-5	2.8E+08	nm	1.2E+09	nm	2.1E-01	n	8.8E-01	n						
Acetonitrile	75-05-8	8.1E+04	n	3.4E+05	n	6.3E+00	n	2.6E+01	n	1.3E+01	n		2.6E+00	n	
Acetophenone	98-86-2	7.8E+05	n	1.2E+07	ns					1.9E+02	n		5.8E+01	n	
Acetylaminofluorene, 2-	53-96-3	1.4E+02	c	6.0E+02	c	2.2E-03	c	9.4E-03	c	1.6E-02	c		7.5E-02	c	
Acrolein	107-02-8	1.4E+01	n	6.0E+01	n	2.1E-03	n	8.8E-03	n	4.2E-03	n		8.4E-04	n	
Acrylamide	79-06-1	2.4E+02	c*	4.6E+03	c*	1.0E-02	c*	1.2E-01	c*	5.0E-02	c*		1.1E-02	c*	
Acrylic Acid	79-10-7	2.0E+03	n	8.3E+03	n	2.1E-02	n	8.8E-02	n	4.2E-02	n		8.5E-03	n	
Acrylonitrile	107-13-1	2.5E+02	c**	1.1E+03	c**	4.1E-02	c**	1.8E-01	c**	5.2E-02	c**		1.1E-02	c**	
Adiponitrile	111-69-3	8.5E+08	nm	3.6E+09	nm	6.3E-01	n	2.6E+00	n						
Alachlor	15972-60-8	9.7E+03	c**	4.1E+04	c*					1.1E+00	c*	2.0E+00	8.7E-01	c*	1.6E+00
Aldicarb	116-06-3	6.3E+03	n	8.2E+04	n					2.0E+00	n	3.0E+00	4.9E-01	n	7.5E-01
Aldicarb Sulfone	1646-88-4	6.3E+03	n	8.2E+04	n					2.0E+00	n	2.0E+00	4.4E-01	n	4.4E-01
Aldicarb sulfoxide	1646-87-3	0.0E+00		0.0E+00								4.0E+00			8.8E-01
Aldrin	309-00-2	3.9E+01	c**	1.8E+02	c*	5.7E-04	c	2.5E-03	c	9.2E-04	c*		1.5E-01	c*	
Allyl Alcohol	107-18-6	3.5E+02	n	1.5E+03	n	1.0E-02	n	4.4E-02	n	2.1E-02	n		4.2E-03	n	
Allyl Chloride	107-05-1	1.7E+02	n	6.9E+02	n	1.0E-01	n	4.4E-01	n	2.1E-01	n		6.7E-02	n	
Aluminum	7429-90-5	7.7E+06	n	1.1E+08	nm	5.2E-01	n	2.2E+00	n	2.0E+03	n		3.0E+06	n	
Aluminum Phosphide	20859-73-8	3.1E+03	n	4.7E+04	n					8.0E-01	n				
Ametryn	834-12-8	5.7E+04	n	7.4E+05	n					1.5E+01	n		1.6E+01	n	
Aminobiphenyl, 4-	92-67-1	2.6E+01	c	1.1E+02	c	4.7E-04	c	2.0E-03	c	3.0E-03	c		1.5E-02	c	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Aminophenol, m-	591-27-5	5.1E+05	n	6.6E+06	n					1.6E+02	n		6.1E+01	n	
Aminophenol, o-	95-55-6	2.5E+04	n	3.3E+05	n					7.9E+00	n		3.0E+00	n	
Aminophenol, p-	123-30-8	1.3E+05	n	1.6E+06	n					4.0E+01	n		1.5E+01	n	
Amitraz	33089-61-1	1.6E+04	n	2.1E+05	n					8.2E-01	n		4.2E+02	n	
Ammonia	7664-41-7	0.0E+00		0.0E+00		5.2E+01	n	2.2E+02	n						
Ammonium Picrate	131-74-8	1.3E+04	n	1.6E+05	n					4.0E+00	n		1.9E+01	n	
Ammonium Sulfamate	7773-06-0	1.6E+06	n	2.3E+07	n					4.0E+02	n		0.0E+00		
Amyl Alcohol, tert-	75-85-4	8.2E+03	n	3.4E+04	n	3.1E-01	n	1.3E+00	n	6.3E-01	n		1.3E-01	n	
Aniline	62-53-3	4.4E+04	n	4.0E+05	c**	1.0E-01	n	4.4E-01	n	1.3E+01	c**		4.6E+00	c**	
Anthraquinone, 9,10-	84-65-1	1.3E+04	n	5.7E+04	c**					1.4E+00	c**		1.4E+01	c**	
Antimony (metallic)	7440-36-0	3.1E+03	n	4.7E+04	n	3.1E-02	n	1.3E-01	n	7.8E-01	n	6.0E+00	3.5E+01	n	2.7E+02
Antimony Pentoxide	1314-60-9	3.9E+03	n	5.8E+04	n					9.7E-01	n				
Antimony Tetroxide	1332-81-6	3.1E+03	n	4.7E+04	n					7.8E-01	n				
Antimony Trioxide	1309-64-4	2.8E+07	n	1.2E+08	nm	2.1E-02	n	8.8E-02	n						
Arsenic, Inorganic	7440-38-2	6.8E+02	c**R	3.0E+03	c*R	6.5E-04	c**	2.9E-03	c**	5.2E-02	c*	1.0E+01	1.5E+00	c*	2.9E+02
Arsine	7784-42-1	2.7E+01	n	4.1E+02	n	5.2E-03	n	2.2E-02	n	7.0E-03	n				
Asbestos (units in fibers)	1332-21-4											7.0E+06 (G)			
Asulam	3337-71-1	2.3E+06	n	3.0E+07	n					7.2E+02	n		1.8E+02	n	
Atrazine	1912-24-9	2.4E+03	c**	1.0E+04	c*					3.0E-01	c*	3.0E+00	2.0E-01	c*	1.9E+00
Auramine	492-80-8	6.2E+02	c	2.6E+03	c	1.1E-02	c	4.9E-02	c	7.8E-02	c		7.1E-01	c	
Avermectin B1	65195-55-3	2.5E+03	n	3.3E+04	n					8.0E-01	n		1.4E+03	n	
Azinphos-methyl	86-50-0	1.9E+04	n	2.5E+05	n	1.0E+00	n	4.4E+00	n	5.6E+00	n		1.7E+00	n	
Azobenzene	103-33-3	5.6E+03	c	2.6E+04	c	9.1E-02	c	4.0E-01	c	1.2E-01	c		9.3E-01	c	
Azodicarbonamide	123-77-3	8.6E+05	n	4.0E+06	n	7.3E-04	n	3.1E-03	n	2.0E+03	n		6.8E+02	n	
Barium	7440-39-3	1.5E+06	n	2.2E+07	n	5.2E-02	n	2.2E-01	n	3.8E+02	n	2.0E+03	1.6E+04	n	8.2E+04

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Benfluralin	1861-40-1	3.9E+04	n	5.8E+05	n					2.8E+00	n		9.4E+01	n	
Benomyl	17804-35-2	3.2E+05	n	4.1E+06	n					9.7E+01	n		8.5E+01	n	
Bensulfuron-methyl	83055-99-6	1.3E+06	n	1.6E+07	n					3.9E+02	n		1.0E+02	n	
Bentazon	25057-89-0	1.9E+05	n	2.5E+06	n					5.7E+01	n		1.2E+01	n	
Benzaldehyde	100-52-7	1.7E+05	c**	8.2E+05	c*					1.9E+01	c*		4.1E+00	c*	
Benzene	71-43-2	1.2E+03	c**	5.1E+03	c**	3.6E-01	c**	1.6E+00	c**	4.6E-01	c**	5.0E+00	2.3E-01	c**	2.6E+00
Benzenediamine-2-methyl sulfate, 1,4-	6369-59-1	1.9E+03	n	2.3E+04	c**					6.0E-01	n		1.7E-01	n	
Benzenethiol	108-98-5	7.8E+03	n	1.2E+05	n					1.7E+00	n		1.1E+00	n	
Benzidine	92-87-5	5.3E-01	c	1.0E+01	c	1.5E-05	c	1.8E-04	c	1.1E-04	c		2.8E-04	c	
Benzoic Acid	65-85-0	2.5E+07	n	3.3E+08	nm					7.5E+03	n		1.5E+03	n	
Benzotrichloride	98-07-7	5.3E+01	c	2.5E+02	c					3.0E-03	c		6.6E-03	c	
Benzyl Alcohol	100-51-6	6.3E+05	n	8.2E+06	n					2.0E+02	n		4.8E+01	n	
Benzyl Chloride	100-44-7	1.1E+03	c**	4.8E+03	c**	5.7E-02	c**	2.5E-01	c**	8.9E-02	c**		9.8E-02	c**	
Beryllium and compounds	7440-41-7	1.6E+04	n	2.3E+05	n	1.2E-03	c**	5.1E-03	c**	2.5E+00	n	4.0E+00	1.9E+03	n	3.2E+03
Bifenox	42576-02-3	5.7E+04	n	7.4E+05	n					1.0E+01	n		7.6E+01	n	
Biphenthrin	82657-04-3	9.5E+04	n	1.2E+06	n					3.0E+01	n		1.4E+05	n	
Biphenyl, 1,1'-	92-52-4	4.7E+03	n	2.0E+04	n	4.2E-02	n	1.8E-01	n	8.3E-02	n		8.7E-01	n	
Bis(2-chloro-1-methylethyl) ether	108-60-1	3.1E+05	n	4.7E+06	ns					7.1E+01	n		2.6E+01	n	
Bis(2-chloroethoxy)methane	111-91-1	1.9E+04	n	2.5E+05	n					5.9E+00	n		1.3E+00	n	
Bis(2-chloroethyl)ether	111-44-4	2.3E+02	c	1.0E+03	c	8.5E-03	c	3.7E-02	c	1.4E-02	c		3.6E-03	c	
Bis(chloromethyl)ether	542-88-1	8.3E-02	c	3.6E-01	c	4.5E-05	c	2.0E-04	c	7.2E-05	c		1.7E-05	c	
Bisphenol A	80-05-7	3.2E+05	n	4.1E+06	n					7.7E+01	n		5.8E+03	n	
Boron And Borates Only	7440-42-8	1.6E+06	n	2.3E+07	n	2.1E+00	n	8.8E+00	n	4.0E+02	n		1.3E+03	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Boron Trichloride	10294-34-5	1.6E+07	n	2.3E+08	nm	2.1E+00	n	8.8E+00	n	4.2E+00	n				
Boron Trifluoride	7637-07-2	3.1E+05	n	4.7E+06	n	1.4E+00	n	5.7E+00	n	2.6E+00	n				
Bromate	15541-45-4	9.9E+02	c*	4.7E+03	c					1.1E-01	c*	1.0E+01	8.5E-01	c*	7.7E+01
Bromo-2-chloroethane, 1-	107-04-0	3.5E+01	n	1.5E+02	n	6.3E-03	n	2.6E-02	n	1.2E-02	n		3.3E-03	n	
Bromo-3-fluorobenzene, 1-	1073-06-9	2.3E+03	n	3.5E+04	n					4.9E-01	n		4.7E-01	n	
Bromo-4-fluorobenzene, 1-	460-00-4	2.3E+03	n	3.5E+04	n					4.6E-01	n		4.4E-01	n	
Bromoacetic acid	79-08-3	0.0E+00		0.0E+00								6.0E+01 (G)			1.2E+01
Bromobenzene	108-86-1	2.9E+04	n	1.8E+05	n	6.3E+00	n	2.6E+01	n	6.2E+00	n		4.2E+00	n	
Bromochloromethane	74-97-5	1.5E+04	n	6.3E+04	n	4.2E+00	n	1.8E+01	n	8.3E+00	n		2.1E+00	n	
Bromodichloromethane	75-27-4	2.9E+02	c	1.3E+03	c	7.6E-02	c	3.3E-01	c	1.3E-01	c	8.0E+01 (G)	3.6E-02	c	2.2E+01
Bromoform	75-25-2	1.9E+04	c**	8.6E+04	c*	2.6E+00	c	1.1E+01	c	3.3E+00	c*	8.0E+01 (G)	8.7E-01	c*	2.1E+01
Bromomethane	74-83-9	6.8E+02	n	3.0E+03	n	5.2E-01	n	2.2E+00	n	7.5E-01	n		1.9E-01	n	
Bromophos	2104-96-3	3.9E+04	n	5.8E+05	n					3.5E+00	n		1.5E+01	n	
Bromopropane, 1-	106-94-5	2.2E+04	n	9.4E+04	n	1.0E+01	n	4.4E+01	n	2.1E+01	n		6.4E+00	n	
Bromoxynil	1689-84-5	5.3E+03	c*	2.2E+04	c*					6.1E-01	c*		5.2E-01	c*	
Bromoxynil Octanoate	1689-99-2	6.7E+03	c*	3.2E+04	c*					2.4E-01	c*		2.1E+00	c*	
Butadiene, 1,3-	106-99-0	7.6E+01	c**	3.3E+02	c**	9.4E-02	c**	4.1E-01	c**	7.1E-02	c**		3.9E-02	c**	
Butanol, N-	71-36-3	7.8E+05	n	1.2E+07	ns					2.0E+02	n		4.1E+01	n	
Butyl Alcohol, t-	75-65-0	1.4E+06	c**	6.5E+06	c**	5.2E+02	n	2.2E+03	n	1.5E+02	c**		3.2E+01	c**	
Butyl alcohol, sec-	78-92-2	1.3E+07	n	1.5E+08	nms	3.1E+03	n	1.3E+04	n	2.4E+03	n		5.0E+02	n	
Butylate	2008-41-5	3.9E+05	n	5.8E+06	n					4.6E+01	n		4.5E+01	n	
Butylated hydroxyanisole	25013-16-5	2.7E+06	c	1.1E+07	c	4.9E+01	c	2.2E+02	c	1.5E+02	c		2.9E+02	c	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Butylated hydroxytoluene	128-37-0	1.5E+05	c*	6.4E+05	c*					3.4E+00	c*		1.0E+02	c*	
Butylbenzene, n-	104-51-8	3.9E+05	ns	5.8E+06	ns					1.0E+02	n		3.2E+02	n	
Butylbenzene, sec-	135-98-8	7.8E+05	ns	1.2E+07	ns					2.0E+02	n		5.9E+02	n	
Butylbenzene, tert-	98-06-6	7.8E+05	ns	1.2E+07	ns					6.9E+01	n		1.6E+02	n	
Cacodylic Acid	75-60-5	1.3E+05	n	1.6E+06	n					4.0E+01	n		1.1E+01	n	
Cadmium (Diet)	7440-43-9	7.1E+02	n	1.0E+04	n	1.0E-03	n	4.4E-03	n						
Cadmium (Water)	7440-43-9	0.0E+00		0.0E+00		1.0E-03	n	4.4E-03	n	1.8E-01	n	5.0E+00	1.4E+01	n	3.8E+02
Caprolactam	105-60-2	3.1E+06	n	4.0E+07	n	2.3E-01	n	9.6E-01	n	9.9E+02	n		2.5E+02	n	
Captafol	2425-06-1	3.6E+03	c**	1.5E+04	c*	6.5E-02	c	2.9E-01	c	4.0E-01	c**		7.1E-01	c**	
Captan	133-06-2	2.4E+05	c**	1.0E+06	c*	4.3E+00	c	1.9E+01	c	3.1E+01	c**		2.2E+01	c**	
Carbaryl	63-25-2	6.3E+05	n	8.2E+06	n					1.8E+02	n		1.7E+02	n	
Carbofuran	1563-66-2	3.2E+04	n	4.1E+05	n					9.4E+00	n	4.0E+01	3.7E+00	n	1.6E+01
Carbon Disulfide	75-15-0	7.7E+04	n	3.5E+05	n	7.3E+01	n	3.1E+02	n	8.1E+01	n		2.4E+01	n	
Carbon Tetrachloride	56-23-5	6.5E+02	c*	2.9E+03	c*	4.7E-01	c*	2.0E+00	c*	4.6E-01	c*	5.0E+00	1.8E-01	c*	1.9E+00
Carbonyl Sulfide	463-58-1	6.7E+03	n	2.8E+04	n	1.0E+01	n	4.4E+01	n	2.1E+01	n		5.1E+01	n	
Carbosulfan	55285-14-8	6.3E+04	n	8.2E+05	n					5.1E+00	n		1.2E+02	n	
Carboxin	5234-68-4	6.3E+05	n	8.2E+06	n					1.9E+02	n		1.0E+02	n	
Ceric oxide	1306-38-3	1.3E+08	nm	5.4E+08	nm	9.4E-02	n	3.9E-01	n						
Chloral Hydrate	302-17-0	7.8E+05	n	1.2E+07	n					2.0E+02	n		4.0E+01	n	
Chloramben	133-90-4	9.5E+04	n	1.2E+06	n					2.9E+01	n		7.0E+00	n	
Chloramines, Organic	E701235	0.0E+00		0.0E+00								4.0E+03 (G)			
Chloranil	118-75-2	1.3E+03	c	5.7E+03	c					1.8E-01	c		1.5E-01	c	
Chlordane (alpha)	5103-71-9	3.6E+03	n	5.0E+04	n					3.6E-01	n		4.9E+01	n	
Chlordane (gamma)	5103-74-2	3.6E+03	n	5.0E+04	n					1.0E+00	n		1.4E+02	n	
Chlordane (technical mixture)	12789-03-6	1.7E+03	c**	7.7E+03	c**	2.8E-02	c**	1.2E-01	c**	2.0E-02	c**	2.0E+00	2.7E+00	c**	2.7E+02

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Chlordecone (Kepone)	143-50-0	5.4E+01	c*	2.3E+02	c	6.1E-04	c	2.7E-03	c	3.5E-03	c*		1.2E-01	c*	
Chlorfenvinphos	470-90-6	4.4E+03	n	5.7E+04	n					1.1E+00	n		3.1E+00	n	
Chlorimuron, Ethyl-	90982-32-4	5.7E+05	n	7.4E+06	n					1.8E+02	n		6.0E+01	n	
Chlorine	7782-50-5	1.8E+01	n	7.8E+01	n	1.5E-02	n	6.4E-02	n	3.0E-02	n	4.0E+03 (G)	1.5E-02	n	2.0E+03
Chlorine Dioxide	10049-04-4	2.3E+05	n	3.4E+06	n	2.1E-02	n	8.8E-02	n	4.2E-02	n	8.0E+02 (G)			
Chlorite (Sodium Salt)	7758-19-2	2.3E+05	n	3.5E+06	n					6.0E+01	n	1.0E+03			
Chloro-1,1-difluoroethane, 1-	75-68-3	5.4E+06	ns	2.3E+07	ns	5.2E+03	n	2.2E+04	n	1.0E+04	n		5.2E+03	n	
Chloro-1,3-butadiene, 2-	126-99-8	1.0E+01	c	4.4E+01	c	9.4E-03	c	4.1E-02	c	1.9E-02	c		9.8E-03	c	
Chloro-2-methylaniline HCl, 4-	3165-93-3	1.2E+03	c	5.0E+03	c					1.7E-01	c		1.5E-01	c	
Chloro-2-methylaniline, 4-	95-69-2	5.4E+03	c**	2.3E+04	c*	3.6E-02	c	1.6E-01	c	7.0E-01	c**		4.0E-01	c**	
Chloroacetaldehyde, 2-	107-20-0	2.6E+03	c	1.2E+04	c					2.9E-01	c		5.8E-02	c	
Chloroacetic Acid	79-11-8	0.0E+00		0.0E+00								6.0E+01 (G)			1.2E+01
Chloroacetophenone, 2-	532-27-4	4.3E+06	n	1.8E+07	n	3.1E-03	n	1.3E-02	n						
Chloroaniline, p-	106-47-8	2.7E+03	c**	1.1E+04	c**					3.7E-01	c**		1.6E-01	c**	
Chlorobenzene	108-90-7	2.8E+04	n	1.3E+05	n	5.2E+00	n	2.2E+01	n	7.8E+00	n	1.0E+02	5.3E+00	n	6.8E+01
Chlorobenzene sulfonic acid, p-	98-66-8	6.3E+05	n	8.2E+06	n					2.0E+02	n		4.7E+01	n	
Chlorobenzilate	510-15-6	4.9E+03	c*	2.1E+04	c*	9.1E-02	c	4.0E-01	c	3.1E-01	c*		1.0E+00	c*	
Chlorobenzoic Acid, p-	74-11-3	1.9E+05	n	2.5E+06	n					5.1E+01	n		1.3E+01	n	
Chlorobenzotrifluoride, 4-	98-56-6	2.2E+03	c**	9.6E+03	c*	3.3E-01	c*	1.4E+00	c*	6.5E-01	c**		2.3E+00	c**	
Chlorobutane, 1-	109-69-3	3.1E+05	n	4.7E+06	ns					6.4E+01	n		2.6E+01	n	
Chlorodifluoromethane	75-45-6	4.9E+06	ns	2.1E+07	ns	5.2E+03	n	2.2E+04	n	1.0E+04	n		4.3E+03	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Chloroethanol, 2-	107-07-3	1.6E+05	n	2.3E+06	n					4.0E+01	n		8.1E+00	n	
Chloroform	67-66-3	3.2E+02	c*	1.4E+03	c*	1.2E-01	c*	5.3E-01	c*	2.2E-01	c*	8.0E+01 (G)	6.1E-02	c*	2.2E+01
Chloromethane	74-87-3	1.1E+04	n	4.6E+04	n	9.4E+00	n	3.9E+01	n	1.9E+01	n		4.9E+00	n	
Chloromethyl Methyl Ether	107-30-2	2.0E+01	c	8.9E+01	c	4.1E-03	c	1.8E-02	c	6.5E-03	c		1.4E-03	c	
Chloronitrobenzene, o-	88-73-3	1.8E+03	c*	7.7E+03	c*	1.0E-03	n	4.4E-03	n	2.4E-01	c*		2.2E-01	c*	
Chloronitrobenzene, p-	100-00-5	4.4E+03	n	3.8E+04	c**	2.1E-01	n	8.8E-01	n	1.2E+00	c**		1.1E+00	c**	
Chlorophenol, 2-	95-57-8	3.9E+04	n	5.8E+05	n					9.1E+00	n		8.9E+00	n	
Chloropicrin	76-06-2	2.0E+02	n	8.2E+02	n	4.2E-02	n	1.8E-01	n	8.3E-02	n		2.5E-02	n	
Chlorothalonil	1897-45-6	3.2E+04	c**	1.4E+05	c**					4.0E+00	c**		9.0E+00	c**	
Chlorotoluene, o-	95-49-8	1.6E+05	n	2.3E+06	ns					2.4E+01	n		2.3E+01	n	
Chlorotoluene, p-	106-43-4	1.6E+05	n	2.3E+06	ns					2.5E+01	n		2.4E+01	n	
Chlorozotocin	54749-90-5	2.3E+00	c	9.6E+00	c	4.1E-05	c	1.8E-04	c	3.2E-04	c		7.1E-05	c	
Chlorpropham	101-21-3	3.2E+04	n	4.1E+05	n					7.1E+00	n		6.4E+00	n	
Chlorpyrifos	2921-88-2	6.3E+03	n	8.2E+04	n					8.4E-01	n		1.2E+01	n	
Chlorpyrifos Methyl	5598-13-0	6.3E+04	n	8.2E+05	n					1.2E+01	n		5.4E+01	n	
Chlorsulfuron	64902-72-3	3.2E+05	n	4.1E+06	n					9.9E+01	n		8.3E+01	n	
Chlorthal-dimethyl	1861-32-1	6.3E+04	n	8.2E+05	n					1.2E+01	n		1.5E+01	n	
Chlorthiophos	60238-56-4	5.1E+03	n	6.6E+04	n					2.8E-01	n		7.3E+00	n	
Chromium(III), Insoluble Salts	16065-83-1	1.2E+07	n	1.8E+08	nm					2.2E+03	n		4.0E+09	n	
Chromium(VI)	18540-29-9	3.0E+02	c*	6.3E+03	c*	1.2E-05	c	1.5E-04	c	3.5E-02	c		6.7E-01	c	
Chromium, Total	7440-47-3	0.0E+00		0.0E+00								1.0E+02			1.8E+08
Clofentezine	74115-24-5	8.2E+04	n	1.1E+06	n					2.3E+01	n		1.4E+03	n	
Cobalt	7440-48-4	2.3E+03	n	3.5E+04	n	3.1E-04	c**	1.4E-03	c**	6.0E-01	n		2.7E+01	n	
Coke Oven Emissions	E649830	0.0E+00		0.0E+00		1.6E-03	c	2.0E-02	c						

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Copper	7440-50-8	3.1E+05	n	4.7E+06	n					8.0E+01	n	1.3E+03	2.8E+03	n	4.6E+04
Cresol, m-	108-39-4	3.2E+05	n	4.1E+06	n	6.3E+01	n	2.6E+02	n	9.3E+01	n		7.4E+01	n	
Cresol, o-	95-48-7	3.2E+05	n	4.1E+06	n	6.3E+01	n	2.6E+02	n	9.3E+01	n		7.5E+01	n	
Cresol, p-	106-44-5	1.3E+05	n	1.6E+06	n	6.3E+01	n	2.6E+02	n	3.7E+01	n		3.0E+01	n	
Cresol, p-chloro-m-	59-50-7	6.3E+05	n	8.2E+06	n					1.4E+02	n		1.7E+02	n	
Cresols	1319-77-3	6.3E+05	n	8.2E+06	n	6.3E+01	n	2.6E+02	n	1.5E+02	n		1.3E+02	n	
Crotonaldehyde, trans-	123-73-9	3.7E+02	c*	1.7E+03	c*					4.0E-02	c*		8.2E-03	c*	
Cumene	98-82-8	1.9E+05	n	9.9E+05	ns	4.2E+01	n	1.8E+02	n	4.5E+01	n		7.4E+01	n	
Cupferron	135-20-6	2.5E+03	c	1.0E+04	c	4.5E-02	c	1.9E-01	c	3.5E-01	c		6.1E-01	c	
Cyanazine	21725-46-2	6.5E+02	c*	2.7E+03	c*					8.8E-02	c*		4.1E-02	c*	
Cyanides		0.0E+00		0.0E+00									0.0E+00		
~Calcium Cyanide	592-01-8	7.8E+03	n	1.2E+05	n					2.0E+00	n		0.0E+00		
~Copper Cyanide	544-92-3	3.9E+04	n	5.8E+05	n					1.0E+01	n		0.0E+00		
~Cyanide (CN-)	57-12-5	2.3E+03	n	1.5E+04	n	8.3E-02	n	3.5E-01	n	1.5E-01	n	2.0E+02	1.5E+00	n	2.0E+03
~Cyanogen	460-19-5	7.8E+03	n	1.2E+05	n					2.0E+00	n		0.0E+00		
~Cyanogen Bromide	506-68-3	7.0E+05	n	1.1E+07	n					1.8E+02	n		0.0E+00		
~Cyanogen Chloride	506-77-4	3.9E+05	n	5.8E+06	n					1.0E+02	n		0.0E+00		
~Hydrogen Cyanide	74-90-8	2.3E+03	n	1.5E+04	n	8.3E-02	n	3.5E-01	n	1.5E-01	n		1.5E+00	n	
~Potassium Cyanide	151-50-8	1.6E+04	n	2.3E+05	n					4.0E+00	n		0.0E+00		
~Potassium Silver Cyanide	506-61-6	3.9E+04	n	5.8E+05	n					8.2E+00	n		0.0E+00		
~Silver Cyanide	506-64-9	7.8E+05	n	1.2E+07	n					1.8E+02	n		0.0E+00		
~Sodium Cyanide	143-33-9	7.8E+03	n	1.2E+05	n					2.0E+00	n	2.0E+02	0.0E+00		
~Thiocyanates	E1790665	1.6E+03	n	2.3E+04	n					4.0E-01	n		0.0E+00		
~Thiocyanic Acid	463-56-9	1.6E+03	n	2.3E+04	n					4.0E-01	n		0.0E+00		
~Zinc Cyanide	557-21-1	3.9E+05	n	5.8E+06	n					1.0E+02	n		0.0E+00		

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Cyclohexane	110-82-7	6.5E+05	ns	2.7E+06	ns	6.3E+02	n	2.6E+03	n	1.3E+03	n		1.3E+03	n	
Cyclohexane, 1,2,3,4,5-pentabromo-6-chloro-	87-84-3	2.7E+04	c**	1.1E+05	c*					2.8E+00	c*		1.6E+01	c*	
Cyclohexanone	108-94-1	2.8E+06	n	1.3E+07	ns	7.3E+01	n	3.1E+02	n	1.4E+02	n		3.4E+01	n	
Cyclohexene	110-83-8	3.1E+04	n	3.1E+05	ns	1.0E+02	n	4.4E+02	n	7.0E+00	n		4.6E+00	n	
Cyclohexylamine	108-91-8	1.6E+06	n	2.3E+07	n					3.8E+02	n		1.0E+02	n	
Cyfluthrin	68359-37-5	1.6E+05	n	2.1E+06	n					1.2E+01	n		3.1E+03	n	
Cyromazine	66215-27-8	3.2E+06	n	4.1E+07	n					9.9E+02	n		2.5E+02	n	
DDD, p,p`- (DDD)	72-54-8	2.3E+03	c**	9.6E+03	c**	4.1E-02	c	1.8E-01	c	3.2E-02	c**		7.5E+00	c**	
DDE, p,p'-	72-55-9	2.0E+03	c**	9.3E+03	c**	2.9E-02	c	1.3E-01	c	4.6E-02	c*		1.1E+01	c*	
DDT	50-29-3	1.9E+03	c**	8.5E+03	c**	2.9E-02	c	1.3E-01	c	2.3E-01	c**		7.7E+01	c**	
Dalapon	75-99-0	1.9E+05	n	2.5E+06	n					6.0E+01	n	2.0E+02	1.2E+01	n	4.1E+01
Daminozide	1596-84-5	3.0E+04	c*	1.3E+05	c*	5.5E-01	c	2.4E+00	c	4.3E+00	c*		9.5E-01	c*	
Decabromodiphenyl ether, 2,2',3,3',4,4',5,5',6,6'- (BDE-209)	1163-19-5	4.4E+04	n	5.7E+05	n					1.4E+01	n		7.8E+03	n	
Demeton	8065-48-3	2.5E+02	n	3.3E+03	n					4.2E-02	n				
Di(2-ethylhexyl)adipate	103-23-1	4.5E+05	c**	1.9E+06	c*					6.5E+01	c*	4.0E+02	4.7E+03	c*	2.9E+04
Diallate	2303-16-4	8.9E+03	c	3.8E+04	c					5.4E-01	c		8.0E-01	c	
Diazinon	333-41-5	4.4E+03	n	5.7E+04	n					1.0E+00	n		6.5E+00	n	
Dibromo-3-chloropropane, 1,2-	96-12-8	5.3E+00	c*	6.4E+01	c*	1.7E-04	c	2.0E-03	c*	3.3E-04	c	2.0E-01	1.4E-04	c	8.6E-02
Dibromoacetic acid	631-64-1	0.0E+00		0.0E+00								6.0E+01 (G)			1.2E+01
Dibromobenzene, 1,3-	108-36-1	3.1E+03	n	4.7E+04	n					5.3E-01	n		5.1E-01	n	
Dibromobenzene, 1,4-	106-37-6	7.8E+04	n	1.2E+06	n					1.3E+01	n		1.2E+01	n	
Dibromochloromethane	124-48-1	8.3E+03	c*	3.9E+04	c*					8.7E-01	c*	8.0E+01	2.3E-01	c*	2.1E+01

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Dibromoethane, 1,2-	106-93-4	3.6E+01	c	1.6E+02	c	4.7E-03	c	2.0E-02	c	7.5E-03	c	5.0E-02 (G)	2.1E-03	c	1.4E-02
Dibromomethane (Methylene Bromide)	74-95-3	2.4E+03	n	9.9E+03	n	4.2E-01	n	1.8E+00	n	8.3E-01	n		2.1E-01	n	
Dibutyltin Compounds	E1790661	1.9E+03	n	2.5E+04	n					6.0E-01	n				
Dicamba	1918-00-9	1.9E+05	n	2.5E+06	n					5.7E+01	n		1.5E+01	n	
Dichloramine	3400-09-7	0.0E+00		0.0E+00								4.0E+03 (G)			
Dichloro-2-butene, 1,4-	764-41-0	2.1E+00	c	9.4E+00	c	6.7E-04	c	2.9E-03	c	1.3E-03	c		6.6E-04	c	
Dichloro-2-butene, cis-1,4-	1476-11-5	7.4E+00	c	3.2E+01	c	6.7E-04	c	2.9E-03	c	1.3E-03	c		6.2E-04	c	
Dichloro-2-butene, trans-1,4-	110-57-6	7.4E+00	c	3.2E+01	c	6.7E-04	c	2.9E-03	c	1.3E-03	c		6.2E-04	c	
Dichloroacetic Acid	79-43-6	1.1E+04	c**	4.6E+04	c**					1.5E+00	c**	6.0E+01 (G)	3.1E-01	c**	1.2E+01
Dichlorobenzene, 1,2-	95-50-1	1.8E+05	n	9.3E+05	ns	2.1E+01	n	8.8E+01	n	3.0E+01	n	6.0E+02	3.0E+01	n	5.8E+02
Dichlorobenzene, 1,4-	106-46-7	2.6E+03	c	1.1E+04	c	2.6E-01	c	1.1E+00	c	4.8E-01	c	7.5E+01	4.6E-01	c	7.2E+01
Dichlorobenzidine, 3,3'-	91-94-1	1.2E+03	c	5.1E+03	c	8.3E-03	c	3.6E-02	c	1.3E-01	c		8.2E-01	c	
Dichlorobenzophenone, 4,4'-	90-98-2	5.7E+04	n	7.4E+05	n					7.8E+00	n		4.7E+01	n	
Dichlorodifluoromethane	75-71-8	8.7E+03	n	3.7E+04	n	1.0E+01	n	4.4E+01	n	2.0E+01	n		3.0E+01	n	
Dichloroethane, 1,1-	75-34-3	3.6E+03	c	1.6E+04	c	1.8E+00	c	7.7E+00	c	2.8E+00	c		7.8E-01	c	
Dichloroethane, 1,2-	107-06-2	4.6E+02	c**	2.0E+03	c**	1.1E-01	c**	4.7E-01	c**	1.7E-01	c**	5.0E+00	4.8E-02	c**	1.4E+00
Dichloroethylene, 1,1-	75-35-4	2.3E+04	n	1.0E+05	n	2.1E+01	n	8.8E+01	n	2.8E+01	n	7.0E+00	1.0E+01	n	2.5E+00
Dichloroethylene, cis-1,2-	156-59-2	6.3E+03	n	3.7E+04	n	4.2E+00	n	1.8E+01	n	2.5E+00	n	7.0E+01	7.4E-01	n	2.1E+01
Dichloroethylene, trans-1,2-	156-60-5	7.0E+03	n	3.0E+04	n	4.2E+00	n	1.8E+01	n	6.8E+00	n	1.0E+02	2.1E+00	n	3.1E+01
Dichlorophenol, 2,4-	120-83-2	1.9E+04	n	2.5E+05	n					4.6E+00	n		2.3E+00	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Dichlorophenoxy Acetic Acid, 2,4-	94-75-7	7.0E+04	n	9.6E+05	n					1.7E+01	n	7.0E+01	4.5E+00	n	1.8E+01
Dichloropropane, 1,2-	78-87-5	1.6E+03	n	6.6E+03	n	4.2E-01	n	1.8E+00	n	8.2E-01	n	5.0E+00	2.7E-01	n	1.7E+00
Dichloropropane, 1,3-	142-28-9	1.6E+05	n	2.3E+06	ns					3.7E+01	n		1.3E+01	n	
Dichloropropanol, 2,3-	616-23-9	1.9E+04	n	2.5E+05	n					5.9E+00	n		1.3E+00	n	
Dichloropropene, 1,3-	542-75-6	1.8E+03	c**	8.2E+03	c**	7.0E-01	c**	3.1E+00	c**	4.7E-01	c**		1.7E-01	c**	
Dichlorvos	62-73-7	1.9E+03	c**	7.9E+03	c**	3.4E-02	c**	1.5E-01	c**	2.6E-01	c**		8.1E-02	c**	
Dicrotophos	141-66-2	1.9E+02	n	2.5E+03	n					6.0E-02	n		1.4E-02	n	
Dicyclopentadiene	77-73-6	1.3E+02	n	5.4E+02	n	3.1E-02	n	1.3E-01	n	6.3E-02	n		2.2E-01	n	
Dieldrin	60-57-1	3.4E+01	c**	1.4E+02	c*	6.1E-04	c	2.7E-03	c	1.8E-03	c*		7.1E-02	c*	
Diesel Engine Exhaust	E17136615	0.0E+00		0.0E+00		9.4E-03	c*	4.1E-02	c*				0.0E+00		
Diethanolamine	111-42-2	1.3E+04	n	1.6E+05	n	2.1E-02	n	8.8E-02	n	4.0E+00	n		8.1E-01	n	
Diethylene Glycol Monobutyl Ether	112-34-5	1.9E+05	n	2.4E+06	n	1.0E-02	n	4.4E-02	n	6.0E+01	n		1.3E+01	n	
Diethylene Glycol Monoethyl Ether	111-90-0	3.8E+05	n	4.8E+06	n	3.1E-02	n	1.3E-01	n	1.2E+02	n		2.4E+01	n	
Diethylformamide	617-84-5	7.8E+03	n	1.2E+05	n					2.0E+00	n		4.1E-01	n	
Diethylstilbestrol	56-53-1	1.6E+00	c	6.6E+00	c	2.8E-05	c	1.2E-04	c	5.1E-05	c		2.8E-02	c	
Difenzoquat	43222-48-6	5.2E+05	n	6.8E+06	n					1.7E+02	n		2.6E+04	n	
Diflubenzuron	35367-38-5	1.3E+05	n	1.6E+06	n					2.9E+01	n		3.3E+01	n	
Difluoroethane, 1,1-	75-37-6	4.8E+06	ns	2.0E+07	ns	4.2E+03	n	1.8E+04	n	8.3E+03	n		2.8E+03	n	
Difluoropropane, 2,2-	420-45-1	2.4E+06	ns	1.0E+07	ns	3.1E+03	n	1.3E+04	n	6.3E+03	n		1.4E+04	n	
Dihydrosafrole	94-58-6	9.9E+03	c	4.5E+04	c	2.2E-01	c	9.4E-01	c	3.0E-01	c		1.9E-01	c	
Diisopropyl Ether	108-20-3	2.2E+05	n	9.4E+05	n	7.3E+01	n	3.1E+02	n	1.5E+02	n		3.7E+01	n	
Diisopropyl Methylphosphonate	1445-75-6	6.3E+05	ns	9.3E+06	ns					1.6E+02	n		4.5E+01	n	
Dimethipin	55290-64-7	1.4E+05	n	1.8E+06	n					4.4E+01	n		9.6E+00	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Dimethoate	60-51-5	1.4E+04	n	1.8E+05	n					4.4E+00	n		9.9E-01	n	
Dimethoxybenzidine, 3,3'-	119-90-4	3.4E+02	c	1.4E+03	c					4.7E-02	c		5.8E-02	c	
Dimethyl methylphosphonate	756-79-6	3.2E+05	c**	1.4E+06	c**					4.6E+01	c**		9.6E+00	c**	
Dimethylamino azobenzene [p-]	60-11-7	1.2E+02	c	5.0E+02	c	2.2E-03	c	9.4E-03	c	5.0E-03	c		2.1E-02	c	
Dimethylaniline HCl, 2,4-	21436-96-4	9.4E+02	c	4.0E+03	c					1.3E-01	c		1.2E-01	c	
Dimethylaniline, 2,4-	95-68-1	2.7E+03	c**	1.1E+04	c*					3.7E-01	c*		2.1E-01	c*	
Dimethylaniline, N,N-	121-69-7	1.6E+04	n	1.2E+05	c**					2.5E+00	c**		9.0E-01	c**	
Dimethylbenzidine, 3,3'-	119-93-7	4.9E+01	c	2.1E+02	c					6.5E-03	c		4.3E-02	c	
Dimethylformamide	68-12-2	2.6E+05	n	1.5E+06	n	3.1E+00	n	1.3E+01	n	6.1E+00	n		1.2E+00	n	
Dimethylhydrazine, 1,1-	57-14-7	5.7E+00	n	2.4E+01	n	2.1E-04	n	8.8E-04	n	4.2E-04	n		9.3E-05	n	
Dimethylhydrazine, 1,2-	540-73-8	8.8E-01	c	4.1E+00	c	1.8E-05	c	7.7E-05	c	2.8E-05	c		6.5E-06	c	
Dimethylphenol, 2,4-	105-67-9	1.3E+05	n	1.6E+06	n					3.6E+01	n		4.2E+01	n	
Dimethylphenol, 2,6-	576-26-1	3.8E+03	n	4.9E+04	n					1.1E+00	n		1.3E+00	n	
Dimethylphenol, 3,4-	95-65-8	6.3E+03	n	8.2E+04	n					1.8E+00	n		2.1E+00	n	
Dimethylvinylchloride	513-37-1	1.1E+03	c	4.8E+03	c	2.2E-01	c	9.4E-01	c	3.3E-01	c		1.1E-01	c	
Dinitro-o-cresol, 4,6-	534-52-1	5.1E+02	n	6.6E+03	n					1.5E-01	n		2.6E-01	n	
Dinitro-o-cyclohexyl Phenol, 4,6-	131-89-5	1.3E+04	n	1.6E+05	n					2.3E+00	n		7.7E+01	n	
Dinitroaniline, 3,5-	618-87-1	2.5E+03	n	3.3E+04	n	2.1E-01	n	8.8E-01	n	7.7E-01	n		4.1E-01	n	
Dinitrobenzene, 1,2-	528-29-0	6.3E+02	n	8.2E+03	n					1.9E-01	n		1.8E-01	n	
Dinitrobenzene, 1,3-	99-65-0	6.3E+02	n	8.2E+03	n					2.0E-01	n		1.8E-01	n	
Dinitrobenzene, 1,4-	100-25-4	6.3E+02	n	8.2E+03	n					2.0E-01	n		1.8E-01	n	
Dinitrophenol, 2,4-	51-28-5	1.3E+04	n	1.6E+05	n					3.9E+00	n		4.4E+00	n	
Dinitrotoluene Mixture, 2,4/2,6-	E1615210	8.0E+02	c	3.4E+03	c					1.1E-01	c		1.5E-01	c	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Dinitrotoluene, 2,4-	121-14-2	1.7E+03	c**	7.4E+03	c*	3.2E-02	c	1.4E-01	c	2.4E-01	c*		3.2E-01	c*	
Dinitrotoluene, 2,6-	606-20-2	3.6E+02	c**	1.5E+03	c*					4.9E-02	c*		6.7E-02	c*	
Dinitrotoluene, 2-Amino-4,6-	35572-78-2	7.7E+02	n	1.1E+04	n					1.9E-01	n		1.5E-01	n	
Dinitrotoluene, 4-Amino-2,6-	19406-51-0	7.7E+02	n	1.1E+04	n					1.9E-01	n		1.5E-01	n	
Dinitrotoluene, Technical grade	25321-14-6	1.2E+03	c**	5.1E+03	c*					1.0E-01	c*		1.4E-01	c*	
Dinoseb	88-85-7	6.3E+03	n	8.2E+04	n					1.5E+00	n	7.0E+00	1.3E+01	n	6.2E+01
Dioxane, 1,4-	123-91-1	5.3E+03	c*	2.4E+04	c*	5.6E-01	c**	2.5E+00	c**	4.6E-01	c*		9.4E-02	c*	
Dioxins															
~Hexachlorodibenzo-p-dioxin, Mixture	34465-46-8	1.0E-01	c	4.7E-01	c	2.2E-06	c	9.4E-06	c	1.3E-05	c		1.7E-02	c	
~TCDD, 2,3,7,8-	1746-01-6	4.8E-03	c**	2.2E-02	c**	7.4E-08	c*	3.2E-07	c*	1.2E-07	c*	3.0E-05	5.9E-05	c*	1.5E-02
Diphenamid	957-51-7	1.9E+05	n	2.5E+06	n					5.3E+01	n		5.2E+02	n	
Diphenyl Ether	101-84-8	3.4E+03	n	1.4E+04	n	4.2E-02	n	1.8E-01	n	8.3E-02	n		3.4E-01	n	
Diphenyl Sulfone	127-63-9	5.1E+03	n	6.6E+04	n					1.5E+00	n		3.6E+00	n	
Diphenylamine	122-39-4	6.3E+05	n	8.2E+06	n					1.3E+02	n		2.3E+02	n	
Diphenylhydrazine, 1,2-	122-66-7	6.8E+02	c	2.9E+03	c	1.3E-02	c	5.6E-02	c	7.8E-02	c		2.5E-01	c	
Diquat	2764-72-9	1.4E+04	n	1.8E+05	n					4.0E+00	n	2.0E+01	3.3E+01	n	1.7E+02
Direct Black 38	1937-37-7	7.3E+01	c	3.1E+02	c	1.3E-03	c	5.8E-03	c	1.1E-02	c		5.1E+03	c	
Direct Blue 6	2602-46-2	7.3E+01	c	3.1E+02	c	1.3E-03	c	5.8E-03	c	1.1E-02	c		1.7E+04	c	
Direct Brown 95	16071-86-6	8.1E+01	c	3.4E+02	c	1.5E-03	c	6.5E-03	c	1.2E-02	c		1.6E+02	c	
Disulfoton	298-04-4	2.5E+02	n	3.3E+03	n					5.0E-02	n		9.4E-02	n	
Dithiane, 1,4-	505-29-3	7.8E+04	n	1.2E+06	n					2.0E+01	n		9.7E+00	n	
Diuron	330-54-1	1.3E+04	n	1.6E+05	n					3.6E+00	n		1.5E+00	n	
Dodine	2439-10-3	1.3E+05	n	1.6E+06	n					4.0E+01	n		2.1E+02	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
EPTC	759-94-4	3.9E+05	n	5.8E+06	n					7.5E+01	n		4.0E+01	n	
Endosulfan	115-29-7	4.7E+04	n	7.0E+05	n					1.0E+01	n		1.4E+02	n	
Endosulfan Sulfate	1031-07-8	3.8E+04	n	4.9E+05	n					1.1E+01	n		2.1E+02	n	
Endothall	145-73-3	1.3E+05	n	1.6E+06	n					3.8E+01	n	1.0E+02	9.1E+00	n	2.4E+01
Endrin	72-20-8	1.9E+03	n	2.5E+04	n					2.3E-01	n	2.0E+00	9.2E+00	n	8.1E+01
Epichlorohydrin	106-89-8	1.9E+03	n	8.2E+03	n	1.0E-01	n	4.4E-01	n	2.0E-01	n		4.5E-02	n	
Epoxybutane, 1,2-	106-88-7	1.6E+04	n	6.7E+04	n	2.1E+00	n	8.8E+00	n	4.2E+00	n		9.2E-01	n	
Ethanol, 2-(2-methoxyethoxy)-	111-77-3	2.5E+05	n	3.3E+06	n					8.0E+01	n		1.6E+01	n	
Ethephon	16672-87-0	3.2E+04	n	4.1E+05	n					1.0E+01	n		2.1E+00	n	
Ethion	563-12-2	3.2E+03	n	4.1E+04	n					4.3E-01	n		8.5E-01	n	
Ethoxyethanol Acetate, 2-	111-15-9	2.6E+05	n	1.4E+06	n	6.3E+00	n	2.6E+01	n	1.2E+01	n		2.5E+00	n	
Ethoxyethanol, 2-	110-80-5	2.6E+05	n	1.5E+06	n	4.2E+00	n	1.8E+01	n	8.0E+00	n		1.6E+00	n	
Ethyl Acetate	141-78-6	6.2E+04	n	2.6E+05	n	7.3E+00	n	3.1E+01	n	1.4E+01	n		3.1E+00	n	
Ethyl Acrylate	140-88-5	4.7E+03	n	2.1E+04	n	8.3E-01	n	3.5E+00	n	1.4E+00	n		3.2E-01	n	
Ethyl Chloride (Chloroethane)	75-00-3	5.4E+05	n	2.3E+06	ns	4.2E+02	n	1.8E+03	n	8.3E+02	n		2.4E+02	n	
Ethyl Ether	60-29-7	1.6E+06	n	2.3E+07	ns					3.9E+02	n		8.8E+01	n	
Ethyl Methacrylate	97-63-2	1.8E+05	n	7.6E+05	n	3.1E+01	n	1.3E+02	n	6.3E+01	n		1.5E+01	n	
Ethyl Tertiary Butyl Ether (ETBE)	637-92-3	1.3E+05	c*	5.6E+05	c*	3.5E+01	c	1.5E+02	c	7.0E+01	c*		1.7E+01	c*	
Ethyl-p-nitrophenyl Phosphonate	2104-64-5	6.3E+01	n	8.2E+02	n					8.9E-03	n		2.8E-01	n	
Ethylbenzene	100-41-4	5.8E+03	c*	2.5E+04	c*	1.1E+00	c*	4.9E+00	c*	1.5E+00	c*	7.0E+02	1.7E+00	c*	7.8E+02
Ethylene Cyanohydrin	109-78-4	4.4E+05	n	5.7E+06	n					1.4E+02	n		2.8E+01	n	
Ethylene Diamine	107-15-3	7.0E+05	n	1.1E+07	n					1.8E+02	n		4.1E+01	n	
Ethylene Glycol	107-21-1	5.1E+06	n	6.6E+07	n	4.2E+01	n	1.8E+02	n	1.6E+03	n		3.2E+02	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Ethylene Glycol Monobutyl Ether	111-76-2	6.3E+05	n	8.2E+06	n	1.7E+02	n	7.0E+02	n	2.0E+02	n		4.1E+01	n	
Ethylene Oxide	75-21-8	2.0E+00	c	2.5E+01	c	3.4E-04	c	4.1E-03	c	6.7E-04	c		1.4E-04	c	
Ethylene Thiourea	96-45-7	5.1E+02	n	6.6E+03	n	2.2E-01	c	9.4E-01	c	1.6E-01	n		3.6E-02	n	
Ethyleneimine	151-56-4	2.7E+00	c	1.2E+01	c	1.5E-04	c	6.5E-04	c	2.4E-04	c		5.2E-05	c	
Ethylphthalyl Ethyl Glycolate	84-72-0	1.9E+07	n	2.5E+08	nm					5.8E+03	n		1.3E+04	n	
Fenamiphos	22224-92-6	1.6E+03	n	2.1E+04	n					4.4E-01	n		4.3E-01	n	
Fenpropathrin	39515-41-8	1.6E+05	n	2.1E+06	n					6.4E+00	n		2.9E+02	n	
Fenvalerate	51630-58-1	1.6E+05	n	2.1E+06	n					5.0E+01	n		3.2E+04	n	
Fluometuron	2164-17-2	8.2E+04	n	1.1E+06	n					2.4E+01	n		1.9E+01	n	
Fluoride	16984-48-8	3.1E+05	n	4.7E+06	n	1.4E+00	n	5.7E+00	n	8.0E+01	n	4.0E+03	1.2E+04	n	6.0E+05
Fluorine (Soluble Fluoride)	7782-41-4	4.7E+05	n	7.0E+06	n	1.4E+00	n	5.7E+00	n	1.2E+02	n	4.0E+03	1.8E+04	n	6.0E+05
Fluridone	59756-60-4	5.1E+05	n	6.6E+06	n					1.4E+02	n		1.6E+04	n	
Flurprimidol	56425-91-3	2.5E+05	n	3.3E+06	n					6.9E+01	n		3.1E+02	n	
Flusilazole	85509-19-9	1.3E+04	n	1.6E+05	n					3.1E+00	n		5.1E+02	n	
Flutolanil	66332-96-5	3.2E+06	n	4.1E+07	n					7.9E+02	n		4.2E+03	n	
Fluvalinate	69409-94-5	6.3E+04	n	8.2E+05	n					2.0E+01	n		2.9E+04	n	
Folpet	133-07-3	5.7E+05	n	7.4E+06	n					1.6E+02	n		3.9E+01	n	
Fomesafen	72178-02-0	6.3E+04	n	8.2E+05	n					1.9E+01	n		6.3E+01	n	
Fonofos	944-22-9	1.3E+04	n	1.6E+05	n					2.4E+00	n		4.7E+00	n	
Formaldehyde	50-00-0	1.1E+04	c**	5.0E+04	c**	2.2E-01	c**	9.4E-01	c**	3.9E-01	c**		7.8E-02	c**	
Formic Acid	64-18-6	2.9E+03	n	1.2E+04	n	3.1E-02	n	1.3E-01	n	6.3E-02	n		1.3E-02	n	
Fosetyl-AL	39148-24-8	1.6E+07	n	2.1E+08	nm					5.0E+03	n		6.6E+04	n	
Furans															
~Dibenzofuran	132-64-9	7.8E+03	n	1.2E+05	n					7.9E-01	n		1.5E+01	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
~Furan	110-00-9	7.8E+03	n	1.2E+05	n					1.9E+00	n		7.3E-01	n	
~Tetrahydrofuran	109-99-9	1.8E+06	n	9.5E+06	n	2.1E+02	n	8.8E+02	n	3.4E+02	n		7.5E+01	n	
Furazolidone	67-45-8	1.4E+02	c	6.0E+02	c					2.0E-02	c		3.9E-02	c	
Furfural	98-01-1	2.1E+04	n	2.6E+05	n	5.2E+00	n	2.2E+01	n	3.8E+00	n		8.1E-01	n	
Furium	531-82-8	3.6E+02	c	1.5E+03	c	6.5E-03	c	2.9E-02	c	5.1E-02	c		6.8E-02	c	
Furmecyclox	60568-05-0	1.8E+04	c	7.7E+04	c	3.3E-01	c	1.4E+00	c	1.1E+00	c		1.2E+00	c	
Glufosinate, Ammonium	77182-82-2	3.8E+04	n	4.9E+05	n					1.2E+01	n		2.6E+00	n	
Glutaraldehyde	111-30-8	6.0E+05	n	7.0E+06	n	8.3E-03	n	3.5E-02	n	2.0E+02	n		4.0E+01	n	
Glycidaldehyde	765-34-4	2.3E+03	n	2.1E+04	n	1.0E-01	n	4.4E-01	n	1.7E-01	n		3.3E-02	n	
Glyphosate	1071-83-6	6.3E+05	n	8.2E+06	n					2.0E+02	n	7.0E+02	8.8E+02	n	3.1E+03
Guanidine	113-00-8	7.8E+04	n	1.2E+06	n					2.0E+01	n		4.5E+00	n	
Guanidine Chloride	50-01-1	1.3E+05	n	1.6E+06	n					4.0E+01	n		0.0E+00		
Guanidine Nitrate	506-93-4	1.9E+05	n	2.5E+06	n					6.0E+01	n		1.5E+01	n	
Haloxyfop, Methyl	69806-40-2	3.2E+02	n	4.1E+03	n					7.6E-02	n		8.4E-01	n	
Heptachlor	76-44-8	1.3E+02	c**	6.3E+02	c*	2.2E-03	c	9.4E-03	c	1.4E-03	c*	4.0E-01	1.2E-01	c*	3.3E+01
Heptachlor Epoxide	1024-57-3	7.0E+01	c**	3.3E+02	c**	1.1E-03	c	4.7E-03	c	1.4E-03	c**	2.0E-01	2.8E-02	c**	4.1E+00
Heptanal, n-	111-71-7	2.4E+03	n	1.0E+04	n	3.1E-01	n	1.3E+00	n	6.3E-01	n		1.4E-01	n	
Heptane, N-	142-82-5	2.2E+03	n	2.9E+04	n	4.2E+01	n	1.8E+02	n	6.0E-01	n		4.8E+00	n	
Hexabromobenzene	87-82-1	1.6E+04	n	2.3E+05	n					4.0E+00	n		2.3E+01	n	
Hexabromodiphenyl ether, 2,2',4,4',5,5'- (BDE-153)	68631-49-2	1.3E+03	n	1.6E+04	n					4.0E-01	n		0.0E+00		
Hexachlorobenzene	118-74-1	7.8E+01	n	9.6E+02	c**	6.1E-03	c	2.7E-02	c	9.8E-03	c**	1.0E+00	1.2E-01	c**	1.3E+01
Hexachlorobutadiene	87-68-3	1.2E+03	c**	5.3E+03	c*	1.3E-01	c	5.6E-01	c	1.4E-01	c**		2.7E-01	c**	
Hexachlorocyclohexane, Alpha-	319-84-6	8.6E+01	c	3.6E+02	c	1.6E-03	c	6.8E-03	c	7.2E-03	c		4.2E-02	c	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Hexachlorocyclohexane, Beta-	319-85-7	3.0E+02	c	1.3E+03	c	5.3E-03	c	2.3E-02	c	2.5E-02	c		1.5E-01	c	
Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9	7.1E+01	n	1.0E+03	n	9.1E-03	c	4.0E-02	c	1.2E-02	n	2.0E-01	7.1E-02	n	1.2E+00
Hexachlorocyclohexane, Technical	608-73-1	3.0E+02	c	1.3E+03	c	5.5E-03	c	2.4E-02	c	2.5E-02	c		1.5E-01	c	
Hexachlorocyclopentadiene	77-47-4	1.8E+02	n	7.5E+02	n	2.1E-02	n	8.8E-02	n	4.1E-02	n	5.0E+01	1.3E-01	n	1.6E+02
Hexachloroethane	67-72-1	1.8E+03	c**	8.0E+03	c**	2.6E-01	c*	1.1E+00	c*	3.3E-01	c**		2.0E-01	c**	
Hexachlorophene	70-30-4	1.9E+03	n	2.5E+04	n					6.0E-01	n		8.0E+02	n	
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	8.3E+03	c**	3.8E+04	c*					9.7E-01	c**		3.7E-01	c**	
Hexamethylene Diisocyanate, 1,6-	822-06-0	3.1E+02	n	1.3E+03	n	1.0E-03	n	4.4E-03	n	2.1E-03	n		2.1E-02	n	
Hexamethylene diisocyanate biuret	4035-89-6	5.7E+07	n	2.4E+08	nm	4.2E-02	n	1.8E-01	n				0.0E+00		
Hexamethylene diisocyanate isocyanurate	3779-63-3	5.7E+07	n	2.4E+08	nm	4.2E-02	n	1.8E-01	n				0.0E+00		
Hexamethylphosphoramide	680-31-9	2.5E+03	n	3.3E+04	n					8.0E-01	n		1.8E-01	n	
Hexane, Commercial	E5241997	1.2E+04	c**	5.1E+04	c**	1.4E+01	c**	6.1E+01	c**	2.8E+01	c**		2.0E+02	c**	
Hexane, N-	110-54-3	6.1E+04	n	2.5E+05	ns	7.3E+01	n	3.1E+02	n	1.5E+02	n		1.0E+03	n	
Hexanedioic Acid	124-04-9	1.3E+07	n	1.6E+08	nm					4.0E+03	n		9.9E+02	n	
Hexanol, 1-,2-ethyl- (2-Ethyl-1-hexanol)	104-76-7	1.5E+03	n	6.3E+03	n	4.2E-02	n	1.8E-01	n	8.3E-02	n		2.3E-02	n	
Hexanone, 2-	591-78-6	2.0E+04	n	1.3E+05	n	3.1E+00	n	1.3E+01	n	3.8E+00	n		8.8E-01	n	
Hexazinone	51235-04-2	2.1E+05	n	2.7E+06	n					6.4E+01	n		3.0E+01	n	
Hexythiazox	78587-05-0	1.6E+05	n	2.1E+06	n					1.1E+01	n		5.0E+01	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Hydramethylnon	67485-29-4	1.1E+05	n	1.4E+06	n					3.4E+01	n		1.2E+07	n	
Hydrazine	302-01-2	3.2E+01	c**	1.4E+02	c**	5.7E-04	c**	2.5E-03	c**	1.1E-03	c**		2.2E-04	c**	
Hydrazine Sulfate	10034-93-2	2.3E+02	c	1.1E+03	c	5.7E-04	c	2.5E-03	c	2.6E-02	c				
Hydrogen Chloride	7647-01-0	2.8E+09	nm	1.2E+10	nm	2.1E+00	n	8.8E+00	n	4.2E+00	n				
Hydrogen Fluoride	7664-39-3	3.1E+05	n	4.7E+06	n	1.5E+00	n	6.1E+00	n	2.8E+00	n				
Hydrogen Sulfide	7783-06-4	2.8E+08	nm	1.2E+09	nm	2.1E-01	n	8.8E-01	n	4.2E-01	n				
Hydroquinone	123-31-9	9.0E+03	c*	3.8E+04	c*					1.3E+00	c*		8.7E-01	c*	
Imazalil	35554-44-0	8.9E+03	c*	3.8E+04	c					9.0E-01	c		1.5E+01	c	
Imazaquin	81335-37-7	1.6E+06	n	2.1E+07	n					4.9E+02	n		2.4E+03	n	
Imazethapyr	81335-77-5	1.6E+07	n	2.1E+08	nm					4.7E+03	n		4.1E+03	n	
Iodine	7553-56-2	7.8E+04	n	1.2E+06	n					2.0E+01	n		1.2E+03	n	
Iprodione	36734-19-7	2.5E+05	n	3.3E+06	n					7.4E+01	n		2.2E+01	n	
Iron	7439-89-6	5.5E+06	n	8.2E+07	n					1.4E+03	n		3.5E+04	n	
Isobutyl Alcohol	78-83-1	2.3E+06	n	3.5E+07	ns					5.9E+02	n		1.2E+02	n	
Isophorone	78-59-1	5.7E+05	c**	2.4E+06	c**	2.1E+02	n	8.8E+02	n	7.8E+01	c**		2.6E+01	c**	
Isopropalin	33820-53-0	1.2E+05	n	1.8E+06	n					4.0E+00	n		9.2E+01	n	
Isopropanol	67-63-0	5.6E+05	n	2.4E+06	n	2.1E+01	n	8.8E+01	n	4.1E+01	n		8.4E+00	n	
Isopropyl Methyl Phosphonic Acid	1832-54-8	6.3E+05	n	8.2E+06	n					2.0E+02	n		4.3E+01	n	
Isoxaben	82558-50-7	3.2E+05	n	4.1E+06	n					7.3E+01	n		2.0E+02	n	
JP-7	E1737665	4.3E+10	nm	1.8E+11	nm	3.1E+01	n	1.3E+02	n	6.3E+01	n				
Lactofen	77501-63-4	5.1E+04	n	6.6E+05	n					1.0E+01	n		4.6E+02	n	
Lactonitrile	78-97-7	1.3E+03	n	1.6E+04	n					4.0E-01	n		8.1E-02	n	
Lanthanum	7439-91-0	3.9E+02	n	5.8E+03	n					1.0E-01	n				
Lanthanum Acetate Hydrate	100587-90-4	1.3E+02	n	1.7E+03	n					4.2E-02	n				

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Lanthanum Chloride Heptahydrate	10025-84-0	1.5E+02	n	2.2E+03	n					3.7E-02	n				
Lanthanum Chloride, Anhydrous	10099-58-8	2.2E+02	n	3.3E+03	n					5.7E-02	n				
Lanthanum Nitrate Hexahydrate	10277-43-7	1.3E+02	n	1.9E+03	n					3.2E-02	n				
Lead Compounds															
~Lead Phosphate	7446-27-7	8.2E+04	c	3.8E+05	c	2.3E-01	c	1.0E+00	c	9.1E+00	c				
~Lead acetate	301-04-2	2.6E+03	c	1.1E+04	c	3.5E-02	c	1.5E-01	c	3.7E-01	c		7.5E-02	c	
~Lead and Compounds	7439-92-1	4.0E+05	G	8.0E+05	G	1.5E-01	G			1.5E+01	G	1.5E+01			1.4E+04
~Lead subacetate	1335-32-6	1.4E+04	c	6.0E+04	c	2.6E-01	c	1.1E+00	c	2.1E+00	c		4.5E-01	c	
~Tetraethyl Lead	78-00-2	7.8E-01	n	1.2E+01	n					1.3E-04	n		4.7E-04	n	
Lewisite	541-25-3	3.9E+01	n	5.8E+02	n					9.0E-03	n		3.8E-03	n	
Linuron	330-55-2	4.9E+04	n	6.3E+05	n					1.3E+01	n		1.1E+01	n	
Lithium	7439-93-2	1.6E+04	n	2.3E+05	n					4.0E+00	n		1.2E+03	n	
MCPA	94-74-6	3.2E+03	n	4.1E+04	n					7.5E-01	n		2.0E-01	n	
MCPB	94-81-5	2.8E+05	n	3.6E+06	n					6.5E+01	n		2.6E+01	n	
MCPP	93-65-2	6.3E+03	n	8.2E+04	n					1.6E+00	n		4.7E-01	n	
Malathion	121-75-5	1.3E+05	n	1.6E+06	n					3.9E+01	n		1.0E+01	n	
Maleic Anhydride	108-31-6	6.3E+05	n	8.0E+06	n	7.3E-02	n	3.1E-01	n	1.9E+02	n		3.8E+01	n	
Maleic Hydrazide	123-33-1	3.2E+06	n	4.1E+07	n					1.0E+03	n		2.1E+02	n	
Malononitrile	109-77-3	6.3E+02	n	8.2E+03	n					2.0E-01	n		4.1E-02	n	
Mancozeb	8018-01-7	1.9E+05	n	2.5E+06	n					5.4E+01	n		7.6E+01	n	
Maneb	12427-38-2	3.2E+04	n	4.1E+05	n					9.8E+00	n		1.4E+01	n	
Manganese (Diet)	7439-96-5	0.0E+00				5.2E-03	n	2.2E-02	n						
Manganese (Non-diet)	7439-96-5	1.8E+05	n	2.6E+06	n	5.2E-03	n	2.2E-02	n	4.3E+01	n		2.8E+03	n	
Mephosfolan	950-10-7	5.7E+02	n	7.4E+03	n					1.8E-01	n		2.6E-01	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Mepiquat Chloride	24307-26-4	1.9E+05	n	2.5E+06	n					6.0E+01	n		2.0E+01	n	
Mercaptobenzothiazole, 2-	149-30-4	2.5E+04	n	2.1E+05	c**					6.3E+00	c**		1.8E+01	c**	
Mercury Compounds															
~Mercuric Chloride (and other Mercury salts)	7487-94-7	2.3E+03	n	3.5E+04	n	3.1E-02	n	1.3E-01	n	5.7E-01	n	2.0E+00			
~Mercury (elemental)	7439-97-6	1.1E+03	n	4.6E+03	ns	3.1E-02	n	1.3E-01	n	6.3E-02	n	2.0E+00	3.3E+00	n	1.0E+02
~Methyl Mercury	22967-92-6	7.8E+02	n	1.2E+04	n					2.0E-01	n		1.4E+03	n	
~Phenylmercuric Acetate	62-38-4	5.1E+02	n	6.6E+03	n					1.6E-01	n		5.0E-02	n	
Merphos	150-50-5	2.3E+02	n	3.5E+03	n					6.0E-02	n		5.9E+00	n	
Metalaxyl	57837-19-1	3.8E+05	n	4.9E+06	n					1.2E+02	n		3.3E+01	n	
Methacrylonitrile	126-98-7	7.5E+02	n	1.0E+04	n	3.1E+00	n	1.3E+01	n	1.9E-01	n		4.3E-02	n	
Methamidophos	10265-92-6	3.2E+02	n	4.1E+03	n					1.0E-01	n		2.1E-02	n	
Methanol	67-56-1	1.2E+07	n	1.2E+08	nms	2.1E+03	n	8.8E+03	n	2.0E+03	n		4.1E+02	n	
Methidathion	950-37-8	9.5E+03	n	1.2E+05	n					2.9E+00	n		7.1E-01	n	
Methomyl	16752-77-5	1.6E+05	n	2.1E+06	n					5.0E+01	n		1.1E+01	n	
Methoxy-5-nitroaniline, 2-	99-59-2	1.1E+04	c	4.7E+04	c					1.5E+00	c		5.3E-01	c	
Methoxychlor	72-43-5	3.2E+04	n	4.1E+05	n					3.7E+00	n	4.0E+01	2.0E+02	n	2.2E+03
Methoxyethanol Acetate, 2-	110-49-6	1.1E+04	n	5.1E+04	n	1.0E-01	n	4.4E-01	n	2.1E-01	n		4.2E-02	n	
Methoxyethanol, 2-	109-86-4	2.6E+04	n	2.0E+05	n	7.3E-01	n	3.1E+00	n	1.3E+00	n		2.6E-01	n	
Methyl Acetate	79-20-9	7.8E+06	n	1.2E+08	nms					2.0E+03	n		4.1E+02	n	
Methyl Acrylate	96-33-3	1.5E+04	n	6.1E+04	n	2.1E+00	n	8.8E+00	n	4.2E+00	n		8.9E-01	n	
Methyl Ethyl Ketone (2-Butanone)	78-93-3	2.7E+06	n	1.9E+07	n	5.2E+02	n	2.2E+03	n	5.6E+02	n		1.2E+02	n	
Methyl Hydrazine	60-34-4	1.0E+02	n	4.4E+02	n	2.1E-03	n	8.8E-03	n	4.2E-03	n		9.4E-04	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Methyl Isobutyl Ketone (4-methyl-2-pentanone)	108-10-1	3.3E+06	n	1.4E+07	ns	3.1E+02	n	1.3E+03	n	6.3E+02	n		1.4E+02	n	
Methyl Isocyanate	624-83-9	4.6E+02	n	1.9E+03	n	1.0E-01	n	4.4E-01	n	2.1E-01	n		5.9E-02	n	
Methyl Methacrylate	80-62-6	4.4E+05	n	1.9E+06	n	7.3E+01	n	3.1E+02	n	1.4E+02	n		3.0E+01	n	
Methyl Parathion	298-00-0	1.6E+03	n	2.1E+04	n					4.5E-01	n		7.4E-01	n	
Methyl Phosphonic Acid	993-13-5	3.8E+05	n	4.9E+06	n					1.2E+02	n		2.4E+01	n	
Methyl Styrene (Mixed Isomers)	25013-15-4	3.2E+04	n	2.6E+05	n	4.2E+00	n	1.8E+01	n	2.3E+00	n		3.8E+00	n	
Methyl methanesulfonate	66-27-3	5.5E+03	c	2.3E+04	c	1.0E-01	c	4.4E-01	c	7.9E-01	c		1.6E-01	c	
Methyl tert-Butyl Ether (MTBE)	1634-04-4	4.7E+04	c*	2.1E+05	c*	1.1E+01	c*	4.7E+01	c*	1.4E+01	c*		3.2E+00	c*	
Methyl-1,4-benzenediamine dihydrochloride, 2-	615-45-2	1.9E+03	n	2.5E+04	n					6.0E-01	n		3.6E-01	n	
Methyl-2-Pentanol, 4-	108-11-2	5.4E+06	ns	2.3E+07	ns	3.1E+02	n	1.3E+03	n	6.3E+02	n		1.4E+02	n	
Methyl-5-Nitroaniline, 2-	99-55-8	6.0E+04	c**	2.6E+05	c**					8.2E+00	c**		4.6E+00	c**	
Methyl-N-nitro-N-nitrosoguanidine, N-	70-25-7	6.5E+01	c	2.8E+02	c	1.2E-03	c	5.1E-03	c	9.4E-03	c		3.2E-03	c	
Methylaniline Hydrochloride, 2-	636-21-5	4.2E+03	c	1.8E+04	c	7.6E-02	c	3.3E-01	c	6.0E-01	c		2.6E-01	c	
Methylarsonic acid	124-58-3	6.3E+04	n	8.2E+05	n					2.0E+01	n		5.8E+00	n	
Methylbenzene,1-4-diamine monohydrochloride, 2-	74612-12-7	1.3E+03	n	1.6E+04	n					4.0E-01	n				
Methylbenzene-1,4-diamine sulfate, 2-	615-50-9	1.9E+03	n	2.3E+04	c**					6.0E-01	n				
Methylcholanthrene, 3-	56-49-5	5.5E+00	c	1.0E+02	c	1.6E-04	c	1.9E-03	c	1.1E-03	c		2.2E+00	c	
Methylene Chloride	75-09-2	3.5E+04	n	3.2E+05	n	6.3E+01	n	2.6E+02	n	1.1E+01	n	5.0E+00	2.7E+00	n	1.3E+00

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Methylene-bis(2-chloroaniline), 4,4'-	101-14-4	1.2E+03	c*	2.3E+04	c**	2.4E-03	c	2.9E-02	c	1.6E-01	c*		1.8E+00	c*	
Methylene-bis(N,N-dimethyl) Aniline, 4,4'-	101-61-1	1.2E+04	c	5.0E+04	c	2.2E-01	c	9.4E-01	c	7.0E-01	c		3.9E+00	c	
Methylenebisbenzenamine, 4,4'-	101-77-9	3.4E+02	c	1.4E+03	c	6.1E-03	c	2.7E-02	c	4.7E-02	c		2.1E-01	c	
Methylenediphenyl Diisocyanate	101-68-8	8.5E+07	n	3.6E+08	nm	6.3E-02	n	2.6E-01	n				0.0E+00		
Methylstyrene, Alpha-	98-83-9	5.5E+05	ns	8.2E+06	ns					7.8E+01	n		1.2E+02	n	
Metolachlor	51218-45-2	9.5E+05	n	1.2E+07	n					2.7E+02	n		3.2E+02	n	
Metribuzin	21087-64-9	1.6E+05	n	2.1E+06	n					4.9E+01	n		1.5E+01	n	
Metsulfuron-methyl	74223-64-6	1.6E+06	n	2.1E+07	n					4.9E+02	n		1.9E+02	n	
Midrange Aliphatic Hydrocarbon Streams	E1790669	6.5E+02	c*	2.8E+03	c*	6.2E-01	c*	2.7E+00	c*	1.2E+00	c**		1.8E+01	c**	
Mineral oils	8012-95-1	2.3E+07	ns	3.5E+08	nms					6.0E+03	n		2.4E+05	n	
Mirex	2385-85-5	3.6E+01	c*	1.7E+02	c	5.5E-04	c	2.4E-03	c	8.8E-04	c		6.3E-01	c	
Molinate	2212-67-1	1.3E+04	n	1.6E+05	n					3.0E+00	n		1.7E+00	n	
Molybdenum	7439-98-7	3.9E+04	n	5.8E+05	n	2.1E-01	n	8.8E-01	n	1.0E+01	n		2.0E+02	n	
Monochloramine	10599-90-3	7.8E+05	n	1.2E+07	n					2.0E+02	n	4.0E+03 (G)	0.0E+00		
Monomethylaniline	100-61-8	1.3E+04	n	1.6E+05	n					3.8E+00	n		1.4E+00	n	
Myclobutanil	88671-89-0	1.6E+05	n	2.1E+06	n					4.5E+01	n		5.6E+02	n	
N,N'-Diphenyl-1,4-benzenediamine	74-31-7	1.9E+03	n	2.5E+04	n					3.6E-01	n		3.7E+01	n	
Naled	300-76-5	1.6E+04	n	2.3E+05	n					4.0E+00	n		1.8E+00	n	
Naphtha, High Flash Aromatic (HFAN)	64742-95-6	2.3E+05	n	3.5E+06	n	1.0E+01	n	4.4E+01	n	1.5E+01	n		0.0E+00		
Naphthylamine, 2-	91-59-8	3.0E+02	c	1.3E+03	c					3.9E-02	c		2.0E-01	c	
Napropamide	15299-99-7	7.6E+05	n	9.8E+06	n					2.0E+02	n		1.3E+03	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Nickel Acetate	373-02-4	6.7E+04	n	8.1E+05	n	1.5E-03	n	6.1E-03	n	2.2E+01	n		4.5E+00	n	
Nickel Carbonate	3333-67-3	6.7E+04	n	8.1E+05	n	1.5E-03	n	6.1E-03	n	2.2E+01	n				
Nickel Carbonyl	13463-39-3	8.2E+04	n	1.1E+06	n	1.5E-03	n	6.1E-03	n	2.9E-03	n				
Nickel Hydroxide	12054-48-7	8.2E+04	n	1.1E+06	n	1.5E-03	n	6.1E-03	n	2.0E+01	n				
Nickel Oxide	1313-99-1	8.4E+04	n	1.2E+06	n	2.1E-03	n	8.8E-03	n	2.0E+01	n				
Nickel Refinery Dust	E715532	8.2E+04	n	1.1E+06	n	1.5E-03	n	6.1E-03	n	2.2E+01	n		3.2E+03	n	
Nickel Soluble Salts	7440-02-0	1.5E+05	n	2.2E+06	n	9.4E-03	n	3.9E-02	n	3.9E+01	n		2.6E+03	n	
Nickel Subsulfide	12035-72-2	4.1E+02	c	1.9E+03	c	1.5E-03	n	6.1E-03	n	4.5E-02	c				
Nickelocene	1271-28-9	6.0E+02	c	2.5E+03	c	1.5E-03	n	6.1E-03	n	8.6E-02	c				
Nitrate (measured as nitrogen)	14797-55-8	1.3E+07	n	1.9E+08	nm					3.2E+03	n	1.0E+04			
Nitrate + Nitrite (measured as nitrogen)	E701177	0.0E+00		0.0E+00								1.0E+04			
Nitrite (measured as nitrogen)	14797-65-0	7.8E+05	n	1.2E+07	n					2.0E+02	n	1.0E+03			
Nitroaniline, 2-	88-74-4	6.3E+04	n	8.0E+05	n	5.2E-03	n	2.2E-02	n	1.9E+01	n		8.0E+00	n	
Nitroaniline, 4-	100-01-6	2.5E+04	n	1.1E+05	c**	6.3E-01	n	2.6E+00	n	3.8E+00	c**		1.6E+00	c**	
Nitrobenzene	98-95-3	5.1E+03	c**	2.2E+04	c**	7.0E-02	c*	3.1E-01	c*	1.4E-01	c**		9.2E-02	c**	
Nitrocellulose	9004-70-0	1.9E+10	nm	2.5E+11	nm					6.0E+06	n		1.3E+06	n	
Nitrofurantoin	67-20-9	4.4E+05	n	5.7E+06	n					1.4E+02	n		6.1E+01	n	
Nitrofurazone	59-87-0	4.2E+02	c	1.8E+03	c	7.6E-03	c	3.3E-02	c	6.0E-02	c		5.4E-02	c	
Nitroglycerin	55-63-0	6.3E+02	n	8.2E+03	n					2.0E-01	n		8.5E-02	n	
Nitroguanidine	556-88-7	6.3E+05	n	8.2E+06	n					2.0E+02	n		4.8E+01	n	
Nitromethane	75-52-5	5.4E+03	c**	2.4E+04	c**	3.2E-01	c**	1.4E+00	c**	6.4E-01	c**		1.4E-01	c**	
Nitropropane, 2-	79-46-9	6.4E+01	c	2.8E+02	c	4.8E-03	c	2.1E-02	c	9.7E-03	c		2.5E-03	c	
Nitroso-N-ethylurea, N-	759-73-9	4.5E+00	c	8.5E+01	c	1.3E-04	c	1.6E-03	c	9.2E-04	c		2.2E-04	c	
Nitroso-N-methylurea, N-	684-93-5	1.0E+00	c	1.9E+01	c	3.0E-05	c	3.6E-04	c	2.1E-04	c		4.6E-05	c	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Nitroso-di-N-butylamine, N-	924-16-3	9.9E+01	c	4.6E+02	c	1.8E-03	c	7.7E-03	c	2.7E-03	c		5.5E-03	c	
Nitroso-di-N-propylamine, N-	621-64-7	7.8E+01	c	3.3E+02	c	1.4E-03	c	6.1E-03	c	1.1E-02	c		8.1E-03	c	
Nitrosodiethanolamine, N-	1116-54-7	1.9E+02	c	8.2E+02	c	3.5E-03	c	1.5E-02	c	2.8E-02	c		5.6E-03	c	
Nitrosodiethylamine, N-	55-18-5	8.1E-01	c	1.5E+01	c	2.4E-05	c	2.9E-04	c	1.7E-04	c		6.1E-05	c	
Nitrosodimethylamine, N-	62-75-9	2.0E+00	c*	3.4E+01	c*	7.2E-05	c*	8.8E-04	c*	1.1E-04	c*		2.7E-05	c*	
Nitrosodiphenylamine, N-	86-30-6	1.1E+05	c	4.7E+05	c	1.1E+00	c	4.7E+00	c	1.2E+01	c		6.7E+01	c	
Nitrosomethylethylamine, N-	10595-95-6	2.0E+01	c	9.1E+01	c	4.5E-04	c	1.9E-03	c	7.1E-04	c		2.0E-04	c	
Nitrosomorpholine [N-]	59-89-2	8.1E+01	c	3.4E+02	c	1.5E-03	c	6.5E-03	c	1.2E-02	c		2.8E-03	c	
Nitrosopiperidine [N-]	100-75-4	5.8E+01	c	2.4E+02	c	1.0E-03	c	4.5E-03	c	8.2E-03	c		4.4E-03	c	
Nitrosopyrrolidine, N-	930-55-2	2.6E+02	c	1.1E+03	c	4.6E-03	c	2.0E-02	c	3.7E-02	c		1.4E-02	c	
Nitrotoluene, m-	99-08-1	6.3E+02	n	8.2E+03	n					1.7E-01	n		1.6E-01	n	
Nitrotoluene, o-	88-72-2	3.2E+03	c**	1.5E+04	c**					3.1E-01	c**		3.0E-01	c**	
Nitrotoluene, p-	99-99-0	2.5E+04	n	1.4E+05	c**					4.3E+00	c**		4.0E+00	c**	
Nonane, n-	111-84-2	1.1E+03	n	7.2E+03	ns	2.1E+00	n	8.8E+00	n	5.3E-01	n		7.5E+00	n	
Norflurazon	27314-13-2	9.5E+03	n	1.2E+05	n					2.9E+00	n		1.9E+01	n	
Octabromodiphenyl Ether	32536-52-0	1.9E+04	n	2.5E+05	n					6.0E+00	n		1.2E+03	n	
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	3.9E+05	n	5.7E+06	n					1.0E+02	n		1.3E+02	n	
Octamethylpyrophosphoramide	152-16-9	1.3E+04	n	1.6E+05	n					4.0E+00	n		9.6E-01	n	
Oryzalin	19044-88-3	7.0E+04	c*	2.9E+05	c*					7.9E+00	c*		1.5E+01	c*	
Oxadiazon	19666-30-9	3.2E+04	n	4.1E+05	n					4.7E+00	n		4.8E+01	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Oxamyl	23135-22-0	1.6E+05	n	2.1E+06	n					5.0E+01	n	2.0E+02	1.1E+01	n	4.4E+01
Oxyfluorfen	42874-03-3	7.4E+03	c*	3.1E+04	c					5.4E-01	c*		4.3E+01	c*	
Paclobutrazol	76738-62-0	8.2E+04	n	1.1E+06	n					2.3E+01	n		4.6E+01	n	
Paraquat Dichloride	1910-42-5	2.8E+04	n	3.7E+05	n					9.0E+00	n		1.2E+02	n	
Parathion	56-38-2	3.8E+04	n	4.9E+05	n					8.6E+00	n		4.3E+01	n	
Pebulate	1114-71-2	3.9E+05	n	5.8E+06	n					5.6E+01	n		4.5E+01	n	
Pendimethalin	40487-42-1	1.9E+06	n	2.5E+07	n					1.4E+02	n		1.6E+03	n	
Pentabromodiphenyl Ether	32534-81-9	1.6E+04	ns	2.3E+05	ns					4.0E+00	n		1.7E+02	n	
Pentabromodiphenyl ether, 2,2',4,4',5- (BDE-99)	60348-60-9	6.3E+02	n	8.2E+03	n					2.0E-01	n		8.7E+00	n	
Pentachlorobenzene	608-93-5	6.3E+03	n	9.3E+04	n					3.2E-01	n		2.4E+00	n	
Pentachloroethane	76-01-7	7.7E+03	c	3.6E+04	c					6.5E-01	c		3.1E-01	c	
Pentachloronitrobenzene	82-68-8	2.7E+03	c**	1.3E+04	c*					1.2E-01	c*		1.5E+00	c*	
Pentachlorophenol	87-86-5	1.0E+03	c*	4.0E+03	c*	5.5E-01	c	2.4E+00	c	4.1E-02	c*	1.0E+00	5.7E-02	c*	1.4E+00
Pentaerythritol tetranitrate (PETN)	78-11-5	5.7E+04	n	5.3E+05	c**					1.7E+01	n		2.6E+01	n	
Pentamethylphosphoramide (PMPA)	10159-46-3	6.3E+02	n	8.2E+03	n					2.0E-01	n		4.1E-02	n	
Pentane, n-	109-66-0	8.1E+04	n	3.4E+05	n	1.0E+02	n	4.4E+02	n	2.1E+02	n		1.0E+03	n	
Per- and Polyfluoroalkyl Substances (PFAS)															
~Ammonium perfluoro-2-methyl-3-oxahexanoate	62037-80-3	1.9E+01	n	2.5E+02	n					6.0E-03	n		1.3E-03	n	
~Hexafluoropropylene oxide dimer acid (HFPO-DA)	13252-13-6	2.3E+01	n	3.5E+02	n					6.0E-03	n				

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
~Perfluorobutanesulfonate	45187-15-3	1.9E+03	n	2.5E+04	n					6.0E-01	n		1.9E-01	n	
~Perfluorobutanesulfonic acid (PFBS)	375-73-5	1.9E+03	n	2.5E+04	n					6.0E-01	n		1.9E-01	n	
~Perfluorohexanesulfonate	108427-53-8	1.3E+02	n	1.6E+03	n					3.9E-02	n		1.7E-02	n	
~Perfluorohexanesulfonic acid (PFHxS)	355-46-4	1.3E+02	n	1.6E+03	n					3.9E-02	n		1.7E-02	n	
~Perfluorononanoate	72007-68-2	1.9E+01	n	2.5E+02	n					5.9E-03	n		2.5E-02	n	
~Perfluorononanoic acid (PFNA)	375-95-1	1.9E+01	n	2.5E+02	n					5.9E-03	n		2.5E-02	n	
~Perfluorooctanesulfonate	45298-90-6	1.3E+01	n	1.6E+02	n					4.0E-03	n		3.8E-03	n	
~Perfluorooctanesulfonic acid (PFOS)	1763-23-1	1.3E+01	n	1.6E+02	n					4.0E-03	n		3.8E-03	n	
~Perfluorooctanoate	45285-51-6	1.9E+01	n	2.5E+02	n					6.0E-03	n		9.1E-02	n	
~Perfluorooctanoic acid (PFOA)	335-67-1	1.9E+01	n	2.5E+02	n					6.0E-03	n		9.1E-02	n	
~Potassium perfluorobutanesulfonate	29420-49-3	1.9E+03	n	2.5E+04	n					6.0E-01	n		3.0E-01	n	
~Potassium perfluorooctanesulfonate	2795-39-3	1.3E+01	n	1.6E+02	n					4.0E-03	n				
Perchlorates															
~Ammonium Perchlorate	7790-98-9	5.5E+03	n	8.2E+04	n					1.4E+00	n				
~Lithium Perchlorate	7791-03-9	5.5E+03	n	8.2E+04	n					1.4E+00	n				
~Perchlorate and Perchlorate Salts	14797-73-0	5.5E+03	n	8.2E+04	n					1.4E+00	n	1.5E+01 (G)			

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
~Potassium Perchlorate	7778-74-7	5.5E+03	n	8.2E+04	n					1.4E+00	n				
~Sodium Perchlorate	7601-89-0	5.5E+03	n	8.2E+04	n					1.4E+00	n				
Permethrin	52645-53-1	3.2E+05	n	4.1E+06	n					1.0E+02	n		2.4E+04	n	
Phenacetin	62-44-2	2.5E+05	c	1.0E+06	c	4.5E+00	c	1.9E+01	c	3.4E+01	c		9.7E+00	c	
Phenmedipham	13684-63-4	1.5E+06	n	2.0E+07	n					3.8E+02	n		2.1E+03	n	
Phenol	108-95-2	1.9E+06	n	2.5E+07	n	2.1E+01	n	8.8E+01	n	5.8E+02	n		3.3E+02	n	
Phenol, 2-(1-methylethoxy)-, methylcarbamate	114-26-1	2.5E+04	n	3.3E+05	n					7.8E+00	n		2.5E+00	n	
Phenothiazine	92-84-2	3.2E+03	n	4.1E+04	n					4.3E-01	n		1.4E+00	n	
Phenyl Isothiocyanate	103-72-0	1.6E+03	n	2.3E+04	n					2.6E-01	n		1.7E-01	n	
Phenylenediamine, m-	108-45-2	3.8E+04	n	4.9E+05	n					1.2E+01	n		3.2E+00	n	
Phenylenediamine, o-	95-54-5	4.5E+03	c**	1.9E+04	c*					6.5E-01	c*		1.7E-01	c*	
Phenylenediamine, p-	106-50-3	6.3E+03	n	8.2E+04	n					2.0E+00	n		5.4E-01	n	
Phenylphenol, 2-	90-43-7	2.8E+05	c	1.2E+06	c					3.0E+01	c		4.1E+02	c	
Phorate	298-02-2	1.3E+03	n	1.6E+04	n					3.0E-01	n		3.4E-01	n	
Phosgene	75-44-5	3.1E+01	n	1.3E+02	n	3.1E-02	n	1.3E-01	n	6.3E-02	n		1.6E-02	n	
Phosmet	732-11-6	1.3E+05	n	1.6E+06	n					3.7E+01	n		8.2E+00	n	
Phosphine	7803-51-2	2.3E+03	n	3.5E+04	n	3.1E-02	n	1.3E-01	n	5.7E-02	n				
Phosphoric Acid	7664-38-2	1.4E+09	nm	6.0E+09	nm	1.0E+00	n	4.4E+00	n						
Phosphorus, White	7723-14-0	1.6E+02	n	2.3E+03	n					4.0E-02	n		1.5E-01	n	
Phthalates															
~Bis(2-ethylhexyl)phthalate	117-81-7	3.9E+04	c**	1.6E+05	c*	1.2E+00	c	5.1E+00	c	5.6E+00	c**	6.0E+00	1.3E+03	c**	1.4E+03
~Butyl Benzyl Phthalate	85-68-7	2.9E+05	c**	1.2E+06	c*					1.6E+01	c*		2.4E+02	c*	
~Butylphthalyl Butylglycolate	85-70-1	6.3E+06	n	8.2E+07	n					1.3E+03	n		3.1E+04	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
~Dibutyl Phthalate	84-74-2	6.3E+05	n	8.2E+06	n					9.0E+01	n		2.3E+02	n	
~Diethyl Phthalate	84-66-2	5.1E+06	n	6.6E+07	n					1.5E+03	n		6.1E+02	n	
~Dimethylterephthalate	120-61-6	7.8E+05	n	1.2E+07	n					1.9E+02	n		4.9E+01	n	
~Octyl Phthalate, di-N-	117-84-0	6.3E+04	n	8.2E+05	n					2.0E+01	n		5.7E+03	n	
~Phthalic Acid, p-	100-21-0	3.2E+06	n	4.1E+07	n					9.4E+02	n		3.4E+02	n	
~Phthalic Anhydride	85-44-9	1.3E+07	n	1.6E+08	nm	2.1E+00	n	8.8E+00	n	3.9E+03	n		8.5E+02	n	
Picloram	1918-02-1	4.4E+05	n	5.7E+06	n					1.4E+02	n	5.0E+02	3.8E+01	n	1.4E+02
Picramic Acid (2-Amino-4,6-dinitrophenol)	96-91-3	6.3E+02	n	8.2E+03	n					2.0E-01	n		1.3E-01	n	
Picric Acid (2,4,6-Trinitrophenol)	88-89-1	1.3E+04	n	1.6E+05	n					4.0E+00	n		1.9E+01	n	
Pirimiphos, Methyl	29232-93-7	4.6E+03	n	6.0E+04	n					8.9E-01	n		8.4E-01	n	
Polybrominated Biphenyls	36355-01-8	1.8E+01	c**	7.7E+01	c**	3.3E-04	c	1.4E-03	c	2.6E-03	c**				
Polychlorinated Biphenyls (PCBs)															
~Aroclor 1016	12674-11-2	4.1E+02	n	5.1E+03	n	1.4E-01	c	6.1E-01	c	1.4E-01	n		1.3E+01	n	
~Aroclor 1221	11104-28-2	2.0E+02	c	8.3E+02	c	4.9E-03	c	2.1E-02	c	4.7E-03	c		8.0E-02	c	
~Aroclor 1232	11141-16-5	1.7E+02	c	7.2E+02	c	4.9E-03	c	2.1E-02	c	4.7E-03	c		8.0E-02	c	
~Aroclor 1242	53469-21-9	2.3E+02	c	9.5E+02	c	4.9E-03	c	2.1E-02	c	7.8E-03	c		1.2E+00	c	
~Aroclor 1248	12672-29-6	2.3E+02	c	9.4E+02	c	4.9E-03	c	2.1E-02	c	7.8E-03	c		1.2E+00	c	
~Aroclor 1254	11097-69-1	1.2E+02	n	9.7E+02	c**	4.9E-03	c	2.1E-02	c	7.8E-03	c**		2.0E+00	c**	
~Aroclor 1260	11096-82-5	2.4E+02	c	9.9E+02	c	4.9E-03	c	2.1E-02	c	7.8E-03	c		5.5E+00	c	
~Aroclor 5460	11126-42-4	3.5E+03	n	4.4E+04	n					1.2E+00	n		2.0E+02	n	
~Heptachlorobiphenyl, 2,3,3',4,4',5,5'- (PCB 189)	39635-31-9	1.3E+02	c**	5.2E+02	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*		2.8E+00	c*	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
~Hexachlorobiphenyl, 2,3',4,4',5,5'- (PCB 167)	52663-72-6	1.2E+02	c**	5.1E+02	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*		1.7E+00	c*	
~Hexachlorobiphenyl, 2,3,3',4,4',5'- (PCB 157)	69782-90-7	1.2E+02	c**	5.0E+02	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*		1.7E+00	c*	
~Hexachlorobiphenyl, 2,3,3',4,4',5- (PCB 156)	38380-08-4	1.2E+02	c**	5.0E+02	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*		1.7E+00	c*	
~Hexachlorobiphenyl, 3,3',4,4',5,5'- (PCB 169)	32774-16-6	1.2E-01	c**	5.1E-01	c**	2.5E-06	c*	1.1E-05	c*	4.0E-06	c*		1.7E-03	c*	
~Pentachlorobiphenyl, 2',3,4,4',5- (PCB 123)	65510-44-3	1.2E+02	c**	4.9E+02	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*		1.0E+00	c*	
~Pentachlorobiphenyl, 2,3',4,4',5- (PCB 118)	31508-00-6	1.2E+02	c**	4.9E+02	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*		1.0E+00	c*	
~Pentachlorobiphenyl, 2,3,3',4,4'- (PCB 105)	32598-14-4	1.2E+02	c**	4.9E+02	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*		1.0E+00	c*	
~Pentachlorobiphenyl, 2,3,4,4',5- (PCB 114)	74472-37-0	1.2E+02	c**	5.0E+02	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*		1.0E+00	c*	
~Pentachlorobiphenyl, 3,3',4,4',5- (PCB 126)	57465-28-8	3.6E-02	c**	1.5E-01	c**	7.4E-07	c*	3.2E-06	c*	1.2E-06	c*		3.0E-04	c*	
~Polychlorinated Biphenyls (high risk)	1336-36-3	2.3E+02	c	9.4E+02	c	4.9E-03	c	2.1E-02	c			5.0E-01			
~Polychlorinated Biphenyls (low risk)	1336-36-3					2.8E-02	c	1.2E-01	c	4.4E-02	c	5.0E-01	6.8E+00	c	7.8E+01
~Polychlorinated Biphenyls (lowest risk)	1336-36-3					1.4E-01	c	6.1E-01	c			5.0E-01			
~Tetrachlorobiphenyl, 3,3',4,4'- (PCB 77)	32598-13-3	3.8E+01	c**	1.6E+02	c**	7.4E-04	c*	3.2E-03	c*	6.0E-03	c**				
~Tetrachlorobiphenyl, 3,4,4',5- (PCB 81)	70362-50-4	1.2E+01	c**	4.8E+01	c**	2.5E-04	c*	1.1E-03	c*	4.0E-04	c*		6.2E-02	c*	
Polymeric Methylene Diphenyl Diisocyanate (PMDI)	9016-87-9	8.5E+07	n	3.6E+08	nm	6.3E-02	n	2.6E-01	n						

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Polynuclear Aromatic Hydrocarbons (PAHs)															
~Acenaphthene	83-32-9	3.6E+05	n	4.5E+06	n					5.3E+01	n		5.5E+02	n	
~Anthracene	120-12-7	1.8E+06	n	2.3E+07	n					1.8E+02	n		5.8E+03	n	
~Benz[a]anthracene	56-55-3	1.1E+03	c	2.1E+04	c	1.7E-02	c	2.0E-01	c	3.0E-02	c		1.1E+01	c	
~Benzo(e)pyrene	192-97-2	5.7E+02	n	7.3E+03	n	2.1E-04	n	8.8E-04	n	1.8E-01	n		2.2E+02	n	
~Benzo(j)fluoranthene	205-82-3	4.2E+02	c	1.8E+03	c	2.6E-02	c	1.1E-01	c	6.5E-02	c		7.8E+01	c	
~Benzo[a]pyrene	50-32-8	1.1E+02	c*	2.1E+03	c*	2.1E-04	n	8.8E-04	n	2.5E-02	c*	2.0E-01	2.9E+01	c*	2.4E+02
~Benzo[b]fluoranthene	205-99-2	1.1E+03	c	2.1E+04	c	1.7E-02	c	2.0E-01	c	2.5E-01	c		3.0E+02	c	
~Benzo[k]fluoranthene	207-08-9	1.1E+04	c	2.1E+05	c	1.7E-01	c	2.0E+00	c	2.5E+00	c		2.9E+03	c	
~Chloronaphthalene, Beta-	91-58-7	4.8E+05	n	6.0E+06	n					7.5E+01	n		3.9E+02	n	
~Chrysene	218-01-9	1.1E+05	c	2.1E+06	c	1.7E+00	c	2.0E+01	c	2.5E+01	c		9.0E+03	c	
~Dibenz[a,h]anthracene	53-70-3	1.1E+02	c	2.1E+03	c	1.7E-03	c	2.0E-02	c	2.5E-02	c		9.6E+01	c	
~Dibenzo(a,e)pyrene	192-65-4	4.2E+01	c	1.8E+02	c	2.6E-03	c	1.1E-02	c	6.5E-03	c		8.4E+01	c	
~Dimethylbenz(a)anthracene, 7,12-	57-97-6	4.6E-01	c	8.4E+00	c	1.4E-05	c	1.7E-04	c	1.0E-04	c		9.9E-02	c	
~Fluoranthene	206-44-0	2.4E+05	n	3.0E+06	n					8.0E+01	n		8.9E+03	n	
~Fluorene	86-73-7	2.4E+05	n	3.0E+06	n					2.9E+01	n		5.4E+02	n	
~Indeno[1,2,3-cd]pyrene	193-39-5	1.1E+03	c	2.1E+04	c	1.7E-02	c	2.0E-01	c	2.5E-01	c		9.8E+02	c	
~Methylnaphthalene, 1-	90-12-0	1.8E+04	c*	7.3E+04	c*					1.1E+00	c*		6.0E+00	c*	
~Methylnaphthalene, 2-	91-57-6	2.4E+04	n	3.0E+05	n					3.6E+00	n		1.9E+01	n	
~Naphthalene	91-20-3	2.0E+03	c**	8.6E+03	c**	8.3E-02	c**	3.6E-01	c**	1.2E-01	c**		3.8E-01	c**	
~Nitropyrene, 4-	57835-92-4	4.2E+02	c	1.8E+03	c	2.6E-02	c	1.1E-01	c	1.9E-02	c		3.3E+00	c	
~Pyrene	129-00-0	1.8E+05	n	2.3E+06	n					1.2E+01	n		1.3E+03	n	
Prochloraz	67747-09-5	3.6E+03	c*	1.5E+04	c*					3.8E-01	c*		1.9E+00	c*	
Profluralin	26399-36-0	4.7E+04	n	7.0E+05	n					2.6E+00	n		1.6E+02	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Prometon	1610-18-0	9.5E+04	n	1.2E+06	n					2.5E+01	n		1.2E+01	n	
Prometryn	7287-19-6	2.5E+05	n	3.3E+06	n					6.0E+01	n		9.0E+01	n	
Pronamide	23950-58-5	4.7E+05	n	6.2E+06	n					1.2E+02	n		1.2E+02	n	
Propachlor	1918-16-7	8.2E+04	n	1.1E+06	n					2.5E+01	n		1.5E+01	n	
Propanil	709-98-8	3.2E+04	n	4.1E+05	n					8.2E+00	n		4.5E+00	n	
Propargite	2312-35-8	2.8E+03	c*	1.2E+04	c					1.6E-01	c		1.1E+01	c	
Propargyl Alcohol	107-19-7	1.6E+04	n	2.3E+05	n					4.0E+00	n		8.1E-01	n	
Propazine	139-40-2	1.3E+05	n	1.6E+06	n					3.4E+01	n		3.0E+01	n	
Propham	122-42-9	1.3E+05	n	1.6E+06	n					3.5E+01	n		2.2E+01	n	
Propiconazole	60207-90-1	6.3E+05	n	8.2E+06	n					1.6E+02	n		5.3E+02	n	
Propionaldehyde	123-38-6	7.5E+03	n	3.1E+04	n	8.3E-01	n	3.5E+00	n	1.7E+00	n		3.4E-01	n	
Propyl benzene	103-65-1	3.8E+05	ns	2.4E+06	ns	1.0E+02	n	4.4E+02	n	6.6E+01	n		1.2E+02	n	
Propylene	115-07-1	2.2E+05	n	9.3E+05	ns	3.1E+02	n	1.3E+03	n	6.3E+02	n		6.0E+02	n	
Propylene Glycol	57-55-6	1.3E+08	nm	1.6E+09	nm					4.0E+04	n		8.1E+03	n	
Propylene Glycol Dinitrate	6423-43-4	3.9E+07	n	1.6E+08	nm	2.8E-02	n	1.2E-01	n						
Propylene Glycol Monomethyl Ether	107-98-2	4.1E+06	n	3.7E+07	n	2.1E+02	n	8.8E+02	n	3.2E+02	n		6.5E+01	n	
Propylene Oxide	75-56-9	2.1E+03	c*	9.7E+03	c*	7.6E-01	c**	3.3E+00	c**	2.7E-01	c*		5.6E-02	c*	
Pyridine	110-86-1	7.8E+03	n	1.2E+05	n					2.0E+00	n		6.8E-01	n	
Quinalphos	13593-03-8	3.2E+03	n	4.1E+04	n					5.1E-01	n		4.3E+00	n	
Quinoline	91-22-5	1.8E+02	c	7.7E+02	c					2.4E-02	c		7.8E-02	c	
Quizalofop-ethyl	76578-14-8	5.7E+04	n	7.4E+05	n					1.2E+01	n		1.9E+02	n	
Refractory Ceramic Fibers (units in fibers)	E715557					3.1E+03	G	1.3E+04	G						
Resmethrin	10453-86-8	1.9E+05	n	2.5E+06	n					6.7E+00	n		4.2E+03	n	
Ronnel	299-84-3	3.9E+05	n	5.8E+06	n					4.1E+01	n		3.7E+02	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Rotenone	83-79-4	2.5E+04	n	3.3E+05	n					6.1E+00	n		3.2E+03	n	
Safrole	94-59-7	5.5E+02	c	1.0E+04	c	1.6E-02	c	1.9E-01	c	9.6E-02	c		5.9E-02	c	
Selenious Acid	7783-00-8	3.9E+04	n	5.8E+05	n					1.0E+01	n				
Selenium	7782-49-2	3.9E+04	n	5.8E+05	n	2.1E+00	n	8.8E+00	n	1.0E+01	n	5.0E+01	5.2E+01	n	2.6E+02
Selenium Sulfide	7446-34-6	3.9E+04	n	5.8E+05	n	2.1E+00	n	8.8E+00	n	1.0E+01	n				
Sethoxydim	74051-80-2	8.8E+05	n	1.1E+07	n					1.6E+02	n		1.4E+03	n	
Silica (crystalline, respirable)	7631-86-9	4.3E+08	nm	1.8E+09	nm	3.1E-01	n	1.3E+00	n						
Silver	7440-22-4	3.9E+04	n	5.8E+05	n					9.4E+00	n		8.0E+01	n	
Simazine	122-34-9	4.5E+03	c**	1.9E+04	c*					6.1E-01	c*	4.0E+00	3.0E-01	c*	2.0E+00
Sodium Acifluorfen	62476-59-9	8.2E+04	n	1.1E+06	n					2.6E+01	n		2.1E+02	n	
Sodium Azide	26628-22-8	3.1E+04	n	4.7E+05	n					8.0E+00	n				
Sodium Diethyldithiocarbamate	148-18-5	2.0E+03	c*	8.5E+03	c					2.9E-01	c		1.8E-01	c	
Sodium Fluoride	7681-49-4	3.9E+05	n	5.8E+06	n	1.4E+00	n	5.7E+00	n	1.0E+02	n	4.0E+03	1.5E+04	n	6.0E+05
Sodium Fluoroacetate	62-74-8	1.3E+02	n	1.6E+03	n					4.0E-02	n		8.1E-03	n	
Sodium Metavanadate	13718-26-8	7.8E+03	n	1.2E+05	n					2.0E+00	n				
Sodium Tungstate	13472-45-2	6.3E+03	n	9.3E+04	n					1.6E+00	n				
Sodium Tungstate Dihydrate	10213-10-2	6.3E+03	n	9.3E+04	n					1.6E+00	n				
Stirofos (Tetrachlorovinphos)	961-11-5	2.3E+04	c**	9.6E+04	c*					2.8E+00	c*		8.2E+00	c*	
Strontium, Stable	7440-24-6	4.7E+06	n	7.0E+07	n					1.2E+03	n		4.2E+04	n	
Strychnine	57-24-9	1.9E+03	n	2.5E+04	n					5.9E-01	n		6.5E+00	n	
Styrene	100-42-5	6.0E+05	n	3.5E+06	ns	1.0E+02	n	4.4E+02	n	1.2E+02	n	1.0E+02	1.3E+02	n	1.1E+02
Styrene-Acrylonitrile (SAN) Trimer (THNA isomer)	57964-39-3	1.9E+04	n	2.5E+05	n					4.8E+00	n				

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Styrene-Acrylonitrile (SAN) Trimer (THNP isomer)	57964-40-6	1.9E+04	n	2.5E+05	n					4.8E+00	n				
Sulfolane	126-33-0	6.3E+03	n	8.2E+04	n	2.1E-01	n	8.8E-01	n	2.0E+00	n		4.4E-01	n	
Sulfonylbis(4-chlorobenzene), 1,1'-	80-07-9	5.1E+03	n	6.6E+04	n					1.1E+00	n		6.5E+00	n	
Sulfur Trioxide	7446-11-9	1.4E+08	nm	6.0E+08	nm	1.0E-01	n	4.4E-01	n	2.1E-01	n		0.0E+00		
Sulfuric Acid	7664-93-9	1.4E+08	nm	6.0E+08	nm	1.0E-01	n	4.4E-01	n				0.0E+00		
Sulfurous acid, 2-chloroethyl 2-[4-(1,1-dimethylethyl)phenoxy]-1-methylethyl ester	140-57-8	2.2E+04	c*	9.2E+04	c*	4.0E-01	c	1.7E+00	c	1.3E+00	c*		1.5E+01	c*	
TCMTB	21564-17-0	1.9E+05	n	2.5E+06	n					4.8E+01	n		3.3E+02	n	
Tebuthiuron	34014-18-1	4.4E+05	n	5.7E+06	n					1.4E+02	n		3.9E+01	n	
Temephos	3383-96-8	1.3E+05	n	1.6E+06	n					4.0E+01	n		7.6E+03	n	
Terbacil	5902-51-2	8.2E+04	n	1.1E+06	n					2.5E+01	n		7.5E+00	n	
Terbufos	13071-79-9	2.0E+02	n	2.9E+03	n					2.4E-02	n		5.2E-02	n	
Terbutryn	886-50-0	6.3E+03	n	8.2E+04	n					1.3E+00	n		1.9E+00	n	
Tert-Butyl Acetate	540-88-5	8.1E+03	c	3.6E+04	c	2.2E+00	c	9.4E+00	c	3.3E+00	c		7.6E-01	c	
Tetrabromodiphenyl ether, 2,2',4,4'- (BDE-47)	5436-43-1	6.3E+02	n	8.2E+03	n					2.0E-01	n		5.3E+00	n	
Tetrachlorobenzene, 1,2,4,5-	95-94-3	2.3E+02	n	3.5E+03	n					1.7E-02	n		7.9E-02	n	
Tetrachloroethane, 1,1,1,2-	630-20-6	2.0E+03	c	8.8E+03	c	3.8E-01	c	1.7E+00	c	5.7E-01	c*		2.2E-01	c*	
Tetrachloroethane, 1,1,2,2-	79-34-5	6.0E+02	c	2.7E+03	c	4.8E-02	c	2.1E-01	c	7.6E-02	c		3.0E-02	c	
Tetrachloroethylene	127-18-4	8.1E+03	n	3.9E+04	n	4.2E+00	n	1.8E+01	n	4.1E+00	n	5.0E+00	1.8E+00	n	2.3E+00

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Tetrachlorophenol, 2,3,4,6-	58-90-2	1.9E+05	n	2.5E+06	n					2.4E+01	n		1.8E+01	n	
Tetrachlorotoluene, p- alpha, alpha, alpha-	5216-25-1	4.3E+01	c*	2.0E+02	c*					1.7E-03	c*		5.7E-03	c*	
Tetraethyl Dithiopyrophosphate	3689-24-5	3.2E+03	n	4.1E+04	n					7.1E-01	n		5.2E-01	n	
Tetrafluoroethane, 1,1,1,2-	811-97-2	1.0E+07	ns	4.3E+07	ns	8.3E+03	n	3.5E+04	n	1.7E+04	n		9.3E+03	n	
Tetramethylphosphoramide, -N,N,N',N" (TMPA)	16853-36-4	6.3E+02	n	8.2E+03	n					2.0E-01	n				
Tetryl (Trinitrophenylmethylnitramine)	479-45-8	1.6E+04	n	2.3E+05	n					3.9E+00	n		3.7E+01	n	
Thallic Oxide	1314-32-5	1.6E+02	n	2.3E+03	n					4.0E-02	n				
Thallium (I) Nitrate	10102-45-1	7.8E+01	n	1.2E+03	n					2.0E-02	n				
Thallium (Soluble Salts)	7440-28-0	7.8E+01	n	1.2E+03	n					2.0E-02	n	2.0E+00	1.4E+00	n	1.4E+02
Thallium Acetate	563-68-8	7.8E+01	n	1.2E+03	n					2.0E-02	n		4.1E-03	n	
Thallium Carbonate	6533-73-9	1.3E+02	n	1.6E+03	n					4.0E-02	n		8.3E-03	n	
Thallium Chloride	7791-12-0	7.8E+01	n	1.2E+03	n					2.0E-02	n				
Thallium Selenite	12039-52-0	7.8E+01	n	1.2E+03	n					2.0E-02	n				
Thallium Sulfate	7446-18-6	1.6E+02	n	2.3E+03	n					4.0E-02	n				
Thifensulfuron-methyl	79277-27-3	2.7E+05	n	3.5E+06	n					8.6E+01	n		2.6E+01	n	
Thiobencarb	28249-77-6	6.3E+04	n	8.2E+05	n					1.6E+01	n		5.5E+01	n	
Thiodiglycol	111-48-8	5.4E+05	n	7.9E+06	n					1.4E+02	n		2.8E+01	n	
Thiofanox	39196-18-4	1.9E+03	n	2.5E+04	n					5.3E-01	n		1.8E-01	n	
Thiophanate, Methyl	23564-05-8	4.7E+04	c*	2.0E+05	c*					6.7E+00	c*		5.7E+00	c*	
Thiram	137-26-8	9.5E+04	n	1.2E+06	n					2.9E+01	n		4.2E+01	n	
Tin	7440-31-5	4.7E+06	n	7.0E+07	n					1.2E+03	n		3.0E+05	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Titanium Tetrachloride	7550-45-0	1.4E+07	n	6.0E+07	n	1.0E-02	n	4.4E-02	n	2.1E-02	n				
Toluene	108-88-3	4.9E+05	n	4.7E+06	ns	5.2E+02	n	2.2E+03	n	1.1E+02	n	1.0E+03	7.6E+01	n	6.9E+02
Toluene-2,4-diisocyanate	584-84-9	6.4E+02	n	2.7E+03	n	8.3E-04	n	3.5E-03	n	1.7E-03	n		2.5E-02	n	
Toluene-2,5-diamine	95-70-5	1.3E+03	n	1.3E+04	c**					4.0E-01	n		1.2E-01	n	
Toluene-2,6-diisocyanate	91-08-7	5.3E+02	n	2.2E+03	n	8.3E-04	n	3.5E-03	n	1.7E-03	n		2.6E-02	n	
Toluenediamine, 2,3-	2687-25-4	6.3E+02	n	8.2E+03	n					2.0E-01	n		6.2E-02	n	
Toluenediamine, 3,4-	496-72-0	6.3E+02	n	8.2E+03	n					2.0E-01	n		6.2E-02	n	
Toluic Acid, p-	99-94-5	3.2E+04	n	4.1E+05	n					9.0E+00	n		2.3E+00	n	
Toluidine, o- (Methylaniline, 2-)	95-53-4	3.4E+04	c	1.4E+05	c	5.5E-02	c	2.4E-01	c	4.7E+00	c		2.0E+00	c	
Toluidine, p-	106-49-0	1.8E+04	c**	7.7E+04	c**					2.5E+00	c**		1.1E+00	c**	
Total Petroleum Hydrocarbons (Aliphatic High)	E1790670	2.3E+07	ns	3.5E+08	nms					6.0E+03	n		2.4E+05	n	
Total Petroleum Hydrocarbons (Aliphatic Low)	E1790666	2.1E+04	n	1.5E+05	ns	4.2E+01	n	1.8E+02	n	9.0E+00	n		9.8E+00	n	
Total Petroleum Hydrocarbons (Aliphatic Medium)	E1790668	9.6E+03	ns	4.4E+04	ns	1.0E+01	n	4.4E+01	n	1.0E+01	n		1.5E+02	n	
Total Petroleum Hydrocarbons (Aromatic High)	E1790676	1.8E+03	n	2.2E+04	n	2.1E-04	n	8.8E-04	n	6.0E-01	n		7.1E+02	n	
Total Petroleum Hydrocarbons (Aromatic Medium)	E1790674	3.0E+04	n	1.7E+05	n	6.3E+00	n	2.6E+01	n	5.7E+00	n		8.3E+00	n	
Toxaphene	8001-35-2	4.9E+02	c**	2.1E+03	c**	8.8E-03	c	3.8E-02	c	7.1E-02	c**	3.0E+00	1.1E+01	c**	4.6E+02

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Toxaphene, Weathered	E1841606	1.9E+02	n	2.5E+03	n					6.0E-02	n		9.3E+00	n	
Tralomethrin	66841-25-6	4.7E+04	n	6.2E+05	n					1.5E+01	n		5.8E+03	n	
Tri-n-butyltin	688-73-3	2.3E+03	n	3.5E+04	n					3.7E-01	n		8.2E+00	n	
Triacetin	102-76-1	5.1E+08	nm	6.6E+09	nm					1.6E+05	n		4.5E+04	n	
Triadimefon	43121-43-3	2.1E+05	n	2.8E+06	n					6.3E+01	n		5.0E+01	n	
Triallate	2303-17-5	9.7E+03	c*	4.6E+04	c*					4.7E-01	c*		1.0E+00	c*	
Triasulfuron	82097-50-5	6.3E+04	n	8.2E+05	n					2.0E+01	n		2.1E+01	n	
Tribenuron-methyl	101200-48-0	5.1E+04	n	6.6E+05	n					1.6E+01	n		6.1E+00	n	
Tribromobenzene, 1,2,4-	615-54-3	3.9E+04	n	5.8E+05	n					4.5E+00	n		6.4E+00	n	
Tribromophenol, 2,4,6-	118-79-6	5.7E+04	n	7.4E+05	n					1.2E+01	n		2.2E+01	n	
Tribufos	78-48-8	1.3E+03	n	1.6E+04	n					5.7E-02	n		2.8E-01	n	
Tributyl Phosphate	126-73-8	6.0E+04	c**	2.6E+05	c**					5.2E+00	c**		2.5E+01	c**	
Tributyltin Compounds	E1790679	1.9E+03	n	2.5E+04	n					6.0E-01	n				
Tributyltin Oxide	56-35-9	1.9E+03	n	2.5E+04	n					5.7E-01	n		2.9E+04	n	
Trichloramine	10025-85-1	0.0E+00		#VALUE!								4.0E+03 (G)			
Trichloro-1,2,2-trifluoroethane, 1,1,2-	76-13-1	6.7E+05	n	2.8E+06	ns	5.2E+02	n	2.2E+03	n	1.0E+03	n		2.6E+03	n	
Trichloroacetic Acid	76-03-9	7.8E+03	c*	3.3E+04	c*					1.1E+00	c*	6.0E+01 (G)	2.2E-01	c*	1.2E+01
Trichloroaniline HCl, 2,4,6-	33663-50-2	1.9E+04	c	7.9E+04	c					2.7E+00	c		7.4E+00	c	
Trichloroaniline, 2,4,6-	634-93-5	1.9E+02	n	2.5E+03	n					4.0E-02	n		3.6E-01	n	
Trichlorobenzene, 1,2,3-	87-61-6	6.3E+03	n	9.3E+04	n					7.0E-01	n		2.1E+00	n	
Trichlorobenzene, 1,2,4-	120-82-1	5.8E+03	n	2.6E+04	n	2.1E-01	n	8.8E-01	n	4.0E-01	n	7.0E+01	1.2E+00	n	2.0E+02
Trichloroethane, 1,1,1-	71-55-6	8.1E+05	ns	3.6E+06	ns	5.2E+02	n	2.2E+03	n	8.0E+02	n	2.0E+02	2.8E+02	n	7.0E+01
Trichloroethane, 1,1,2-	79-00-5	1.5E+02	n	6.3E+02	n	2.1E-02	n	8.8E-02	n	4.1E-02	n	5.0E+00	1.3E-02	n	1.6E+00

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Trichloroethylene	79-01-6	4.1E+02	n	1.9E+03	n	2.1E-01	n	8.8E-01	n	2.8E-01	n	5.0E+00	1.0E-01	n	1.8E+00
Trichlorofluoromethane	75-69-4	2.3E+06	ns	3.5E+07	ns					5.2E+02	n		3.3E+02	n	
Trichlorophenol, 2,4,5-	95-95-4	6.3E+05	n	8.2E+06	n					1.2E+02	n		4.0E+02	n	
Trichlorophenol, 2,4,6-	88-06-2	6.3E+03	n	8.2E+04	n	9.1E-01	c	4.0E+00	c	1.2E+00	n		1.2E+00	n	
Trichlorophenoxyacetic Acid, 2,4,5-	93-76-5	6.3E+04	n	8.2E+05	n					1.6E+01	n		6.8E+00	n	
Trichlorophenoxypropionic acid, -2,4,5	93-72-1	5.1E+04	n	6.6E+05	n					1.1E+01	n	5.0E+01	6.1E+00	n	2.8E+01
Trichloropropane, 1,1,2-	598-77-6	3.9E+04	n	5.8E+05	n					8.8E+00	n		3.5E+00	n	
Trichloropropane, 1,2,3-	96-18-4	5.1E+00	c*	1.1E+02	c*	3.1E-02	n	1.3E-01	n	7.5E-04	c*		3.2E-04	c*	
Trichloropropene, 1,2,3-	96-19-5	7.3E+01	n	3.1E+02	n	3.1E-02	n	1.3E-01	n	6.2E-02	n		3.1E-02	n	
Tricresyl Phosphate (TCP)	1330-78-5	1.3E+05	n	1.6E+06	n					1.6E+01	n		1.5E+03	n	
Tridiphane	58138-08-2	1.9E+04	n	2.5E+05	n					1.8E+00	n		1.3E+01	n	
Triethylamine	121-44-8	1.2E+04	n	4.8E+04	n	7.3E-01	n	3.1E+00	n	1.5E+00	n		4.4E-01	n	
Triethylene Glycol	112-27-6	1.3E+07	n	1.6E+08	nm					4.0E+03	n		8.8E+02	n	
Trifluoroethane, 1,1,1-	420-46-2	1.5E+06	n	6.2E+06	ns	2.1E+03	n	8.8E+03	n	4.2E+03	n		1.3E+04	n	
Trifluralin	1582-09-8	5.9E+04	n	4.2E+05	c**					2.6E+00	c**		8.4E+01	c**	
Trimethyl Phosphate	512-56-1	2.7E+04	c**	1.1E+05	c**					3.9E+00	c**		8.6E-01	c**	
Trimethylbenzene, 1,2,3-	526-73-8	3.4E+04	n	2.0E+05	n	6.3E+00	n	2.6E+01	n	5.5E+00	n		8.1E+00	n	
Trimethylbenzene, 1,2,4-	95-63-6	3.0E+04	n	1.8E+05	n	6.3E+00	n	2.6E+01	n	5.6E+00	n		8.1E+00	n	
Trimethylbenzene, 1,3,5-	108-67-8	2.7E+04	n	1.5E+05	n	6.3E+00	n	2.6E+01	n	6.0E+00	n		8.7E+00	n	
Trimethylpentene, 2,4,4-	25167-70-8	7.8E+04	ns	1.2E+06	ns					3.8E+00	n		1.3E+01	n	
Trinitrobenzene, 1,3,5-	99-35-4	2.2E+05	n	3.2E+06	n					5.9E+01	n		2.1E+02	n	
Trinitrotoluene, 2,4,6-	118-96-7	3.6E+03	n	5.1E+04	n					9.8E-01	n		5.7E+00	n	
Triphenylphosphine Oxide	791-28-6	1.3E+05	n	1.6E+06	n					3.6E+01	n		1.5E+02	n	

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Tris(1,3-Dichloro-2-propyl) Phosphate	13674-87-8	1.3E+05	n	1.6E+06	n					3.6E+01	n		8.0E+02	n	
Tris(1-chloro-2-propyl)phosphate	13674-84-5	6.3E+04	n	8.2E+05	n					1.9E+01	n		6.5E+01	n	
Tris(2,3-dibromopropyl)phosphate	126-72-7	2.8E+02	c	1.3E+03	c	4.3E-03	c	1.9E-02	c	6.8E-03	c		1.3E-01	c	
Tris(2-chloroethyl)phosphate	115-96-8	2.7E+04	c**	1.1E+05	c**					3.8E+00	c**		3.8E+00	c**	
Tris(2-ethylhexyl)phosphate	78-42-2	1.7E+05	c**	7.2E+05	c*					2.4E+01	c**		1.2E+05	c**	
Tungsten	7440-33-7	6.3E+03	n	9.3E+04	n					1.6E+00	n		2.4E+02	n	
Uranium	7440-61-1	1.6E+03	n	2.3E+04	n	4.2E-03	n	1.8E-02	n	4.0E-01	n	3.0E+01	1.8E+02	n	1.4E+04
Urethane	51-79-6	1.2E+02	c	2.3E+03	c	3.5E-03	c	4.2E-02	c	2.5E-02	c		5.6E-03	c	
Vanadium Pentoxide	1314-62-1	6.6E+04	n	8.4E+05	n	3.4E-04	c**	1.5E-03	c**	1.5E+01	n				
Vanadium and Compounds	7440-62-2	3.9E+04	n	5.8E+05	n	1.0E-02	n	4.4E-02	n	8.6E+00	n		8.6E+03	n	
Vernolate	1929-77-7	7.8E+03	n	1.2E+05	n					1.1E+00	n		8.9E-01	n	
Vinclozolin	50471-44-8	7.6E+03	n	9.8E+04	n					2.1E+00	n		1.6E+00	n	
Vinyl Acetate	108-05-4	9.1E+04	n	3.8E+05	n	2.1E+01	n	8.8E+01	n	4.1E+01	n		8.7E+00	n	
Vinyl Bromide	593-60-2	2.6E+02	c**	1.1E+03	c**	1.9E-01	c**	8.2E-01	c**	3.7E-01	c**		1.1E-01	c**	
Vinyl Chloride	75-01-4	5.9E+01	c	1.7E+03	c*	1.7E-01	c*	2.8E+00	c*	1.9E-02	c	2.0E+00	6.5E-03	c	6.9E-01
Warfarin	81-81-2	1.9E+03	n	2.5E+04	n					5.6E-01	n		5.9E-01	n	
Xylene, m-	108-38-3	5.5E+04	n	2.4E+05	n	1.0E+01	n	4.4E+01	n	1.9E+01	n		1.9E+01	n	
Xylene, o-	95-47-6	6.4E+04	n	2.8E+05	n	1.0E+01	n	4.4E+01	n	1.9E+01	n		1.9E+01	n	
Xylene, p-	106-42-3	5.6E+04	n	2.4E+05	n	1.0E+01	n	4.4E+01	n	1.9E+01	n		1.9E+01	n	
Xylenes	1330-20-7	5.8E+04	n	2.5E+05	n	1.0E+01	n	4.4E+01	n	1.9E+01	n	1.0E+04	1.9E+01	n	9.9E+03
Zinc Phosphide	1314-84-7	2.3E+03	n	3.5E+04	n					6.0E-01	n				

Contaminant		Screening Levels											Protection of Groundwater SSLs		
Analyte	CAS No.	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Resident Air (µg/m^3)	key	Industrial Air (µg/m^3)	key	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Zinc and Compounds	7440-66-6	2.3E+06	n	3.5E+07	n					6.0E+02	n		3.7E+04	n	
Zineb	12122-67-7	3.2E+05	n	4.1E+06	n					9.9E+01	n		2.9E+02	n	
Zirconium	7440-67-7	6.3E+02	n	9.3E+03	n					1.6E-01	n		4.8E+02	n	

Keys: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = OW; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = C_{sat} exceeded.

An extraction of key chemicals of concern (CoCs) and their screening levels from Table 8-4 is provided in Table 8-5 below:

Table 8-5: Derailment CoCs and Soil/Water Screening Levels Based on EPA RSLs

Analyte	Screening Levels (Cancer Risk of 1 x 10^{-6} and Non-Cancer Hazard Quotient of 0.1)				Protection of Groundwater SSLs		
	Resident Soil (µg/kg)	key	Industrial Soil (µg/kg)	key	Risk-based SSL (µg/kg)	key	MCL-based SSL (µg/kg)
Acetone	7,000,000	n	110,000,000	nm	370	n	
Benzene	1,200	c**	5,100	c**	0.23	c**	2.60
n-Butyl acrylate							
2-Ethylhexyl acrylate	70.5***						
2-Butoxyethanol - RA (Ethylene Glycol Monobutyl Ether)	630,000	n	8,200,000	n	41	n	
isobutylene							
Methylcyclohexane							
Methyl acetate	7,800,000	n	120,000,000	nms	410	n	
Methylcyclohexane							
Toluene	490,000	n	4,700,000	ns	76	n	690
Xylenes, Total	58,000	n	250,000	n	19	n	9,900
2-Butoxyethanol - RA (Ethylene Glycol Monobutyl Ether)	630,000	n	8,200,000	n	41	n	
Diethylene glycol							
Propylene glycol	130,000,000	nm	1,600,000,000	nm	8,100	n	
Acenaphthene	360,000	n	4,500,000	n	550	n	
Acenaphthylene							
Anthracene	1,800,000	n	23,000,000	n	5,800	n	
Benz[a]anthracene	1,100	c	21,000	c	11	c	
Benzo[a]pyrene	110	c*	2,100	c*	29	c*	240
Benzo[b]fluoranthene	1,100	c	21,000	c	300	c	
Benzo[g,h,i]perylene							
Benzo[k]fluoranthene	11,000	c	210,000	c	2,900	c	
Chrysene	110,000	c	2,100,000	c	9,000	c	
Dibenzofuran	7,800	n	120,000	n	15	n	
Fluoranthene	240,000	n	3,000,000	n	8,900	n	
Fluorene	240,000	n	3,000,000	n	540	n	
Indeno[1,2,3-cd]pyrene	1,100	c	21,000	c	980	c	
2-Methylnaphthalene	24,000	n	300,000	n	19	n	
Naphthalene	2,000	c**	8,600	c**	0.38	c**	
Phenanthrene							
Pyrene	180,000	n	2,300,000	n	1,300	n	

Keys: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = OW; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

***from R. Van Herwijnen, 2009, "Environmental Risk Limits for 2-ethylhexyl acrylate – Maximum Permissible Concentration in Soil – 70.5 µg/kg - see www.rivm.nl/bibliotheek/rapporten/601782024.pdf.

From Stantec's June 2023 East Palestine Train Derailment Site Potable Water Well Sampling Quality Assurance Project Plan (QAPP) report, we also have their VOC and SVOC screening values for drinking water standards for the East Palestine, OH derailment (Exhibit 153, pg. A-14) as shown in Table 8-6:

Table 8-6: Stantec's June 14, 2023 QAPP Screening Levels

Analyte	CAS #	Selected Screening Drinking Water Standards	Units
Analytical Method: US EPA Method 524.2 modified			
1,1-Dichloropropene	563-58-6	0.47 [4]	µg/ℓ
1,2,4-Trimethylbenzene	95-63-6	56 [2]	µg/ℓ
Benzene	71-43-2	5 [1,3]	µg/ℓ
2-Ethylhexyl acrylate*	103-11-7	500 [4]	µg/ℓ
Ethylbenzene	100-41-4	700 [1,3]	µg/ℓ
m-Xylene & p-Xylene	179601-23-1	19 [4]	µg/ℓ
n-Butyl acrylate	141-32-2	560 [4]	µg/ℓ
o-Xylene	95-47-6	190 [2]	µg/ℓ
Toluene	108-88-3	1,000 [1,3]	µg/ℓ
Analytical Method: US EPA Method 525.2 modified			
1-Methylnaphthalene	90-12-0	1.1 [2]	µg/ℓ
2-Methylnaphthalene	91-57-6	36 [2]	µg/ℓ
Acenaphthene	83-32-9	530 [2]	µg/ℓ
Acenaphthylene	208-96-8	12 [4]	µg/ℓ
Anthracene	120-12-7	1,800 [2]	µg/ℓ
Benzo[a]anthracene	56-55-3	0.03 [2]	µg/ℓ
Benzo[a]pyrene	50-32-8	0.2 [1,3]	µg/ℓ
Benzo[b]fluoranthene	205-99-2	0.25 [2]	µg/ℓ
Benzo[g,h,i]perylene	191-24-2	0.12 [4]	µg/ℓ
Benzo[k]fluoranthene	207-08-9	2.5 [2]	µg/ℓ
Chrysene	218-01-9	25 [2]	µg/ℓ

Analyte	CAS #	Selected Screening Drinking Water Standards	Units
Dibenz(a,h)anthracene	53-70-3	0.025 [2]	µg/ℓ
Fluoranthene	206-44-0	800 [2]	µg/ℓ
Fluorene	86-73-7	290 [2]	µg/ℓ
Indeno[1,2,3-cd]pyrene	193-39-5	0.25 [2]	µg/ℓ
Naphthalene	91-20-3	0.12 [2]	µg/ℓ
Phenanthrene	85-01-8	50 [4]	µg/ℓ
Pyrene	129-00-0	120 [2]	µg/ℓ
Analytical Method: SW-846 Method 8270 modified			
2-Butyloxyethanol (Ethylene Glycol Monobutyl Ether)*	111-76-2	2,000 [2]	µg/ℓ

Notes:

CAS - Chemical abstract service.

USEPA - United States Environmental Protection Agency.

MCL - Maximum contaminant level.

µg/ℓ - Micrograms per liter.

[1] Drinking Water Standards for Ohio Public Water Systems, September 2018 (Ohio Administrative Code Chapter 3745-81).

[2] USEPA RSLs Resident Tap Water (TR=1E-06/THQ=1.) - https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables.

[3] MCLS - National Primary Drinking Water Regulations 40 CFR Part 141.

[4] ATSDR - Agency for Toxic Substances and Disease Registry Calculated Criteria.

[5] Analytical method or similar method will be utilized for analysis.

* Analyte is not included in approved EPA Method list. Analyzed by laboratory-modified method shown.

8.2 Petty Potable Water (City and Well) and Sump Water Analyses Results and Comparisons with Water Screening Levels:

To illustrate the use of screening levels illustrated in Section 8-1, along with potential water screening levels for 2-Ethyl Hexyl Acrylate, comparisons for these values against potable water were collected by Petty in February 2023 from a limited number of homes, along with a shallow sump water sample at one home, was completed.

Specific samples are described below.

Domestic City Water:

Location # 8 – Samples W-8-1 to 4

Location # 9 – Samples W-9-1 to 4

Locations # 11 – Samples W-11-1 to 4.

Well Water:

Location #13 – Samples W-13A-1 to 4

Location #15 – Samples W-15B-1 to 4

Location #16 – Samples W-16B-1 to 4.

8' Sump Water – Not Used for Drinking Water:

Location #8# - Samples W-8B-1 to 4.

Sample results for VOCs, SVOCs, glycols, and dioxins/dioxin-like substances are summarized in Table 8-7:

Table 8-7 Potable, Well, and Sump Water Sampling Results and Comparison with Screening Levels

Sample Results by Location and Analytical Methods								Contaminant	Screening Levels (Cancer Risk of 1 x 10^{-6} and Non-Cancer Hazard Quotient of 0.1)		
Location #	Date	Sample #	Matrix	Analysis Method	Analyte	Result	Unit	Analyte	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)
Potable Water Sample Results Above Detection Limits from Municipal Water											
8	2023-02-22	W-8-1	Water	8260 D	Chlorodibromomethane (Dibromochloromethane)	2.2	µg/ℓ	Dibromochloromethane	0.87	c*	80 (G)
8	2023-02-22	W-8-1	Water	8260 D	Chloroform	6.5	µg/ℓ	Chloroform	0.22	c*	80 (G)
8	2023-02-22	W-8-1	Water	8260 D	Dichlorobromomethane (Bromodichloromethane)	3.0	µg/ℓ	Bromodichloromethane	0.13	c	80 (G)
8	2023-02-22	W-8-2	Water	8270 E	*No detections*			SVOCs			
8	2023-02-22	W-8-3	Water	8015 C	*No detections*			Glycols			
					Dioxin/Dioxin-Like Substances				Ground Water (µg/ℓ)*		Ground Water (pg/ℓ)
8	2023-02-22	W-8-4	Water	8290 A	1,2,3,4,6,7,8-HpCDD	2.1	pg/ℓ		0.00013	Est.	130
8	2023-02-22	W-8-4	Water	8290 A	1,2,3,4,6,7,8-HpCDF	1.2	pg/ℓ		0.00013	Est.	130
8	2023-02-22	W-8-4	Water	8290 A	1,2,3,4,7,8-HxCDD	0.88	pg/ℓ		0.000013	RSL	13
8	2023-02-22	W-8-4	Water	8290 A	1,2,3,4,7,8-HxCDF	0.60	pg/ℓ		0.000013	Est.	13
8	2023-02-22	W-8-4	Water	8290 A	1,2,3,4,7,8,9-HpCDF	0.84	pg/ℓ		0.000013	Est.	13
8	2023-02-22	W-8-4	Water	8290 A	1,2,3,6,7,8-HxCDD	0.86	pg/ℓ		0.000013	Est.	13
8	2023-02-22	W-8-4	Water	8290 A	1,2,3,6,7,8-HxCDF	0.81	pg/ℓ		0.000013	Est.	13
8	2023-02-22	W-8-4	Water	8290 A	1,2,3,7,8-PeCDD	0.68	pg/ℓ		0.00000012	Est.	0.12
8	2023-02-22	W-8-4	Water	8290 A	1,2,3,7,8-PeCDF	0.74	pg/ℓ		0.00039	Est.	390
8	2023-02-22	W-8-4	Water	8290 A	1,2,3,7,8,9-HxCDD	0.70	pg/ℓ		0.000013	Est.	13
8	2023-02-22	W-8-4	Water	8290 A	1,2,3,7,8,9-HxCDF	1.1	pg/ℓ		0.000013	Est.	13
8	2023-02-22	W-8-4	Water	8290 A	2,3,4,6,7,8-HxCDF	0.86	pg/ℓ		0.000013	Est.	13
8	2023-02-22	W-8-4	Water	8290 A	2,3,4,7,8-PeCDF	0.55	pg/ℓ		0.000039	Est.	39

Sample Results by Location and Analytical Methods								Contaminant	Screening Levels (Cancer Risk of 1 x 10^{-6} and Non-Cancer Hazard Quotient of 0.1)		
Location #	**Date**	**Sample #**	**Matrix**	**Analysis Method**	**Analyte**	**Result**	**Unit**	**Analyte**	**Tap Water (µg/ℓ)**	**key**	**MCL (µg/ℓ)**
8	2023-02-22	W-8-4	Water	8290 A	2,3,7,8-TCDD	0.29	pg/ℓ		0.00000012	RSL	0.12
8	2023-02-22	W-8-4	Water	8290 A	OCDD	5.4	pg/ℓ		0.0004	Est.	400
8	2023-02-22	W-8-4	Water	8290 A	OCDF	2.2	pg/ℓ		0.0004	Est.	400
									Tap Water (µg/ℓ)		**MCL (µg/ℓ)**
9	2023-02-22	W-9-1	Water	8260 D	*No detections*			VOCs			
9	2023-02-22	W-9-2	Water	8270 E	*No detections*			SVOCs			
9	2023-02-22	W-9-3	Water	8015 C	*No detections*			Glycols			
					Dioxin/Dioxin-Like Substances				**Ground Water (µg/ℓ)***		**Ground Water (pg/ℓ)**
9	2023-02-22	W-9-4	Water	8290 A	1,2,3,4,6,7,8-HpCDD	0.7	pg/ℓ		0.00013	Est.	130
9	2023-02-22	W-9-4	Water	8290 A	1,2,3,4,6,7,8-HpCDF	0.18	pg/ℓ		0.00013	Est.	130
9	2023-02-22	W-9-4	Water	8290 A	1,2,3,4,7,8-HxCDD	0.084	pg/ℓ		0.000013	RSL	13
9	2023-02-22	W-9-4	Water	8290 A	1,2,3,4,7,8,9-HpCDF	0.2	pg/ℓ		0.000013	Est.	13
9	2023-02-22	W-9-4	Water	8290 A	1,2,3,6,7,8-HxCDD	0.16	pg/ℓ		0.000013	Est.	13
9	2023-02-22	W-9-4	Water	8290 A	1,2,3,6,7,8-HxCDF	0.2	pg/ℓ		0.000013	Est.	13
9	2023-02-22	W-9-4	Water	8290 A	1,2,3,7,8,9-HxCDF	0.4	pg/ℓ		0.000013	Est.	13
9	2023-02-22	W-9-4	Water	8290 A	2,3,4,6,7,8-HxCDF	0.22	pg/ℓ		0.000013	Est.	13
9	2023-02-22	W-9-4	Water	8290 A	OCDD	1.4	pg/ℓ		0.0004	Est.	400
9	2023-02-22	W-9-4	Water	8290 A	OCDF	0.67	pg/ℓ		0.0004	Est.	400
									Tap Water (µg/ℓ)	**key**	**MCL (µg/ℓ)**
11	2023-02-22	W-11-1	Water	8260 D	Chlorodibromo-methane (Dibromochloro-methane)	***1.3***	µg/ℓ	Dibromochloro-methane	0.87	c*	80 (G)
11	2023-02-22	W-11-1	Water	8260 D	Chloroform	***1.5***	µg/ℓ	Chloroform	0.22	c*	80 (G)
11	2023-02-22	W-11-1	Water	8260 D	Dichlorobromo-methane (Bromodichloro-methane)	***1.7***	µg/ℓ	Bromodichloro-methane	0.13	c	80 (G)
									Ground Water (µg/ℓ)	**key**	**MCL (µg/ℓ)**
11	2023-02-22	W-11-1	Water	8260 D	2-Ethylhexyl acrylate	***4.0***	µg/ℓ	2-Ethylhexyl acrylate	1.30** / 500***		
11	2023-02-22	W-11-2	Water	8270 E	*No detections*			SVOCs			
11	2023-02-22	W-11-3	Water	8015 C	*No detections*			Glycols			
					Dioxin/Dioxin-Like Substances				**Ground Water (µg/ℓ)***		**Ground Water (pg/ℓ)**
11	2023-02-22	W-11-4	Water	8290 A	1,2,3,4,6,7,8-HpCDD	0.68	pg/ℓ		0.00013	Est.	130
11	2023-02-22	W-11-4	Water	8290 A	1,2,3,4,6,7,8-HpCDF	0.26	pg/ℓ		0.00013	Est.	130
11	2023-02-22	W-11-4	Water	8290 A	1,2,3,6,7,8-HxCDD	0.27	pg/ℓ		0.000013	RSL	13
11	2023-02-22	W-11-4	Water	8290 A	1,2,3,6,7,8-HxCDF	0.25	pg/ℓ		0.000013	Est.	13
11	2023-02-22	W-11-4	Water	8290 A	1,2,3,7,8-PeCDF	0.28	pg/ℓ		0.00039	Est.	390

Sample Results by Location and Analytical Methods								Contaminant	Screening Levels (Cancer Risk of 1 x 10^{-6} and Non-Cancer Hazard Quotient of 0.1)		
Location #	**Date**	**Sample #**	**Matrix**	**Analysis Method**	**Analyte**	**Result**	**Unit**	**Analyte**	**Tap Water (µg/ℓ)**	**key**	**MCL (µg/ℓ)**
11	2023-02-22	W-11-4	Water	8290 A	1,2,3,7,8,9-HxCDD	0.21	pg/ℓ		0.000013	Est.	13
11	2023-02-22	W-11-4	Water	8290 A	1,2,3,7,8,9-HxCDF	0.57	pg/ℓ		0.000013	Est.	13
11	2023-02-22	W-11-4	Water	8290 A	2,3,4,6,7,8-HxCDF	0.4	pg/ℓ		0.000013	Est.	13
11	2023-02-22	W-11-4	Water	8290 A	2,3,4,7,8-PeCDF	0.27	pg/ℓ		0.000039	Est.	39
Potable Water Sample Results Above Detection Limits from Wells											
									Tap Water (µg/ℓ)	-	**MCL (µg/ℓ)**
13	2023-02-23	W-13A	Water	8260 D	*No detections*			VOCs			
13	2023-02-23	W-13A-2	Water	8270 E	*No detections*			SVOCs			
13	2023-02-23	W-13-3	Water	8015 C	*No detections*			Glycols			
									Ground Water (µg/ℓ)*		**Ground Water (pg/ℓ)**
13	2023-02-23	W-13A-4	Water	8290 A	1,2,3,4,6,7,8-HpCDD	1.9	pg/ℓ	Dioxin/Dioxin Like Substances	0.00013	Est.	130
13	2023-02-23	W-13A-4	Water	8290 A	1,2,3,4,6,7,8-HpCDF	1.2	pg/ℓ		0.00013	Est.	130
13	2023-02-23	W-13A-4	Water	8290 A	1,2,3,4,7,8-HxCDF	0.55	pg/ℓ		0.000013*	Est.	13
13	2023-02-23	W-13A-4	Water	8290 A	1,2,3,4,7,8,9-HpCDF	0.52	pg/ℓ		0.000013	Est.	13
13	2023-02-23	W-13A-4	Water	8290 A	1,2,3,6,7,8-HxCDF	0.27	pg/ℓ		0.000013	Est.	13
13	2023-02-23	W-13A-4	Water	8290 A	1,2,3,7,8,9-HxCDF	0.98	pg/ℓ		0.000013	Est.	13
13	2023-02-23	W-13A-4	Water	8290 A	2,3,4,6,7,8-HxCDF	1	pg/ℓ		0.000013	Est.	13
13	2023-02-23	W-13A-4	Water	8290 A	2,3,4,7,8-PeCDF	0.45	pg/ℓ		0.000039	Est.	39
13	2023-02-23	W-13A-4	Water	8290 A	OCDD	8.5	pg/ℓ		0.00040	Est.	400
13	2023-02-23	W-13A-4	Water	8290 A	OCDF	2.3	pg/ℓ		0.00040	Est.	400
									Tap Water (µg/ℓ)		**MCL (µg/ℓ)**
15	2023-02-23	W-15B	Water	8260 D	*No detections*			VOCs			
15	2023-02-23	W-15B-3	Water	8015 C	*No detections*			SVOCs			
15	2023-02-23	W-15B-4	Water	8270 E	*No detections*			Glycols			
									Ground Water (µg/ℓ)*		**Ground Water (pg/ℓ)**
15	2023-02-23	W-15B-2	Water	8290 A	1,2,3,4,6,7,8-HpCDD	2.7	pg/ℓ	Dioxin/Dioxin Like Substances	0.00013	Est.	130
15	2023-02-23	W-15B-2	Water	8290 A	1,2,3,4,6,7,8-HpCDF	0.99	pg/ℓ		0.00013	Est.	130
15	2023-02-23	W-15B-2	Water	8290 A	1,2,3,4,7,8-HxCDD	0.93	pg/ℓ		0.000013	RSL	13
15	2023-02-23	W-15B-2	Water	8290 A	1,2,3,4,7,8,9-HpCDF	0.76	pg/ℓ		0.000013	Est.	13
15	2023-02-23	W-15B-2	Water	8290 A	1,2,3,6,7,8-HxCDD	1	pg/ℓ		0.000013	Est.	13
15	2023-02-23	W-15B-2	Water	8290 A	1,2,3,6,7,8-HxCDF	0.6	pg/ℓ		0.000013	Est.	13
15	2023-02-23	W-15B-2	Water	8290 A	1,2,3,7,8-PeCDD	***0.52***	pg/ℓ		0.00000012	Est.	0.12
15	2023-02-23	W-15B-2	Water	8290 A	1,2,3,7,8,9-HxCDD	1.1	pg/ℓ		0.000013	Est.	13

Sample Results by Location and Analytical Methods								Contaminant	Screening Levels (Cancer Risk of 1 x 10^{-6} and Non-Cancer Hazard Quotient of 0.1)		
Location #	**Date**	**Sample #**	**Matrix**	**Analysis Method**	**Analyte**	**Result**	**Unit**	**Analyte**	**Tap Water (µg/ℓ)**	**key**	**MCL (µg/ℓ)**
15	2023-02-23	W-15B-2	Water	8290 A	2,3,4,7,8-PeCDF	0.69	pg/ℓ		0.000039	Est.	39
15	2023-02-23	W-15B-2	Water	8290 A	OCDD	8.5	pg/ℓ		0.00040	Est.	400
15	2023-02-23	W-15B-2	Water	8290 A	OCDF	2.5	pg/ℓ		0.00040	Est.	400
									Tap Water (µg/ℓ)	**key**	**MCL (µg/ℓ)**
16	2023-02-24	W-16B-1	Water	8260 D	Methylene Chloride	***5***	µg/ℓ	Methylene Chloride	11.0	n	5.0
16	2023-02-24	W-16B-2	Water	8270 E	*No detections*			SVOCs			
16	2023-02-24	W-16B-3	Water	8015 C	*No detections*			Glycols			
					Dioxin/Dioxin-Like Substances				**Ground Water (µg/ℓ)***		**Ground Water (pg/ℓ)**
16	2023-02-24	W-16B-4	Water	8290 A	1,2,3,4,6,7,8-HpCDD	13	pg/ℓ		0.00013	Est.	130
16	2023-02-24	W-16B-4	Water	8290 A	1,2,3,4,6,7,8-HpCDF	2.9	pg/ℓ		0.00013	Est.	130
16	2023-02-24	W-16B-4	Water	8290 A	1,2,3,4,7,8-HxCDD	0.92	pg/ℓ		0.000013	RSL	13
16	2023-02-24	W-16B-4	Water	8290 A	1,2,3,4,7,8-HxCDF	0.79	pg/ℓ		0.000013	Est.	13
16	2023-02-24	W-16B-4	Water	8290 A	1,2,3,4,7,8,9-HpCDF	1	pg/ℓ		0.000013	Est.	13
16	2023-02-24	W-16B-4	Water	8290 A	1,2,3,6,7,8-HxCDD	0.85	pg/ℓ		0.000013	Est.	13
16	2023-02-24	W-16B-4	Water	8290 A	1,2,3,6,7,8-HxCDF	0.89	pg/ℓ		0.000013	Est.	13
16	2023-02-24	W-16B-4	Water	8290 A	**1,2,3,7,8-PeCDD**	***0.38***	pg/ℓ		0.00000012	Est.	0.12
16	2023-02-24	W-16B-4	Water	8290 A	1,2,3,7,8-PeCDF	0.61	pg/ℓ		0.000039	Est.	39
16	2023-02-24	W-16B-4	Water	8290 A	1,2,3,7,8,9-HxCDD	1.4	pg/ℓ		0.000013	Est.	13
16	2023-02-24	W-16B-4	Water	8290 A	1,2,3,7,8,9-HxCDF	1	pg/ℓ		0.000013	Est.	13
16	2023-02-24	W-16B-4	Water	8290 A	2,3,4,6,7,8-HxCDF	1.2	pg/ℓ		0.000013	Est.	13
16	2023-02-24	W-16B-4	Water	8290 A	2,3,4,7,8-PeCDF	0.75	pg/ℓ		0.000039	Est.	39
16	2023-02-24	W-16B-4	Water	8290 A	2,3,7,8-TCDF	0.24	pg/ℓ		0.000013	Est.	13
16	2023-02-24	W-16B-4	Water	8290 A	OCDD	59	pg/ℓ		0.00040	Est.	400
16	2023-02-24	W-16B-4	Water	8290 A	OCDF	5.4	pg/ℓ		0.00040	Est.	400
Water Sample Results Above Detection Limits From Shallow Sump (~8' bgs)											
									Ground / Drinking Water (µg/ℓ)		**MCL (µg/ℓ)**
8	2023-02-22	W-8B-1	Water	8260 D	2-Ethylhexyl acrylate	***4.0***	µg/ℓ	**2-Ethylhexyl acrylate**	1.30** / 500***		
8	2023-02-22	W-8B-2	Water	8270 E	*No detections*			SVOCs			
8	2023-02-22	W-8B-3	Water	8015 C	*No detections*			Glycols			
					Dioxin/Dioxin-Like Substances				**Ground Water (µg/ℓ)***		**Ground Water (pg/ℓ)**
8	2023-02-22	W-8B-4	Water	8290 A	1,2,3,4,6,7,8-HpCDD	1.1	pg/ℓ		0.00013	Est.	130
8	2023-02-22	W-8B-4	Water	8290 A	1,2,3,4,6,7,8-HpCDF	0.4	pg/ℓ		0.00013	Est.	130

Sample Results by Location and Analytical Methods								Contaminant	Screening Levels (Cancer Risk of 1 x 10^{-6} and Non-Cancer Hazard Quotient of 0.1)		
Location #	Date	Sample #	Matrix	Analysis Method	Analyte	Result	Unit	Analyte	Tap Water (µg/ℓ)	key	MCL (µg/ℓ)
8	2023-02-22	W-8B-4	Water	8290 A	1,2,3,4,7,8,9-HpCDF	0.5	pg/ℓ		0.000013	Est.	13
8	2023-02-22	W-8B-4	Water	8290 A	1,2,3,6,7,8-HxCDD	0.5	pg/ℓ		0.000013	RSL	13
8	2023-02-22	W-8B-4	Water	8290 A	1,2,3,6,7,8-HxCDF	0.4	pg/ℓ		0.000013	Est.	13
8	2023-02-22	W-8B-4	Water	8290 A	1,2,3,7,8-PeCDF	0.6	pg/ℓ		0.000039	Est.	39
8	2023-02-22	W-8B-4	Water	8290 A	1,2,3,7,8,9-HxCDD	0.6	pg/ℓ		0.000013	Est.	13
8	2023-02-22	W-8B-4	Water	8290 A	2,3,4,6,7,8-HxCDF	0.3	pg/ℓ		0.000013	Est.	13
8	2023-02-22	W-8B-4	Water	8290 A	2,3,4,7,8-PeCDF	0.4	pg/ℓ		0.000039	Est.	39
8	2023-02-22	W-8B-4	Water	8290 A	2,3,7,8-TCDF	0.2	pg/ℓ		0.000013	Est.	13
8	2023-02-22	W-8B-4	Water	8290 A	OCDD	11	pg/ℓ		0.00040	Est.	400
8	2023-02-22	W-8B-4	Water	8290 A	OCDF	1.0	pg/ℓ		0.00040	Est.	400

* Est. based on relative TEFi's; RSL - residential screening level for 2,3,7,8 TCDD and 1,2,3,4,7,8-HxCDD (Delaware DNR Screening Levels Table - April 2023 - https://documents.dnrec.delaware.gov/dwhs/remediation/HSCA-Screening-Level-Table-Guidance.pdf)

**from R. Van Herwijnen, 2009, "Environmental Risk Limits for 2-ethylhexyl acrylate – Maximum Permissible Concentration in Groundwater – 1.30 µg/ℓ - see www.rivm.nl/bibliotheek/rapporten/601782024.pdf

***from March 9, 2023 Harrison Senate Testimony – "The Agency of Toxic Substances and Disease Registry (ATSDR) provided invaluable, timely provisional health guidance screening levels for these chemicals to determine what level might pose a health risk to finished drinking water. There is no drinking water maximum contaminant level (MCL) for these and many other chemicals that are stored or transported near the Ohio River. These screening levels were 560 parts per billion (ppb) for n-butylacrylate; 500 ppb for 2-ethylhexyl-acrylate; and 200 ppb for 2-ethyl-hexanol.https://www.epw.senate.gov/public/_cache/files/3/7/37aea483-bdb0-4073-98bd-6f945ccc8b75/0588699B0B602F72732777 19FD47AC9C.03-09-2023-harrison-testimony.pdf (ppb is ~µg/ℓ)

From Table 8-4, screening levels for VOCs, SVOCs, and dioxins/furans in waters are illustrated. Note that contamination levels in the domestic water supply would be expected to be low in February 2023 given the distance to the aquifer and the time to travel within the aquifer. Unless the well was shallow, it would be expected to take some time for derailment contamination to reach the well head.

Nevertheless, in sampling results from over 670 wells during the February into April 2023 timeframe, Stantec found contamination in nine samples (Exhibit 146, pgs. 12-13; see also Exhibit 148). Contaminants were 2-butyloxyethanol, toluene, naphthalene, fluorene, and 1-methylnapthalene. In their presentation they wrote:

> "Maybe add something like, "of 670 samples collected to date, only 8 samples exceed the RL, 1 sample exceeded DWS for one analyte." - be prepared to discuss PW-303, location to incident, are there other potables/sentinels between it and the derailment area?"

9.0 SURFACE SOILS AND WATER SAMPLING DATA ANALYSES AND SUMMARIES:

The following four sets of data (see also Appendix C) were reviewed, analyzed, summarized, and plotted with a focus on surface/sediment soils and surface water data for PAHs and Dioxins/Furans since they remain longer in the environment than VOCs:

- Data Set #1: Plaintiff Data / Petty Analyzed - July, August, and December 2023 sampling data (see Exhibit 50).
- Data Set #2: Petty February through April 2023 sampling data.
- Data Set #3: GEL 2023 sampling data.
- Data Set #4: Scott Smith 2023 through 2025 sampling data (note that only data at/near Plaintiff sites (i.e., 35 locations) were discussed, analyzed and plotted in this report. The entire listing is shown in Exhibit 179.

The approaches used to analyze these data, along with results and plots from these analyses, follow.

9.1 Approach to Data Analyses:

The approach to working with these four data sets consisted of the following steps (see also Exhibit 50):

- Select surface/sediment soil sampling and surface water sampling results from each of the four data sets for further analysis.
- Perform QA/QC checks on VOC, SVOC, Glycol, and Dioxin/Furan data for each of these samples and clear flags to just "J" (a value between the RL – reporting limit and MDL – minimum detection limit) and "U" (value below the MDL) flags for further analyses of the data. This work was performed by Laboratory Data Consultants, Inc., 2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010. Output files from this QA/QC review of the Level 4 reports are provided in Exhibits 161 through 163 except for Petty Data Set #1 which is provided in Exhibit 50.
- Summarize surface Total Petroleum Hydrocarbon (TPH) results and equivalent benzo(a)pyrene (BaP) values and compare these with U.S. EPA (United States Environmental Protection Agency) Residential Regional Screening Levels (RRSLs) for BaP in surface soils. Calculations of benzo(a)pyrene equivalent values (PEFs) are based on a 2022 published paper by ATSDR.[3]
- Summarize surface dioxin/furan sampling results and determine total TCDD toxic equivalents (TEQs). Compare the TEQs with the cancer screening value TEQ of 4.8 used by the NS's contractor, Arcadis (see earlier reference to this value). [Note that initial dioxin/furane factors for screening factors – TEFs – were found in the NS/Arcadis March 6, 2023 Planning Report (Exhibit 94 – Bates ED_013980L_00001401-00117).
- Summarize/Discuss PEF and TEQ results.
- Plot PEF and TEQ results at/near the CeramFab and WYG properties.

[3] https://www.atsdr.cdc.gov/pha-guidance/resources/ATSDR-PAH-Guidance-508.pdf.

9.2 Illustration of BaP_E Approach/Calculations:

Potency Equivalency Factors (PEF) are values assigned to Polycyclic Aromatic Hydrocarbons (PAHs) to derive a total equivalent benzo[a]pyrene (BaP_E) value for all PAHs found in a given sample.

PEF factors for given PAHs are shown in Table 9-1, 9-2, and 9-3:

PEF Factors:

Table 9-1: PEF Factors for PAHs

Potency Equivalency Factors (PEFs) Used by Petty for Polycyclic Aromatic Hydrocarbons (PAHs)*							
Acenaphthene	**Acenaphthylene**	**Anthracene**	**Benzo[a]anthracene**	**Benzo[a]pyrene**	**Benzo(b)fluoranthene**	**Benzo[j]fluoranthene**	**Benzo[k]fluoranthene**
0.0	**0.0**	**0.0**	**0.1**	**1**	**0.1**	**0.1**	**0.1**

Table 9-2: PEF Factors for PAHs – cont.

Potency Equivalency Factors (PEFs) Used by Petty for Polycyclic Aromatic Hydrocarbons (PAHs)* - cont.							
Benzo[g,h,i]perylene	**Benzo[k]fluoranthene**	**1,1'-Bipheyl**	**Bis(2-ethylhexyl) phthalate**	**Carbazole**	**Chrysene**	**Dibenz(a,h)acridine**	**Dibenz(a,j)acridine**
0.0	**0.0**	**0.0**	**0.0**	**0.0**	**0.01**	**0.1**	**0.1**

Table 9-3: PEF Factors for PAHs – cont.

Potency Equivalency Factors (PEFs) Used by Petty for Polycyclic Aromatic Hydrocarbons (PAHs)* - cont.							
Dibenzofuran	**Fluoranthene**	**Fluorene**	**Indeno[1,2,3-cd]pyrene**	**2-Methylnaphthalene**	**Naphthalene**	**Phenanthrene**	**Pyrene**
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

* 0.0 Value used for PAH's Not Listed in the 2022 ATSDR Paper – note values for PAH's not listed in ATSDR Paper are conservatively assumed to be zero.

The PEF values from Tables 9-1 through 9-3 are shown in the ATSDR reference (https://www.atsdr.cdc.gov/pha-guidance/resources/ATSDR-PAH-Guidance-508.pdf) (Figure 9-1):

PAH Guidance for Cancer Evaluations – V1, April 14, 2022

Table 1. Potency equivalency factors (PEFs) for polycyclic aromatic hydrocarbons (PAHs)

CAS Number	PAH*	PEF†
50-32-8	Benzo(a)pyrene	1
56-55-3	Benzo(a)anthracene	0.1
205-99-2	Benzo(b)fluoranthen	0.1
205-82-3	Benzo(j)fluoranthene	0.1
207-08-9	Benzo(k)fluoranthene	0.1
218-01-9	Chrysene	0.01
224-42-0	Dibenz(a,j)acridine	0.1
226-36-8	Dibenz(a,h)acridine	0.1
194-59-2	7H-dibenzo(c,g)carbazole	1
192-65-4	Dibenzo(a,e)pyrene	1
189-64-0	Dibenzo(a,h)pyrene	10
189-55-9	Dibenzo(a,i)pyrene	10
191-30-0	Dibenzo(a,l)pyrene	10
193-39-5	Indeno(1,2,3-cd)pyrene	0.1
3697-24-3	5-methylchrysene	1
5522-43-0	1-nitropyrene	0.1
57835-92-4	4-nitropyrene	0.1
42397-64-8	1,6-dinitropyrene	10
42397-65-9	1,8-dinitropyrene	1
7496-02-8	6-nitrochrysene	10
607-57-8	2-nitrofluorene	0.01
53-70-3	Dibenzo(a,h)anthracen	2.4‡
57-97-6	7,12-dimethylbenz(a)anthracene	147‡,§
56-49-5	3-methylcholanthrene	13‡,§
602-87-9	5-nitroacenaphthene	0.08‡

*Naphthalene is not included in this table and should not be included in benzo(a)pyrene (BaP) equivalent calculations. See Section 3.3 for special considerations for naphthalene.

†PEFs are from the California Office of Environmental Health Hazard Assessment (OEHHA) (2015), with the exception of the PEFs for dibenzo(a,h)anthracene, 7,12-dimethyl(a)benzanthracene , 3-methylcholanthrene, 5-nitroacenaphthene, and naphthalene.

‡PEFs are based on the ratio of OEHHA's oral cancer slope factor (CSF) for BaP (i.e., 1.7 $[mg/kg/day]^{-1}$) and OEHHA's cancer potency factors for each PAH: 4.1 $(mg/kg/day)^{-1}$ for dibenzo(a,h)anthracene, 250 $(mg/kg/day)^{-1}$ for 7,12-dimethylbenz(a)anthracene, 22 $(mg/kg/day)^{-1}$ for 3-methylcholanthrene, and 0.13 $(mg/kg/day)^{-1}$ for 5-nitroacenaphthene. OEHHA's CSF for BaP is documented in OEHHA (2010) and the cancer potency factors are presented in OEHHA (2015).

§7,12-dimethyl(a)benzanthracene and 3-methylcholanthrene are not generally measured in environmental samples and are not included in U.S. Environmental Protection Agency's suite of 16 PAHs that are typically analyzed. If they are detected, health assessors should contact the agency that completed the sampling to determine why they were measured.

Figure 9-1: PEF Factors for PEF Calculations

Note that if a specific PAH is not listed, the PEF factor used was zero to determine BaP_E values.

An illustration of a BaP_E value using PEF factors for PAHs for one sample is shown in Table 9-4:

Table 9-4: BaP_E Example Calculation for Sample E1-1

Sample #	Date	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Laboratory Qualifier	Validator Qualifier	Comment	Value Used When DL = 50% DL	Value Used When DL = 0% DL	PEF Factors for PAHs	PEF Contrib. - 50% DLs	PEF Contrib. - DLs = 0
E1-1	07/19/2023	Acenaphthene	3.1	µg/Kg	16	3.1	U			1.6	0.0	0	0.0	0.0
E1-1	07/19/2023	Acenaphthylene	4.3	µg/Kg	16	4.3	U			2.2	0.0	0	0.0	0.0
E1-1	07/19/2023	Anthracene	2.6	µg/Kg	16	2.6	U			1.3	0.0	0	0.0	0.0
E1-1	07/19/2023	Benz[a]anthracene	22	µg/Kg	16	3.7				22.0	22.0	0.1	2.2	2.2
E1-1	07/19/2023	Benzo(a)pyrene	26	µg/Kg	16	10				26.0	26.0	1	26.0	26.0
E1-1	07/19/2023	Benzo(b)fluoranthene	40	µg/Kg	16	7				40.0	40.0	0.1	4.0	4.0
E1-1	07/19/2023	Benzo(ghi)perylene	16	µg/Kg	16	7.7				16.0	16.0	0	0.0	0.0
E1-1	07/19/2023	Benzo(k)fluoranthene	10	µg/Kg	16	7.5	J			10.0	10.0	0.1	1.0	1.0
E1-1	07/19/2023	Chrysene	28	µg/Kg	16	3.4				28.0	28.0	0.01	0.3	0.3
E1-1	07/19/2023	Dibenzo(a,h)anthracene	7.5	µg/Kg	16	7.5	U			3.8	0.0	2.4	9.0	0.0
E1-1	07/19/2023	Fluoranthene	33	µg/Kg	16	4.8				33.0	33.0	0	0.0	0.0
E1-1	07/19/2023	Fluorene	3	µg/Kg	16	3	U			1.5	0.0	0	0.0	0.0
E1-1	07/19/2023	Indeno(1,2,3-cd)pyrene	20	µg/Kg	16	8				20.0	20.0	0.1	2.0	2.0
E1-1	07/19/2023	Naphthalene	8.1	µg/Kg	16	2.6	J			8.1	8.1	0	0.0	0.0
E1-1	07/19/2023	Phenanthrene	22	µg/Kg	16	2.4				22.0	22.0	0	0.0	0.0
E1-1	07/19/2023	Pyrene	36	µg/Kg	16	2.3				36.0	36.0	0	0.0	0.0
Total BaP_E													***44.5***	***35.5***

For comparison, it is informative to compare these levels with US EPA residential soil regional screening levels for benzo(a)pyrene (BaP). These RRSLs for BaP (Source: https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables - downloaded October 9, 2023) are summarized in Figure 9-2:

Residential Risk-Based Screening Levels for PAHs and BaP

Contaminant		Carcinogenic Target Risk (TR) = 1E-06				Noncancer Child Hazard Index (HI) = 1			
Analyte	CAS No.	Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL Child THQ=1 (mg/kg)	Dermal SL Child THQ=1 (mg/kg)	Inhalation SL Child THQ=1 (mg/kg)	Noncarcinogenic SL Child THI=1 (mg/kg)
Polynuclear Aromatic Hydrocarbons (PAHs)									
~Acenaphthene	83-32-9					4.7E+03	1.5E+04		3.6E+03
~Anthracene	120-12-7					2.3E+04	7.6E+04		1.8E+04
~Benz[a]anthracene	56-55-3	1.5E+00	4.6E+00	7.4E+01	1.1E+00				
~Benzo(e)pyrene	192-97-2					7.0E+00	3.0E+01	2.8E+03	5.7E+00
~Benzo(j)fluoranthene	205-82-3	5.8E-01	1.6E+00	3.5E+04	4.2E-01				
~Benzo[a]pyrene	50-32-8	1.5E-01	4.6E-01	2.3E+03	1.1E-01	2.3E+01	7.6E+01	2.8E+03	1.8E+01
~Benzo[b]fluoranthene	205-99-2	1.5E+00	4.6E+00	2.3E+04	1.1E+00				
~Benzo[k]fluoranthene	207-08-9	1.5E+01	4.6E+01	2.3E+05	1.1E+01				
~Chloronaphthalene, Beta-	91-58-7					6.3E+03	2.0E+04		4.8E+03
~Chrysene	218-01-9	1.5E+02	4.6E+02	2.3E+06	1.1E+02				
~Dibenz[a,h]anthracene	53-70-3	1.5E-01	4.6E-01	2.3E+03	1.1E-01				
~Dibenzo(a,e)pyrene	192-65-4	5.8E-02	1.6E-01	3.5E+03	4.2E-02				
~Dimethylbenz(a)anthracene, 7,12-	57-97-6	6.1E-04	1.8E-03	1.9E+01	4.6E-04				
~Fluoranthene	206-44-0					3.1E+03	1.0E+04		2.4E+03
~Fluorene	86-73-7					3.1E+03	1.0E+04		2.4E+03
~Indeno[1,2,3-cd]pyrene	193-39-5	1.5E+00	4.6E+00	2.3E+04	1.1E+00				
~Methylnaphthalene, 1-	90-12-0	2.4E+01	6.6E+01		1.8E+01	5.5E+03	1.8E+04		4.2E+03
~Methylnaphthalene, 2-	91-57-6					3.1E+02	1.0E+03		2.4E+02
~Naphthalene	91-20-3	5.8E+00	1.6E+01	3.8E+00	2.0E+00	1.6E+03	5.1E+03	1.4E+02	1.3E+02
~Nitropyrene, 4-	57835-92-4	5.8E-01	1.6E+00	3.5E+04	4.2E-01				
~Perylene	198-55-0					7.0E+00	2.3E+01	2.8E+03	5.4E+00
~Pyrene	129-00-0					2.3E+03	7.6E+03		1.8E+03

Figure 9-2: BaP Residential Surface Soil RSLs

For BaP, the following RRSLs for soil levels in mg/kg are provided:

For Carcinogenic Target Risk of 1 in 1 million (1×10^{-6}):

- Ingestion Screening Level – 0.15 mg/kg (1.5×10^{-1})
- Dermal Screening Level – 0.46 mg/kg (4.6×10^{-1})
- Inhalation Screening Level – 2,300 mg/kg (2.3×10^{3})
- *Overall Soil Carcinogenic Screening Level (sum of above)* – ***0.11 mg/kg*** or ***110 µg/kg.*** [Calculation for overall cancer RRSL value for soils: - [1/(1/0.15 + 1/0.46 + ½,300)] = [1/(6.667 + 2.174 + 0.000435)] = [1/8.84] = 0.113 or ~1.1×10^{-1} – Q.E.D.].

For Child Non-Cancer Hazard Index (HI) of 1:

- Ingestion Screening Level – Child – 23 mg/kg (2.3×10^{1})
- Dermal Screening Level – 0.46 mg/kg (7.6×10^{1})
- Inhalation Screening Level – 2,300 mg/kg (2.8×10^{3})
- *Overall Soil Carcinogenic Screening Level (sum of above) – 18 mg/kg*. [Calculation for overall non-cancer RRSL value for soils: - [1/(1/23 + 1/76 + ½,800)] = [1/(0.04348 + 0.01316 + 0.000357)] = [1/0.05699] = 17.55 or ~18 or ~1.8×10^{1}].

9.2.1 Discussion of Risk Assessments Processes:

Note that under risk assessment guidance protocols, chemicals are defined as either a potential carcinogen or a hazardous (non-carcinogenic) substance, or both. Cancer risk defined as "Incremental probability of an individual's developing cancer over a lifetime as a result of exposure to a potential carcinogen" and Hazard Index (HI) as "The sum of two or more hazard quotients for multiple substances and/or multiple exposure pathways"; a Hazard Quotient (HQ) is defined as "The ratio of a single substance exposure level over a specified time period to a reference dose for that substance derived from a similar exposure period".[4]

Explicitly, target risk levels for carcinogenic and noncarcinogenic effects are defined as follows[5]:

- "For carcinogenic effects, a concentration is calculated that corresponds to a 10^{-6} (or 1 in 1 million) incremental risk of an individual developing cancer over a lifetime as a result of exposure to the potential from all significant exposure pathways for a given medium" [in this case, not for all exposure pathways, but only for three soil pathways.]
- For non-carcinogenic effects, a concentration is calculated that corresponds to an HI (Hazard Index) of 1, which is the level of exposure to a chemical from all significant exposure pathways in a given medium below which it is unlikely for even sensitive populations to experience adverse health effects" [again, in this case, not for all exposure pathways, but only for three soil pathways].

The data in Figure 9-2 are based on cancer risk levels of 1 case in 1 million (1×10^{-6}) and a HI of 1, which are common values inherent in setting risk-based standards.

9.2.2 PRG's – Why are they Used and How are they Derived:

As noted by the US EPA in Preliminary Remediation Goals (PRGs)[6] were originally developed as screen tools for contaminated sites as part of the Remedial Investigation/Feasibility Study (RI/FS) process to determine what, if anything, needs to be done to clean-up potentially chemically contaminated sites. PRGs allow one to determine:

- Media (soil, water, air) of potential concern – in this case contaminated surface or near-surface soils.
- Chemicals of concern (CoCs) – in this case BaP.

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[4] US EPA, 1991, Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals (PRGs), EPA/540/R-92/003, Publication 9285.7-01B, December, pp. vii & viii - https://www.epa.gov/risk/risk-assessment-guidance-superfund-rags-part-b.

[5] Ibid, pp. 14-15.

[6] Ibid, pg. 4.

- Probable future land use – in this case what are the implications for clean-up, clean-up costs, and property values?

This risk-based process resulted in a number of guidance documents beginning in ~1989 known as the RAGS [Risk Assessment Guidance for Superfund].[7]

US EPA warns the user of PRGs that "It is important to remember that risk-based PRGs (either scoping or later on) are initial guidelines. They do not establish that cleanup to meet these goals is warranted."[8] On the other hand, the US EPA, in their July 1996 Soil Screening Guidance: User's Guide,[9] provided the following graphic and guidance regarding PRGs (Figure 9-3):

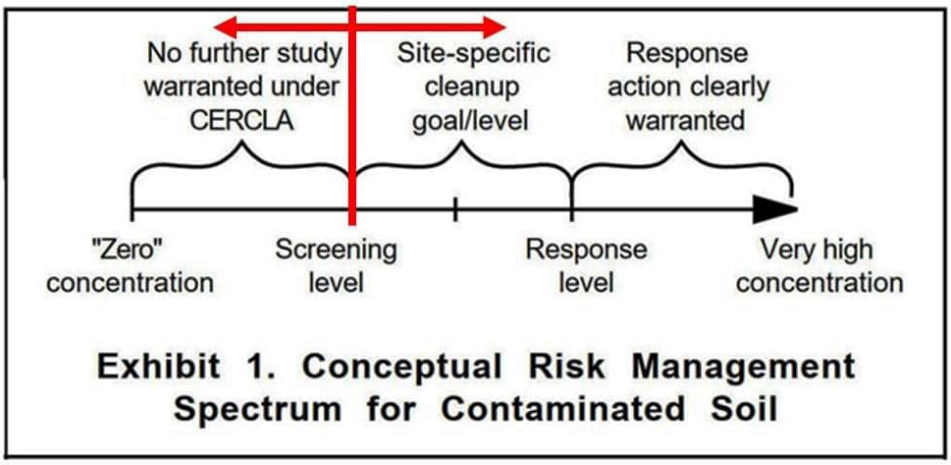


Figure 9-3: Concept of Risk Management or Actions Based on Soil Screening Levels

As illustrated in Figure 9-3, if the Soil Screening Level (SSL) for a specific chemical is below the specific SSL, then "no further study is warranted" whereas if the value is above the SSL further investigations and response actions are warranted (e.g., Phase II – Site Assessment or Phase III – Remediation – see Section 4). "*EPA anticipates the use of SSLs as a tool to facilitate a prompt identification of contaminants and exposure areas of concern during both remedial actions and some removal actions* under CERCLA." The US EPA further stated that:

> "The Soil Screening Guidance is a tool that the U.S. Environmental Protection Agency (EPA) developed to help standardize and accelerate the evaluation and cleanup of contaminated soils at sites on the National Priorities List (NPL) with future residential land use. This guidance provides a methodology for environmental science/engineering

[7] See https://www.epa.gov/risk/risk-assessment-guidance-superfund-rags-part-b for RAGS Parts A through F.

[8] US EPA, 1991, Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manue (Part B, Development of Risk-based Preliminary Remediation Goals (PRGs), EPA/540/R-92/003, Publication 9285.7-01B, December, pg. 4 - https://www.epa.gov/risk/risk-assessment-guidance-superfund-rags-part-b.

[9] US EPA, 1996, Soil Screen Guidance: User's Guide, Publication 9355.4-23, July, pg. 4 - https://semspub.epa.gov/work/HQ/175238.pdf.

professionals to calculate risk-based, site-specific, soil screening levels (SSLs) for contaminants in soil that may be used to identify areas needing further investigation at NPL sites.

SSLs are not national cleanup standards. SSLs alone do not trigger the need for response actions or define "unacceptable" levels of contaminants in soil. In this guidance, "screening" refers to the process of identifying and defining areas, contaminants, and conditions, at a particular site that do not require further Federal attention. Generally, at sites where contaminant concentrations fall below SSLs, no further action or study is warranted under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). (Some States have developed screening numbers that are more stringent than the generic SSLs presented here; therefore, further study may be warranted under State programs.) Generally, where contaminant concentrations equal or exceed SSLs, further study or investigation, but not necessarily cleanup, is warranted."

More recently in December 2002, the US EPA discussed the "Screening Concept" succinctly as follows[10]:

"As used in this guidance, screening refers to the process of identifying and defining areas, contaminants, and conditions at a site that do not warrant further federal attention under CERCLA. Site managers make these determinations by comparing measured soil contaminant concentrations to soil screening levels (SSLs). SSLs are soil contaminant concentrations below which no further action or study regarding the soil at a site is warranted under CERCLA, provided that conditions associated with the SSLs are met. In general, areas with measured concentrations of contaminants below SSLs may be screened from further federal attention; *if actual concentrations in the soil are at or above SSLs, further study, though not necessarily cleanup action, is warranted*. Exhibit 2-1 summarizes the definition and the applicability of the soil screening process and the associated SSLs.

SSLs are risk-based soil concentrations derived for individual chemicals of concern from standardized sets of equations. These equations combine EPA chemical toxicity data with parameters defined by assumed future land uses and exposure scenarios, including receptor characteristics and potential exposure pathways. Residential SSLs, initially described in the 1996 SSG and updated in this document, are based on exposure scenarios associated with residential activities, while non-residential SSLs are based on scenarios associated with non-residential activities.

For each chemical, SSLs are back-calculated from target risk levels. For the inhalation pathway and for the combined direct ingestion/dermal absorption pathway (see Figure 9.2), target risk levels for soil exposures are a one-in-a-million ($1x10^{-6}$) excess lifetime cancer risk for carcinogens and a hazard quotient (HQ) of one for non-carcinogens. SSLs for the migration to ground water pathway are back-calculated from the following ground water concentration limits (in order of preference): non-zero maximum contaminant level goals (MCLGs);

[10] US EPA, 2002, Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Publication # OSWER 9355.4-24, December, pg. 2-1 - https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=91003IJK.TXT.

maximum contaminant levels (MCLs); or health-based limits (based on a cancer risk of $1x10^{-6}$ or an HQ of one).

Stated most simply, risk-based analyses are equations combining exposure information with EPA toxicity data to determine if a contaminated site requires further analyses or not.

Soils Screening Level Pathways:

For soil screening levels, three primary pathways, routes for exposure, are used for both the carcinogenic and hazard residential risk-based screening level calculations[11]:

- Ingestion (surface and shallow sub-surface soils).
- Dermal (skin) absorption (surface and shallow sub-surface soils).
- Inhalation (fugitive dust and outdoor vapors).

Note that shallow subsurface soils are defined as the top 2 centimeters (or just under 1" – 0.79" as 2.54 cm = 1 inch). Note that this depth contrasts with work completed by Norfolk Southern's contractor (Arcadis) where a high percentage of their soil samples were taken to depths of 0.1' to 0.5' (1.2" to 6") and would not be considered surface samples.[12,13]

Soils Screening Level Equations:

For soil screening levels, six equations are needed to calculate the RSSLs (Residential Soil Screening Levels) – three for the three cancer pathways and three for the three non-cancer HI pathways. For illustration purposes, four of the six equations are presented below (Figures 9-4 to 9-7) but a detailed discussion of the origin of these equations is left to the original references[14]:

[11] Ibid, pp. 1-4 and 3-2.

[12] Arcadis - Norfolk Southern Railway Company Phase I – Preliminary Residential/Commercial/Agricultural Soil Sampling Plan East Palestine Train Derailment Site East Palestine, Ohio March 6, 2023; Revised April 5, 2023 – see https://www.epa.gov/system/files/documents/2023-06/04%2005%2023%20Residential-Commercial-Agricultural%20Soil%20Sampling%20Work%20Plan%20508.pdf. (see pg. 3).

[13] Arcadis - Norfolk Southern Railway Company - Characterization Work Plan for Derailment-Area Soil - East Palestine Train Derailment Site - East Palestine, Ohio, September 7, 2023, V 3.6 – see https://www.epa.gov/system/files/documents/2023-09/Arcadis%20Soil%20Characterization%20Work%20Plan%20v3.6_CLEAN508.pdf.

[14] US EPA, 1996, Soil Screen Guidance: User's Guide, Publication 9355.4-23, July, pp. 21-23 & Attachment D - https://semspub.epa.gov/work/HQ/175238.pdf.

Equation 2: Screening Level Equation for Ingestion of Carcinogenic Contaminants in Residential Soil

$$\text{Screening Level (mg/kg)} = \frac{TR \times AT \times 365\ d/yr}{SF_o \times 10^{-6}\ kg/mg \times EF \times IF_{soil/adj}}$$

Parameter/Definition (units)	Default
TR/target cancer risk (unitless)	10^{-6}
AT/averaging time (yr)	70
SF_o /oral slope factor $(mg/kg\text{-}d)^{-1}$	chemical-specific (Attachment D)
EF/exposure frequency (d/yr)	350
$IF_{soil/adj}$ /age-adjusted soil ingestion factor (mg-yr/kg-d)	114

Figure 9-4: Screening Level Equation for Soil Ingestion Pathway – Carcinogenic Contaminants

Equation 1: Screening Level Equation for Ingestion of Noncarcinogenic Contaminants in Residential Soil

$$\text{Screening Level (mg/kg)} = \frac{THQ \times BW \times AT \times 365\ d/yr}{1/RfD_o \times 10^{-6}\ kg/mg \times EF \times ED \times IR}$$

Parameter/Definition (units)	Default
THQ/target hazard quotient (unitless)	1
BW/body weight (kg)	15
AT/averaging time (yr)	6[a]
RfD_o/oral reference dose (mg/kg-d)	chemical-specific (Attachment D)
EF/exposure frequency (d/yr)	350
ED/exposure duration (yr)	6
IR/soil ingestion rate (mg/d)	200

[a] For noncarcinogens, averaging time equals to exposure duration.

Figure 9-5: Screening Level Equation for Soil Ingestion Pathway – Non-Carcinogenic Contaminants

Equation 3: Screening Level Equation for Inhalation of Carcinogenic Fugitive Dusts from Residential Soil

$$\text{Screening Level (mg/kg)} = \frac{TR \times AT \times 365\ d/yr}{URF \times 1{,}000\ \mu g/mg \times EF \times ED \times \frac{1}{PEF}}$$

Parameter/Definition (units)	Default
TR/target cancer risk (unitless)	10^{-6}
AT/averaging time (yr)	70
URF/inhalation unit risk factor $(\mu g/m^3)^{-1}$	chemical-specific (Attachment D)
EF/exposure frequency (d/yr)	350
ED/exposure duration (yr)	30
PEF/particulate emission factor (m^3/kg)	**1.32×10^9 (Equation 5)**

Figure 9-6: Screening Level Equation for Soil Inhalation Pathway – Carcinogenic Contaminants

Equation 4: Screening Level Equation for Inhalation of Noncarcinogenic Fugitive Dusts from Residential Soil

$$\text{Screening Level (mg/kg)} = \frac{THQ \times AT \times 365\ d/yr}{EF \times ED \times \left[\frac{1}{RfC} \times \frac{1}{PEF}\right]}$$

Parameter/Definition (units)	Default
THQ/target hazard quotient (unitless)	1
AT/averaging time (yr)	30
EF/exposure frequency (d/yr)	350
ED/exposure duration (yr)	30
RfC/inhalation reference concentration (mg/m^3)	chemical-specific (Attachment D)
PEF/particulate emission factor (m^3/kg)	**1.32×10^9 (Equation 5)**

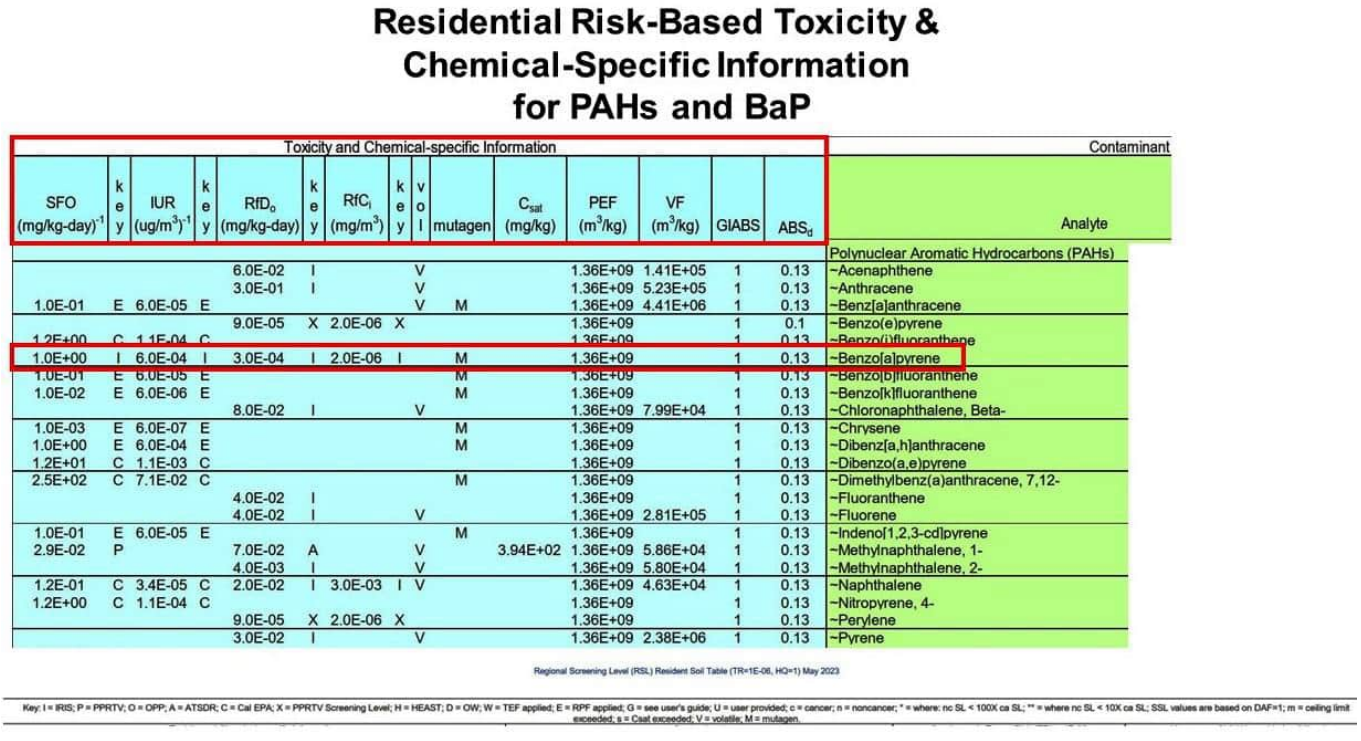
Figure 9-7: Screening Level Equation for Soil Inhalation Pathway – Non-Carcinogenic Contaminants

Both fugitive dust equations use a parameter known as the particulate emission factor or PEF; its calculation is shown in Figure 9-8:

Equation 5: Derivation of the Particulate Emission Factor	
$PEF\ (m^3/kg) = Q/C \times \frac{3{,}600\ s/h}{0.036 \times (1\text{-}V) \times (U_m/U_t)^3 \times F(x)}$	
Parameter/Definition (units)	**Default**
PEF/particulate emission factor (m^3/kg)	1.32×10^9
Q/C/inverse of mean conc. at center of a 0.5-acre-square source (g/m^2-s per kg/m^3)	90.80
V/fraction of vegetative cover (unitless)	0.5 (50%)
U_m /mean annual windspeed (m/s)	4.69
U_t /equivalent threshold value of windspeed at 7 m (m/s)	11.32
F(x)/function dependent on U_m/U_t derived using Cowherd et al. (1985) (unitless)	0.194

Figure 9-8: Equation for PEF Used in Fugitive Dust Calculations

The Slope Factor (SF) - cancer, Reference Concentration (RfC) and Reference Concentrations (RfD) – non-cancer, for BaP, are shown in Figure 9-9:



Residential Risk-Based Toxicity & Chemical-Specific Information for PAHs and BaP

Toxicity and Chemical-specific Information														Contaminant
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	vol	mutagen	C_{sat} (mg/kg)	PEF (m^3/kg)	VF (m^3/kg)	GIABS	ABS_d	Analyte
															Polynuclear Aromatic Hydrocarbons (PAHs)
				6.0E-02	I			V			1.36E+09	1.41E+05	1	0.13	~Acenaphthene
				3.0E-01	I			V			1.36E+09	5.23E+05	1	0.13	~Anthracene
1.0E-01	E	6.0E-05	E					V	M		1.36E+09	4.41E+06	1	0.13	~Benz[a]anthracene
				9.0E-05	X	2.0E-06	X				1.36E+09		1	0.1	~Benzo(e)pyrene
1.2E+00	C	1.1E-04	C								1.36E+09		1	0.13	~Benzo(j)fluoranthene
1.0E+00	I	6.0E-04	I	3.0E-04	I	2.0E-06	I		M		1.36E+09		1	0.13	~Benzo[a]pyrene
1.0E-01	E	6.0E-05	E						M		1.36E+09		1	0.13	~Benzo[b]fluoranthene
1.0E-02	E	6.0E-06	E						M		1.36E+09		1	0.13	~Benzo[k]fluoranthene
				8.0E-02	I			V			1.36E+09	7.99E+04	1	0.13	~Chloronaphthalene, Beta-
1.0E-03	E	6.0E-07	E						M		1.36E+09		1	0.13	~Chrysene
1.0E+00	E	6.0E-04	E						M		1.36E+09		1	0.13	~Dibenz[a,h]anthracene
1.2E+01	C	1.1E-03	C								1.36E+09		1	0.13	~Dibenzo(a,e)pyrene
2.5E+02	C	7.1E-02	C						M		1.36E+09		1	0.13	~Dimethylbenz(a)anthracene, 7,12-
				4.0E-02	I						1.36E+09		1	0.13	~Fluoranthene
				4.0E-02	I			V			1.36E+09	2.81E+05	1	0.13	~Fluorene
1.0E-01	E	6.0E-05	E						M		1.36E+09		1	0.13	~Indeno[1,2,3-cd]pyrene
2.9E-02	P			7.0E-02	A			V		3.94E+02	1.36E+09	5.86E+04	1	0.13	~Methylnaphthalene, 1-
				4.0E-03	I			V			1.36E+09	5.80E+04	1	0.13	~Methylnaphthalene, 2-
1.2E-01	C	3.4E-05	C	2.0E-02	I	3.0E-03	I	V			1.36E+09	4.63E+04	1	0.13	~Naphthalene
1.2E+00	C	1.1E-04	C								1.36E+09		1	0.13	~Nitropyrene, 4-
				9.0E-05	X	2.0E-06	X				1.36E+09		1	0.13	~Perylene
				3.0E-02	I			V			1.36E+09	2.38E+06	1	0.13	~Pyrene

Regional Screening Level (RSL) Resident Soil Table (TR=1E-06, HQ=1) May 2023

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = OW; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; c = cancer; n = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; m = ceiling limit exceeded; s = Csat exceeded; V = volatile; M = mutagen

Figure 9-9: Slope Factor (SF) - Cancer, and Reference Concentration (RfC) – Non-Cancer, for BaP

For BaP, the following input parameters are used in the RSSLs:

- Oral Slope Factor (SFO) – 1.0 (kg-d/mg).
- Oral Reference Dose (RfD_o): 3 x 10^{-4} (mg/kg-d)).
- Inhalation Reference Concentration (RfC_i): 2.0 x 10^{-6} (mg/m^3).
- Particle Emission Factor (PEF): 1.36 x 10^9 (m^3/kg).
- Dermal Absorption Factor (ABS_d): 0.13 (mg/mg).

Historic (2014 & 2017) derivations of BaP SFs can be found at: [15,16]

Note, for several technical reasons, the US EPA assumed for RSSLs that the non-carcinogenic pathway is based on children input parameters.

Cancer slope factors (SF) are defined as follows:[17]

> SF $(mg/kg*day)^{-1}$ = [(Inhalation unit risk - $\mu g/m^3)^{-1}$ x 70 kg x (20 m^3/day)$^{-1}$ x 1,000 µg/mg)]

Unit risk factors define the lifetime excess cancer risk associated with exposure to a unit concentration of a contaminant (e.g., 1 mg/m3 in air) given a specified set of exposure parameters (70 kg body weight, 20 m3/day inhalation rate, 365 days of exposure per a 365-day year, and 70 years of exposure over a 70-year lifetime). Values used in Risk Assessments are typically found in the US EPA IRIS (Integrated Risk Information System) – database[18] or HEAST (Health Effects Assessment Summary Tables).[19]

Note that this equation assumes a generic adult weight of 70 kg (~154.3#) and adult breathing rate of 20 m^3/day (~0.0245 cubic feet/minute – CFM). These two values can be adjusted for children, women, or men's actual weights and/or breathing rates that are published in the US EPA's Exposure Factors Handbooks.[20]

The conversion between Non-Cancer Reference Concentrations (RfCs) and Reference Doses (RfDs) are shown below as follows:[21]

> RfC (mg/m^3) x 20 m^3/day] / 70 kg = RfD (mg/kg*day)

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[15] US EPA, 2014. Toxicological Review of Benzo[a]pyrene (CASRN 50-32-8) In Support of Summary Information on the Integrated Risk Information System (IRIS), EPA/635/R-14/312a – September - https://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=520493&Lab=NCEA.

[16] US EPA, 2017. Toxicological Review of Benzo[a]pyrene (CASRN 50-32-8), EPA/635/R-17/003Fa – January - https://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0136tr.pdf.

[17] ORNL - RAIS, 2023. The Risk Assessment Information System – Toxicity Values - https://rais.ornl.gov/tutorials/toxvals.html.

[18] https://www.epa.gov/iris.

[19] https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=2877.

[20] https://www.epa.gov/expobox/about-exposure-factors-handbook.

[21] ORNL - RAIS, 2023. The Risk Assessment Information System – Toxicity Values - https://rais.ornl.gov/tutorials/toxvals.html.

As with slope factors, this conversion assumes a generic adult weight and breathing rate that can be adjusted.

In terms of how terms such as RfC's and RfD's are determined, they are typically based on No Observed Adverse Effect Levels (NOAELs) or Lowest Observed Effect Levels (LOAELs) from the scientific literature.

These terms are then adjusted with Uncertainty Factors (UFs) and sometimes Modification Factors (MFs) as illustrated below:

RfD = [(NOAEL or LOAEL) / (UF_A * UF_H * UF_L * UF_S*UF_D*MF)[22see also23,24,25,26,27]

Note that the underlying basis for an RfD value is the NOAEL or LOAEL value which is then discounted by Uncertainty Factors (Ufs), and at times a Modifying Factor (MF). These terms are further explained as follows:

> "Briefly, the RfD is calculated by determining the most sensitive and significant NOAEL or LOAEL for noncancer effects and dividing that by the product of a series of uncertainty factors and a modifying factor where UF_A represents the uncertainty of using experimental animal data for human effects, UF_H represents the variable susceptibilities in the human population (e.g., genetic, nutritional, age), UF_L represents the expected ratio of the LOAEL to the NOAEL when a LOAEL is used instead of a NOAEL, UF_S represents the uncertainty of predicting chronic exposure effects on the basis of subchronic exposure studies, UF_D represents the uncertainty assigned to an inadequate data base, and MF is a modifying factor to account for any additional uncertainty not addressed by the standard uncertainty factors.
>
> Typically, uncertainty factors are assigned values ranging from 1 to 10. If information concerning a factor is sparse and uncertainty is high, a default value of 10 generally is used. If information is available, the uncertainty factor might be reduced to 1. For example, UFA would be 1 if the NOAEL or LOAEL is based on human data. A value of less than 1 for the UFA would be used if the NOAEL for the biological end point of concern is more sensitive in animals than in humans. UFH would be less than 10 if the NOAEL or LOAEL is based on a susceptible human subpopulation. UFS would be 1 if adequate chronic exposure studies have been conducted or chronic effects are not expected. UFL would be 1 if a NOAEL is available. UFD would be 1 if an adequate

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[22] National Academies Press, 1999, Review of the U.S. Army's Health Risk Assessments for Oral Exposure to Six Chemical-Warfare Agents – Chapter 2 – Derivation of Reference Doses, - https://nap.nationalacademies.org/read/9644/chapter/4.

[23] Dourson, Fleter and Robinson, 1996. Evolution of Science-Based Uncertainty Factors in Non-Cancer Risks Assessment, Regulatory Toxicology and Pharmacology, Vol. 24, pp. 108-120.

[24] Danovic et al., 2015. The Scientific Basis for Uncertainty Factors Used in Setting Occupational Exposure Limits, - Table I, JOEH, Vol. 12, pp. S55-S68 – Supplement 1.

[25] National Academy of Sciences, 2013, Environmental Decisions in the Face of Uncertainty – Committee on Decision Making Under Uncertainty Board on Population Health and Public Health Practice, see pg. 49 - https://www.ncbi.nlm.nih.gov/books/NBK200844/.

[26] California OEHHA – Chapter 4 – Uncertainty Factors - https://www.dir.ca.gov/dosh/doshreg/uf%20background%20information.pdf

[27] US EPA, 2009. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment), EPA-540-R-070-002 OSWER 9285.7-82, January - https://www.epa.gov/risk/risk-assessment-guidance-superfund-rags-part-f.

array of human and animal data is available for various biological effects. For an uncertainty factor that falls between 1 and 10, a factor of 3 is typically assigned, because 3 is the approximate logarithmic mean of 1 and 10, and the assumption is made that the uncertainty factor is distributed lognormally.

A modifying factor between 1 and 10 is used when the five uncertainty factors do not explicitly account for all scientific uncertainties that exist. The default value for the modifying factor is 1."

A further discussion of UF's used by the US and other countries was published by the Interdepartmental Group on Health Risks from Chemicals[28]

An excellent discussion by the US EPA from 1993 and 2002 on the development of RfCs and RfDs, including UFs, can be found at.[29,30]

While not shown above, the equivalent dermal equations can be found in US EPA, 2002, Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Publication # OSWER 9355.4-24, December.[31]

9.2.3 Implications to the Property Owner Should RSSLs for BaP (TPH BEFs) be Exceeded:

As illustrated earlier in Figure 9-3 and repeated here in Figure 9-10, if residential soil screening levels for BaP are found to be exceeded then further responses are recommended:

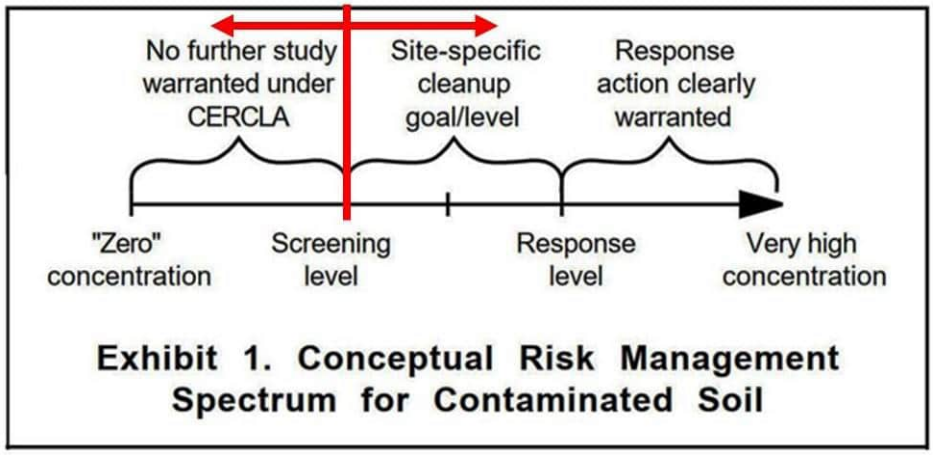


Figure 9-10: Concept of Risk Management or Actions based on Soil Screening Levels

[28] IGHRC, 2003. Uncertainty Factors: Their Use in Human Health Risk Assessment – UK Government - http://www.iehconsulting.co.uk/IEH_Consulting/IEHCPubs/IGHRC/cr9.pdf.

[29] US EPA, 1993. Reference Dose (RfD): Decription and Use in Health Risk Assessments – Background Document 1A, March 15 - https://www.epa.gov/iris/reference-dose-rfd-description-and-use-health-risk-assessments.

[30] US EPA, 2002. A Review of the Reference Dose and Reference Concentration Processes, EPA/630/P-02/002F, December - https://www.epa.gov/risk/review-reference-dose-and-reference-concentration-processes-document.

[31] https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=91003IJK.TXT.

Traditionally, in the environmental arena, this would imply completion of a Phase II (Site Assessment) and then potentially a Phase III (Site Remediation).

9.2.4 Descriptions and Discussions of Phase 1, Phase 2, and Phase 3 Environmental Site Assessments (ESAs):

This Environmental Site Assessment Process (ESA) process – Phase 1, Phase 2, and Phase 3 is illustrated in Figure 9-11 and terms are defined below:

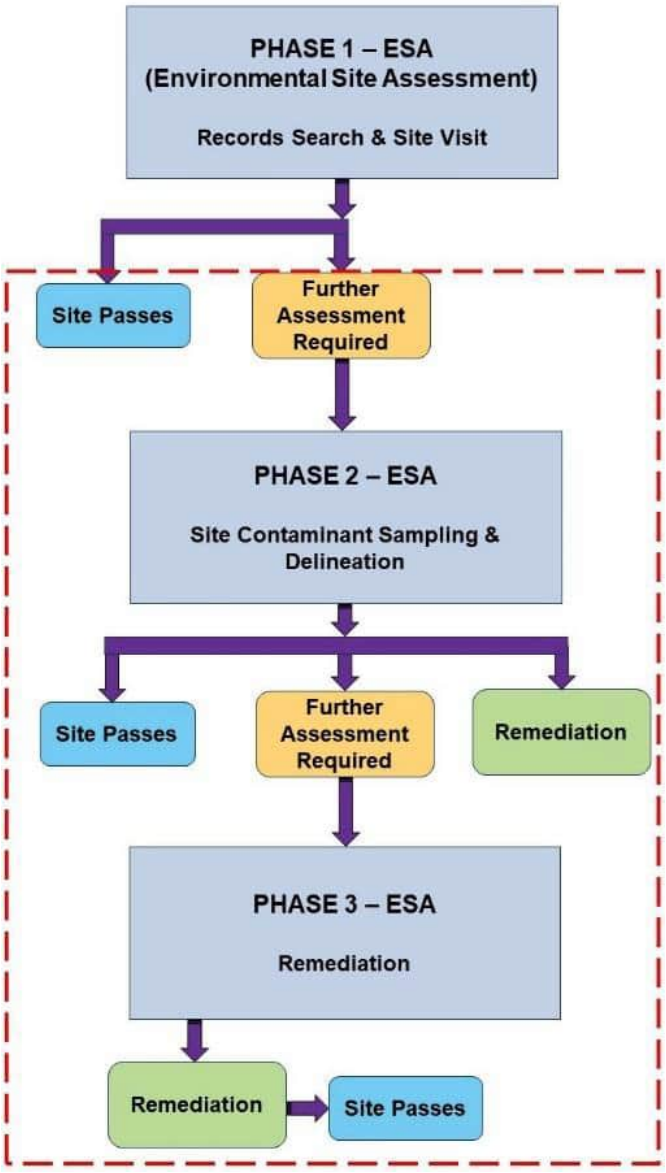


Figure 9-11: Schematic of Traditional Environmental Site Assessment (ESA) Process

Each of these Phases outlined in Figure 9-11 is briefly summarized below:

Phase 1:

A Phase 1 is typically associated with the purchase of a property and involves: i) review of site specific data bases for evidence of chemicals used or released on the site and ii) a walk-through of the site. No specific site sampling is typically associated with a Phase I. The American Society for Testing and Materials (ASTM) has developed a Standard for completion of Phase 1's (ASTM E1527-21 – Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process). If potential environmental issues are identified, then a Phase 2 is recommended.

In the current situation, properties with actual or anticipated (via modeling) BaP levels above the RSSLs would be beyond this initial Phase I step and likely need to proceed to Phase II and possibly Phase III efforts (see red dashed outlined box in Figure 9-11).

Phase 2:

A Phase 2 typically involves: i) borings and sampling for chemicals of concern (CoCs) to determine the extent and levels of contamination to soils and waters, ii) remediation plan if levels exceed acceptable limits of contamination and iii) if required, the start of remedial activities. The American Society for Testing and Materials (ASTM) has also developed a Standard for completion of Phase 2's (ASTM E1903-19 – Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process).

In the current situation, properties with actual or anticipated (via modeling) BaP levels above the RSSLs, would likely need to proceed to Phase II and possibly Phase III efforts (see red dashed outlined box in Figure 9-11). This will involve costs to the owner lowering the net value of their property by at least the cost(s) of the Phase 2.

Phase 3:

A Phase 3 Environmental Site Assessment (Phase III ESA) typically involves: i) remediation of the site for chemicals of concern (CoCs) and ii) may involve iterations of additional assessments and remedial activities. It is a necessary step in the process of removing environmental contaminants and remediating a property – assuming that contamination is found on the site. The Phase 3, if needed, follows Phase 1 and Phase 2 ESAs that preceded it and determined its direction.

This is the most expensive Phase of the process should it be needed.

9.3 Illustration of TEQ Approach/Calculations:

Dioxins are often a generic term used to represent dioxin and dioxin-like substances (2,3,7,8-Tetrachlorodibenzo-p-dioxin and dioxin-like compounds). This term consists of more than a dozen specific chemicals. The laboratory uses abbreviations for these chemicals, their full names are listed in Table 9-5 (see also Exhibit 38):

Table 9-5: Listing of Dioxin-Like Substances and Full Names

Laboratory Name	Full Name
1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
1,2,3,4,6,7,8-HpCDF	1,2,3,4,6,7,8-Heptachlorodibenzofuran
1,2,3,4,7,8-HxCDD	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,4,7,8-HxCDF	1,2,3,4,7,8-Hexachlorodibenzofuran
1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8,9-Heptachlorodibenzofuran
1,2,3,6,7,8-HxCDD	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,6,7,8-HxCDF	1,2,3,6,7,8-Hexachlorodibenzofuran
1,2,3,7,8-PeCDD	1,2,3,7,8-Pentachlorodibenzo-p-dioxin
1,2,3,7,8-PeCDF	1,2,3,7,8-Pentachlorodibenzofuran
1,2,3,7,8,9-HxCDD	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
1,2,3,7,8,9-HxCDF	1,2,3,7,8,9-Hexachlorodibenzofuran
2,3,4,6,7,8-HxCDF	2,3,4,6,7,8-Hexachlorodibenzofuran
2,3,4,7,8-PeCDF	2,3,4,7,8-Pentachlorodibenzofuran
2,3,7,8-TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
2,3,7,8-TCDF	2,3,7,8-Tetrachlorodibenzofuran
OCDD	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin
OCDF	1,2,3,4,6,7,8,9-Octachlorodibenzofuran

The United States Environmental Protection Agency (EPA) https://nepis.epa.gov/Exe/ZyNET.exe/P1009HJ9.TXT?ZyActionD=ZyDocument&Client=EPA&Index=2006+Thru+2010&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C06thru10%5CTxt%5C00000023%5CP1009HJ9.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL – "recommends that the toxicity equivalence factor (TEF) methodology, a component mixture method, be used to evaluate human health risks posed by these mixtures, using TCDD as the index chemical" (see also ATSDR, 2022; DeVito, et al, 2024; US EPA, 2010 and Van den Berg, 2007).

The history of this methodology is reproduced below:

> "The EPA has recommended use of the Toxicity Equivalence Factor (TEF) Methodology and the World Health Organization's (WHO's) TEFs to evaluate the risks associated with exposure to mixtures of TCDD and DLCs for human health (U.S. EPA, 1987, 1989, 2003) and ecological risk assessments (U.S. EPA, 2008). The WHO has used a process based on consensus judgment of scientific expert panels to develop TEFs for mammals, birds, and fish and has re-evaluated them on a schedule of approximately every 5 years (Ahlborg et al., 1994; van den Berg et al., 1998, 2006; also see WHO's Web site for the dioxin TEFs, available at:

http://www.who.int/ipcs/assessment/tef_update/en/). After evaluating the empirical data on TCDD and some DLCs, WHO reconfirmed that the combined effects of these compounds generally are consistent with dose additivity, a key underlying assumption of the TEF methodology (van den Berg et al., 2006). In this document, the EPA is updating its human health approach by adopting the mammalian TEFs for DLCs recommended in the WHO's 2005 reevaluation of TEFs for human exposures to DLCs (van den Berg et al., 2006). EPA Program Offices and Regions have historically used TEF values in their risk assessments; this document recommends the 2005 WHO consensus TEFs, but does not address specific risk assessment applications of TEFs."

Data from Table 9-6 below, were converted from mg/kg to ng/kg by multiplying by a factor of one million (lab data in ng/kg units). Note that the screening levels were defined for two groups (Intermediate exposure – child age 2 to 6 for 1 year) and chronic (26-yr. residential exposure) were the same for both dioxins and dioxin-like substances. While perhaps odd that these values are the same, one only has to convert data from one column since the data in both columns (intermediate and chronic) are the same for each chemical. Results of this calculation are shown in Table 9-6:

Table 9-6: Norfolk Southern's Screening Levels for Dioxin and Dioxin-Like Substances

Dioxin or Dioxin-Like Substance	Norfolk Southern Screening Levels	
	mg/kg	ng/kg
2,3,7,8-tetrachlorodibenzo-p-dioxin	4.8E-06	4.8
1,2,3,7,8-pentachlorodibenzo-p-dioxin	4.8E-06	4.8
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	0.000048	48
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	0.000048	48
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	0.000048	48
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	0.00048	480
1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin	0.016	16,000
2,3,7,8-tetrachlorodibenzofuran	0.000048	48
1,2,3,7,8-pentachlorodibenzofuran	0.00016	160
2,3,4,7,8-pentachlorodibenzofuran	0.000016	16
1,2,3,6,7,8-hexachlorodibenzofuran	0.000048	48
1,2,3,7,8,9-hexachlorodibenzofuran	0.000048	48
2,3,4,6,7,8-hexachlorodibenzofuran	0.000048	48
1,2,3,4,6,7,8-heptachlorodibenzofuran	0.00048	480
1,2,3,4,6,8,9-heptachlorodibenzofuran	0.000048	48
1,2,3,4,7,8-hexachlorodibenzofuran	0.000048	48
1,2,3,4,6,7,8,9-octachlorodibenzofuran	0.0016	1,600

Note that the Norfolk Southern Screening Levels for dioxins (setting 4.8 ng/kg to TEF_i of 1.0) mostly match the weighting values for TEF_i's from the US EPA (see also US EPA, 2010, California OEHHA, 2011 and Van den Berg, 2006).

Under this method, each specific chemical is given a rating (TEF) compared with TCDD and the sum of the product concentrations times their weightings determined to calculate a total TCDD toxic equivalence (TEQ):

$$TEQ = \sum_{i=1}^{n} (C_i \times TEF_i)$$

Individual TEF_i from the US EPA (US EPA, 2010) are summarized below in Table 9-7:

Table 9-7: TEF's for Dioxin and Dioxin-Like Substances

Compound	TEF_i
Polychlorinated dibenzo-p-dioxins (PCDDs)	
2,3,7,8-TCDD	1
1,2,3,7,8-PeCDD	1
1,2,3,4,7,8-HxCDD	0.1
1,2,3,6,7,8-HxCDD	0.1
1,2,3,7,8,9-HxCDD	0.1
1,2,3,4,6,7,8-HpCDD	0.01
OCDD	0.0003
Polychlorinated dibenzofurans (PCDFs)	
2,3,7,8-TCDF	0.1
1,2,3,7,8-PeCDF	0.03
2,3,4,7,8-PeCDF	0.3
1,2,3,4,7,8-HxCDF	0.1
1,2,3,6,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDF	0.1
2,3,4,6,7,8-HxCDF	0.1
1,2,3,4,6,7,8-HpCDF	0.01
1,2,3,4,7,8,9-HpCDF	0.01
OCDF	0.0003
Polychlorinated biphenyls* (PCBs)	
3,3',4,4'-TCB	0.0001
3,4,4',5-TCB	0.0003
3,3',4,4',5-PeCB	0.1
3,3',4,4',5,5'-HxCB	0.03

Compound	TEF_i
2,3,3',4,4'-PeCB	0.00003
2,3,4,4',5-PeCB	0.00003
2,3',4,4',5-PeCB	0.00003
2',3,4,4',5-PeCB	0.00003
2,3,3',4,4', 5 -HXCB	0.00003
2,3,3',4,4',5'-HxCB	0.00003
2,3',4,4',5,5'-HxCB	0.00003
2,3,3',4,4',5,5'-HpCB	0.00003

Note that the Norfolk Southern Screening Levels for dioxins mostly match the weighting values for TEF_i's from the US EPA (Table 9-6) with the exception of two values (Table 9-8):

Table 9-8: Norfolk Southern's Soil Screening Levels for Dioxin and Dioxin-Like Substances vs. TEF_i's

Dioxin or Dioxin-Like Substance	Dioxin or Dioxin-Like Subs.	Screening Levels		
		NF Equiv. TEF_i (EPA, 2010 & WHO 2005)	Arcadis TEF_I (Basis – EPA, 2010)	WHO 2022 – DeVito et al.
2,3,7,8-tetrachlorodibenzo-p-dioxin	2,3,7,8-TCDD	1	1	1
1,2,3,7,8-pentachlorodibenzo-p-dioxin	1,2,3,7,8-PeCDD	1	1	0.4
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	1,2,3,4,7,8-HxCDD	0.1	0.1	0.09
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	1,2,3,6,7,8-HxCDD	0.1	0.1	0.07
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	1,2,3,7,8,9-HxCDD	0.1	0.1	0.05
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	1,2,3,4,6,7,8-HpCDD	0.01	0.01	0.05
1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin	OCDD	0.0003	0.0003	0.001
			0	
2,3,7,8-tetrachlorodibenzofuran	2,3,7,8-TCDF	0.1	0.1	0.07
1,2,3,7,8-pentachlorodibenzofuran	1,2,3,7,8-PeCDF	0.03	0.03	0.01
2,3,4,7,8-pentachlorodibenzofuran	2,3,4,7,8-PeCDF	0.3	0.3	0.1
1,2,3,6,7,8-hexachlorodibenzofuran	1,2,3,4,7,8-HxCDF	0.1	0.1	0.3
1,2,3,7,8,9-hexachlorodibenzofuran	1,2,3,6,7,8-HxCDF	0.1	0.1	0.09
2,3,4,6,7,8-hexachlorodibenzofuran	1,2,3,7,8,9-HxCDF	0.1	0.1	0.2
1,2,3,4,6,7,8-heptachlorodibenzofuran	2,3,4,6,7,8-HxCDF	0.01	0.1	0.1
1,2,3,4,6,8,9-heptachlorodibenzofuran	1,2,3,4,6,7,8-HpCDF	0.01	0.01	0.02

Dioxin or Dioxin-Like Substance	Dioxin or Dioxin-Like Subs.	Screening Levels		
		NF Equiv. TEF_i (EPA, 2010 & WHO 2005)	Arcadis TEF_i (Basis – EPA, 2010)	WHO 2022 – DeVito et al.
1,2,3,4,7,8-hexachlorodibenzofuran	1,2,3,4,7,8,9-HpCDF	0.1	***0.01***	0.1
1,2,3,4,6,7,8,9-octachlorodibenzofuran	OCDF	0.003	***0.0003***	0.002

EES used the more conservative US EPA TEF_i factors. For comparison, the latest WHO, 2022 (DeVito, et al.) are presented in the last column of Table 9-8.

An example TEQ calculation, using either 50%, or 0% of the values below the MDLs ("U" flag values), are shown in Table 9-9.

Table 9-9: TEQ Example Calculation for Sample E1-2

Sample #	Date	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Laboratory Qualifier	Validator Qualifier	Reason	Value Used When DL = 50% DL	Value Used When DL = 0% DL	TEF_i Factors for Total TEQ	TEF_i Contrib. - 50% DLs & TEQs	TEF_i Contrib. - 0% DLs & TEQs
E1-2	07/19/2023	1,2,3,4,6,7,8-HpCDD	52	ng/kg	57	0.88	J			52.00	52.00	0.01	0.5	0.5
E1-2	07/19/2023	1,2,3,4,6,7,8-HpCDF	15	ng/kg	57	0.1	J B			15.00	15.00	0.01	0.2	0.2
E1-2	07/19/2023	1,2,3,4,7,8,9-HpCDF	1	ng/kg	57	0.13	J			1.00	1.00	0.01	0.0	0.0
E1-2	07/19/2023	1,2,3,4,7,8-HxCDD	1.9	ng/kg	57	0.25	J			1.90	1.90	0.1	0.2	0.2
E1-2	07/19/2023	1,2,3,4,7,8-HxCDF	3.9	ng/kg	57	0.37	J I	J	EMPC	3.90	3.90	0.1	0.4	0.4
E1-2	07/19/2023	1,2,3,6,7,8-HxCDD	3.7	ng/kg	57	0.26	J			3.70	3.70	0.1	0.4	0.4
E1-2	07/19/2023	1,2,3,6,7,8-HxCDF	4.6	ng/kg	57	0.38	J I	J	EMPC	4.60	4.60	0.1	0.5	0.5
E1-2	07/19/2023	1,2,3,7,8,9-HxCDD	2.9	ng/kg	57	0.22	J			2.90	2.90	0.1	0.3	0.3
E1-2	07/19/2023	1,2,3,7,8,9-HxCDF	0.42	ng/kg	57	0.42	U			0.21	0.21	0.1	0.0	0.0
E1-2	07/19/2023	1,2,3,7,8-PeCDD	1.6	ng/kg	57	0.37	J I	J	EMPC	1.60	1.60	1	1.6	1.6
E1-2	07/19/2023	1,2,3,7,8-PeCDF	0.21	ng/kg	57	0.21	U			0.11	0.11	0.03	0.0	0.0
E1-2	07/19/2023	2,3,4,6,7,8-HxCDF	4.8	ng/kg	57	0.36	J			4.80	4.80	0.1	0.5	0.5
E1-2	07/19/2023	2,3,4,7,8-PeCDF	6.2	ng/kg	57	0.19	J I	J	EMPC	6.20	6.20	0.3	1.9	1.9
E1-2	07/19/2023	2,3,7,8-TCDD	0.21	ng/kg	11	0.21	U			0.11	0.11	1	0.1	0.1
E1-2	07/19/2023	2,3,7,8-TCDF	0.31	ng/kg	11	0.31	U			0.16	0.16	0.1	0.0	0.0
E1-2	07/19/2023	OCDD	560	ng/kg	110	0.51				560.00	560.00	0.0003	0.2	0.2
E1-2	07/19/2023	OCDF	25	ng/kg	110	0.15	J			25.00	25.00	0.0003	0.0	0.0
E1-2	07/19/2023	Total HpCDD	98	ng/kg	57	0.88				98.00	98.00			
E1-2	07/19/2023	Total HpCDF	17	ng/kg	57	0.12	J B			17.00	17.00			
E1-2	07/19/2023	Total HxCDD	20	ng/kg	57	0.24	J B			20.00	20.00			
E1-2	07/19/2023	Total HxCDF	51	ng/kg	57	0.38	J I	J	EMPC	51.00	51.00			
E1-2	07/19/2023	Total PeCDD	4.8	ng/kg	57	0.37	J I	J	EMPC	4.80	4.80			
E1-2	07/19/2023	Total PeCDF	75	ng/kg	57	0.2	I B	J	EMPC	75.00	75.00			
E1-2	07/19/2023	Total TCDD	2.2	ng/kg	11	0.21	J B	J	Laboratory Blank	2.20	2.20			

Sample #	Date	Analyte	Result	Unit	RL	MDL (all others) or EDL (dioxins)	Laboratory Qualifier	Validator Qualifier	Reason	Value Used When DL = 50% DL	Value Used When DL = 0% DL	TEF_i Factors for Total TEQ	TEF_i Contrib. - 50% DLs & TEQs	TEF_i Contrib. - 0% DLs & TEQs
E1-2	07/19/2023	Total TCDF	23	ng/kg	11	0.31	B			23.00	23.00			
Total TEQ:													**6.6**	**6.6**

Note that in this example (Table 9-9), the TEQ was calculated to be 6.6 for this sample. Note also, that whether 0% or 50% of the MDL values were used effectively did not impact the overall result. This conclusion was observed in nearly all the TEQ calculations completed for samples analyzed.

9.4 Soil BaP_E Calculation Results:

Soil BaP_E calculation results from the sampling data sets described earlier are summarized in this Section.

9.4.1 Soil BaP_E Calculation Results for Data Set #1:

Soil BaP_E calculation results for soil sample PAH sample results, using the methodology outlines in Section 9.2, are summarized in Tables 9-10 and 9-11:

Table 9-10: Summary of Soil TPH BaP_E Calculation Results – Non-Background Samples

Sample #	Date	Lat.	Long.	BaP_E Calc. Results – Used 50% DLs	BaP_E Calc. Results – Used DLs = 0
E1-1	07/19/2023	40.8631	-80.5010	44.5	35.5
E1-2	07/19/2023	40.8984	-80.5198	806.6	806.6
E1-3	07/19/2023	40.8905	-80.5032	475.5	475.5
E1-4	07/19/2023	40.8793	-80.4805	51.3	39.9
E1-5	07/19/2023	40.9118	-80.4679	415.9	415.9
E1-6	07/19/2023	40.9204	-80.4974	244.8	244.8
E1-7	07/19/2023	40.9199	-80.5220	478.1	478.1
E1-8	07/19/2023	40.9540	-80.5130	943.0	943.0
E1-9	07/19/2023	40.9463	-80.4863	2,070.0	2,070.0
E1-10	07/19/2023	40.9357	-80.4499	91.8	83.3
E1-11	07/19/2023	40.9770	-80.4735	96.4	86.1
E31-1	07/18/2023	40.8945	-80.5874	712.3	712.3
E31-2	07/18/2023	40.9489	-80.6526	333.7	333.7
E31-3	07/18/2023	40.9767	-80.7553	107.0	97.5
E31-4	07/18/2023	41.0120	-80.7067	52.9	43.5
E31-5	07/18/2023	41.0322	-80.6686	2,129.0	2,129.0
E31-6	07/18/2023	41.0977	-80.7138	7,329.0	7,329.0
E31-7	07/18/2023	41.0792	-80.7449	979.2	979.2
E31-8	07/18/2023	41.0696	-80.7744	248.2	248.2
E31-9	07/18/2023	41.0495	-80.7962	443.0	443.0
E31-10	07/18/2023	41.0246	-80.8225	9,321.0	9,321.0
E31-11	07/18/2023	41.0766	-80.8865	9,370.0	9,370.0
E31-12	07/18/2023	41.0998	-80.8661	1,350.2	1,350.2

Sample #	Date	Lat.	Long.	BaP_E Calc. Results – Used 50% DLs	BaP_E Calc. Results – Used DLs = 0
E31-13	07/18/2023	41.1257	-80.8234	750.5	750.5
E31-14	07/18/2023	41.1385	-80.7894	1,111.0	1,111.0
E31-15	07/18/2023	41.1627	-80.7534	1,556.9	1,556.9
E31-16	07/18/2023	41.2283	-80.7989	1,050.2	1,050.2
E31-17	07/18/2023	41.1812	-80.8852	1,324.1	1,324.1
E31-18	07/18/2023	41.1238	-80.9687	58.7	49.1
E31-19	07/18/2023	41.2028	-80.9929	12,307.0	12,307.0
E31-20	07/18/2023	41.2391	-80.9454	17.1	0.0
E31-21	07/18/2023	41.2712	-80.8932	1,309.6	1,309.6
E31-22	07/18/2023	41.3026	-81.0126	15.6	0.0
E32-1	07/18/2023	40.7698	-80.0655	64.8	55.8
E32-2	07/18/2023	40.6578	-80.1151	608.3	608.3
E32-3	07/18/2023	40.5727	-80.2020	5,923.0	5,923.0
E32-4	07/18/2023	40.6285	-80.2713	205.7	205.7
E32-5	07/18/2023	40.6935	-80.2037	133.8	113.4
E32-6	07/18/2023	40.7838	-80.1553	172.6	143.8
E32-7	07/18/2023	40.7952	-80.2501	60.2	51.6
E32-8	07/18/2023	40.7566	-80.2702	97.3	72.2
E32-9	07/18/2023	40.7516	-80.3314	2,173.0	2,173.0
E32-10	07/18/2023	40.6991	-80.3052	691.6	691.6
E32-11	07/18/2023	40.6850	-80.3394	344.6	211.6
E32-12	07/18/2023	40.7343	-80.4049	225.1	154.7
E32-13	07/18/2023	40.7629	-80.3646	57.4	46.6
E32-14	07/18/2023	40.8161	-80.3354	1,687.0	1,687.0
E32-15	07/18/2023	40.8121	-80.3820	33.5	24.3
E32-16	07/18/2023	40.7478	-80.4242	86.5	75.6
E32-17	07/18/2023	40.7986	-80.4434	145.2	128.4
E32-18	07/18/2023	40.8220	-80.4979	154.1	154.1
CLASS 1	08/16/2023	40.4273	-80.5781	260.4	260.4
CLASS 2	08/16/2023	40.4411	-80.5699	169.8	169.8
CLASS 3	08/16/2023	40.6155	-80.5637	339.9	339.9
CLASS 4	08/16/2023	40.5931	-80.2653	62.1	62.1
CLASS 5	08/16/2023	40.8067	-80.4405	35.5	24.4
CLASS 6A	08/16/2023	40.8491	-80.4421	32.0	20.0
CLASS 6B	08/16/2023	40.8542	-80.4386	2,870.0	2,870.0
CLASS 7	08/16/2023	40.8285	-80.4806	70.4	70.4
CLASS 8	08/16/2023	40.8336	-80.4980	193.9	77.4

Sample #	Date	Lat.	Long.	BaP_E Calc. Results – Used 50% DLs	BaP_E Calc. Results – Used DLs = 0
CLASS 9	08/16/2023	40.8375	-80.5270	54.3	43.3
CLASS 10	08/16/2023	40.8291	-80.5397	5,047.0	5,047.0
CLASS 11	08/16/2023	40.8365	-80.5345	120.8	120.8
CLASS 12	08/16/2023	40.8372	-80.5315	70.8	70.8
CLASS 14	08/16/2023	40.8433	-80.5356	47.4	36.0
CLASS 15	08/16/2023	40.8624	-80.5519	10,317.0	10,317.0
0-10	12/06/2023	40.983700	-80.518900	4,060.0	4,060.0
0-15	12/06/2023	41.046600	-80.519500	71.3	59.3
15-5	12/06/2023	40.899700	-80.513600	137.6	125.7
15-15	12/06/2023	41.052000	-80.465200	2,007.0	2,007.0
33-5	12/06/2023	40.898900	-80.479500	398.2	398.2
33-10	12/06/2023	40.965100	-80.437200	430.0	430.0
33-15	12/21/2023	41.016200	-80.363500	118.9	118.9
50-5	12/06/2023	40.879600	-80.463000	121.9	111.4
50-10	12/21/2023	40.940500	-80.389800	40.7	29.7
50-15	12/06/2023	40.979400	-80.322200	126.3	126.3
60-2	12/06/2023	40.846800	-80.497700	88.3	76.9
60-10	12/06/2023	40.909600	-80.368700	263.5	263.5
60-15	12/06/2023	40.944000	-80.282000	122.6	110.6
60-15-D	12/06/2023	40.944000	-80.282000	461.0	461.0
70-5	12/06/2023	40.862700	-80.444600	1,230.2	1,230.2
70-10	12/06/2023	40.888300	-80.347200	75.0	63.4
70-15	12/06/2023	40.915500	-80.259600	286.9	286.9
70-15-D	12/06/2023	40.915500	-80.259600	719.7	719.7
80-10	12/06/2023	40.859745	-80.356241	729.0	729.0
80-15	12/06/2023	40.870400	-80.248800	319.8	285.0
90-2	12/06/2023	40.841800	-80.493000	37.0	26.6
90-5	12/06/2023	40.840600	-80.434700	66.0	54.0
90-10	12/06/2023	40.840200	-80.344800	62.8	62.8
90-15	12/06/2023	40.839000	-80.259300	216.4	194.8
315-5	12/06/2023	40.879000	-80.605200	2,475.0	2,475.0
315-5D	12/06/2023	40.879000	-80.605200	2,403.0	2,403.0
315-10	12/06/2023	40.929300	-80.669700	191.7	191.7
330-5	12/06/2023	40.900000	-80.575500	149.6	137.6
330-10	12/06/2023	40.965700	-80.635200	592.8	592.8

Sample #	Date	Lat.	Long.	BaP_E Calc. Results – Used 50% DLs	BaP_E Calc. Results – Used DLs = 0
345-5	12/06/2023	40.906700	-80.557300	1,654.0	1,654.0
345-10	12/06/2023	40.972700	-80.589500	2,904.0	2,904.0
345-15	12/06/2023	41.052300	-80.603800	1,152.8	1,152.8
Count or #				**98**	**98**
Minimum Value				**15.6**	**0.0**
Maximum Value				**12,307.0**	**12,307.0**
Average or Mean				**1,161.9**	**1,153.9**
Standard Deviation				**2,279.9**	**2,283.5**
Samples > 110 µg/kg				**69**	**68**
% of Samples > 110 µg/kg				**70.41%**	**69.39%**

For the 98 non-background TPH PEF sample values, the average value reported was 1,161.9 µg/kg using 50% of the detection limit (DL) values; the average was 1,153.9 µg/kg for TPH PEF sample values using zero for DL values.

Table 9-11: Summary of Soil TPH BaP_E Calculation Results – Background Samples

Sample #	Date	Lat.	Long.	BaP_E Calc. Results – Used DLs = 0	BaP_E Calc. Results – Used 50% DLs
LK-01	12/21/2023	40.473919	-81.986393	38.2	52.6
LK-02	12/21/2023	40.473919	-81.986377	20.2	34.5
LK-03	12/21/2023	40.473932	-81.986345	28.6	43.2
LK-04	12/21/2023	40.473940	-81.986296	29.0	43.3
LK-05	12/21/2023	40.473926	-81.986400	27.2	41.6
LK-06	12/21/2023	40.473930	-81.986377	29.5	43.9
LK-07	12/21/2023	40.473959	-81.986350	27.0	42.7
LK-08	12/21/2023	40.473954	-81.986315	28.6	42.9
LK-09	12/21/2023	40.473954	-81.986393	39.3	51.8
LK-10	12/21/2023	40.473979	-81.986373	27.7	42.0
LK-11	12/21/2023	40.473993	-81.986376	29.8	44.1
LK-12	12/21/2023	40.474012	-81.986323	33.9	47.7
LK-13	12/21/2023	40.474024	-81.986427	30.6	44.9
LK-14	12/21/2023	40.474026	-81.986417	22.3	37.2
LK-15	12/21/2023	40.474041	-81.986390	31.0	46.6
LK-16	12/21/2023	40.474060	-81.986335	27.6	43.2

Sample #	Date	Lat.	Long.	BaP_E Calc. Results – Used DLs = 0	BaP_E Calc. Results – Used 50% DLs
Count or #				16	16
Minimum Value				20.2	34.5
Maximum Value				39.3	52.6
Average or Mean				29.4	43.9
Standard Deviation				4.8	4.5
Samples > 110 µg/kg				0	0
% of Samples > 110 µg/kg				0.00%	0.00%

For the 16 background soil TPH PEF sample values, the average value reported was 43.9 µg/kg using 50% of the detection limit (DL) values; the average was 29.4 µg/kg for TPH PEF sample values using zero for DL values.

As shown in Figures 9-12 and 9-13 below, 16 BaP_E background samples were taken ~81 miles to the west/southwest of CaramFab facility in the Lower Killbock Creek Wildlife Area:

Petty's Background
PAH Soil Samples
Rd 1 ug/kg: (ND=0)

PEF Contrib. - DLs = 0
38.2
20.2
28.6
29
27.2
29.5
27
28.6
39.3
27.7
29.8
33.9
30.6
22.3
31
27.6

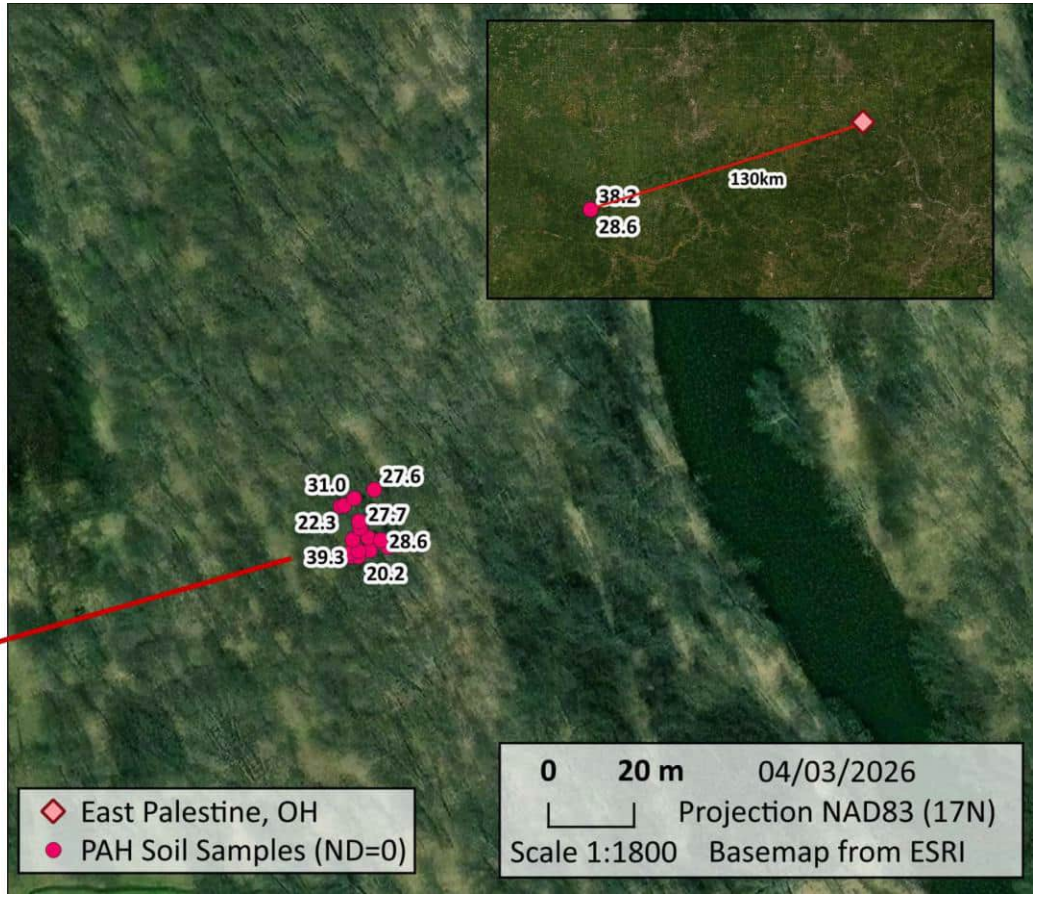


Figure 9-12: Plot of Soil BaP_E Calculation Results for Background Samples – Using 0% of DLs for DL Constituents

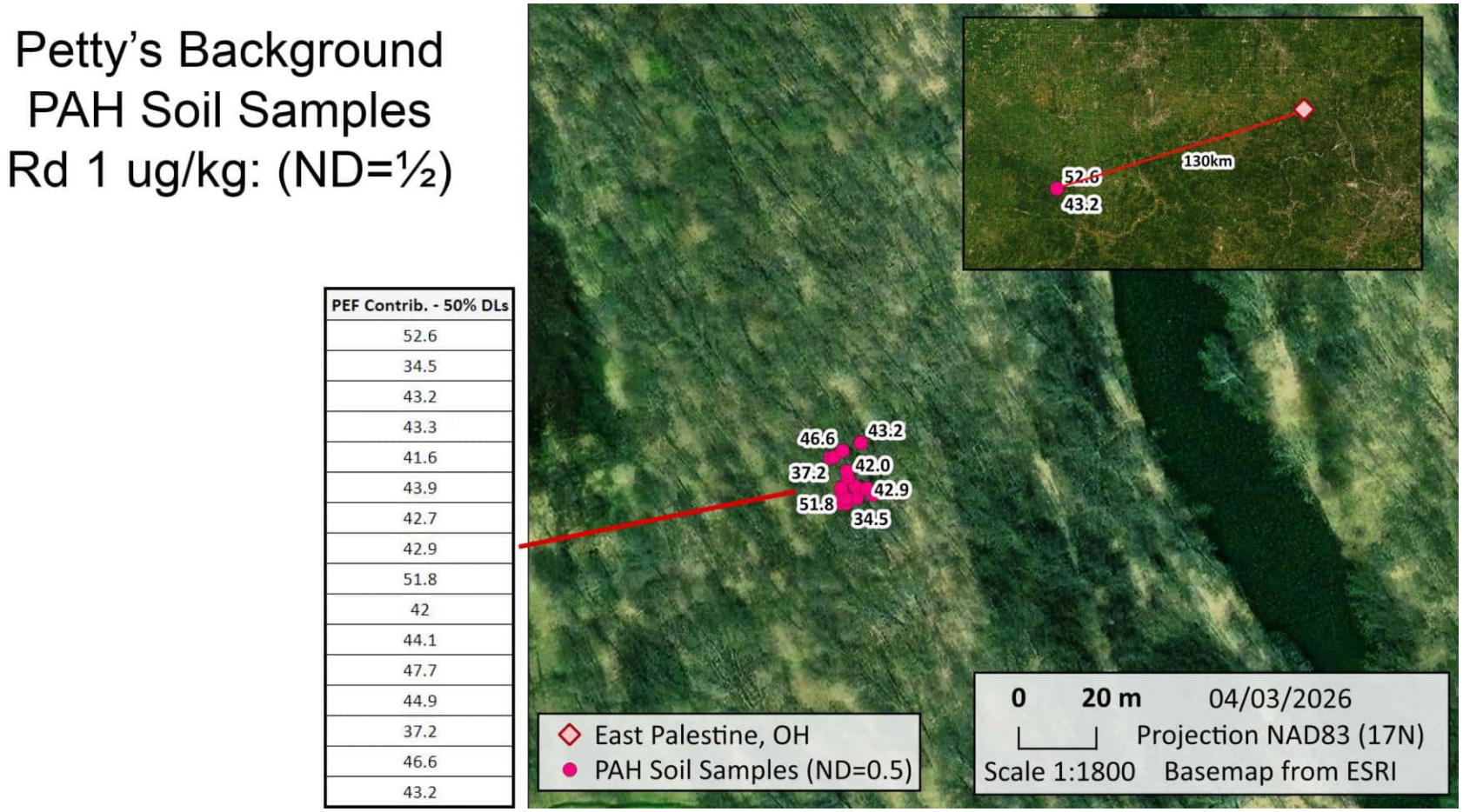


Figure 9-13: Plot of Soil BaP_E Calculation Results for Data Set #1 – Using 50% of DLs for DL Constituents

In addition, statistics on whether or not the mean values for non-background TPH PEF values were the same as for background TPH-PEF values were completed. This statistical analysis is known as Analyses of Variance (ANOVA). Results for two scenarios (using means based on using DLs at 0% of DLs and means based on using DLs = 50%) follow in Table 9-12 and 9-13 respectively:

Table 9-12: ANOVA Calculations and Results for Case where DLs = 0 were Utilized to Calculated TPH PEFs

ANOVA Case 1a: Comparison of TPH PEF Means for Non-Background and Background Samples Using DLs = 0			
Sample Set	**Avg.**	**Obs.**	$(x_{jmean} - x_{mean})^2 * n_j$
Non-Background	1,153.93	98	130,492,220.2072
Background	29.40	16	14,952,249.7644
Total	996.10	114	145,444,469.9716
x^2 Calcs.	**Value**		
Total	505,791,221.4820		
Between	145,444,469.9716		
Within	360,346,751.5104		
ANOVA			
Groups (k)	2		
Observations (n)	114		
df (model)	1		
df (residual)	112		
F-statistic	45.21		
p-value	**0.000000001**		**F.Dist.RT(F, df_m, df_{res})**

Table 9-13: ANOVA Calculations and Results for Case where DLs at 50% of DLs were Utilized to Calculated TPH PEFs

ANOVA Case 1b: Comparison of TPH PEF Means for Non-Background and Background Samples Using DLs = 50% DL			
Sample Set	**Avg.**	**Obs.**	$(x_{jmean} - x_{mean})^2 * n_j$
Non-Background	1,161.85	98	2,412,742.8409
Background	43.89	16	14,778,049.9005
Total	1,004.94	114	17,190,792.7414
x^2 Calcs.	**Value**		

ANOVA Case 1b: Comparison of TPH PEF Means for Non-Background and Background Samples Using DLs = 50% DL			
Total	504,216,475.8122		
Between	17,190,792.7414		
Within	487,025,683.0708		
ANOVA			
Groups (k)	2		
Observations (n)	114		
df (model)	1		
df (residual)	112		
F-statistic	3.95		
p-value	**0.04922**		**F.Dist.RT(F, df_m, df_{res})**

Interpretation of ANOVA Calculations:

The basic or null hypothesis of the ANOVA calculations is that the means of the means (in this case two means – non-background and background) are the same. If they are not found to be the same the null hypothesis that the mean values are the same is rejected and one concludes that the means are not the same. The basis for making this decision is based on the calculated "p-value." Classically, this is set at 0.05. Technically definitions for making this decision are shown below:

> "The P-value is the probability of obtaining an F-ratio as large or larger than the one observed, assuming that the null hypothesis of no difference amongst group means is true. Moreover, If the p-value of an ANOVA is less than 0.05, then we reject the null hypothesis that each group mean is equal. In this scenario, we can then perform post-hoc tests to determine exactly which groups differ from each other."
>
> "If this p-value is less than α = 0.05, we reject the null hypothesis of the ANOVA and conclude that there is a statistically significant difference between the means of the two groups. Otherwise, if the p-value is not less than α = .05 then we fail to reject the null hypothesis and conclude that we do not have sufficient evidence to say that there is a statistically significant difference between the means of the two groups."

In both cases, the p-value was calculated to be <0.05 (0.04922 and 0.000000001 – Tables 9-12 and 9-13), so the null hypotheses are rejected and one can conclude that the means are not the same.

Note that under risk assessment guidance protocols, chemicals are defined as either a potential carcinogen or a hazardous (non-carcinogenic) substance, or both. Cancer risk defined as "Incremental probability of an individual's developing cancer over a lifetime as a result of exposure to a potential carcinogen" and Hazard Index (HI) as "The sum of two or more hazard quotients for multiple substances and/or multiple exposure pathways"; a Hazard Quotient (HQ) is defined as "The ratio of a single substance

exposure level over a specified time period to a reference dose for that substance derived from a similar exposure period".[32]

Explicitly, target risk levels for carcinogenic and noncarcinogenic effects are defined as follows[33]:

- "For carcinogenic effects, a concentration is calculated that corresponds to a 10^{-6} (or 1 in 1 million) incremental risk of an individual developing cancer over a lifetime as a result of exposure to the potential from all significant exposure pathways for a given medium" [in this case, not for all exposure pathways, but only for three soil pathways.]
- For non-carcinogenic effects, a concentration is calculated that corresponds to an HI (Hazard Index) of 1, which is the level of exposure to a chemical from all significant exposure pathways in a given medium below which it is unlikely for even sensitive populations to experience adverse health effects" [again, in this case, not for all exposure pathways, but only for three soil pathways].

The data in Figure 9-2 are based on cancer risk levels of 1 case in 1 million (1×10^{-6}) and a HI of 1, which are common values inherent in setting risk-based standards.

9.4.2 Soil BaP_E Calculation Results for Data Set #2:

Soil BaP_E calculation results for soil sample PAH sample results from Data Set #2, using the methodology outlines in Section 9.2, are summarized in Table 9-14:

Table 9-14: Summary of Soil TPH BaP_E Calculation Results from Data Set #2

PAH Soil BaPE Calculation Results from Data Set #2						Calculation Results	
Client Sample Id	COC ID	Petty ID	Collection Date	Latitude	Longitude	BaPEqs ND = 0 ug/Kg	BaPEqs ND = 1/2 ug/Kg
240-180819-1	S-1	S-1-2	02/21/2023 00:00	40.8358	-80.5392	5,037.0	5,037.0
240-180819-2	S-2	S-2-2	02/21/2023 00:00	40.8339	-80.5281	195.3	195.3
240-180819-3	S-3	S-3-2	02/21/2023 00:00	40.8358	-80.5392	3,979.0	3,979.0
240-180757-1	S-4A	S-4A-2	02/21/2023 00:00	40.8353	-80.5178	27.1	39.3
240-180757-2	S-4B S-5	S-5-2	02/21/2023 00:00	40.8344	-80.5317	343.2	343.2
240-180743-5	S-6A-2-3-4	S-6A-2	02/21/2023 00:00	40.8336	-80.5406	5,293.0	5,293.0
240-180743-6	S-6B-2-3-4	S-6B-2	02/21/2023 00:00	40.8336	-80.5406	4,274.0	4,274.0
240-180824-1	S-7-A	S-7A-2	02/22/2023 00:00	40.8328	-80.5425	1,198.6	1,198.6

[32] US EPA, 1991, Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals (PRGs), EPA/540/R-92/003, Publication 9285.7-01B, December, pp. vii & viii - https://www.epa.gov/risk/risk-assessment-guidance-superfund-rags-part-b.

[33] Ibid, pp. 14-15.

PAH Soil BaPE Calculation Results from Data Set #2						Calculation Results	
Client Sample Id	COC ID	Petty ID	Collection Date	Latitude	Longitude	BaPEqs ND = 0 ug/Kg	BaPEqs ND = 1/2 ug/Kg
240-180824-2	S-8	S-8-2	02/22/2023 00:00	40.8303	-80.5344	77.2	90.4
240-180825-1	S-9	S-9-2	02/22/2023 00:00	40.8522	-80.5469	19.9	34.2
240-180861-1	S-10	S-10A-2	02/23/2023 00:00	40.8300	-80.5258	309.6	309.6
240-180825-2	S-11	S-11A-2	02/22/2023 00:00	40.8361	-80.5344	119.6	119.6
240-180861-2	S-15A	S-15A-2	02/23/2023 00:00	40.8475	-80.5828	36.4	47.4
240-184054-1	30-2A	S-30-2A/2B	04/21/2023 09:40	40.8294	-80.5222	267.3	267.3
240-184054-2	31-2A	S-31-2A/2B	04/21/2023 10:07	40.8375	-80.5269	65.5	75.7
240-184054-3	32-2A	S-32-2A/2B	04/21/2023 10:20	40.8372	-80.5275	501.7	501.7
240-184054-4	33-2A	S-33-2A/2B	04/21/2023 10:55	40.8486	-80.5386	40.7	52.2
240-184054-5	34-2A	S-34-2A/2B	04/21/2023 11:23	40.7986	-80.5589	107.8	129.4
240-184054-6	35-2A	S-35-2A/2B	04/21/2023 12:02	40.8289	-80.5467	36.0	46.8
240-184054-7	36-2A	S-36-2A/2B	04/21/2023 13:28	40.8319	-80.5267	315.0	315.0
240-184054-8	37-2A	S-37-2A/2B	04/21/2023 14:07	40.8364	-80.5303	546.1	546.1
240-184054-9	38-2A	S-38-2A/2B	04/21/2023 14:43	40.8358	-80.5392	819.5	819.5
240-184054-10	39-2A	S-39-2A/2B	04/21/2023 17:10	40.8367	-80.5039	122.5	122.5

9.4.3 Soil BaP_E Calculation Results for Data Set #3:

Soil BaP_E calculation results for soil sample PAH sample results from Data Set #3, using the methodology outlines in Section 9.2, are summarized in Table 9-15:

Table 9-15: Summary of Soil TPH BaP_E Calculation Results from Data Set #3

Client Sample Id	Latitude	Longitude	CeramFab or WYG Sample or Address	BaPEqs ND = 0 ug/Kg	BaPEqs ND = 1/2 ug/Kg
EP02-SO-1-1	40.83579	-80.52514	CeramFab - 900 E. Taggart St.	591.13	4,816.13
EP02-SO-2	40.8356	-80.5255	CeramFab - 900 E. Taggart St.	61.36	873.86
EP02-SO-3	40.83576	-80.52563	CeramFab - 900 E. Taggart St.	591.13	4,816.13
EP02-SO-4	40.83577	-80.52552	CeramFab - 900 E. Taggart St.	61.36	873.86
EP02-SO-5	40.83579	-80.52439	CeramFab - 900 E. Taggart St.	174.24	1,168.74
EP02-SO-6	40.83558	-80.52352	CeramFab - 900 E. Taggart St.	276.63	4,397.63
EP02-SSS-3	40.83526	-80.52356	CeramFab - 900 E. Taggart St.	111.00	878.00
EP03-SO; except VOCs	40.83494	-80.5259	800 E. Taggart St.	513.02	4,296.02
EP05-SO; except VOCs	40.8339	-80.52624	124 N. Pleasant Dr.	278.84	3,522.34
EP06-SO; except VOCs	40.8316	-80.52581	60 S. Pleasant Dr.	80.24	1,250.24
EP06-SO-2; except VOCs	40.833636	-80.524392	60 S. Pleasant Dr.	59.51	989.01

Client Sample Id	Latitude	Longitude	CeramFab or WYG Sample or Address	BaPEqs ND = 0 ug/Kg	BaPEqs ND = 1/2 ug/Kg
EP08-SO-2; except VOCs	40.83515	-80.53669	WYG Refractories - 193 N. James St.	618.51	1,782.01
EP10-SO; except VOCs	40.83699	-80.52715	701 E. Martin St.	0.00	997.96
EP11-SO; except VOCs	40.83687	-80.53486	275 E. Martin St.	986.60	9,371.60
EP12-SO; except VOCs	40.8328	-80.53134	472 E. Main St.	97.84	4,222.01
EP13-SO; except VOCs	40.8317	-80.53942	76 S. Market St.	107.76	4,836.90
EP14-SO; except VOCs	40.83923	-80.5413	86 W. Grant St.	183.50	9,037.10
EP80-SO-2; except VOCs	40.83515	-80.53669	CeramFab - 900 E. Taggart St.	784.80	9,949.80

9.4.4 Soil and Sediment BaP_E Calculation Results for Data Set #4:

Soil and Sediment BaP_E calculation results for soil sample PAH sample results from Data Set #4, using the methodology outlines in Section 9.2, are summarized in Tables 9-16 and 9-17:

Table 9-16: Summary of Soil TPH BaP_E Calculation Results from Data Set #4

Sample ID	Sampled Date	Sample Type	Property Address	Sample Latitude-Longitude	BaPEqs ND = 0 ug/Kg	BaPEqs ND = 1/2 ug/Kg
410-141089-11	8/29/2023	Soil	Near 418 East Taggart Street	40.835031, -80.532323	949.0	1,081.0
410-141089-9	8/29/2023	Soil	Near 418 East Taggart Street	40.835031, -80.532328	248.5	380.5
410-237289-1	8/3/2025	Soil	Near 418 East Taggart Street	40.835031, -80.532323	734.2	734.2
410-237289-3	8/3/2025	Soil	Near 418 East Taggart Street	40.835031, -80.532332	935.3	935.3
410-237282-1	8/3/2025	Soil	Near 83 East Rebecca Street	40.834128, -80.537799	1,176.7	1,176.7
410-237282-3	8/3/2025	Soil	Near 83 East Rebecca Street	40.834128, -80.537799	1,379.4	1,379.4
410-127590-3	5/16/2023	Soil	83 East Rebecca Street, East Palestine, OH	40.834205, -80.538378	961.8	961.8
410-144711-8	9/25/2023	Soil	83 East Rebecca Street, East Palestine, OH	40.834205, -80.538378	1,874.0	1,874.0
410-126924-3	5/15/2023	Soil	885 Taggart Street, East Palestine OH	40.834554, -80.524993	825.7	1,065.7
					15,698.0	15,698.0
					961.8	961.8
410-137121-3	7/31/2023	Soil	885 Taggart Street, East Palestine OH	40.834554, -80.524993	828.4	828.4
410-175954-1	6/12/2024	Soil	885 Taggart Street, East Palestine OH	40.834554, -80.524993	739.8	739.8
410-237292-1	8/3/2025	Soil	885 Taggart Street, East Palestine OH	40.834554, -80.524993	440.9	440.9
410-119901-6	3/22/2023	Soil	3519 N. Pleasant Drive, East Palestine, OH	40.848138, -80.526954	83.9	97.1
410-119901-8	3/22/2023	Soil	59 Wallace Avenue, East Palestine, OH	40.847014, -80.543711	56.2	67.2
410-119901-10	3/22/2023	Soil	164 East Main Street, East Palestine, OH	40.832937, -80.536923	83.3	98.9
410-119901-13	3/22/2023	Soil	468 Alice Street, East Palestine, OH	40.833634, -80.531475	35.3	45.5
410-119901-1	3/22/2023	Soil	3112 Hillcrest Circle, East Palestine, OH	40.854400, -80.535975	26.9	38.5
410-126924-6	5/15/2023	Soil	171 South Pleasant Drive, East Palestine, OH	40.830042, -80.525782	29,170.0	29,170.0
410-128628-10	5/30/2023	Soil	457 East Clark St, East Palestine, OH	40.836137, -80.531693	159.5	261.2
410-137121-6	7/31/2023	Soil	127½ Park Avenue, East Palestine OH	40.834455, -80.542120	210.7	321.1
410-141089-6	8/28/2023	Soil	756 Hollow Road, Enon Valley, PA 16120	40.848589, -80.453834	3,193.0	3,193.0
410-142486-7	9/11/2023	Soil	745 East Martin St, East Palestine, OH	40.836635, -80.525957	176.2	262.6

Sample ID	Sampled Date	Sample Type	Property Address	Sample Latitude-Longitude	BaPEqs ND = 0 ug/Kg	BaPEqs ND = 1/2 ug/Kg
410-142486-6	9/11/2023	Soil	745 East Martin St, East Palestine, OH	40.836546, -80.526515	20.5	128.8
410-250542-1	10/29/2025	Soil	454 Overlook Drive, Hillsville, PA 16132	41.016241, -80.497051	10,915.0	10,915.0
410-250542-2	10/29/2025	Soil	454 Overlook Drive, Hillsville, PA 16132	41.016395, -80.496879	2,854.0	2,854.0

Table 9-17: Summary of Sediment TPH BaP_E Calculation Results from Data Set #4

Sample ID	Sampled Date	Sample Type	Property Address	Sample Latitude-Longitude	Dioxin TEQ ng-TEQ/kg (ND=0)	Dioxin TEQ ng-TEQ/kg (ND=1/2)
410-118226-4	3/8/2023	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	548.3	655.1
410-128628-1	5/29/2023	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	208.3	340.3
410-141089-10	8/29/2023	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	836.0	956.0
410-175955-1	6/12/2024	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	1,115.7	1,115.7
410-237289-2	8/3/2025	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	38.6	48.7
410-237282-2	8/3/2025	Sediment	Near 83 East Rebecca Street	40.834128, -80.537799	86.5	86.5

9.5 Plots of Soil BaP_E Calculation Results at/near CeramFab & WYG Facilities:

Plots of soil BaP_E calculation results from the data sets described earlier at/near Plaintiff locations, are summarized in this Section:

9.5.1 Plot of Soil BaP_E Calculation Results for Data Set #1:

Soil BaP_E calculation results for Data Set #1 are shown plotted in Figures 9-14 and 9-15:

Close up: Petty's PAH Rd 1: BaP eqs (ND=0)

>110 ug/kg

<110 ug/kg

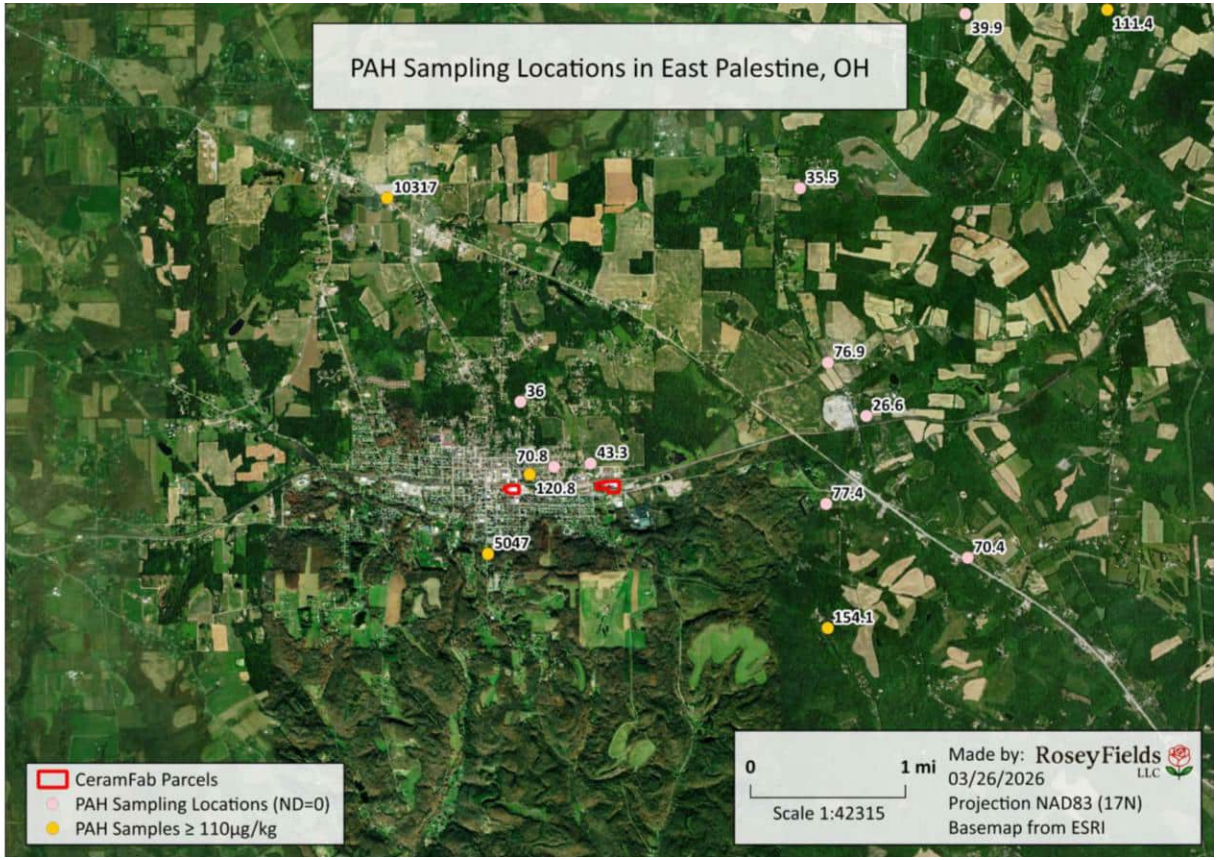


Figure 9-14: Plot of Soil BaP_E Calculation Results for Data Set #1 – Using 0 for DL Constituents

Close up:
Petty's PAH Rd
1: BaP eqs
(ND=½)

>110 ug/kg

<110 ug/kg

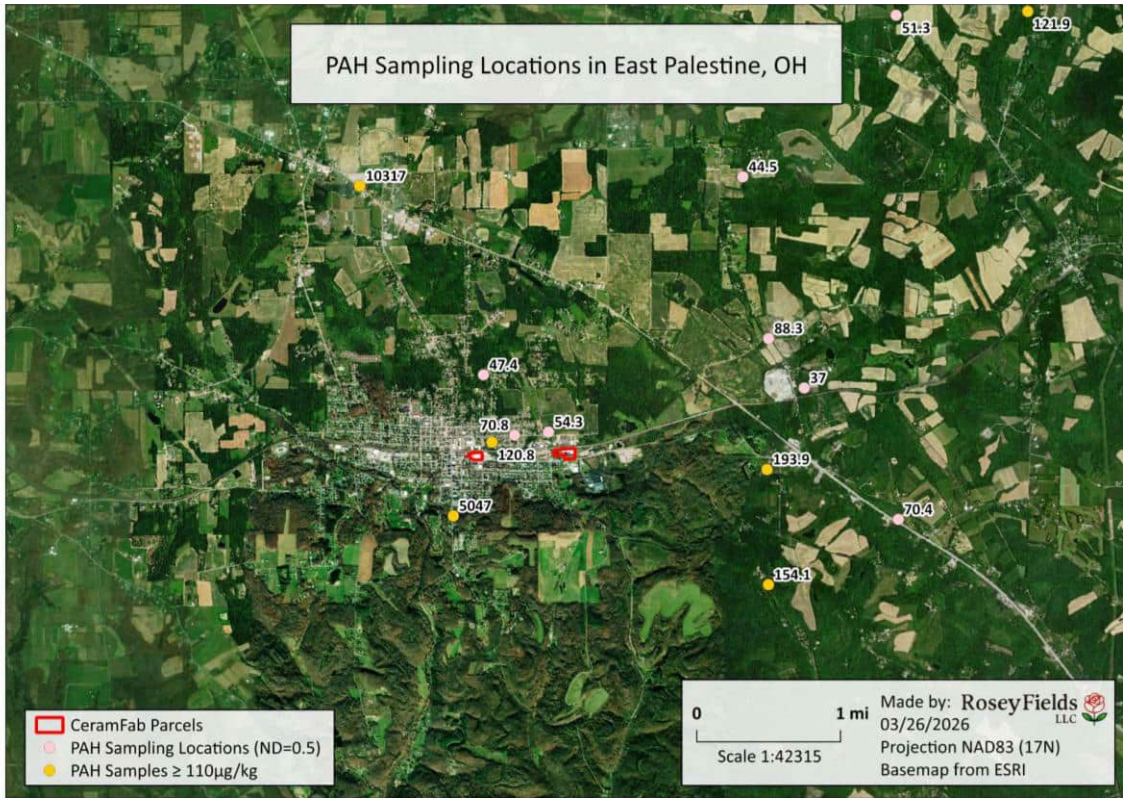


Figure 9-15: Plot of Soil BaP_E Calculation Results for Data Set #1 – Using 50% of DLs for DL Constituents

9.5.2 Soil Plots of BaP_E Calculation Results for Data Set #2:

Soil BaPE calculation results for Data Set #2 are shown plotted in Figures 9-16 and 9-17:

Close up: Petty Round 2 PAH: ND=0
BaPeq ug/kg

Figure 9-16: Soil BaP_E Calculation Results for Data Set #2 – Using 0 for DL Constituents

Close up: Petty Round 2 PAH: ND=½
BaPeq ug/kg

Figure 9-17: Soil BaP_E Calculation Results for Data Set #2 – Using 50% of DLs for DL Constituents

9.5.3 Soil Plots of BaP_E Calculation Results for Data Set #3:

Soil BaPE calculation results for Data Set #3 are shown plotted in Figures 9-18 and 9-19:

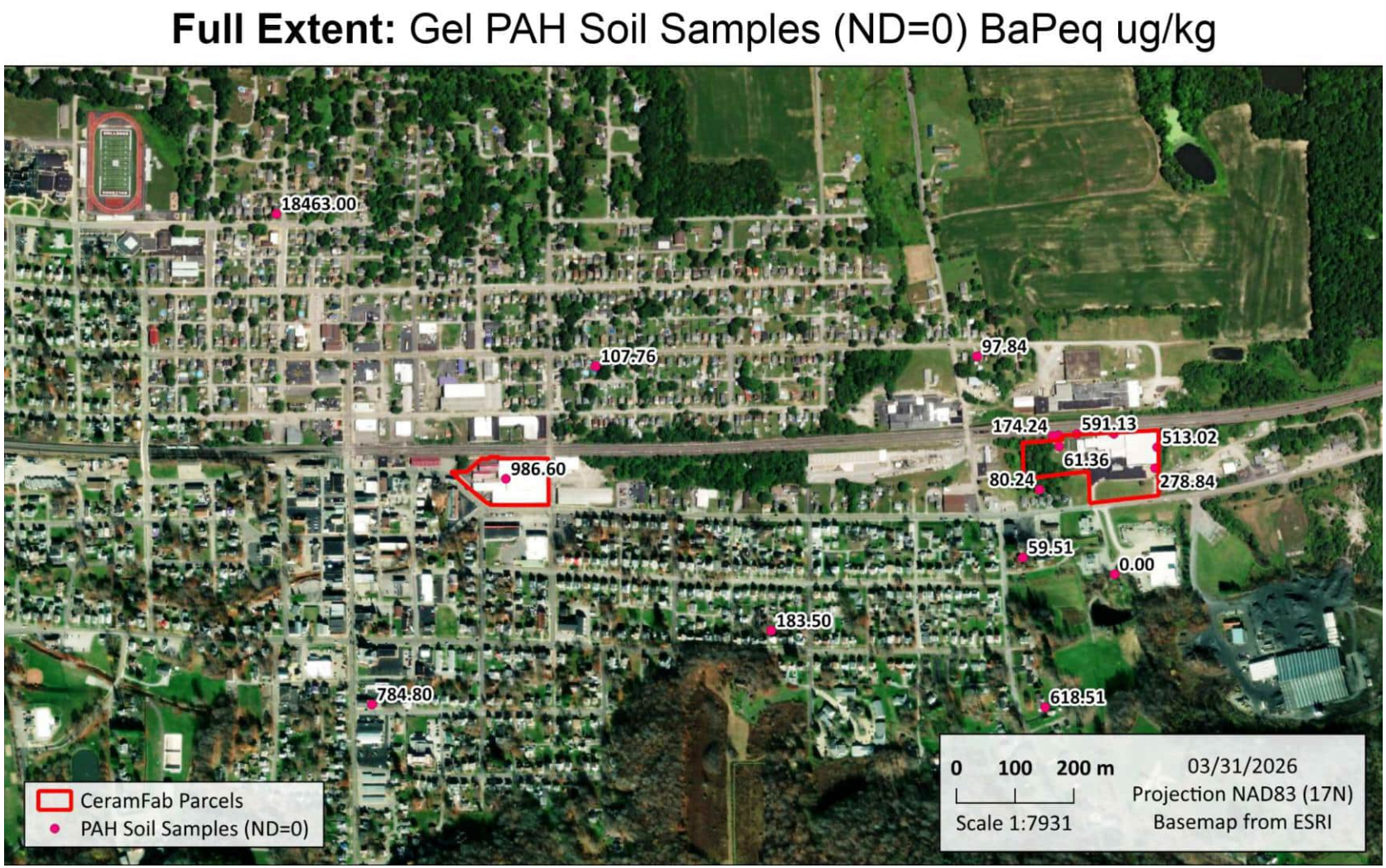


Figure 9-18: Soil BaP_E Calculation Results for Data Set #3 – Using 0 for DL Constituents

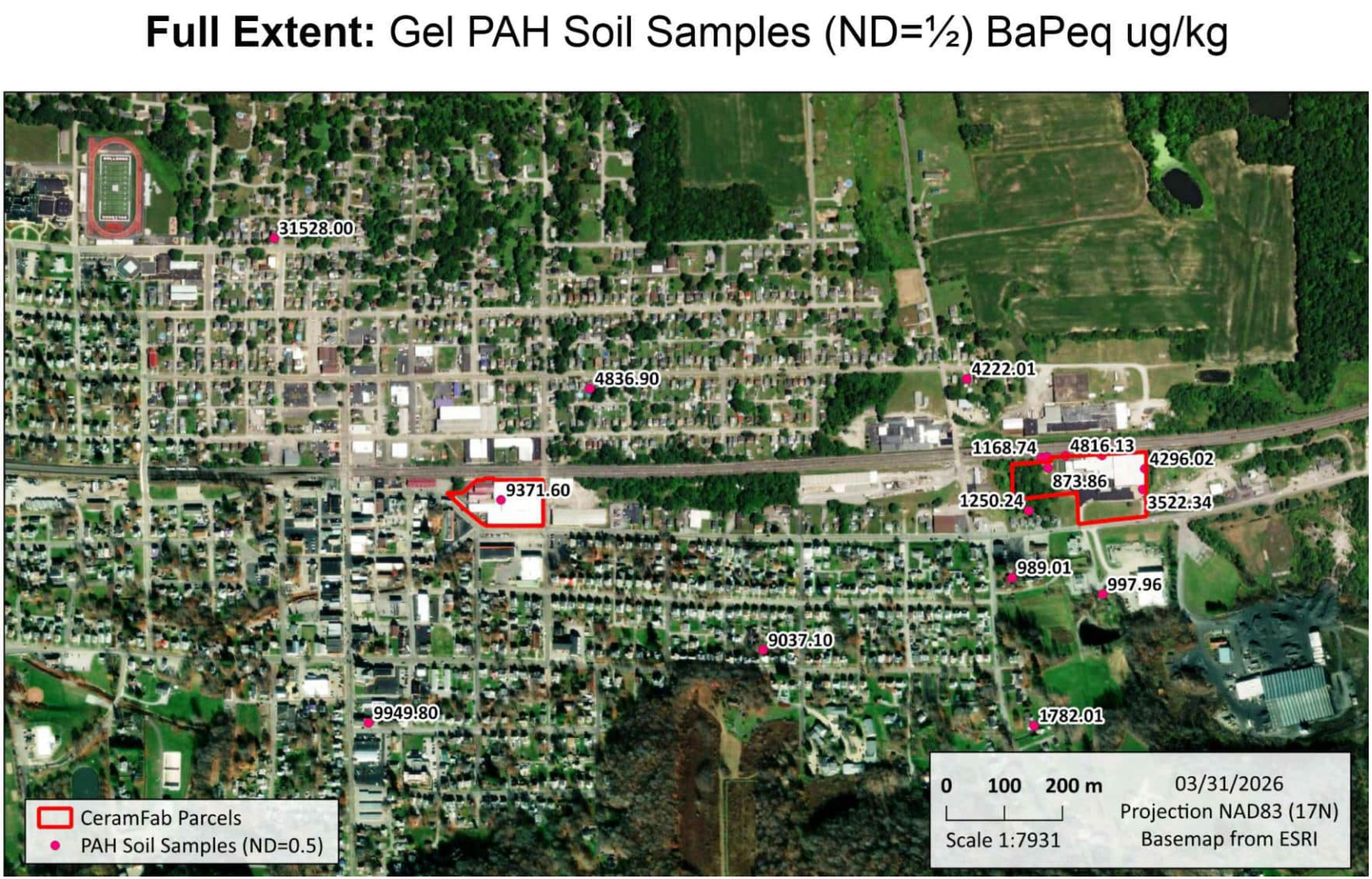


Figure 9-19: Soil BaP_E Calculation Results for Data Set #3 – Using 50% of DLs for DL Constituents

9.5.4 Soil Plots of BaP_E Calculation Results for Data Set #4:

Soil BaPE calculation results for Data Set #4 are shown plotted in Figures 9-20 and 9-21 and sediment calculation results for Data Set #4 are shown plotted in Figures 9-22 and 9-23:

Close-Up: Smith PAH Soil Samples (ND=0) BaPeq ug/kg

Figure 9-20: Soil BaP_E Calculation Results for Data Set #4 – Using 0 for DL Constituents

Close-Up: Smith PAH Soil Samples (ND=½) BaPeq ug/kg

Figure 9-21: Soil BaP_E Calculation Results for Data Set #4 – Using 50% of DLs for DL Constituents

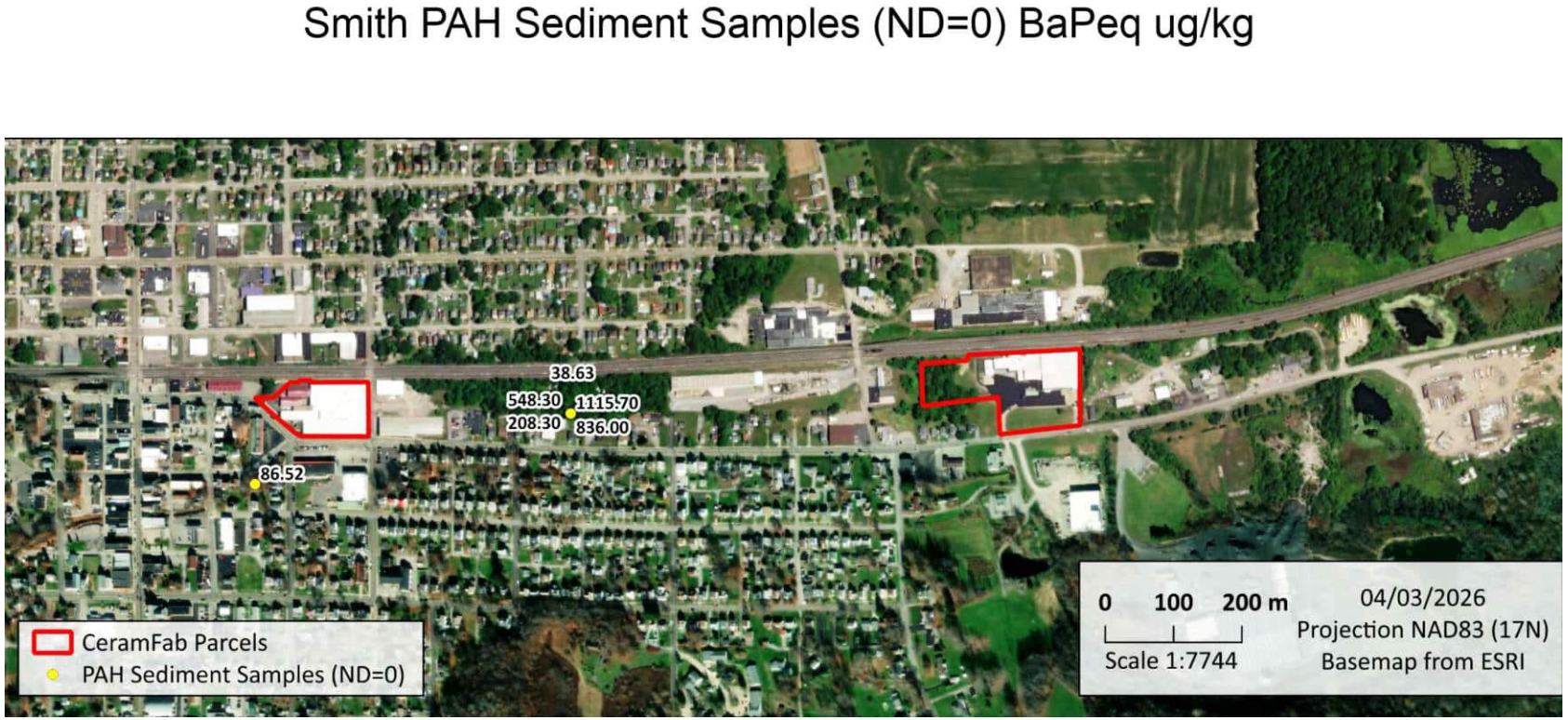


Figure 9-22: Sediment BaP_E Calculation Results for Data Set #4 – Using 0 for DL Constituents

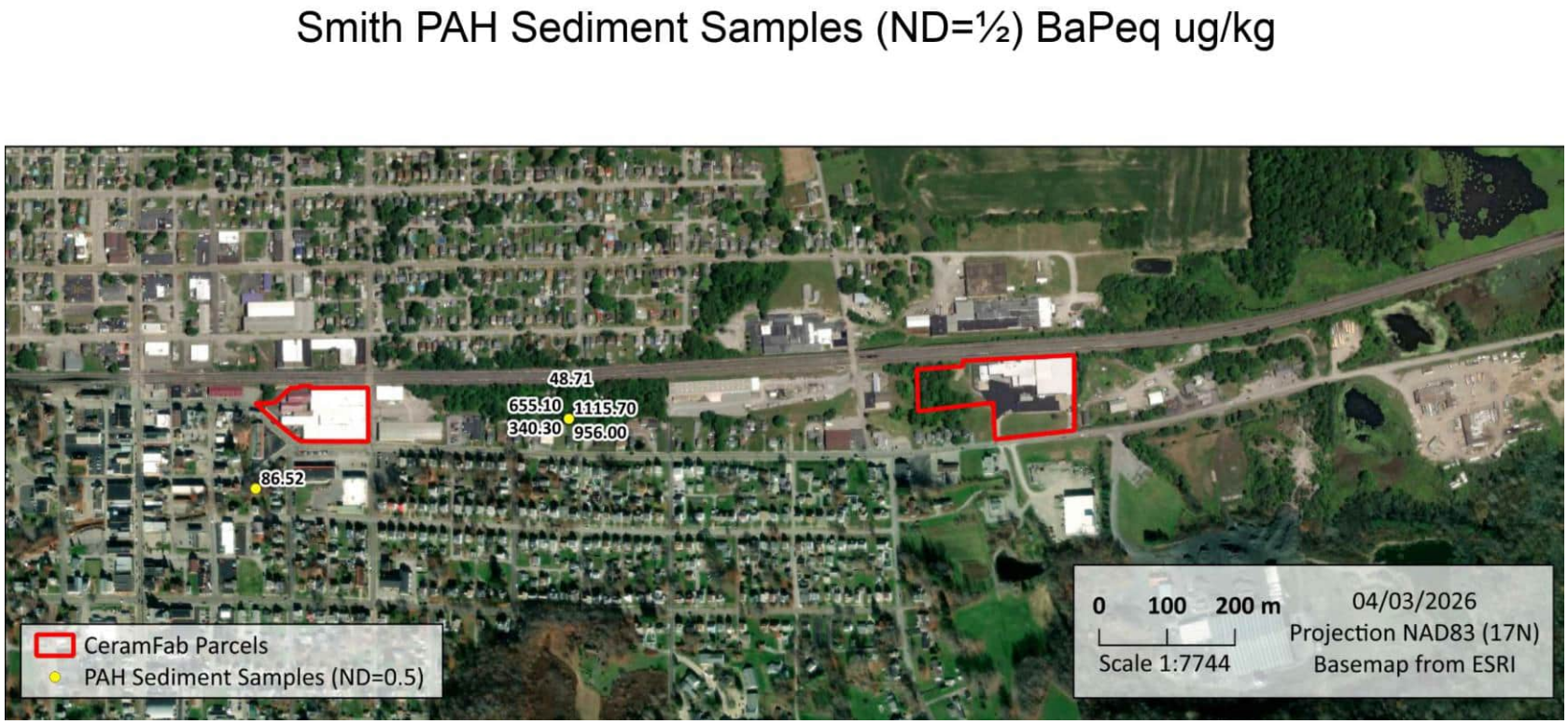


Figure 9-23: Sediment BaP_E Calculation Results for Data Set #4 – Using 50% of DLs for DL Constituents

9.6 Soil Dioxin TEQ Calculation Results:

Soil dioxin TEQ calculation results, from the data sets described earlier, are summarized in this Section.

9.6.1 Soil Dioxin TEQ Calculation Results for Data Set #1:

Soil dioxin TEQ calculation results for soil sample PAH sample results from Data Set #1, using the methodology outlined in Section 9.3, are summarized in Table 9-18:

Table 9-18: Summary of Soil Dioxin/Furan TEQ Calculations from Data Set #1 – Non-Background Samples

Sample #	Date	Lat.	Long.	Total TEQ using 50% DLs (pg/g)	Total TEQ using 0% DLs (pg/g)
E1-1	07/19/2023	40.8631	-80.5010	0.4	0.4
E1-2	07/19/2023	40.8984	-80.5198	6.6	6.6
E1-3	07/19/2023	40.8905	-80.5032	4.6	4.6
E1-4	07/19/2023	40.8793	-80.4805	1.8	1.8
E1-5	07/19/2023	40.9118	-80.4679	3.6	3.6
E1-6	07/19/2023	40.9204	-80.4974	4.9	4.9
E1-7	07/19/2023	40.9199	-80.5220	1.5	1.5
E1-8	07/19/2023	40.9540	-80.5130	4.6	4.5
E1-9	07/19/2023	40.9463	-80.4863	24.0	24.0
E1-10	07/19/2023	40.9357	-80.4499	1.7	1.7
E1-11	07/19/2023	40.9770	-80.4735	1.7	1.7
E31-1	07/18/2023	40.8945	-80.5874	2.3	2.2
E31-2	07/18/2023	40.9489	-80.6526	6.0	6.0
E31-3	07/18/2023	40.9767	-80.7553	2.6	2.5
E31-4	07/18/2023	41.0120	-80.7067	1.0	1.0
E31-5	07/18/2023	41.0322	-80.6686	14.4	14.4
E31-6	07/18/2023	41.0977	-80.7138	7.2	7.2
E31-7	07/18/2023	41.0792	-80.7449	19.8	19.7
E31-8	07/18/2023	41.0696	-80.7744	41.5	41.5
E31-9	07/18/2023	41.0495	-80.7962	19.9	19.8
E31-10	07/18/2023	41.0246	-80.8225	4.5	4.5
E31-11	07/18/2023	41.0766	-80.8865	4.2	4.2
E31-12	07/18/2023	41.0998	-80.8661	20.6	20.6
E31-13	07/18/2023	41.1257	-80.8234	4.0	4.0
E31-14	07/18/2023	41.1385	-80.7894	8.1	8.1

Sample #	Date	Lat.	Long.	Total TEQ using 50% DLs (pg/g)	Total TEQ using 0% DLs (pg/g)
E31-15	07/18/2023	41.1627	-80.7534	20.4	20.4
E31-16	07/18/2023	41.2283	-80.7989	10.5	10.5
E31-17	07/18/2023	41.1812	-80.8852	22.4	22.4
E31-18	07/18/2023	41.1238	-80.9687	5.9	5.9
E31-19	07/18/2023	41.2028	-80.9929	45.6	45.6
E31-20	07/18/2023	41.2391	-80.9454	0.8	0.8
E31-21	07/18/2023	41.2712	-80.8932	26.3	26.3
E31-22	07/18/2023	41.3026	-81.0126	1.3	1.3
E32-1	07/18/2023	40.7698	-80.0655	3.6	3.6
E32-2	07/18/2023	40.6578	-80.1151	1.5	1.5
E32-3	07/18/2023	40.5727	-80.2020	2.2	2.2
E32-4	07/18/2023	40.6285	-80.2713	7.2	7.2
E32-5	07/18/2023	40.6935	-80.2037	7.9	7.9
E32-6	07/18/2023	40.7838	-80.1553	5.9	5.9
E32-7	07/18/2023	40.7952	-80.2501	4.9	4.9
E32-8	07/18/2023	40.7566	-80.2702	4.4	4.4
E32-9	07/18/2023	40.7516	-80.3314	8.2	8.2
E32-10	07/18/2023	40.6991	-80.3052	10.4	10.4
E32-11	07/18/2023	40.6850	-80.3394	16.9	16.9
E32-12	07/18/2023	40.7343	-80.4049	7.6	7.5
E32-13	07/18/2023	40.7629	-80.3646	3.5	3.4
E32-14	07/18/2023	40.8161	-80.3354	8.9	8.9
E32-15	07/18/2023	40.8121	-80.3820	1.4	1.3
E32-16	07/18/2023	40.7478	-80.4242	4.1	4.0
E32-17	07/18/2023	40.7986	-80.4434	3.5	3.5
E32-18	07/18/2023	40.8220	-80.4979	3.0	3.0
CLASS 1	08/16/2023	40.4273	-80.5781	3.9	3.9
CLASS 2	08/16/2023	40.4411	-80.5699	0.4	0.4
CLASS 3	08/16/2023	40.6155	-80.5637	8.8	8.8
CLASS 4	08/16/2023	40.5931	-80.2653	2.2	2.2
CLASS 5	08/16/2023	40.8067	-80.4405	2.9	2.9
CLASS 6A	08/16/2023	40.8491	-80.4421	0.7	0.7
CLASS 6B	08/16/2023	40.8542	-80.4386	5.6	5.6
CLASS 7	08/16/2023	40.8285	-80.4806	4.5	4.5
CLASS 8	08/16/2023	40.8336	-80.4980	8.8	8.8

Sample #	Date	Lat.	Long.	Total TEQ using 50% DLs (pg/g)	Total TEQ using 0% DLs (pg/g)
CLASS 9	08/16/2023	40.8375	-80.5270	7.0	7.0
CLASS 10	08/16/2023	40.8291	-80.5397	11.1	11.1
CLASS 11	08/16/2023	40.8365	-80.5345	6.0	6.0
CLASS 12	08/16/2023	40.8372	-80.5315	3.9	3.9
CLASS 14	08/16/2023	40.8433	-80.5356	10.4	10.4
CLASS 15	08/16/2023	40.8624	-80.5519	28.5	28.5
0-10	12/06/2023	40.983700	-80.518900	24.1	24.1
0-15	12/06/2023	41.046600	-80.519500	4.3	4.3
15-5	12/06/2023	40.899700	-80.513600	3.5	3.5
15-15	12/06/2023	41.052000	-80.465200	5.5	5.5
33-5	12/06/2023	40.898900	-80.479500	3.9	3.9
33-10	12/06/2023	40.965100	-80.437200	4.5	4.5
33-15	12/21/2023	41.016200	-80.363500	1.6	1.6
50-5	12/06/2023	40.879600	-80.463000	9.3	9.3
50-10	12/21/2023	40.940500	-80.389800	1.3	1.3
50-15	12/06/2023	40.979400	-80.322200	7.2	7.2
60-2	12/06/2023	40.846800	-80.497700	2.2	2.2
60-10	12/06/2023	40.909600	-80.368700	0.9	0.9
60-15	12/06/2023	40.944000	-80.282000	3.4	3.4
60-15-D	12/06/2023	40.944000	-80.282000	3.7	3.7
70-5	12/06/2023	40.862700	-80.444600	2.7	2.7
70-10	12/06/2023	40.888300	-80.347200	4.3	4.3
70-15	12/06/2023	40.915500	-80.259600	9.7	9.7
70-15-D	12/06/2023	40.915500	-80.259600	10.7	10.7
80-10	12/06/2023	40.859745	-80.356241	3.3	3.3
80-15	12/06/2023	40.870400	-80.248800	9.4	9.4
90-2	12/06/2023	40.841800	-80.493000	0.5	0.5
90-5	12/06/2023	40.840600	-80.434700	5.8	5.8
90-10	12/06/2023	40.840200	-80.344800	1.8	1.8
90-15	12/06/2023	40.839000	-80.259300	17.4	17.4
315-5	12/06/2023	40.879000	-80.605200	17.1	17.1
315-5D	12/06/2023	40.879000	-80.605200	14.7	14.7
315-10	12/06/2023	40.929300	-80.669700	4.0	4.0
330-5	12/06/2023	40.900000	-80.575500	6.1	6.1
330-10	12/06/2023	40.965700	-80.635200	4.6	4.6

Sample #	Date	Lat.	Long.	Total TEQ using 50% DLs (pg/g)	Total TEQ using 0% DLs (pg/g)
345-5	12/06/2023	40.906700	-80.557300	4.2	4.2
345-10	12/06/2023	40.972700	-80.589500	5.2	5.2
345-15	12/06/2023	41.052300	-80.603800	8.1	8.1
Count or #				**98**	**98**
Minimum Value				**0.4**	**0.4**
Maximum Value				**45.6**	**45.6**
Average or Mean				**7.8**	**7.7**
Standard Deviation				**8.2**	**8.2**
# of Samples ≥ 4.8 ng/kg (NS/Arcadis Screening Value - pg. 31 of Sampling Report)[34]				**48**	**48**
% of Samples ≥ 4.8 ng/kg (NS/Arcadis Screening Value - pg. 31 of Sampling Report)[35]				**48.98%**	**48.98%**

For the 98 non-background soil Dioxin/Furan TEQ sample values, the average value reported was 7.8 ng/kg using 50% of the detection limit (DL) values; the average was 7.7 ng/kg or pg/g for Dioxin/Furan TEQ sample values using zero for DL values.

A set of soil dioxin TEQ calculation results for soil samples believed to be background samples are summarized in Table 9-19:

Table 9-19: Summary of Soil Dioxin/Furan Background Sample TEQ Calculations

Sample #	Date	Lat.	Long.	Total TEQ using 50% DLs (pg/g)	Total TEQ using 0% DLs (pg/g)
LK-01	12/21/2023	40.473919	-81.986393	2.3	2.3
LK-02	12/21/2023	40.473919	-81.986377	1.9	1.9
LK-03	12/21/2023	40.473932	-81.986345	2.5	2.5
LK-04	12/21/2023	40.473940	-81.986296	1.5	1.5
LK-05	12/21/2023	40.473926	-81.986400	2.6	2.6
LK-06	12/21/2023	40.473930	-81.986377	2.2	2.2
LK-07	12/21/2023	40.473959	-81.986350	2.3	2.3
LK-08	12/21/2023	40.473954	-81.986315	2.1	2.1
LK-09	12/21/2023	40.473954	-81.986393	2.5	2.5
LK-10	12/21/2023	40.473979	-81.986373	2.7	2.7

[34] Arcadis - Norfolk Southern Railway Company - Characterization Work Plan for Derailment-Area Soil - East Palestine Train Derailment Site - East Palestine, Ohio, September 7, 2023, V 3.6 – see https://www.epa.gov/system/files/documents/2023-09/Arcadis%20Soil%20Characterization%20Work%20Plan%20v3.6_CLEAN508.pdf.

[35] Ibid 46.

Sample #	Date	Lat.	Long.	Total TEQ using 50% DLs (pg/g)	Total TEQ using 0% DLs (pg/g)
LK-11	12/21/2023	40.473993	-81.986376	2.3	2.3
LK-12	12/21/2023	40.474012	-81.986323	2.4	2.4
LK-13	12/21/2023	40.474024	-81.986427	2.2	2.2
LK-14	12/21/2023	40.474026	-81.986417	2.0	2.0
LK-15	12/21/2023	40.474041	-81.986390	2.5	2.5
LK-16	12/21/2023	40.474060	-81.986335	2.6	2.6
Count or #				**16**	**16**
Minimum Value				**1.5**	**1.5**
Maximum Value				**2.7**	**2.7**
Average or Mean				**2.3**	**2.3**
Standard Deviation				**0.3**	**0.3**
# of Samples ≥ 4.8 ng/kg (NS/Arcadis Screening Value - pg. 31 of Sampling Report)				**0**	**0**
% of Samples ≥ 4.8 ng/kg (NS/Arcadis Screening Value - pg. 31 of Sampling Report)				**0.00%**	**0.00%**

For the 16 background soil Dioxin/Furan TEQ sample values, the average value reported was 2.3 ng/kg using 50% of the detection limit (DL) values; the average was 2.3 ng/kg for Dioxin/Furan TEQ sample values using zero for DL values.

As shown in Figure 9-24 dioxin TEQ background samples were taken ~81 miles to the west/southwest of CaramFab facility in the Lower Killbock Creek Wildlife Area:

Petty's Background Dioxin Soil Samples Rd 1 ng/kg: (ND=0 & ND=½)*

Total TEQ using 50% DLs	Total TEQ using 0% DLs
2.3	2.3
1.9	1.9
2.5	2.5
1.5	1.5
2.6	2.6
2.2	2.2
2.3	2.3
2.1	2.1
2.5	2.5
2.7	2.7
2.3	2.3
2.4	2.4
2.2	2.2
2	2
2.5	2.5
2.6	2.6

*Results are the same

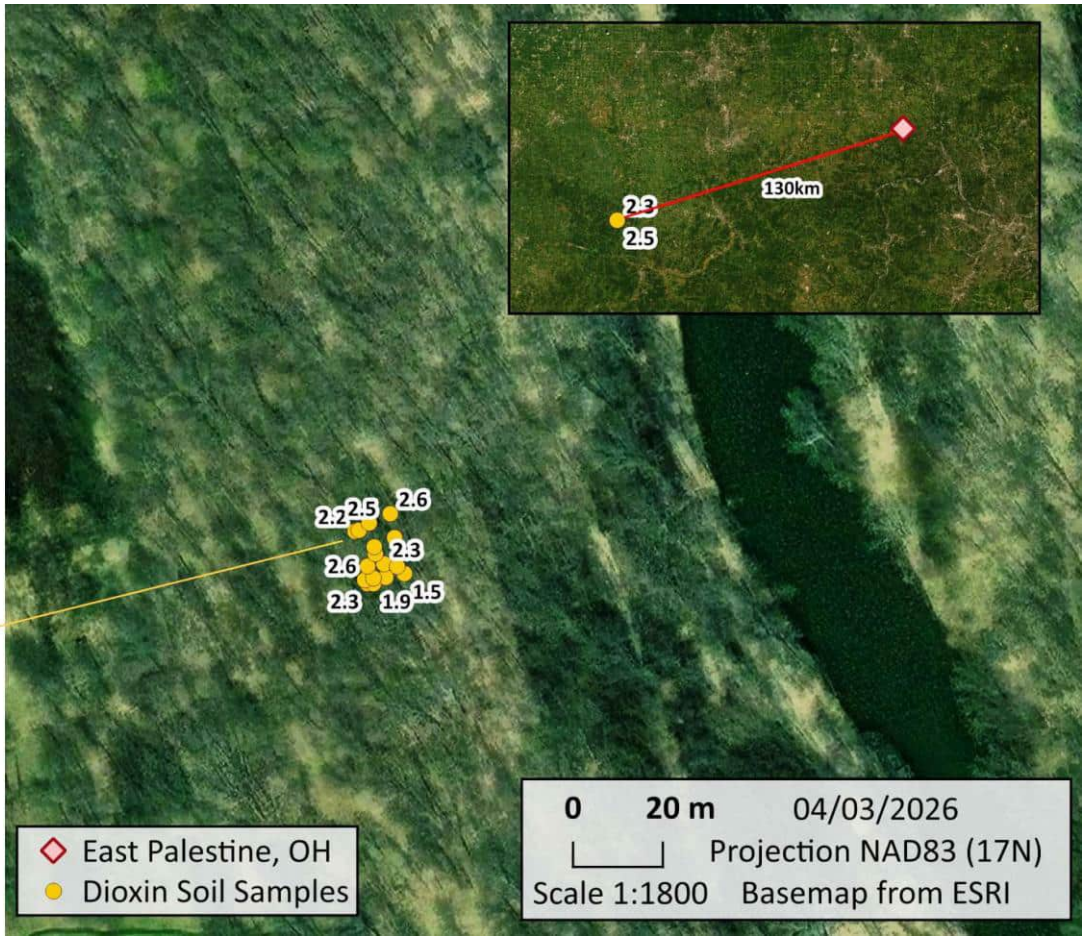


Figure 9-24: Plot of Soil Dioxin TEQ Calculation Results for Background Samples – Using 0% & 50% of DLs for DL Constituents

These results are higher than the only background samples reported in Ohio by the US EPA (Exhibit 92, pg. 2) from 2014 work by Urban et al. where the mean of three samples was 1.0 pg/g (vs. 2.3 pg/g in Table 9-18) with a medium value of 1.2 pg/g and values ranging from 1 to 1.8 pg/g. Thus, even our background values may not be background levels.

In addition, statistics on whether or not the mean values for non-background Dioxin/Furan TEQ values were the same as for background Dioxin/Furan TEQ values were completed. This statistical analysis is known as Analyses of Variance (ANOVA). Results for two scenarios (using means based on using DLs at 50% of DLs and means based on using DLs = 0) follow in Table 9-20 and 9-21 respectively:

Table 9-20: ANOVA Calculations and Results for Case where DLs at 50% of DLs were Utilized to Calculated Dioxin/Furan TEQs – Data Set #1

ANOVA Case 1a: Comparison of Dioxin/Furan TEQ Means for Non-Background and Background Samples Using DLs = 50% DL			
Sample Set	**Avg.**	**Obs.**	$(x_{jmean} - x_{mean})^2 * n_j$
Non-Background	7.75	98	57.6533
Background	2.29	16	353.1263
Total	6.99	114	410.7796
x^2 Calcs.	**Value**		
Total	6,489.8637		
Between	410.7796		
Within	6,079.0842		
ANOVA			
Groups (k)	2		
Observations (n)	114		
df (model)	1		
df (residual)	112		
F-statistic	7.57		
p-value	**0.00693**		**F.Dist.RT(F, df_m, df_{res})**

Table 9-21: ANOVA Calculations and Results for Case where DLs = 0 were Utilized to Calculated Dioxin/Furan TEQs – Data Set #1

ANOVA Case 1b: Comparison of Dioxin/Furan TEQ Means for Non-Background and Background Samples Using DLs = 0			
Sample Set	**Avg.**	**Obs.**	$(x_{jmean} - x_{mean})^2 * n_j$
Non-Background	7.74	98	57.4486

ANOVA Case 1b: Comparison of Dioxin/Furan TEQ Means for Non-Background and Background Samples Using DLs = 0			
Background	2.29	16	351.8728
Total	6.98	114	409.3214
x^2 Calcs.	**Value**		
Total	6,489.3952		
Between	409.3214		
Within	6,080.0738		
ANOVA			
Groups (k)	2		
Observations (n)	114		
df (model)	1		
df (residual)	112		
F-statistic	7.54		
p-value	0.00703		**F.Dist.RT(F, df_m, df_{res})**

In both cases, even using apparently high background values, the p-value was calculated to be <0.05 (0.00693 and 0.00703 – Tables 9-20 and 9-21), so the null hypotheses are rejected and one can conclude that the means are not the same.

9.6.2 Soil Dioxin TEQ Calculation Results for Data Set #2:

Soil dioxin TEQ calculation results for soil sample PAH sample results from Data Set #2, using the methodology outlines in Section 9.3, are summarized in Table 9-22:

Table 9-22: Summary of Soil Dioxin/Furan TEQ Calculations from Data Set #2

Dioxin Soil Samples ID and Location Information from Data Set #2					TEQ Calculation Results	
Lab Sample Id (Original)	**Petty ID**	**Sample #**	**Latitude**	**Longitude**	**TEQs ND = 0 ng-TEQ/kg (or pg/g)**	**TEQs ND = 1/2 ng-TEQ/kg (or pg/g)**
1	S-1-4	1	40.8358	-80.5392	138.6	138.7
2	S-2-4	2	40.8339	-80.5281	8.3	8.3
3	S-3-4	3	40.8358	-80.5192	139.8	139.8
4	S-4A-4	4	40.8353	-80.5178	0.8	0.8
5	S-5-4	5	40.8344	-80.5317	10.3	10.3
6A	S-6A-4	6	40.8336	-80.5406	17.3	17.3
6B	S-6B-4	6	40.8336	-80.5406	8.2	8.2

Dioxin Soil Samples ID and Location Information from Data Set #2					TEQ Calculation Results	
Lab Sample Id (Original)	Petty ID	Sample #	Latitude	Longitude	TEQs ND = 0 ng-TEQ/kg (or pg/g)	TEQs ND = 1/2 ng-TEQ/kg (or pg/g)
7A	S-7A-4	7	40.8328	-80.5425	5.3	5.3
8	S-8-4	8	40.8303	-80.5344	2.7	2.7
9	S-9-4	9	40.8522	-80.5469	1.8	1.8
10A	S-10A-4	10	40.8300	-80.5258	1.3	1.3
11A	S-11A-4	11	40.8361	-80.5344	5.5	5.5
15A	S-15A-4	15	40.8475	-80.5828	2.1	2.1
30	S-30-4A	30	40.8294	-80.5222	2.6	2.6
31	S-31-4A	31	40.8375	-80.5269	22.8	22.8
32	S-32-4A	32	40.8372	-80.5275	19.2	19.2
33	S-33-4A	33	40.8486	-80.5386	17.4	17.4
34	S-34-4A	34	40.7986	-80.5589	0.5	0.7
35	S-35-4A	35	40.8289	-80.5467	1.7	1.7
36	S-36-4A	36	40.8319	-80.5267	7.5	7.5
37	S-37-4A	37	40.8364	-80.5303	20.1	20.1
38	S-38-4A	38	40.8358	-80.5392	39.5	39.5
39	S-39-4A	39	40.8367	-80.5039	1.4	1.4
70	S-70-4	70	40.8359	-80.5272	0.9	0.9
71	S-71-4	71	40.8359	-80.5268	0.1	0.2
72	S-72-4	72	40.8359	-80.5263	27.4	27.4
73	S-73-4	73	40.8362	-80.5214	41.9	41.9
74	S-74-4	74.1	40.8361	-80.5218	110.6	110.6
75	S-75-4	75	40.8361	-80.5223	42.4	42.4
76	S-76-4	76.1	40.8361	-80.5222	377.5	377.5
77	S-77-4	77	40.8361	-80.5223	62.4	62.4
78	S-78-4	78.1	40.8361	-80.5225	40.4	40.4
79	S-79-4	79	40.8361	-80.5218	9.9	9.9
80	S-80-4	80	40.8361	-80.5223	13.6	13.6
81	S-81-4	81	40.8361	-80.5225	140.9	140.9
82	S-82-4	82	40.8361	-80.5223	22.3	22.3

As shown in Table 9-22, a nanogram per kilogram (ng/kg) is equal to a picogram per gram (pg/g) since there are 1,000 ng in a pg and 1,000 g in a kg.

9.6.3 Soil Dioxin TEQ Calculation Results for Data Set #3:

Soil dioxin TEQ calculation results for soil sample PAH sample results from Data Set #3, using the methodology outlines in Section 9.3, are summarized in Table 9-23:

Table 9-23: Summary of Soil Dioxin/Furan TEQ Calculations from Data Set #3

Client Sample Id	Latitude	Longitude	CeramFab or WYG Sample or Address	TEQs ND = 0 ng-TEQ/kg (or pg/g)	TEQs ND = 1/2 ng-TEQ/kg (or pg/g)
EP02-SO-1-1	40.83579	-80.52514	CeramFab - 900 E. Taggart St.	3.7	111.4
EP02-SO-2	40.8356	-80.5255	CeramFab - 900 E. Taggart St.	5.5	5.8
EP02-SO-3	40.83576	-80.52563	CeramFab - 900 E. Taggart St.	4.8	4.8
EP02-SO-4	40.83577	-80.52552	CeramFab - 900 E. Taggart St.	3.3	3.5
EP02-SO-5	40.83579	-80.52439	CeramFab - 900 E. Taggart St.	15.9	15.9
EP02-SO-6	40.83558	-80.52352	CeramFab - 900 E. Taggart St.	12.9	12.9
EP02-SSS-3	40.83526	-80.52356	CeramFab - 900 E. Taggart St.	22.3	22.3
EP03-SO; except VOCs	40.83494	-80.5259	800 E. Taggart St.	16.7	16.7
EP05-SO; except VOCs	40.8339	-80.52624	124 N. Pleasant Dr.	23.5	23.5
EP06-SO; except VOCs	40.8316	-80.52581	60 S. Pleasant Dr.	5.7	6.0
EP06-SO-2; except VOCs	40.833636	-80.524392	60 S. Pleasant Dr.	7.2	7.4
EP08-SO-2; except VOCs	40.83515	-80.53669	WYG Refractories - 193 N. James St.	22.8	23.3
EP10-SO; except VOCs	40.83699	-80.52715	701 E. Martin St.	18.0	18.3
EP11-SO; except VOCs	40.83687	-80.53486	275 E. Martin St.	24.4	24.6
EP12-SO; except VOCs	40.8328	-80.53134	472 E. Main St.	27.8	27.8
EP13-SO; except VOCs	40.8317	-80.53942	76 S. Market St.	27.0	29.7
EP14-SO; except VOCs	40.83923	-80.5413	86 W. Grant St.	94.1	97.9
EP80-SO-2; except VOCs	40.83515	-80.53669	WYG Refractories - 193 N. James St.	21.5	21.7

9.6.4 Soil and Sediment Dioxin TEQ Calculation Results for Data Set #4:

Soil and sediment dioxin TEQ calculation results for soil sample PAH sample results from Data Set #4, using the methodology outlines in Section 9.3, are summarized in Tables 9-24 and 9-25:

Table 9-24: Summary of Soil Dioxin/Furan TEQ Calculations from Data Set #4

Sample ID	Sampled Date	Sample Type	Property Address	Sample Latitude-Longitude	Dioxin TEQ ng-TEQ/kg (ND=0)	Dioxin TEQ ng-TEQ/kg (ND=1/2)
410-141089-11	8/29/2023	Soil	Near 418 East Taggart Street	40.835031, -80.532323	13.4	13.7
410-141089-9	8/29/2023	Soil	Near 418 East Taggart Street	40.835031, -80.532328	1.2	4.5
410-237289-1	8/3/2025	Soil	Near 418 East Taggart Street	40.835031, -80.532323	5.2	7.1
410-237289-3	8/3/2025	Soil	Near 418 East Taggart Street	40.835031, -80.532332	0.5	3.3
410-237282-1	8/3/2025	Soil	Near 83 East Rebecca Street	40.834128, -80.537799	5.0	7.0
410-237282-3	8/3/2025	Soil	Near 83 East Rebecca Street	40.834128, -80.537799	24.5	24.7
410-127590-3	5/16/2023	Soil	83 East Rebecca Street, East Palestine, OH	40.834205, -80.538378	13.9	25.0
410-144711-8	9/25/2023	Soil	83 East Rebecca Street, East Palestine, OH	40.834205, -80.538378	31.3	31.4
410-126924-3	5/15/2023	Soil	885 Taggart Street, East Palestine OH	40.834554, -80.524993	1,826.3	1,826.3
410-137121-3	7/31/2023	Soil	885 Taggart Street, East Palestine OH	40.834554, -80.524993	438.0	438.0
410-175954-1	6/12/2024	Soil	885 Taggart Street, East Palestine OH	40.834554, -80.524993	1,197.5	1,197.5
410-237292-1	8/3/2025	Soil	885 Taggart Street, East Palestine OH	40.834554, -80.524993	2,062.6	2,327.1
410-119901-6	3/22/2023	Soil	3519 N. Pleasant Drive, East Palestine, OH	40.848138, -80.526954	27.5	27.9
410-119901-8	3/22/2023	Soil	59 Wallace Avenue, East Palestine, OH	40.847014, -80.543711	0.7	3.6
410-119901-10	3/22/2023	Soil	164 East Main Street, East Palestine, OH	40.832937, -80.536923	1.5	5.6
410-119901-13	3/22/2023	Soil	468 Alice Street, East Palestine, OH	40.833634, -80.531475	0.9	3.6
410-119901-1	3/22/2023	Soil	3112 Hillcrest Circle, East Palestine, OH	40.854400, -80.535975	0.7	3.8
410-126924-6	5/15/2023	Soil	171 South Pleasant Drive, East Palestine, OH	40.830042, -80.525782	3.9	7.8
410-128628-10	5/30/2023	Soil	457 East Clark St, East Palestine, OH	40.836137, -80.531693	8.7	8.9
410-137121-6	7/31/2023	Soil	127½ Park Avenue, East Palestine OH	40.834455, -80.542120	21.7	21.9
410-141089-5	8/28/2023	Soil	301 East Taggart Street, East Palestine OH	40.834492, -80.534339	11.7	11.9
410-141089-6	8/28/2023	Soil	756 Hollow Road, Enon Valley, PA 16120	40.848589, -80.453834	3.5	5.7
410-141089-14	8/29/2023	Soil	650 East Martin Street, East Palestine, OH	40.837258, -80.528113	6.9	8.9
410-142486-7	9/11/2023	Soil	745 East Martin St, East Palestine, OH	40.836635, -80.525957	46.0	49.0
410-142486-6	9/11/2023	Soil	745 East Martin St, East Palestine, OH	40.836546, -80.526515	17.2	25.2
410-250542-1	10/29/2025	Soil	454 Overlook Drive, Hillsville, PA 16132	41.016241, -80.497051	11.8	13.3
410-250542-2	10/29/2025	Soil	454 Overlook Drive, Hillsville, PA 16132	41.016395, -80.496879	6.4	8.6
410-135745-1	7/20/2023	Soil	675 East Taggart Street, East Palestine, OH	40.834444, -80.527528	23.2	23.3

Table 9-25: Summary of Sediment Dioxin/Furan TEQ Calculation Results from Data Set #4

Sample ID	Sampled Date	Sample Type	Property Address	Sample Latitude-Longitude	Dioxin TEQ ng-TEQ/kg (ND=0)	Dioxin TEQ ng-TEQ/kg (ND=1/2)
410-118226-4	3/8/2023	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	0.60	28.64
410-128628-1	5/29/2023	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	35.20	544.26
410-141089-10	8/29/2023	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	4.28	53.69
410-175955-1	6/12/2024	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	4.53	55.66
410-237282-2	8/3/2025	Sediment	Near 83 East Rebecca Street	40.834128, -80.537799	0.20	23.01
410-237289-2	8/3/2025	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	0.24	25.65

9.7 Plots of Soil Dioxin TEQ Calculation Results at/near CeramFab & WYG Facilities:

Plots of soil TEQ calculation results from the data sets described earlier at/near Plaintiff locations, are summarized in this Section:

9.7.1 Plot of Soil Dioxin Calculation Results for Data Set #1:

Soil dioxin TEQ calculation results for Data Set #1 are shown plotted in Figures 9-25 and 9-26:

Close up: Petty's Round 1: Dioxin ng-TEQ/kg (ND=0)

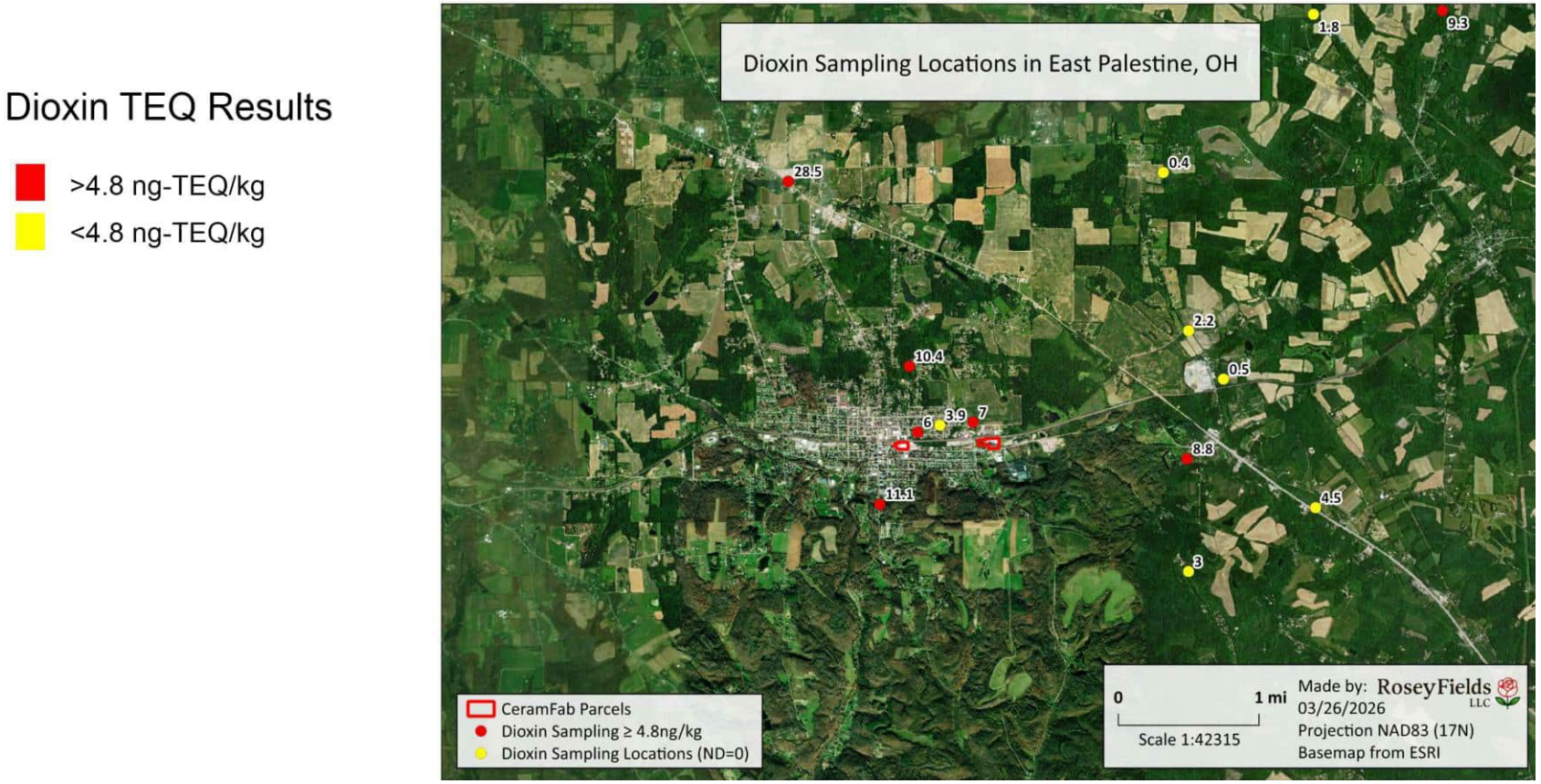


Figure 9-25: Plot of Soil TEQs Calculation Results for Data Set #1 – Using 0 for DL Constituents

Close up: Petty's Round 1: Dioxin ng-TEQ/kg (ND=1/2)

Petty's Dioxin
Rd 1: (ND=1/2)

>4.8 ng-TEQ/kg

<4.8 ng-TEQ/kg

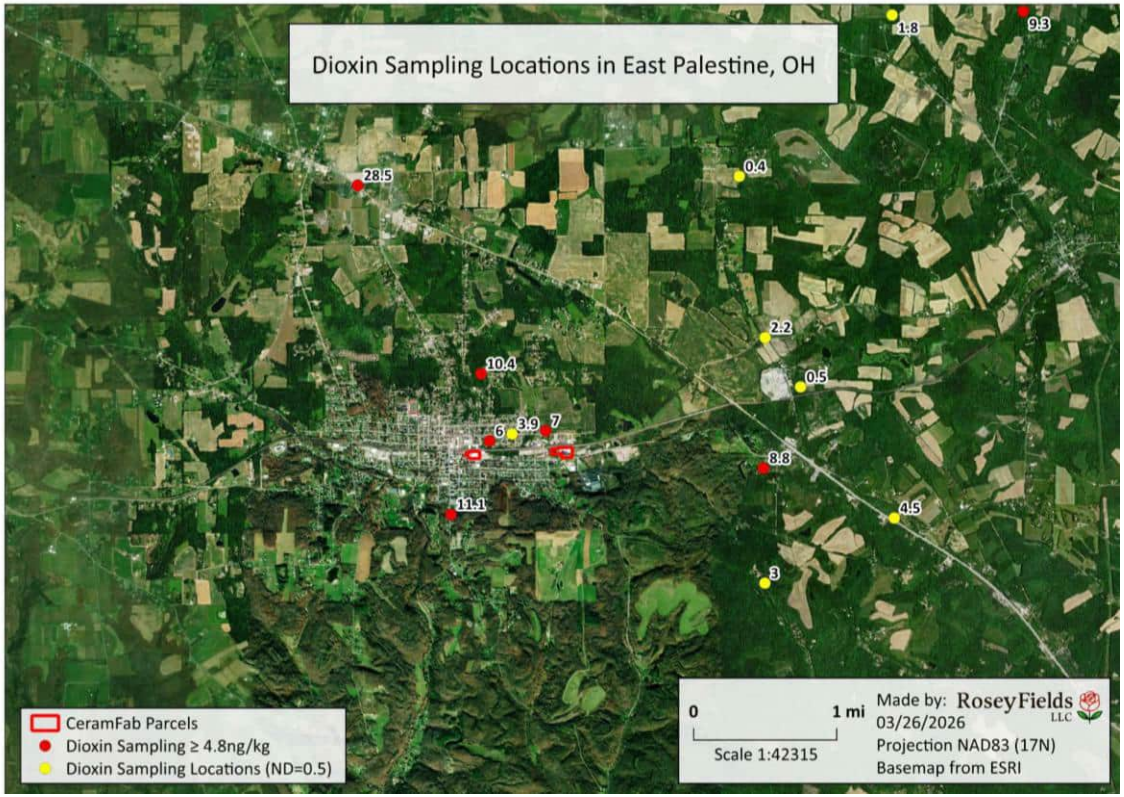


Figure 9-26: Plot of Soil TEQs Calculation Results for Data Set #1 – Using 50% of DLs for DL Constituents

9.7.2 Plot of Soil Dioxin Calculation Results for Data Set #2:

Soil dioxin TEQ calculation results for Data Set #2 are shown plotted in Figures 9-27 and 9-28:

Close up: Petty Round 2
Dioxin Soil Sampling (ND=0) ng-TEQ/kg

Figure 9-27: Plot of Soil TEQs Calculation Results for Data Set #2 – Using 0 for DL Constituents

Close up: Petty Round 2 Dioxin Soil Sampling (ND=½)
ng-TEQ/kg

Figure 9-28: Plot of Soil TEQs Calculation Results for Data Set #2 – Using 50% of DLs for DL Constituents

9.7.3 Plot of Soil Dioxin Calculation Results for Data Set #3:

Soil dioxin TEQ calculation results for Data Set #3 are shown plotted in Figures 9-29 and 9-30:

Full Extent: GEL Dioxin Soil Sampling (ND=0) ng-TEQ/kg

Figure 9-29: Plot of TEQs Calculation Results for Data Set #3 – Using 0 for DL Constituents

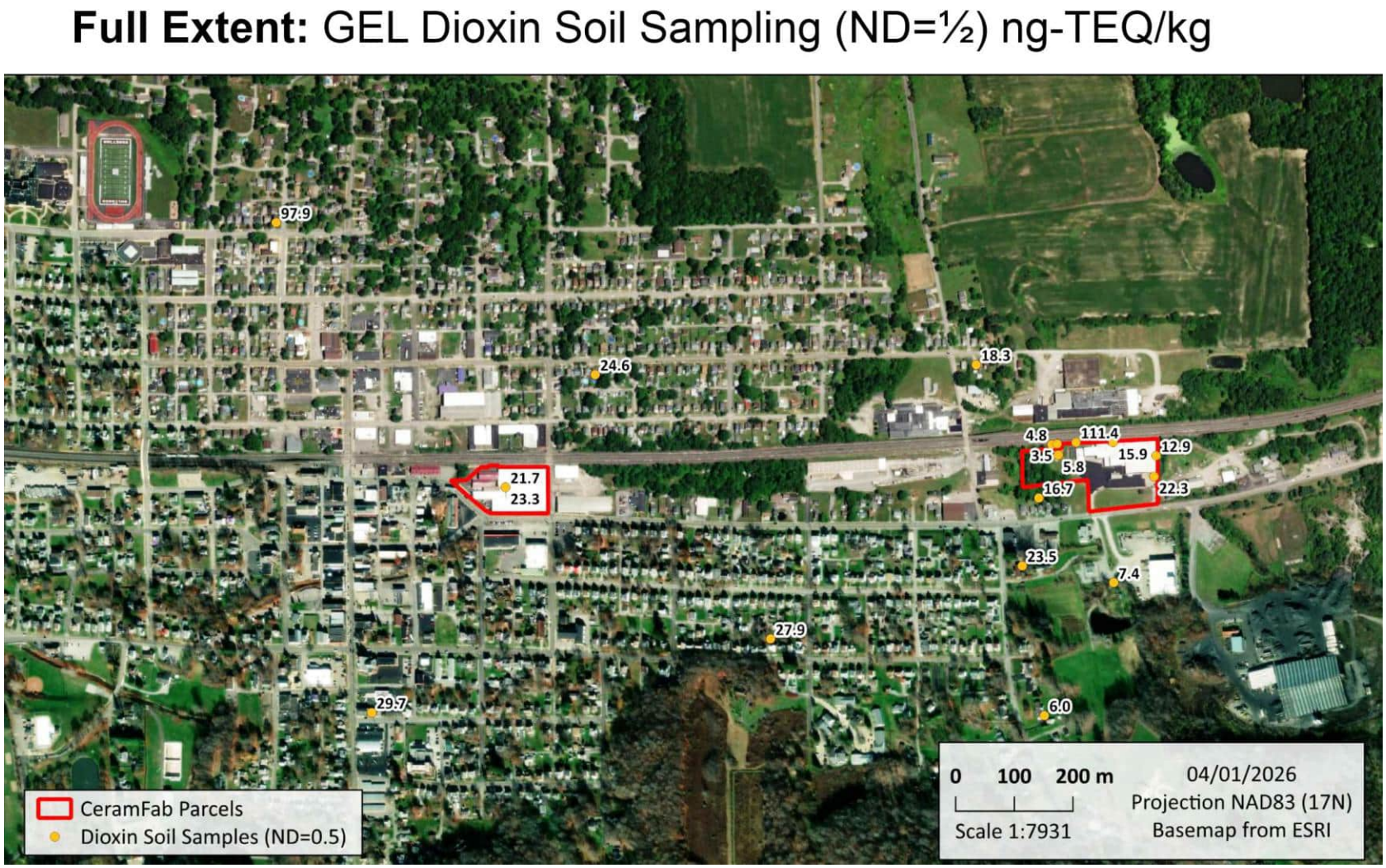


Figure 9-30: Plot of TEQs Calculation Results for Data Set #3 – Using 50% of DLs for DL Constituents

9.7.4 Plot of Soil Dioxin Calculation Results for Data Set #4:

Soil dioxin TEQ calculation results for Data Set #4 are shown plotted in Figures 9-31 and 9-32 and sediment dioxin TEQ calculation results for Data Set #4 are shown plotted in Figures 9-33 and 9-34:

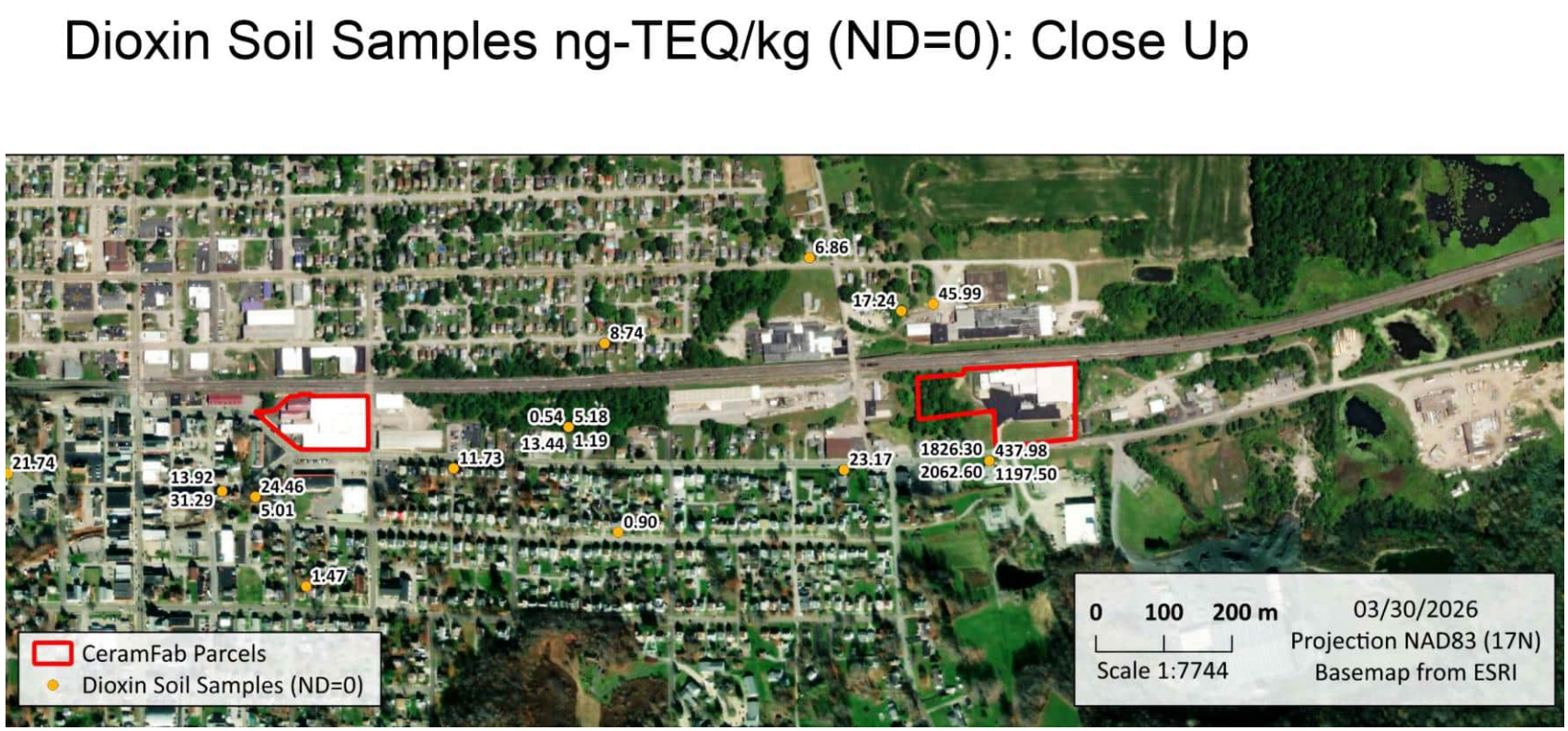


Figure 9-31: Plot of Soil TEQs for Data Set #4 – Using 0 for DL Constituents

Dioxin Soil Samples ng-TEQ/kg (ND=½): Close Up

Figure 9-32: Plot of Soil TEQs for Data Set #4 – Using 50% of DLs for DL Constituents

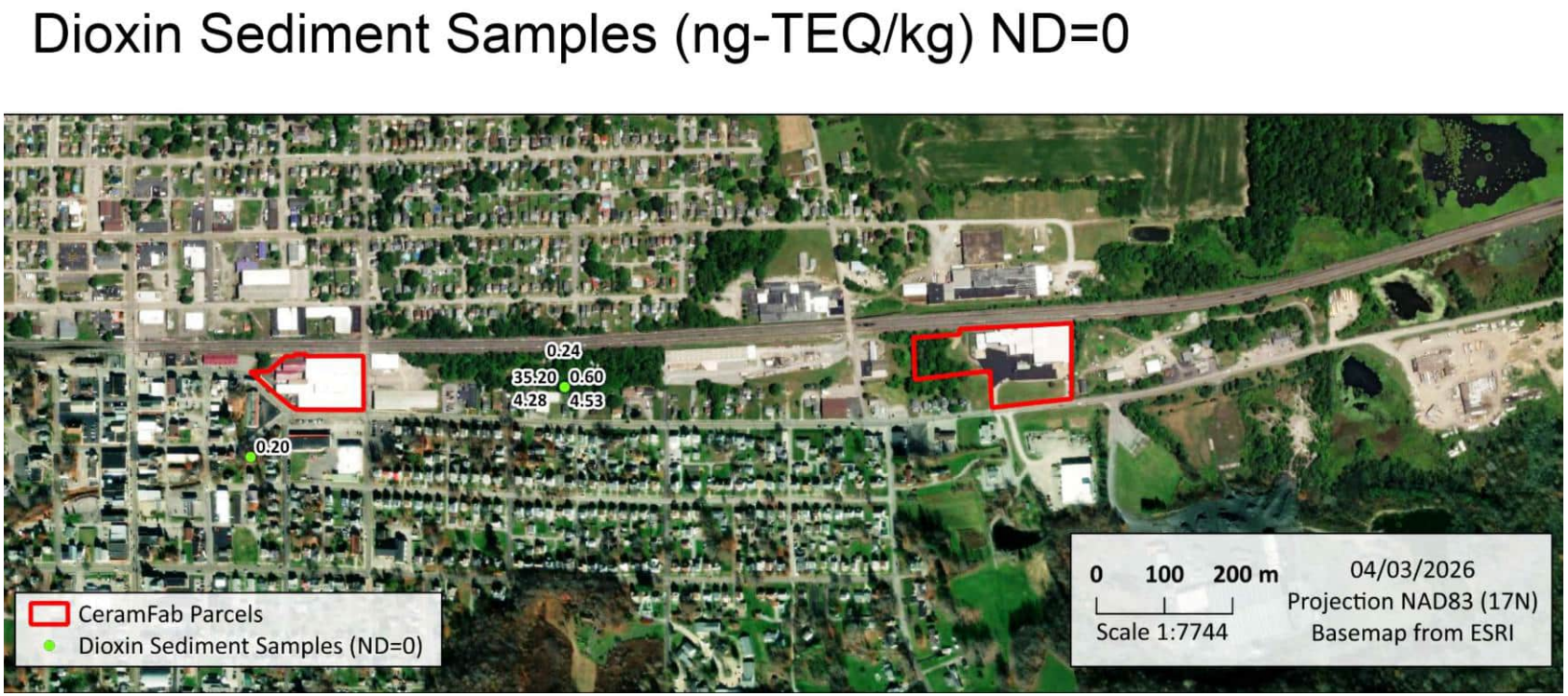


Figure 9-33: Plot of Sediment TEQs for Data Set #4 – Using 0 for DL Constituents

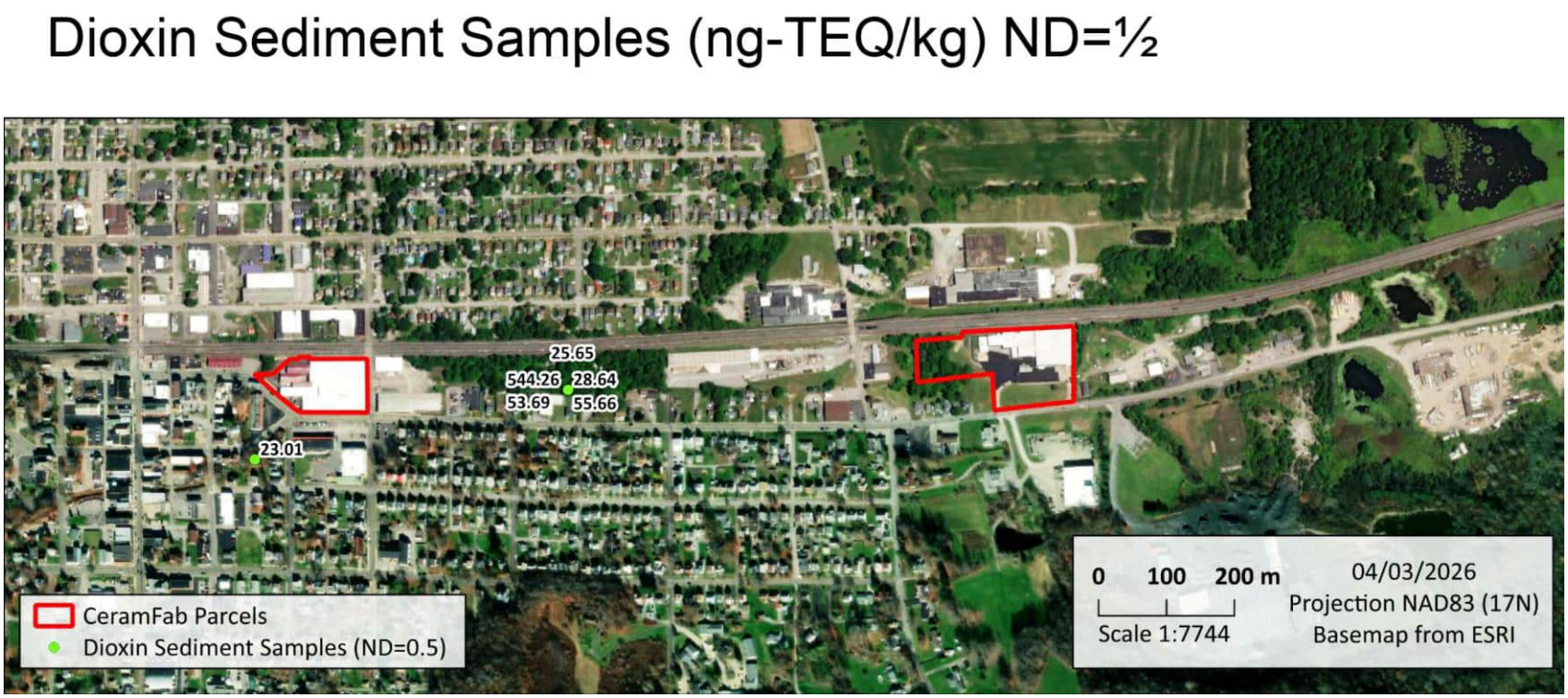


Figure 9-34: Plot of Sediment TEQs for Data Set #4 – Using 50% of DLs for DL Constituents

9.7.4.1 Raw Soil Dioxin Calculation Results/Plots from Eurofins for Data Set #4:

For comparison with US EPA calculated dioxin results, using non-QA/QC data, TEQ results provided by Eurofins (basis 2022 WHO TEFs) are summarized in Table 9-26:

Table 9-26: Summary of Soil, Sediments and Water Dioxin/Furan TEQ Calculations for Data Set #4 by Eurofins

Sample ID	Sampled Date	Sample Type	Property Address	Sample Latitude-Longitude	Eurofins Dioxin TEQ Result
Soils					
410-116817-5	2/22/2023	Soil	Near 418 East Taggart Street	40.835031, -80.532323	18.0
410-116817-6	2/24/2023	Soil	Near 418 East Taggart Street	40.835031, -80.532323	19.0
410-141089-11	8/29/2023	Soil	Near 418 East Taggart Street	40.835031, -80.532323	15.0
410-141089-9	8/29/2023	Soil	Near 418 East Taggart Street	40.835031, -80.532328	4.7
410-237289-1	8/3/2025	Soil	Near 418 East Taggart Street	40.835031, -80.532323	11.0
410-237289-3	8/3/2025	Soil	Near 418 East Taggart Street	40.835031, -80.532332	4.3
410-237282-1	8/3/2025	Soil	Near 83 East Rebecca Street	40.834128, -80.537799	12.0
410-237282-3	8/3/2025	Soil	Near 83 East Rebecca Street	40.834128, -80.537799	51.0
410-127590-3	5/16/2023	Soil	83 East Rebecca Street, East Palestine, OH	40.834205, -80.538378	25.0
410-144711-8	9/25/2023	Soil	83 East Rebecca Street, East Palestine, OH	40.834205, -80.538378	34.0
410-265284-1	2/11/2026	Soil	83 East Rebecca Street, East Palestine, OH	40.834205, -80.538378	79.0
410-126924-3	5/15/2023	Soil	885 Taggart Street, East Palestine OH	40.834554, -80.524993	1,900.0
410-137121-3	7/31/2023	Soil	885 Taggart Street, East Palestine OH	40.834554, -80.524993	460.0
410-175954-1	6/12/2024	Soil	885 Taggart Street, East Palestine OH	40.834554, -80.524993	1,300.0
410-237292-1	8/3/2025	Soil	885 Taggart Street, East Palestine OH	40.834554, -80.524993	5,300.0
410-119901-6	3/22/2023	Soil	3519 N. Pleasant Drive, East Palestine, OH	40.848138, -80.526954	65.0
410-119901-8	3/22/2023	Soil	59 Wallace Avenue, East Palestine, OH	40.847014, -80.543711	5.2
410-119901-10	3/22/2023	Soil	164 East Main Street, East Palestine, OH	40.832937, -80.536923	8.8
410-119901-13	3/22/2023	Soil	468 Alice Street, East Palestine, OH	40.833634, -80.531475	5.5
410-119901-1	3/22/2023	Soil	3112 Hillcrest Circle, East Palestine, OH	40.854400, -80.535975	4.2
410-126924-6	5/15/2023	Soil	171 South Pleasant Drive, East Palestine, OH	40.830042, -80.525782	8.0
410-128628-10	5/30/2023	Soil	457 East Clark St, East Palestine, OH	40.836137, -80.531693	9.4
410-137121-6	7/31/2023	Soil	127½ Park Avenue, East Palestine OH	40.834455, -80.542120	23.0
410-141089-5	8/28/2023	Soil	301 East Taggart Street, East Palestine OH	40.834492, -80.534339	13.0
410-141089-6	8/28/2023	Soil	756 Hollow Road, Enon Valley, PA 16120	40.848589, -80.453834	6.0
410-141089-14	8/29/2023	Soil	650 East Martin Street, East Palestine, OH	40.837258, -80.528113	9.6
410-144711-16	9/26/2023	Soil	258 East Martin St, East Palestine, OH	40.837189, -80.535222	19.0
410-142486-4	9/11/2023	Soil	1440 Beaver Circle, Columbiana OH 44408	40.879484, -80.620574	3.2
410-142486-7	9/11/2023	Soil	745 East Martin St, East Palestine, OH	40.836635, -80.525957	48.0

Sample ID	Sampled Date	Sample Type	Property Address	Sample Latitude-Longitude	Eurofins Dioxin TEQ Result
410-142486-6	9/11/2023	Soil	745 East Martin St, East Palestine, OH	40.836546, -80.526515	31.0
410-250542-1	10/29/2025	Soil	454 Overlook Drive, Hillsville, PA 16132	41.016241, -80.497051	40.0
410-250542-2	10/29/2025	Soil	454 Overlook Drive, Hillsville, PA 16132	41.016395, -80.496879	9.2
410-265283-1	2/11/2026	Soil	266 East Martin St., East Palestine OH	40.837180, -80.535075	10.0
410-265285-1	2/11/2026	Soil	258 East Martin St, East Palestine, OH	40.837455, -80.535225	7.0
410-265315-3	2/10/2026	Soil	130 East Main Street, East Palestine, OH	40.833020, -80.537563	16.0
410-265317-1	2/11/2026	Soil	716 East Main Street, East Palestine, OH	40.832550, -80.526898	49.0
410-130775-1	6/13/2023	Soil	800 East Taggart Street, East Palestine, OH	40.834946, -80.525904	27.0
410-162165-2	2/27/2024	Soil	800 East Taggart Street, East Palestine, OH	40.834946, -80.525904	11.0
410-162165-1	2/27/2024	Soil	800 East Taggart Street, East Palestine, OH	40.834686, -80.525866	24.0
410-265318-1	2/11/2026	Soil	800 East Taggart Street, East Palestine, OH	40.834686, -80.525866	24.0
410-265318-2	2/11/2026	Soil	800 East Taggart Street, East Palestine, OH	40.834946, -80.525904	39.0
410-265318-3	2/11/2026	Soil	800 East Taggart Street, East Palestine, OH	40.834946, -80.525904	20.0
410-135745-1	7/20/2023	Soil	675 East Taggart Street, East Palestine, OH	40.834444, -80.527528	26.0
410-265320-1	2/11/2026	Soil	675 East Taggart Street, East Palestine, OH	40.834444, -80.527528	29.0
Waters					
410-116817-1	2/22/2023	Water	Near 418 East Taggart Street	40.834128, -80.537799	8.6
410-116817-4	2/24/2023	Water	Near 418 East Taggart Street	40.835031, -80.532323	4.2
Sediments					
410-118226-4	3/8/2023	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	3.8
410-128628-1	5/29/2023	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	75.0
410-141089-10	8/29/2023	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	6.7
410-175955-1	6/12/2024	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	7.2
410-237289-2	8/3/2025	Sediment	Near 418 East Taggart Street	40.835031, -80.532323	2.7
410-237282-2	8/3/2025	Sediment	Near 83 East Rebecca Street	40.834128, -80.537799	2.7

Plots of the data shown in Table 9-26 are shown in Figures 9-35 through 9-37:

Dioxin Soil Samples ng-TEQ/kg: Close Up

Figure 9-35: Plot of Soil TEQs Results for Data Set #4 – Using Eurofins Calculated Results

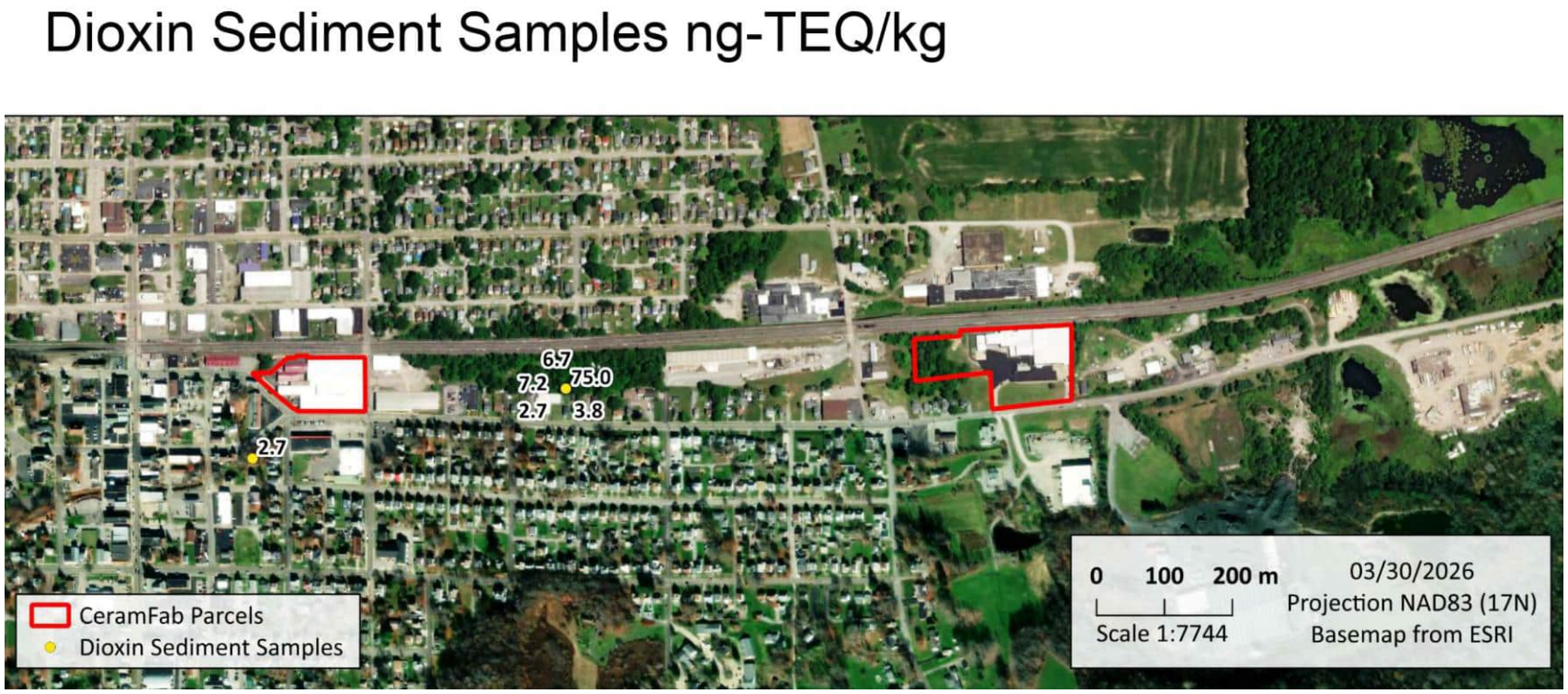


Figure 9-36: Plot of Sediment TEQs Results for Data Set #4 – Using Eurofins Calculated Results

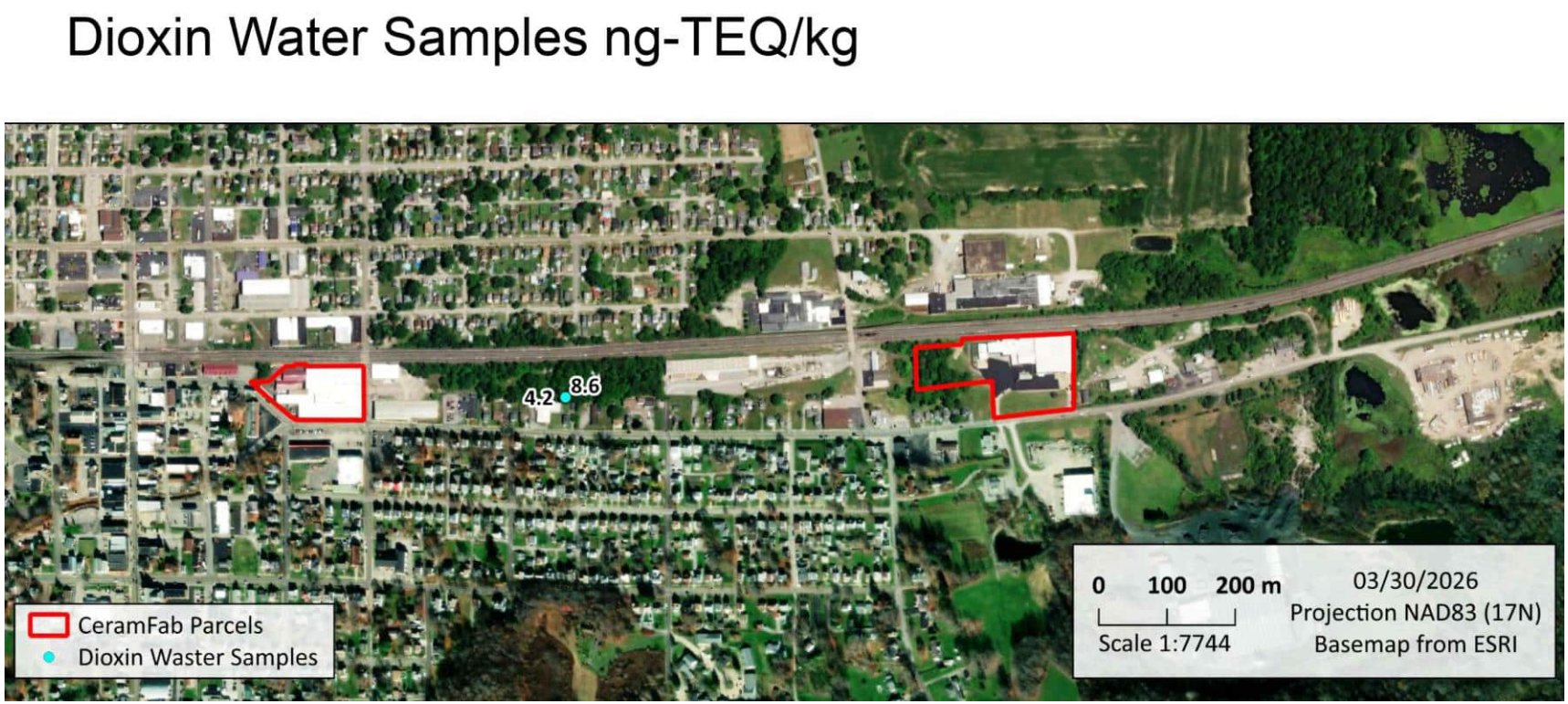


Figure 9-37: Plot of Water TEQs Results for Data Set #4 – Using Eurofins Calculated Results

9.8 Water Dioxin TEQ Calculation Results:

Water dioxin TEQ calculation results, from some of the water samples taken, are summarized in this Section.

9.8.1 Water Dioxin TEQ Calculation Results for Data Set #2:

A summary of TEQ calculations for water dioxin/furan samples from Data Set #2 are summarized in Table 9-27:

Table 9-27: Summary of Water Dioxin/Furan TEQ Calculations from Data Set #2

Dioxin Water Sample ID and Locations – Data Set #2					TEQ Calculation Results	
COC ID	Petty ID	Sample #	Latitude	Longitude	TEQs ND = 0 pg-TEQ/L	TEQs ND = 1/2 pg-TEQ/L
W-2-4	W-2-4A/4B	1	40.8339	-80.5281	0	0.2
W-4A-4	W-4a-4a/4b	2	40.8353	-80.5178	1.9	1.9
W-6-4A-4B	W-6-4B	3	40.8336	-80.5406	2.2	2.3
W-8-4	W-8-4a/4b	4	40.8303	-80.5344	0.2	0.3
W-8B-4	W-8B-4A/4B	5	40.8303	-80.5344	0.5	0.5
W-9-4	W-9-4A/4B	6	40.8522	-80.5469	0.2	0.3
W-10-4	W-10-4a	6	40.8300	-80.5258	1.1	1.2
W-11-4	W-11-4A/4B	7	40.8361	-80.5344	0.3	0.3
W-13A-4	W-13-4A/4B	8	40.8511	-80.5658	0.0	0.2
W-15A-2	W-15A-2B/2a	9	40.8475	-80.5828	0.0	0.2
W-15A-2	W-15A-4B/4a	10	40.8475	-80.5828	2.0	2.1
W-15B-2	W-15B-4a/4b	11	40.8475	-80.5828	0.2	0.4
W-29-4A,B	W-29-4A/4B	15	40.8339	-80.5433	6.6	6.7
W-70-4A-B	W-70-4A/4B	30	40.8359	-80.5272	5.8	6.3
W-72-4A-B	W-72-4A/4B	31	40.8359	-80.5263	0.1	0.1
W-74-2,4	W-74-4a/4b	32	40.8361	-80.5218	8.9	9.2
W-76-2,4	W-76-4a/4b	33	40.8361	-80.5222	3.0	3.1
W-78-2-4	W-78-4a/4b	34	40.8361	-80.5222	1.6	1.7

Surface water dioxin TEQ calculation results for Data Set #2 are shown plotted in Figures 9-38 and 9-39:

Close up: Petty Round 2 Dioxin Water Sampling (ND=0)
ng-TEQ/kg

Figure 9-38: Plot of Surface Water TEQs for Data Set #2 – Using 0 for DL Constituents

Close up: Petty Round 2 Dioxin Water Sampling (ND=½)
ng-TEQ/kg

Figure 9-39: Plot of Surface Water TEQs for Data Set #2 – Using 50% of DLs for DL Constituents

9.8.2 Water Dioxin TEQ Calculation Results for Data Set #3:

A summary of TEQ calculations for water dioxin/furan samples from Data Set #3 are summarized in Table 9-28:

Table 9-28: Summary of Water Dioxin/Furan TEQ Calculations from Data Set #3

Client Sample Id	Latitude	Longitude	CeramFab or WYG Sample or Address	ND = 0	ND = 1/2
EP02-SSW-1	40.83574	-80.52534	CeramFab - 900 E. Taggart St.	1.05	2.30
EP02-SSW-2	40.83552	-80.52362	CeramFab - 900 E. Taggart St.	0.00	1.09
EP02-SSW-3	40.83526	-80.52356	CeramFab - 900 E. Taggart St.	3.67	5.56
EP02-SSW-4	40.83526	-80.52415	CeramFab - 900 E. Taggart St.	13.29	16.26
EP02-SSW-5	40.83554	-80.52518	CeramFab - 900 E. Taggart St.	6.20	8.13
EP06-SW	40.832858	-80.524374	60 S. Pleasant Dr.	0.03	2.32
EP80-SSW	40.83554	-80.52518	CeramFab - 900 E. Taggart St.	5.87	8.44

Surface water dioxin TEQ calculation results for Data Set #3 are shown plotted in Figures 9-40 and 9-41:

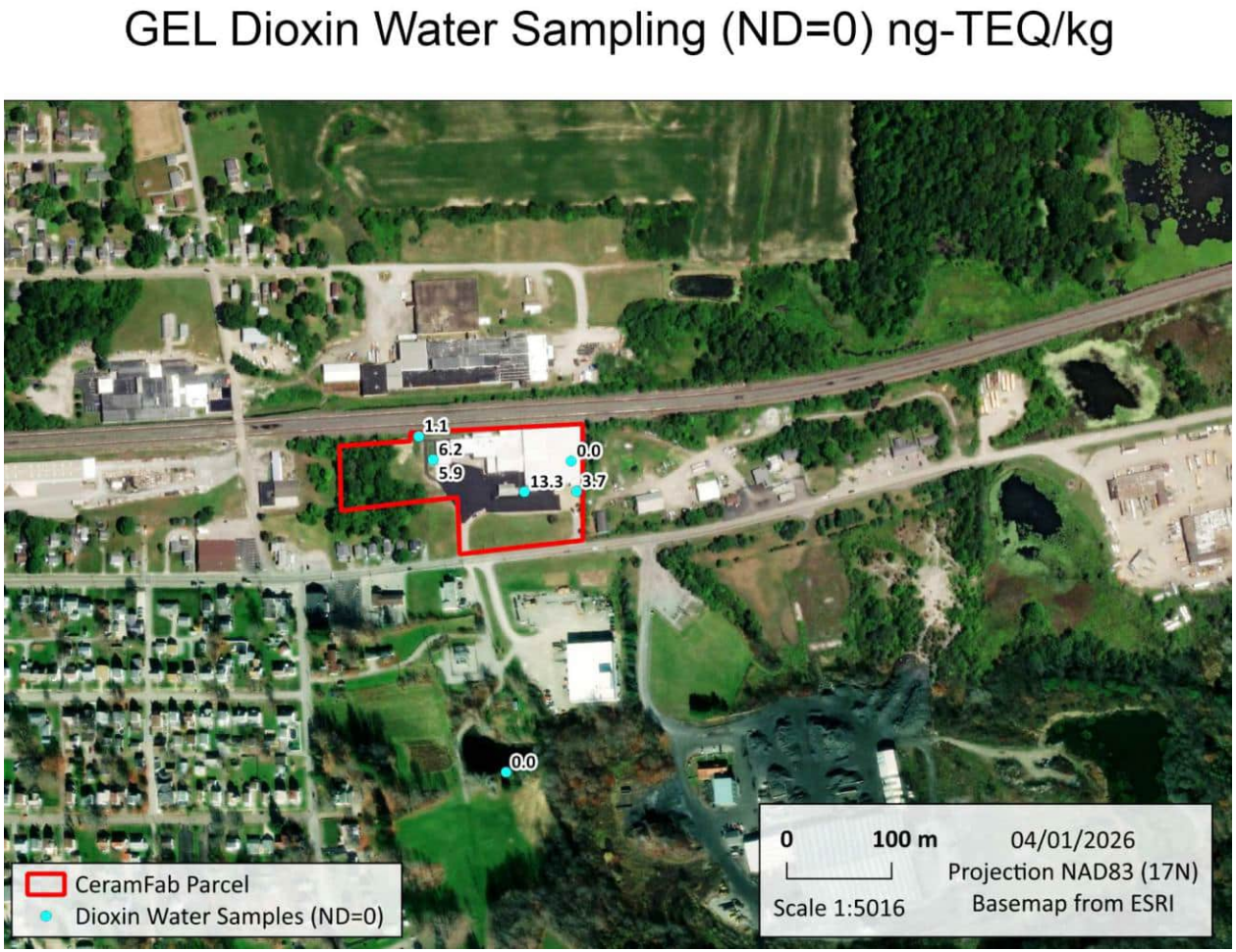


Figure 9-40: Plot of Surface Water TEQs for Data Set #3 – Using 0 for DL Constituents

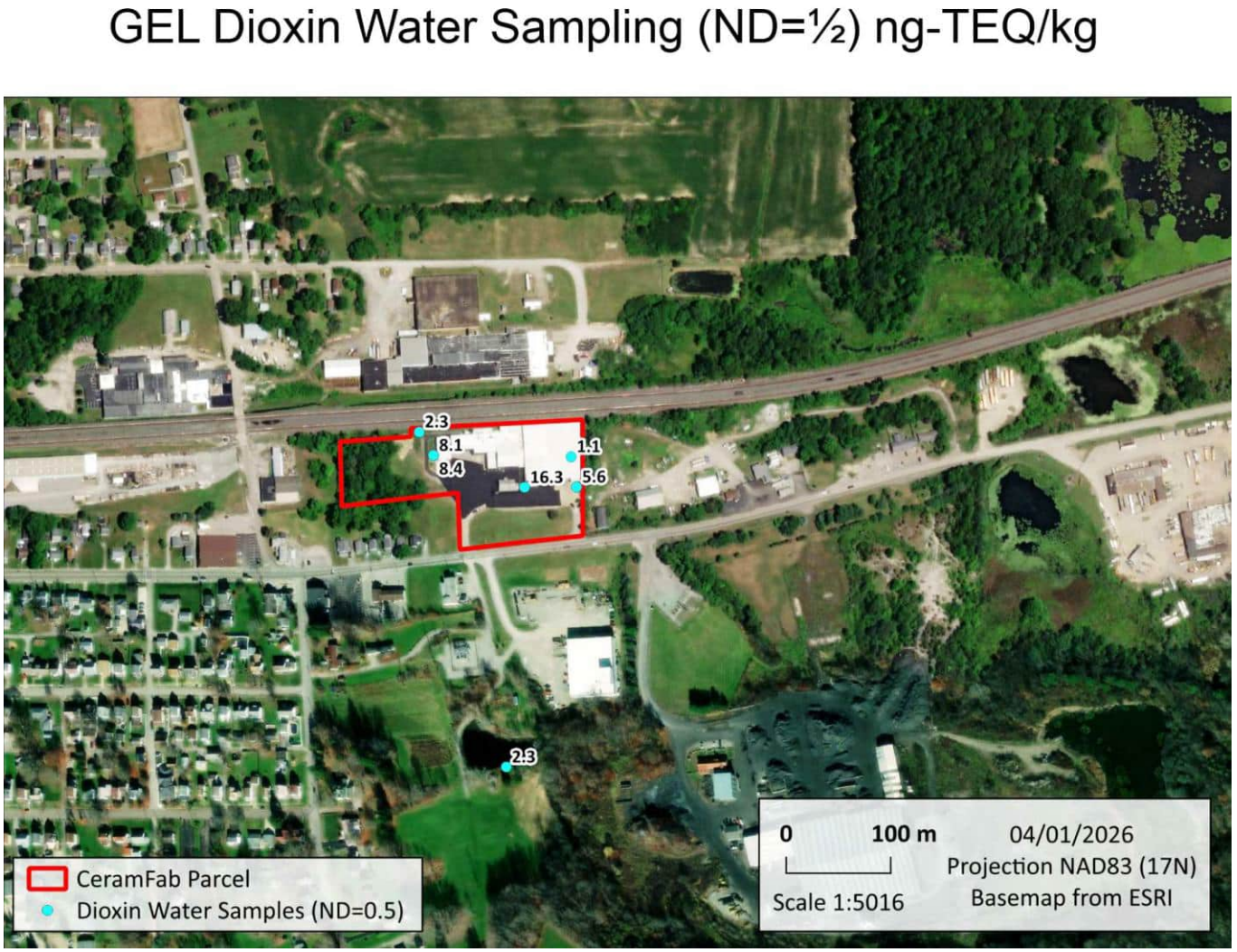


Figure 9-41: Plot of Surface Water TEQs for Data Set #3 – Using 50% of DLs for DL Constituents

9.9 TEQ Trends with Time:

It is well established that dioxins are long-lived in the environment and degrade very slowly as is found with many chlorinated hydrocarbons. Sampling results over time for two locations illustrate that the levels of dioxins measured with time (as TEQs) have remained elevated and in these two locations, have actually increased (Figure 9-42 and 9-43):

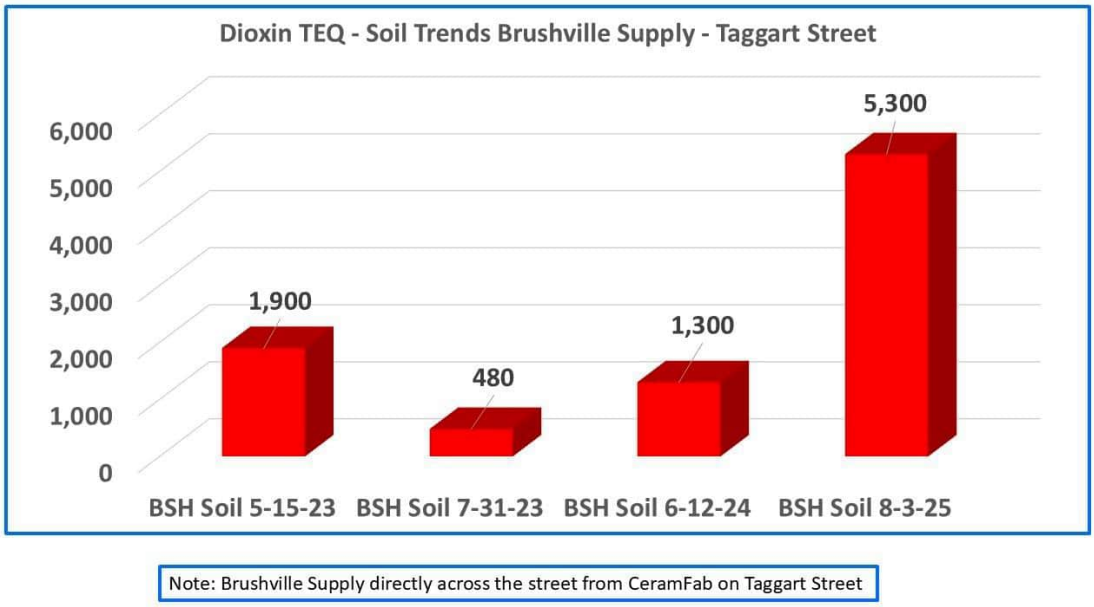


Figure 9-42: Dioxin TEQ Values with Time for the Brushville Supply Location Across Taggart Street from the CeramFab Facility

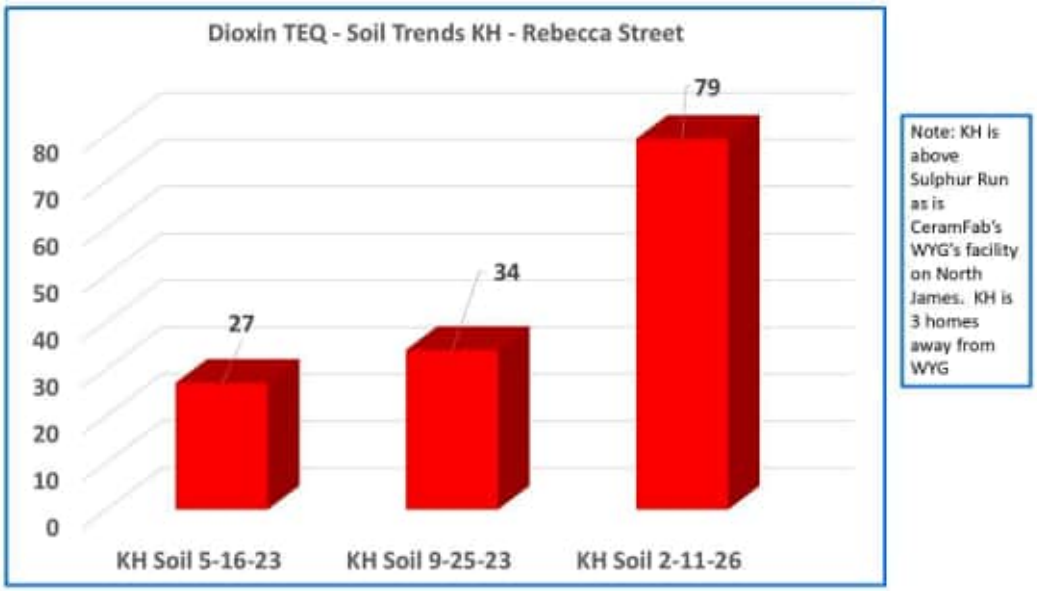


Figure 9-43: Dioxin TEQ Values with Time for the KH Location Which is Three Homes Away from the WYG Facility

These increases with time may be a reflection of remedial activities and/or resulting depositions and/or ongoing depositions. However, regardless of reason, the plots suggests that TEQ levels remain well above the screening level of 4.8 at/near the Plaintiffs locations and in the East Palestine, OH community and have increased with time.

9.10 TEQ Sulfur Run Results: Sediments vs. Side Banks:

Another interesting finding while remediation of the sediments in Sulfur Run may have had some impact on reducing contaminant levels, the banks on the side of Sulfur Run are elevated and much higher than the sediments themselves (Figure 9-44 and 9-45):

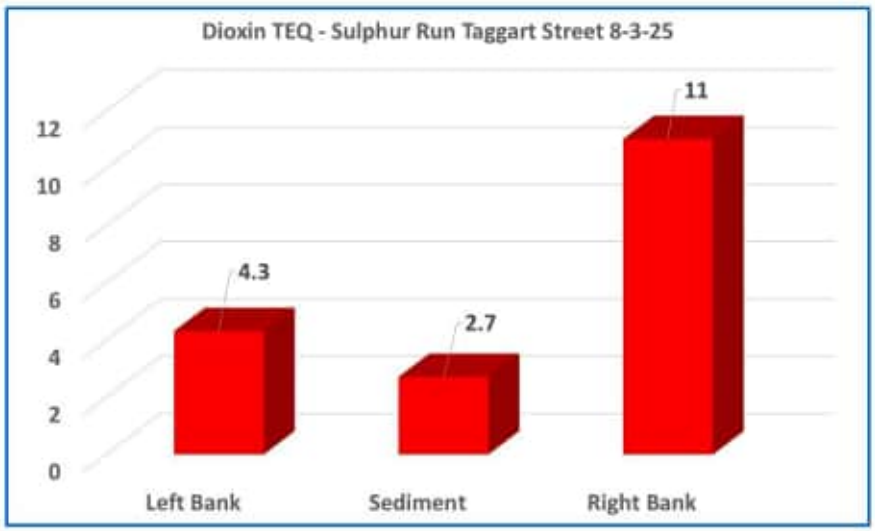


Figure 9-44: Dioxin TEQ Values in Sulfur Run Sediments vs. the Left and Right Side Banks at Taggart Street in East Palestine, OH

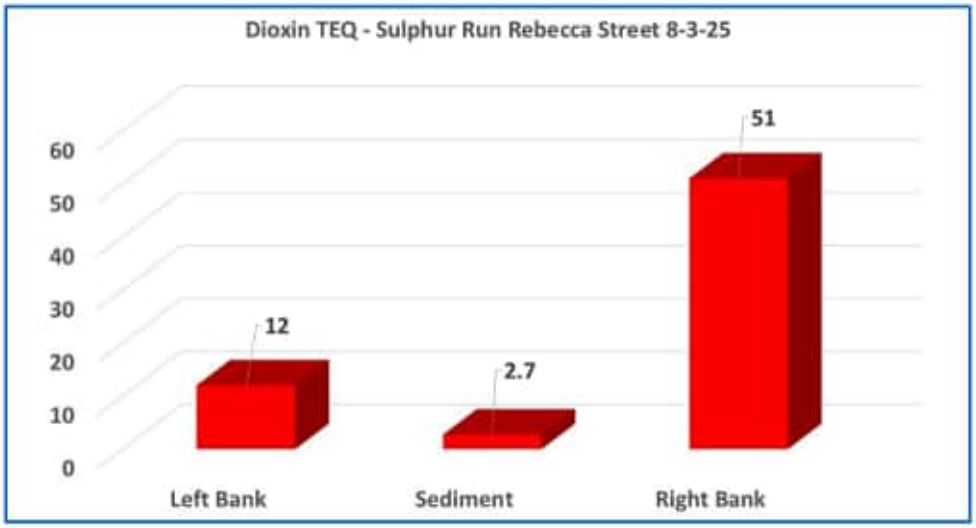


Figure 9-45: Dioxin TEQ Values in Sulfur Run Sediments vs. the Left and Right Side Banks at Rebecca Street in East Palestine, OH

Three of the four TEQ bank values shown in these two figures exceeded the TEQ screening criteria of 4.8 and the fourth value was just below this screening criteria. Moreover, the levels were measured in the fall of 2025, approximately 2.5 years after the derailment, and after remediation efforts were reportedly completed.

10.0 NS/ARCADIS FLAWED APPROACH TO REMEDIATION OF SOILS AND WATERS BELOW THE TRACKS:

Initially, in the first couple of days after the incident (i.e., February 6-8, 2023) as seen in Figures 10-1 and 10-2, NS remediation approach was to remove the derailment debris and to remove and replace rails, ties and ballast in/near the derailment area. Contaminants below/near the ballast were left behind:

February 8, 2023:

Figure 10-1: Aerial view of derailment cleanup and track work - Track repairs and derailment cleanup continue in East Palestine, Ohio, in this view on Feb. 8, 2023. Sol Tucker (from https://www.trains.com/trn/news-reviews/news-wire/rail-traffic-resumes-cleanup-continues-in-east-palestine/#:~:text=Sign%2Dup%20for%20email%20today!&text=EAST%20PALESTINE%2C%20Ohio%20%E2%80%94%20Trains%20are,with%20the%20way%20operations%20resumed)

February 9, 2023:

Figure 10-2 illustrates that railroad cars have been moved to the north and south of the tracks, and new ballast, ties, and rails have been added to both lines:

Figure 10-2: Photograph of Site – February 9, 2023 – Looking Northeast – Many Cars on Either side of the Tracks and Lines Are Restored – Looking East/Northeast

[This photo taken with a drone shows the continuing cleanup of portions of a Norfolk Southern freight train that derailed Friday night in East Palestine, Ohio, Thursday, Feb. 9, 2023. (AP Photo/Gene J. Puskar).]

This allowed contamination to remain behind, and impact nearby soils and groundwaters.

Later, the NS embarked on a remediation plan to remove contaminated soil and waters below/near the tracks, but did so in a flawed manner, by removing the contamination under the two sets of tracks one at a time. The remediation process was to:

- Stop traffic on north track.
- Remove track, ties, ballast, and soils down to a clay layer (see Figure 10-3).
- Replace removed materials, including ballast, ties, and tracks.
- Restart traffic on north track.
- Stop traffic on south track.
- Remove track, ties, ballast, and soil down to a clay layer.
- Replace removed materials, including ballast, ties, and tracks.
- Restart traffic on south track.

Figure 10-3: South Track Remediation – East End

And while this may have allowed NS to continue operating its trains, the flaw with this process is that the contamination under the south track would re-contaminate new clean materials placed under the north tracks as the remediation process continued.

Finally, data from Section 9.9 appear to show that levels of dioxins in locations proximate to the Plaintiff's properties are increasing with time. Why this is occurring is not definitively known, but sampling data results show it is occurring. Ongoing remediation contamination and releases from un-remediated areas (e.g., in the areas and abutting areas to plaintiff locations on Taggart and Rebecca streets which includes the creek banks – see Section 9-10) may be at least in part reasons why contamination levels appear to be increasing with time.

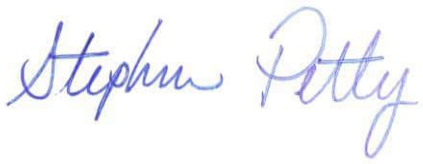
11.0 CLOSING:

The use of the report is subject to the limitations and exceptions set forth within this report, as well as the terms and conditions contained in the original contract documents signed by EES and Client. However, EES will not distribute or publish this report without Client's written consent, except as required by law or a court order.

All opinions provided in this report are made to a reasonable degree of scientific certainty and are based upon my education, training, experience, and research and are also supported by the reference materials listed herein and in the attached reliance materials. I reserve the right to supplement or mend these opinions based upon new evidence reviewed.

EES Group, Inc. appreciates the opportunity to work for Cory Watson Attorneys. If you have any questions or comments regarding this preliminary letter report, please call (754) 220-8844.

Sincerely,



Stephen Petty, P.E., C.I.H., C.S.P.
President, EES Group, Inc.

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29 CFR 1910.134 – OSHA Respiratory Protection Standard

29 CFR 1910.146 – Permit Required Confined Spaces

29 CFR 1910.1000 – OSHA PEL and Controls Standard

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40 CFR Part 68 – Protection of the Environment – Chapter I – EPA – Part 68 Chemical Accident Prevention Provision (i.e., Risk Management Plans – RMP).

40 CFR 700 – Toxic Substances Control Act (TSCA).

APPENDIX A

List of Exhibits

Exhibit	Description
01	November 14, 2023 Complaint - Ceramfab, Inc., Ceramsource, Inc, Yonggong, LLC, WYG Refractories, LLC and CeramSource, Inc. (Plaintiffs) vs. Norfolk Southern Corporation and Norfolk Southern Railway Company (Defendants). Case Number: 4:2023cv02206. Filed: November 14, 2023. Court: U.S. District Court for the Northern District of Ohio
02	June 17, 2025 Arcadis Memo Report to Eric Pohl – USEPA On-Scene Coordinator. Subject: Norfolk Southern Railway Company, East Palestine, Columbiana County, OH Site/Spill Identifier (SSID): C5XR Unilateral Administrative Order CERCLA Docket No. V-W-23-C-004 CeramFab Delineation Request.
03	e-mail from Eric Pohl to Matt Jackson and Distn. regarding CeramFab Delineation Report. Pohl, Eric pohl.eric@epa.gov. Sent: Friday, October 31, 2025 9:40 AM. To: Matt Jackson. cc: Christopher.Hunsicker@nscorp.com; Hunt, Daniel J; Kerr, Michelle; Melisa Witherspoon; Maguire, Andrew; 'Eyerdom, Timothy'; Horvatin, Shanna; Dixit, Naeha; McLaughlin, Jolie; Olson, Erik; 'Joblon, Christine'; Hall, Steven; Grams, Dustin. Subject: RE: NSRC - East Palestine - Train Derailment Site - Package 10 - CeramFab Delineation. Request, Revision 1
04	Arcadis report dated April 27, 2023: Stage 2 Data Validation Memorandum Norfolk Southern East Palestine Train Derailment Site, East Palestine, Ohio. Soil Samples. Sample Delivery Group: 410-121931-1 with cover page including Soil Sampling Summary Table.
05	Cover Letter and Arcadis Report dated March 12, 2024 from Sarah Jonker (Senior Environmental Scientist) and Stephanie R. Knight, P.E.(Client Program Manager/Vice President), Indianapolis, IN to Mr. Howard Wang, CeramFab Inc., 900 East Taggart Street, East Palestine, Ohio 44413. Our Ref: 30208287. Subject: Air and Sub-Slab Vapor Sample Results, CeramFab Inc., Norfolk Southern Derailment Site, East Palestine, Ohio.
06	Cover Letter and Arcadis Report dated May 23, 2024 from Sarah Jonker (Senior Environmental Scientist) and Stephanie R. Knight, P.E.(Client Program Manager/Vice President), Indianapolis, IN to Mr. Howard Wang, CeramFab Inc., 900 East Taggart Street, East Palestine, Ohio 44413. Our Ref: 30208287. Subject: Air and Sub-Slab Vapor Sample Results, CeramFab Inc., Norfolk Southern Derailment Site, East Palestine, Ohio.
07	Cover Letter and Arcadis Report dated August 23, 2024 from Sarah Jonker (Senior Environmental Scientist) and Stephanie R. Knight, P.E.(Client Program Manager/Vice President), Indianapolis, IN to Mr. Howard Wang, CeramFab Inc., 900 East Taggart Street, East Palestine, Ohio 44413. Our Ref: 30208287. Subject: Air and Sub-Slab Vapor Sample Results, CeramFab Inc., Norfolk Southern Derailment Site, East Palestine, Ohio.
08	Cover Letter and Arcadis Report dated December 8, 2024 from Sarah Jonker (Senior Environmental Scientist) and Stephanie R. Knight, P.E.(Client Program Manager/Vice President), Indianapolis, IN to Mr. Howard Wang, CeramFab Inc., 900 East Taggart Street, East Palestine, Ohio 44413. Our Ref: 30208287. Subject: Air and Sub-Slab Vapor Sample Results, CeramFab Inc., Norfolk Southern Derailment Site, East Palestine, Ohio.
09	Arcadis Water Pipe Repair at CeramFab – Summary Report. Bates NS-CeramFab000961-969.
10	March 2, 2023 National Safety Transportation Board (NTSB) News Release. NTSB Examining Rail Car Component in East Palestine Derailment. Downloaded on April 13, 2023.
11	February 3, 2023 National Safety Transportation Board (NTSB) News Release. Norfolk Southern Railway Train Derailment with Subsequent Hazardous Material Release and Fires. Preliminary Report RRD23MR005. Downloaded on February 23, 2023.
12	March 24, 2023. Tom Perkins. Plan to test for dioxins near Ohio train derailment site is flawed, experts say, The Guardian. Downloaded on March 24, 2023.
13	March 21, 2023 National Safety Transportation Board (NTSB). Norfolk Southern Railway Train Derailment with Subsequent Hazardous Material Release and Fires - Investigation Details – Update. Downloaded on April 13, 2023.

Exhibit	Description
14	July 19, 2024 NTSB Final Report regarding NS Train Derailment. Accident Investigation Summary Report HQ-2023-1813. Norfolk Southern Railway Company (NS) East Palestine, OH – Derailment. February 3, 2023. Downloaded from: https://railroads.dot.gov/elibrary/accident-investigation-summary-report-hq-2023-1813.
15	June 25, 2024 NTSB Press Release: "Failed Wheel Bearing Caused Norfolk Southern Train Derailment in East Palestine, Ohio" and 'NTSB: Decision to vent and burn hazmat tank cars "unnecessary."' Downloaded from: https://www.ntsb.gov/news/press-releases/Pages/NR20240625.aspx.
16	June 25, 2004. Abstract of NTSB Final Report regarding Feb. 3, 2023 Train Derailment in East Palestine, OH. Downloaded from: https://www.ntsb.gov/investigations/Documents/East%20Palestine%20Ohio%20Board%20Meeting%20Summary%20with%20Amendments.pdf.
17	Larsen, E., Mac Swinford and Kim E. Vorbau. 2002. Surface Geology of the Ohio Portion of the East Liverpool 30 x 60 Minute Quadrangle. State of Ohio. Department of Natural Resources.
18	Arcadis US, Inc. Norfolk Southern Railway Company Phase I – Preliminary Residential/ Commercial/Agricultural Soil Sampling Plan. East Palestine Train Derailment Site, East Palestine, Ohio. March 6, 2023; Revised April 5, 2023. Prepared for Norfolk Southern Railway Company. Prepared by: Arcadis US, Inc., 50 Fountain Plaza, Suite 600, Buffalo, New York 14202. Phone: 716 667 0900. Fax: 716 842 2612.
19	TRAIN 32N - EAST PALESTINE - derail list Norfolk Southern document – preliminary manifest – February 19, 2023. From: https://www.epa.gov/system/files/documents/2023-02/TRAIN%2032N%20-%20EAST%20PALESTINE%20-%20derail%20list%20Norfolk%20Southern%20document.pdf. See also Exhibits 28-29.
20	Moorwood, Victoria. February 13, 2023. East Palestine Train Derailment: A Timeline of What Happened When. Cincinnati Enquirer. Downloaded March 7, 2023.
21	Deliso, Meredith. March 3, 2023. East Palestine Derailment: Time of Key Events in Toxic Train Disaster. ABC News. Downloaded March 7, 2023.
22	Guise, Michael. February 4, 2023. Train Derailment Causes Massive Fire in East Palestine, OH. CBS Pittsburgh. Downloaded March 7, 2023.
23	Romero, Dennis and Marlene Lenthang. February 6, 2023. Controlled Chemical Release Scheduled to Prevent Explosion in Wake of Ohio Train Derailment. U.S. News. Downloaded March 7, 2023.
24	Wikipeida. 2023 Ohio Train Derailment. Downloaded March 7, 2023.
25	Listing of Uploaded Videos Taken in February 2023 in East Palestine, OH by Petty (Photos Directories contain original files).
26	Petty May 8, 2023 Draft Report - News and Links with regard to Dioxin Testing at East Palestine.
27	Directory with Petty Photos and Movies – Sampling Sites / Misc.
28	Altman, Rebecca. April 4, 2023, On Vinyl Essay, Orion - Contains Link to Initial NS Manifest (see Exhibits 29 and 19).
29	TRAIN 32N - EAST PALESTINE - Derail List – from Orion Paper Link (see Exhibit 28).
30	FracTracker Alliance. April 3, 2023. Off the Rails.
31	Video - Vinyl Chloride Production 1954 BF Goodrich Company
32	About PVC - ECVM". ECVM. Archived from the Original on 5 December 2023. Retrieved February 26, 2026.
33	"Poly(Vinyl Chloride)". www.pslc.ws. Retrieved February 26, 2026.

Exhibit	Description
34	"Poly(Vinyl Chloride)". From Sigma Millipore. https://www.sigmaaldrich.com/US/en/substance/polyvinylchloride123459002862. Retrieved February 26, 2026.
35	Feb. 6, 2023 East Palestine Evacuation Zones - Governor's Office - State of Ohio. East Palestine Update: Evacuation Area Extended, Controlled Release of Rail Car Contents Planned for 3:30 p.m. From: https://governor.ohio.gov/media/news-and-media/east-palestine-update-evacuation-area-extended-controlled-release-of-rail-car-contents-planned-for-3-30-pm-02062023#:~:text=In%20Ohio%2C%20the%20areas%20at,may%20be%20subject%20to%20arrest. Retrieved February 26, 2026.
36	Norfolk Southern Railway Company Phase I – Preliminary Residential/Commercial/Agricultural Soil Sampling Plan - East Palestine Train Derailment Site, East Palestine, Ohio. March 6, 2023; Revised April 5, 2023. From: https://www.epa.gov/system/files/documents/2023-06/04%2005%2023%20Residential-Commercial-Agricultural%20Soil%20Sampling%20Work%20Plan%20508.pdf. Retrieved February 26, 2026.
37	Lucas, Justin. April 4, 2023. Impacts of the East Palestine Train Derailment Mapped. From: https://urbanfootprint.com/blog/blog-post/east-palestine-impacts-mapped/. Retrieved February 26, 2026. Evacuation areas and smoke area.
38	April 19, 2023. Petty Draft Report Summarizing Analytical Findings from Sampling Air, Soils, and Waters in and around East Palesttine, OH following Release of Chemicals from Norfolk Southern Train Derailment.
39	April 27, 2023. Petty Draft Report Summarizing Analytical Findings from Sampling Air, Soils, and Waters in and around East Palesttine, OH following Release of Chemicals from Norfolk Southern Train Derailment.
40	March 30, 2023 - Petty Draft Report on Weather (wind) Data.
41	EES Group, Inc. Chart of Media, Analyses, and Methods for Chain of Custody for Soil, Sediment, and Water Sampling/Samples, Stephen Petty, P.E., C.I.H., C.S.P. April 18, 2023.
42	April 18, 2023 - Petty observations from review of posted EPA air, sediment, soil and water sampling results
43	April 27, 2023 Petty Draft Summary of Analytical Results from E Palestine, OH Train Derailment.
44	May 10, 2023. Petty Draft Report Summarizing April Soil and Water Sampling Locations in and around East Palestine, OH following Release of Chemicals from Norfolk Southern Train Derailment.
45	May 31, 2023 - EES Group, Inc (Petty) TRI Extractions - Downloaded TRI files for Columbiana County, OH (2021, 2020, 2019 and 10 to 11 companies), Beaver County, PA (2021 and 32 companies) and Lawrence County, PA (2021 and 17 companies) - Summary Tables.
46	June 6, 2023. EES Group, Inc (Petty) TRI Extractions – New Waterford, OH – Columbiana County & New Philadelphia, OH – Tuscarawas, OH - Table 1: New Waterford, OH - Columbiana County, OH Listed Locations and Chemicals by Company (1987 through 2021).
47	May 23, 2023 - Petty Plotted Map of BUSTR Sites
48	May 23, 2023 download – BUSTR file report - 15000004-01 1020 E Taggart - Leake Oil Company – 1995.
49	May 23, 2023 download – BUSTR file report - 15000004-02 1020 E Taggart - Leake Oil Company – 1998.
50	April 14, 2024. Petty Draft Report Summarizing Potential Implications of Benzo(a)pyrene & Dioxin/Furan Soil Sampling Results in Surface Soils In/Around the Norfolk Southern Train Derailment Site in East Palestine, OH.

Exhibit	Description
51	Continuous Air Monitoring Summary Table – 2/11-13/2023 Low Resolution Air Sampling
52	Summary of Petty Feb to May 2023 Sampling Locations and Sample #s.
53	April 18, 2023 Arcadis Report to Norfolk Southern Railway Company. East Palestine, OH Derailment Waste Management Plan. Milepost PC49 Railroad Tracks Northeast of North Pleasant Drive and Taggart Road Intersect, Columbiana County, East Palestine, Ohio. EPA ID: OHR000221457. Waste Characterization Report.
54	February 3, 2023 Arcadis Report to Norfolk Southern Railway Company. Main Line Interim Soil Removal Plan, Amendment 3, East Palestine, OH
55	June 27, 2023 Arcadis Report to Norfolk Southern Railway Company. Groundwater Characterization Work Plan, East Palestine, OH with June 29, 2023 Approval Cover Letter from USEPA's Ralph Dollhopf – On-Scene Coordinator to NS RR.
56	December 12, 2023 Directive issued by the USEPA on pursuant to the Unilateral Administrative Order CERCLA Docket No. V-W-23-C-004 regarding "Unreported Gelatinous Material and Explanation of Actions".
57	January 11, 2024 Arcadis Report to Norfolk Southern Railway Company. Main Line Interim Soil Removal Plan Addendum for Backfill and Restoration with January 8, 2024 Approval with Changes Cover Letter from USEPA Region 5.
58	Undated Arcadis Report (circa March/April 2024) entitled: "Water Pipe Repair at CeramFab - Summary Report." Repairs made from March 5-7, 2024.
59	Undated Arcadis Report (circa May/April 2024) entitled: "FINAL Flow Restoration in Stormwater Swales and Ditches Process." This report contains attachments summarizing analytical results from sampling activities along with e-mails between Arcadis and USEPA.
60	June 17, 2025 Arcadis U.S., Inc. (Arcadis) CeramFab Delineation Request Memorandum (Memo) to USEPA's Eric Pohl (On-Scene Coordinator). The memo was prepared on behalf of Norfolk Southern Railway Company (NSRC) in association with the East Palestine Train Derailment in East Palestine, Ohio (Site). This memo contains attachments summarizing analytical results from sampling activities.
60-1	June 17, 2025 Arcadis U.S., Inc. (Arcadis) CeramFab Delineation Request Memorandum (Memo) to USEPA's Eric Pohl (On-Scene Coordinator) – Dioxin QA QCs data.
60-2	June 17, 2025 Arcadis U.S., Inc. (Arcadis) CeramFab Delineation Request Memorandum (Memo) to USEPA's Eric Pohl (On-Scene Coordinator) – PFAS QA QCs data.
60-3	June 17, 2025 Arcadis U.S., Inc. (Arcadis) CeramFab Delineation Request Memorandum (Memo) to USEPA's Eric Pohl (On-Scene Coordinator) – VOC+ QA QCs data.
60-4	June 17, 2025 Arcadis U.S., Inc. (Arcadis) CeramFab Delineation Request Memorandum (Memo) to USEPA's Eric Pohl (On-Scene Coordinator) – Butyl Acrylate, Ethyl Hexyl Acrylate etc. data.
60-5	June 17, 2025 Arcadis U.S., Inc. (Arcadis) CeramFab Delineation Request Memorandum (Memo) to USEPA's Eric Pohl (On-Scene Coordinator) – Figures.
60-6	June 17, 2025 Arcadis U.S., Inc. (Arcadis) CeramFab Delineation Request Memorandum (Memo) to USEPA's Eric Pohl (On-Scene Coordinator) – Figures with Summary Data.
61	July 2023 Stormwater Pollution Prevention Plan - East Palestine Train Derailment, Columbiana County, Ohio prepared by Arcadis U.S., Inc. for Mr. Daniel Hunt, Norfolk Southern Railway Company. Includes site maps.
62	Bureau of Underground Storage Tank Regulations (BUSTR) file for Triple L Trucking, 448 E. Taggart St., East Palestine, OH site. Incident #1540788-00.

Exhibit	Description
63	Bureau of Underground Storage Tank Regulations (BUSTR) file for Triple L Trucking, 448 E. Taggart St., East Palestine, OH site. Case #15000113-01.
64	Bureau of Underground Storage Tank Regulations (BUSTR) Circle K file.
65	Petty 5-24-23 BUSTR Search and Requests - E. Palestine Search List and File Requests – Excel File.
66	Petty 5-23-2023 - Plots of E. Palestine BUSTR Sites.
67	February 10, 2023 Arcadis Remedial Action Work Plan to Ohio EPA (Mr. Kurt Koller, On-Scene Coordinator – Ohio-EPA) and NS by Andy Pennington (Environmental Scientist) and Jason Artrip (Certified Project manager). Site Figures attached.
68	February 9, 2023 East Palestine Train Derailment Air Monitoring Frequently Asked Questions (FAQs). Use of low resolution (ppm and VOC) equipment.
69	O'Marra et al., 1971. Combustion Products from Vinyl Chloride Monomer, AIHA Jornal, 32-3, pp. 153-156.
70	Univ. of Pittsburg, 2024. Vinyl Chloride - to burn or not to burn. Forges and Fifth.
71	Zhang, Mengmei et al., 2105. Dioxins and PVC in Combustion and Fires, WM&R, Vol 33, pp. 630-643.
72	Copy of February 19, 2023 US EPA Web Page - East Palestine
73	September 21, 2024 GAP Petty Declaration.
74	October 17, 2023 Letter report from People's Action Institute's Stephen U. Lester (Science Director) and Mihir Vohra (Science Fellow) to Ms. Jami Wallace, President, Unity Council for the East Palestine Train Derailment, East Palestine, OH regarding site dioxin testing.
75	September 6, 2024 Declaration of Richard J. Schuhmann, Ph.D., In re: East Palestine Derailment, Case No. 4:23-cv-00242, United States District Court for the Northern District of Ohio.
76	September 7, 2023 Arcadis Report to Norfolk Southern Railway Company. Characterization Work Plan for Derailment-Area Soil. East Palestine Train Derailment Site, East Palestine, Ohio. See pg. 31 for recommended dioxin screening level.
77	February 19, 2023 Petty draft report on Information Regarding Chemicals of Concern.
78	EPA Air Sampling Results – East Palestine, OH Webpage – Downloaded April 17, 2023. Excel files – original and sorted by chemical name.
79	EPA Soil and Sediment Sampling Results – East Palestine, OH Webpage – Downloaded April 17, 2023.
80	EPA Water Sampling Results – East Palestine, OH Webpage – Downloaded April 17, 2023. Excel files – original and sorted by chemical name.
81	Directory Containing Level 4 Analytical Data Files.
82	March 10, 2023 Eurofins report prepared for Norfolk Southern & Norfolk Southern Corporation. Job #: 240-180588-2. Soil dioxin composite soil sample taken on February 17, 2023.
83	February 28, 2023 Eurofins report prepared for Norfolk Southern & Norfolk Southern Corporation. Job #: 240-180684-1. Soils SVOCs. VOCs, PFAS, Metals and Dioxin samples taken from North Ditch on February 20, 2023.
84	March 9, 2023 Eurofins report prepared for Norfolk Southern & Norfolk Southern Corporation. Job #: 240-181183-1. Water SVOCs. VOCs, PFAS, Metals, DRO and TOC samples taken from Blue Building E and W (CeramFab), Clark, Pleasant and Gas Station on March 1, 2023.

Exhibit	Description
85	March 20, 2023 Eurofins report prepared for Norfolk Southern & Norfolk Southern Corporation. Job #: 240-181894-1. Soils SVOCs. VOCs, Metals, and PCB samples taken from S. Track – West End from 2' to 16' bgs with composites on March 14, 2023.
86	March 7, 2023 Eurofins report prepared for Norfolk Southern & Norfolk Southern Corporation. Job #: 410-117699-1. Water samples for VOCs at unknown locations taken on March 6, 2023. Rush job.
87	February 1, 2023 Eurofins report prepared for Norfolk Southern & Norfolk Southern Corporation. Job #: 240-180173-2. Water composite sample 01-05 for PFASs at unknown locations taken on February 9, 2023.
88	October 22, 2024 NS/Arcadis Report, Phase I – Residential, Commercial/Agricultural Soil Sampling Report - Revision 3 (Updated Conclusion in Section 7 in response to October 21, 2024 comment from USEPA). From: https://www.epa.gov/east-palestine-oh-train-derailment/phase-one-residential-commercial-and-agricultural-soil-sampling. Original report was issued on May 19, 2023. Revision 1: Issued September 13, 2024 – Revisions in response to August 29, 2024 comments from USEPA. Revision 2 issued on October 10, 2024. Revisions to Sections 6, 7, and 9. Updated title of Section 6; Clarified / Updated Conclusions in Sections 7 and 9 in response to October 8, 2024 comments from USEPA.
89	Ohio/Pennsylvania University Research Consortium. 2025. Data Brief: Dioxins and Furans. Contact: Dr. Jennifer Richmond-Bryant at North Carolina State University, jrbryan3@ncsu.edu. Data were collected by the LSU Superfund Research Center in partnership with Kent State University and reviewed by the OH/PA University Research Consortium.
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91	US EPA, 2025-07-31. Event Reconstruction Plume Map.
92	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (US EPA). Region 5. 2023-09-14. Memo from Mike Devito, Keith Fusinski, Michelle Kerr, Mark Durno on behalf of the Environmental Unit for the East Palestine Train Derailment to Ralph Dollhopf, Incident Commander. Subject: Summary of Phase 1 Dioxin Results for the East Palestine Derailment Incident. Background Dioxin Soil Concentrations.
93	U.S. Environmental Protection Agency (US EPA), 2023-05-31. Retrospective Soot Deposition Analysis for the East Palestine Derailment Incident Response.
94	March 6, 2023 Arcadis Sampling Plan with Screening Values. Norfolk Southern Railway Company - Phase I Preliminary, Residential/Commercial/Agricultural Soil Sampling Plan, East Palestine Train Derailment Site., East Palestine, Ohio. Bates: ED_013980L_00001401-00001 to ED_013980L_00001401-00117. Proposed Soil Screening Levels: Bates ED_013980L_00001401-00117.
95	N/A/Arcadis Soil Inspection and Sample Locations as of April 18, 2023 (pdf). From: https://www.epa.gov/system/files/documents/2023-05/PIO%20Soil%20Sampling%20Plan%20Map%2020230506.pdf.
96	US EPA Detailment Map and Other Information. May 6, 2023. From: https://www.epa.gov/system/files/documents/2023-05/PIO%20Derailment%20Location%2020230506-508.pdf.

Exhibit	Description
97	US EPA Brochure – March 2023 – Dioxins not likely of concern. "EPA heard directly from East Palestine area farmers and families who are concerned about dioxins. We want to be clear that the input and perspective of the East Palestine community is essential to our ongoing response efforts. EPA has been monitoring the air, soil, and water for "indicator chemicals" that would likely appear if dioxins had been formed after the vent and burn. Test results to date and other data suggest a low probability for a risk to health from dioxin from this incident. However, to address concerns from agricultural stakeholders and residents, EPA is requiring Norfolk Southern to sample directly for dioxins, focusing on soils to help identify if dioxins are present and attributable to the incident." From: https://www.epa.gov/system/files/documents/2023-03/EPTD%20Soil%20Sampling%20Factsheet%20V3.pdf.
98	Excel Spreadsheet with NS SVOC and Dioxin Sampling Results. From: https://www.epa.gov/east-palestine-oh-train-derailment/phase-one-residential-commercial-and-agricultural-soil-sampling#df.
99	CTEH, LLC (5120 Northshore Drive, Little Rock, AR 72118 - 501-801-8500). Revised March 3, 2023 Air Sampling and Analysis Plan (SAP) - Version 1.6. East Palestine Train Derailment Site, East Palestine, OH. Prepared on Behalf of: Norfolk Southern Railway Company.
100	Director of NS Provided MSDSs SDSs.
101	Derailed Train Car Manifest.
102	March 11, 2026 redacted e-mail from Aaron M. Ponzo (Defense Council) to J. Collins – no CeramFab SDSs.
103	Guise, Michael. Feb. 4, 2023. Train Derailment Causes Massive Fire in East Palestine, OH. CBS News, Pittsburgh. From: https://www.cbsnews.com/pittsburgh/pictures/train-derailment-fire-ohio-east-palestine/.
104	Charalambous, Peter. Feb. 6, 2023. Ohio Train Derailment: Controlled burn of toxic chemicals went "as planned" PA gov. says. ABC News. From: https://abcnews.go.com/US/train-derails-flames-ohio-causes-half-town-evacuate/story?id=96892580.
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107	Mercado, Angely. Feb. 8, 2023. Photos Show Aftermath of Toxic Train Derailment in Ohio. Yahoo GIZMODO. From: https://www.yahoo.com/now/photos-show-aftermath-toxic-train-214500115.html.
108	CBS Pittsburgh. Feb. 8, 2023. East Palestine Train Derailment: Evacuation order lifted as officials say air and water samples show it's safe. From: https://www.cbsnews.com/pittsburgh/live-updates/east-palestine-ohio-train-derailment-hazardous-materials-ntsb-evacuations/.
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Exhibit	Description
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112	Kaplan, Michael. Feb. 15, 2023. Excess size caused train to break down in days before it derailed in Ohio, employees say. CBS Evening News with Norah O'Donnell. From: https://www.cbsnews.com/news/ohio-train-derailment-east-palestine-norfolk-southern-excess-size/.
113	Gibbs, Alice. Feb. 16, 2023. Plane Passenger Photo Shows Size of Smoke Plume After Ohio Train Derailment. Newsweek - On the Internet. From: https://www.newsweek.com/plane-passenger-photo-smoke-plume-ohio-train-derailment-1781722.
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126	Marshall, Micaela. March 3, 2023. EPA: Dioxin testing begins 'soon' in East Palestine. Spectrum News 1, Columbus. From: https://spectrumnews1.com/oh/columbus/news/2023/03/03/epa--dioxin-testing-begins--soon--in-east-palestine--doctor-weighs-in-on-resident-s-symptoms.

Exhibit	Description
127	Pace Analytical Services, LLC. March 4, 2023 Report prepared for the State of Indiana. Level 4 Dioxin/Furan Report for Three Soils Samples (WS-1, WS-2 and WS-2 Dup). From CoC: Wast Sampling – OH Derailment. Collected on March 4, 2023 by IDEM Senate Ave., Office of Land Quality, Indianapolis, IN by Chelsea McCammack.
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136	Perkins, Tom. March 17, 2023. Levels of carcinogenic chemical near Ohio derailment site far above safe limit. From: https://www.theguardian.com/us-news/2023/mar/17/norfolk-southern-derailment-east-palestine-ohio-carcinogenic-chemical-levels.
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Exhibit	Description
140	Gans, Jared. March 31, 2023. CDC teams studying East Palestine health risks got sick during investigation. The Hill. From: https://thehill.com/policy/healthcare/3927743-cdc-teams-studying-east-palestine-health-risks-got-sick-during-investigation-cnn/.
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143	March 6, 2023 e-mail from US EPA Brian Gullett to US EPA Distribution List including Todd Ramaly. Subject: EPTD Site: Confidential Attorney Work Product/Attorney-Client Privileged Communication. Dr. Gullett writes to Todd: "Todd, Chlorinated dioxins/furans are virtually insoluble in water. Even if it rained, it'd be extremely unlikely that they'd be in the soil 6" deep. Brian."
144	Arcadis Field Work Order Form. 2023. Work Description: Groundwater Sampling for PFAS at Shallow Monitoring Wells STW-7, STW-9, STW-23, STW-24, STW-26 and STW-26. Date of Work: As wells become available for sampling, Summer/Fall 2023. Scope of Work: Monitoring wells to be sampled for PFAS are: STW-7, STW-9, STW-23, STW-24, STW-26 and STW-26. These wells will also be sampled for non-PFAS parameters.
144	Arcadis Field Work Order Form. 2023. Work Description: Groundwater Sampling for PFAS at Shallow Monitoring Wells STW-7, STW-9, STW-23, STW-24, STW-26 and STW-26. Date of Work: As wells become available for sampling, Summer/Fall 2023. Scope of Work: Monitoring wells to be sampled for PFAS are: STW-7, STW-9, STW-23, STW-24, STW-26 and STW-26. These wells will also be sampled for non-PFAS parameters. ARCADIS00198619.
145	Ohio EPA Field Investigation Findings Form. Date: 5/7/2023. Corrective Active Report Date: 5/9/2023 @ 8:30 Tactics Meeting. Table with columns titled: Location, OEPA Field Observations, Is Action Required? And Norfolk Southern Corrective Action. [Sheens from operations] ARCADIS00354929.
146	Undated Stantec Presentation to Norfolk Southern Railway Company titled: "Portable Water Sampling Work Plan and QAPP Sample Frequency Revision Discussion. [Discusses Zones 1, 2, 3 and 4.] ARCADIS00355749.
147	June 14, 2023 Stantec Potable Water Sampling Work Plan Update to Norfolk Southern Railway Company for the East Palestine Train Derailment Site, East Palestine, OH. CERCLA Docket No. V-W-23-C-004. Prepared for: Norfolk Southern Railway Company, East Palestine, Ohio. Prepared by: Stantec Consulting Services Inc., 10745 Westside Way, Suite 250, Alpharetta, GA 30009. Project Number: 172607922. ARCADIS00382926.
148	Minutes from CTEH East Palestine, Ohio - Potable Water Supply Meeting. Subject: Potable Water Working Group. Meeting Date: 2023-03-15. Location: Teams. Time: 11:00 to 12:00 PM. Project name: NSRC – Taggart Road Incident. Prepared by: Michael Hutchinson. CTEH-000157116.
149	10/20/2023 Printed Spreadsheet with Draft Agencies Comments on East Palestine Derailment Site Amendment to Appendix I Work Plan: North Ditch Seep Investigation and Operational Tactic Memo. ARCADIS00000744.
150	Split Table with Shallow and Deep Well Details Provided including Well #, Site Area Location, Geographic Location, Hydrostatic Target, Elevations, Well details and depth, Geology at screen and water column length. ARCADIS00002073.

Exhibit	Description
151	Shallow and Deep Well Maps and Analytical Chemistry Sample Results. Figure 1: Groundwater Characterization Wells; Figure 2: Sept. 30, 2023 Shallow Potentiometric Surface Map; Figure 3: October 7, 2023 Shallow Potentiometric Surface Map; Figure 4: Soil Analytical Results – Shallow Well Locations; Figure 5: Shallow Monitoring Well Analytical Results – Groundwater; Figure 6: Deep Monitoring Well Analytical Groundwater Results Groundwater. ARCADIS00002445.
152	August 29, 2023 - V 3.5 Arcadis Norfolk Southern Railway Company Characterization Work Plan for Derailment-Area Soil East Palestine Train Derailment Site East Palestine, Ohio. Version: 1.0: March 6, 2023 - Initial submittal; Version 2.0: May 5, 2023 - Updated plan incorporating revised sampling design and parameter list; Version 2.1: May 10, 2023 - Further revised sampling design and parameter list; Version 3: June 13, 2023 - Current submittal, revised sampling design and parameter list; Version 3.1: July 12, 2023 - Updated to address EU draft comments dated 6/23/23 and subsequent discussions; Version 3.2: July 18, 2023 Updated to address EU draft comments dated 7/15/23; Version 3.3: July 23, 2023 - Updated to address modifications from the USEPA on 7/20/23; Version 3.4: August 11, 2023 - Updated to address non-substantive changes from V3.3; Version 3.5: August 29, 2023 - Updated to reflect changes to analytical program identified during QAPP finalization. Figure 1: Site Working Area; Figure 2: Surface Water Flow; Figure 3: Car Scrapping 3; Figure 4: Car Scrapping 4; Figure 5: Ditch East of Car Scrapping 4; Figure 6: South Ditch East of Pleasant; Figure 7: South Ditch West of Pleasant; Figure 8: North Ditch West of Pleasant; Figure 9: PA Waste Staging; Figure 10: Park Dr.; Figure 11: Bacon Ave.; Figure 12: Wastewater 1 and Wastewater 2; Figure 13: Car Scrapping 2; Figure 14: Car Scrapping 1; Figure 15: Tank Farm 1; Figure 16: Upland of the Main Line East; Figure 17: Upland of North Ditch; Figure 18: Tank Farm 2; Figure 19: Tank Farm 3; Figure 20: Tank Farm 5; Figure 21: Tank Farm 6; Figure 22: Waste Staging; Figure 23: Wetland Phase I; Figure 24: Underground Features; Figure 25: Standby Tank Area 1; Figure 26: Standby Tank Area 2; Figure 27: WWTP Effluent Tanks. Figure 28: Sample Evaluation Decision Logic for Delineation. Site Drawings: CeramFab – Figure DEP_DU3. ARCADIS00022046.
153	June 2023 – Revision 4 - East Palestine Train Derailment Site Potable Water Well Sampling Quality Assurance Project Plan East Palestine, Ohio. CERCLA Docket No. V-W-23-C-004. Prepared for: Norfolk Southern Railway Company. ARCADIS00022489.
154	Day 284 Norfolk Southern East Palestine Executive Summary - Monday 11/13/2023 – Day 284. Liquid and Solid Wastes Categorized and/or Shipped and Soil Samples Taken. Total Number of VOC samples collected 371; Total Number of ISM samples collected 903; Total Number of samples collected 1,274. [From https://ism-2.itrcweb.org/. Incremental Sampling Methodology (ISM) is a structured composite sampling and processing protocol that reduces data variability and provides a reasonably unbiased estimate of mean contaminant concentrations in a volume of soil targeted for sampling. ISM provides representative samples of specific soil volumes defined as decision units by collecting numerous increments of soil (typically, 30 to 100 increments) that are combined, processed, and subsampled according to specific protocols.] ARCADIS00027053.
155	February 14, 2023 Arcadis Draft Quality Assurance Project Plan (QAPP) for the Norfolk Southern Railway Company February 3, 2023 Derailment East Palestine, Ohio. ARCADIS00121558.
156	March 5, 2026 Deposition of Justin Gaudi. CeramFab, Inc., CeramsSource, Inc., Yonggong, LLC and WYG Refractories, Inc. vs. Norfolk Southern Corporation and Norfolk Southern Railway Company. Case #: 4:23-cv-022026-BYP. In the United States District Court for the Northern District Court of Ohio – Western Division.
157	February 26, 2026 Deposition of Kevin Smith. CeramFab, Inc., CeramsSource, Inc., Yonggong, LLC and WYG Refractories, Inc. vs. Norfolk Southern Corporation and Norfolk Southern Railway Company. Case #: 4:23-cv-022026-BYP. In the United States District Court for the Northern District Court of Ohio – Western Division.
158	February 20, 2026 Deposition of Christopher Hunsicker. CeramFab, Inc., CeramsSource, Inc., Yonggong, LLC and WYG Refractories, Inc. vs. Norfolk Southern Corporation and Norfolk Southern Railway Company. Case #: 4:23-cv-022026-BYP. In the United States District Court for the Northern District Court of Ohio – Western Division. Rough Draft.

Exhibit	Description
159	March 17, 2026, Declaration of Geoffrey C. Rathgeber, in Support of Defendants' Joint Statement. CeramFab, Inc., CeramsSource, Inc., Yonggong, LLC and WYG Refractories, Inc. vs. Norfolk Southern Corporation and Norfolk Southern Railway Company. Case #: 4:23-cv-022026-BYP. In the United States District Court for the Northern District Court of Ohio – Western Division.
160	March 17, 2026, Declaration of Rick Helmadollar, in Support of Defendants' Joint Statement. CeramFab, Inc., CeramsSource, Inc., Yonggong, LLC and WYG Refractories, Inc. vs. Norfolk Southern Corporation and Norfolk Southern Railway Company. Case #: 4:23-cv-022026-BYP. In the United States District Court for the Northern District Court of Ohio – Western Division.
161	Directory of Plaintiff Data Set #1 QA/AC's EDD files.
162	Directory of Petty Data Set #2 QA/AC's EDD files.
163	Directory of GEL Data Set #3 QA/AC's EDD files.
164	Directory of Smith Data Set #4 QA/AC's EDD files.
165	Arcadis US, Inc. Norfolk Southern Railway Company Phase I – Preliminary Residential/ Commercial/Agricultural Soil Sampling Plan. East Palestine Train Derailment Site, East Palestine, Ohio. March 6, 2023. Prepared for Norfolk Southern Railway Company. Prepared by: Arcadis US, Inc., 50 Fountain Plaza, Suite 600, Buffalo, New York 14202. Phone: 716 667 0900. Fax: 716 842 2612.
166	April 15, 2022. SVOC (Semi volatile organic compounds) Sampling Guidelines, Rev. 1.0. First Revision by Thomas J. McDonald on April 15, 2022. Downloaded from NIEHS (National Institute of Environmental Health Sciences) NIH (National Institute of Health) portal: https://portal.niehs.nih.gov/dr2/unmanaged/files/svoc_sampling_04_15_2022_508.pdf on April 1, 2026.
167	Extractions of Chain of Custody's from Exhibit 88 where No Sampler is Listed.
168	Extractions of Chain of Custody's from Exhibit 88 where Sampler is Listed.
169	February 21, 2023. US EPA Internal Memo. SUBJECT: Enforcement Action Memorandum – Determination of Threat to Public Health and the Environment at the East Palestine Train Derailment Site, East Palestine, Columbiana County, Ohio (Site ID: C5XR) FROM: Ralph Dollhopf, On-Scene Coordinator, Emergency Response Section 1 THRU: Jason H. El-Zein, Manager, Emergency Response Branch 1 TO: Douglas Ballotti, Director, Superfund & Emergency Management Division.
170	GEL EP02 raw sample results for VOC, SVOC and Dioxins for Standing Storm Water (SSW) results SSW-1 through SSW-4.
171	Norfolk Southern Railway Co. et al., vs. Oxy Vinyls LP, et al. Case No.: 4:23-CV-242, Trial United States District Court, Northern District of Ohio – Eastern Division. Judge Benita Y. Pearson. Transcripts Volumes 1-16.
172	Exponent Report of Chason Coelho and accompanying exhibits. Norfolk Southern Railway Co. et al., vs. Oxy Vinyls LP, et al. Case No.: 4:23-CV-242, Trial United States District Court, Northern District of Ohio – Eastern Division. Judge Benita Y. Pearson.
173	Exponent Report of Joseph Lemberg and accompanying exhibits. Norfolk Southern Railway Co. et al., vs. Oxy Vinyls LP, et al. Case No.: 4:23-CV-242, Trial United States District Court, Northern District of Ohio – Eastern Division. Judge Benita Y. Pearson.
174	Expert Report of James Rader and accompanying exhibits. Norfolk Southern Railway Co. et al., vs. Oxy Vinyls LP, et al. Case No.: 4:23-CV-242, Trial United States District Court, Northern District of Ohio – Eastern Division. Judge Benita Y. Pearson.

Exhibit	Description
175	Expert Report of Michael Lunsford and accompanying exhibits. Norfolk Southern Railway Co. et al., vs. Oxy Vinyls LP, et al. Case No.: 4:23-CV-242, Trial United States District Court, Northern District of Ohio – Eastern Division. Judge Benita Y. Pearson.
176	Expert Report of Joseph Poplawski and accompanying exhibits. Norfolk Southern Railway Co. et al., vs. Oxy Vinyls LP, et al. Case No.: 4:23-CV-242, Trial United States District Court, Northern District of Ohio – Eastern Division. Judge Benita Y. Pearson.
177	Expert Report of Gary Wolf and accompanying exhibits. Norfolk Southern Railway Co. et al., vs. Oxy Vinyls LP, et al. Case No.: 4:23-CV-242, Trial United States District Court, Northern District of Ohio – Eastern Division. Judge Benita Y. Pearson.
178	Expert Report of Dr. Allen Zaremsbki and accompanying exhibits. Norfolk Southern Railway Co. et al., vs. Oxy Vinyls LP, et al. Case No.: 4:23-CV-242, Trial United States District Court, Northern District of Ohio – Eastern Division. Judge Benita Y. Pearson.
179	Complete listing of all Data Set #4 East Palestine, OH Samples and Sample Locations (111).

APPENDIX B

US EPA East Palestine Sampling Data for Benzene and Vinyl Chloride

Downloaded April 17, 2023

Table B-1 – US EPA Results for Benzene and Vinyl Chloride in the Air – Downloaded April 17, 2023

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
MUNICIPAL OFFICE	EPD-MUNICIPALOFFICE-02042023	2/4/2023	13:20	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.092	Final	0.98	
SR01	EPD-SR01-230204	2/5/2023	1:25	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.092	Final	0.78	
DW-B01	EPD-DW-B01-020623	2/6/2023	8:10	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.16	Final	0.46	J-
SA-01	EPD-SA-01-020623	2/6/2023	21:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	4.2	J-
SR01	EPD-SR01-020623	2/6/2023	11:04	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.098	Final	0.54	J-
PM-01	EPD-PM-01-020823	2/8/2023	2:38	Air	Tedlar Bag	Mobile	71-43-2	Benzene	ug/m3	0.639	Prelim	<0.639	U
PM-02	EPD-PM-02-020823	2/8/2023	5:35	Air	Tedlar Bag	Mobile	71-43-2	Benzene	ug/m3	0.639	Prelim	<0.639	U
WA-01	EPD-WA-01-020723	2/8/2023	15:37	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.099	Final	12	
WA-01	EPD-WA-01-020823	2/9/2023	15:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.12	Final	0.87	
WA-01	EPD-WA-01-020923	2/10/2023	15:07	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.097	Final	0.53	
WA-01	EPD-WA-01-021023	2/11/2023	13:40	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.092	Final	1.2	
WA-01	EPD-WA-02-021123	2/12/2023	12:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	1.2	
WA-01	EPD-WA-01-021123	2/12/2023	12:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	1.1	
ST-02	EPD-MG-01-021223	2/13/2023	11:36	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	1.4	
WA-01	EPD-WA-01-021223	2/13/2023	12:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	3	
ST-02	EPD-MG-01-021423	2/14/2023	11:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	1.1	
WA-01	EPD-WA-01-021423	2/14/2023	10:56	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	2.1	
WA-01	EPD-WA-01-021523	2/15/2023	10:27	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	0.65	
A-01A	EPD-A-01-021523	2/15/2023	10:46	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	0.67	
WA-01	EPD-WA-01-021623	2/16/2023	5:05	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.092	Final	1.1	
A-01	EPD-A-01-021623	2/16/2023	6:33	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.095	Final	0.67	
WA-01	EPD-WA-01-021723	2/17/2023	11:48	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.098	Final	0.58	
A-01	EPD-A-01-021723	2/17/2023	12:26	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	0.4	
WA-01	EPD-WA-01-021823	2/18/2023	7:56	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	0.56	
A-01B	EPD-A-01-021823	2/18/2023	4:55	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	0.5	
WA-01	EPD-WA-01-021923	2/19/2023	5:50	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	0.56	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
A-01	EPD-A-01-021923	2/19/2023	5:27	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	0.55	
WA-01	EPD-WA-01-022023	2/20/2023	7:00	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	1.9	
A-01	EPD-A-01-022023	2/20/2023	0:26	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	0.84	
WA-01	EPD-WA-01-022123	2/21/2023	0:33	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	1.3	
A-01	EPD-A-01-022123	2/21/2023	7:37	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	0.97	
WA-01	EPD-WA-01-022223	2/22/2023	9:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	0.9	
WA-01	EPD-WA-02-022223	2/22/2023	9:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	0.82	
A-01	EPD-A-01-022223	2/22/2023	5:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	3	
WA-01	EPD-WA-03-022323	2/23/2023	23:20	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	1.2	
A-01	EPD-A-01-022323	2/23/2023	7:38	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	1	
WA-01	EPD-WA-01-022423	2/24/2023	9:22	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	0.63	
A-01	EPD-A-01-022423	2/24/2023	8:11	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	0.35	
UW	EPD-A-02-022423	2/24/2023	9:17	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	0.36	
WA-01	EPD-WA-01-022523	2/25/2023	7:40	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.092	Final	0.68	
A-01	EPD-A-01-022523	2/25/2023	4:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	0.45	
WA-01	EPD-WA-01-022623	2/26/2023	7:57	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	1.9	
A-01	EPD-A-01-022623	2/26/2023	4:24	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.095	Final	1.4	
WA-01	EPD-WA-01-022723	2/27/2023	7:41	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	1.4	
WA-01	EPD-WA-02-022723	2/27/2023	5:27	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	1.5	
A-01	EPD-A-01-022723	2/27/2023	7:49	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	1.4	
WA-01	EPD-WA-01-022823	2/28/2023	3:40	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	1.6	
A-01	EPD-DW-01-022823	2/28/2023	2:32	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	0.67	
WA-02	EPD-WA-02-022823	2/28/2023	7:40	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	1.2	
WA-03	EPD-WA-03-022823	2/28/2023	7:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.12	Final	0.57	
WA-01	EPD-WA-01-030123	3/1/2023	7:55	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	0.97	
A-01	EPD-DW-030123	3/1/2023	8:24	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	0.86	
WA-02	EPD-WA-02-030123	3/1/2023	8:14	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	1	
WA-03	EPD-WA-03-030123	3/1/2023	5:05	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.098	Final	0.74	
WA-01	EPD-WA-01-030323	3/3/2023	15:57	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.68	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-02	EPD-WA-02-030323	3/3/2023	13:12	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.61	
WA-03	EPD-WA-03-030323	3/3/2023	13:27	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.23	Final	0.59	
DW-SW	EPD-DW-01-030323	3/3/2023	13:44	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.6	
WA-01	EPD-WA-01-030423	3/4/2023	14:32	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.28	Final	1.1	
WA-02	EPD-WA-02-030423	3/4/2023	12:32	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.43	
WA-03	EPD-WA-03-030423	3/4/2023	12:32	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.39	
DW-SW	EPD-DW-01-030423	3/4/2023	11:52	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.41	
WA-01	EPD-WA-01-030523	3/5/2023	10:51	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	1.9	
WA-01	EPD-WA-11-030523	3/5/2023	10:52	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.13	Final	2	
WA-02	EPD-WA-02-030523	3/5/2023	7:33	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	1.5	
WA-03	EPD-WA-03-030523	3/5/2023	7:44	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	1.1	
DW-E	EPD-DW-01-030523	3/5/2023	10:14	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.12	Final	0.75	
UW-W	EPD-UW-01-030523	3/5/2023	8:16	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.11	Final	1.3	
WA-01	EPD-WA-01-030623	3/6/2023	8:19	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.23	Final	0.96	
WA-02	EPD-WA-02-030623	3/6/2023	8:47	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.18	Final	1	
WA-03	EPD-WA-03-030623	3/6/2023	9:10	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.19	Final	0.57	
WA-04	EPD-WA-04-030623	3/6/2023	7:58	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.58	
WA-06	EPD-WA-06-030623	3/6/2023	9:59	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	1.3	
UW-H	EPD-UW-01-030623	3/6/2023	9:47	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.23	Final	0.65	
WA-05	EPD-WA-05-030623	3/6/2023	9:29	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.91	
WA-01	EPD-WA-01-030723	3/7/2023	8:12	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.09	Final	0.96	
WA-02	EPD-WA-02-030723	3/7/2023	8:40	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.1	Final	0.54	
WA-03	EPD-WA-03-030723	3/7/2023	8:57	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.099	Final	0.63	
WA-04	EPD-WA-04-030723	3/7/2023	9:51	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.099	Final	0.58	
WA-06	EPD-WA-06-030723	3/7/2023	8:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.093	Final	0.76	
WA-01	EPD-WA-01-030823	3/8/2023	8:58	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.47	
WA-02	EPD-WA-02-030823	3/8/2023	9:10	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.37	
WA-03	EPD-WA-03-030823	3/8/2023	10:07	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.24	Final	0.37	
WA-04	EPD-WA-04-030823	3/8/2023	8:50	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.54	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-06	EPD-WA-06-030823	3/8/2023	13:48	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.52	
DW-D	EPD-DW-01-030823	3/8/2023	10:31	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.34	
UW-H	EPD-UW-01-030823	3/8/2023	10:44	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.23	Final	0.33	
WA-05	EPD-WA-05-030823	3/8/2023	14:50	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.34	
WA-01	EPD-WA-01-030923	3/9/2023	13:50	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.71	
WA-02	EPD-WA-02-030923	3/9/2023	14:27	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.54	
WA-03	EPD-WA-03-030923	3/9/2023	14:52	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.5	
WA-04	EPD-WA-04-030923	3/9/2023	13:35	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.53	
WA-06	EPD-WA-06-030923	3/9/2023	14:44	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.19	Final	0.56	
UW-H	EPD-UW-01-030923	3/9/2023	14:46	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.37	
WA-05	EPD-WA-05-030923	3/9/2023	14:59	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.53	
DW-H	EPD-DW-01-030923	3/9/2023	13:10	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.49	
WA-01	EPD-WA-01-031023	3/10/2023	13:18	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.23	Final	0.56	
WA-01	EPD-WA-11-031023	3/10/2023	12:00	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.54	
WA-02	EPD-WA-02-031023	3/10/2023	13:48	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.25	Final	0.58	
WA-03	EPD-WA-03-031023	3/10/2023	15:19	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.62	
DW-E	EPD-DW-01-031023	3/10/2023	12:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.5	
WA-04	EPD-WA-04-031023	3/10/2023	13:01	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.38	
WA-06	EPD-WA-06-031023	3/10/2023	14:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.19	Final	0.64	
WA-05	EPD-WA-05-031023	3/10/2023	14:54	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.6	
UW-A	EPD-UW-01-031023	3/10/2023	15:13	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.49	
WA-01	EPD-WA-01-031123	3/11/2023	13:14	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	1.7	
WA-01	EPD-WA-11-031123	3/11/2023	13:14	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	1.7	
WA-02	EPD-WA-02-031123	3/11/2023	14:06	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.23	Final	0.37	
WA-03	EPD-WA-03-031123	3/11/2023	16:10	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.19	Final	0.34	
WA-04	EPD-WA-04-031123	3/11/2023	12:36	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.62	
WA-06	EPD-WA-06-031123	3/11/2023	14:39	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.71	
DW-G	EPD-DW-01-031123	3/11/2023	15:29	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.32	
WA-05	EPD-WA-05-031123	3/11/2023	14:54	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.37	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
UW-G	EPD-UW-01-031123	3/11/2023	12:19	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.19	Final	0.35	
WA-01	EPD-WA-01-031223	3/12/2023	12:25	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	1.6	
WA-02	EPD-WA-02-031223	3/12/2023	13:05	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.26	Final	0.56	
WA-03	EPD-WA-03-031223	3/12/2023	15:48	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.54	
WA-04	EPD-WA-04-031223	3/12/2023	12:10	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	1.4	
WA-06	EPD-WA-06-031223	3/12/2023	13:22	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.79	
DW-D	EPD-DW-01-031223	3/12/2023	12:55	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.23	Final	0.6	
UW-H	EPD-UW-01-031223	3/12/2023	15:32	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.34	
WA-05	EPD-WA-55-031223	3/12/2023	14:22	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.26	Final	0.4	
WA-05	EPD-WA-05-031223	3/12/2023	14:22	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.35	
WA-01	EPD-WA-01-031323	3/13/2023	12:18	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	2	
WA-02	EPD-WA-02-031323	3/13/2023	12:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.47	
WA-03	EPD-WA-03-031323	3/13/2023	14:57	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.44	
WA-04	EPD-WA-04-031323	3/13/2023	12:05	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	1.9	
WA-06	EPD-WA-06-031323	3/13/2023	12:53	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.38	
DW-G	EPD-DW-01-031323	3/13/2023	14:18	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.43	
UW-C	EPD-UW-01-031323	3/13/2023	11:53	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.46	
WA-05	EPD-WA-05-031323	3/13/2023	13:59	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.46	
WA-05	EPD-WA-55-031323	3/13/2023	13:59	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.48	
WA-01	EPD-WA-01-031423	3/14/2023	12:34	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	1.6	
WA-02	EPD-WA-02-031423	3/14/2023	12:58	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.41	
WA-03	EPD-WA-03-031423	3/14/2023	14:53	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.56	
WA-04	EPD-WA-04-031423	3/14/2023	12:07	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.27	Final	0.9	
WA-06	EPD-WA-06-031423	3/14/2023	13:12	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.46	
WA-05	EPD-WA-05-031423	3/14/2023	13:52	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.42	
UW-G	EPD-UW-01-031423	3/14/2023	14:10	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.38	
DW-C	EPD-DW-01-031423	3/14/2023	11:56	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.48	
WA-01	EPD-WA-01-031523	3/15/2023	12:03	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	2.4	
WA-02	EPD-WA-02-031523	3/15/2023	12:35	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.49	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-04	EPD-WA-04-031523	3/15/2023	11:39	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.7	
WA-06	EPD-WA-06-031523	3/15/2023	12:49	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.48	
DW-D	EPD-DW-01-031523	3/15/2023	12:17	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.46	
UW-H	EPD-UW-01-031523	3/15/2023	14:05	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.4	
WA-05	EPD-WA-05-031523	3/15/2023	13:51	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.43	
WA-01	EPD-WA-01-031623	3/16/2023	12:46	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	7.5	
WA-02	EPD-WA-02-031623	3/16/2023	13:11	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	1.3	
WA-03	EPD-WA-03-031623	3/16/2023	14:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.23	Final	0.87	
WA-04	EPD-WA-04-031623	3/16/2023	12:10	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	1.6	
WA-06	EPD-WA-06-031623	3/16/2023	13:32	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	1.4	
UW-H	EPD-UW-01-031623	3/16/2023	14:10	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.24	Final	0.64	
WA-05	EPD-WA-05-031623	3/16/2023	13:57	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	1.3	
DW	EPD-DW-01-031623	3/16/2023	13:02	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	1.2	
WA-01	EPD-WA-01-031723	3/17/2023	12:11	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.66	
WA-02	EPD-WA-02-031723	3/17/2023	12:32	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.4	
WA-03	EPD-WA-03-031723	3/17/2023	14:15	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.5	
WA-06	EPD-WA-06-031723	3/17/2023	12:58	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.23	Final	1.4	
WA-05	EPD-WA-05-031723	3/17/2023	13:39	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.47	
DW-F	EPD-DW-01-031723	3/17/2023	13:17	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.4	
UW-B	EPD-UW-01-031723	3/17/2023	14:08	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.58	
WA-02	EPD-WA-02-031823	3/18/2023	12:53	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	0.37	
WA-03	EPD-WA-03-031823	3/18/2023	14:44	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.3	
WA-05	EPD-WA-55-031823	3/18/2023	14:03	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.36	
WA-01	EPD-WA-01-031923	3/19/2023	12:35	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	0.48	
WA-01	EPD-WA-11-031923	3/19/2023	12:32	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.49	
WA-02	EPD-WA-02-031923	3/19/2023	13:05	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.39	
WA-03	EPD-WA-03-031923	3/19/2023	14:50	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.19	Prelim	0.37	
WA-04	EPD-WA-04-031923	3/19/2023	8:17	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	0.6	
WA-06	EPD-WA-06-031923	3/19/2023	13:32	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.49	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-01	EPD-WA-01-032023	3/20/2023	12:38	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.66	
WA-02	EPD-WA-02-032023	3/20/2023	12:46	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.53	
WA-04	EPD-WA-04-032023	3/20/2023	12:24	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.48	Prelim	2.4	
WA-06	EPD-WA-06-032023	3/20/2023	13:10	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.89	
WA-05	EPD-WA-05-032023	3/20/2023	13:25	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.52	
WA-05	EPD-WA-55-032023	3/20/2023	13:25	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.52	
WA-02	EPD-WA-02-032123	3/21/2023	12:54	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.37	Final	0.9	
WA-04	EPD-WA-04-032123	3/21/2023	12:26	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.19	Final	1.9	
WA-06	EPD-WA-06-032123	3/21/2023	13:07	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	1.7	
WA-06	EPD-WA-66-032123	3/21/2023	13:07	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.3	Final	1.9	
WA-05	EPD-WA-05-032123	3/21/2023	13:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.69	
WA-01	EPD-WA-01-032223	3/22/2023	12:49	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	1.6	
WA-02	EPD-WA-02-032223	3/22/2023	12:59	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	1.1	
WA-03	EPD-WA-33-032223	3/22/2023	14:28	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	1.3	
WA-03	EPD-WA-03-032223	3/22/2023	14:28	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	1.4	
WA-04	EPD-WA-04-032223	3/22/2023	12:35	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	2	
WA-06	EPD-WA-06-032223	3/22/2023	13:09	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	1.9	
WA-05	EPD-WA-05-032223	3/22/2023	13:37	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	1.1	
DW-B	EPD-DW-B-032223	3/22/2023	14:18	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.87	
UW-F	EPD-UW-F-032223	3/22/2023	14:00	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	1.1	
WA-01	EPD-WA-01-032323	3/23/2023	12:53	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.52	Final	0.6	
WA-02	EPD-WA-02-032323	3/23/2023	12:59	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.33	
WA-03	EPD-WA-03-032323	3/23/2023	14:28	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.28	Final	0.34	
WA-04	EPD-WA-04-032323	3/23/2023	12:40	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	1.8	
WA-06	EPD-WA-06-032323	3/23/2023	8:18	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.18	Final	0.58	
WA-05	EPD-WA-05-032323	3/23/2023	13:41	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.35	
WA-05	EPD-WA-55-032323	3/23/2023	13:41	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.35	
DW-B	EPD-DW-B-032323	3/23/2023	14:40	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.37	
UW-F	EPD-UW-F-032323	3/23/2023	14:00	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.29	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-01	EPD-WA-01-032423	3/24/2023	12:54	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.42	
WA-02	EPD-WA-02-032423	3/24/2023	13:03	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.32	
WA-03	EPD-WA-03-032423	3/24/2023	14:28	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.37	
WA-03	EPD-WA-33-032423	3/24/2023	14:28	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.34	
WA-04	EPD-WA-04-032423	3/24/2023	12:50	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.7	
WA-06	EPD-WA-06-032423	3/24/2023	11:05	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.37	
WA-05	EPD-WA-05-032423	3/24/2023	13:41	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.35	
DW-B	EPD-DW-B-032423	3/24/2023	14:40	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.28	
UW-F	EPD-UW-F-032423	3/24/2023	14:00	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.34	
WA-01	EPD-WA-11-022523	3/25/2023	13:05	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.63	
WA-01	EPD-WA-01-032523	3/25/2023	13:05	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.6	
WA-02	EPD-WA-02-032523	3/25/2023	13:20	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.62	
WA-03	EPD-WA-03-032523	3/25/2023	14:20	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.54	
WA-04	EPD-WA-04-032523	3/25/2023	12:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.84	
WA-06	EPD-WA-06-032523	3/25/2023	13:31	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.67	
WA-05	EPD-WA-05-032523	3/25/2023	13:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.58	
DW-F	EPD-DW-F-032523	3/25/2023	14:00	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.52	
UW-B	EPD-UW-B-032523	3/25/2023	14:40	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.41	
WA-01	EPD-WA-01-032623	3/26/2023	13:05	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.49	
WA-02	EPD-WA-02-032623	3/26/2023	13:20	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.24	
WA-03	EPD-WA-03-032623	3/26/2023	14:20	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.24	
WA-04	EPD-WA-04-032623	3/26/2023	12:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.43	
WA-06	EPD-WA-06-032623	3/26/2023	13:31	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.58	
WA-05	EPD-WA-55-032623	3/26/2023	13:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.27	
WA-05	EPD-WA-05-032623	3/26/2023	13:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.28	
UW-G	EPD-UW-G-032623	3/26/2023	14:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.24	
DW-C	EPD-DW-C-032623	3/26/2023	12:27	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.25	
WA-01	EPD-WA-01-032723	3/27/2023	12:21	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	1.1	
WA-02	EPD-WA-02-032723	3/27/2023	13:20	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	1.3	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-03	EPD-WA-33-032723	3/27/2023	14:10	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.91	
WA-06	EPD-WA-06-032723	3/27/2023	13:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	1.5	
WA-05	EPD-WA-05-032723	3/27/2023	13:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	1.1	
UW-G	EPD-UW-G-032723	3/27/2023	14:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.91	
DW-C	EPD-DW-C-032723	3/27/2023	12:36	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	0.7	
WA-01	EPD-WA-01-032823	3/28/2023	12:57	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.44	
WA-02	EPD-WA-02-032823	3/28/2023	13:19	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.31	
WA-03	EPD-WA-03-032823	3/28/2023	14:10	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Final	0.3	
WA-04	EPD-WA-04-032823	3/28/2023	12:47	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	1.3	
WA-04	EPD-WA-44-032823	3/28/2023	12:47	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	1.3	
WA-06	EPD-WA-06-032823	3/28/2023	13:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.53	
DW-D	EPD-DW-D-032823	3/28/2023	13:07	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.39	
UW-H	EPD-UW-H-032823	3/28/2023	14:31	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Final	0.31	
WA-05	EPD-WA-05-032823	3/28/2023	13:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Final	0.31	
WA-01	EPD-WA-01-032923	3/29/2023	12:58	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	1.3	
WA-02	EPD-WA-02-032923	3/29/2023	13:18	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.93	
WA-03	EPD-WA-03-032923	3/29/2023	12:56	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.67	
DW-E	EPD-DW-E-032923	3/29/2023	12:26	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.91	
WA-04	EPD-WA-04-032923	3/29/2023	12:00	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	3.3	
WA-06	EPD-WA-06-032923	3/29/2023	13:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	1	
WA-05	EPD-WA-05-032923	3/29/2023	13:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.85	
WA-05	EPD-WA-55-032923	3/29/2023	13:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.86	
UW-A	EPD-UW-A-032923	3/29/2023	14:27	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.61	
WA-01	EPD-WA-01-033023	3/30/2023	12:58	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.55	
WA-02	EPD-WA-02-033023	3/30/2023	13:18	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.54	
WA-03	EPD-WA-03-033023	3/30/2023	14:00	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.46	
WA-04	EPD-WA-04-033023	3/30/2023	12:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	1.3	
WA-06	EPD-WA-66-033023	3/30/2023	8:27	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.25	Prelim	0.7	
WA-06	EPD-WA-06-033023	3/30/2023	8:26	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.63	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-05	EPD-WA-05-033023	3/30/2023	13:45	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.5	
UW-G	EPD-UW-G-033023	3/30/2023	14:15	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.43	
DW-C	EPD-DW-C-033023	3/30/2023	12:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.32	
WA-01	EPD-WA-01-033123	3/31/2023	12:54	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.89	
WA-02	EPD-WA-22-033123	3/31/2023	12:04	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	1.2	
WA-02	EPD-WA-02-033123	3/31/2023	12:04	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	1.2	
WA-03	EPD-WA-03-033123	3/31/2023	14:00	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.74	
WA-04	EPD-WA-04-033123	3/31/2023	11:50	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	2	
WA-06	EPD-WA-06-033123	3/31/2023	13:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	1.3	
WA-05	EPD-WA-05-033123	3/31/2023	13:44	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	1.1	
DW-A	EPD-DW-A-033123	3/31/2023	14:27	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.6	
UW-E	EPD-UW-E-033123	3/31/2023	12:20	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	1.1	
WA-01	EPD-WA-11-040123	4/1/2023	12:50	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	0.33	
WA-01	EPD-WA-01-040123	4/1/2023	12:50	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.23	Prelim	0.34	
WA-02	EPD-WA-02-040123	4/1/2023	13:06	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.3	
WA-03	EPD-WA-03-040123	4/1/2023	14:04	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	0.26	
WA-04	EPD-WA-04-040123	4/1/2023	12:35	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	2.2	
WA-06	EPD-WA-06-040123	4/1/2023	12:39	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	0.52	
WA-05	EPD-WA-05-040123	4/1/2023	12:56	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.29	
UW-E	EPD-UW-E-040123	4/1/2023	12:20	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.28	
WA-01	EPD-WA-01-040223	4/2/2023	12:50	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	0.31	
WA-02	EPD-WA-02-040223	4/2/2023	13:06	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.28	
WA-03	EPD-WA-03-040223	4/2/2023	14:06	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.25	
WA-04	EPD-WA-04-040223	4/2/2023	12:38	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.66	
WA-06	EPD-WA-06-040223	4/2/2023	13:46	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.38	
WA-05	EPD-WA-05-040223	4/2/2023	13:25	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.19	Prelim	0.26	
UW-G	EPD-UW-G-040223	4/2/2023	14:18	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.25	
DW-C	EPD-DW-CC-040223	4/2/2023	12:21	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.28	
DW-C	EPD-DW-C-040223	4/2/2023	12:21	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.29	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-01	EPD-WA-01-040323	4/3/2023	12:49	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.54	
WA-02	EPD-WA-02-040323	4/3/2023	12:59	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.64	
WA-03	EPD-WA-03-040323	4/3/2023	14:01	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.62	
WA-04	EPD-WA-04-040323	4/3/2023	12:29	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	0.88	
WA-06	EPD-WA-06-040323	4/3/2023	13:14	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	1.2	
DW-D	EPD-DW-D-040323	4/3/2023	11:58	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.57	
UW-H	EPD-UW-HH-040323	4/3/2023	14:31	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.56	
UW-H	EPD-UW-H-040323	4/3/2023	14:31	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.53	
WA-05	EPD-WA-05-040323	4/3/2023	13:24	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.76	
WA-01	EPD-WA-01-040523	4/5/2023	12:41	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	1.5	
WA-02	EPD-WA-02-040523	4/5/2023	12:58	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	1	
WA-03	EPD-WA-03-040523	4/5/2023	14:10	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	0.61	
WA-04	EPD-WA-04-040523	4/5/2023	12:30	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	1.1	
WA-06	EPD-WA-06-040523	4/5/2023	13:16	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	1.4	
WA-05	EPD-WA-05-040523	4/5/2023	13:35	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	0.9	
WA-05	EPD-WA-55-040523	4/5/2023	13:35	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.25	Prelim	0.95	
DW-H	EPD-DW-H-040523	4/5/2023	13:52	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	0.53	
UW-D	EPD-UW-D-040523	4/5/2023	12:16	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.24	Prelim	0.92	
WA-01	EPD-WA-01-040623	4/6/2023	12:41	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.35	Prelim	0.66	
WA-02	EPD-WA-02-040623	4/6/2023	12:54	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	0.34	
WA-03	EPD-WA-03-040623	4/6/2023	14:10	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.34	
WA-04	EPD-WA-04-040623	4/6/2023	12:25	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.2	Prelim	0.65	
WA-06	EPD-WA-66-040623	4/6/2023	13:08	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.22	Prelim	0.57	
WA-06	EPD-WA-06-040623	4/6/2023	13:08	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.23	Prelim	0.58	
WA-05	EPD-WA-05-040623	4/6/2023	13:29	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.36	
UW-E	EPD-UW-E-040623	4/6/2023	11:59	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.23	Prelim	0.3	
WA-01	EPD-WA-01-041023	4/10/2023	12:20	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.87	
WA-02	EPD-WA-02-041023	4/10/2023	12:33	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.72	
WA-03	EPD-WA-33-041023	4/10/2023	13:27	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.5	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-03	EPD-WA-03-041023	4/10/2023	13:27	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.23	Prelim	0.52	
WA-04	EPD-WA-04-041023	4/10/2023	12:12	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.76	
WA-06	EPD-WA-06-041023	4/10/2023	12:46	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.72	
WA-05	EPD-WA-05-041023	4/10/2023	13:01	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.64	
DW-F	EPD-DW-F-041023	4/10/2023	11:58	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.62	
UW-B	EPD-UW-B-041023	4/10/2023	13:48	Air	Summa Canister	TO-15 SIM	71-43-2	Benzene	ug/m3	0.21	Prelim	0.4	
MUNICIPAL_OFFICE	EPD-MUNICIPALOFFICE-02042023	2/4/2023	13:20	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Final	<0.031	U
SR01	EPD-SR01-230204	2/5/2023	1:25	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Final	<0.031	U
DW-B01	EPD-DW-B01-020623	2/6/2023	8:10	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.055	Final	0.055	UJ
SA-01	EPD-SA-01-020623	2/6/2023	21:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.074	Final	16	J-
SR01	EPD-SR01-020623	2/6/2023	11:04	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.033	UJ
PM-01	EPD-PM-01-020823	2/8/2023	2:38	Air	Tedlar Bag	Mobile	75-01-4	Vinyl Chloride	ug/m3	0.511	Prelim	<0.511	U
PM-02	EPD-PM-02-020823	2/8/2023	5:35	Air	Tedlar Bag	Mobile	75-01-4	Vinyl Chloride	ug/m3	0.511	Prelim	<0.511	U
WA-01	EPD-WA-01-020723	2/8/2023	15:37	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	10	
WA-01	EPD-WA-01-020823	2/9/2023	15:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.041	Final	0.44	
WA-01	EPD-WA-01-020923	2/10/2023	15:07	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	J
WA-01	EPD-WA-01-021023	2/11/2023	13:40	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Final	1.7	
WA-01	EPD-WA-02-021123	2/12/2023	12:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	1.8	
WA-01	EPD-WA-01-021123	2/12/2023	12:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	1.7	
ST-02	EPD-MG-01-021223	2/13/2023	11:36	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
WA-01	EPD-WA-01-021223	2/13/2023	12:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.071	Final	4.2	
ST-02	EPD-MG-01-021423	2/14/2023	11:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
WA-01	EPD-WA-01-021423	2/14/2023	10:56	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	6.1	
WA-01	EPD-WA-01-021523	2/15/2023	10:27	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	<0.036	U
A-01A	EPD-A-01-021523	2/15/2023	10:46	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	<0.035	U
WA-01	EPD-WA-01-021623	2/16/2023	5:05	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Final	7.7	
A-01	EPD-A-01-021623	2/16/2023	6:33	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	0.48	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-01	EPD-WA-01-021723	2/17/2023	11:48	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	1	
A-01	EPD-A-01-021723	2/17/2023	12:26	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
WA-01	EPD-WA-01-021823	2/18/2023	7:56	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	1.2	
A-01B	EPD-A-01-021823	2/18/2023	4:55	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	U
WA-01	EPD-WA-01-021923	2/19/2023	5:50	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	0.27	
A-01	EPD-A-01-021923	2/19/2023	5:27	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	<0.036	U
WA-01	EPD-WA-01-022023	2/20/2023	7:00	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.037	Final	11	
A-01	EPD-A-01-022023	2/20/2023	0:26	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
WA-01	EPD-WA-01-022123	2/21/2023	0:33	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.038	Final	4.7	
A-01	EPD-A-01-022123	2/21/2023	7:37	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.037	Final	<0.037	J
WA-01	EPD-WA-01-022223	2/22/2023	9:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.037	Final	1.3	J+
WA-01	EPD-WA-02-022223	2/22/2023	9:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	1.2	J+
A-01	EPD-A-01-022223	2/22/2023	5:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	0.061	J+
WA-01	EPD-WA-03-022323	2/23/2023	23:20	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.038	Final	0.99	
A-01	EPD-A-01-022323	2/23/2023	7:38	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	0.043	
WA-01	EPD-WA-01-022423	2/24/2023	9:22	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	0.84	J+
A-01	EPD-A-01-022423	2/24/2023	8:11	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.038	Final	<0.038	U
UW	EPD-A-02-022423	2/24/2023	9:17	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	<0.035	U
WA-01	EPD-WA-01-022523	2/25/2023	7:40	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Final	0.6	
A-01	EPD-A-01-022523	2/25/2023	4:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	J
WA-01	EPD-WA-01-022623	2/26/2023	7:57	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	2	
A-01	EPD-A-01-022623	2/26/2023	4:24	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	U
WA-01	EPD-WA-01-022723	2/27/2023	7:41	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	1.2	
WA-01	EPD-WA-02-022723	2/27/2023	5:27	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	1.4	
A-01	EPD-A-01-022723	2/27/2023	7:49	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	0.088	
WA-01	EPD-WA-01-022823	2/28/2023	3:40	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.038	Final	0.11	
A-01	EPD-DW-01-022823	2/28/2023	2:32	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.037	Final	<0.037	U
WA-02	EPD-WA-02-022823	2/28/2023	7:40	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.19	
WA-03	EPD-WA-03-022823	2/28/2023	7:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.039	Final	0.74	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-01	EPD-WA-01-030123	3/1/2023	7:55	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	0.39	
A-01	EPD-DW-030123	3/1/2023	8:24	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	0.036	
WA-02	EPD-WA-02-030123	3/1/2023	8:14	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.037	Final	0.56	
WA-03	EPD-WA-03-030123	3/1/2023	5:05	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	1.1	
WA-01	EPD-WA-01-030323	3/3/2023	15:57	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	0.22	
WA-02	EPD-WA-02-030323	3/3/2023	13:12	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.92	
WA-03	EPD-WA-03-030323	3/3/2023	13:27	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	1.8	
DW-SW	EPD-DW-01-030323	3/3/2023	13:44	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	0.11	
WA-01	EPD-WA-01-030423	3/4/2023	14:32	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.045	Final	0.11	
WA-02	EPD-WA-02-030423	3/4/2023	12:32	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	<0.035	J
WA-03	EPD-WA-03-030423	3/4/2023	12:32	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.55	
DW-SW	EPD-DW-01-030423	3/4/2023	11:52	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	<0.036	U
WA-01	EPD-WA-01-030523	3/5/2023	10:51	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.038	Final	0.73	
WA-01	EPD-WA-11-030523	3/5/2023	10:52	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.044	Final	0.78	
WA-02	EPD-WA-02-030523	3/5/2023	7:33	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.037	Final	0.28	
WA-03	EPD-WA-03-030523	3/5/2023	7:44	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.037	Final	0.24	
DW-E	EPD-DW-01-030523	3/5/2023	10:14	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.04	Final	0.24	
UW-W	EPD-UW-01-030523	3/5/2023	8:16	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.038	Final	0.046	
WA-01	EPD-WA-01-030623	3/6/2023	8:19	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	3.5	
WA-02	EPD-WA-02-030623	3/6/2023	8:47	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.03	Final	3.8	
WA-03	EPD-WA-03-030623	3/6/2023	9:10	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Final	2	
WA-04	EPD-WA-04-030623	3/6/2023	7:58	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	0.5	
WA-06	EPD-WA-06-030623	3/6/2023	9:59	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Final	3.4	
UW-H	EPD-UW-01-030623	3/6/2023	9:47	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	0.41	
WA-05	EPD-WA-05-030623	3/6/2023	9:29	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Final	0.72	
WA-01	EPD-WA-01-030723	3/7/2023	8:12	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.03	Final	0.18	
WA-02	EPD-WA-02-030723	3/7/2023	8:40	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.14	
WA-03	EPD-WA-03-030723	3/7/2023	8:57	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.38	
WA-04	EPD-WA-04-030723	3/7/2023	9:51	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.16	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-06	EPD-WA-06-030723	3/7/2023	8:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Final	0.12	
WA-01	EPD-WA-01-030823	3/8/2023	8:58	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	0.55	
WA-02	EPD-WA-02-030823	3/8/2023	9:10	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	<0.036	U
WA-03	EPD-WA-03-030823	3/8/2023	10:07	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.038	Final	<0.038	U
WA-04	EPD-WA-04-030823	3/8/2023	8:50	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.34	
WA-06	EPD-WA-06-030823	3/8/2023	13:48	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	U
DW-D	EPD-DW-01-030823	3/8/2023	10:31	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	0.22	
UW-H	EPD-UW-01-030823	3/8/2023	10:44	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	<0.036	U
WA-05	EPD-WA-05-030823	3/8/2023	14:50	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	U
WA-01	EPD-WA-01-030923	3/9/2023	13:50	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.4	
WA-02	EPD-WA-02-030923	3/9/2023	14:27	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.27	
WA-03	EPD-WA-03-030923	3/9/2023	14:52	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Final	0.22	
WA-04	EPD-WA-04-030923	3/9/2023	13:35	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.3	
WA-06	EPD-WA-06-030923	3/9/2023	14:44	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.03	Final	0.063	
UW-H	EPD-UW-01-030923	3/9/2023	14:46	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	U
WA-05	EPD-WA-05-030923	3/9/2023	14:59	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
DW-H	EPD-DW-01-030923	3/9/2023	13:10	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	U
WA-01	EPD-WA-01-031023	3/10/2023	13:18	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.037	Final	0.14	
WA-01	EPD-WA-11-031023	3/10/2023	12:00	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	0.12	
WA-02	EPD-WA-02-031023	3/10/2023	13:48	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.04	Final	0.34	
WA-03	EPD-WA-03-031023	3/10/2023	15:19	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	0.6	
DW-E	EPD-DW-01-031023	3/10/2023	12:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.12	
WA-04	EPD-WA-04-031023	3/10/2023	13:01	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	0.16	
WA-06	EPD-WA-06-031023	3/10/2023	14:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.03	Final	0.56	
WA-05	EPD-WA-05-031023	3/10/2023	14:54	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.073	
UW-A	EPD-UW-01-031023	3/10/2023	15:13	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.087	
WA-01	EPD-WA-01-031123	3/11/2023	13:14	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.41	
WA-01	EPD-WA-11-031123	3/11/2023	13:14	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Final	0.4	
WA-02	EPD-WA-02-031123	3/11/2023	14:06	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	<0.036	U

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-03	EPD-WA-03-031123	3/11/2023	16:10	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Final	<0.031	U
WA-04	EPD-WA-04-031123	3/11/2023	12:36	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	0.22	
WA-06	EPD-WA-06-031123	3/11/2023	14:39	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	U
DW-G	EPD-DW-01-031123	3/11/2023	15:29	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	<0.035	U
WA-05	EPD-WA-05-031123	3/11/2023	14:54	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	U
UW-G	EPD-UW-01-031123	3/11/2023	12:19	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Final	0.051	
WA-01	EPD-WA-01-031223	3/12/2023	12:25	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.22	
WA-02	EPD-WA-02-031223	3/12/2023	13:05	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.041	Final	0.16	
WA-03	EPD-WA-03-031223	3/12/2023	15:48	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.2	
WA-04	EPD-WA-04-031223	3/12/2023	12:10	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.13	
WA-06	EPD-WA-06-031223	3/12/2023	13:22	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.15	
DW-D	EPD-DW-01-031223	3/12/2023	12:55	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.038	Final	0.25	
UW-H	EPD-UW-01-031223	3/12/2023	15:32	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
WA-05	EPD-WA-55-031223	3/12/2023	14:22	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.041	Final	<0.041	U
WA-05	EPD-WA-05-031223	3/12/2023	14:22	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	<0.035	U
WA-01	EPD-WA-01-031323	3/13/2023	12:18	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.23	
WA-02	EPD-WA-02-031323	3/13/2023	12:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	U
WA-03	EPD-WA-03-031323	3/13/2023	14:57	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	0.1	
WA-04	EPD-WA-04-031323	3/13/2023	12:05	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.24	
WA-06	EPD-WA-06-031323	3/13/2023	12:53	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
DW-G	EPD-DW-01-031323	3/13/2023	14:18	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
UW-C	EPD-UW-01-031323	3/13/2023	11:53	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	0.1	
WA-05	EPD-WA-55-031323	3/13/2023	13:59	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	U
WA-05	EPD-WA-05-031323	3/13/2023	13:59	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
WA-01	EPD-WA-01-031423	3/14/2023	12:34	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.47	
WA-02	EPD-WA-02-031423	3/14/2023	12:58	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	U
WA-03	EPD-WA-03-031423	3/14/2023	14:53	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	U
WA-04	EPD-WA-04-031423	3/14/2023	12:07	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.043	Final	0.59	
WA-06	EPD-WA-06-031423	3/14/2023	13:12	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	U

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-05	EPD-WA-05-031423	3/14/2023	13:52	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	U
UW-G	EPD-UW-01-031423	3/14/2023	14:10	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	U
DW-C	EPD-DW-01-031423	3/14/2023	11:56	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	0.35	
WA-01	EPD-WA-01-031523	3/15/2023	12:03	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	0.54	
WA-02	EPD-WA-02-031523	3/15/2023	12:35	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	U
WA-04	EPD-WA-04-031523	3/15/2023	11:39	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	0.46	
WA-06	EPD-WA-06-031523	3/15/2023	12:49	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	J
DW-D	EPD-DW-01-031523	3/15/2023	12:17	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	J
UW-H	EPD-UW-01-031523	3/15/2023	14:05	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	U
WA-05	EPD-WA-05-031523	3/15/2023	13:51	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	U
WA-01	EPD-WA-01-031623	3/16/2023	12:46	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.96	
WA-02	EPD-WA-02-031623	3/16/2023	13:11	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.2	
WA-03	EPD-WA-03-031623	3/16/2023	14:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	0.44	
WA-04	EPD-WA-04-031623	3/16/2023	12:10	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	0.71	
WA-06	EPD-WA-06-031623	3/16/2023	13:32	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.12	
UW-H	EPD-UW-01-031623	3/16/2023	14:10	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.038	Final	<0.038	U
WA-05	EPD-WA-05-031623	3/16/2023	13:57	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	U
DW	EPD-DW-01-031623	3/16/2023	13:02	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	0.36	
WA-01	EPD-WA-01-031723	3/17/2023	12:11	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	<0.036	U
WA-02	EPD-WA-02-031723	3/17/2023	12:32	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	<0.035	U
WA-03	EPD-WA-03-031723	3/17/2023	14:15	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	4.1	
WA-06	EPD-WA-06-031723	3/17/2023	12:58	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.037	Final	<0.037	U
WA-05	EPD-WA-05-031723	3/17/2023	13:39	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	U
DW-F	EPD-DW-01-031723	3/17/2023	13:17	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	U
UW-B	EPD-UW-01-031723	3/17/2023	14:08	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	1.1	
WA-02	EPD-WA-02-031823	3/18/2023	12:53	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	<0.034	U
WA-03	EPD-WA-03-031823	3/18/2023	14:44	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	<0.033	U
WA-05	EPD-WA-55-031823	3/18/2023	14:03	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	<0.033	U
WA-01	EPD-WA-11-031923	3/19/2023	12:32	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	<0.034	J

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-01	EPD-WA-01-031923	3/19/2023	12:35	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Prelim	<0.035	J
WA-02	EPD-WA-02-031923	3/19/2023	13:05	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	<0.032	U
WA-03	EPD-WA-03-031923	3/19/2023	14:50	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Prelim	<0.031	J
WA-04	EPD-WA-04-031923	3/19/2023	8:17	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Prelim	0.11	
WA-06	EPD-WA-06-031923	3/19/2023	13:32	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	<0.033	U
WA-01	EPD-WA-01-032023	3/20/2023	12:38	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	<0.033	J
WA-02	EPD-WA-02-032023	3/20/2023	12:46	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Prelim	<0.031	U
WA-04	EPD-WA-04-032023	3/20/2023	12:24	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.076	Prelim	<0.076	J
WA-06	EPD-WA-06-032023	3/20/2023	13:10	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	<0.032	U
WA-05	EPD-WA-05-032023	3/20/2023	13:25	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Prelim	<0.031	U
WA-05	EPD-WA-55-032023	3/20/2023	13:25	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	<0.032	U
WA-02	EPD-WA-02-032123	3/21/2023	12:54	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.059	Final	0.47	
WA-04	EPD-WA-04-032123	3/21/2023	12:26	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.03	Final	0.31	
WA-06	EPD-WA-06-032123	3/21/2023	13:07	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.55	
WA-06	EPD-WA-66-032123	3/21/2023	13:07	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.049	Final	0.56	
WA-05	EPD-WA-05-032123	3/21/2023	13:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.042	
WA-01	EPD-WA-01-032223	3/22/2023	12:49	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	3.3	
WA-02	EPD-WA-02-032223	3/22/2023	12:59	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	1.1	
WA-03	EPD-WA-33-032223	3/22/2023	14:28	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	4.6	
WA-03	EPD-WA-03-032223	3/22/2023	14:28	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	4.6	
WA-04	EPD-WA-04-032223	3/22/2023	12:35	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	1.9	
WA-06	EPD-WA-06-032223	3/22/2023	13:09	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	2.5	
WA-05	EPD-WA-05-032223	3/22/2023	13:37	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	0.3	
DW-B	EPD-DW-B-032223	3/22/2023	14:18	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	1	
UW-F	EPD-UW-F-032223	3/22/2023	14:00	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.77	
WA-01	EPD-WA-01-032323	3/23/2023	12:53	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.083	Final	<0.083	U
WA-02	EPD-WA-02-032323	3/23/2023	12:59	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	U
WA-03	EPD-WA-03-032323	3/23/2023	14:28	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.046	Final	0.87	
WA-04	EPD-WA-04-032323	3/23/2023	12:40	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-06	EPD-WA-06-032323	3/23/2023	8:18	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.028	Final	<0.028	U
WA-05	EPD-WA-05-032323	3/23/2023	13:41	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	U
WA-05	EPD-WA-55-032323	3/23/2023	13:41	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
DW-B	EPD-DW-B-032323	3/23/2023	14:40	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.31	
UW-F	EPD-UW-F-032323	3/23/2023	14:00	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	U
WA-01	EPD-WA-01-032423	3/24/2023	12:54	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.74	
WA-02	EPD-WA-02-032423	3/24/2023	13:03	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.055	
WA-03	EPD-WA-03-032423	3/24/2023	14:28	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
WA-03	EPD-WA-33-032423	3/24/2023	14:28	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	<0.035	U
WA-04	EPD-WA-04-032423	3/24/2023	12:50	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.34	
WA-06	EPD-WA-06-032423	3/24/2023	11:05	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	<0.036	J
WA-05	EPD-WA-05-032423	3/24/2023	13:41	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	<0.035	U
DW-B	EPD-DW-B-032423	3/24/2023	14:40	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
UW-F	EPD-UW-F-032423	3/24/2023	14:00	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
WA-01	EPD-WA-11-022523	3/25/2023	13:05	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.6	
WA-01	EPD-WA-01-032523	3/25/2023	13:05	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	0.66	
WA-02	EPD-WA-02-032523	3/25/2023	13:20	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.21	
WA-03	EPD-WA-03-032523	3/25/2023	14:20	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	1.1	
WA-04	EPD-WA-04-032523	3/25/2023	12:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	J
WA-06	EPD-WA-06-032523	3/25/2023	13:31	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.48	
WA-05	EPD-WA-05-032523	3/25/2023	13:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.099	
DW-F	EPD-DW-F-032523	3/25/2023	14:00	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.16	
UW-B	EPD-UW-B-032523	3/25/2023	14:40	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	0.13	
WA-01	EPD-WA-01-032623	3/26/2023	13:05	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
WA-02	EPD-WA-02-032623	3/26/2023	13:20	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	<0.035	U
WA-03	EPD-WA-03-032623	3/26/2023	14:20	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	J
WA-04	EPD-WA-04-032623	3/26/2023	12:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.082	
WA-06	EPD-WA-06-032623	3/26/2023	13:31	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	<0.035	U
WA-05	EPD-WA-55-032623	3/26/2023	13:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-05	EPD-WA-05-032623	3/26/2023	13:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
UW-G	EPD-UW-G-032623	3/26/2023	14:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Final	<0.036	U
DW-C	EPD-DW-C-032623	3/26/2023	12:27	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	0.051	
WA-01	EPD-WA-01-032723	3/27/2023	12:21	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	1.3	
WA-02	EPD-WA-02-032723	3/27/2023	13:20	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Prelim	0.89	
WA-03	EPD-WA-33-032723	3/27/2023	14:10	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	1	
WA-06	EPD-WA-06-032723	3/27/2023	13:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.92	
WA-05	EPD-WA-05-032723	3/27/2023	13:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.22	
UW-G	EPD-UW-G-032723	3/27/2023	14:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.23	
DW-C	EPD-DW-C-032723	3/27/2023	12:36	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Prelim	0.39	
WA-01	EPD-WA-01-032823	3/28/2023	12:57	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	0.4	
WA-02	EPD-WA-02-032823	3/28/2023	13:19	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	U
WA-03	EPD-WA-03-032823	3/28/2023	14:10	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Final	<0.035	U
WA-04	EPD-WA-04-032823	3/28/2023	12:47	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	1	
WA-04	EPD-WA-44-032823	3/28/2023	12:47	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	0.98	
WA-06	EPD-WA-06-032823	3/28/2023	13:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Final	<0.034	U
DW-D	EPD-DW-D-032823	3/28/2023	13:07	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	0.13	
UW-H	EPD-UW-H-032823	3/28/2023	14:31	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Final	<0.032	U
WA-05	EPD-WA-05-032823	3/28/2023	13:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Final	<0.033	U
WA-01	EPD-WA-01-032923	3/29/2023	12:58	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	1.6	
WA-02	EPD-WA-02-032923	3/29/2023	13:18	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	0.12	
WA-03	EPD-WA-03-032923	3/29/2023	12:56	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	0.08	
DW-E	EPD-DW-E-032923	3/29/2023	12:26	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	<0.032	U
WA-04	EPD-WA-04-032923	3/29/2023	12:00	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	1	
WA-06	EPD-WA-06-032923	3/29/2023	13:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	0.089	
WA-05	EPD-WA-05-032923	3/29/2023	13:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	<0.032	U
WA-05	EPD-WA-55-032923	3/29/2023	13:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	<0.032	U
UW-A	EPD-UW-A-032923	3/29/2023	14:27	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	<0.033	U
WA-01	EPD-WA-01-033023	3/30/2023	12:58	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.66	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-02	EPD-WA-02-033023	3/30/2023	13:18	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.16	
WA-03	EPD-WA-03-033023	3/30/2023	14:00	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.08	
WA-04	EPD-WA-04-033023	3/30/2023	12:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.26	
WA-06	EPD-WA-66-033023	3/30/2023	8:27	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.04	Prelim	0.097	
WA-06	EPD-WA-06-033023	3/30/2023	8:26	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Prelim	0.08	
WA-05	EPD-WA-05-033023	3/30/2023	13:45	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	<0.032	U
UW-G	EPD-UW-G-033023	3/30/2023	14:15	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.031	Prelim	<0.031	U
DW-C	EPD-DW-C-033023	3/30/2023	12:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.035	
WA-01	EPD-WA-01-033123	3/31/2023	12:54	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.52	
WA-02	EPD-WA-22-033123	3/31/2023	12:04	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.39	
WA-02	EPD-WA-02-033123	3/31/2023	12:04	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.4	
WA-03	EPD-WA-03-033123	3/31/2023	14:00	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.93	
WA-04	EPD-WA-04-033123	3/31/2023	11:50	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	0.27	
WA-06	EPD-WA-06-033123	3/31/2023	13:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.66	
WA-05	EPD-WA-05-033123	3/31/2023	13:44	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.11	
DW-A	EPD-DW-A-033123	3/31/2023	14:27	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	0.21	
UW-E	EPD-UW-E-033123	3/31/2023	12:20	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.075	
WA-01	EPD-WA-01-040123	4/1/2023	12:50	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Prelim	<0.036	U
WA-01	EPD-WA-11-040123	4/1/2023	12:50	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Prelim	<0.035	U
WA-02	EPD-WA-02-040123	4/1/2023	13:06	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	<0.034	U
WA-03	EPD-WA-03-040123	4/1/2023	14:04	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Prelim	0.82	
WA-04	EPD-WA-04-040123	4/1/2023	12:35	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Prelim	<0.036	U
WA-06	EPD-WA-06-040123	4/1/2023	12:39	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Prelim	<0.035	U
WA-05	EPD-WA-05-040123	4/1/2023	12:56	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	<0.034	U
UW-E	EPD-UW-E-040123	4/1/2023	12:20	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	<0.034	U
WA-01	EPD-WA-01-040223	4/2/2023	12:50	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Prelim	0.11	
WA-02	EPD-WA-02-040223	4/2/2023	13:06	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	<0.032	U
WA-03	EPD-WA-03-040223	4/2/2023	14:06	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	<0.032	U
WA-04	EPD-WA-04-040223	4/2/2023	12:38	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.21	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-06	EPD-WA-06-040223	4/2/2023	13:46	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	<0.033	U
WA-05	EPD-WA-05-040223	4/2/2023	13:25	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.03	Prelim	<0.03	U
UW-G	EPD-UW-G-040223	4/2/2023	14:18	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	<0.032	U
DW-C	EPD-DW-CC-040223	4/2/2023	12:21	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.088	
DW-C	EPD-DW-C-040223	4/2/2023	12:21	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.091	
WA-01	EPD-WA-01-040323	4/3/2023	12:49	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.37	
WA-02	EPD-WA-02-040323	4/3/2023	12:59	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	0.099	
WA-03	EPD-WA-03-040323	4/3/2023	14:01	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	1.5	
WA-04	EPD-WA-04-040323	4/3/2023	12:29	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Prelim	0.16	
WA-06	EPD-WA-06-040323	4/3/2023	13:14	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.21	
DW-D	EPD-DW-D-040323	4/3/2023	11:58	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	0.24	
UW-H	EPD-UW-HH-040323	4/3/2023	14:31	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.22	
UW-H	EPD-UW-H-040323	4/3/2023	14:31	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.22	
WA-05	EPD-WA-05-040323	4/3/2023	13:24	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.059	
WA-01	EPD-WA-01-040523	4/5/2023	12:41	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Prelim	1.3	
WA-02	EPD-WA-02-040523	4/5/2023	12:58	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.51	
WA-03	EPD-WA-03-040523	4/5/2023	14:10	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Prelim	1.2	
WA-04	EPD-WA-04-040523	4/5/2023	12:30	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Prelim	1	
WA-06	EPD-WA-06-040523	4/5/2023	13:16	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.76	
WA-05	EPD-WA-55-040523	4/5/2023	13:35	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.04	Prelim	<0.04	J
WA-05	EPD-WA-05-040523	4/5/2023	13:35	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Prelim	0.04	
DW-H	EPD-DW-H-040523	4/5/2023	13:52	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Prelim	0.07	
UW-D	EPD-UW-D-040523	4/5/2023	12:16	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.039	Prelim	0.62	
WA-01	EPD-WA-01-040623	4/6/2023	12:41	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.056	Prelim	0.25	
WA-02	EPD-WA-02-040623	4/6/2023	12:54	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Prelim	0.087	
WA-03	EPD-WA-03-040623	4/6/2023	14:10	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.67	
WA-04	EPD-WA-04-040623	4/6/2023	12:25	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.032	Prelim	0.8	
WA-06	EPD-WA-66-040623	4/6/2023	13:08	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.035	Prelim	0.11	

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
WA-06	EPD-WA-06-040623	4/6/2023	13:08	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.037	Prelim	0.11	
WA-05	EPD-WA-05-040623	4/6/2023	13:29	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	<0.033	U
UW-E	EPD-UW-E-040623	4/6/2023	11:59	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.037	Prelim	<0.037	U
WA-01	EPD-WA-01-041023	4/10/2023	12:20	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	1.3	
WA-02	EPD-WA-02-041023	4/10/2023	12:33	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.59	
WA-03	EPD-WA-33-041023	4/10/2023	13:27	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.2	
WA-03	EPD-WA-03-041023	4/10/2023	13:27	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.036	Prelim	0.21	
WA-04	EPD-WA-04-041023	4/10/2023	12:12	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.37	
WA-06	EPD-WA-06-041023	4/10/2023	12:46	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.32	
WA-05	EPD-WA-05-041023	4/10/2023	13:01	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	<0.034	U
DW-F	EPD-DW-F-041023	4/10/2023	11:58	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.034	Prelim	0.099	
UW-B	EPD-UW-B-041023	4/10/2023	13:48	Air	Summa Canister	TO-15 SIM	75-01-4	Vinyl Chloride	ug/m3	0.033	Prelim	0.036	

Table B-2 – US EPA Results for Benzene and Vinyl Chloride in the Soils/Sediments – Downloaded April 17, 2023

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Valid.	Final Result	Qualifier
SD-01	EPD-SD01-SR-230208	2/8/2023	17:55	Sediment	Sediment	SW8260D	71-43-2	Benzene	mg/kg	0.0064	Final	<0.0064	U
SD-04	EPD-SD04-SR-230208	2/8/2023	17:45	Sediment	Sediment	SW8260D	71-43-2	Benzene	mg/kg	0.0063	Final	<0.0063	U
BP1	EPD-SD02-BP1-230208	2/8/2023	18:40	Sediment	Sediment	SW8260D	71-43-2	Benzene	mg/kg	9	Final	130	
BP1	EPD-SD03-BP1-230208	2/8/2023	19:00	Sediment	Sediment	SW8260D	71-43-2	Benzene	mg/kg	5.5	Final	<5.5	U
SO5	EPD-SO5-230210	2/10/2023	11:34	Soil	Soil	SW8260D	71-43-2	Benzene	mg/kg	0.053	Final	1.7	
SO4	EPD-SO4-230210	2/10/2023	11:23	Soil	Soil	SW8260D	71-43-2	Benzene	mg/kg	0.046	Final	0.25	
SO2	EPD-SO2-230210	2/10/2023	10:55	Soil	Soil	SW8260D	71-43-2	Benzene	mg/kg	0.6	Final	2.2	
SO3	EPD-SO3-230210	2/10/2023	11:15	Soil	Soil	SW8260D	71-43-2	Benzene	mg/kg	0.048	Final	0.28	
SO1	EPD-SO1-230210	2/10/2023	10:40	Soil	Soil	SW8260D	71-43-2	Benzene	mg/kg	0.91	Final	<0.91	U
SD-01	EPD-SD01-SR-230208	2/8/2023	17:55	Sediment	Sediment	SW8260D	75-01-4	Vinyl Chloride	mg/kg	0.0064	Final	<0.0064	U
SD-04	EPD-SD04-SR-230208	2/8/2023	17:45	Sediment	Sediment	SW8260D	75-01-4	Vinyl Chloride	mg/kg	0.0063	Final	<0.0063	U
BP1	EPD-SD02-BP1-230208	2/8/2023	18:40	Sediment	Sediment	SW8260D	75-01-4	Vinyl Chloride	mg/kg	9	Final	11	
BP1	EPD-SD03-BP1-230208	2/8/2023	19:00	Sediment	Sediment	SW8260D	75-01-4	Vinyl Chloride	mg/kg	5.5	Final	<5.5	U
SO5	EPD-SO5-230210	2/10/2023	11:34	Soil	Soil	SW8260D	75-01-4	Vinyl Chloride	mg/kg	0.053	Final	<0.053	U
SO4	EPD-SO4-230210	2/10/2023	11:23	Soil	Soil	SW8260D	75-01-4	Vinyl Chloride	mg/kg	0.046	Final	5	
SO2	EPD-SO2-230210	2/10/2023	10:55	Soil	Soil	SW8260D	75-01-4	Vinyl Chloride	mg/kg	0.6	Final	4.6	
SO3	EPD-SO3-230210	2/10/2023	11:15	Soil	Soil	SW8260D	75-01-4	Vinyl Chloride	mg/kg	0.048	Final	3.9	
SO1	EPD-SO1-230210	2/10/2023	10:40	Soil	Soil	SW8260D	75-01-4	Vinyl Chloride	mg/kg	0.91	Final	<0.91	U

Table B-3 – US EPA Results for Benzene and Vinyl Chloride in the Water – Downloaded April 17, 2023

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Validation Level	Final Result	Qualifier
SW-02	EPD-SW-02-01-020423	2/4/2023	12:00	Water	Stream/River	SW8260D	71-43-2	Benzene	ug/L	100	Final	<100	U

Location	Sample No.	Sample Date	Sample Time	Matrix	Sample Media	Analytical Method	CAS No.	Analyte	Units	RL	Validation Level	Final Result	Qualifier
SW-01	EPD-SW-01-01-020423	2/4/2023	13:45	Water	Stream/River	SW8260D	71-43-2	Benzene	ug/L	1	Final	<1	U
SW-03	EPD-SW-03-01-020423	2/4/2023	15:40	Water	Stream/River	SW8260D	71-43-2	Benzene	ug/L	100	Final	<100	U
SW01-SR	EPD-SW01-SR-230208	2/8/2023	16:30	Water	Stream/River	SW8260D	71-43-2	Benzene	ug/L	100	Final	<100	U
SW02-SR	EPD-SW02-SR-230208	2/8/2023	16:45	Water	Stream/River	SW8260D	71-43-2	Benzene	ug/L	100	Final	<100	U
SW03-SR	EPD-SW03-SR-230208	2/8/2023	16:12	Water	Free Product	SW8260D	71-43-2	Benzene	mg/kg	0.27	Final	<0.27	U
SW-02	EPD-SW-02-01-021023	2/10/2023	15:30	Water	Stream/River	SW8260D	71-43-2	Benzene	ug/L	1	Final	<1	U
SW-03	EPD-SW-03-01-021023	2/10/2023	15:00	Water	Stream/River	SW8260D	71-43-2	Benzene	ug/L	1	Final	<1	U
SW-03	EPD-SW-03-01-021023-FD	2/10/2023	15:01	Water	Stream/River	SW8260D	71-43-2	Benzene	ug/L	1	Final	<1	U
SW-08	EPD-SW-08-01-021023	2/10/2023	11:30	Water	Stream/River	SW8260D	71-43-2	Benzene	ug/L	1	Final	<1	U
SW-07	EPD-SW-07-01-021023	2/10/2023	12:20	Water	Stream/River	SW8260D	71-43-2	Benzene	ug/L	1	Final	<1	U
SW-05	EPD-SW-05-01-021023	2/10/2023	14:00	Water	Stream/River	SW8260D	71-43-2	Benzene	ug/L	1	Final	<1	U
SW-06	EPD-SW-06-01-021023	2/10/2023	13:00	Water	Stream/River	SW8260D	71-43-2	Benzene	ug/L	1	Final	<1	U
SW-04	EPD-SW-04-01-021023	2/12/2023	14:30	Water	Stream/River	SW8260D	71-43-2	Benzene	ug/L	1	Final	<1	U
SW-02	EPD-SW-02-01-020423	2/4/2023	12:00	Water	Stream/River	SW8260D	75-01-4	Vinyl Chloride	ug/L	100	Final	<100	U
SW-01	EPD-SW-01-01-020423	2/4/2023	13:45	Water	Stream/River	SW8260D	75-01-4	Vinyl Chloride	ug/L	1	Final	<1	U
SW-03	EPD-SW-03-01-020423	2/4/2023	15:40	Water	Stream/River	SW8260D	75-01-4	Vinyl Chloride	ug/L	100	Final	<100	U
SW01-SR	EPD-SW01-SR-230208	2/8/2023	16:30	Water	Stream/River	SW8260D	75-01-4	Vinyl Chloride	ug/L	100	Final	2,400	J+
SW02-SR	EPD-SW02-SR-230208	2/8/2023	16:45	Water	Stream/River	SW8260D	75-01-4	Vinyl Chloride	ug/L	100	Final	2,200	
SW03-SR	EPD-SW03-SR-230208	2/8/2023	16:12	Water	Free Product	SW8260D	75-01-4	Vinyl Chloride	mg/kg	0.27	Final	0.65	
SW-02	EPD-SW-02-01-021023	2/10/2023	15:30	Water	Stream/River	SW8260D	75-01-4	Vinyl Chloride	ug/L	1	Final	3.9	
SW-03	EPD-SW-03-01-021023	2/10/2023	15:00	Water	Stream/River	SW8260D	75-01-4	Vinyl Chloride	ug/L	1	Final	1.1	
SW-03	EPD-SW-03-01-021023-FD	2/10/2023	15:01	Water	Stream/River	SW8260D	75-01-4	Vinyl Chloride	ug/L	1	Final	1.1	
SW-08	EPD-SW-08-01-021023	2/10/2023	11:30	Water	Stream/River	SW8260D	75-01-4	Vinyl Chloride	ug/L	1	Final	<1	U
SW-07	EPD-SW-07-01-021023	2/10/2023	12:20	Water	Stream/River	SW8260D	75-01-4	Vinyl Chloride	ug/L	1	Final	<1	U
SW-05	EPD-SW-05-01-021023	2/10/2023	14:00	Water	Stream/River	SW8260D	75-01-4	Vinyl Chloride	ug/L	1	Final	<1	U
SW-06	EPD-SW-06-01-021023	2/10/2023	13:00	Water	Stream/River	SW8260D	75-01-4	Vinyl Chloride	ug/L	1	Final	<1	U
SW-04	EPD-SW-04-01-021023	2/12/2023	14:30	Water	Stream/River	SW8260D	75-01-4	Vinyl Chloride	ug/L	1	Final	<1	U

APPENDIX C

EXHIBIT 100 SDS EXTRACTIONS – SORTED BY CHEMICAL

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
2-Ethylhexyl Acrylate, 50 ppm MEHQ Synonyms: Ethyl hexyl acrylate	11/25/2022	The Dow Chemical Company	NS-CA-000001381	Ethyl hexyl acrylate: >=99.6 - <=100.0	Information on likely routes of exposure: Inhalation, Eye contact, Skin contact, Ingestion. Acute toxicity Endpoints: Not classified based on available information. Acute oral toxicity Information for the Product: Low toxicity if swallowed. Swallowing may result in gastrointestinal irritation or ulceration. Swallowing may result in burns of the mouth and throat. Acute dermal toxicity Information for the Product: Prolonged skin contact is unlikely to result in absorption of harmful amounts. Acute inhalation toxicity Information for the Product: Prolonged excessive exposure may cause adverse effects. Excessive exposure may cause severe irritation to upper respiratory tract (nose and throat) and lungs. Signs and symptoms of excessive exposure may include: May cause dizziness and drowsiness. Headache. May cause pulmonary edema (fluid in the lungs.) Effects may be delayed. Skin Corrosion/irritation: Causes skin irritation. Information for the Product: Based on product testing: Brief contact may cause severe skin irritation with pain and local redness. Repeated contact may cause skin burns. Symptoms may include pain, severe local redness, swelling, and tissue damage. Serious eye damage/eye irritation: Not classified based on available information. Information for the Product:	Chronic toxicity Specific Target Organ Systemic Toxicity (Repeated Exposure): Not classified based on available information. Information for the Product: In animals, effects have been reported on the following organs: Respiratory tract. Carcinogenicity: Not classified based on available information. Information for the Product: Has caused tumors in skin painting tests in animals. Positive findings are believed to be secondary to chronic irritation/tissue injury. Ethyl hexyl acrylate: IARC Group 2B: Possibly carcinogenic to humans Teratogenicity: Not classified based on available information. Information for the Product: Did not cause birth defects or other effects in the fetus even at doses which caused toxic effects in the mother. Reproductive toxicity: Not classified based on available information. Information for the Product: In animal studies, did not interfere with reproduction. In animal studies, did not interfere with fertility. Mutagenicity: Not	Disposal methods: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Waste characterizations and compliance with applicable laws are the responsibility soley of the waste generator. FOR UNUSED AND UNCANTAMINATED PRODUCT, always send to a licensed disposer per applicable regulations. Consult the local waste disposal expert for the appropriate waste disposal method. Recover or recycle, if possible. Otherwise, send it to a licensed disposer. Contaminated packaging: Empty containers retain product residues. Follow label warnings even after container is emptied. Improper disposal or reuse of this container may be dangerous and illegal. Refer to applicable federal, state and local regulations.	NS-CA-000001381-1396

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
					Based on product testing: May cause slight temporary eye irritation. Corneal injury is unlikely. For skin sensitization: May cause an allergic skin reaction. For respiratory sensitization: Not classified based on available information. Information for the Product: For skin sensitization: Has caused allergic skin reactions in humans. Has caused allergic skin reactions when tested in guinea pigs. Has demonstrated the potential for contact allergy in mice. For respiratory sensitization: Not relevant data found. Specific Target Organ Systemic Toxicity (Single Exposure): May cause respiratory irritation. Aspiration Hazard: Not classified based on available information. Information for the Product: Aspiration into the respiratory system may occur during ingestion or vomiting. Due to corrosivity, tissue damage or lung injury may occur.	classified based on available information. Information for the Product: In vitro genetic toxicity studies were predominantly negative. Animal genetic toxicity studies were negative.		
2-Ethylhexyl Acrylate, 50 ppm MEHQ – aka Ethyl Hexyl Acrylate.	2/4/2023	Dow	NS-CA-000000001	Ethyl Hexyl Acrylate: ≥99.6 to ≤100.0%	Inhalation: Prolonged excessive exposure may cause adverse effects. Excessive exposure may cause server irritation to upper respiratory tract (nose and throat) and lungs. Signs and symptoms of excessive exposure include: May cause dizziness and drowsiness. Headache. May cause pulmonary edema (fluid in lungs). Effects may be delayed.	IARC 2B: Possibly carcinogenic to humans.	DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. FOR UNUSED AND	NS-CA-000000001 to 016

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
							UNCONTAMINATED PRODUCT, always send to a licensed disposer per applicable regulations. Consult the local waste disposal expert for the appropriate waste disposal method.	
Benzene	7/30/2014	ALONUSA	NS-CA-000000430	Benzene: 100%	Acute Toxicity: Harmful if swallowed. Skin Corrosion/Irritation: Causes skin irritation. Serious Eye Damage/ Irritation: Cause serious eye irritation.	May cause genetic defects. May cause cancer. IRAC 1: Human carcinogen. NTP: Evidence of Carcinogenicity, known human carcinogen.	Ecology – Waste Materials: This material is hazardous to the aquatic environment. Keep out of sewers and waterways. Waste Disposal Recommendation: Dispose of waste material in accordance with all local, regional, national and international regulations.	NS-CA-000000430-439
Benzene (Duplicate	7/30/2014	Alon USA Energy Inc.	NS-CA-000001397	Benzene: 100%	Acute Toxicity: Harmful if swallowed. Skin Corrosion/Irritation: Causes skin irritation. Serious Eye Damage/ irritation: Causes serious eye irritation. Respiratory or Skin Sensitization: Not classified. Symptoms/injuries After Inhalation: May cause drowsiness or dizziness. May cause respiratory irritation. Symptoms/Injuries After Skin Contact: Causes skin irritation. Symptoms/Injuries After Eye Contact: Causes eye irritation.	Germ Cell Mutagenicity: May cause genetic defects. Carcinogenicity: May cause cancer. Reproductive Toxicity: Not classified. Specific Target Organ Toxicity (Single Exposure): Causes damage to organs. Specific Target Organ Toxicity (Repeated Exposure): Causes damage to organs through prolonged or repeated exposure. Aspiration Hazard: May be fatal if swallowed and enters airways. Potential Adverse Human Health Effects and Symptoms:	Disposal Considerations Waste treatment methods Waste Disposal Recommendations: Dispose of waste material in accordance with all local, regional, national, and international regulations. Additional Information: Handle empty containers with care because residual vapors are flammable. Ecology – Waste Materials: This material is hazardous to the aquatic environment. Keep out of sewers and waterways.	NS-CA-000001397-1406

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
						Harmful if inhaled. Symptoms/Injuries After Ingestion: May be fatal if swallowed and enters airways. Ingestion is likely to be harmful or have adverse effects. Chronic Symptoms: Prolonged exposure may cause effects in specific organs such as the liver, kidneys, blood, and nervous system. May cause cancer. Causes damage to organs through prolonged or repeated exposure. May cause heritable genetic damage.		
Butyl Acrylate	1/21/2017	Arkema Inc.	NS-CA-000000440	2-Propenoic Acid, Butyl Ester: >=99%	Potential Health Effects: If swallowed, may cause gastrointestinal irritation including nausea and vomiting. Vapor causes irritation to the respiratory tract and the eyes. Possible cross sensitization with other acrylates and methacrylates. \May be harmful if swallowed. Dermal: May be harmful in contact with skin. Inhalation: Harmful if inhaled. Skin Irritation: Causes skin irritation. Eye Irritation: Causes serious eye irritation. Skin Sensitization: May cause allergic skin reaction.	Carcinogenicity: Chronic inhalation administration to rat/ No increase in tumor incidence was reported. Chronic dermal administration to mouse / No increase in tumor incidence was reported. Classified by the international Agency for Research on Cancer as: Group 3: Unclassifiable as to carcinogenicity in humans	Waste disposal: Disposal via incineration is recommended. Dispose of in accordance with federal, state and local regulations. Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits. Note: Chemical additions to, processing of, or otherwise altering this material may make this waste management information incomplete, inaccurate, or otherwise	NS-CA-000000440-455

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
							inappropriate. Furthermore, state and local waste disposal requirements may be more restrictive or otherwise different from federal laws and regulations. Take appropriate measures to prevent release to the environment.	
Butyl Acrylate	1/21/2017	Arkema Inc.	NS-CA-000001407	2-Propenoic acid, butyl ester: =99%	Acute Toxicity Oral: May be harmful if swallowed. Dermal: May be harmful in contact with skin. Inhalation: Harmful if inhaled. Skin Irritation: Causes skin irritation Eye Irritation: Causes serious eye irritation. Skin Sensitization: May cause allergic skin reaction. Repeated dose Toxicity: Subchronic drinking water administration to rat/signs: changes in food or water consumption, decreased growth rate. Subchronic oral administration to rat/ affected organ(s): respiratory tract, eye / Local irritation Human Experience: Skin Contact: Skin allergy was observed.	Carcinogenicity: Chronic Inhalation administration to rat/ No increase in tumor incidence was reported. Chronic dermal administration to mouse/ No increase in tumor incidence was reported. Classified by the International Agency for Research on Cancer as: Group3: Unclassifiable as to carcinogenicity in humans. Genotoxicity: Assessment in Vitro: No genetic changes were observed in laboratory tests using: bacterial. Both positive and negative responses for genetic changes were observed in laboratory tests using: animal cells. Assessment in Vivo: No genetic changes were observed in laboratory tests using: hamster, rat. Developmental toxicity: Exposure during	Dispose of contents/container to an approved waste disposal plant. Waste disposal: Disposal via incineration is recommended. Dispose of in accordance with federal, state and local regulations. Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits. Note: Chemical additions to, processing of, or otherwise altering this material may make this waste management information incomplete, inaccurate, or otherwise inappropriate. Furthermore, state and local waste disposal requirements may be more restrictive or	NS-CA-000001407-1422

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
						pregnancy, Inhalation (Rat)/ No birth defects were observed, (levels produced toxic effects in the mothers and offspring). Exposure during pregnancy, Oral (Mouse)/ Birth defects were observed, (levels produced toxic effects in the mothers and offspring). Reproductive effects: Repeated exposure by inhalation (Rat)/ Did not cause damage to the reproductive organs. Other Information: Possible cross sensitization with other acrylates and methacrylates.	otherwise different from federal laws and regulations. Take appropriate measures to prevent release to the environment.	
Carpol GP-3510 Polyol Synonyms: Polyether Polyol; Glycerine-Propoxylated-Ethoxylated Polyol	5/22/2020	Carpenter Co.	NS-CA-000000456	Polyether Polyol: 100%	Skin Corrosion/Irritation: Based on available information, skin corrosion/irritation is not expected under normal conditions of use. Serious Eye Damage/Irritation: Based on available information, eye damage/irritation criteria are not met. Respiratory or Skin Sensitization: Based on available information, sensitization criteria are not met. Germ Cell Mutagenicity: Available studies have not indicated this material to be a mutagen. Carcinogenicity: This product does not contain aby component that is considered a human carcinogen by IARC, ACGIH, OSHA or NTP. Reproductive Toxicity: No data	Potential Health Effects Inhalation: Acute: Not expected to be a hazard due to low vapor pressure. Chronic: None known. Skin: Acute: None known. Chronic: None known. Eye: Acute: May cause mild irritation. Chronic: None known. Ingestion: Acute: Small amounts swallowed may cause gastrointestinal discomfort. Chronic: None Known.	Product Waste: Do not dump into any sewers, on the ground, or into any body of water. All disposal methods must be in compliance with Federal, State/Provincial, and local regulations. Packaging Waste: Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.	NS-CA-000000456-463

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
					available. Specific Target Organ Toxicity (single exposure): Not data available. Specific Target Organ Toxicity (repeated exposure): No data available. Aspiration Hazard: No data available.			
Diethylene Glycol (IVL)	2/16/2022	Indorama Ventures Oxides LLC	NS-CA-000000727	2,2'-oxydiethanol: >=90-<=100%	Advice on protection against fire and explosion: Normal measures for preventive fire protection. Advice on safe handling: Avoid formation of respirable particles. Do not breathe vapours or spray mist. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Dispose of rinse water in accordance with local and national regulations. Warning. Harmful if swallowed. Wash skin thoroughly after handling. Do not eat, drink or smoke when using this product. Call a poison center/doctor if you feel unwell. Rinse mouth.	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens. No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.	Dispose of contents/ container to an approved waste disposal plant. Waste from residues: Dispose of contents and container in accordance with all local, regional, national and international regulations. Do not dispose of waste into sewer. Do not contaminate ponds, waterways or ditches with chemical or used container. Contaminated packaging: Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in	NS-CA-000000727-739
Dipropylene Glycol Fragrance 1,1-Oxydi-2-Propanol	11/22/2019	Lyondell Chemical Company LyondellBasell Tower	NS-CA-000000713	Dipropylene Glycol: >=99.5%	Acute oral toxicity: Based on acute toxicity values, not classified. Ingestion of high doses may cause discomfort and irritation of the gastrointestinal tract and CNS depression (fatigue, dizziness	Chronic Toxicity Carcinogenicity: Not classified. No adverse effect observed. Germ cell mutagenicity: Not classified. No	Disposal considerations Waste treatment methods Product: Comply with federal, state, or local	NS-CA-000000713-726

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
					and possibly loss of concentration, with collapse, coma and death in cases of severe over-exposure). Acute inhalation toxicity: Based on acute toxicity values, not classified. Acute dermal toxicity: Based on acute toxicity values, not classified. Skin corrosion/irritation: Based on skin irritation values, not classified. May cause slight transient skin irritation. Serious eye damage/eye irritation: Based on eye irritation values, not classified. Respiratory or skin sensitization: Respiratory sensitization Not classified. Not study available. Skin sensitization not classified, no adverse effect observed.	adverse effect observed. Reproductive Toxicity Effects on fertility Effects on or via lactation: Not classified. Male rats and female mice ingesting multi-gram quantities of dipropylene glycol for 90 days exhibited changes in testis and estrous cycle that appeared secondary to clinical-and systemic toxicity, debilitation and death. Data available on related homologues suggest it is unlikely to affect fertility or reproduction at lower exposures that do not cause morbidity or mortality. Effects on Development: Not classified. No adverse effect observed. Target Organ Systemic Toxicant – Single exposure: Based on single exposure toxicity values, not classified. Target Organ Systemic Toxicant – Repeated exposure: Based on repeated exposure toxicity values, not classified. Aspiration hazard: Based on physico-chemical values or lack of human evidence, not classified.	regulations for disposal. Landfill solids at permitted sites. Burn concentrated liquids, diluting 3with clean, low viscosity fuel. Avoid flameouts and assure that emissions comply with all applicable standards/regulations. Dilute aqueous waste may biodegrade. Assure effluent complies with applicable regulations.	
Glycol Ether EB	10/22/2019	Equistar Chemicals, LP Lyondell Basell	NS-CA-000000500	2-Butoxyethanol: <99.5%	Acute oral toxicity: Classified Harmful if swallowed. Ingestion may cause weakness,	Chronic Toxicity Carcinogenicity: Not classified	Do not dispose of waste into sewer. Do not contaminate	NS-CA-000000500-511

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
					confusion, anxiety, decreased blood pressure, and CNS depression with collapse and coma. Acute inhalation Toxicity: Exposure to very high concentrations of aerosols may cause irritation of the eyes, nose, and throat and depression of the central nervous system. Acute dermal toxicity: Based on acute toxicity values, not classified. Skin corrosion/ irritation: Classified Causes mild skin irritation. Serious eye damage/eye irritation: Classified. Causes serious eye irritation. Respiratory or skin sensitization: Respiratory sensitization Not classified Not study available. Skin sensitization Not classified No adverse effect observed.	No adverse effect observed. Gem cell mutagenicity: Not classified No adverse effect observed. Reproductive Toxicity Effects on fertility/ Effects on or via lactation: Not classified No adverse effect observed. Effects on Development: Not classified. No adverse effect observed. Target Organ Systemic Toxicant – Single Exposure: Not classified. Exposure routes: Inhalation, Ingestion Target Organs: Central nervous system May cause drowsiness or dizziness. Target Organ Systemic Toxicant – Repeated Exposure: Results from acute and repeat exposure studies in rats, mice and rabbits indicate that EGBE causes injury to red blood cells with subsequent intravascular hemolysis and anemia, and secondary changes in the liver and kidney. Human and guinea pig red blood cells are resistant to EGBE injury and therefore the effects noted in sensitive species are	ponds, waterways or ditches with chemical or used container. Dispose of as hazardous waste in compliance with local and national regulations.	

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
						not relevant to humans. Aspiration hazard: not classified May be harmful if swallowed and enters airways.		
Glycol Ether EB	10/22/2019	Equistar Chemicals, LP LyondellBasell Tower	NS-CA-000000763	2-Butoxyethanol: <99.5%	Acute Oral Toxicity: Classified. Harmful if swallowed. Ingestion may cause weakness, confusion, anxiety, decreased blood pressure, and CNS depression with collapse and coma. Acute inhalation toxicity: Exposure to very high concentrations of aerosols may cause irritation of the eyes, nose, and throat and depression of the central nervous system. Acute dermal toxicity: Based on acute toxicity values, not classified. Skin corrosion/irritation: Classified Causes mild skin irritation. Serious eye damage/eye irritation: Classified Causes serious eye irritation. Respiratory or skin sensitization: Respiratory sensitization Not classified. No study available. Target Organ Systemic Toxicant – Single Exposure: Not classified. Exposure routes: inhalation, Ingestion. Target Organs: Central nervous system. May cause drowsiness or dizziness. Aspiration hazard: Not classified. May be harmful if swallowed and enters airways.	Chronic Toxicity Carcinogenicity: Not classified. No adverse effect observed. Germ cell mutagenicity: Not classified. No adverse effect observed. Reproductive toxicity Effects on fertility/ Effects on or via lactation: Not classified. No adverse effect observed Effects on Development: Not classified. Target Organ Systemic Toxicant – Repeated exposure: Based on repeated exposure toxicity values, not classified. Results from acute and repeat exposure studies in rats, mice and rabbits indicate that EGBE causes injury to red blood cell with subsequent intravascular hemolysis and anemia, and secondary changes in the liver and kidney. Human and guinea pig red blood cells are resistant to EGBE injury and therefore the effects noted in sensitive species are to relevant to humans.	Accidental Release Measures Personal precautions: Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Use personal protective equipment. Ensure adequate ventilation. Eliminate all sources of ignition. Environmental precautions: Do not allow contact with soil, surface or ground water. Do not discharge product into the aquatic environment without pretreatment (biological treatment plant). Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.	NS-CA-000000763-774

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
Isobutylene	11/22/2019	Lyondell Chemical Company Lyondell basell	NSCA000000512	Isobutylene: >=99.0%	Acute toxicity Acute oral toxicity: Not applicable Acute inhalation toxicity: Based on acute toxicity values, not classified. Acute dermal toxicity: Not applicable. Skin corrosion/irritation: Not classified Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite. Serious eye damage/eye irritation: Not classified Contact with liquid may cause frostbite. Respiratory or skin sensitization: Respiratory sensitization Not applicable. Skin Sensitization Not applicable.	Chronic Toxicity Carcinogenicity: Not classified Contains a substance that has a positive carcinogenicity study. The weight of evidence for the carcinogenicity of this substance does not meet the criteria for classification. Germ cell mutagenicity: Not classified No adverse effect observed. Reproductive toxicity Effects on fertility/ Not classified. Effects on or via lactation No adverse effect observed. Effects on Development: Not classified No adverse effect observed. Target Organ Systemic Toxicant – Single exposure: Based on single exposure toxicity values, not classified. High concentrations may cause central nervous system depression. Target Organ Systemic Toxicant – Repeated exposure: Based on repeated exposure toxicity values, not classified. Aspiration hazard: Not applicable.	Waste treatment methods Product: Assure emissions comply with applicable regulations. Contaminated product, soil, water, container residues and spill cleanup materials may be hazardous wastes. Contaminated product, soil or water should be considered dangerous due to potential evolution of flammable vapor. Proper grounding procedures to avoid static electricity should be followed. The product should not be allowed to enter drains, water courses or the soil.	NSCA000000512-527
Isobutylene,	11/22/2019	Lyondell	NS-CA-	Isobutylene: >=99.0%	Use personal protective	Chronic Toxicity	Prevent product from	NS-CA-

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
Isobutene, Unsaturated Butene, 2-Methylpropene		Chemical Company	000000684		equipment. Ensure adequate ventilation. Eliminate all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Enter area only if strictly necessary. A combustible gas detector can be used to check for flammable gas or vapors. Acute toxicity: Acute oral toxicity: Not applicable. Acute inhalation toxicity: Based on acute toxicity values, not classified. Acute dermal toxicity: Not applicable. Skin corrosion/irritation: Not classified. Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite. Serious eye damage/eye irritation: Not classified. Contact with liquid may cause frostbite. Respiratory or skin sensitization: Respiratory sensitization not applicable.	Carcinogenicity: Not classified. Contains a substance that has a positive carcinogenicity study. The weight of evidence for the carcinogenicity of this substance does not meet the criteria for classification. Germ cell mutagenicity: Not classified. No adverse effect observed. Reproductive toxicity Effects on fertility/Effects on or via lactation: Not classified. No adverse effect observed. Effects on Development: Not classified. No adverse effect observed. Target Organ Systemic Toxicant – Single exposure: Based on single exposure toxicity values, not classified. High concentrations may cause central nervous system depression. Target Organ Systemic Toxicant – Repeated exposure: Based on repeated exposure toxicity values, not classified. Aspiration hazard: Not applicable.	entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities. An authoritative evaluation of environmental exposure and risk indicates that no special risk management practices are needed to control environmental release. Waste treatment methods Product: Assure emissions comply with applicable regulations. Contaminated product, soil, water, container residues and spill cleanup materials may be hazardous wastes. Contaminated product, soil or water should be considered dangerous due to potential evolution of flammable vapor. Proper grounding procedures to avoid static electricity should be followed. The product should not be allowed to enter drains, water courses or the soil.	000000684-689
LUBAD 1903: Lubricating oil additive	1/6/2022	Chevron Oronite Company LLC	NS-CA-000000491	Highly refined mineral oil (C15-C50): 35-40% Zinc alkyl dithiophosphate: 5-10% Arenesulfonic acid, alkyl derivatives, metal salts: 1-	Serious Eye Damage/Irritation: The eye irritation hazard is based on an evaluation of the data for similar products. These data show that a specific component present in this product antagonizes (or	Delayed or Other Health Effects: Not classified. Indication of any immediate medical attention and special	Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as	NS-CA-000000491-499

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
				5% Branched alkylphenol and Calcium branched alkylphenol: <0.3%	decreases the severity of) the eye irritation of the ZnDTP Skin Corrosion/Irritation: The material is not considered a skin irritant. The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Skin Sensitization: The material is not considered a skin sensitizer. The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Acute Dermal Toxicity: The material is not considered a dermal toxicant. The product has not been tested. The statement is based on evaluation of a data for similar materials or product components. Acute Oral Toxicity: The material is not considered an oral toxicant. The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Acute Inhalation Toxicity: The material is not considered an inhalation toxicant. The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Acute Toxicity Estimate: Not Determined. Germ Cell Mutagenicity: The material is not considered a mutagen. The product has not been tested. The statement is based on evaluation of data for similar materials or product components.	treatment needed Note to Physicians: Administration of 100% oxygen and supportive care is the preferred treatment for poisoning by hydrogen sulfide gas. For additional information on H2S, see Chevron SDS No. 301. . At low levels, hydrogen sulfide causes irritation of the eyes, nose, and throat. Moderate levels can cause headache, dizziness, nausea, and vomiting, as well as coughing and difficulty breathing. Higher levels cause shock, convulsions, coma, and death. After a serous exposure, symptoms usually begin immediately. The U.S. National Institute for Occupational Safety and Health (NIOSH) considers air concentrations of hydrogen sulfide gas greater than 100 ppm to be Immediately Dangerous to Life and Health (IDLH).	defined by international, country, or local laws and regulation	

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
					Reproductive Toxicity: The material is not considered a reproductive toxicant. The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Specific Target Organ Toxicity – Single Exposure: The material is not considered a target organ toxicant (single exposure). The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Specific Target Organ Toxicity – Repeated Exposure: The material is not considered a target organ toxicant (repeated exposure). The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Aspiration Hazard: The material is not considered an aspiration hazard.			
OLOA 55603	09/22/2022	Chevron Oronite Company LLC	NS-CA-000000785	Highly refined mineral oil (C15-C50): 40-45% Zinc alkyl dithiophosphate: 5-10% Arenesulfonic acid, alkyl derivatives, metal salts: 1-5% Branched alkylphenol and Calcium branched alkylphenol: <0.3%	Information on toxicological effects Serious Eye Damage/Irritation: The eye irritation hazard is based on an evaluation of the data for similar products. These data show that a specific component present in this product antagonizes (or decreases the severity of) the eye irritation of the ZnDTP. Skin Corrosion/Irritation: The material is not considered a skin irritant. The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Skin Sensitization: The material	The U.S. National Institute for Occupational Safety and Health (NIOSH) considers air concentrations of hydrogen sulfide gas greater than 100 ppm to be Immediately Dangerous to Life and Health (IDLH). This product contains Arenesulfonic acid, alkyl derivatives, metal salts. This substance may cause skin sensitization, eye irritation, lung effects, skin corrosion. When using this substance,	Avoid release to the environment. Disposal: Dispose of contents/container in accordance with applicable local/regional/national/ international regulations.	NS-CA-000000785-793

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
					is not considered a skin sensitizer. The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Acute Dermal Toxicity: The material is not considered a dermal toxicant. The product has not been tested. The statement is based on evaluation of a data for similar materials or product components. Acute Oral Toxicity: The material is not considered an oral toxicant. The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Acute Inhalation Toxicity: The material is not considered an inhalation toxicant. The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Acute Toxicity Estimate: Not Determined. Germ Cell Mutagenicity: The material is not considered a mutagen. The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Reproductive Toxicity: The material is not considered a reproductive toxicant. The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Specific Target Organ Toxicity – Single Exposure: The material is not considered a target organ	avoid skin contact, avoid ingestion, use skin protection. This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. Note of the oils require a cancer warning under OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the national Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B). These oils have not been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as: confirmed human carcinogen (A1), suspected human carcinogen (A2), or confirmed animal carcinogen with unknown relevance to humans (A3).		

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
					toxicant (single exposure). The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Specific Target Organ Toxicity – Repeated Exposure: The material is not considered a target organ toxicant (repeated exposure). The product has not been tested. The statement is based on evaluation of data for similar materials or product components. Aspiration Hazard: The material is not considered an aspiration hazard.			
Polyvinyl Chloride Resin	8/30/2018	Shintech, Inc.	NS-CA-000001540	Polyvinyl Chloride Resin: >99.8%	Toxicity Data: There is limited toxicity information available for this product.	Carcinogenicity: This product is not considered carcinogenic by OSHA, NTP, or IARC Reproductive Effects: None reported. Mutagenicity: Has not been reported. Teratogenicity: Has not been reported.	Waste Disposal: Do not dump this product into any sewers, on the ground, or into any body of water. Dispose of in accordance with all applicable federal, state, and local regulations. Waste characterization and compliance with applicable laws are the responsibility of the waste generator.	NS-CA-000001540-1546
Propylene Glycol Industrial	11/22/2019	Lyondell Chemical Company, LyondellBasell Tower	NS-CA-000000700	Propylene Glycol: >=99.0%	Acute toxicity Acute oral toxicity: Based on acute toxicity values, not classified. Acute inhalation toxicity: Based on acute toxicity values, not classified. Acute dermal toxicity: Based on acute toxicity values, not classified. Skin corrosion/irritation: Based on skin irritation values, not classified. May cause slight transient skin irritation.	Chronic Toxicity Carcinogenicity: Not classified. No adverse effect observed. Germ cell mutagenicity: Not classified. No adverse effect observed. Reproductive toxicity Effects on Fertility/Not classified. Effects on or via lactation: No adverse effect observed.	Disposal considerations Waste treatment methods Product: Comply with federal, state, or local regulations for disposal. Landfill solids at permitted sites. Burn concentrated liquids, diluting 3with clean, low viscosity fuel. Avoid flameouts and assure that emissions	NS-CA-000000700-712

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
					Serious eye damage/eye irritation: Based on eye irritation values, not classified. May produce minimal, fully reversible eye irritation. Respiratory or skin sensitization: Respiratory sensitization. Not classified no data available Skin sensitization Not classified Skin reactions of unknown etiology have been described in some hypersensitive individuals following topical application.	Effects on Development: Not classified. No adverse effect observed. Target Organ Systemic Toxicant-Single Exposure: Based on single exposure toxicity values, not classified. Target Organ Systemic Toxicant – Repeated Exposure: Based on repeated exposure toxicity values, not classified. Propylene glycol is of low inherent toxicity in rats and dogs after repeated oral exposure, while cats show species-specific hematological changes in red blood cells (other tissues unremarkable). Rats exposed repeatedly to high aerosol concentrations exhibited signs consistent with irritation of the eyes and nasal mucosa hut showed no evidence of systemic toxicity. Aspiration hazard: Based on physico-chemical values or lack of human evidence, not classified.	comply with all applicable standards/regulations. Dilute aqueous waste may biodegrade. Assure effluent complies with applicable regulations.	
Propylene Glycol USP/EP Bulk Synonyms: Propylene Glycol, 1,2-Propanediol, 1,2-Dihydroxypropane, Monopropylene Glycol	1/16/2023	Not mentioned	NSCA000000528	Propylene Glycol: >=99.5%	High doses may cause CNS depression (fatigue, dizziness and possibly loss of concentration, with collapse, coma and death in cases of severe over-exposure). Risks: May cause eye, skin, and respiratory tract irritation.	Not a hazardous substance or mixture according to Regulation (EC) No 127220008 Other hazards: This substance/mixture contains no components considered to be either persistent, bioaccumulative and	Try to prevent the material from entering drains or water courses. Extinguish ignition sources; stop release; prevent flow to sewers or public waters. Notify fire and environmental authorities.	NSCA000000528-543

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
						toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.	Impound/recover large land spill; soak up small spill with inert solids. Soak up small spills with inert solids. Use suitable disposal containers. On water, material is soluble and may float or sink. Contain/collect rapidly to minimize dispersion. Disperse residue to reduce aquatic harm. Report per regulatory requirements.	
Propylene Glycol USP/EP, Bulk	1/16/2023	None Given	NS-CA-000000747	Propylene Glycol: >=99.5%	Symptoms: High doses may cause CNS depression (fatigue, dizziness and possibly loss of concentration, with collapse, coma and death in cases of severe over-exposure). Risks: May cause eye, skin, and respiratory tract irritation. Acute Inhalation Toxicity: Assessment: The substance or mixture has no acute inhalation toxicity. Acute dermal toxicity: LD50 (Rabbit): >5,000 mg/kg. Skin Corrosion/irritation Product: Based on skin irritation values, not classified. May cause slight transient skin irritation. Serious eye damage/eye irritation Product: May produce minimal, fully reversible eye irritation. Respiratory or skin sensitization Product: No data available. STOT-single exposure: Based on single exposure toxicity values, not classified.	Carcinogenicity – Assessment: No adverse effect observed. Propylene Glycol: Carcinogenicity – Assessment: No increase in tumors was noted in rats and dogs exposed to high concentrations of propylene glycol via the diet for up to 2 years. The incidence of skin tumors was unaltered in mice following dermal application over a lifetime. Germ cell mutagenicity Product: No adverse effect observed Carcinogenicity – Assessment: No adverse effect observed. Reproductive Toxicity – Assessment No adverse effect observed. STOT-repeated	Try to prevent the material from entering drains or water courses. Extinguish ignition sources; stop release, prevent flow to sewers or public waters. Notify fire and environmental authorities. Impound/recover large land spills with inert solids. Use suitable disposal containers. On water, material is soluble and may float or sink. Disperse residue to reduce aquatic harm. Report per regulatory requirements.	NS-CA-000000747-762

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
						exposure: Based on repeated exposure toxicity values, not classified. Propylene glycol is of low inherent toxicity in rats and dogs after repeated oral exposure, while cats show species-specific hematological changes in red blood cells (other tissues unremarkable). Rats expose repeatedly to high aerosol concentrations exhibited signs consistent with irritation of the eyes and nasal mucosa but showed no evidence of systemic toxicity.		
SOLBERG VERSAGARD AS-100	1/18/2021	Perimeter Solutions	NS-CA-000001639	2-butoxyethanol: 5-<20% (carboxymethyl)dimethyl-3[(1-oxododecyl)amino]propyl ammonium hydroxide: 2-<6% Sodium octyl sulphate: 0.5--<3%	Information on toxicological effects: The experimental information related to the toxicological properties of the product itself is not available. Contains glycols. With possibility of effects that are hazardous to the health, it is recommended not to breathe the vapours for long periods of time. Dangerous health implications: In case of exposure that is repetitive, prolonged or at concentrations higher than recommended by the occupational exposure limits, it may result in adverse effects on health depending on the means of exposure: A-Ingestion (acute affect) Acute toxicity: Based on available data, the classification criteria are not met, however, it contains substances classified as dangerous for consumption. Corrosivity/Irritability: The	D-CMR effects (carcinogenicity, mutagenicity and toxicity to reproduction): Carcinogenicity: Based on available data, the classification criteria are not met, as it does not contain substances classified as dangerous for the effects mentioned. Mutagenicity: Based on the available data, the classification criteria are not met, as it does not contain substances classified as dangerous for this effect. Reproductive toxicity: Based on available data, the classification criteria are not met, as it does not contain substances classified as dangerous for this effect.	Disposal methods: Waste management (disposal and evaluation): Consult the authorized waste service manager on the assessment and disposal operations. In case the container has been in direct contact with the product, it will be processed the same way as the actual product. Otherwise, it will be processed as non-dangerous residue. We do not recommend disposal down the drain. Regulations related to waste management: Legislation related to waste management: 40 CFR Part261 – IDENTIFICATION AND LISTING OF HAZARDOUS	NS-CA-000001639-1648

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
					consumption of a considerable dose can cause irritation in the throat, abdominal pain, nausea and vomiting. B-Inhalation (acute effect): Acute toxicity: Based on available data, the classification criteria are not met, however, it contains substances classified as dangerous for inhalation. Corrosivity/Irritability: Based on available data, the classification criteria are not met, as it does not contain substances classified as dangerous for this effect. C-Contact with the skin and the eyes (acute effect): Contact with the skin: Produces skin inflammation. Contact with the eyes: Produces serious eye damage after contact. F-Specific target organ toxicity (STOT) – single exposure: Based on available data, the classification criteria are not met, as it does not contain substances classified as dangerous for this effect. H-Aspiration Hazard: Based on available data, the classification criteria are not met, as it does not contain substances classified as dangerous for this effect.	E-Sensitizing effects: Respiratory: Based on available data, the classification criteria are not met, as it does not contain substances classified as dangerous for this effect. Cutaneous: Based on available data, the classification criteria are not met, as it does not contain substances classified as dangerous for this effect. G-Specific target organ toxicity (STOT)-repeated exposure: Based on available data, the classification criteria are not met, as it does not contain substances classified as dangerous for this effect. Skin: Based on available data, the classification criteria are not met, as it does not contain substances classified as dangerous for this effect.	WASTE.	
Vinyl Chloride (Monomer) Synonyms: VCM; Monoghloroethylene; Chloroethene; Ethylene, chloro-; Vinyl chloride monomer.	11/30/2020	Oxy Vinyls, LP	NS-CA-000001174	Vinyl Chloride: 99-100%	Contact with liquid may cause frostbite to exposed tissue. May produce symptoms of central nervous system depression including headache, dizziness, nausea, loss of balance and drowsiness. May cause respiratory irritation. Target Organ Toxicity (Single Exposure): May cause respiratory tract irritation. May	OSHA Regulatory Status: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200. Contains vinyl chloride, a known human cancer agent. Causes damage to the	Disposal: Dispose of contents and container in accordance with applicable local, regional, national, and/or international regulations. Waste from material: Reuse or reprocess, if possible. May be subject to disposal regulations. Dispose	NS-CA-000001174-1191

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
					cause drowsiness or dizziness. Direct contact with liquid or rapidly expanding gas may cause frostbite to contacted tissue (eyes, skin, etc.). May displace oxygen and cause rapid suffocation. Acute Toxicity: Eye Contact: Causes eye irritation. Rapid evaporation of the material may cause frostbite. Skin Contact: Causes skin irritation. Rapid evaporation of the material may cause frostbite. Inhalation: May cause respiratory tract irritation. Several minutes of exposure to high, but attainable concentrations (over 1000 ppm) may cause difficulty breathing, central nervous system depression and symptoms such as: ataxia or dizziness, drowsiness or fatigue, loss of consciousness, headache, euphoria and irritability, visual and or hearing disturbances, nausea, memory loss. Prolonged, high concentration exposures may cause unconsciousness or death. Cardiac: Acute intoxication may cause irregular heartbeats. Ingestion: Not a likely route of exposure in occupational settings.	nervous system, musculoskeletal system, lymphatic system and respiratory system through prolonged or repeated exposure. Suspected of causing genetic defects. May cause cancer. This material is a potential endocrine disruptor. Target Organ Toxicity (Repeated): Causes damage to the nervous system, musculoskeletal system, lymphatic system and respiratory system through prolonged or repeated exposure. Carcinogenicity: Category 1A - May cause cancer. Germ Cell Mutagenicity: Category 2 – Suspected of causing genetic defects. Repeat occupational exposure to Vinyl Chloride have been associated with Raynaud syndrome and associated scleroderma-like skin changes on the hands. Vinyl Chloride is listed on the Endocrine Disruptors Exchange's (TEDX) List of Potential Endocrine Disruptors database of chemicals with the potential to affect the endocrine system. Every chemical on the TEDX List has one or more	in accordance with all applicable regulations. Generators of waste (equal to or greater than 100kg/mo) containing this contaminant, EPA hazardous waste number U043 and D043, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste. 40 CFR 240-280, 300-306, 702-799 (USEPA). If the material is to be incinerated, the chemical incinerator must be equipped with an afterburner (to assure complete combustion to prevent the formation of phosgene) and an acid scrubber (to remove the halo acids produced). Container Management: Refer to manufacturer/supplier for information on recovery/recycling. Dispose of container in accordance with applicable local, regional, national, and/or international regulations. Container rinsate must be disposed of in compliance with applicable regulations. Contaminated Material: Contaminated material must be disposed of in a permitted waste management facility.	

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
						verified citations published, accessible, primary scientific research demonstrating effects on the endocrine system. Chronic Toxicity: Chronic Effects: Chronic exposure to Vinyl Chloride monomer (VCM) may cause damage to the nervous system, respiratory system, musculoskeletal system, and lymphatic system. Occupational overexposure has produced a specific cancer (angiosarcoma of the liver) and is associated with hepatocellular cancer. Repeated prolonged exposure may damage: skin (scleroderma), bones (acro-osteolysis), blood vessels in the hands (Raynaud's Syndrome). Suspected of causing genetic defects. Suspected of damaging fertility or the unborn child. Reproductive effects and testes damage occurred in rats exposed to vinyl chloride. These endpoints, however, were generally noted at concentrations greater than those necessary to cause liver damage.		
Yubase 6	1/1/2020	SK Lubricants Co., Ltd.	NS-CA-000000775	Distillates (petroleum), hydrotreated heavy paraffinic: 100%	Potential acute health effects Eye contact: No known significant effects or critical	Over-exposure signs/symptoms: Eye contact: no	Disposal methods: The generation of waste should be avoided or minimized wherever	NS-CA-000000775-784

Product	Date of MSDS or SDS	Manu.	Filename	Ingredient(s)	Toxicological Information – Acute Toxicity	Toxicological Information – Chronic Toxicity	Disposal	Bates
					hazards. Inhalation: No known significant effects or critical hazards. Skin Contact: No known significant effects or critical hazards. Ingestion: No known significant effects or critical hazards.	specific data. Inhalation: No specific data. Skin contact: No specific data. Ingestion: No specific data.	possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.	

APPENDIX D

LABORATORY DATA AND CALCULATIONS

Date Set #1: July, August and December 2023 Sampling Data and Analyses:

Date Set #2: February Through April 2023 Sampling Data and Analyses:

Date Set #3: GEL Sampling Data and Analyses:

Date Set #4: Scott Smith Sampling Data and Analyses:

APPENDIX E

CV and Case List of Stephen E. Petty, P.E., C.I.H., C.S.P.

Mr. Stephen E. Petty, P.E., C.I.H., C.S.P.
President

Company

EES Group, Inc.
(d/b/a - Engineering & Expert Services, Inc.)
1701 E. Atlantic Blvd., Suite 5
Pompano Beach, FL 33060

Education

B.S., Chemical Engineering, University of Washington

M.S., Chemical Engineering, University of Washington

M.B.A., University of Dayton

Experience

General

Mr. Petty is President of EES Group, Inc. (Engineering & Expert Services, Inc.). He started EES Group, Inc. in 1996, ultimately having offices in Ohio (Columbus and Cleveland) and in Florida (Pompano Beach). In 2015, he sold the Ohio portion of EES Group, Inc. while retaining Florida operations. Prior to starting EES Group, Inc. in 1996, Mr. Petty was the Manager of Residential and Commercial Technology at Columbia Energy and a Senior Research Engineer at Battelle. He has ~45 years of forensic engineering, environmental health and safety, and energy experience. Since 2002, he has completed or supervised over 7,000 engineering forensic and health and safety projects for nearly 100 clients. This culminated in the writing of a Forensic Engineering textbook targeted at assessing claims for the insurance industry (*Forensic Engineering: Damage Assessments for Residential and Commercial Structures*, January 3, 2013, CRC Press publication; 2nd Edition published in 2022).

Mr. Petty's health and safety experience has focused on projects for the legal community (expert witness), the insurance industry, institutions, and the private sector. His expertise covers the area of Professional Engineering (PE's in six states), Industrial Hygiene (registered Certified Industrial Hygienist - CIH) and safety (registered Certified Safety Professional - CSP). As a CIH, he investigates the causes/solutions of an individual's sickness, impaired health, and discomfort at work and in the home. As a CSP, he investigates situations primarily arising out of possible Occupational Safety and Health Administration (OSHA) violations associated with workplace injuries. In other cases, this extends to customers injured at facilities where they are working or shopping. Finally, he is a certified Asbestos Evaluation Specialist in Ohio.

Mr. Petty has been disclosed ~400 expert witness cases to date, with a primary focus on exposure to organic chemicals, inorganic chemicals, pesticides, PFOA, PFAS, mold, bacteria (Legionella), heat and bio-toxins; OSHA workplace compliance (chemical exposures, amputations, and slips, trips and falls, and building envelope systems). He has also supported/testified on building envelope, water cause and origin, structural, and roof damage claims. His company assembled a nine-member team of experts that

won the expert witness contract for the Ohio School Facilities Commission (OSFC) from 2004-2008.

Mr. Petty has extensive expertise on heating, ventilation and air conditioning (HVAC) systems and holds nine (9) U.S. patents primarily related to HVAC systems.

His safety and environmental experience also included completion of many complex projects in Risk Assessment (BUSTR, EPA and VAP), Industrial Hygiene, Process Safety Management (PSM), Risk Management Plans (Health and Safety Audits), Environmental Assessments (EA) and Environmental Impact Statements (EIS), and air and water permits (PTI, PTO, NPDES, etc.) for numerous clients across the United States.

Finally, he has served in a leadership role in technology evaluations, business plans, and product development activities for dozens of products and ventures. He has been the invited dinner/lunch speaker to ASHRAE/AIHA and legal association functions.

Health and Safety Experience

- Mr. Petty has been utilized as an expert witness in ~400 cases primarily related to human exposure(s) and safety (OSHA). In the exposure area, he has worked/ testified on cases of exposure to acid gases, benzene, isocyanates, formaldehyde, gasoline, paint products, other organic chemicals, PFOA/PFAS silica, pesticides, Legionella and other bacteria and molds. In the safety area, he has worked/testified in worker exposure to chemicals, falls, and amputation cases and the standard of care required to protect workers and customers. He is recognized for his ability to reduce complex sets of information regarding exposure and compliance with regulatory standards into simple but accurate reports and presentations. Areas of practice include:
  - Occupational Safety and Health Administration Regulations:
    - OSHA Health and Safety Regulations for Workers 29 CFR 1910 General Industry and 29 CFR 1926 Construction Industry
    - OSHA Process Safety Management of Highly Hazardous Chemicals - 29 CFR 1910.119
    - Personal Protective Equipment - PPE - 29 CFR 1910.132
    - Respiratory Protection Standard - 29 CFR 1910.134 and preceding/current ANSI Z88 Standards.
    - 29 CFR 1910.1000 - OSHA PEL and Controls Standard
    - 29 CFR 1910.1028 - Benzene Standard
    - Hazard Communication Standard - HAZCOM - 29 CFR 1910.1200 and preceding/current ANSI Z129.1 (Precautionary Labeling), ANSI Z400.1 (MSDS Preparation) and LAPI Industry Standards (7 Editions from 1945 forward).
  - Mine Safety Health Administration (MSHA) EH&S Regulations - 30 CFR Parts 1 to 199

- United State Environmental Protection Agency - USEPA - 40 CFR (Including pesticides, hazardous wastes, permitting, remediation, and Process Safety Management).
- DOT Transportation Regulations and Spill Response - Hazardous Waste Operations and Emergency Response (HAZWOPER) - 46 CFR.

Mr. Petty is also trained in Hazardous Waste Operations and Emergency Response (HAZWOPER) (40-hr.) and has served as a trainer for the 40-hr. course.

- Mr. Petty was appointed as a Voting Member on July 2025 for ASHRAE's SPCC 241 – Control of Infectious Aerosols were approved and effective July 1, 2025. His appointment term was designated as "Appointment of Stephen E. Petty as PCVM-General for a two-year term, beginning July 1, 2025, and ending June 30, 2027."
- Mr. Petty is a recognized expert in Risk Assessment (RA) having been one of 14 to take the first Risk Assessment courses offered by the Ohio State University & University of Cincinnati Schools of Public Health in 1997. In addition to having completed a dozen risk assessments, he was selected by the State of Ohio Bureau of Storage Tank Regulators (BUSTR) to help write their 1999 UST RA regulations. He was selected to train BUSTR staff RA (5-week course) and to help write the on-line RA webpage, proof the equations, and to help with the on-line help handbook.
- He has completed dozens of indoor air sampling projects for residential, commercial, and industrial clients. Clients include Grange Insurance Company, Northwest Local School District, Children's Hospital, Berger Hospital, Citgo, Salem University, and Nestle.
- He has completed dozens of mold field evaluation projects. In this area, he attended a one-week ACGIH mold course in late 2002. He also received his residential mold inspector credentials from the IESO in 2003.
- Examples of specific projects completed are:
  - Conducted worker illness IAQ program where Iraqi documents were being scanned. Sampled for anthrax, bio-toxins, mold, bacteria, VOCs, CO and CO_2, temperature and humidity to help determine cause of worker complaints.
  - Sampled surface and materials for anthrax and bio-toxins at two commercial facilities.
  - Selected and completed analysis to determine cause of illness to players in their locker room at Nationwide Arena for the Columbus Blue Jackets professional hockey team.
  - Served as an expert to the OSFC on building HVAC and human comfort issues in school buildings.
  - Developed implementation templates for several Process Safety Management (PSM) and Risk Management Program (RMP) clients (e.g. Nestle facilities).

- Prepared public meeting presentation materials for AEP RMPs at their Conesville and Tanners Creek power plants. Focus was to match public legal requirements with needs of the client, and development and presentation of worst case and alternative case release scenarios under Part 68 of 40 CFR.
- Completed PSM programs for two Southwest Research Institute (SwRI) facilities and two Nestle facilities. Focus was on completing process hazards analyses (PrHAs) and on setting up ongoing PSM programs. For Nestle, set up file-based system, wrote plans for all 14 major elements, and provided detailed checklists and guidance on sections such as training, mechanical integrity, etc.
- Completed multiple ventilation projects for American Electric Power Plant facilities to determine best locations (performance vs. cost) for hazardous gas monitors in power plants and whether or not ductwork was contaminated with mold.
- Completed series of EH&S projects for Dublin schools (e.g. air quality audits and noise analyses). Completed air clearance testing and reporting and held public meetings for the vandalism clean-up efforts of Grizzell Middle School.
- Conducted industrial hygiene audits and testing for numerous public and private clients. Focused on HVAC systems, sampling (CO, CO_2, relative humidity, molds, dust, bacteria, formaldehyde, VOCs, and isocyanates) and remediation/abatement.
- Completed Failure Modes & Effects Analyses (FMEA) for DOD BZ Nerve Agent Plant design. Plant was later built, operated, and decommissioned in Pine Bluff, AR without incident.

➢ Developed IAQ solutions based on ASHRAE Standards and new technologies (e.g. desiccants).

➢ Developed and taught OSHA HAZWOPPER courses (40-hr, 24-hr and 8-hr).

➢ Voting member ASHRAE TC 8.3; corresponding member ASHRAE TC 3.5 (Desiccants).

➢ Adjunct Professor at Franklin University. Instructor of Environmental and Earth Sciences courses.

Engineering Experience

➢ President and Owner of EES Group, Inc. (EES) since 1996. Developed EES into one of the leading forensic companies in the state of Florida and Ohio.

➢ Author of *Forensic Engineering: Damage Assessments for Residential and Commercial Structures*, January 3, 2013, a CRC Press publication (2nd Edition to issue in early 2022). The book provides guidance on engineering claims assessments for the insurance industry.

- Developed forensics libraries and technical bulletins on how to assess insurance claims and fraud associated with claims. Lead author of refereed journal article reviewing hail damage from ~750 individual assessments.
- Completed or supervised over 7,000 forensics inspection projects for ~100 insurance companies and other private sector clients since 2002. Projects were associated with structural failures in residential and commercial buildings, structural damage and failures caused by vehicles striking buildings, water causation and origin analysis, causes of plumbing failures, HVAC failures and damage, roof system failures and structural damage, mold cause, origin and removal, lead cause and removal, hail damage, and lightning claims. Also completed or supervised over 200 insurance appraisals (negotiated settlements) for the industry. Was selected and completed role as an umpire for a 36-building one million dollar hail claim dispute. Testified in trial on roofing claim disputes. Specifically requested for difficult projects and for projects in the state of Texas.
- Led company in efforts to bid and win roofing and environmental contracts with the Ohio School Facilities Commission (OSFC).
- Managed the turnkey design, permitting, and building of a fuel farm facility ($750K) for The Ohio State University (OSU) Airport (2000). Project entailed the layout, design, and installation of six aboveground storage tanks (ASTs), 12,000 gallons each, and the removal and closure of four existing USTs. Fuels included Jet-A and Av-Gas. Project roles included site plans/layouts, preparation of subcontractor specifications, construction oversight, concrete foundation and subsurface design, permitting (PTI and PTO), start-up troubleshooting, and commissioning activities.
- Was lead researcher on two teams of nationally recognized residential and commercial heat pump development programs: i) Battelle (Double-Effect Absorption Heat Pump) and ii) Columbia Gas System (Dual Cycle Heat Pump). Both projects met goals for performance (efficiency and capacity). Research resulted in receipt of six U.S. Patents.
- Co-designed parking lot and storm-water collection system for major trucking firm on 40-acre site in Cleveland. Project began as a site assessment and concluded with facility design.
- Process engineer for 200 million gallons-per-day wastewater treatment plant for a Weyerhaeuser paper mill.
- Evaluated incineration technology and cost/benefit for an incinerator that burned organophosphate and chlorinated thio-ether wastes. Developed source term for present and future emissions under varying load rates.
- Prepared a carbon treatment designs for removing organophosphates and chlorinated thio-ether, and nerve agents from wastewater.
- Designed/permitted first of three mobile wastewater treatment facilities in the State of Ohio.
- Developed a process to eliminate HF/tar hazardous waste generation from an electronics manufacturing process.

- Developed processes to reduce contamination of water from oil spills, including biodegradation and controlled combustion.
- Conducted bench-scale analysis of reverse osmosis, ultrafiltration, wet air oxidation, and solvent extraction treatment processes.

Environmental Experience

- Provided 8-hr. Tier 1 & Tier 2 training to State of Ohio BUSTR site coordinators (May 23, 2000).
- Provided approximately 40 hours of Risk Assessment Training (five 8-hr. training sessions) to BUSTR coordinators (May 1999).
- Member of BUSTR's new rules advisory committee (1999).
- Completed over a dozen BUSTR Tier 2 and Tier 3 Risk Assessments (RA) for clients such as CITGO, AEP, Anderson Concrete, and the Port Columbus Airport Authority. Creative solutions saved years of remediation and millions of dollars.
- Completed BUSTR Tier 4 RA for American Electric Power.
- Completed Environmental Assessment for NASA - Lewis Rocket Engine Test Facility.
- Completed dozens of Federal/State air, water, and hazardous waste permits (e.g., PTI, PTO, FESOP and NPDES) for dozens of industrial clients.
- Developed Spill Prevention, Controls and Countermeasures (SPCC) Plan template according to 40 CFR 112. Developed SPCC template, which has been audited and accepted by Ohio EPA. Prepared site-specific SPCC's for clients such as L.J. Minor (Cleveland), Mickley Oil Company, Doersam LLC, Federal Express Corporation (Blue Ash), and Central Ohio Asphalt.
- Prepared hazardous waste evaluation for the NASA–Merritt Island Environmental Impact Assessment of Space Shuttle SRB refurbishing facility in a wildlife area.
- Developed a portion of the database used in preparing the original Resource Conservation and Recovery Act (RCRA).
- Developed BUSTR Residential and Commercial Risk Assessment (RA) Models.

Other Experience

- Responsible for all intellectual property (e.g., patents) and commercialization of residential, commercial, vehicle, and fuel cell technology for Columbia Gas System and their development partners.
- Served on 11 Industry Advisory Bodies [Gas Research Institute (GRI), American Gas Association (AGA), U.S. Department of Energy Funding Initiative - $2 billion (USDOE-FI), and Gas Utilization Research Forum (GURF)].
- Served as U.S. DOE expert reviewer on cooling, heat pump, desiccant, and power generation proposals.
- Served on U.S. DOE expert review panel for desiccant program area.

- Prepared business acquisition due diligence for Columbia Gas System corporate staff (e.g. micro-turbines).
- Provided technical and business due diligence for three venture capital firms on a dozen emerging markets.
- Authored budget recommendations for DOE Funding Initiative in Power Generation, Cooling, and NGV areas based on industry consensus meetings.
- Served/Serving on ANSI and ASHRAE Standards Working Groups (Z21.40 and SPC 40).
- Provided keynote presentations on Energy Deregulation for four major utilities and several industry groups.
- Completed nationally recognized market research on U.S. cooling, refrigeration, and controls markets.

Certifications, Registrations, and Honors

Registered Professional Engineer, State of Florida #76583, State of Kentucky #24116, State of Ohio #49063, State of Pennsylvania #PE-053899-E, State of Texas #101855 (also listed windstorm inspector), and State of West Virginia #16311

Certified Industrial Hygienist, 8067 CP, November 2000.

Certified Safety Professional, 23563, November 2012

Asbestos Hazard Evaluation Specialist – State of Ohio #ES34643

Certified Residential Mold Inspector – (IESO) - 2004

ASHRAE Certificate of Appreciation, May 2002, ASHRAE Standard 40.

ASHRAE Fundamentals of HVAC Systems – 35 CEUs (Feb. to April 2008).

AIHA CIH Refresher (Univ. of Michigan) – 40-hr. class - 1998

Certificate of Accomplishment in Risk Assessment from The Ohio State University School of Public Health – 120-hr. class – 1997

Certificate of Achievement – Ohio Department of Transportation 80-hr. class – Managing in the Environmental Process – 1997

Roof Consulting Institute (RCI) Courses:

- Advanced Thermal & Moisture Control (5/14/2008)
- Professional Roof Consulting (5/15-16/2008)
- Roof Technology & Science I (9/15-16/2009)
- Roof Technology & Science II (9/17-18/2009)

Undergraduate Scholarships from the Pulp and Paper Foundation Scholarship Fund for Freshman, Sophomore, and Junior Years.

Certificate of High Scholarship – Department of Chemical Engineering – University of Washington – Jr. Year - 1978.

Undergraduate Scholarship from Department of Chemical Engineering, Senior Year.

Undergraduate B.S. Ch.E. – Cum Laude.

Graduate School - M. S. Ch. E. – 2nd in Class

Raymond Roesch Award, University of Dayton, (awarded annually to top MBA graduate); graduated first in MBA class with 4.0 GPA – 1988.

Memberships

Member, American Industrial Hygiene Association (AIHA)

Member, American Conference of Governmental Industrial Hygienists (ACGIH)

Member, American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE). Member TC 2.3 and TC 8.3 Technical Committees. Voting Member of ASHRAE SPCC 241 – Infectious Disease Control Standard.

Member, American Institute of Chemical Engineers (AIChE)

Member, Sigma Xi.

U.S. Patents

U.S. 6,649,062. November 18, 2003. Fluid-Membrane Separation. Petty.

U.S. 6,109,339. August 29, 2000. Heating System. Talbert, Ball, Yates, Petty, and Grimes.

U.S. 5,769,033. June 23, 1998. Hot Water Storage. Petty and Jones.

U.S. 5,636,527. June 10, 1997. Enhanced Fluid-Liquid Contact. Christensen and Petty.

U.S. 5,546,760. August 20, 1996. Generator Package for Absorption Heat Pumps. Cook, Petty, Meacham, Christensen, and McGahey.

U.S. 5,533,362. July 9, 1996. Heat Transfer Apparatus for Heat Pumps. Cook, Petty, Meacham, Christensen, and McGahey.

U.S. 5,339,654. August 23, 1994. Heat Transfer Apparatus for Heat Pumps. Cook, Petty, Meacham, Christensen, and McGahey.

U.S. 5,067,330. November 26, 1991. Heat Transfer Apparatus for Heat Pumps. Cook, Petty, Meacham, Christensen, and McGahey.

U.S. 4,972,679. November 27, 1990. Absorption Refrigeration and Heat Pump System with Defrost. Petty and Cook.

Books

Forensic Engineering: Damage Assessments for Residential and Commercial Structures – 2nd Ed., September 24, 2021, Taylor Francis/CRC Press, 771 pp.

Forensic Engineering: Damage Assessments for Residential and Commercial Structures, January 4, 2013, Taylor Francis/CRC Press, 804 pp.

Publications

Stephen E. Petty, 2020, *Visible dust and asbestos: what does it suggest regarding asbestos exposures?* Journal of Scientific Practice and Integrity. 2(1). DOI: 10.35122/001c.14496, August.

Stephen E. Petty, Mark Nicas, Anthony A. Boiarski, 2011. *A quantitative Method for Estimating Dermal Benzene Absorption from Benzene-containing Hydrocarbon Liquids,* Int. J Occup Environ Health, Vol. 17/No. 4, Oct./Dec. 2011, pgs. 287-300.

Stephen E. Petty, PE, CIH, Mark Petty, Tim Kasberg, 2009. *Evaluation of Hail-Strike Damage to Asphalt Shingles Based on Hailstone Size, Roof Pitch, Direction of Incoming Storm, and Facing Roof Elevation*, Interface, The Journal of RCI; May/June, Vol. XXVII, No. 5, pgs. 4-10.

Peter F. Infante, MPH, DRPH, Stephen E. Petty, PE, CIH, D. H. Groth, G. Markowitz, D. Rosner, 2009. *Vinyl Chloride Propellant in Hair Spray and Angiosarcoma of the Liver among Hairdressers and Barbers: Case Reports*, Int. J Occup Environ Health; 15:36-42.

Petty, S.E., Ball, D., Nation, J. and S. Talbert, 1997. *A New, Integrated Compact Combo System for Multi-Family Residences*, Proceedings of the 48th Conference Papers Available from the 48th International Appliance Technical Conference (IATC), May 12 - 14, 1997, Ohio State University – Fawcett Center, Columbus, OH.

Petty, S.E., 1997. *Mack's LNG Truck Ready to Move into Refuse Collection Market,* NGV Tech Update, Gas Research Institute, Spring Edition, pgs. 1 and 3.

Petty, S., 1983. *Combustion of Crude Oil on Water*, Fire Safety Journal, Vol. 5, pgs. 123-134.

Petty, S., B.A. Garrett-Price and G.L. McKown, 1983. *Preliminary Assessment of the Use of Heat Transfer Fluids for Solar Thermal Energy Systems*, EPA-600/S7-83-021, U.S. Environmental Protection Agency, April.

English, C.J., S.E. Petty and D.S. Sclarew, 1983. *Treatment of Biomass Gasification Wastewaters Using a Combined Wet Air Oxidation/Activated Sludge Process,* PNL-4593, Contract DE-AC06-76RLO-1830, U.S. Department of Energy, February.

Petty, S.E., W. Wakamiya, C.J. English, J.A. Strand and D.D. Mahlum, 1982. *Assessment of Synfuel Spill Cleanup Options,* PNL-4244, UC-11,90i,91, Contract DE-AC06-76RLO 1830, U.S. Department of Energy, April.

Wakamiya, W., Petty, S.E., Boiarski, A., Putnam, A., 1982. *Combustion of Oil on Water: An Experimental Program*, U. S. Department of Energy, DOE/NBM/1002, Contract # AC06-76RLO 1830, February.

Petty, S., B.A. Garrett-Price and G.L. McKown, 1982. *Preliminary Assessment of the Use of Heat Transfer Fluids for Solar Thermal Energy Systems*, PNL-4182, IAG No. AD-89-F-1-623-0, U.S. Environmental Protection Agency, January.

Petty, S.E., N.E. Bell and C.J. English, Jr., 1981. *Treatment of Biomass Gasification Wastewaters Using Wet Air Oxidation, Solvent Extraction and Reverse Osmosis,* PNL

SA-10093, Proceedings of the 13th Biomass Thermochemical Conversion Contractor's Meeting, Arlington, VA, October 27-29, pgs. 718-747.

Petty, S.E., N.E. Bell and C.J. English, Jr., 1981. *Treatment of Biomass Gasification Wastewaters Using Wet Air Oxidation, Solvent Extraction and Reverse Osmosis,* Contract DE-AC06-76RLO-1830, U.S. Department of Energy, October.

Petty, S.E., S.D. Eliason and M.M. Laegreid, 1981. *Treatment of Biomass Gasification Wastewaters Using Reverse Osmosis,* PNL-4018, Contract DE-AC06-76RLO-1830, U.S. Department of Energy, September.

Mercer, B.W., W. Wakamiya, S.E. Petty, J.A. Strand and D.D. Mahlum, 1981. *Assessment of Synfuel Spill Cleanup Options,* PNL-SA-9806 – Proceedings of DOE Workshop on Processing, Needs, and Methodology for Wastewater from the Conversion of Coal, Oil Shale and Biomass to Synfuels, Richland, WA.

Eakin, D.E., J.M. Donovan, G.R. Cysewski, S.E. Petty and J.V. Maxham, 1981. *Preliminary Evaluation of Alternative Ethanol/Water Separation Processes,* PNL-3823, UC-98d, Contract DE-AC06-76RLO-1830, U.S. Department of Energy, May.

Zima, G.E., G.H. Lyon, P.G. Doctor, G.R. Hoenes, S.E. Petty and S.A. Weakley, 1981. *Some Aspects of Cost/Benefit Analysis for In-Service Inspection of PWR Steam Generators,* NUREG/CR-1490, PNL-3388, U.S. Nuclear Regulatory Commission, May.

Petty, S.E., 1981. *Potential Synthetic Fuel Spill Sources and Volumes to the Year 2000,* Contract DE-AC06-76RLO 1830, U.S. Department of Energy, March.

Petty, S.E. and W. Wakamiya, 1981. *Projections on Synfuels Production to the Year 2000,* Contract DE-AC06-76RLO 1830, U.S. Department of Energy, January

Petty, S.E., and J.V. Maxham, 1981. *Ethanol-Water Separation Using a Corn as a Dehydration Agent,* Contract DE-AC06-76RLO 1830, U.S. Department of Energy, January.

J.V. Maxham and S.E. Petty, 1980. *Dehydration of Alcohol/Water Solutions with Solid Dehydration Agents to Produce Alcohol for Gasohol,* Contract DE-AC06-76RLO 1830, U.S. Department of Energy, September.

Petty, S.E., and J.V. Maxham, 1980. *Ethanol-Water Separation Using a Reverse Osmosis Process,* PNL-3579, Contract DE-AC06-76RLO 1830, U.S. Department of Energy, September.

English, C.J., S. E. Petty and G.W. Dawson. 1980. *Identification of Hazardous Waste Disposal Sites and Management Practices in Region 10.* Contract WA-79-A375, U.S. Environmental Protection Agency, February.

Dawson, G.W., C.J. English and S.E. Petty, 1980. *Physical Chemical Properties of Hazardous Waste Constituents,* U. S. Environmental Protection Agency, Southeast Environmental Research Laboratory, Athens, Ga. March 5.

Wakamiya, W., J.V. Maxham and S.E. Petty, 1979. *Biomass Gasification Wastewater Treatment – Interim Report,* PNL-SA-8165, Contract EY-76-C-06-1830, U.S. Department of Energy, September.

Mr. Stephen E. Petty, P.E., C.I.H., C.S.P

SUMMARY OF PRESENTATIONS & PODCASTS

By

Stephen Petty

DATE	LOCATION	AUDIENCE	TOPIC	DURATION (Hrs.)
April 1, 1999	Bureau of Underground Storage Tank Regulators (BUSTR) Reynoldsburg, OH	BUSTR Chief and State Coordinators, Training Session	BUSTR RISK ASSESSMENT TRAINING Introductory Session	8 hours
April 22, 1999	Bureau of Underground Storage Tank Regulators (BUSTR) Reynoldsburg, OH	BUSTR Chief and State Coordinators, Training Session	BUSTR RISK ASSESSMENT TRAINING Second Session	8 hours
May 6, 1999	Bureau of Underground Storage Tank Regulators (BUSTR) Reynoldsburg, OH	BUSTR Chief and State Coordinators, Training Session	BUSTR RISK ASSESSMENT TRAINING Third Session	8 hours
May 27, 1999	Bureau of Underground Storage Tank Regulators (BUSTR) Reynoldsburg, OH	BUSTR Chief and State Coordinators, Training Session	BUSTR RISK ASSESSMENT TRAINING Fourth Session	8 hours
June 4, 1999	Bureau of Underground Storage Tank Regulators (BUSTR) Reynoldsburg, OH	BUSTR Chief and State Coordinators, Training Session	BUSTR RISK ASSESSMENT TRAINING Fifth Session	8 hours

DATE	LOCATION	AUDIENCE	TOPIC	DURATION (Hrs.)
May 23, 2000	Bureau of Underground Storage Tank Regulators (BUSTR) Reynoldsburg, OH	BUSTR Chief and State Coordinators, Training Session	Factors Influencing Tier 1 and Tier 2 Evaluations Training Session for New Rules	8 hours
January 18, 2001	Engineer's Club, Dayton, OH	ASHRAE, Dayton Chapter, Dinner Speaker	Energy and Cost Benefit Analyses of Heating, Ventilation and Air Conditioning Systems Available for Ohio Schools	2 hours
January 25, 2001	Riffe Tower, Columbus, OH	Ohio School Facilities Commission, Ohio Department of Development, State School A/Es	Energy and Cost Benefit Analyses of Heating, Ventilation and Air Conditioning Systems Available for Ohio Schools	7 hours
March 13, 2001	Ashland Chemical, Columbus, OH	PDMA – Columbus Chapter, Breakfast Speaker	The Product Development Process - Case Studies	1 hour
July 30, 2001	Toledo, OH	City of Toledo, Environmental Director and Staff	Status of BUSTR's New Rule, March 31, 1999	2 hours
September 21, 2001	Lexington, KY	ASHRAE Region VII & Bluegrass Chapter, Invited Luncheon Speaker	Energy and Cost Benefit Analyses of Heating, Ventilation and Air Conditioning Systems Available for Ohio Schools	1.5 hour
November 13, 2001	Wadsworth, OH	ASHRAE Akron Chapter, Dinner Speaker	Energy and Cost Benefit Analyses of Heating, Ventilation and Air Conditioning Systems Available for Ohio Schools	2 hours
February 12, 2002	Cincinnati, OH	ASHRAE Cincinnati Chapter, Lunch Speaker	Evaluation of Heating, Ventilation and Air Conditioning Systems (HVAC) Systems Available for Ohio Schools	1.5 hours
July 2002	Cleveland, OH	AIHA Luncheon Speaker	IAQ Cost – Benefit Analyses For Heating, Ventilation and Air Conditioning Systems (HVAC) Systems Available for Ohio Schools	1.5 hours
September 24, 2002	Columbus, OH	Ohio Builds 2002	Evaluation of HVAC Systems Contained in the OSFC Design Manual	1.5 hours

DATE	LOCATION	AUDIENCE	TOPIC	DURATION (Hrs.)
February 5, 2003	Toledo, OH	ASHRAE Toledo Chapter, Dinner Speaker	Energy and Cost Benefit Analyses of Heating, Ventilation and Air Conditioning Systems Available for Ohio Schools	2 hours
May 9, 2004	Atlanta, GA	American Industrial Hygiene Conference and Expo (AIHce), Professional Development Course #418	Mold Contamination: A Hands-On Workshop Addressing Inspection, Remediation Specifications, Project Oversight and Post-Remediation Assessment	8 hours
September 14, 2004	Gahanna, OH	Gahanna Board of Realtors Luncheon Speaker	Mold – After the Contract	1 hour
November 4, 2004	Cincinnati, OH	Cincinnati Bar Association Luncheon Speaker	Mold – Facts/Fiction/Who Knows?	2 hours
November 17, 2004	Columbus, OH	Ohio Public Facility Maintenance Association (OPFMA) Annual Meeting	Impact of Temperature on Occupants: Theory vs. Reality	1.5 hours
October 17, 2005	Phoenix, AZ	LexisNexis Benzene Litigation Conference	How Low Can You Go? Measuring Exposure to Benzene	1 hour
April 21, 2006	Cleveland, OH	National Business Institute Proving Damages Caused by Mold Infestation in Ohio	Make a Mold Claim and Litigate the Case	2 hours
November 9, 2006	Columbus, OH	Bricker & Eckler Building Industry	Avoiding and Handling Mold Claims	1 hour
June 3, 2008	New Orleans, LA	Harris-Martin Benzene Conference	Historic Levels of Benzene in Products	1 hour
August 14, 2009	Columbus, OH	State Auto Insurance Company	Assessment of Hail and Wind Damage	3 hours
December 4, 2009	Akron, OH	Nationwide Insurance Company	Presentation and Seminar on Log Cabin Construction, Maintenance & Reparability	2 hours
March 17, 2010	Westerville, OH	Nationwide Insurance Company	Seminar on Impact of Wind & Hail Damage to Building Materials	1 hour
May 9, 2012	Dublin, OH	Grange Insurance Company	Lightning Damage Assessments	3 hours
June 18, 2013	Delaware, OH	Nationwide Insurance Company	Forensic Analysis of Fire Damage to Foundation Walls	3 hours

DATE	LOCATION	AUDIENCE	TOPIC	DURATION (Hrs.)
August 21, 2020	Westerville, OH	~300 Teachers – Oakstone Academy, Westerville, OH, 43081	Engineering Controls installed to Protect Students and Faculty – Masks Don't Work	1 hour
March 5, 2021	Zoom / Podcast	Daniel Horowitz – Episode 826 - Only a Neanderthal Can Believe a Masks Stops the Virus (Guest: Stephen Petty https://podcasts.apple.com/us/podcast/ep-826-only-neanderthal-can-believe-mask-stops-virus/id1065050908?i=1000511752553	Exposure, Exposure Controls and PPE wrt Masking vs Engineering Controls	1 hour
March 13, 2021	Westerville, OH	Ohio Stands Up - ~350 attendees	Exposure, Exposure Controls and PPE wrt Masking – Engineering Controls are the Solution	1 hour
March 22, 2021	Zoom / Podcast	Dr. Frank https://youtu.be/l3dor-4Af2A	Exposure, Exposure Controls and PPE wrt Masking – Engineering Controls in a Real Special Needs School	1 hour
April 16, 2021	Osgood, OH	Ohio Stands Up - ~100 attendees	Exposure, Exposure Controls and PPE wrt Masking – Engineering Controls are the Solution	1 hour
September 13, 2021	Zoom / Podcast	The Dennis Michael Lynch Podcast interviews Stephen Petty	Exposure, Exposure Controls and PPE wrt Masking – Engineering Controls in a Real Special Needs School. Current Court Cases	1 hour
October 11, 2021	Lincoln, NB (Univ. of Nebraska)	Radio Interview with Scott Voorhies on KFAB – October 11, 2021, Omaha, NB – 9:30 to 10:00 CST	Exposure, Exposure Controls and PPE – Engineering Controls, Not Masks or N95s are the Solution	1 hour
October 14, 2021	Lincoln, NB (Univ. of Nebraska)	Nebraska Stands Up	Exposure, Exposure Controls and PPE – Engineering Controls, Not Masks or N95s are the Solution	1 hour
February 22, 2022	Letter to CDC	CDC, Dr Fauci and White House https://standupmichigan.sfo3.digitaloceanspaces.com/CDC%20Response%20Letter%20-%20February%2022,%202022.pdf	Letter to CDC regarding concerns about misinformation being published to the public, concerns about damage to perception of science to the public and willingness to volunteer.	N/A
February 25, 2022	Concord, NH	New Hampshire State Legislature Health Subcommittee	Exposure, Exposure Controls and PPE – Engineering Controls, Not Masks or N95s	1 hour

DATE	LOCATION	AUDIENCE	TOPIC	DURATION (Hrs.)
			are the Solution	
March 30, 2022	Concord, NH	New Hampshire State Senate Health Subcommittee https://www.youtube.com/watch?v=J3dnkbKoj4A	Exposure, Exposure Controls and PPE – Engineering Controls, Not Masks or N95s are the Solution	1 hour
April 2022	Zoom / Podcast	Interview and Podcast - The Fat Emperor - Ep. 141 The Ultimate PPE Expert with Incredible Insights into Mask Science	Recent testimony on masking and letter to CDC.	1 hour
April 25, 2022	Zoom / Podcast	Interview and Press Release by American Family Network - https://afn.net/medical-health/2022/04/25/cdc-gave-pols-what-they-wanted-ignored-what-the-science-said/	Exposure, Exposure Controls and PPE – Engineering Controls, Not Masks or N95s are the Solution	1 hour
May 2, 2022 – 10:00 AM	Zoom / Podcast	OSHA's Informal Rulemaking Hearing for Occupational Exposure to COVID-19 in Healthcare Settings – Petty Testimony	Rules Regarding Control of Covid and Infectious Diseases in the Workplace	½ hour
July 5, 2022	Zoom / Podcast	Stephen Petty: Absurdity of Masks by Veronika Kyrylenko	Exposure, Exposure Controls and PPE – Engineering Controls, Not Masks or N95s are the Solution	1 hour
August 7, 2022	Zoom / Podcast	Life Down Under Podcast by Gray Stanton - The Real Science – "Face Masks Do NOT Work" w/Stephen Petty, CIH	Exposure, Exposure Controls and PPE – Engineering Controls, Not Masks or N95s are the Solution	1 hour
August 18, 2022	Zoom / Podcast	The Safety Pro Podcasts by Blaine J. Hoffmann - 159: Mask Efficacy & COVID-19 w/Stephen Petty, CIH.	Exposure, Exposure Controls and PPE – Engineering Controls, Not Masks or N95s are the Solution	1 hour
August 22, 2022	Grand Rapids, MI	Frontline Industrial Hygienists - Michigan Stands Up	Exposure, Exposure Controls and PPE – Engineering Controls, Not Masks or N95s are the Solution	1 hour
November 16, 2023	Columbus, OH	Building Environment Council of Ohio 2023 BECO Annual Conference	East Palestine, an Environmental Review	1 hour
December 15, 2023	Columbus, OH	Ohio Legislature and Senate	Exposure, Exposure Controls and PPE – Engineering Controls, Not Masks or N95s are the Solution – Review of the Science	1 hour

DATE	LOCATION	AUDIENCE	TOPIC	DURATION (Hrs.)
January 23, 2024	Zoom	Testimony Regarding Proposed North Carolina (N.C.) Department of Labor (DOL) Subchapter 071 Regulation – Airborne Infectious Diseases	Engineering Controls, PPE, Respiratory Protection, Social Distancing, History of Protection Against Airborne Infectious Diseases, Review of Regulatory Positions, IH	¼ hr.
February 12, 2024	Zoom	Testimony Regarding Proposed North Carolina (N.C.) Department of Labor (DOL) Subchapter 071 Regulation – Airborne Infectious Diseases Presentation and Q&A Session	Engineering Controls, PPE, Respiratory Protection, Social Distancing, History of Protection Against Airborne Infectious Diseases, Review of Regulatory Positions, Industrial Hygiene Resulted, in part, for proposed rule not being accepted on March 13, 2024 (https://www.labor.nc.gov/news/press-releases/2024/03/13/nc-department-labor-chooses-not-adopt-infectious-disease-petitions).	1.5 hrs.
March 15, 2024	Concord, NH Legislative State House Meeting Room	Invited Testimony to the NH House Committee (Environmental & Agriculture Committee - Special Committee on COVID Response Efficacy - Chair: Rep. Barbara Comtois) for the opportunity to present a summary of the real science on the topic of masking, social distancing and harms caused by recent policy decisions.	Engineering Controls, PPE, Respiratory Protection, Social Distancing, History of Protection Against Airborne Infectious Diseases, Review of Regulatory Positions, Industrial Hygiene	2.5 hrs.
March 29, 2025	Liberty Valley Church, 9851 Olde Eight Rd., Northfield, OH 44067- Invited Guest Speaker -	Sponsored by Ohio Advocates for Medical Freedom (OAMF) – Informed & Unstoppable – Medical Freedom in Action	Concepts of Industrial Hygiene Exposure / Exposure Control / PPE / Masks / 6' Rule / Why Masks Do Not and Can Not Work / What Actually Works & Damage to Children / Adults	1 hr.

Podcasts

1. March 5, 2021 – Daniel Horowitz show – spoke for an hour (Ep 826 | Only a Neanderthal Can Believe a Mask Stops a Virus | Guest: Stephen Petty). https://podcasts.google.com/feed/aHR0cHM6Ly9mZWVkcy5tZWdhcGhvbmUuZm0vQk1EQzg3MTM4MDM1Njg/episode/YTk3MTk1MTQtN2RlNC0xMWViLTljNTYtYmY2YWI5NWFlZDcz?sa=X&ved=0CAYQkfYCahcKEwiI2PuriKHvAhUAAAAAHQAAAAAQIA&hl=en.

   YTk3MTk1MTQtN2RlNC0xMWViLTljNTYtYmY2YWI5NWFlZDcz.htm.

   https://podcasts.apple.com/us/podcast/ep-826-only-neanderthal-can-believe-mask-stops-virus/id1065050908?i=1000511752553

   "Today we are joined by one of the top experts on exposure to hazardous materials. Stephen Petty is a certified industrial hygienist who has testified in court for years as a subject-matter expert on hazardous particulates. He explains the absurdity of thinking a mask can block a virus. Instead, he believes we should have focused on technology that actually dilutes or kills the virus so the public would actually feel safe with technology that works. After listening to Stephen, you will never look at that cheap cloth the same."

2. Dr. Frank – March 22, 2021 – Stephen Petty – IH-PPE and Masks.

   Stephen Petty explains the "microns" of Covid, and how best to mitigate them at a special needs school in Westerville, OH (Oakstone Academy).

   https://youtu.be/I3dor-4Af2A

   Dr. Rebecca Morrison's input regarding children, masking, and engineering controls:

   https://rumble.com/vkhlrn-dr-becky-oakstone-academy

3. Torre Says – September 8, 2021 - Mask Truth - An Interview With Stephen Petty - Exposure - Failure - Justification – Reality – "A true subject expert, Mr. Stephen Petty, P.E., C.I.H., C.S.P., joins Tore to talk truth about masks. The insanity, the law, schools and what looks like child abuse are all discussed. Reality means droplets, aerosols, mask holes, and openings the size of a human hair. What are the effects of depriving children of oxygen? Airline cooties coming down the aisle. It's really all about control. Shocking behavior from the emerging tyrants. Who's the conspiracy theorist now? It's important to dispel dis-info for both judges and the public. Mask mandates are being overturned in Kentucky and elsewhere. The forensic engineering behind OSHA lies. What ever happened to dilution and ventilation? Open a window. Know the law and the facts, then you will be part of a real mask solution.

   https://play.anghami.com/episode/1028747275.

   https://getpodcast.com/podcast/tore-says-show/wed-08-sep-mask-truth-an-interview-with-stephen-petty-exposure-failure_e3c56696a6

4. DML Podcast – September 13, 2021: Exposure expert who is winning court cases against mask mandates tells parents how to win the fight. The Dennis Michael Lynch Podcast.

   DML interviews Steve Petty, a Certified Industrial Hygienist who's specialty these days is waging war against mask mandates. His strategy is simple, expose the science of exposure.

   Petty, who's testimony was instrumental is getting Kentucky to reverse its mask mandates, explains in the most simple of forms that masks do not work as the CDC describes. Petty's argument, which is based completely on science and proof, is working with parents and lawyers who are fighting school districts over the ridiculous mask mandates imposed on children.

   Petty is near impossible to argue against, and he's a hidden gem in the fight for parental rights when it comes to the masking issue.

   This must listen podcast is both enlightening and troubling, and a resource for all parents to consider.

   https://podcasts.apple.com/us/podcast/dml-podcast-sep-13-exposure-expert-who-is-winning-court/id1328791677?i=1000535159315.

5. Radio Interview with Scott Voorhies on KFAB – October 11, 2021, Omaha, NB – 9:30 to 10:00 CST.

6. Liberty Coalition Canada – Liberty Dispatch – February 1, 2022 – IH-PPE and Masks.

   https://podcasts.apple.com/ca/podcast/episode-99-masks-dont-work-an-interview-with-ppe/id1559570986?i=1000550149187

7. COVID REVEALED - #8: - December 2021 - Stephen Petty (Bonus 8) Real Science on Masks – 50 minute video interview by Patrick Gentempo – CEO – Revealed Films:

   https://urldefense.proofpoint.com/v2/url?u=https-3A__brandnewtube.com_watch_covid-2Drevealed-2Dstephen-2Dpetty-2Dbonus-2D8-2Dreal-2Dscience-2Don-2Dmasks-5FbxMIsOOi3akRKuy.html&d=DwIFAg&c=euGZstcaTDllvimEN8b7jXrwqOf-v5A_CdpgnVfiiMM&r=Nunf125vkblW0RJs_gsUPISxeUNkX6ZNQBFQumDhWF4&m=Z5mOYEDxl21FFFk4Cu8WZGoA2F9uIIM_InvOlqgmVss&s=5yKa3jezsL1zPh80IvRIJPPVP7SeE1cp4mOEzIB09YY&e=

   or

   https://brandnewtube.com/watch/covid-revealed-stephen-petty-bonus-8-real-science-on-masks_bxMIsOOi3akRKuy.html/list/jk5aTFim1dOYDaP

8. Liberty Coalition Canada – Michael Thiessen - February 5, 2022 - Masks DON'T Work! - An Interview with PPE & Exposure Control Expert, Stephen Petty

Host Michael Thiessen discusses the efficacy of masks with PPE and exposure control expert, Stephen Petty: https://rumble.com/vu27ez-masks-dont-work-an-interviewppe-and-exposure-control-expert-stephen-petty.html

9. Testimony on Masking to New Hampshire Senate Subcommittee on March 30, 2022

   https://youtu.be/J3dnkbKoj4A?t=17

   Also at: https://pa.childrenshealthdefense.org/video/stephen-petty-industrial-hygienist-expert-on-valuelessness-of-mask/

   and at Not Your CBC News: https://notcbc.ca/2022/05/14/expert-on-masks-and-ppe-masks-dont-stop-or-slow-viral-spread/

10. Stephen Petty testimony on proposed OSHA Standard – May 2, 2022:

    https://www.youtube.com/watch?v=zzAN8GRyL8o

11. Open Source Truth - Stephen Petty: Testimony: Masks – Do Not, Can Not Work for COVID

    http://www.opensourcetruth.com/stephen-petty-testimony-masks-do-not-can-not-work-for-covid/

12. The Fat Emperor - Ep. 141 The Ultimate PPE Expert with Incredible Insights into Mask Science.

    "Blown away the other day when I came across Stephen Petty (B.S.Ch.E. M.S.Ch.E. M.B.A.) and his evidence deposition at a USA public hearing – I took an excerpt, fixed up the audio levels and just had to release it as a podcast! But don't worry – I'll be getting him on to the podcast as soon as I can, for a full discussion. Here is a document with references which he and a team submitted to NIH and CDC: CDC Response Letter – February 22, 2022.

    The original video of his deposition [March 30, 2022 Testimony] is here btw: https://www.youtube.com/watch?v=J3dnkbKoj4A. Also, please do follow his podcast and other materials here – he's a gem of a genuine expert! https://www.youtube.com/channel/UCwPHqgMiWwjpqd5dA-Og_Ag [Much more material on my Rumble site: https://rumble.com/c/PettyPodcasts as YouTube censored my video podcasts.

    https://thefatemperor.com/ep-141-the-ultimate-ppe-expert-with-incredible-insights-into-mask-science/

13. American Family Network: April 25, 2022 Press Release

    https://afn.net/medical-health/2022/04/25/cdc-gave-pols-what-they-wanted-ignored-what-the-science-said/

14. Stephen Petty: Absurdity of Masks by Veronika Kyrylenko. July 5, 2022.

    https://thenewamerican.com/stephen-petty-absurdity-of-masks/

    Stephen Petty, a certified industrial hygienist, safety professional, and engineer with 45 years of experience in the field and one of the top testifying experts on

personal protective equipment (PPE) and exposure control in the country, explained in detail why neither surgical masks nor N95 respirators can protect people from Covid. Moreover, the new studies cited by Mr. Petty show that masks increase one's chances of getting infected. In children, masks are associated with delays in intellectual, social, and emotional development.

Since the massive body of evidence continues to be ignored by the nation's top healthcare officials, it is clear that mask policies have nothing to do with public health, but aim at establishing control over the population, argued the expert.

15. Life Down Under Podcast by Gray Stanton - The Real Science – "Face Masks Do NOT Work" w/Stephen Petty, CIH. August 7, 2022.

https://lifedownunder.exposed/podcast/real-science-face-masks-do-not-work/

The Real Science – "Face Masks Do NOT Work"

Season Two, Episode One:

SYNOPSIS: Our first gripping episode for Season Two. A MUST LISTEN. Tonight covers the actual science behind WHY face masks have never worked in almost 100 years against any aerosol virus which COVID-19, and Influenza Type 'A', and 'B' are; In addition to face masks contribution to creating bacterial pneumonia, amongst long lasting and damaging environmental pollution.

Introduction segment illustrates the NEW ZEALAND chief executive of the Ministry of Health and the country's Director-General of Health in his own words that "masks don't work". Dr Ashley BLOOMFIELD has been the public-facing health specialist liaising with the media during the COVID-19 scamdemic in NEW ZEALAND on behalf of the government, since the first press conference on 27 JANUARY 2020. Dr BLOOMFIELD stepped down from his role at the NEW ZEALAND Ministry of Health at the end of JULY 2022. Other speakers within the introduction are Dr Michael YEADON PhD was formerly Vice President & Chief

Scientific Officer of Allergy & Respiratory at Pfizer Global R&D, and Dr Roger HODKINSON is a medical specialist in pathology, a graduate of Cambridge University and a Fellow of the College of American Pathologists (FCAP) and the Royal College of Physicians and Surgeons of CANADA (FRCPC). We also cover Dr Kelly VICTORY MD on her stance against face masks on Ask Dr. DREW MD Podcast Show. Next up is the New and Exclusive Worldwide release of the Canadian Feature Film Documentary "Uninformed Consent" 23 JULY 2022 – A Must See. Then there is America's most courageous Industrial Hygienist Mr. Stephen PETTY (Rumble.com Petty Podcast) whose recent testimony overturned state wide all face mask mandates in the state of Kentucky, USA; including his testimony 30 MARCH 2022 before The New Hampshire Senate. Professor Lee BASHAM University of TEXAS lecture on "Governing by Crisis: How Toxic Truths Subvert Mainstream Investigation" – The blue print to every false flag, including COVID-19. And let's NOT forget the latest update on the KHAZARIAN Mafia and their false flag in UKRAINE so as to control the last space ark discovered deep underneath the Oleshky Sands National Park, Kherson province, UKRAINE. In addition we present you with an Open Letter to UK and Scottish Governments: Culpable by Commission and Omission. Douglas BRODIE's open letter campaign to Scottish government officials continues unabated. In his latest email titled 'Culpable by Commission and Omission' and addressed to Drew HENDRY, Member of Parliament for INVERNESS and NAIRN, he asks 20 questions. And finally Gray STANTON's views – WHAT's Done is Done!

16. The Safety Pro Podcasts by Blaine J. Hoffmann - 159: Mask Efficacy & COVID-19 w/Stephen Petty, CIH. August 18, 2022.

    https://thesafetypropodcast.com/159-mask-efficacy-covid-19-wstephen-petty-cih.

17. Tom Rentz Podcast. February 20, 2026. Discussed my role in Roundup litigation and ghost paper.

Petty Podcasts:

Podcast Page on Rumble.com:

Home page link: https://rumble.com/c/PettyPodcasts

#2: What the Heck is an IH?
https://rumble.com/vldkut-what-the-heck-is-an-ih-ep.-02.html

#3: How Small is a Virus Particle?
https://rumble.com/vldl7v-how-small-is-a-virus-particle-virion-ep.-03.html

#4: How Long Can Particles Stay Suspended in the Air?
https://rumble.com/vldlgr-how-long-can-particles-stay-suspended-in-the-air-ep.-04.html

#5: How Much Protection Can a Mask Provide? The Great Gapsy. https://rumble.com/vlbs0d-how-much-protection-can-a-mask-provide-mask-vs.-ppe-ep.-05-removed-from-yt.html

#6: How to Control Exposure to Viruses, Bacteria, and Mold. https://rumble.com/vldll7-how-to-control-exposure-to-viruses-bacteria-and-mold-ep.-06.html.

#7: How and Why People Get Persuaded. https://rumble.com/vldlpd-how-and-why-people-get-persuaded-ep.-07.html

#11: Children & Masks; CDC Document Review (1 of 4). https://rumble.com/vliep6-children-and-masks-cdc-document-review-1-of-4-ep.-11.html

#12: Children & Masks; CDC Document Review (2 of 4). https://rumble.com/vlieu6-children-and-masks-cdc-document-review-2-of-4-ep.-12.html

#13: Children & Masks; CDC Document Review (3 of 4). https://rumble.com/vlieym-children-and-masks-cdc-document-review-3-of-4-ep.-13.html

#14: Children & Masks; CDC Document Review (4 of 4). https://rumble.com/vlif2i-children-and-masks-efficacy-and-negative-effects-part-4-of-4-ep.-14.html

#17: Masks vs. Respirators (What is ACTUALLY PPE). https://rumble.com/vlqbee-masks-vs.-respirators-what-is-actually-ppe-ep.-17.html

#18: How Dirty Does a Mask Get – Those Dirty Bird Masks. https://rumble.com/vlqbk8-how-dirty-does-a-mask-get-ep.-18.html

#20: Mask Information Overview: Why Masks Cannot and Do Not Work. https://rumble.com/vrx3yk-masks-why-they-cannot-and-do-not-work-overview-ep.-20.html

#23: CDC & the ASTM Mask Standard: Part 1. https://rumble.com/vs6rkh-cdc-and-the-astm-mask-standard-part-1.html

#24: CDC & the ASTM Mask Standard: Part 2. https://rumble.com/vsft64-cdc-statement-on-astm-mask-standard-part-2.html

#25: Masks – The Masks and the Dummy Dots (i.e., the 6' Rule) - The Truth is Coming Out - Lies, Lies, and *?/@ Lies. https://rumble.com/vsg013-masks-the-truth-is-leaking-out-slowly.html

#26: Moving on from Masks to N95s: NOT SO FAST. https://rumble.com/vt72ko-moving-on-from-masks-to-n95s-not-so-fast.html

#27: Forget CDCs Slow Motion Move from Masks to N95s – Go Straight To Engineering Controls. https://rumble.com/vtwhq8-forget-cdcs-slow-motion-move-from-masks-to-n95s-go-straight-to-engineering-.html

#28: Lockdowns Don't Work – Did this Originate from a 15-yr. Old's Science Fair Project? https://rumble.com/vuepx1-lockdowns-dont-work-did-this-originate-from-a-15-yr.-olds-science-fair-proj.html

#29: Children, Lockdowns and Masks – Stop Harming our Children! https://rumble.com/vvnpn4-children-lockdowns-and-masks-stop-harming-our-children.html

#30: Forget Masking: The Real Science Continues to Leak Out https://rumble.com/v252b7p-ep.-30-forget-masking-the-real-science-continues-to-leak-out.html

#31: Birx's Silent Invasion – What She Says About Masks – No Wonder We Were in Trouble! https://rumble.com/v2a52is-episode-31-birxs-silent-invasion-what-she-says-about-masks-no-wonder-we-wer.html

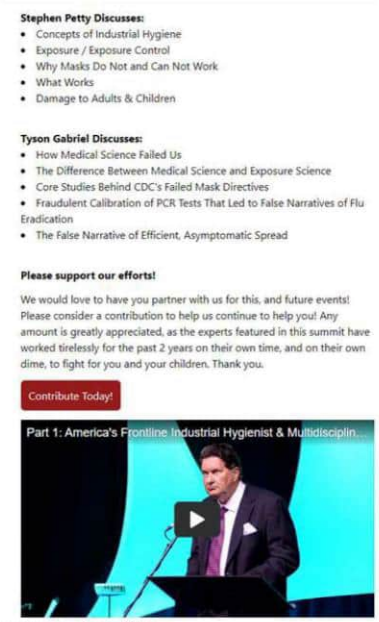
In this episode, we talk with Stephen Petty, CIH, about the true efficacy of masks as it relates to the prevention of COVID-19 transmission.

Stephen Petty, a certified industrial hygienist, safety professional, and engineer with 45 years of experience in the field, is one of the top testifying experts on personal protective equipment (PPE) and exposure control in the country.

WARNING: This episode gets into topics that are still not widely discussed openly and honestly. Let's just say the video may not make it to YouTube, and we are ok with that.

17. Frontline Industrial Hygienists, Michigan Stands Up – Tammy and Kristen, w/Stephen Petty, CIH. August 22, 2022.

Videos at Standup Michigan: https://www.standupmichigan.com/



Links to all three sessions follow; Petty is found in Session #1:

Part 1: rumble.com/v1hbxq7-part-1…

Part 2: rumble.com/v1hd5or-part-2…

Part 3: rumble.com/v1hfaof-part-3…

Mr. Stephen E. Petty, P.E., C.I.H., C.S.P

SUMMARY OF CLASSES TAUGHT AT FRANKLIN UNIVERSITY

By

Stephen Petty

Class Title	Description	Term	Dates	# Students	Comments
SCIE131 Q1WW	Environmental Science 131	Winter 2003	1/3/03 to 4/24/03	17	Online class
SCIE131 E1FF	Environmental Science 131	Summer 2003	5/21/03 to 6/25/03	13	In-Class
SCIE114 F2FF	Earth Science 114	Fall 2003	9/29/03 to 11/3/03	17	In-Class
SCIE131 H1FF	Environmental Science 131	Fall 2003	11/12/03 to 12/17/03	15	In-Class
SCIE131 Q1WW	Environmental Science 131	Summer 2004	05/17/04 to 08/07/04	14	Online class
SCIE131 H1FF	Environmental Science 131	Fall 2004	11/10/04 to 12/15/04	19	In-Class
SCIE 131 H1FF	Environmental Science 131	Fall 2005	11/9/05 to 12/14/05	19	In-Class
SCIE 131 H1FF	Environmental Science 131	Spring 2006	3/27/06 to 5/1/06	?	In-Class

SCIE 114 – 4 Semester Credit Hours

SCIE 131 – 4 Semester Credit Hours

Stephen Petty – Disclosed Expert Case List:

SUMMARY OF DISCLOSED EXPERT WITNESS CASES – STEPHEN PETTY

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Mr. Luther L. Liggett Jr. Bricker & Eckler, L.L.P. 100 S. Third Street Columbus, OH 43215	Construction Corporation vs. Roth Produce (Supported Plaintiff). Testified at hearing in Franklin County, OH.	Refrigerated Warehouse (Design Purpose – HVAC) Testified at Mediation Hearing	Settled in Arbitration	- / -	2001
Mr. Michael P. Giertz Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Sandra D. Howell and Estate of Mr. Howell Defendant(s): Nalco, Bayer and David Hackathorn (Bayer's Director of Health) In the Circuit Court of Marshall County, West Virginia (Supported Plaintiffs)	Legionella Exposure at Chemical Plant Deposed by Defendant(s) 2003	Negotiated Settlement	EES-2002-002 Case No. 00-C-234M	2002
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Donna E. Gwinn, Individually and Executrix of the Estate of William B. Gwinn Defendant(s): Chemical Leaman Tank Lines (CLTL), a Delaware Corporation, Quality Distribution, Inc., d/b/a Quality Carrier, Successor-in-Interest to Chemical Leaman Tank Lines, Inc., a Florida Corporation, and Okey Edens. In the Circuit Court of Marshall County, West Virginia. (Supported Plaintiffs).	Benzene Exposure at Tanker Truck Cleaning Facility Deposed on 3/21/2003	Negotiated Settlement 2003	EES-2002-040 Case No. 02-C-120M	2002-2003
Mr. Guy Bucci Attorney at Law Bucci, Bailey & Javins P. O. Box 3712 Charleston, West Virginia 25337	Plaintiff(s): William Shaffer and Rosa Shaffer, husband and wife. Defendant(s): Monongahela Power Company d/b/a Allegheny Power as an Ohio Corporation In the Circuit Court of Pleasants County, West Virginia (Supported Plaintiff)	Legionella Exposure at Power Plant	Negotiated Settlement Settled 04/2004	EES-2002-01 Cause No.: 00 -C-28	2001 - 2004
Mr. James M. Barber Attorney at Law 604 Virginia Street, East Suite 200 Charleston, WV 25301	Plaintiff(s): Daniel O. Dixon Defendant(s): A C & S, Inc. (Supported Plaintiff)	Acid Gas Exposure at Chemical Plant	Negotiated Settlement Settled 05/2004	EES-2003-005 Cause No.: 02-C-1995	2003 - 2004
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Michael A. Lebron, Pamela Lebron Defendant(s): Shell Oil Company; Amoco Oil Company; Union Oil Company of California; Radiator Specialty Company; PPG Industries, Inc.; E.I. Du Pont de Nemours & Company and Bondo Corporation. (Supported Plaintiffs)	Benzene Exposure from Paint and Service Station Operations Deposed by Defendant(s) on 11/21/03	Negotiated Settlement 03/2009	EES-2002-052 Cause No.: 01L10021	2002-2009

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Mr. Brian Bradigan Attorney At Law Brian J. Bradigan, L.L.C. 3948 Townsfair Way Suite 230 Columbus, OH 43219	Plaintiff(s): Jeffrey and Theresa Vaughn (Homeowners) Defendant(s): Timberline Log Homes (Grange Insurance – Builder's Insurance) (Supported Defendant)	Mold and Water Leaks in Log Home Due to Poor Construction	Negotiated Settlement	EES-2003-019 -	2003
Ms. Joanne Peters Attorney At Law Isaac, Brant, Ledman & Teetor LLP 250 E. Broad St. Suite 900 Columbus, OH 43215-3742	Plaintiff(s): Fisher (Homeowners) Defendant(s): Muth and Company – Roofing Company (Supported Defendant)	Mold and Water Leaks in Home Due to Roof Installation	Negotiated Settlement	- / -	2003
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Timothy J. Farley Defendant(s): Keystone Shipping Company, Margate Shipping Company and Chilbar Shipping Company Shipping Company Court of Common Pleas Philadelphia County, PA Civil Action - Law (Supported Plaintiff)	Benzene and other Chemical Exposures from Working on Tankers	Negotiated Settlement 8/09/2004	EES-2003-180 Cause No.: 0957	2003-2004
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): David Ball Defendant(s): BASF, Corp., Ford Motor Company, 3M Company, Petroleum Traders Company, Myers Industries, Inc., d/b/a Patch Rubber Co., Radiator Specialty Company, Loctite Corporation, and Lykins Oil Company Court of Common Pleas Cuyahoga, Ohio (Supported Plaintiff)	Benzene and other Chemical Exposures Focus on Labeling and MSDS sheets	Negotiated Settlement 12/2005	EES-2003-217 Cause No.: CV-02-473352	2003-2005
Voltolini & Voltolini Attorneys at Law 1350 West Fifth Ave. Suite 214 Columbus, OH 43212	Plaintiff: Janis Weekly Defendant(s): Terminix Pre-Lawsuit (Supported Plaintiff)	Durisban - Chlorpyrifos (Pesticide) Exposure Completed detailed inspection and research.	Completed	EES-2003-352 Cause No: 94-018	2003-2004
Harvit & Schwartz, L.C. 2018 Kanawha Blvd., E. Charleston, WV 25311	Plaintiff: Robert H. Casdorph, Jr and Melba Casdorph, his wife Defendant(s): West Virginia State Police, an agency of the State of West Virginia, and Castle Products, Inc., a New York Corporation. In the Circuit Court of Marshall County, West Virginia (Supported Plaintiff)	CML-Chronic Myelogenous Leukemia	Negotiated Settlement 11/2011	EES-2003-329 Cause No.: 03-C-109M Worker's Comp. Decision Appealed to WV Supreme Ct. – Decision	2003-2011

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
				in Favor of Plaintiff on 11/9/2019	
Dinsmore & Shohl, LLP 255 E. Fifth Street, Suite 1900 Cincinnati, OH 45202	Plaintiff: Doug Kinslow Defendant(s): M.E.B. Two (Supported Defendant)	Mold Contamination Inspection, mold testing and detailed findings report	Negotiated Settlement	EES-2003-353 Cause No.: 3780-88	2003-2004
Mr. Scott Sheets Attorney At Law Isaac, Brant, Ledman & Teetor LLP 250 E. Broad St., Suite 900 Columbus, OH 43215-3742	Plaintiff: Stanger (Homeowners) Defendant(s): Davis Fine Homes – Homebuilder (Supported Plaintiff)	Mold and Water Inspection, Testing, and Support	Negotiated Settlement	EES-2003-366	2003
Mr. J. Andrew Crawford Reese, Pyle, Drake & Meyer, P.L.L. 36 N. Second Street P.O. Box 919 Newark, OH 43058-0919	Plaintiff: Murray Headlee et al. Defendant(s): Truberry Group, Inc. et al. (Homebuilder) Delaware, OH County Court of Common Pleas (Supported Defendant)	Mold and Water Leaks in Home; Prepared outline of opinions.	Negotiated Settlement on/about 03/08/2004	EES-2003-405 Cause No.: 03 CVH 01007	2003 - 2004
Mr. J. Zackary Zatezalo Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff: Mr. James V. Dollhopf and Kristin L. Dollhopf Defendant(s): PPG Industries, Sherwin-Williams Company, Ashland, Inc., CIBA Specialty Chemicals, Chem-Pak Solutions, General Fiberglass Supply, Inc., Meguiar's Products, Sunnyside Corporation, Milwaukee Paint, Inc. State of Wisconsin Circuit Court Milwaukee County (Supported Plaintiff)	Benzene and other Chemical Exposures from Painting Operations	Negotiated Settlement	EES-2003-407 Cause No.: 03-CV-4832	2003-2004
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff: Shelly Gray, Individually and as Plaintiff Ad Litem for Sherri Bond, deceased. Defendant(s): BP Corporation North America Inc. and BP Products North America Inc. et.al – Former American Oil Company (AMOCO) Site Circuit Court of Jackson County, Missouri, at Independence. (Supported Plaintiff)	Benzene and other Chemical Exposures from Underground Piping and Tank Leaks	Negotiated Settlement 03/16/2006	EES-2003-415 Case No.: 02-CV-229538	2003-2006
Mr. J. Michael Prascik Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600, Wheeling, WV 26003	Plaintiff: Mr. Barry Hovis and Lesa Hovis, his wife. Defendant(s): Carboline Company, Rust-Oleum Corporation, E.I. Dupont De Nemours and Company, Valspar Coatings, One Shot, LLC, PPG Industries, Inc., Sherwin-Williams, . In the Circuit Court of Common Pleas in York County, South Carolina. (Supported Plaintiff)	Exposure to Paint	Negotiated Settlement 10/2004	EES-2004-049 Cause No.: 2003-CP-46-165	2004
Mr. J. Michael Prascik Hartley & O'Brien, P.L.L.C.	Plaintiff: Lucinda Cutlip Defendant(s): West Virginia Department of Transportation,	Exposure to Diesel Exhaust	Testified in Trial 1/10/06	EES-2004-066	2004-2006

Case: 4:23-cv-02206-BYP Doc #: 117-5 Filed: 09/08/26 389 of 465. PageID #: 5425

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
The Wagner Building 2001 Main Street, Suite 600, Wheeling, WV 26003	Division of Highways, and Guttman Oil Company, a foreign corporation In the Circuit Court of Kanawha County West Virginia (Supported Plaintiff)	Deposed by Defendant(s) on 08/11/2005 and 09/21/2005	Decision in Favor of Defendant	Cause No.: 02-C-2345	
Mr. Kris Cormany Attorney at Law Bucci, Bailey & Javins P. O. Box 3712 Charleston, West Virginia 25337	Plaintiff: Erby E. Lester and Donna Lester, his wife Defendant(s): Elk Run Coal Company, Inc. a West Virginia Corporation d/b/a Black Castle Mining Company, Spartan Mining Company, a West Virginia Corporation and d/b/a Trace Transport Company. In the Circuit Court of Boone County West Virginia. (Supported Plaintiff)	Exposure to Combustion Products from Fire in Maintenance Building Deposed by Defendant on 03/01/2006	Negotiated Settlement 05/10/2006	LAW-2004-009 Cause No.: 04-C-231	2004 - 2006
Mr. Guy R. Bucci Bucci Bailey & Javins Suite 910 Bank One Center, 707 Virginia Street, East, Charleston, WV 25301	Plaintiff: Linda Kitzmiller Defendant(s): Jefferson Supply Co. United States District Court For the Northern District of West Virginia, Elkins Division (Supported Plaintiff)	Exposure to Chemicals Deposed by Defendant(s) 06/06/2006 Daubert Hearing 10/30/2006 – Motion Denied	Negotiated Settlement 11/05/2007	LAW-2004-010 Cause No.: 2:05-CV-22	2004 - 2007
Mr. Chris Wilson Wilson, Frame, Benninger & Metheney, P.L.L.C.	Plaintiff: Paula J. Ondo Defendant(s): TBD (Supported Plaintiff)	Mold and HVAC	Completed Report Submitted	EES-2004-134	2004
Mr. J. Michael Prascik Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff: Mr. Douglas Bates Defendant(s): The Dow Chemical Company et al. (Supported Plaintiff)	Chemical Exposure - Various products in garage	Closed	EES-2004-137 Cause No.: 3:03CV519BN	2005-2009
Mr. J. Michael Prascik Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600, Wheeling, WV 26003	Plaintiff: Deborah Trojan Defendant(s): Peoples Gas Light & Coke Co. (Supported Plaintiff)	Benzene Exposure From Former Manufactured Gas Plant Site Deposed by Defendant 11/12/2004	Negotiated Settlement 12/2004	EES-2004-135 Cause No.: 01 L 16472	2004

Case: 4:23-cv-02206-BYP Doc #: 117-5 Filed: 09/08/26 390 of 465. PageID #: 5426

Engineering & Expert Services, Inc.©

April 6, 2026

Petty Expert Report – CeramFab and WYG Plaintiffs - NS Train Derailment in East Palestine, OH

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Charles Cooper Charles Cooper Law Offices 407 Center Street Ironton, OH 45638	Plaintiff: Mr. and Mrs. Shelton Defendant(s): Mr. and Mrs. LeMaster (Supported Plaintiff) In response to Grange Claim #: HP91871 (Supported Defendant)	Mold and Water Damage	Closed	LAW-2004-004	2004-2005
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff: Mr. Robert Scherer Defendant(s): S & S Automotive, Inc. et al. (Supported Plaintiff)	Benzene Exposure Deposed by Defendant(s) 11/11/2004	Negotiated Settlement 11/2005	LAW-2004-001 Cause No.: 02 L 435	2004-2005
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff: Mr. Earl Douglas Defendant(s): Ashland, Inc. et al. (Supported Plaintiff)	Benzene Exposure Deposed by Defendant(s) 03/29/2005 Daubert Hearing 01/13/2006 – Motion Denied	Negotiated Settlement 04/2008	LAW-2004-002 Cause No.: 01/CE-00392	2004-2008
Mr. Guy R. Bucci Bucci Bailey & Javins Suite 910 Bank One Center, 707 Virginia Street, East, Charleston, WV 25301	Plaintiff: Brummage et al. Defendant(s): Thrasher et al. (Supported Plaintiff)	Mold and Bacteria Exposures/Sewage System Failure (Two expert reports written late 2004 and early 2005).	Negotiated Settlement 09/2005	LAW-2004-003	2004-2005
Mr. William M. Owens Owens & Manning 413 Main Street, 2nd Floor Coshocton, OH 43812	Plaintiff: Ms. Delaine Freeman Defendant(s): Randy Stotts et al. (Supported Plaintiff)	Mold Determination	Negotiated Settlement 10/2004	LAW-2004-005 Cause No.: 02 CI 588	2004
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff: Mr. Terry Defendant(s): Go-Mart Inc. et al. (Supported Plaintiff)	Benzene Exposure Deposed by Defendant(s) 8/20/2009	Negotiated Settlement 9/2010	LAW-2004-006	2004-2010
Mr. David J. Romano Romano Law Office 363 Washington Avenue Clarksburg, WV 26301	Plaintiff: Cathy A. Arnett Representative of John P. Arnett (Deceased) Defendant(s): The Marmon Corporation et al. (Supported Plaintiff)	Hazardous Chemical Exposure – Cleaners with Sodium Hydroxide	Negotiated Settlement 02/14/2005	LAW-2004-007 Cause No.: 03-C-570-2	2004 - 2005

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Mr. Stephen Brown Mundy & Nelson, L.L.C. P.O. Box 2986 Huntington, WV 25728	Plaintiffs: TBD – Citizens of Huntington Defendant: TechSol (Supported Plaintiff)	Hazardous Chemical Exposure – Coal Tar Containing Benzene – Sampled Creek and Homes for VOCs	Negotiated Settlement 11/2006	LAW-2004-011	2004 - 2005
Mr. Paul Eklund Davis & Young 1700 Midland Building 101 Prospect Avenue West Cleveland, OH 44115-1027	Plaintiffs: Enrico M. Clark and Cynthia Clark Defendant(s): Alchem Corporation and B. George Bufkin (Supported Defendant)	Hazardous Chemical Exposure – Methanol and Acid Gases	Negotiated Settlement 07/2006	LAW-2004-014 Cause No.: 528128	2004 - 2006
Mr. Brian Bradigan Attorney At Law Brian J. Bradigan, L.L.C. 3948 Townsfair Way, Suite 230 Columbus, OH 43219	Plaintiffs: Wanner Searls (Homeowner) Defendant(s): Grange Mutual Casualty Company Franklin County Ohio Court of Common Pleas (Supported Defendant)	Hail Damage to Home	Testified in Trial 04/18/2005 Decision in Favor of Defendant(s) 05/31/2005	EES-2004-094	2004 - 2005
Mr. Lon Walters Partner The Walters Law Firm The Oldham Building 105 East 5th Street Suite 401 Kansas City, MO 64106	Plaintiff: Estate of Nancy Ryan Defendant(s): BP Corporation, American Oil Company, et al. Circuit Court of Jackson County, Independence, MO (Supported Plaintiff)	Benzene/Chemical Exposures from Underground Piping and Tank Leaks and Vapor Emissions	Testified in Trial 08/24-25/2005 Jury Ruled in Favor of Plaintiff(s) – 09/14/2005	LAW-2004-012 Cause No.: 04CV223271	2004 - 2005
Mr. John Davis Gallaghar, Sharp, Fulton & Norman 1501 Euclid Avenue, Seventh Floor Cleveland, OH 44115 Mr. Charles Williams 555 South Front Street, Suite 320 Columbus, OH 43215	Plaintiff: Hidden Lakes Condominium Association Defendant: Acuity Insurance Company (Umpire – Supported Defendant)	Hail Damage Appraisal Umpire Claim #: KL3009 Umpired Decision and Report Issued 04/2005	Completed	EES-2005-020-S	2005
Mr. Nicholas Subashi Subashi, Wildermuth & Ballato The Oakwood Building 2305 Far Hills Avenue Dayton, OH 45419 Mr. Randall Saunders Nationwide Insurance Company 620 Morrison Road Gahanna, OH 43230	Plaintiff: James Wilson et al. Defendant: STO Corp., Jack H. Wieland Builders, Daytco-James, Inc. et al. (Supported Defendant – Roofing Contractor)	Construction Defect Claims Claim #: 92 34 AC 324909 03011997 51 Provided Inspection, Analysis and 3 reports on liability of roofing contractor.	Completed Negotiated Settlement 06/30/2005	EES-2005-050-S Cause No.: 03 CV 61596	2005

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Petty Expert Report – CeramFab and WYG Plaintiffs - NS Train Derailment in East Palestine, OH

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Mr. James M. Barber Attorney at Law 604 Virginia Street, East Suite 200 Charleston, WV 25301	Plaintiff: Lola Hudson Defendant: Arbors Management and Rock Branch Mechanical (Supported Plaintiff)	Legionella Exposure Deposed 12/13/2005	Closed	Law-2005-001	2005 - 2006
Mr. J. Zachary Zatezalo Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff: Little Defendant: American Electric Power (Supported Plaintiff)	Solvent Exposure Deposed by Defendant 03/25/2011	Negotiated Settlement 2011	LAW-2005-002 Cause No.: 03-C-256M	2005-2011
Mr. Guy R. Bucci Bucci Bailey & Javins Suite 910 Bank One Center, 707 Virginia Street, East, Charleston, WV 25301	Plaintiff: Mr. Daniel A. Wilson and Mrs. Joyce L. Wilson Defendant: Mr. Raymond Johnson d/b/a Ray's Auto Center (Supported Plaintiff)	Hazardous Chemicals Exposure	Closed	LAW-2005-006 Cause No.: 04-C-232	2005-2007
Mr. Michael P. Giertz Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff: Janice Weekley Defendant: Terminix International Company (Supported Plaintiff)	Property Contamination from Termidicides (Pesticides) Deposed by Defendant 09/09/2005	Negotiated Settlement 11/2005	LAW-2005-007 Cause No.: 52-181-00697-04	2005
Mr. Bradley R. Oldaker Bailey, Stultz, Oldaker & Greene P.O. Drawer 1310 Weston, WV 26452-1310	Plaintiff: Mack O. Crist Defendant: Vicellio & Grogan et al. (Supported Plaintiff)	Silica- Exposure – Highway Construction Deposed by Defendant 01/17/2006	Negotiated Settlement 05/2006	LAW-2005-008 Cause No.: 04C-64M	2005-2006
Mr. J. Zachary Zatezalo Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff: Jayne Chianelli and estate of Frank Chianelli Defendant(s): Shell Oil Company, Potter Paint Co., Mohawk Finishing Products, Phipps Products Corp., BIX Manufacturing Company, Sherwin Williams Company, Barnett Industries and E.E. Zimmerman (Supported Plaintiff)	Solvent Exposure	Negotiated Settlement 2006	LAW-2005-009 Cause No.: 03 12999/	2005-2006
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff: Denny Morris Defendant: PPG Industries, Inc. (Supported Plaintiff)	Benzene Exposure Deposed by Defendant 10/12/2005	Closed	LAW-2005-010 Cause No.: 99-C-173M	2005-2009

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ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building Suite 600 2001 Main Street, Wheeling, WV 26003	Plaintiff: Thomas H. Ware and Pamela S. Ware, his wife Defendant: Pratt & Whitney Engine Services, Inc. In the Circuit Court of Harrison County, West Virginia (Supported Plaintiff)	Hazardous Chemicals Exposure	Negotiated Settlement 01/2006	LAW-2005-011 Cause No.: 05-C-139-1	2005-2006
Ms. Sandra Spurgeon Spurgeon & Tinker, PSC 120 Prosperous Place, Suite 202 Lexington, KY 40509	Robert A. Tompkins, et al v. Wheeling-Pittsburgh Steel Corporation d/b/a Wheeling Corrugating Company, Inc., et. al v. Terry Roland (Supported Defendant - Insurance Company)	Exposure	Closed	LAW-2005-013	2005-2008
Mr. Louis H. Watson, Jr., P.A. Attorney at Law 520 Capitol Street Jackson, Mississippi 39201-2703	Plaintiff: Fay Lundy and Joel Lundy Defendant: Cilburn Truck Lines, Inc., Conoco, Inc., Individually, a/k/a Conoco Gas and Marketing, a Division of Conoco, Inc., and f/k/a Du Pont Holdings, Inc; ConcoPhillips Company; "John Doe" Defendant(s) In the United States District Court for the Southern District of Mississippi Jackson Division (Supported Plaintiff)	Exposure to benzene from gasoline Deposed by Defendant 9/20/2006	Negotiated Settlement	LAW-2005-014 2005-16 Case No. 2005-16	2005-2007
Mr. Michael P. Giertz Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff: Pauline Poling Defendant: Grafton Auto Parts Circuit Court of Marshall County, West Virginia (Supported Plaintiff)	Exposure to Benzene Containing Solvents	Negotiated Settlement	LAW-2005-016 Case #: 05-C-157M	2005-2009
Mr. Thomas E. Schwartz Holloran White & Schwartz LLP 2000 S. 8th Street St. Louis, Missouri 63104	Plaintiff: Jeff Morgan Defendant: National Railroad Passenger Corporation (Supported Plaintiff)	Diesel Exhaust Exposure Deposed by Defendant 01/31/2006	Negotiated Settlement 04/28/2006	LAW-2005-018 Cause No.: 052-08718	2005-2006
Mr. Richard A. LaVerdiere Sieben Polk LaVerdiere & Dusich 999 Westview Drive Hastings, MN 55033-2495	Plaintiff: Vettrus Defendant: Ashland Chemical et al. Third Judicial District Court, County of Rice, MN (Supported Plaintiff)	Exposure to solvents containing benzene Deposed by Defendant(s) 03/20/2007	Closed	LAW-2005-019 C5-05-1909	2005-2008
Mr. Kevin George 931 Vauxhill Lane Powell, OH 43065	Plaintiff: Mallory Pools Defendant: Mr. Kevin George Delaware County, Ohio Court of Common Pleas (Supported Defendant)	Pool chemistry and staining on Liner.	Testified in Trial (Delaware County Court) 01/19/2006. Decision in	EES-2006-166	2005-2006

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
			favor of Defendant		
Ms. Denyse Clancy Baron & Budd, P.C. 3102 Oak Lawn Ave., Suite 1100 Dallas, TX 75219	Plaintiff: Benoit Defendant: Ato Fina et al. 18th Judicial District Court, For the Parish of Iberville, State of Louisiana (Supported Plaintiff)	Exposure to benzene and benzene containing solvents in refineries and chemical plants	Closed	LAW-2005-020 Cause No.: 62116, Div. A	2005-2007
Ms. Denyse Clancy Baron & Budd, P.C. 3102 Oak Lawn Ave., Suite 1100 Dallas, TX 75219	Plaintiffs: Stubbs & Wilkinson (two cases). Ms. Ann Stubbs, representing the estate of Ben L. Stubbs Herbert W. Wilkinson and Peggy S. Hebert Defendant(s): Radiator Specialty Company et al. 128th Judicial District Court, Orange County, TX (Supported Plaintiff)	Exposure to benzene & benzene-containing solvents- refineries, chemical plants Deposed by Defendant(s) 3/29/06 and 4/25/06	Negotiated Settlement	LAW-2005-021 & BAR-2006-001 Stubbs/Wilkinson - Cause No.:A-030272C	2005-2007
Mr. Thomas E. Schwartz Holloran White & Schwartz LLP 2000 S. 8th Street St. Louis, Missouri 63104	Plaintiff: Ursula Michelle Creaghan and Daniel Aaron Creaghan as surviving children of Steven Francis Creaghan Defendant: Superior Solvents & Chemicals, Inc.; Transchemical Inc., Ashland, Inc., Chemisphere Corp., Reichhold, Inc. Akzo Nobel Coatings, Inc., Brenntag Mid-South, Inc., Eastman Chemical Co., and Shell Oil Company (Supported Plaintiff)	Benzene exposure from paint manufacturing Deposed by Defendant on 8/29/2006	Negotiated Settlement 9/2006	LAW-2005-022 Cause No.: 042-07417	2005-2007
Mr. Lon Walters The Walters Law Firm The Oldham Building 105 East 5th Street, Suite 401 Kansas City, MO 64106	Plaintiff: Detel Defendant: BP Corporation North America, Inc., and BP Products North America, Inc. Circuit Court of Jackson County, Independence, MO (Supported Plaintiff)	Benzene exposure Deposed by Defendant on 9/11/2006	Negotiated Settlement 10/18/2006	WAL-06-001 Cause No.: 04CV207637	2005-2006
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff: Richard C. Smith and Vickie Smith Defendant(s): Sal Chemical Company, Inc., Chemical Solvents, Inc., and United States Can Company Circuit Court of Brooke County, WV (Supported Plaintiff)	Organic Chemical Exposure Deposed by Defendant(s) 02/06/2007	Negotiated Settlement 06/2007	HAR-2006-002 Case No.: 05-C-211 AMR	2006-2007
Ms. Denyse Clancy Baron & Budd, P.C. 3102 Oak Lawn Ave., Suite 1100 Dallas, TX 75219	Plaintiffs: Troy Lucas Defendant(s): Diamond Shamrock, Marathon, U.S. Steel, WD-40, Radiator Specialty, ConocoPhillips and Occidental Chemical 23rd Judicial District Court, Brazoria County, TX (Supported Plaintiff)	Exposure to benzene and benzene containing solvents while working for Diamond Shamrock	Closed	BAR-2006-002 Cause No. 35,311	2006-2007
Ms. Denyse Clancy Baron & Budd, P.C.	Plaintiffs: Donna Cashiola, Page	Exposure	Decision in	BAR-2006-005	2006-2008

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
3102 Oak Lawn Ave., Suite 1100 Dallas, TX 75219	Defendant(s): American Petroleum Institute, Inc. et al. 298th Judicial Court, Dallas, TX (Supported Plaintiff)	Deposed by Defendant 9/22/2006	favor of Defendant	Cause No.: 04-00545	
Ms. Denyse Clancy Baron & Budd, P.C. 3102 Oak Lawn Ave., Suite 1100 Dallas, TX 75219	Plaintiff: David Carpenter Defendant(s): Spray Products Corp. et al. Circuit Court of Cook County, Chicago, Illinois (Supported Plaintiff)	Benzene Exposure	2007	BAR-2006-006 Cause No.: 2006L00673	2006-2007
Ms. Denyse Clancy Baron & Budd, P.C. 3102 Oak Lawn Ave., Suite 1100 Dallas, TX 75219	Plaintiffs: Larry Koger (deceased) and Kim Koger Defendant(s): Ashburn Industries et al. 128th Judicial District Court, Orange County, TX (Supported Plaintiff)	Exposure to benzene and benzene containing solvents while working for EBBA Iron	Negotiated Settlement	BAR-2006-007 Cause No.: A050388-C	2006-2007
Mr. Kirk Claunch Baron & Budd, P.C. 3102 Oak Lawn Ave., Suite 1100 Dallas, TX 75219	Plaintiffs: Bekkelund Defendant(s): General Tire, Shell, Specialty Radiator 23rd Judicial District Court, Brazoria County, TX (Supported Plaintiff)	Exposure to benzene and benzene containing solvents Deposed by Defendant 3/13/2007	Negotiated Settlement	BAR-2006-009 Cause No.: 24038*BJ03	2006-2008
Mr. Andrew DuPont Locks Law Firm 1500 Walnut Street, 20th Floor Philadelphia, PA 19102	Plaintiff: Kirk Jenkins Defendant(s): (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 2008	LOC-2006-001	2006-2008
Mr. Bradley Oldaker Bailey, Stultz, Oldaker & Green P.O. Drawer 1310 Weston, West Virginia 26452	Plaintiffs: William K. Stern et al. Defendant(s): Chemtal Incorporated et al. Circuit Court of Marshall County, West Virginia (Supported Plaintiff)	Exposure to Polyacrylamide Flocculant with Residual Acrylamide Monomer.	Negotiated Settlement	OLD-2007-001 Cause No.: 03-C-49M	2004
Mr. Lon Walters The Walters Law Firm The Oldham Building 105 East 5th Street, Suite 401 Kansas City, MO 64106	Plaintiff: Sean Reed Defendant(s): B.P. Corporation North America, Inc., and BP Products North America, Inc. et al. Circuit Court of Jackson County, Missouri at Independence (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement	WAL-2007-001 Cause No.: 04CV-209341	2007
Mr. John Hughes The Law Offices of John J. Hughes 1200 Gough Street, Suite 1 San Francisco, CA 94109	Plaintiff: Daniel F. Dean as administrator of the estate of William J. Dean Defendant(s): Overseas Shipbuilding Group (OSG) Ship Management, Inc., Juneau Tanker Group, Inc., Cambridge Tankers, Inc., OMI Corp., Interocean Ugland Management, Inc., and SL Service, Inc. Superior Court of the State of California, County of San Francisco	Benzene Exposure	Negotiated Settlement 04/2008	HUG-2007-001 Cause No.: CGC-04-430986	2007-2008

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ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	(Supported Plaintiff)				
Mr. Jim Waldenberger Kline & Specter The Nineteenth Floor 1525 Locust Street Philadelphia, PN 19102	Plaintiff: Karen Horvat, Estate of Andrew J. Horvat, Deceased, et al. Defendant(s): Crane Oil Company et al. Superior Court of New Jersey Gloucester County (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 01/2012	WAL-2007-001 Cause No.: GLO-000497-07	2007-2012
Mr. J. Keith Hyde Ms. D'Juana Parks Provost & Umphrey, L.L.P. 490 Park Street P.O. Box 4905 Beaumont, TX 77704	Plaintiff: Jan Goss, Individually and as Representative of the Estate of Velma Church, Deceased, et al. Defendant: Schering-Plough Corp. 4th Judicial Court, Rusk County, State of Texas (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 04/2008	PAR-2007-001 Cause No.: 2006-232	2007-2008
Bradley R. Oldaker Bailey, Stultz, Oldaker & Greene P.O. Drawer 1310 Weston, West Virginia 26452	Plaintiff: Estate of Darren Patrick Brake Defendant: TKS Contracting Circuit Court of Upshur County, West Virginia (Supported Plaintiff)	Wrongful Death Forklift Accident	Negotiated Settlement 02/2008	OLD-2007-002 Case No.: 07-C-155	2007-2008
Mr. John Langdoc Baron & Bud Baron & Budd, P.C. 3102 Oak Lawn Ave., Suite 1100 Dallas, TX 75219	Plaintiff: Edward Paul Wick Defendant(s): 3M Company et al. Court of Common Pleas Philadelphia County (Supported Plaintiff)	Asbestos	Negotiated Settlement 02/2009	BAR-2007-004 Cause No.: 0512-2989	2007-2009
Mr. Lon Walters The Walters Law Firm The Oldham Building 105 East 5th Street, Suite 401 Kansas City, MO 64106	Plaintiff: Paul Hedrick & Joyce Hedrick Defendant: BP Corporation North America Inc. and BP Products North America Inc. – Former American Oil Company (AMOCO) Site Circuit Court of Jackson County, Missouri at Independence (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement	LON-2007-002 Cause No.: 04CV-209360 – Div. 16	2007
Mr. Lon Walters The Walters Law Firm The Oldham Building 105 East 5th Street, Suite 401 Kansas City, MO 64106	Plaintiff: Barbara Behymer, individually and as Plaintiff Ad Litem for Richard Behymer, deceased Defendant: BP Corporation North America Inc. and BP Products North America Inc. – Former American Oil Company (AMOCO) Site. Circuit Court of Jackson County, Missouri at Independence. (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 03/07/2008	LON-2007-003 Cause No.: 04CV238342	2007-2008
Mr. Chuck Gordon Hubbell Peak O'Neal Napier & Leach Law Firm Union Station 30 W. Pershing Rd., Suite 350 Kansas City, MO 64108	Plaintiff: Robert L. Almaguer Defendant: The Burlington Northern & Santa Fe Railway Company City Court of the City of St. Louis, State of Missouri (Supported Plaintiff)	Railroad Worker PAH Exposure	Negotiated Settlement 08/16/2008	HUB-2007-001 Cause No.: 052-10081	2007-2008
Mr. Gregory A. Lofstead	Plaintiff: Dennie Polk	Silicosis	Negotiated	RPWB-2007-	2007-2008

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Richardson, Patrick, Westbrook & Brickman, LLC 174 East Bay Street Charleston SC 29401	Defendant: Brooks Run Coal Company et al. Circuit Court of Mingo County, West Virginia (Supported Plaintiff)		Settlement 01/2008	001 Cause No.: 04-C-650	
Mr. Gregory A. Lofstead Richardson, Patrick, Westbrook & Brickman, LLC 174 East Bay Street Charleston SC 29401	Plaintiff: Ricky G. Prince and Diana Prince Defendant: Eastern Associated Coal Corp. et al. Circuit Court of Mingo County, West Virginia (Supported Plaintiff)	Silicosis	Negotiated Settlement 05/2008	RPWB-2007-002 Cause No.: 04-C-289	2007-2008
Mr. James Zury The Law Offices of James C. Zury 450 Alkyre Run Drive, Suite 120 Westerville, OH 43082	Defendant: Ohio Builders, Inc. and Mr. David B. Holbert, President Plaintiff: Rick and Karen Upchurch (Supported Defendant)	Mold Contamination	Negotiated Settlement 01/2008	SUR-07-001	2007-2008
Mr. Thomas E. Schwartz Holloran White & Schwartz LLP 2000 S. 8th Street St. Louis, Missouri 63104	Plaintiff: Paula Dangerfield Defendant: BP Corp. North America, Inc. et al. Third Judicial Circuit Court, Madison County, State of Illinois (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 2014	SCH-07-001 Case #: 08-L-1032	2007-2014
Mr. James Billings Zacks Law Firm 33 S. James Road Columbus, OH 43213	Plaintiff: Joseph Pingue Defendant: Able Roofing Franklin County, Ohio Court of Common Pleas (Supported Plaintiff)	Roofing/Water Infiltration	Testified in Trial 6/9/2008 Decision in Favor of Plaintiff	ZAC-08-001	2008
Mr. Thomas E. Schwartz Holloran White & Schwartz LLP 2000 S. 8th Street St. Louis, Missouri 63104	Plaintiff: Tricia Mary Iraci and the Estate of Giacomo Iraci Defendant(s): Heritage-Crystal Clean, LLC, Superior Solvents & Chemicals, Inc., Citgo Petroleum Corporation, Sunoco, Inc., The Valvoline Company and 3M Company Circuit Court of Cook County Illinois County Department, Law Division (Supporting Plaintiff)	Benzene Exposure Deposed by Defendant(s) 5/04/2011	-	SCH-2008-001 Case No.: 05 L 7528	2008
Mr. Thomas E. Schwartz Holloran White & Schwartz LLP 2000 S. 8th Street St. Louis, Missouri 63104	Plaintiff: Tomas Fields Defendant: The Alton & Southern Railway Company Circuit Court – St. Clair County, IL (Supported Plaintiff)	Railroad Diesel and Benzene Exposure Deposed by Defendant(s) 3/16/2010	Negotiated Settlement 8/2010	SCH-2008-003 Cause: 06L 308	2008-2010
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building	Plaintiff: Elmer B. Haymond and Norma Haymond Defendant(s): Moore North American, Inc. et al. Circuit Court of Marshall County, WV	Organic Chemical Exposure	Negotiated Settlement	HAR-2008-001 Cause No.: 04-	2008

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
2001 Main Street, Suite 600 Wheeling, WV 26003	(Supported Plaintiff)			C-211	
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff: Daniel E. Emery and Liselle Emery Defendant(s): Shell Oil Company, Individually and d/b/a Shell Chemical Company and as Successor-by-Merger to Pennzoil-Quaker State Company, a Delaware Corporation, Pennzoil-Quaker State Company, C. E Bradley Laboratories, Inc., Exxon Mobil Corporation, Safety-Kleen Systems, Inc., f/k/a Safety-Kleen Corp., The Coleman Company, Inc., Cleveland Lithochrome, Company, Inc., Minnesota Mining and Manufacturing Company (3-M), Miles Supply Company, Inc., Granite City Tool Company of Vermont, Inc., Intertape Polymer Corp. State of Vermont, Washington County, SS (Supporting Plaintiffs)	Benzene Exposure Deposed by Defendant(s) 7/21/2010	Negotiated Settlement	HAR-2008-002 Cause No. 80-2-09 WNCV	2008
Mr. Karl Novak Richardson, Patrick, Westbrook & Brickman, LLC 174 East Bay Street Charleston SC 29401	Plaintiff(s): Debra Herzog, Individually and as Administrator of the Estate of Kent Herzog, Deceased, for the use and benefit of Surviving Next of Kin, Debra Herzog (Surviving Spouse), Ryan Herzog, and Heather Ragan (Surviving Children) Defendant(s): Tex-Trim, Inc.; Sunnyside Corp.; E.I. DuPont De Nemours and Company; Superglue Corp.; The Savogran Company; RPM Wood Finishes Group; Inc., Wilsonart International, Inc., WD-40 Company, W.M. Barr & Co., Inc., DAP, Inc.; Mohawk Finishing Products, Inc.; The Glidden Co., D/B/A ICI Paints; OSI Sealants, Inc.; Do it Best Corp.; Henkel Consumer Adhesives; Inc., Henkel Corp., Individually and as successor to Henkel Locktite Corp.; Sovereign Specialty Chemicals; Henkel Consumer Adhesives, Inc., OSI Sealants, Inc., and Formica Corp.; IPS Corp. (formally Industrial Polychemical Service); Franklin International, Inc. (formerly Franklin Glue); Camie-Campbell, Inc. (formerly Camie Co.); and Camie-Campbell International, Inc. Circuit Court of the Third Judicial Circuit, Madison County, Illinois (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 02/2010	RPWB-2008-001 Cause No.: 207-L-538	2008-2010
Mr. Robert Black Heard, Robins, Cloud & Lubel, LLP 3800 Buffalo Speedway, 5th Floor Houston, Texas 77098	Plaintiff(s): Walter Mairose, Individually and as Executor of the Estate of Mae I. Mairose et al. Defendant(s): The Dow Chemical Company et al. Circuit Court for Baltimore City, County of Baltimore, State of Maryland	Vinyl Chloride Exposure Deposed by Defendants 06/11/2008	Negotiated Settlement 08/2008	HRCL-2008-001 Case No.: 24-C-06-011110	2008

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	(Supported Plaintiff)				
Mr. Keith Patton Shrader & Associates 3900 Essex Lane, Suite 390 Houston, TX 77027	Plaintiff(s): John Davis Ward, et al. Defendant(s): Citizens Gas & Coke Utility Marion County Superior Court, State of Indiana (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 05/2008	SCHM-08-001 Cause No.: 49D03-0701-CT-002020	2008
Mr. Gene Egdorf The Lanier Law Firm 6810 FM - 1960 West Houston, Texas 77069	Plaintiff(s): Judy A. Bates, individually and as Personal Representative of the Heirs and Estate of Loren G. Bates, Deceased, et al. Defendant(s): Shintech, Inc. et al. United States District Court for the Western District of Missouri (Supported Plaintiff)	Vinyl Chloride Exposure	Negotiated Settlement 2008	LAN-08-001 Cause No.: 06-0944-CV-W-GAF	2008-2008
Mr. Zach Zatezalo Bordas & Bordas, PLLC 1358 National Road Wheeling, West Virginia 26003	Plaintiff(s): Mr. Joe Berry Charlton, Vicki Charlton (wife), and Shasta Charlton (daughter) Defendant: Wheeling-Pittsburgh Steel Corp. West Virginia Worker's Compensation Office of Judges & Brooke County Circuit Court (Supported Plaintiffs)	Coke Oven Gases and Heat Exposure Deposed by Defendant 05/10/2011	Negotiated Settlement 2012	BOR-08-003 Claim #: 2006204793 Cause No.: 07-C-119	2008-2012
Mr. Andrew J. DuPont Locks Law Firm The Curtis Center 601 Walnut Street, Suite 720 East 170 South Independence Mall West Philadelphia, Pennsylvania 19106	Plaintiff(s): Michael Cardello and Tracy Cardello, his wife Defendant: CRC Industries, Inc. et al. Court of Common Pleas of Allegheny County, State of Pennsylvania (Supporting Plaintiffs)	Benzene Exposure	-	LOC-08-001 Cause No. GD-05-029307	2008
Mr. Robert Black Heard, Robins, Cloud & Lubel, LLP 3800 Buffalo Speedway, 5th Floor Houston, Texas 77098	Plaintiff(s): Robert B. Oakley (Deceased) and Irene Oakley Defendant(s): Air Products and Chemicals, Inc., Aristech Chemical Corporation; Atlantic Richfield Company, BP Corporation of America, Inc., BP Products North America, Inc., BP Amoco Chemical Company, Occidental Chemical Corporation, Radiator Specialty Company, United States Steel Corporation, and USX Corporation U.S. District Court for the Eastern District of Texas Marshall Division (Supported Plaintiff)	Benzene Exposure 11/25/2008 - Defendant(s) motion to exclude Petty testimony denied.	Negotiated Settlement 12/2008	HRCL-08-002 Case No.: 2:07-CV-00351	2008
Mr. Robert Black Heard, Robins, Cloud & Lubel, LLP 3800 Buffalo Speedway, 5th Floor Houston, Texas 77098	Plaintiff(s): Gerald Diaz (deceased) and Deborah Diaz Defendant(s): Handschy Industries, Inc., E.I. DuPont de Nemours & Co., et al. In the District Court, Orange County, 128th Judicial District	Benzene Exposure	Negotiated Settlement 8/2012	HRCL-08-003 Cause No.: A-070037DC	2008-2012

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	Court (Supported Plaintiff)				
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Mr. Richard Gordon Defendant(s): Texaco Marine Services, Inc. et al. United States District Court for the District of New Jersey (Supported Plaintiff)	Benzene Exposure Deposed by Defendant(s) 6/28/2011	Negotiated Settlement 08/2011	HAR-08-005 Cause No. 09 CV-911 (JAG)	2008-2011
Mr. Keith Patton Shrader & Associates 3900 Essex Lane, Suite 390 Houston, TX 77027	Plaintiff(s): Mr. Raul Zendejas and Araceli Zendejas. Defendant(s): Shell Oil Company, Shell Chemical, LP, Individually and as Successor-in-interest to Shell Chemical Corporation, ConocoPhillips Company, Von Verde Citrus Packing House, Inc., an Arizona corporation; Von Verde Harvesting, Inc., a dissolved Arizona corporation; and Von Verde Citrus Growers Cooperative, Inc a dissolved Arizona Corporation In the Superior Court of the State of Arizona in and for the County of Maricopa (Supported Plaintiffs)	Benzene Exposure Deposed by Defendant(s) 9/23/2009	Trial Testimony 11/9-10/2009 Decision in Favor of Defendant(s) 11/19/2009	SCHM-08-002 Cause No.: CV-2007-005399	2008-2009
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Bonnie L. Mallory, Executrix of the Estate of Robert E. Mallory, Deceased Defendant(s): Goodyear Tire & Rubber Company, Akron, OH, et al. Court of Common Pleas, Summit County, Ohio (Supported Plaintiff)	Benzene Exposure Deposed by Defendant(s) 10/21/2009	Negotiated Settlement 2010	HAR-08-006 2007-11-8033 Case No.: CV07-11-8033	2008-2010
Mr. Raphael Metzger Metzger Law Group 401 E. Ocean Blvd., Suite 800 Long Beach, CA 90802	Plaintiff(s): Thomas Wayne Reese Defendant: Gans Ink & Supply Co., and Does 1 through 200, inclusive Superior Court of the State of California for the County of Los Angeles – Central District (Supported Plaintiff)	Benzene Exposure Deposed by Defendant 7/7/2009	Negotiated Settlement 05/2010	MET-08-001 Case No.: BC332936	2008-2010
Mr. Guy Bucci Bucci, Bailey & Javins 213 Hale Street Charleston, WV 25301	Plaintiff(s): Michael Schmidt Defendant: Bayer Corporation, Bayer Material Science LLC, John Cool, Terry Eddy, Charles "Buddy" Kotson and John Long Circuit Court of Marshall County, West Virginia 7/28/2008 2nd Amended Complaint Filed (Supported Plaintiff)	TDI Exposure Deposed by Defendant 02/03/2010 and 06/03/2010	Negotiated Settlement 09/2012	BUC-07-001 Case No.: 08-C-121-K	2007-2012
Mr. Thomas E. Schwartz Holloran White & Schwartz LLP 2000 S. 8th Street	Plaintiff(s): Suzanne Schaefer, Individually and as Special Administrator of the Estate of Richard D. Schaefer, Deceased Defendant: The Premcor Refining Group, Inc. formerly	Benzene Exposure	-	SCH-08-005 Case No.: 06 L	2008

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
St. Louis, Missouri 63104	known as Clark Refining & Marketing, Inc. and formerly known as Clark Oil & Refining Corporation, and Illinois Petroleum Company, Inc. and Texor Petroleum Company, Inc., and Parent Petroleum, Inc. Circuit Court of Will County, State of Illinois (Supporting Plaintiff)			578	
Ms. Kelly McMeekin Paul & Hanley 1608 Fourth Street, Suite 300 Berkeley, CA 94710	Plaintiff(s): Julie (Judy) Murray, Individually and as Successor-In-Interest to Erica Murray Defendant: Chevron Corporation; Union Oil Company of California; Greka Oil & Gas, Inc.; Drilling & Production Co.; ConocoPhillips, Kerr-McGee Corporation; Anadarko Petroleum Corporation, Key Energy Group, Inc. and DOES 2-210 Superior Court of the State of California, County of Los Angeles (Supported Plaintiff)	Benzene Exposure Deposed by Defendant(s) 10/28-29/2009	Closed 2010	PAU-08-001 Case No.: YCO56221	2008-2010
Mr. Michael P. Giertz Hartley & O'Brien, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Douglas E. Fedor Defendant: Norfolk Southern Railway Co. (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 11/2008	HAR-08-007 Case No.: CV-08-652069	2008
Mr. Robert Black Heard, Robins, Cloud & Lubel, LLP 3800 Buffalo Speedway, 5th Floor Houston, Texas 77098	Plaintiff(s): Candis L. Snyder, individually, and as the Personal Representative of the Estate of William Luther Clark, Deceased; Patricia L. Clark, Shelley K. Winfrey and Kerry A. Clark, Individually and as the Wrongful Death Beneficiaries of the Estate of William Luther Clark, Deceased Defendant: E.I. DuPont De Nemours and Company, Inc., PPG Industries, Inc., Sherwin Williams Company, BASF Corp., Wesco Group, Inc. U.S. Steel/Aristech Chemical Corp., Radiator Specialty Company, Sunoco, Inc., The Glidden Company and ICI Americas, Inc. Superior Court of the State of Washington in and for the County of King (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 7/2010	HRCL-08-004 Case No.: 07-2-27647-5SEA	2008
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Christopher R. Scearce and Angela W. Scearce, his wife Defendant(s): The Sherwin-Williams Company; Abercrombie Oil Company, Inc.; Hutchens Petroleum Corporation; UNIVAR USA, Inc.; Caswell Auto Parts, LLC; Texaco, Inc.; Chemtek, Incorporated, Travelers Insurance Company and Key Risk Management Services. North Carolina Industrial Commission, Raleigh, North	Benzene Exposure Deposed by Defense 10/28/2010	Testified before the North Carolina Industrial Commission 8/11/10 Negotiated	HAR-08-004 Cause No.: 08-CVS-420	2008

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Engineering & Expert Services, Inc.© 401 April 6, 2026
Petty Expert Report – CeramFab and WYG Plaintiffs - NS Train Derailment in East Palestine, OH

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	Carolina; State of North Carolina In the General Court of Justice Superior Court, Division, Caswell County (Supporting Plaintiff)		Settlement		
Mr. Keith Patton Shrader & Associates 3900 Essex Lane, Suite 390 Houston, TX 77027	Plaintiff(s): George Oliver Tanner, Individually and as Independent Administrator of the Estate of Jimmie Wayne Tanner, Deceased Defendant: ExxonMobil Corporation et al. In the United States District Court for the Southern District of Texas Houston Division (Supporting Plaintiff)	Benzene Exposure	-	SHR-09-001 Cause No.: 01-16849-001	2009
Mr. Guy Bucci Bucci, Bailey & Javins 213 Hale Street Charleston, WV 25301	Plaintiff(s): Ricky J. Carman Defendant: Bayer Corporation, Bayer Material Science LLC, John Cool, Terry Eddy, Charles "Buddy" Kotson and John Long Circuit Court of Marshall County, West Virginia (Supported Plaintiff)	TDI Exposure Deposed by Defendant(s) 02/03/2010	Negotiated Settlement 08/2010	BUC-09-001 Case No.: 08-C-269K	2009-2010
Ms. Denyse Clancy Baron & Budd, P.C. 3102 Oak Lawn Ave., Suite 1100 Dallas, TX 75219	Plaintiff(s): Michael Malcontento Defendant: Court of Common Pleas, Philadelphia County, November Term, 2006, No: 0632 (Supported Plaintiff)	Asbestos Exposure	Negotiated Settlement 2010	BAR-009-002 Case No.: 26035 Asbestos	2009-2010
Mr. Keith Patton Shrader & Associates 3900 Essex Lane, Suite 390 Houston, TX 77027	Plaintiff(s): Ms. Barbara Way and Estate of Mr. James Way Defendant: Ashland, Inc., Exxon Mobil Corporation, Shell Oil Company, Chevron U.S.A., Inc., Goodrich Corporation, and Parker Hannifan Corporation In the Court of Common Pleas, Cuyahoga County, Ohio (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 2010	SHR-09-002 Cause No.: CV 09 683084	2009-2010
Mr. Robert Black Heard, Robins, Cloud & Lubel, LLP 3800 Buffalo Speedway, 5th Floor Houston, Texas 77098	Plaintiff(s): Lewis E. Knapper and Linda Knapper Defendant: Safety-Kleen Systems, Inc., Aristech Chemical Corp., Radiator Specialty Company, Sunoco, Inc. (R&M), United States Steel Corporation, and USX Corporation. U.S. District Court for the Eastern District of Texas Lufkin Division (Supported Plaintiffs)	Benzene Exposure Deposed by Defendant 07/16/2009 11/16/2009 - Defendant(s) motion to exclude Petty testimony denied.	Negotiated Settlement 02/2010	HRCL-09-001 Civil Action No: 9:08-cv-0084	2009-2010
Mr. Robert Black Heard, Robins, Cloud & Lubel, LLP 3800 Buffalo Speedway, 5th Floor	Plaintiff(s): Linda Denise Smith and Estate of Wesley Fred Smith, Deceased et al.	Benzene Exposure	Negotiated Settlement	HRCL-09-002	2009-2010

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Houston, Texas 77098	Defendant: E.I DuPont De Nemours and Company, Inc., PPG Industries Inc., Sherwin Williams Company, BASF Corporation, Akzo Nobel Coatings, Inc. United States District Court for the Eastern District of Texas, Beaumont Division (Supported Plaintiff)		6/2010	Cause No.: 08-CV-385	
Mr. Robert Black Heard, Robins, Cloud & Lubel, LLP 3800 Buffalo Speedway, 5th Floor Houston, Texas 77098	Plaintiff(s): Fred Cantu and Ruth Cantu Defendant: BP Amoco Chemical Company et al. In the District Court of Galveston Texas, 56th Judicial District (Supported Plaintiffs)	Benzene Exposure	Dismissed 2010	HRCL-09-003 Cause No.: 07 CV 0594	2009-2010
Mr. Robert Black Heard, Robins, Cloud & Lubel, LLP 3800 Buffalo Speedway, 5th Floor Houston, Texas 77098	Plaintiff(s): Darla J. Lemaire, Individually, and as the Independent Executrix of the Estate of Michael Lemaire, Deceased et al. Defendant: Berryman Products, Inc.; Delaware USS Corporation, Huntsman Petrochemical Corporation, Radiator Specialty Company, Texaco Chemical Company, Texaco, Inc., United States Steel Corporation, and USX Corporation 172nd Judicial District of Jefferson County, Texas (Supported Plaintiff)	Benzene Exposure Deposed by Defendant(s) 10/13/2009	Negotiated Settlement 10/31/2009	HRCL-09-007 Cause No.: E-178,440	2009
Mr. Andrew DuPont Locks Law Firm 1500 Walnut Street, 20th Floor Philadelphia, PA 19102	Plaintiff(s): Ryan Glenn Davis and Evan Scott H. Davis, Executors of the Last Will and Testament of Ronald Davis, Deceased. Defendant(s): Sunoco, Inc. (R&M) f/k/a Sun Company, Inc., Radiator Specialty Company, United States Steel Corp., Insilco Technologies, Inc., Eastman Kodak Co., The Sherwin-Williams Co., et al. Court of Common Pleas, Philadelphia County (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 2011	LOC-2009-002 Cause No.: 090301835	2009-2011
Mr. Andrew DuPont Locks Law Firm The Curtis Center 601 Walnut Street, Suite 720 East Philadelphia, Pennsylvania 19106	Plaintiff(s): Richard Ascani Defendant: E.I. Du Pont Nemours & Company, BASF Corp, SM Co., Safety-Kleen Systems, Inc., et al. Supreme Court of the State of New York, County of Kings (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 2010	LOC-09-003 Cause No.: 12061-09	2009-2010
Mr. Andrew DuPont Locks Law Firm The Curtis Center 601 Walnut Street, Suite 720 East Philadelphia, Pennsylvania 19106	Plaintiff(s): Joann Grandpre, Individually and as the Administratrix of the Estate of Anthony Grandpre, Deceased; Treva Cadres, Trina Kohlman and Troylise Grandpre, Individually and as the Beneficiaries of the Estate of Anthony Grandpre, Deceased Defendant: PPG Industries, Inc., PPG Industries Ohio, Inc., PPG Coatings, Inc., E.I. DuPont de Nemours & Co., DuPont	Benzene Exposure	Negotiated Settlement 2010	LOC-09-004 Cause No. 2004-4180, Division J, Section 13	2009-2010

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	Performance Coatings, Inc. Individually and as Successor-In-Interest to Spies Hecker, Inc., DuPont Automotive Products, Inc., Spies Hecker, Inc., BASF Corporation, BASF Coatings AG, Individually and Successor-In-Interest to Inmont Corporation, BASF-Inmont Corporation, BASF Corporation-Inmont Division, The Sherwin-Williams Company, Inc., Sherwin-Williams Automotive Finishes Corp., Illinois Tool Works, Inc. Individually and Successor-In-Interest to Fibre Glass-Evercoat Company, Inc., Crescent City Color, Tarride Color Service, Inc., Tarride Sale, Inc., Automotive Paint & Trimming Supply Company, Inc., Linda's Hip Hop Auto Paint & Supply Shop, LLC. Civil District Court for the Parish of New Orleans, State of Louisiana (Supported Plaintiff)				
Ms. Denyse Clancy Baron & Budd, P.C. 3102 Oak Lawn Ave., Suite 1100 Dallas, TX 75219	Plaintiff(s): Dolores Juliano, as Executrix of the Estate of John Juliano Defendant: A.W. Chesterton Company, et al. In the Court of Common Pleas Philadelphia County, PA. (Supported Plaintiff)	Asbestos Exposure	Negotiated Settlement 2012	BAR-09-003 Cause No.: 001905	2009-2012
Ms. Denyse Clancy Baron & Budd, P.C. 3102 Oak Lawn Ave., Suite 1100 Dallas, TX 75219	Plaintiff(s): Leroy Thompson Defendant: A.W. Chesterton Company, et al. In the Court of Common Pleas Philadelphia County, PA. (Supported Plaintiff)	Asbestos Exposure	Negotiated Settlement 2009	BAR-09-004	2009
Mr. Robert Black Heard, Robins, Cloud & Lubel, LLP 3800 Buffalo Speedway, 5th Floor Houston, Texas 77098	Plaintiff(s): Susan Stevenson, Jordan W. Stevenson and Amy S. Fontenot, Individually, and as Heirs to the Estate of James Edward Stevenson Defendant: Bayer Corporation, Successor in Interest to Miles, Inc., Denka Chemical, Mobay Corporation and Mobay Chemical Company; Atofina Petrochemicals, Inc. individually and formerly known as American Petrofina Company of Texas and Fina Oil and Chemical Company; Chevron Chemical Company; Chevron U.S.A. Incorporated, individually and as successor in interest to Gulf Oil Corporation; Chevron Phillips Chemical Company, LLC; Chevron Phillips Chemical Company LP; Conoco, Inc., individually a/k/a Conoco Gas and Marketing, a Division of Conoco, Inc., and formerly known as Du Pont holdings, Inc.; ConocoPhillips Company; E.I. DuPont de Nemours and Company, Inc.; ExxonMobil Oil Corporation, individually, f/k/a Mobil Oil Corporation, and a/k/a Mobil Chemical Company, a Division of ExxonMobil Oil Corporation; Fina Oil and	Benzene Exposure	Negotiated Settlement 02/2010	HRCL-09-008 Case No.: A-040211-C	2009

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	Chemicals; Fina, Inc.; Goodyear Tire & Rubber Company; Great Lakes Carbon Corporation; Mobil Chemical Company, Inc., individually and f/k/a Mobil Chemical Corporation; Radiator Specialty Company; United States Steel Corporation, individually, f/k/a United States Steel LLC, and f/k/a USX Corporation; and USX Corporation, individually, f/k/a U.S. Steel Company, f/k/a United States Steel Corporation and as a subsidiary of Marathon Oil Company 128th Judicial District Court, Orange County, Texas (Supported Plaintiffs)				
Ms. Denyse Clancy Baron & Budd, P.C. 3102 Oak Lawn Ave., Suite 1100 Dallas, TX 75219	Plaintiff(s): Stephen J. Kolar and Carol Kolar Defendant: Buffalo Pumps, Inc. et al. Philadelphia County Court of Common Pleas Civil Trial Division (Supported Plaintiffs)	Asbestos Exposure	Negotiated Settlement 2010	BAR-09-005 Case No.: 000199 Asbestos	2009-2010
Ms. Denyse Clancy Baron & Budd, P.C. 3102 Oak Lawn Ave., Suite 1100 Dallas, TX 75219	Plaintiff(s): Earl J. Goodhart and Betty R. Goodhart h/w Defendant: Garlock Sealing Technologies, et al. In the Court of Common Pleas Philadelphia County, PA (Supported Plaintiffs)	Asbestos Exposure	Negotiated Settlement 03/2010	BAR-2009-006 Case No.: 0000436 Asbestos	2009-2010
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): John M. Ashworth and Johnnie M. Hord, Individually and Executrix of the Estate of Anthony T. Hord, deceased Defendant(s): The Goodyear Tire & Rubber Company et al. Court of Common Pleas, Summit County, Ohio (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement May 2010	HAR-09-001 Case No.: 2008-10-7361	2009-2010
Mr. R. Dean Hartley Hartley & O'Brien, P.L.L.C. The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s)s: Johnnie M. Hord, Individually and Executrix of the Estate of Anthony T. Hord, deceased and John M. Hord Defendant(s): The Goodyear Tire & Rubber Company et al. Court of Common Pleas, Summit County, Ohio (Supported Plaintiff)	Benzene Exposure Deposed by Defendant(s) 07/07/2010	Negotiated Settlement 12/2010	HAR-09-001 Case No.: 2008-10-7361	2009-2010
Mr. Ted Gianaris Simmons Attorneys At Law 707 Berkshire Blvd. P.O. Box 521 East Alton, IL 62024	Plaintiff(s)s: Tristan Tolloty, a minor, by his next friends and parents, Brian Tolloty and Jessica Tolloty Defendant(s): Republic Services, Inc. Republic Services of Ohio, II, LLC, Waste Management, Inc., and Waste Management of Ohio, Inc. In the Court of Common Please, Stark County, Ohio (Supported Plaintiffs)	Benzene Exposure	Resolved 7/2012	SIM-09-001 Case No.: BC 416990	2009-2012
Mr. Andrew DuPont	Plaintiff(s): Kenneth Roberts and Helen Jean Roberts, his	Benzene Exposure	Negotiated	LOC-09-005	2009-2012

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Locks Law Firm 1500 Walnut Street, 20th Floor Philadelphia, PA 19102	wife. Defendant: Sunoco, Inc. (R&M) f/k/a Sun Company, Inc. and f/k/a Sun Oil Company, Inc., etc. Court of Common Pleas, Philadelphia County (Supported Plaintiffs)		Settlement 3/2012	Case No.: 3320	
Mr. Greg Lofstead Richardson, Patrick, Westbrook & Brickman, LLC 1017 Chuck Dawley Blvd. Mt. Pleasant, SC 29464 & Mr. Timothy C. Bailey Bucci Bailey & Javins LC PO Box 3712 Charleston, WV 25337	Plaintiff(s): Clarence J. Dorsey and Susan Dorsey Defendant: Copperas Coal Corporation; Hunter Ridge Coal Company, f/k/a Anker Energy Corporation; Brooks Run Mining Company, LLC; Fossil Fuels, Inc.; and Kingston Mining, Inc. Circuit Court of Nicholas County, West Virginia (Supported Plaintiffs)	Silica Dust Exposure Deposed by Defendant(s) 09/10/2010	Negotiated Settlement 9/10/2010	RPWB-10-001 Case No.: 09-C-36	2010-2010
Mr. Raphael Metzger Metzger Law Group 401 E. Ocean Blvd., Suite 800 Long Beach, CA 90802	Plaintiff(s): Laura Hammond, individually and as Guardian ad Litem of Minors Rachel Hammond and John Hammond; Craig Hammond; Elizabeth Wust; Marissa Stockreef; Stephanie Head, and Geoffrey Head Defendant: Chevron Corporation; Chevron USA, Inc.; Angeles Chemical Co., Inc.; Ashland Inc.; Ashland Oil, Inc.; Bortz Oil Co., Inc.; Chemcentral Corp; The Dow Chemical Company; E.I. Du Pont de Nemours and Company; Shell Oil Company; SOCO West Inc.: Union Carbide Corporation and Univar USA Inc. Superior Court of the State of California for the County of Los Angeles – Central District (Supported Plaintiffs)	Benzene Exposure Deposed by Defendant(s) 5/27/2010	Testified in Trial 01/26/2011 Decision in Favor of Defendant 2/2011	MET-10-001 Case No.: BC 358265	2010-2011
Mr. Robert Black Heard Robins Cloud & Black 9 Greenway Plaza, Suite 2300 Houston, Texas 77046	Plaintiff(s): Patricia A. McClurg, Individually and as the Representative of the Estate of Duard Wayne McClurg, Deceased and Terena McClurg Defendant(s): Ingram Barge Company, Savogran Company, W.M. Barr Company, Inc., et al. United States District Court, Eastern District of Texas, Beaumont Division (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 11/2010	HRCB-10-002 Case No.: 1:09-CV-00504	2010
Mr. Andrew DuPont Locks Law Firm 1500 Walnut Street, 20th Floor Philadelphia, PA 19102	Plaintiff(s): John J. Mull, III, and Renee Crimmins, H/W Defendant: The Sherwin Williams Company; M.A. Bruder & Sons, Inc.; Urbanik Paint & Wallpaper Co., Inc.; Tnemec, Inc.; Benjamin Moore & Co. Duron Paints & Wallcoverings; Texaco, Inc.; ChevronTexaco Corp.; Getty Petroleum Marketing, Inc. f/k/a Getty Realty Corp. f/k/a Power Test	Benzene Exposure Deposed by Defendant(s) 03/17/2011	Negotiated Settlement 5/17/2011	LOC-10-001 Case No.: CAM-L-884-07	2010-2011

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	Corp.; Lukoil Americas Corp; Mikecon Corp.; Exxon Mobil Corp; Getty Realty Corp. and John Doe Corporations One through Ten (1-10) Superior Court of New Jersey, Law Division – Camden County (Supported Plaintiffs)				
Mr. Keith Patton Shrader & Associates, L.L.P. 3900 Essex Lane, Suite 390 Houston, TX 77027	Plaintiff(s): Sharon Claytor, Personal Representative of the Estate of Rick D. Lewis; and Hilarie Lewis, Heir of Rick D. Lewis Defendant: Rebel Oil Company, a Nevada Corporation; Kinder Morgan Energy Partners, L.P.; ConocoPhillips Company; Shell Chemical Company; Chevron U.S.A., Inc.; Tosco Corporation; Tosco Refining Company; BP Products North America, Inc. and Atlantic Richfield Company District Court, Clark County, Nevada (Supported Plaintiffs)	Benzene Exposure	Testified in Trial 09/27-28/2011 Decision in Favor of Plaintiff 10/2011 Decision Confirmed by the Supreme Court of Nevada 12/16/2014	SHR-10-001 Case No.: A566869, Dept. XVII	2010-2011
Mr. Darren Brown Provost Umphrey Law Firm, LLP 490 Park Street Beaumont, Texas 77701	Plaintiff(s): Monte McWilliams Defendant(s): Exxon Mobil Corporation et al. 14th Judicial District Court, Parish of Calcasieu, State of Louisiana, Division E (Supported Plaintiff)	Benzene Exposure	Decision in Favor of Plaintiff 02/2012	PRO-10-001 Cause No.: 2009-002803	2010-2012
Mr. Keith Patton Shrader & Associates, L.L.P. 3900 Essex Lane, Suite 390 Houston, TX 77027	Plaintiff(s): Richard Czuprynski Defendant: The Kansas City & Southern Railway Company Circuit Court of Jackson County, Missouri (Supporting Plaintiff)	Benzene from Benzene-Containing Products Deposed by Defendant 11/29/2011	Dismissed	SHR-11-001 Cause No.: 1016-CV06186, Division No. 4	2011-2012
Mr. Greg Coolidge Metzger Law Group 401 E. Ocean Blvd., Ste. 800 Long Beach, CA 90802	Plaintiff(s): Steven Billing et al. Defendant(s): Azko Nobel Paints, LLC et al. Superior Court of the State of California for the County of Los Angeles (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 01/2012	MET-11-001 Case No.: BC 416990	2011-2012
Mr. Brian Madden Wagstaff & Cartmell, LLP 4740 Grand Avenue, Suite 300 Kansas City, MO 64112	Plaintiff(s): Charles Ross and Rocio Ross Defendant(s): Chevron Phillips Chemical Company, LP; Chevron Phillips Chemical Holdings II, LLC; and Chevron Phillips Chemical Company, LLC.	Benzene Exposure Deposed by Defendant(s)	Negotiated Settlement 03/2012	WAG-11-001 Case No.: 10-02-01901-	2011-2012

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	District Court of Montgomery County, Texas, 284th Judicial District (Supported Plaintiffs)	04/24/2012		CO	
Mr. Keith Hyde Provost Humphrey P.O. Box 4905 Beaumont, Texas 77704	Plaintiff(s): Jo Beth Allen and Lisa Wolfe, Surviving Children of Joe Allen, Deceased Defendant(s): Texaco, Inc., Chevron USA, Inc. and Atlantic Richfield Company In the District Court, Jefferson County, Texas, 60th Judicial District (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 03/2012	PRO-11-001 Cause No. B-186,652	2011-2012
Ms. Jo Anna Pollock Simmons Attorneys At Law 707 Berkshire Blvd. P.O. Box 521 East Alton, IL 62024	Plaintiff(s): City of Roxana Defendant(s): Shell Oil Company, Equilon Enterprisers, LLC d/b/a Shell Oil Products, US, a Corporation, ConocoPhillips Company, WRB Refining LP, ConocoPhillips WRB Partner, LLC, and Cenovus GPCP, LLC. The Circuit Court Third Judicial Circuit Madison County, IL (Supported Plaintiffs)	Benzene Exposure Deposed by Defendant(s) 11/05/2015	Negotiated Settlement 2016	SIM-11-001 Case No.: 3:12-cv-00336 GDM-PMF	2011-2016
Mr. Brad Oldaker Bailey, Stultz, Oldaker & Greene 122 Court Avenue Weston, WV 26452	Plaintiff(s): Ralph E. Taylor, Kathy Taylor, individually and in their capacity as guardian and next friend of Jane Doe, a minor. Defendant(s): E.I. Du Pont & Company, a Delaware Corporation, KBR, Inc., a Delaware Corporation, BE&K Construction Company, L.L.C., a Delaware Corporation and Debra Hartman, an Individual. In the Circuit Court of Kanawha County, West Virginia. (Supported Plaintiff)	Safety (Scaffold Incident)	Negotiated Settlement 09/2012	OLD-11-001 Case No. 11-C-1713	2011-2012
R. Dean Hartley Hartley & O'Brien, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Cynthia L. Gunto, Individually and as Executrix of the Estate of Michael T. Gunto, deceased. Defendant(s): PPG Industries, Inc. Circuit Court of Marshall County, West Virginia (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 03/2013	HAR-11-001 Case No.: 09 C 260K	2011-2013
Mr. Gary L. Hall Smith, Rolfes & Skavdahl Co., LPA 600 Vine Street, Suite 2600 Cincinnati, OH 45202	Plaintiff(s): Rex A. Absher and Cosetta Absher Defendant(s): State Auto Insurance Company of Ohio In the Court of Common Pleas Lawrence County, Ohio. (Supported Insurance Company - Defendant)	Formaldehyde Exposure Deposed by Plaintiffs 02/09/2012	Decision in Favor of Plaintiff	STE-12-001 Case No.: 10-OC-908	2011-2012
Dr. Herschel L. Hobson Hobson & Bradley	Plaintiff(s): William P. Hite and Patricia A. Hite	Benzene Exposure	Negotiated Settlement	HOB-11-001	2011-2014

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Attorneys At Law 2190 Harrison Beaumont, TX 77701	Defendant(s): Apex Oil Company, Inc., Valero Energy Corp., successor in interest to Clark Oil Company and Premcor, Inc. et al. Circuit Court of Cook County Illinois, County Department, Law Division (Supported Plaintiff)	Deposed by Defendant(s) 04/02/2013	2/2014	Case No.: 09 L 4510	
Mr. Ted Gianaris Simmons Attorneys At Law 707 Berkshire Blvd. P.O. Box 521 East Alton, IL 62024	Plaintiff(s): James and Betty Cox Defendant(s): Shell Oil Company, Equilon Enterprisers, LLC d/b/a Shell Oil Products, US, a Corporation, ConocoPhillips Company, WRB Refining LP, ConocoPhillips WRB Partner, LLC, and Cenovus GPCP, LLC. (Supported Plaintiffs)	VOC Exposure Site Visit, Interview and Report	Resolved Pre-Litigation 2014	SIM-12-001	2012-2014
Mr. Keith Hyde Provost Humphrey P.O. Box 4905 Beaumont, Texas 77704	Plaintiff(s): Claude W. Shute & Arthur Earl Holmes Defendant(s): Citgo Petroleum Company; Canadianoxy Offshore Production Co., ConocoPhillips Company; ExxonMobil Corporation; Chevron U.S.A., Inc.; Texaco, Inc.; Fina, Inc.; GATX Corporation; Crown Petroleum Corporation; Shell Oil Company; Hartford Accident & Indemnity Company; Century Indemnity Company and Lloyds of London In the 14th Judicial District Court of Calcasieu Parish, Louisiana (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 09/2012	PRO-12-001 Cause No.: 2010-003436 "E"	2012
Mr. Andrew DuPont Locks Law Firm The Curtis Center 601 Walnut Street, Suite 720 East 170 South Independence Mall West Philadelphia, Pennsylvania 19106	Plaintiff(s): Sondra Krem, Individually and as Executrix of the Estate of Joseph J. Krem Defendant(s): BP Corporation North America, Inc., Atlantic Richfield Company, Sunoco, Inc. (R&M) f/k/a Sun Company, Inc., Radiator Specialty Company, United States Steel Corporation, Safety-Kleen Systems d/b/a Safety-Kleen, Safety-Kleen Corp. in its own right and d/b/a Safety-Kleen Systems, Inc., The Pep Boys-Manny, Moe & Jack, The Berkebile Oil Company, Inc. and CRC Industries, Inc. In the Court of Common Pleas of Philadelphia County, Pennsylvania – Civil Division (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 11/2012	LOC-12-001 Case No.: 01913	2012
Mr. Andrew J. Stern Kline & Specter 1525 Locust Street Philadelphia, PA 19102	Plaintiff(s): Ruben Grigoryants and Mariana Grigoryants Defendant(s): Safety-Kleen Systems d/b/a Safety-Kleen, Safety-Kleen Corp. in its own right and d/b/a Safety-Kleen Systems, Inc. In the United States District Court for the Western District of Pennsylvania (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 04/2016	KLI-12-001 Case No.: 1:11-cv-00267-SJM	2012-2016

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Mr. Andrew DuPont Locks Law Firm The Curtis Center 601 Walnut Street, Suite 720 East 170 South Independence Mall West Philadelphia, Pennsylvania 19106	Plaintiff(s): David Gerchman and Teresa Gerchman Defendant(s): Berryman Products, Inc.; CRC Industries, Inc., Ford Motor Company, Loctite Corporation n/k/a Henkel Corporation; Illinois Tool Works, Inc., solely as successor-in-interest to Permatex, Inc.; Radiator Specialty Company; United States Steel Corporation, Safety-Kleen Corp., Safety-Kleen Systems, Inc., 3M Company; E.I. DuPont de Nemours & Company; Sea Foam Sales Company; Justice Brothers, Inc.; Hanson Merrill Corporation a/k/a Ernie's Auto Parts and Henkel Corporation In the Superior Court of the State of California for the County of Los Angeles, Southeast District (Supported Plaintiffs)	Benzene Exposure Deposed by Defendant(s) on July 16, 2012.	Negotiated Settlement 08/2012	LOC-12-002 Case No. VC060106	2012-2012
Mr. Thomas E. Schwartz Holloran White & Schwartz LLP 2000 S. 8th Street St. Louis, Missouri 63104	Plaintiff(s): Jeannette Platt, as the surviving wife of Decedent Lawrence Platt, Lukas Platt and Zachary Platt, as the surviving children of Decedent, Loretta Platt, as the surviving mother of Decedent, and Francis Platt, John Platt and Edward Platt, as the surviving siblings of Decedent Defendant(s): BASF Corporation, D&A Distributing, Inc., E.I. DuPont de Nemours & Company, Link Motor Supply Company, Inc., PPG Industries, Inc., and the Sherwin Williams Company In the Circuit Court of St. Louis County, State of Missouri (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 02/2013	SCH-12-001 Case No.: 10SL-CC01305	2012-2013
Mr. Keith Hyde Provost Humphrey P.O. Box 4905 Beaumont, Texas 77704	Plaintiff(s): Billy Smallwood & George C. Washington Defendant(s): Exxon Mobil Corporation et al. In the 136th Judicial District Court of Jefferson County, Texas (Supported Plaintiffs)	Benzene Exposure Deposed by Defendant(s) on October 17, 2013	Negotiated Settlement 11/2013	PRO-12-002 Case No.: D-189,648	2012-2013
Mr. Andrew DuPont Locks Law Firm 1500 Walnut Street, 20th Floor Philadelphia, PA 19102	Plaintiff(s): Andre A. Harvey Defendant(s): Valero Energy Corporation, PBF Energy Company, LLC, Paulsboro Refining Company, LLC, Sunoco, Inc. (R&M) a/k/a Sun Oil Company, Inc. and Sun Company, Inc., Sunoco Logistics Partners, L.P., El Paso Corporation, The Carlyle Group, L.P., Delaware City Refining Company, LLC, Husky Energy, Inc., Lima Refining Company In the Court of Common Pleas of Philadelphia County (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 01/20/2017	LOC-12-003 Case No. 1211102430; 02471	2012-2017
Mr. Brian E. Fritz Saltz, Mongeluzzi, Barrett & Bendesky, P.C. One Liberty Place, 52nd Floor	Plaintiff(s): Jeanne Gans, Administratrix of the Estate of George Gans, and in her own right Defendant(s): Sunoco, Inc., and Sunoco (R&M) Inc.	Benzene Exposure	Negotiated Settlement 3/2014	SMBB-13-001 Case No.:	2013-2014

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Philadelphia, PA 19103	Philadelphia County Court of Common Pleas Law Division (Supported Plaintiff)			03399	
Mr. Guy R. Bucci Bucci Bailey & Javins LC PO Box 3712 Charleston, WV 25337 Mr. Chris Heavens Heavens Law Firm PLLC 2438 Kanawha Blvd., East Charleston, WV 25311	Plaintiff(s): William (Rick) Potter Defendant(s): B&F Contracting, Inc. and its successors 198 State Road 716, Ashland KY 41102 (Supported Plaintiff)	Fall Protection Pre-Suit – Wrote Expert Report	Negotiated Settlement 5-2015	BUC-13-002	2013-2015
Mr. Guy R. Bucci Bucci Law Firm PO Box 3712 Charleston, WV 25337	Plaintiff(s): Muriel A. Thomas and Jackie Thomas, her husband Defendant(s): Interiors Plus, LLC, a West Virginia Limited Liability Company, CENTAUR Floor Systems, LLC, ECORE International, Inc. a Pennsylvania Corporation, and Russell Morrison d/b/a/ Alpha Professional, vs. Bostic, Inc., Third-Party Defendant In the Circuit Court of Kanawha County, West Virginia (Supported Plaintiffs)	Exposure to MDI	WV Workers' Compensation Office of Judges Decision of Reversal in Favor of Plaintiffs 12/19/2014 Negotiated Settlement 05/2016	BUC-13-001 Case No.: 14-C-106	2013-2016
Mr. Brian E. Fritz Saltz, Mongeluzzi, Barrett & Bendesky, P.C. One Liberty Place, 52nd Floor Philadelphia, PA 19103	Plaintiff(s): John and Jacquelyn Coen, Husband and Wife Defendant(s): Carboline Co., RPM, et al. Philadelphia County Court of Common Pleas Law Division (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 11/2013	SMBB-13-002 Case No.: 1714	2013
Ms. Jo Anna Pollock Simmons Attorneys At Law 707 Berkshire Blvd. P.O. Box 521 East Alton, IL 62024	Plaintiff(s): Bridgeton Class Action – Marsha Buck, Troy Lewis, Jean Lewis, Mike Head and Janet Head, individually and on behalf of all others similarly situated. Defendant(s): Republic Services, Inc., Allied Services LLC d/b/a Republic Services of Bridgeton, Bridgeton Landfill, LLC In the United States District Court Eastern District of Missouri. (Supported Plaintiffs)	Benzene Exposure Deposed by Defendant(s) 10/30/2013	Negotiated Settlement 2013	SIM-13-002 Case No.: 13-CV-00801	2013
Mr. Douglas J. May Travelers Staff Counsel 625 Eden Parkway, Suite 510 Cincinnati, OH 45202	Plaintiff(s): Arshot Investment Corporation, et al. Defendant(s): E.V. Bishoff Company, et al. In the Court of Common Pleas Franklin County, OH (Supported Defendant – Mason)	Brick Veneer Failure Structural at Hampton Inn, Columbus, OH Site visit and Expert Report	Negotiated Settlement 2/2014	TRA-13-001 Case No.: 12CV-10-12920	2013-2014
Mr. John Vincent	Plaintiff(s): Tutor Time 123 LLC	HVAC Failure	Settled 2013	WES-13-001	2013

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ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Weston Hurd LLP 10 W. Broad St., Suite 400 Columbus, OH 43215	Defendant(s): Air Force One, Inc. Pre-Lawsuit (Supporting Defendant)	Claimed Site Visit and Expert Report		Claim #: NR-CMM-6050718-110913-A	
Mr. Andrew DuPont Locks Law Firm 1500 Walnut Street, 20th Floor Philadelphia, PA 19102	Plaintiff(s): David A. Johnson and Laura Johnson Defendant(s): Armored Autogroup, Inc. d/b/a STP; Berryman Products, Inc.; CRC Industries, Inc., Loctite Corporation n/k/a Henkel Corporation; Illinois Tool Works, Inc., solely as successor-in-interest to Permatex, Inc.; Radiator Specialty Company; United States Steel Corporation, Safety-Kleen Corp., Safety-Kleen Systems, Inc., 3M Company; Texaco, Inc.; Chevron U.S.A., Inc., Individually and Successor in Interest to Texaco, Inc., Justice Brothers, Inc.; Genuine Parts Company; Henkel Corporation Individually and as Successor in Interest to Loctite Corporation and Henkel Loctite Corporation; Sunoco, Inc. (R&M); Volvo Cars, etc. In the Superior Court of the State of California for the County of Alameda (Supported Plaintiffs)	Benzene Exposure Deposed by Defendant(s) 3/21/2014; 4/8/2014; 4/24/2014	Negotiated Settlement 6/2014 Re-opened 2016 and re-settled 9/2016	LOC-13-001 Case No.: 001641 A142485 In the Court of Appeal of the State of California, First Appellate District	2013-2016
Mr. Andrew DuPont Locks Law Firm 1500 Walnut Street, 20th Floor Philadelphia, PA 19102	Plaintiff(s): David Butler and Teri Rhodes Defendant(s): Sunoco, Inc. (R&M) FKA Sun Company, Inc. FKA Sun Oil Company; United States Steel Company; and Radiator Specialty Company. In the Court of Common Pleas of Philadelphia County, Pennsylvania Civil Division (Supported Plaintiffs)	Benzene Exposure	Testified in Trial 7/29-30/2014 Decision in Favor of Defense 8/8/2014	LOC-13-001 Case No.: 001641	2013-2014
Mr. Thomas E. Schwartz Holloran White & Schwartz, LLP 2000 South 8th Street St. Louis, MO 63104	Plaintiff(s): Elroy Buyat, Jr. Defendant(s): Mallinckrodt, Inc., Covidien, Inc., Safety-Kleen Systems, Inc., Heritage-Crystal Clean, LLC., and Engineered Lubricants, Co In the Circuit Court of St. Louis County, State of Missouri (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 2014	HOL-13-001 Case No.: 1122-CC00786	2013-2014
Mr. Andrew DuPont Locks Law Firm 1500 Walnut Street, 20th Floor Philadelphia, PA 19102	Plaintiff(s): Layne Kleinschmit and Cynthia Kleinschmit Defendant(s): 3M Company; Berryman Products, Inc.; The Blaster Corporation, CRC Industries, Inc., Genuine Parts Company, d/b/a NAPA; Henkel Corporation, individually and as successor in interest to Loctite Corporation and Henkel Locktite Corporation; Loctite Corporation n/k/a Henkel Corporation; Illinois Tool Works, Inc., d/b/a Permatex and	Benzene Exposure	Negotiated Settlement 06/2015	LOC-14-001 Case No. VC060106	2013-2015

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	d/b/a Gumout and d/b/a LPS Laboratories and d/b/a Wynn's.; The Pep Boys – Manny, Moe & Jack; Radiator Specialty Company; Safety-Kleen Corporation, Safety-Kleen Systems, Inc., Sunoco, Inc. (R&M) f/k/a Sun Company, Inc. and f/k/a Sun Oil Company, Inc., Technical Chemical Company; and United States Steel Corporation In the Court of Common Pleas, Philadelphia County (Supporting Plaintiffs)				
Mr. Mark R. Staun The Segal Law Firm 810 Kanawha Boulevard, East Charleston, West Virginia 25301	Plaintiff(s): Steve Ansell Defendant(s): EXXON MOBIL CORPORATION, a New Jersey corporation; SAFETY-KLEEN SYSTEMS, INC., a Wisconsin corporation; RADIATOR SPECIALTY COMPANY, a North Carolina corporation; CRC INDUSTRIES, INC., a Pennsylvania corporation; WEST VIRGINIA, DEPARTMENT OF TRANSPORTATION, DIVISION OF HIGHWAYS, an agency of the State of West Virginia; NAZDAR COMPANY, Individually and as Successor-by-Acquisition/Merger to ADVANCE PROCESS SUPPLY CO., an Illinois corporation; ADVANCE PROCESS SUPPLY CO., an Illinois corporation; 3M COMPANY, a Delaware corporation; FUJIFILM NORTH AMERICA CORPORATION, as Successor-by Merger to FUJIFILM SERICOL U.S.A., INC., as Successor-by-Merger to SERICOL, INC., a New York corporation; UNCOMMON CONGLOMERATES, INC., a Division of CYBERBOND, LLC, a Delaware limited liability company Circuit Court of Marshall County, West Virginia (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 2015	SEG-13-001 Case No.: 13-C-119K	2013-2015
Mr. John Vincent Weston Hurd LLP 10 W. Broad St., Suite 400 Columbus, OH 43215	Plaintiff(s): Mercer Square, LLC Defendant(s): Preferred Real Estate Pre-Suite Inspection and Report (Supported Defendant)	Fire Suppression System Freeze Failure Jack Nicklaus Villa – 18th Green – Muirfield Village, Dublin, OH	Negotiated Settlement 2014	WES-14-001	2014
Mr. Darren Brown Provost Umphrey 490 Park Street Beaumont, TX 77704	Plaintiff(s): Carl Nolan Smith, III Defendant(s): Chevron U.S.A., Inc.; Chevron Chemical Company, LLC; ExxonMobil Oil Corporation; Texaco, Inc.; Atlantic Richfield Company; BP Amoco Chemical Company; BP Products North America, Inc.; Canadianoxy Offshore Production Co.; ConocoPhillips Company; Total Petrochemicals USA, Inc.; Union Oil Company of California; and Huntsman Petrochemical, Inc. 14th Judicial District Court, Parish of Calcasieu, State of Louisiana	Benzene Exposure	Negotiated Settlement 10/2014	PRO-14-001 Cause No.: 2012-5290A	2014

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	(Supported Plaintiff)				
Mr. Robert Black Black Law, PC The Lyric Centre 440 Louisiana, Suite 2400 Houston, Texas 77002	Plaintiff(s): Joseph Dwayne Meeks and Jane Meeks Defendant(s): Ace Hardware, British Petroleum (BP); E.I. du Pont de Nemours and Company (DuPont), Pittsburg Paint Glass (PPG), Savogran; Shell Oil Company (Shell); Sherwin-Williams Company (S-W), W.M. Barr & Company (WM Barr), and US Steel Company. Galveston County, Texas – 122nd District Court (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 09/2015	BLA-14-001 Cause No.: 14-CV-1044	2014-2015
Mr. Scott R. Frieling Allen Stewart, P.C. 325 N. St. Paul St., Ste. 2750 Dallas, TX 75201	Plaintiff(s): Thomas Koenig and Rebecca Koenig Defendant(s): Ashland, Inc., BASF Corporation, Dow Chemical Company, Dynabrade, Inc., E.I. DuPont de Nemours & Co., Egyptian Lacquer Manufacturing Company, Inc., GE Betz, Inc., Henkel Corporation, NB Coatings, Inc., Zinsser Co., Inc. as successor to Parks Corporation, Plastic Process Equipment, Inc., Rohm & Hass Company, Worwag Coatings, LLC. In the Court of Common Pleas, Philadelphia County, PA (Supporting Plaintiff)	Benzene Exposure	Negotiated Settlement 04/2015	ALL-14-001 Cause No.: 12-12-03188	2014-2015
Mr. Scott R. Frieling Allen Stewart, P.C. 325 N. St. Paul St., Ste. 2750 Dallas, TX 75201	Plaintiff(s): Jerri A. Rowan Defendant(s): Sherwin-Williams, Inc., Columbia Forest Products, Inc., Futch Lumber, FTL Properties of Delaware, LLC, Baer Wurth, Aetna, Charter Industries, Temple-Inland, Inc., Tamarac Distributors, Charles F. Shiels, Bluelinx, Flagg, ATC Panels, Inc., Georgia Pacific Wood Products, Weyerhaeuser, Jeld-Wen, Inc., Custom Plywood, Rugby, Inc., Distributor Service, Inc., In the Court of Common Pleas, Cuyahoga County, OH (Supporting Plaintiff)	Benzene Exposure	Negotiated Settlement 01/2015	ALL-14-002 Cause No.: CV 13 813181	2014-2015
Mr. Peter Alfert Hinton Alfert & Kahn LLP 200 Pringle Ave., Suite 450 Walnut Creek, CA 94596	Plaintiff(s): Gavin Kirk, a minor by and through his guardian ad litem Stephen Tobin Kirk, Sarah Kirk, and Stephen Tobin Kirk individuals, Ryan Goode, a minor by and through his guardian ad litem James Goode, Jaqueline Goode and James Goode individuals Defendant(s): Varco International, Inc., Varco Heat Treating Company, Varco Oil Tools, National Oil Well Varco, Plazamerica Inc., Plaza National Real Estate, Inc., Plaza Atrium, Inc., Leed Plaza Atrium, LLC., successor in interest to Plazamerica, Inc., Leed Properties, Cove Properties, Inc., Cove Development Co., Cove Builders, Inc., County of Orange, and Does 1 through 200, inclusive.	Soil/Gas Exposure Deposed by Defendant(s) 07/31/ 2015	Negotiated Settlement 02/2016	HIN-14-001 Cause No.: 30-2010-00423097 & 30-2011-00512364 Consolidated	2014-2016

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ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	In the Superior Court of the State of California, for the County of Orange (Supporting Plaintiffs)				
Mr. Timothy O'Brien Levin Papantonio 316 S. Baylen St.., #600 Pensacola, FL 32502 Mr. Robert Bilott Taft Stettinius & Hollister LLP 425 Walnut Street, Suite 1800 Cincinnati, OH 45202 Mr. Richard Schulte Wright & Schulte 812 E. National Road Vandalia, OH 45377	Plaintiff(s): C-8 Class Action Defendant(s): DuPont de Nemours United States District Court Southern District of Ohio – Eastern Division (Supporting Plaintiffs)	Exposure to C-8 Deposed by Defendant(s) 03/30/2015 Daubert Challenge by Defendant(s) – Denied August 6, 2015	Case 1 Bartlett - Testified in Trial 09/21, 22, 23/2015 Case 1 Decision in favor of Plaintiff Carla Bartlett 10/7/2015 Case 2 Freeman – Testified in Trial 06/10, 13, 14, 15/2016 Case 2 Decision in favor of Plaintiff David Freeman 07/08/2016 Case 3 Vigneron – Testified in Trial 12/1 & 5/2016 Case 3 Decision in favor of Plaintiff Keith Vigneron 01/05/2017 Case 4 Moody – 01/30, 31, and 02/ 1/2017 Case 4 Larry Moody - Part of Class Action Negotiated Settlement of 900 Million +	WRI-14-001	2014-2017

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ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
			02/13/2017		
Mr. Emmett McGowan Nelson Brown & Co. 518 Township Line Road, Suite 300 Blue Bell, PA 19422	Plaintiff(s): Alva & Fern Hoopengardner Defendant(s): Meridian Citizens Mutual Insurance Company United States District Court Eastern District of Pennsylvania (Supported Defendant)	Indoor Air Quality (IAQ)	Negotiated Settlement 2014	NEL-14-001 Cause No.: 2:13-cv-07485-PD	2014
Mr. Scott R. Frieling Allen Stewart, P.C. 325 N. St. Paul St., Ste. 2750 Dallas, TX 75201	Plaintiff(s): Wade Wesley Wiederhold Defendant(s): Safety Kleen, Corp., Safety Kleen Systems, Inc., Rust-Oleum Corp., Berryman Products, Inc., ITW Permatex, a Division of Illinois Tool Works, Inc., The Valspar Corporation, Henkel Corporation, Deere & Company, Gold Eagle Co., The Sherwin-Williams Company, Apollo Industries, Inc., Claire-Sprayway, Inc., and Ozark Kenworth, Inc. In the Circuit Court of Jackson County, Missouri 2 at Independence (Supported Plaintiff)	Benzene Exposure Deposed by Defendant(s) 10/22/2015	Testified in Trial on 06/21/2016 Decision in favor of Defendant 07/2016	ALL-14-002 Case No.: 1316-CV13192	2014-2016
Mr. Andrew DuPont Locks Law Firm 1500 Walnut Street, 20th Floor Philadelphia, PA 19102	Plaintiff(s): Louis Arthur DeSorbo Defendant(s): United States Steel Corporation; Sunoco, Inc. (R&M) f/k/a Sun Company, Inc. and f/k/a Sun Oil Company, Inc.; 3M Company; Rogersol, Inc., Rycoline Products, Inc., a Division of Sun Chemical Commercial Group a/k/a Rycoline Products, LLC and Successor to Rogersol, Inc.; Sun Chemical Corporation, Individually and a Parent and Successor to Rycoline Products, LLC, a/k/a Rycoline Products, Inc. and Successor to Rogersol, Inc.; Van Son Holland Ink Corporation of American; Varn International, d/b/a Varn Products Company; Day International, Inc., Individually and as Successor to and d/b/a Varn Products Company; Printers Service d/b/a Prisco; Deleet Merchandizing Corporation; Cabrun Ink Products, Corporation; Handschy Industries, LLC; Chevron USA, Inc. Individually and as Successor In Interest to Unocal Corporation and its Subsidiaries; Philips Electronics North America Corporation d/b/a and a Parent and Successor In Interest .H. Agriculture and Nutrition, Inc. and Thompson-Hayward Chemical Company; Emco Chemical Distributors, Inc.; PPG Industries, Inc.; Shell Oil Company; Shell Oil Products US, INC.; Fisher Scientific International, Incorporated; Mallinckrodt Baker, Incorporated, Individually and as Successor In Interest to J.T. Baker, Incorporated; Total Petrochemicals & Refining USA, Incorporated, Individually and as Successor In Interest to American	Benzene Exposure	Testified in Trial 02/10/2016 Decision in Favor of Plaintiff 02/2016	LOC-14-002 Cause No. 003450	2014-2016

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ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	Petrofina, Inc. Total Plaza a/k/a FINA, Inc., Cosden Oil Company, Graphic Packaging International, Inc. Individually and Successor in Interest to Handschy Industries, LLC.; Anchor/Lith-Kem-Ko, Incorporated, a Subsidiary of FugiFilm Hunt Chemicals USA, Incorporated; FugiFilm Hunt Chemicals USA, Incorporated, d/b/a and Parent and Successor to Anchor/Lith-Kem-Ko, Incorporated; Sinclair & Valentine Company, Incorporated; Hurst Chemical Company; Gans Ink & Supply Company, Incorporated; Spinks Ink Company, Incorporated; Flint Ink Corporation; et al. In the Court of Common Pleas, Philadelphia County, Pennsylvania (Supported Plaintiff)				
Allen Stewart Stephanie Sherman 325 N. St. Paul St., Suite 2750 Dallas, TX 75201	Plaintiff(s): Christopher Lightfoot Defendant(s): Georgia-Pacific Wood Products LLC, Georgia-Pacific, LLC, individually and as successor-in-interest to Georgia-Pacific Corporation, Weyerhaeuser Company, Weyerhaeuser NR Company, Lowes Home Centers, LLC (NC), and John Doe 1 State Court of Fulton County, GA (Supported Plaintiff)	Wood Dust Exposure	Negotiated Settlement 2016	ALL-15-001 Cause No.: 01960	2015-2016
Mr. Darren Brown Provost Humphrey P.O. Box 4905 Beaumont, Texas 77704	Plaintiff(s): Cathy Withers Defendant(s): Chevron U.S.A., Texaco, Inc., Union Oil Company of California, Alon USA, LP, Anadarko E & P Onshore, LLC, ConcoPhillips Company, ExxonMobil Oil Corporation, PB Amoco Chemical Company, BP Products North America, Inc., Canadianoxy Offshore Production Company, Citgo Petroleum Corporation, Delek Logistics Operating, LLC, Total Petrochemicals & Refining, USA,, Inc., El Paso Energy E.S.T. Company, El Paso Natural Gas Company, LLC, Enbridge Marketing LLC, Targa Resources, Axiall Georgia Gulf Corp., Hunt Oil Company, et al. In the 14th Judicial District Court for the Parish of Calcasieu, State of Louisiana, Division "D"	Benzene Exposure	Negotiated Settlement 12/2016	PRO-15-001 Cause No.: 2013-3723	2015-2016
Kohrman Jackson & Krantz Ms. Heather Zilka 10 West Broad Street, Suite 1900 Columbus, OH 43215	Plaintiff(s): Mary Christian Defendant(s): Lawrence Water, et al. Lawrence County Common Pleas, Ohio (Supported Defendant)	Structural Damage from Water Leak	Negotiated Settlement 10/2016	KJK (SMI)-15-001 Cause No.: 14 OC 739	2015-2016
Mr. Everett Day Black Law, PC The Lyric Centre	Plaintiff(s): Yomanoh Akpobo Defendant(s): Ross Dress for Less, Inc., Houston, TX	Slip & Fall	Negotiated Settlement 07/2017	BLA-15-001 Cause No.: 01-	2015-2017

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
440 Louisiana, Suite 2400 Houston, Texas 77002	American Arbitration Association Arbitration Proceedings – Employment Arbitration (Supported Plaintiff)			15-0005-2333	
Mr. John E. Tomlinson Beasley, Allen, Crow, Methvin, Portis & Miles, P.C. 218 Commerce Street Montgomery, AL 36104	Plaintiff(s): Sheila D. Keenum, Individually, and as Personal Representative of the Estate of Wendell Joe Keenum, deceased Defendant(s): E. I. du Pont de Nemours and Company; PPG Industries, Inc.; SEM Products, Inc.; The Valspar Corporation; Rust-Oleum Corporation; O'Reilly; Automotive Stores, Inc.; R. & R. Bumper & Body Supply, Inc.; Detail Supply, LLC; Sam T. Carter Oil Company, Inc.; The Sherwin-Williams Company; Hunt Refining Company; One Shot LLC; Cumberland Products Incorporated; Powers Paper Company, and Fictitious Defendant(s) 1 through 100. In the Circuit Court of Colbert County, Alabama. (Supported Plaintiff)	Exposure to Paint Products Deposed by Defendant(s) 09/30/2020	Negotiated Settlement 5/9/2023	BEA-16-001 Case #: 20-CV-2016-900050.	2016-2023
Mr. Chris Heavens Heavens Law Firm PLLC 2438 Kanawha Blvd., East Charleston, WV 25311	Plaintiff(s): Dominick Hall Defendant(s): Silicon Processors, Inc. In the Circuit Court of Wood County, WV (Supported Plaintiff)	Personal Injury Deposed by Defendant(s) 08/09/2017	Negotiated Settlement 10/2017	HEA-15-001 Case No: 15-C-471	2015-2017
Mr. Andrew Lipton Hobson & Bradley 2190 Harrison Beaumont, TX 77701	Plaintiff(s): Herbert C. Cowart Defendant(s): ExxonMobil, Hess, Chevron/Texaco, Keystone Shipping, ConocoPhillips, Canadianoxy Offshore Production Company, Coastal Fuels Marketing Company, Shell Oil Company, Union Carbide Corporation, Signet Maritime Corporation, Kirby Inland Marine, LP, BP Products North America, Marathon Oil Company 14th Judicial District Court, Parish of Calcasieu, State of Louisiana, Division E (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 07/2017	HOB-16-001 Cause No.: 2004-3133	2016-2017
Ms. Jo Anna Pollock The Simmons Firm One Court Street Alton, IL 62002	Plaintiff(s): Gerald Dean Maberry Defendant(s): Shell Oil Company, Equilon Enterprises, LLC, d/b/a Shell Oil Products, US; ConocoPhillips Company; WRB Refining LP; ConocoPhillips WRB Partner LLC; Cenovus GPCO LLC; and, BP Products North America, Inc. In the Circuit Court for the Third Judicial Circuit, Madison County, IL (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 09/2016	SIM-16-001 Case No.: 15-L-1193	2016
Mr. Robert Black Black Law, PC	Plaintiff(s): Gregory A. Justice et al.	Benzene Exposure	Negotiated Settlement	BLA-16-001	2016-2017

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
The Lyric Centre 440 Louisiana, Suite 2400 Houston, Texas 77002	Defendant(s): Radiator Specialty (DuPont), Savogran; Shell Oil Company (Shell); Sherwin-Williams Company (S-W), W.M. Barr & Company (WM Barr), and US Steel Company In the District Court of Galveston County, TX – 112nd Judicial District (Supported Plaintiffs)		02/2017	Cause No.: 15-CV-0907	
Mr. Robert Black Black Law, PC The Lyric Centre 440 Louisiana, Suite 2400 Houston, Texas	Plaintiff(s): Nin Koy Defendant(s): Steel Masters, LP, Steel Masters-GP LLC, and J.T. Vaughn Construction, LLC. In the District Court of Harris County, TX – 190th Judicial District (Supported Plaintiff)	Personal Injury - Finger Amputation	Negotiated Settlement 10/2016	BLA-16-002 Civil Cause No: 2015-01-01775	2016
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Lee D. Tanked, Jr. and Cheryl Tankard, his wife. Defendant(s): Advance Auto Parts, Inc.; A.E. Loftes, Co., f/k/a Carquest Auto Parts #1, Inc. d.b.a. Carquest Store #2856; CQ Sourcing, Inc.; Walker Automotive Supply, Inc.; Safety-Kleen Systems, Inc.; CRC Industries, Inc.; 3m Company; and The B'Laster Corporation. In the General Court of Justice, Superior Court Division State of North Carolina, Wake County (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 02-01-2020	HAR-16-002 Civil Cause: 16-CVS-2949	2016-2020
Mr. David J. Carney Anapol Weiss One Logan Square 130 N. 18th St. Suite 1600 Philadelphia, PA 19103	Plaintiff(s): David S. Garrison and Laura Timmes-Garrison Defendant(s): Smiths Group, PLC; Saint-Gobain North America, d/b/a Saint-Gobain Performance Plastic Corporation, successor in interest to CHR Industries, Inc., and Dixon Industries Corporation, successor in interest to Penntube Plastics; Compressor Products International, LLC, successor in interest to Plastomer Products; Quaker City Chemicals, Inc.; Exxon Mobil Corporation; E.I DuPont de Nemours and Company, Inc. and W.N. Stevenson, Company Philadelphia County Court of Common Pleas, PA (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 03/2018	ANA-16-001 Case No.: 001960	2016-2018
Mr. Chris Heavens Heavens Law Firm PLLC 2438 Kanawha Blvd., East Charleston, WV 25311	Plaintiff(s): Walter H. Jones, Jr. Defendant(s): Family Handyman Services of Barboursville, LLC, George E. Linkous, individually and as owner of Family Handyman Services of Barboursville, LLC, and Absolut Roofing, LLC In the Circuit Court of Kanawha County, WV (Supported Plaintiff)	Personal Injury – Fall from Roof	Negotiated Settlement 10/2017	HEA-16-001 Case No.: 15-C-2059	2016-2017

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Mr. Chris Heavens Heavens Law Firm PLLC 2438 Kanawha Blvd., East Charleston, WV 25311	Plaintiff(s): Paul Michalec and Jennifer Michalec Defendant(s): American Supply Company, Inc. In the Court of Common Pleas, Philadelphia County, PA (Supported Plaintiffs)	Personal Injury – Loading Dock Injury	Testified in Trial 07/07/2017 Decision by Jury for the Plaintiffs $573,000 07/17/2017	HEA-16-003 Civil Cause No. 000893	2016-2017
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Mark A. Fitzpatrick and James Parrish and Monica Parrish, his wife Defendant(s): SAL Chemical Co., Inc., an Ohio Corporation, Chemical Solvents, Inc. an Ohio Corporation, Ball Aerosol and Specialty Containers Inc, f/k/a United States Can Company, an Indiana Corporation, Mall Metal Food Container, LLC f/k/a Ball Metal Food Container Corp., a Delaware LLC. In the Circuit Court of Brooke County, West Virginia (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 01/2018	HAR-16-002 Case No,: 14-C-74	2016-2018
Mr. Chris Heavens Heavens Law Firm PLLC 2438 Kanawha Blvd., East Charleston, WV 25311	Plaintiff(s): Heckler Defendant(s): Ricottilli Lumber Company, Inc. Pre-Lawsuit (Supported Plaintiff)	Personal Injury – Sawmill Operations Accident	Cancelled	HEA-16-005	2016-2017
Mr. John (Rett) Guerry III Motley Rice LLC 28 Brigeside Blvd. Mt. Pleasant, SC 29464	Plaintiff(s): Jack S. Edison Defendant(s): CSX Transportation, Inc., individually and as successor-in-interest to Louisville & Nashville Railroad Company In the Circuit Court of Hamilton County, Tennessee (Supported Plaintiff)	Diesel fuel & Exhaust	Negotiated Settlement 08/2017	MOT-16-003 Case No.: 15-C-1407, Division 2	2016-2017
Ms. Jo Anna Pollock Simmons Hanly Conroy One Court Street Alton, IL 62002	Plaintiff(s): Joan Green, on behalf of the Estate of Thomas Albert Green, Deceased Defendant(s): 3M Company, Apex Oil Company, Inc., Clark Oil & Refining Corporation, Premcor Refining Group, Inc., Radiator Specialty Company, Safety-Kleen Corporation, Safety-Kleen Systems, Inc., Turtle Wax, Inc., United States Steel Corporation, et al In the Circuit Court Third Judicial Circuit, Madison County, Illinois (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 10/31/2018	16-004 Case No.: 15-L-1418	2016-Present
Mr. David J. Carney Anapol Weiss One Logan Square 130 N. 18th St.	Plaintiff(s): Jean Nelson, Executrix of the Estate of Charles Nelson, III, Deceased	Benzene Exposure Deposed on	Negotiated Settlement 2018	ANA-16-002 Case No.: 2:16-	2016-Present

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Engineering & Expert Services, Inc.© 420 April 6, 2026
Petty Expert Report – CeramFab and WYG Plaintiffs - NS Train Derailment in East Palestine, OH

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Suite 1600 Philadelphia, PA 19103	Defendant(s): BP Products North America, Inc. individually and as successor in interest to the Standard Oil Company d/b/a SOHIO In the United States District Court for the Eastern District of Pennsylvania (Supported Plaintiff)	06/28/2018		CV-04888-JP	
Mr. John (Rett) Guerry III Motley Rice LLC 28 Bridgeside Blvd. Mt. Pleasant, SC 29464	Plaintiff(s): Jesse D. Roop Defendant(s): CSX Transportation, Inc., Individually and as Successor-in-Interest to Seaboard System Railroad, Seaboard Coast Line Railroad, Seaboard Air Line Railroad and Atlantic Coast Line Railroad State Court of Chatham County, Georgia (Supported Plaintiff)	Diesel Fuel & Exhaust/Benzene Deposed on 06/06/2019 Daubert Hearing 6/6/2020 – Motion Denied	Loss Summary Judgment 06/2020	MOT-16-001 Case No. STCV1600137 SA	2016-2020
Mr. Colin King Dewsnup King & Olsen Law 36 South State Street, Suite 2400 Salt Lake City, UT 84111-0024	Plaintiff(s): Allan Flandro Defendant(s): Chevron Pipe Line Company, a Delaware Corporation; PacifiCorp, an Oregon Corporation dba Rocky Mountain Power; and Corporation of the President of the of the Church of Jesus Christ of Latter-Day Saints. Third Judicial District Court, Salt Lake County, Utah (Supported Plaintiff)	Chemical Exposure	Negotiated Settlement 03-01-2021	DEW-16-001 Case No. 1809005235	2016-2021
Mr. David J. Carney Anapol Weiss One Logan Square 130 N. 18th St. Suite 1600 Philadelphia, PA 19103	Plaintiff(s): James R. Meyer (deceased) and Jeanette Meyer Defendant(s): Atlantic Richfield Company, BP Products North American, Inc., Chevron USA Inc. f/k/a Gulf Oil Corporation, Hess Corporation, ExxonMobil Oil Corporation, Sun Oil Company d/b/a Sunoco Incorporated, Exelon Corporation as parent to Philadelphia Electric Company, Philadelphia Gas Workers, Arcelormittal USA, LLC, United States Steel Corporation, Rohm & Haas Company, J.J. White Incorporated, Nooter Construction Company, Frank Lill & Son, Incorporated, United States Services Group, and Foster Wheeler Zack, Inc. Court of Common Pleas Philadelphia County, PA, Civil Division Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 01/2018	ANA-16-002 Case No. 15-07 -02328	2017-2018
Mr. Guy Bucci Bucci Bailey & Javins LC 112 Capitol Hill, Suite 200 Charleston, WV 25301	Plaintiff(s): Jo Ann Gore Defendant(s): The Kroger Company, an Ohio Corporation United States District Court for the Southern District of West Virginia at Charleston (Supported Plaintiff)	Personal Injury – Fall in Store	Negotiated Settlement 07/2017	BUC-17-001 Civil Action No.: 2:16-cv-09223	2017
Mr. Robert Black Black Law, PC The Lyric Centre	Plaintiff(s): Leo Lippold and Stacy Lippold Individually, and as next friends for XXXXX XXXXXXX, a Minor Defendant(s): A-Pro Top Construction, RRE Armand Place	Personal Injury – Pool Fence Injury to Child – Spike Through	Negotiated Settlement 10/2017	BLA-17-001 Cause No.:	2017

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
440 Louisiana, Suite 2400 Houston, Texas	Holding, LLC and Resource Real Estate Management Company In The District Court of Harris County, Texas 152nd Judicial District. (Supported Plaintiffs)	Neck		2016-11087	
Mr. Brian Fritz Fritz Goldenberg & Bianculli 1515 Market Street, Suite 705 Philadelphia, PA 19102	Plaintiff(s): Thomas Timlin and Wendy Timlin, H/W Defendant(s): BP America, Inc., a/k/a BP Corporation, a/t/a Tosco, Sunoco, Inc. (R&M); Sunoco Partners Marketing and Terminals, LP; Sunoco Logistics Partners, LP; Sunoco Partners, LLC; Sunoco Chemicals, Inc.; Conoco Phillips; Phillips Petroleum Company; Chevron U.S.A, Inc.; Chevron Corporation; Braskem American, Inc.; Braskem S/A; Philadelphia Energy Solutions, LLC; Philadelphia Energy Solutions Refining & Marketing, LLC; Energy Transfer Partners GP, LP; Energy Transfer Partners, LLC; Energy Transfer Partners GP, LP; Citrus Corporation; Kinder Morgan, Inc., The Carlyle Group, LP; Carlyle Management Group Partners, LP; Carlyle Group Management, LLC; Epsilon Products Company, LLC; Honeywell, Inc.; Honeywell International, Inc.; Monroe Energy, LLC; Monroe Energy a/k/a MIPC, LLC, and/or MIPC, LLC. Court of Common Pleas Philadelphia County, PA (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 02/2018	FRI-17-001 Case No.: 15-06-062709 Docket No.: 004033	2017-2018
Mr. Chris Heavens Heavens Law Firm PLLC 2438 Kanawha Blvd., East Charleston, WV 25311	Plaintiff(s): Darrell Fint Defendant(s): Brayman Construction, a Foreign Corporation In the United States District Court for the Southern District of West Virginia (Supported Plaintiff)	Personal Injury	Negotiated Settlement 04/2019	HEA-17-001 Civil Action No. 5:17-CV-04043	2017-2019
Mr. Andrew Lipton Hobson & Bradley 2190 Harrison Beaumont, TX 77701	Plaintiff(s): Arthur Whitfield Defendant(s): Alaska Tanker Company; Alyeska Pipeline Service Company; BP American Inc.; BP Amoco Chemical Company; BP Corporation North America, Inc.; BP Pipelines (Alaska), Inc.; BP Pipelines (North America), Inc.; BP Products North America, Inc.; Chevron Corporation, individually and as successor to Union Oil Company of California (Unocal) and Unocal Pipeline Company; Chevron USA, Inc.; ConocoPhillips Alaska, Inc.; ConocoPhillips Company; ConocoPhillips Transportation Alaska, Inc.; Crowley Marine Services, Inc., individually and as successor to Marine Transport Lines; Crawley Maritime Corporation, individually and as successor to Marine Transport Lines; Hess Corporation; Keystone Shipping Company, individually and successor to Shipco 669 Inc. and Shipco 2296 Inc.; Marine Transport Lines, Inc.; Petro-Diamond, Inc.; Petro-Diamond Terminal Company; Phillips 66 Company; Phillips	Benzene Exposure	Negotiated Settlement 4/2018	HOB-17-001 Cause No: E-198,379	2017-2018

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	66 Pipeline, LLC; and Shell Chemical, LP. In the District Court of Jefferson County, TX, 172nd Judicial District (Supported Plaintiff)				
Mr. Todd McPharlin Kelley Uustal 500 N. Federal Highway, Suite 200 Fort Lauderdale, FL 33301	Plaintiff(s): Polly O'Hara Defendant(s): HomeGoods, Inc. and Martha Prophete In the Circuit Court of the 17th Judicial Circuit in and for Broward County, Florida (Supported Plaintiff)	The standard of care required to protect workers and customers. Deposed on 04/12/2017	Negotiated Settlement 05/2018	KEL-17-001 Case No.: CACE16-007612	2017-2018
Mr. Craig Harris Trentalange & Kelley, P.A. 218 N. Dale Mabry Highway Tampa, FL 33609	Plaintiff(s): James R. Barber Defendant(s): Precision Shooting Equipment, Inc. In the Circuit Court of the Thirteenth Judicial Circuit in and for Hillsborough County, Florida (Supported Plaintiff)	PSE TAC Elite Crossbow Failure Deposed on 06/30/2017	Negotiated Settlement 05/2018	TRE-17-001 Case No. 2016-CA-005728-G	2017-2018
Mr. John (Rett) Guerry III Motley Rice LLC 28 Bridgeside Blvd. Mt. Pleasant, SC 29464	Plaintiff(s): Judith Rosser, Individually and as Executrix of the Estate of Hayden Eugene Rosser, Dec Defendant(s): Norfolk Southern Railway Company, Individually and as Successor to Southern Railway Company, A Virginia Corporation In the United States District Court for the Middle District, North Carolina	Diesel Fuel & Exhaust and Benzene Deposed on 11/28/2017	Negotiated Settlement 05/2018	MOT-17-003 Case No.: 1: 16-CV-4-01	2017-2018
Mr. Guy Bucci Hendrickson & Long PLLC 112 Capitol Hill, Suite 200 Charleston, WV 25301	Plaintiff(s): Cantrell Defendant(s): STAT Pre-Lawsuit (Supported Plaintiff)	Personal Injury (Slip, Trip and Fall) Prepared Report	Negotiated Settlement 10/2018	HEN-17-002	2017-2018
Mr. Brian Madden Wagstaff & Cartmell, LLP 4740 Grand Avenue, Suite 300 Kansas City, MO 64112	Plaintiff(s): Mary Johnson et al. Defendant(s): Zill, LLC; MHS Environmental, Inc., et al. & The City of Kansas City, MO; The Kansas City Public Schools USD 33 a/k/a Kansas Public Schools, Land Bank of Kansas City Missouri, Brandon Dixon and Tiara Dixon, Inner City Oil Company, Inc. and Renee Wiggs and Bill Wiggs (third-party Defendant(s)) In The Circuit Court of Jackson County, Missouri at Kansas City (Supported Plaintiff)	Petroleum Contamination at/near Home Deposed on 12/06/2017	Negotiated Settlement 10/2018	WAG-17-001 Case No.: 1616-CV01151	2017-2018
Mr. Lon Walters The City Market 23A East Third Street Kansas City, MO 64106	Plaintiff(s): James Petrechko Defendant(s): BP Corporation North America Inc. and BP Products North America Inc. – Former American Oil Company (AMOCO) Site In the Circuit Court of Jackson County, Missouri at	Benzene Exposure Deposed on 1/10/2018	Negotiated Settlement 03/2018	WAL-17-001 Case No.: 1616-CV26094	2017-2018

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	Independence (Supported Plaintiff)				
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Elijah P. Morris and Shirley J. Morris, his wife Defendant(s): Constellium Rolled Products Ravenswood, LLC, individually and as successor-in Interest to Kaiser Aluminum, Corporation, Ravenswood Aluminum Corporation, Century Aluminum Corporation of West Virginia, Inc., Pechiney Rolled Products, LLC, Alcan Rolled Products-Ravenswood, Rio Tinto Alcan, Inc., and Apollo Global Management, LLC, a Delaware Limited Liability Company et al. In the Circuit Court of Jackson West Virginia (Supported Plaintiffs)	Aromatic, Chlorinated, and Various Cutting Oils, Mists	Negotiated Settlement 2018	HAR-17-004 Civil Action No. 14-C-80	2017-2018
Mr. John (Rett) Guerry III Motley Rice LLC 28 Brigeside Blvd. Mt. Pleasant, SC 29464	Plaintiff(s): Wendy Smith, Individually and as Personal Representative for the Estate of Jeremy O. Smith, Deceased Defendant(s): CAN Holdings, Inc. et al. State of South Carolina, County of Spartanburg, Court of Common Pleas, Seventh Judicial Circuit (Supported Plaintiff)	Diesel Fuel & Exhaust/Benzene Deposed on 6/04/2019	Negotiated Settlement 08/2019	MOT-17-004 Case No.: 2017-CP-4202983	2017-2019
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Dora Carbajal de Vences and Jose Luis Vences Sotelo, her husband Defendant(s): MAAX US Corp., Individually and as Successor-in-Interest by Aker Plastics Co., Inc., a Delaware Corporation; AOC, LLC; Arkema, Inc.; Axson US, Inc.; CTG International; Edgemate, Inc.; Evonik Corp.; Illinois Tool Works, Inc.; Jotun Paints, Inc.; Jowat Corporation; The Matchless Metal Polish Company; Multi-Tech Products, LLC; Performance Mineral Corp.; Sasol Chemicals North America, LLC; TR Industries, LLC; 3M Company, Individually and as Successor-by-Merger for/to Bondo Company; US Compliance Corp. In the Circuit Court of Berkley County, West Virginia (Supported Plaintiffs)	Chemical Exposure Deposed 06/25-26, 2019	Negotiated Settlement 01/2020	HAR-17-002 Case No.: 17-C-98	2017-2020
Ms. Diana H. Crutchfield Berry, Kessler, Crutchfield, Taylor and Gordon 514 Seventh Street Moundsville, WV 26041 Mr. Guy Bucci Hendrickson & Long 214 Capitol Street Charleston, WV 25301	Plaintiff(s): Mr. Frank David Fullerton and Penny K. Fullerton Defendant(s): Bayer Corporation, an Indiana Corporation; Bayer MaterialScience, LLC, a Delaware Corporation; Covestro, LLC, a Delaware Corporation; Robert Baxter, Individually; Gary Durig, Individually; and Robert Greathouse, Individually Circuit Court of Marshall County, West Virginia (Supported Plaintiffs)	TDI Exposure Deposed on 06/13/2019	Negotiated Settlement 09/2020	BER-17-001 Civil Action No.: 11-C-197 K	2017-2020

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Ms. Jo Anna Pollock Simmons Hanly Conroy One Court Street Alton, IL 62002	Plaintiff(s): James Andrew Spalo, an individual; and Mary Spalo, an individual Defendant(s): Union Pacific Railroad Company, Safety-Kleen Corporation, and Safety-Kleen Systems, Inc., et al. In the Circuit Court of the First Judicial Circuit, Cook County, State of Illinois (Supported Plaintiffs)	RR Worker Deposed on 01/18/2019	Negotiated Settlement 02/2019	SIM-18-001 Case No.: 2017 L 3103	2018-2019
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Judy Caruthers, Individually and as Administratrix of the Estate of Johnny Caruthers, Deceased Defendant(s): 3M Company, a Delaware Corporation; Ashland, LLC, a Kentucky Corporation; B'Laster Corporation, an Ohio Corporation; Castle Product, Inc., a New York Corporation; CRC Industries, Inc., a Pennsylvania Corporation; Exxon Mobil Corporation, a New Jersey Corporation; General Truck Sales Corporation, a West Virginia Corporation; Genuine Parts Company, D/B/A NAPA Auto Parts, a Georgia Corporation; Henkel Corporation, a Delaware Corporation; ITW Polymers Sealants North America, Inc., D/B/A ITW Pro Brands and or LPS, a Texas Corporation; Oliver Fuels & Oils, Inc., a West Virginia Corporation; Radiator Specialty Company, a North Carolina Corporation; Safety-Kleen Systems, Inc., a Wisconsin Corporation; Shamrock Specialties, Inc., a Texas Corporation; Walker Machinery, Co., a West Virginia Corporation; and ZEP, Inc., a Delaware Corporation, Defendant(s) In the Circuit Court of Putnam County, West Virginia. Honorable Judge Stowers (Supported Plaintiff)	Benzene Exposure	Negotiated Settlement 09/2022	HAR-17-003 Case No.: 18-C-83	2017-2022
Weitz & Luxenberg P.C. Ms. Robin Greenwald Mr. Jerry Kristoff 700 Broadway New York, NY 10003 Levin Papantonio Thomas Mitchell Rafferty & Proctor, P.A. 316 South Baylen Street Pensacola, FL 32502	Plaintiff(s): Chaplick, Kyle; Cole, Dean; Cook, Bryan; Gatewood, Stephen; Gatewood, Vicki; Haley, Richard; Hammond, Marcus; Jenkins, Lafayette; Karr, Joshua; Miller, Robert; Puchbauer, Michael; Sanders, Deion; Sessions, Joseph; Winston, Walter. Defendant(s): Monsanto Company In the Circuit Court of the City of St. Louis, State of Missouri (Supported Plaintiffs)	Exposure to Roundup Deposed 7/9, 10, & 11/2019 & 7/25-26/2019 Daubert Motion filed on 9/11/2019; – never ruled on.	Negotiated Settlement 06/2020	LEV-18-001 Case No.: 1822-CC00515	2018-2020
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600	Plaintiff(s): Thomas E. Kemp, Jr. and Kelly Kemp, his wife Defendant(s): Sal Chemical Company, Inc. an Ohio Corporation; Superior Solvents, Inc. (Superior Oil Company, Inc.), d/b/a Superior Solvents and Chemicals, an Indiana	Exposure to Chemicals Deposed on	Negotiated Settlement 07/2019	HAR-18-002 Civil Action No.: 16-C-21	2018-2019

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Wheeling, WV 26003	corporation; The Valspar Corporation, a Delaware corporation; Karcher North America, Inc., d/b/a Hotsy, a Delaware corporation; Tier Environmental Services, Inc., as successor-in-interest to Hukill Chemical Corporation, a Delaware corporation; Jenkin-Guerin, Inc., a Missouri corporation; ZEP Inc., as successor-in-interest to Selig Industries, a Delaware corporation; The Sherwin-Williams Company, an Ohio corporation; and Acuity Specialty Products, Inc. a Georgia corporation. In the Circuit Court of Brooke County, West Virginia. Honorable Ronald E. Wilson. (Supported Plaintiffs)	1/23/2019			
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Donald August and Fran Alexander, his Wife. Defendant(s): Koppers, Inc., a Pennsylvania Corporation; Southeast Ohio Auto Parts, Inc., d/b/a NAPA of Wellsburg, a Georgia Corporation; Kano Laboratories, Inc., a Tennessee Corporation; Sal Chemical Co., Inc., an Ohio Corporation; CRC Industries, Inc., a Pennsylvania Corporation; The B'Laster Corporation, an Ohio Corporation; and Safety-Kleen Systems, Inc., a Wisconsin Corporation. In the Circuit Court of Brooke County, West Virginia. (Supported Plaintiffs)	Exposure to Chemicals Deposed on 1/27/2021	Negotiated Settlement 09/2022	HAR-18-003 Civil Action No.: 16-C-35	2018-2022
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Jay Bradford Crofford Defendant(s): Koppers, Inc., a Pennsylvania Corporation; Southeast Ohio Auto Parts, Inc., d/b/a NAPA of Wellsburg, a Georgia Corporation; Kano Laboratories, Inc., a Tennessee Corporation; Sal Chemical Co., Inc., an Ohio Corporation; CRC Industries, Inc., a Pennsylvania Corporation; The B'Laster Corporation, an Ohio Corporation; and Safety-Kleen Systems, Inc., a Wisconsin Corporation. In the Circuit Court of Brooke County, West Virginia (Supported Plaintiff)	Exposure to Chemicals	Negotiated Settlement February/2024	HAR-18-004 Civil Action No.: 18-C-78	2018-2024
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Christina L. Dearien and Thomas G. Dearien, her husband. Defendant(s): United Carbide Corporation, a New York Corporation; The Dow Chemical Company, a Delaware Corporation; New River Trucking, LLC, a West Virginia Limited Liability Company; UNIVAR, Inc. through its acquired wholly-owned subsidiary; NEXEO Solutions, a Delaware Corporation; Spectrum Chemical Manufacturing Corp., a California Corporation; and ALLNEX, USA, Inc., a Delaware Corporation.	Exposure to Chemicals Deposed 6/20/2023	Negotiated Settlement August/2023	HAR-18-007 Civil Action No. 2:20-cv-00285	2018-2023

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Metzger Law Group Raphael Metzger 401 E. Ocean Blvd., Ste. 800 Long Beach, CA 90802	Plaintiff(s): Johnny Nelson Blake and Kathleen Mary Blake Defendant(s): Akzo Nobel Coatings, Inc., as successor by acquisition to Devoe Coatings and Sinclair Paint Company, an Illinois Corporation; Benjamin Moore & Company, a New Jersey Corporation; Carboline Company, a Missouri Corporation; Castrol Industrial North America, Inc., a Texas Corporation; Dunn-Edwards Corporation, a California Corporation; Ellis Paint Company, a California Corporation; Ennis-Flint as successor by acquisition to Pervo Paint Company, a North Carolina Corporation; Illinois Tool Works, Inc., a Delaware Corporation; Jotun Paints, Inc., a Louisiana Corporation; Magnaflux Corporation, a Delaware Corporation; PPG Industries, Inc., as successor by acquisition to Ameron International Protective Coatings Group, a Pennsylvania Corporation; Rexnord Corporation, as successor by acquisition to the Falk Corporation, a Wisconsin Corporation; Rust-Oleum Corporation, an Illinois Corporation; Safety-Kleen Systems, Inc., a Massachusetts Corporation; The Steco Corporation, an Arizona Corporation; Pervo Paint Company, a California Corporation (previously sued herein as Doe #1); BASF Corporation, a Delaware Corporation (previously sued herein as Doe #2); PFI, Inc., a California Corporation (previously sued herein as Doe #3); PPG Industries, Inc. a Pennsylvania Corporation (previously sued herein as Doe #4); The Valspar Corporation, a Delaware Corporation (previously sued herein as Doe #5); The Sherwin-Williams, Company, an Ohio Corporation (previously sued herein as Doe #6); Tyco International (US), Inc., a Massachusetts Corporation (previously sued herein as Doe #7); W. M. Barr & Company, Inc. a Tennessee Corporation (previously sued herein as Doe #8); CRC Industries, Inc., a Pennsylvania Corporation (previously sued herein as Doe #9); 3M Company, a Delaware Corporation (previously sued herein as Doe #10); Aervoe Industries, Inc. a Nevada Corporation (previously sued herein as Doe #11); Krylon Products Group, an Ohio Corporation (previously sued herein as Doe #12); Axalta Coating Systems, LLC, as successor by acquisition to Pacific Coats Lacquer, a Delaware Limited Liability Company (previously sued herein as Doe #13); Seymour of Sycamore, Inc., an Illinois Corporation (previously sued herein as Doe #14); and Does 15-200, Inclusive. In the Superior Court of the State of California, County of Los Angeles, Central District (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 04/2019	MET-18-001 Case No.: BC616881; Honorable Terry A. Green, Dept. 14	2018-2019

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Mr. Lon Walters The Walters Law Firm The City Market 23A East Third Street Kansas City, MO 64106	Plaintiff(s): Peggy Petrovic, Individually and as Plaintiff ad litem for Alexander Petrovic, Jr., deceased Defendant(s): BP Corporation North America Inc. and BP Products North America Inc. – Former American Oil Company (AMOCO) Site. Circuit Court of Jackson County, Missouri at Independence (Supported Plaintiffs)	Benzene Exposure Deposed on 3/13/2020	Settled	WAL-18-001 Cause No.: 1716-cv24363; Division 5	2018-2020
Mr. Jeff Gaddy Mr. Wesley Bowden Levin Papantonio 316 Baylen Street Pensacola, FL 32502	Plaintiff(s): Wayne D. McClung Defendant(s): E.I. du Pont de Nemours and Company Circuit Court of Wood County, West Virginia (Supported Plaintiff)	C-8 Exposure	Negotiated Settlement 03/2019	LEV-18-002 Civil Action No.: 17-C-223	2018-2019
Mr. Guy Bucci Mr. Scott Long Hendrickson & Long PLLC 214 Capitol St. Charleston, WV 25301	Plaintiff(s): EQT Gathering, LLC Defendant(s): The Travelers Indemnity Company and Travelers Casualty Company of America In the United States District Court for the Southern District of West Virginia at Charleston (Supported Plaintiff)	Gas Pipeline Explosion Wrongful Death	Negotiated Settlement 04/2019	HEN-18-001 Civil Action No. 2:18-cv-00392	2018-2019
Mr. John (Rett) Guerry III Motley Rice LLC 28 Brigeside Blvd. Mt. Pleasant, SC 29464	Plaintiff(s): Roach Defendant(s): CSX, Seaboard Coastline and Atlantic Coastline (Supported Plaintiff)	Diesel Fuel, Herbicides, Fungicides, Fertilizers, Spectracide, Pesticides and Organic Chemicals	Negotiated Settlement 01/2021	MOT-18-005	2018-2021
Mr. John (Rett) Guerry III Motley Rice LLC 28 Brigeside Blvd. Mt. Pleasant, SC 29464	Plaintiff(s): Logan Dodd Defendant(s): L&N/CSX Railroad (Supported Plaintiff)	Diesel Fuel & Exhaust/Benzene/ Asbestos	Negotiated Settlement 04/2021	MOT-18-004	2018-2021
Mr. John (Rett) Guerry III Motley Rice LLC 28 Brigeside Blvd. Mt. Pleasant, SC 29464	Plaintiff(s): Dale E. Price, Executor of the Estate of Gary E. Price, Deceased. Defendant(s): Consolidated Rail Corporation a/k/a American Premier Underwriters, Inc., Individually and as Successor-in-Interest-or-Liability to Penn Central Transportation Company, and/or The Pennsylvania Railroad Company In the Court of Common Pleas of Allegheny County, PA – Civil Action – Asbestos (Supported Plaintiff)	Diesel Fuel, Diesel Exhaust, Creosote, and Asbestos	Negotiated Settlement 09/2022	MOT-18-002 Case No.: GD 19-006889	2018-2022
Mr. R. Dean Hartley Hartley Law Group, PLLC 7 Pine Avenue Wheeling, WV 26003	Plaintiff(s): Douglas L. Steele Defendant(s): PPG Industries, Inc (Supported Plaintiff)	Benzene Exposure	Closed	HART-18-001 No. 21-0231 (BOR Appeal	2018-2020

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
				No. 2055711) Claim No. 20190026683)	
Mr. John (Rett) Guerry III Motley Rice LLC 28 Brigeside Blvd. Mt. Pleasant, SC 29464	Plaintiff(s): Edward Arthur Johnson Defendant(s): CSX Transportation, Inc., Individually and as Successor-in-Interest to Louisville & Nashville Railroad Company and Seaboard Coast Line Railroad In the Circuit Court of Davidson, Tennessee (Supported Plaintiff)	Diesel Fuel & Exhaust/Benzene/ Asbestos Deposed on 11/04/2022	Negotiated Settlement	MOT-18-001 Case No. 19C105	2018-2022
J. Robert Black Black Law, PC 3701 Kirby Dr., Suite 101 Houston, TX 77098	Plaintiff(s): Eva Garcia Gonzales, Individually and as Personal Representative of the Estate of Ricardo S. Gonzales, deceased; Katherine G. Sanchez; Amanda Gonzales-Todd; and Joseph P. Gonzales. Defendant(s): Waukesha-Pearce, LLC; Ace Hardware Corporation; Berryman Products, Inc.; BP Amoco Chemical Company; BP Products North America, Inc.; BP Corporation North American, Inc.; Chevron, USA, Inc.; CRC Industries, Inc.; CTR Petroleum, Inc.; The Dow Chemical Company; E. I. DuPont De Nemours & Company; ExxonMobil Oil Corporation; Radiator Specialty Company; Safety-Kleen Corp., Safety-Kleen Systems, Inc.; Shell Oil, Co.; Total Petrochemicals & Refining USA, Inc.; Union Oil Company of California; United States Steel Corporation. In the District Court of Harris County, Texas, 281st Judicial District. (Supported Plaintiffs)	Benzene Exposure	Negotiated Settlement 05/2019	BLA-18-001 Case No: 2018-21475	2018-2019
Mr. John (Rett) Guerry III Motley Rice LLC 28 Brigeside Blvd. Mt. Pleasant, SC 29464	Plaintiff(s): Arthur N. Miller Defendant(s): B&O/CSZ Railroad	Diesel Fuel & Exhaust/ & Fumes, Silica Sand, Sand Dust, Chemicals including Benzene, Herbicides, & Defoliants	Negotiated Settlement 09/2022	MOT-19-002	2019-2022
Mr. John (Rett) Guerry III Motley Rice LLC 28 Brigeside Blvd. Mt. Pleasant, SC 29464	Plaintiff(s): James Ray Defendant(s): Kansas City Southern Railroad	Diesel Fuel & Exhaust/Benzene/ Asbestos	Negotiated Settlement 06/2021	MOT-19-002	2019-2021
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Michael D. Ruble and Brenda K. Ruble, his wife. Defendant(s): Rust-Oleum Corporation; RPM International; Inc., Zinsser Company, Inc., individually and as successor-in –interest to New Parks, a New Jersey corporation; Zinsser Company, Inc., d/b/a New Parks, a division of Zinsser Company, Inc., a New Jersey corporation; New Parks, a	Exposure to Chemicals	Settled	HAR-19-001 Case No. 19-C-127	2019-2022

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	division of Zinsser Company, Inc., a New Jersey corporation; E. I. DuPont de Nemours and Company; Akzo Nobel, Inc., f/k/a Akzo America, Inc., individually and as successor-in-interest to Akzo Nobel Functional Chemicals, LLC and Akzo Nobel Chemicals, Inc., a Delaware corporation; Akzo Nobel Functional Chemicals, LLC; Akzo Nobel Chemicals, Inc.; Bayer Corporation; Bayer CropScience; Monsanto Company; The Early Construction Company; Advansix, Inc.; Altiva Petrochemicals, LLC; Brenntag Great Lakes, LLC; Brenntag Mid-South, Inc.; Citgo Petroleum Corporation; Exxon Mobil Corporation; FBC Chemical Corporation; Matriz Chemical, LLC; Nexeo Solutions, LLC; the Yenkin-Majestic Paint Corporation; Special Materials Company; and Univar Solutions, Inc., individually and as successor-by-merger to Nexeo Solutions, LLC, a Delaware corporation. In the Circuit Court of Cabell County, West Virginia (Supported Plaintiffs)				
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Mark Ady, Administrator of the Estate of Glenn R. Ady, Deceased Defendant(s): Shell Chemical LP, a Delaware limited partnership, d/b/a Shell Oil Company, et al. In the Circuit Court of Marshall County, West Virginia (Supported Plaintiff)	Formaldehyde Exposure	Negotiated Settlement 2019	HAR-19-003 Case No. 14-C-51K	2019
Weitz & Luxenberg P.C. Ms. Robin Greenwald Mr. Jerry Kristoff 700 Broadway New York, NY 10003 Levin Papantonio Thomas Mitchell Rafferty & Proctor, P.A. 316 South Baylen Street Pensacola, FL 32502	Plaintiff(s): Robert Dickey, Larry Domina, Royce Janzen, Yolanda Mendoza, Frank Pollard, John Sanders, & Frank Tanner Defendant(s): Monsanto Company United States District Court, Northern District of California (Supported Plaintiffs)	Exposure to Roundup Deposed 11/5 & 6/2019 Daubert Motion filed on 11/26/2019 – Decision moved to Local Federal Courts – Never Ruled On.	Negotiated Settlement 06/2020	WL-19-001 Case No. 3:16-cv-05658-VC MDL No. 2741	2019-2020
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Lee Roy Rodgers Defendant(s): Chevron Mining, Inc., Successor by Merger of Molycorp, Inc. & Union Oil Company of California and Unocal Corporation; The B'Laster Corporation, BP Corporation North America, Inc.; and the Henkel Corporation. In Court of Common Pleas, Washington County, PA. (Supported Plaintiff)	Thorium, Uranium, and Benzene Exposures	Negotiated Settlement 02/2020	HAR-19-004 Case No.: 2016-1836	2019-2020
R. Dean Hartley Hartley Law Group, PLLC	Plaintiff(s): Mary Kay Virden, individually and as Executrix of	Exposure to Benzene and Benzene-	Closed	HAR-19-005	2019-2022

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	the Estate of Charles E. Virden, deceased. Defendant(s): Covestro, LLC, as successor-in-interest to BayerMaterial Science, LLC a wholly owned affiliate of Bayer Corporation, which was formerly known as Miles, Inc., successor-in-interest to Mobay Corporation and Bayer U.S.A, a Pennsylvania limited liability company; Ashland LLC, a Kentucky limited liability company; Avantor, Inc., f/k/a Avantor Performance Materials d/b/a and successor to Mallinckrodt Baker, Inc., J.T. Baker, Inc., J.T. Baker Chemical Company, and VWR Corporation, a Delaware corporation; BP Amoco Chemical Company, as successor-in-interest to BP Chemicals, Inc., a Delaware Corporation; BP Products North America, Inc., successor-in-interest to BP Exploration & Oil, Inc., d/b/a BP Oil Company, a Maryland Corporation; Celanese Corporation, Successor-in Interest to Celanese AG, Hoechst Celanese Corporation and Celanese Chemicals, a Delaware Corporation; Chevron U.S.A., Inc., as successor-in-interest by merger to Union Oil Company of California and as successor-in-interest to UNOCAL Corp., a California Corporation; Exxon Mobil Corporation, a Delaware Corporation; Hess Corporation, f/k/a Hess Oil and Chemical Corporation, a New York corporation; Hexion Inc., formerly known as Momentive Specialty Chemicals, Inc., Successor-in-Interest to Hexion Specialty Chemicals, Inc., a Bordon Chemical, Inc., and Borden, Inc., a New Jersey corporation; Shell Chemical, LP, d/b/a Shell Oil Company, a Delaware limited partnership; Sunoco (R&M), LLC, successor-in-interest to Sun Company, Inc. (R&M), a Pennsylvania limited liability company; Tauber Oil Company, a Texas Corporation; Texaco, Inc., a Delaware corporation; Thermo Fisher Scientific Inc., a successor-by-merger to Fisher Scientific International, Inc. successor to and f/k/a Fischer Scientific Company, a Delaware, Corporation; United States Steel Corporation, successor-in-interest to USX Corporation, USS chemicals Division, a Delaware Corporation; Valero Refining-Texas, L.P., as successor-in-interest by acquisition to Basis Petroleum, Inc., f/k/a Phibro Energy USA, Inc., a Delaware limited partnership. In the Circuit Court of Marshall County, West Virginia (Supported Plaintiff)	Containing Chemicals		Case No.: 19-C-252 C	
J. Robert Black Black Law, PC 3701 Kirby Dr., Suite 101 Houston, TX 77098	Plaintiff(s): Aaron Augustine Defendant(s): DeBusk Services Group and Lubrizol. In the United States District Court Southern District of Texas Houston Division	Chemical Burns to Feet and Ankles – Acrylonitrile Exposure	Negotiated Settlement 03/2020	BLA-19-003 Case No.: 4:19-cv-02157	2019-2020

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	(Supported Plaintiff)				
Mr. John (Rett) Guerry III Motley Rice LLC 28 Brigeside Blvd. Mt. Pleasant, SC 29464	Plaintiff(s): Charles E. Caton, Jr., aka Charles Caton Defendant(s): CSX Transportation, Inc. (CSXT); c/o CT Corporation System Statutory Agent, 4400 Easton Commons Way, Suite 125, Columbus, OH 43219; and Consolidated Rail Corporation (CONRAIL); 1717 Arch Street, Suite 1310, Philadelphia, PA 19103-2844; and American Premier Underwriters, Inc. (APU), Individually and as Successor-in-interest to The Penn Central Transportation Company, c/o CT Corporation System Statutory Agent, 4400 Easton Commons Way, Suite 125, Columbus, OH 43219 Court of Common Pleas of Hamilton County, Ohio (Supported Plaintiffs)	Diesel Fuel & Exhaust/Benzene/ Asbestos	Negotiated Settlement 03/2020	MOT-19-003 Case No.: A1903216	2019-2020
Weitz & Luxenberg P.C. Ms. Robin Greenwald Mr. Jerry Kristoff 700 Broadway New York, NY 10003. Levin Papantonio Thomas Mitchell Rafferty & Proctor, P.A. 316 South Baylen Street Pensacola, FL 32502	Plaintiff(s): Timothy Kane et al. (Crabtree, Edwin; Dela Cruz, Thomas; Dyer, Angela; Haynes, Rosita; and Ramirez, Ron). Defendant(s): Monsanto Company In the Circuit Court of the City of St. Louis, State of Missouri. (Supported Plaintiffs)	Exposure to Roundup Deposed 12/3 & 4/2019	Negotiated Settlement 06/2020	WL-19-002 Case No. 1622-CC10172	2019-2020
Weitz & Luxenberg P.C. Ms. Robin Greenwald Mr. Jerry Kristoff 700 Broadway New York, NY 10003. Levin Papantonio Thomas Mitchell Rafferty & Proctor, P.A. 316 South Baylen Street Pensacola, FL 32502	Plaintiff(s): Leroy Seitz, et al. (Cannon, Mario; Jenkins, Larry; Pinnon, Jerry; and Sorich, Scott). Defendant(s): Monsanto Company In the Circuit Court of the City of St. Louis, State of Missouri. (Supported Plaintiffs)	Exposure to Roundup Deposed 1/15 & 16/2020	Negotiated Settlement 06/2020	WL-19-003 Case No. 1722-CC11325	2019-2020
Nadina Beach Lundy Soileau & South, LLP 501 Broad Street Lake Charles, Louisiana 70601	Plaintiff(s): LaTwon Whitby Defendant(s): Monsanto In the Circuit Court of the County of St. Louis, State of Missouri. (Supported Plaintiff)	Exposure to Roundup Deposed on 2/7/2020	Negotiated Settlement 06/2020	LUN-19-001 Case No.: 19SL-CC04020	2019-2020
Mr. Christopher Heavens 2438 Kanawha Blvd. East Charleston, WV 25311	Plaintiff(s): Justin Butcher and Jennifer Butcher Defendant(s): Halliburton Energy Services, Inc., a Delaware Corporation, Antero Resources Corporation, a Delaware Corporation, and Safety Management Systems, LLC, a Louisiana Corporation.	Work-related Amputation/Injury	Negotiated Settlement 01/2024	HEA-19-001 Civil Action No. 1:20cv74 (Kleeh)	2019-2024

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	In the United States District Court for the Northern District of West Virginia, Clarksburg. (Supported Plaintiff)				
Mr. Wesley A. Bowden, Esq. Levin Papantonio Rafferty, Proctor, Buchanan, O'Brien, Barr and Mougey, P.A. 316 South Baylen Street Pensacola, FL 32502, Mr. Gary Douglas, Esq. Douglas & London, PC 859 Maiden Lane, 6th Floor New York, New York 10038, etc.	Plaintiff(s): State of Ohio, ex rel. Michael DeWine Attorney General of Ohio & Plaintiffs' Steering Committee. Defendant(s): E. I. du Pont de Nemours and Company and its related entities including the Chemours Company (referred to collectively as "DuPont"), and the Telomer Defendants. In the Court of Common Pleas, Washington County, OH. Judge Hogan. (Supported Plaintiffs).	PFAS MDL – Standards of Care, Warnings, PPE.	Settled - 2023	LEV-19-001 Case No.: 180T32	2019-2023
Mr. John E. Tomlinson Beasley, Allen, Crow, Methvin, Portis & Miles, P.C. 218 Commerce Street Montgomery, AL 36104	Plaintiff(s): Hollis D. Graham and Shirley Graham Defendant(s): 3M Company; American Offset Printing Ink; Anchor/Lith-Kem-Ko, Incorporated, a Subsidiary of FugiFilm Hunt Chemicals USA, Incorporated; FugiFilm Hunt Chemicals USA, Incorporated, d/b/a and Parent and Successor to Anchor/Lith-Kem-Ko, Incorporated; Day International, Inc.; Deleet Merchandising Corp.; Flint Group US, LLC; Fujifilm Hunt Chemicals USA, Inc.; Printer Service d/b/a Prisco; Rogersol, Inc., Rycoline Products, Inc., a Division of Sun Chemical Commercial Group a/k/a Rycoline Products, LLC and Successor to Rogersol, Inc.; Sun Chemical Corporation, Individually and a Parent and Successor to Rycoline Products, LLC, a/k/a Rycoline Products, Inc. and Successor to Rogersol, Inc.; Varn International, d/b/a Varn Products Company; Day International, Inc., Individually and as Successor to and d/b/a Varn Products Company. In the United States District Court, Northern District of Alabama, Southern Division (Supported Plaintiffs)	Exposure to Printing Products	Negotiated Settlement 12/2020	BEA-20-001 Case #: 2:18-cv-1362-RDP.	2020
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Frederick R. Eastman and Janet L. Eastman, his wife. Defendant(s): Sunoco, Inc.; Texaco, Inc.; Exxon Mobil Corp.; BP Amoco Chemical Company; BP Products North America, Inc.; 3-M Company; CRC Industries, Inc., Advanced Auto Parts, Inc. The B'Laster Corporation; Radiator Specialty Company; United States Steel Corporation; Safety-Kleen Systems, Inc., Kano Laboratories; Valvoline, Inc.; Rust-Oleum Corporation; The Testor Corp.; E.I. DuPont de Nemours & Company; The Sherwin-Williams Company; The	Exposure to Chemicals	Closed	HAR-20-001	2020-2022

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	Valspar Corporation; Autozone, Inc.; Pennzoil-Quaker State Company; W.M Barr & Company, Inc.; PPG Industries, Inc.; AGS Company Solutions, LLC; Sig Manufacturing Company, Inc.; Automotive Systems Warehouse, Inc.; Niteo Products, LLC; Illinois Tool Works, Inc.; Chase Products Company; Wilson Imperial Company; Zep, Inc. In the Court of Common Pleas of Allegheny County, Pennsylvania (Supported Plaintiffs)				
Mr. Kristofer Cormany Cormany Law, PLLC P.O. Box 11827 206 Capitol Street Charleston, WV 25339	Plaintiff(s): Lori Harrison, Administratrix of the Estate of Sarah Cain, Deceased. Defendant(s): Go-Mart, Inc., a West Virginia Corporation, and Heater Oil Company, Inc., a West Virginia Corporation. In the Circuit Court of Putnam County, West Virginia (Supported Plaintiff)	Exposure to Chemicals in Go-Mart Bathroom – Death of Women and Fetus	Negotiated Settlement February 2021	COR-20-001 Civil Action No.: 19-C-115	2020-2021
J. Robert Black Black Law, PC 3701 Kirby Dr., Suite 101 Houston, TX 77098	Plaintiff(s): James Crabtrey and Brenda Crabtrey Defendant(s): Atlantic Richfield Company; Bayer Corporation; Berryman Products, Inc.; Celanese Corporation; Chevron USA, Inc.; Covestro, LLC; Huntsman International, LLC; Ineos Styrolution America, LLC; Nova Chemicals, Inc.; Occidental Chemical Corporation; Radiator Specialty Company; Schneider Electric Systems USA, Inc.; Shell Oil Company; Total Petrochemicals & Refining USA, Inc.; Union Oil Company of California; United States Steel Corporation In the District Court Harris County, Texas (Supported Plaintiffs)	Chemical Exposure	Petty Excused	BLA-20-001 Cause No. 2020-05009 – Court 189	2020-2022
Mr. David P. Matthews Matthews & Associates 2905 Sackett Street Houston, TX 77098	Plaintiff(s): Randall Dean Seidl et al. Defendant(s): Monsanto Co. United States District Court, Northern District of California & In the Circuit Court of Jefferson County State of Missouri. (Supported Plaintiffs)	Exposure to Roundup	Non-resolved cases moved to Frazer, PLC	MAT-20-001 Case No.: 3:17-cv-00519 MDL No. 2741 & Cause No.: 20JE-CC00709	2020-2021
William R. Sutton Beasley Allen Law Firm 218 Commerce St. Montgomery, AL 36104	Plaintiff(s): Randall Dean Seidl Defendant(s): Monsanto Co. United States District Court, Northern District of California (Supported Plaintiff)	Exposure to Roundup Deposed by Defendants 3/2/2021	Settled	BEA-20-2002 Case No.: 3:17-cv-00519 MDL No. 2741	2020-2021

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Mr. John (Rett) Guerry III Motley Rice LLC 28 Bridgeside Blvd. Mt. Pleasant, SC 29464	Plaintiff(s): Cynthia Minnis, Personal Representative of the Estate of Porter K. Minnis, Deceased. Defendant(s): BNSF Railway Company, Individually and as Successor-in-Interest to The Burlington Northern, Inc., Burlington Northern & Santa Fe Railway Company, and Atchison, Topeka and Santa Fe Railway Company. In the Circuit Court of Linn County, State of Missouri (Supported Plaintiff)	Exposure to Diesel Fuel, Diesel Exhaust, Benzene, & Asbestos Deposed by Defendants 12/2/2021	Negotiated Settlement 10/05/22	MOT-19-006 Civil Action No.: 19LI-CC00036	2021-2022
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): John F. Barmess, Jr. and Deborah L. Barmess, his wife. Defendant(s): Chemical Solvents, Inc., an Ohio Corporation; CRC Industries, Inc., a Pennsylvania Corporation; KANO Laboratories, Inc., a Tennessee Corporation; The B'Laster Corporation, an Ohio Corporation; and ZEP, Inc., d/b/a Zep Manufacturing Company, a Delaware Corporation; The PENRAY Companies, Inc., a Delaware Corporation; Radiator Specialty Company, Inc., a North Carolina Corporation; Illinois Tool Works, Inc., a Delaware Corporation; Chagrin Valley Auto Parts Co., f/k/a Madison Auto Parts, d/b/a NAPA Auto Parts, an Ohio Corporation, RICCA Chemical Company, LLC, a Maryland Corporation; Kannenberg Brothers Co., Inc., d/b/a Kwik Kleen Parts Washer Service, an Ohio Corporation; John Doe Companies 1-10 domestic and/or foreign entity.	Exposure to Chemicals	Closed	HAR-20-003 CV20933205	2000-2023
Mr. Wesley A. Bowden, Esq. Levin Papantonio Thomas Mitchell Rafferty & Proctor, P.A. 316 South Baylen Street Pensacola, FL 32502	IN RE: Aqueous Film-Forming Foams (AFFF) Products Liability Litigation - MDL 2873 In the United States District Court for the District of South Carolina Charleston Division (Supported Plaintiff(s))	PF Expert Support Deposed 6/21/22	Negotiated Settlement April 2024	LEV-21-002 MDL No.: 2:18-mn-2873-RMG	2021-2024
Mr. Wesley A. Bowden, Esq. Levin Papantonio Thomas Mitchell Rafferty & Proctor, P.A. 316 South Baylen Street Pensacola, FL 32502	Plaintiff(s): Middlesex Water Company, New Jersey. Defendant(s): 3M Company. United States District Court for the District of New Jersey (Supported Plaintiff)	Evaluation of Treatment Methods and Costs for Removals of PFASs Deposed 7/15/2021 Daubert Motion Denied at Hearing in December 2022	Negotiated Settlement 08/28/2023	LEV-21-003 Case No.: 2:18-cv-15366	2021-2023
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Teddy A. Kemp and Judy L. Kemp, his wife. Defendant(s): Covestro, LLC, as successor-in-interest to BayerMaterial Science, LLC a wholly owned affiliate of Bayer Corporation, which was formerly known as Miles, Inc., successor-in-interest to Mobay Corporation and Bayer U.S.A, a Pennsylvania limited liability company; Axial Corporation,	Exposure to Benzene	Negotiated Settlement 04/12/2001	HAR-20-004 Civil Action No.: 19-C-113C	2020-2021

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	as successor-in-interest to PPG Industries, Inc., a Delaware Corporation; Ashland LLC, a Kentucky limited liability company; BP Amoco Chemical Company, as successor-in-interest to BP Chemicals, Inc., a Delaware Corporation; BP Products North America, Inc., successor-in-interest to BP Exploration & Oil, Inc., d/b/a BP Oil Company, a Maryland Corporation; Chevron U.S.A., Inc., as successor-in-interest by merger to Union Oil Company of California and as successor-in-interest to UNOCAL Corp., a California Corporation; Citgo Petroleum Corp., a Delaware Corporation; Conoco-Phillips Company, as successor by merger to Conoco, Inc. and f/k/a Phillips Petroleum Company, a Delaware Corporation; Exxon Mobil Corporation, a Delaware Corporation; Recochem, Inc., as successor-in-interest to Record Chemical Company, a Delaware Corporation; Shell Chemical, LP, d/b/a Shell Oil Company, a Delaware limited partnership; Sunoco (R&M), LLC, successor-in-interest to Sun Company, Inc. (R&M), a Pennsylvania limited liability company; Tauber Oil Company, a Texas Corporation; Union Oil Company of California, individually and as successor-in-interest by merger to UNOCAL Corp., a California Corporation; United States Steel Corporation, successor-in-interest to USX Corporation, USS chemicals Division, a Delaware Corporation; Valero Refining-Texas, L.P., as successor-in-interest by acquisition to Basis Petroleum, Inc., f/k/a Phibro Energy USA, Inc., a Delaware limited partnership; P&B Steel Erectors, Inc., a West Virginia Corporation; and Sistersville Tank Works, Inc., individually and successor-in-interest to Tyler County Tank Works, Inc. a West Virginia Corporation. In the Circuit Court of Marshall County, West Virginia (Supported Plaintiffs)				
Mr. Todd R. McPharlin, Esq. Coffey McPharlin Trial Law 550 S. Andrews Ave., Suite 420 Ft. Lauderdale, FL 33301	Plaintiff(s): Glen Dusseault Defendant(s): Medical Device Recruiters Inc., et al.	Fall Incident	Negotiated Settlement 11/2021	20-001 Case No.: CACE-18001226	2020-2021
Mr. Todd R. McPharlin, Esq. Coffey McPharlin Trial Law 550 S. Andrews Ave., Suite 420 Ft. Lauderdale, FL 33301	Plaintiff(s): Melanie Brydger Defendant(s): HomeGoods, Inc.; and Jessica LaValle	Fall Incident - Negligence	Decision in Favor of Plaintiff 10/2022	20-002 Filing No.: 99811280	2020-2022
Mr. Todd R. McPharlin, Esq. Coffey McPharlin Trial Law 550 S. Andrews Ave., Suite 420 Ft. Lauderdale, FL 33301	Plaintiff(s): Rose Marie Johnson Defendant(s): Sea Gardens Beach and Tennis Resort, Inc.,; Sea Gardens Beach & Tennis Resort Condominium Association, Inc.; and Sea Gardens Beach & Tennis Resort –	Trip & Fall Incident	Negotiated Settlement 11/2021	20-003 Case No.: CACE-19-009503	2020-2021

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	Ocean Palms Owners Association, Inc.				
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Gregory S. Gwinn and Kimberly Ann Gwinn, his wife Defendant(s): Axalta Coating Systems, LLC, a Delaware LLC; Beckley Welding Supply, Inc., a West Virginia Corporation; Crest Industries, Inc., a Michigan Corporation; E.I. DuPont de Nemours and Company, a Delaware Corporation; Fleetwood Products, Inc.; a New Jersey Corporation; Genuine Parts Company, d/b/a NAPA Auto Parts, a Georgia Corporation; Grow Automotive, a foreign entity; International Autobody Marketing Group (IAMG), an Arizona Corporation; Mountain Marketing, Inc., a West Virginia Corporation; PPG Industries, Inc., a Pennsylvania Corporation; Refinishing Material Specialties, Inc. d/b/a RMS Pro Finishes, Inc., individually and as successor-in-interest to Warren's Auto Parts, Inc., d/b/a Auto Body & Paint Supply, a West Virginia Corporation; Safety-Kleen Systems, Inc., a Wisconsin Corporation; The Sherwin-Williams Company (Martin Senour Automotive Finishes Division), an Ohio Corporation; Transtar Autobody Technologies, Inc., an Ohio Corporation; U-Pop US, Inc., a foreign entity; The Valspar Corporation, a Delaware Corporation; Warren's Auto Parts, Inc., d/b/a Auto Body & Paint Supply, a West Virginia Corporation; and William Farruggia, d/b/a B&L Distributors, a sole proprietorship. In the Circuit Court of Kanawha County, West Virginia. Honorable Judge Louis H. "Duke" Bloom (Supported Plaintiffs)	Exposure Surfactants and Surfactant Ingredients Deposed on 4/13/2021, 4/14/2021 and 6/2/2021	Negotiated Settlement 11/2021	HAR-20-005 Case No.: 17-C-622	2020-2021
R. Dean Hartley Hartley Law Group, PLLC The Wagner Building 2001 Main Street, Suite 600 Wheeling, WV 26003	Plaintiff(s): Louella Alexander, Individually and as Administratrix of the Estate of Ronnie L. Alexander, Sr., Deceased. Defendant(s): SAL Chemical Co., Inc., an Ohio Corporation; Columbia Paint Corporation, PPG Industries, Inc., Individually and as Successor through Acquisition to Imperial Chemicals Industries, plc, a Delaware Corporation; The Valspar Corporation, a Minnesota Corporation; The Sherwin-Williams Company, an Ohio Corporation; Rust-Oleum Corporation, a Delaware Corporation; AKZO Nobel Coatings Inc., as Successor-in-Interest through Acquisition to Imperial Chemicals Industries, plc, a Delaware Corporation; Exxon Mobil Corporation, a New Jersey Corporation; Ashland LLC, a Kentucky Limited Liability Company; Shell Chemical, LP, d/b/a Shell Oil Company, a Delaware Limited Partnership; Sunoco, Inc. (R&M), Individually and as Successor-in Interest	Exposure to Aromatic-Hydrocarbon Products	Closed	HAR-21-002 Civil Action No.: 21-C-35	2021-2023

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	to Sun Company, Inc. (R&M), Sun Oil Company of Pennsylvania, Sun Petroleum Products Company, Inc., and Sun Refining, a Pennsylvania Corporation; CITGO Petroleum Corporation, a Delaware Corporation; EE Zimmerman Co., a Pennsylvania Corporation; 3M Company, a Delaware Corporation; Henkel Corporation, a Delaware Corporation; and Heritage-Crystal Clean, LLC, a Delaware Corporation; Defendants. State of West Virginia Worker's Compensation – Office of Judges (Supported Plaintiffs)				
Mr. Christopher Wiest Chris Wiest, Attorney at Law, PLLC 25 Town Center Blvd, Ste. 104 Crestview Hills, KY 41017	Plaintiff(s): Ridgeway Properties, LLC d/b/a Beans Café & Bakery and Commonwealth of Kentucky, ex re. Attorney General Daniel Cameron Defendant(s): Hon. Andrew Beshear, Governor, Commonwealth of Kentucky, et al. Commonwealth of Kentucky Boone County Court, Division 1 (Supported Plaintiffs)	COVID – Exposure, Exposure Control, PPE, Masks and Engineering Controls	Trial Testimony on May 17, 2021 Bench Trial Decision in Favor of Plaintiffs on 6/8/2021	WEI-21-001 Case No.: 20-CI-00678	2021-2021
Mr. Seldon Jeff Childers Childers Law, LLC 2135 NW 40th Terrace, Suite B Gainesville, Florida 32605	Plaintiff: Justin Green Defendant(s): Alachua County, a political subdivision of the State of Florida In the Circuit Court of the Eighth Judicial Circuit in and for Alachua County, Florida & First District Court of Appeal State of Florida (Supported Plaintiff)	COVID – Exposure, Exposure Control, PPE, Masks and Engineering Controls	Disclosed 4/21/2021 Appellant Decision in Favor of Plaintiffs for Reversal and Remanding 6/11/2021	WEI-21-001 Case No.: 2020-CA-1249	2021-2021
Mr. Patrick D. McMurtray Frazer PLC Burton Hills II 30 Burton Hills Blvd., Suite 450 Nashville, TN 37215	Plaintiff(s): Dolores Verdier, et al. Defendant(s): Monsanto Company, et al. In the Circuit Court of Jefferson County State of Missouri. (Supported Plaintiffs)	Exposure to Roundup	Negotiated Settlement 08/2021	FRA-21-001 Cause No.: 20JE-CO00709	2021-2021
Mr. Patrick D. McMurtray Frazer PLC Burton Hills II 30 Burton Hills Blvd., Suite 450 Nashville, TN 37215	Plaintiff(s): Mr. Allan Shelton Defendant(s): Monsanto Company In the Circuit Court of Jackson County, Missouri at Kansas City. (Supported Plaintiffs)	Exposure to Roundup Deposed by Defendant 8/24/2021	Testified in Trial May 12-13, 2022	FRA-21-002 Case No. 1816-CV17026	2021-2022
Mr. John (Rett) Guerry III Motley Rice LLC 28 Brigeside Blvd.	Plaintiff(s): Carolyn L. Robinson, as Executrix of the Estate of Jesse Irvin Robinson, Deceased and Wrongful Death Beneficiary and Surviving Spouse.	Exposure to Diesel Fuel, Diesel Exhaust, Herbicide, Solvents, &	Withdrew from Case; Rett Guerry III	MOT-21-001 Civic Action:	2021-2022

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Mt. Pleasant, SC 29464	Defendant(s): Illinois Central Railway Company. In the Circuit Court of the 19th Judicial District of Jackson County, Mississippi. (Supporting Plaintiff)	Asbestos	Retired	21-28(3)	
Ms. Erin E. Mersino Great Lakes Justice Center 5600 W. Mount Hope Hwy. Lansing, MII 48917	Plaintiff(s); Resurrection School; Christopher Mianecki, individually and as next friend on behalf of his minor children C.M., Z.M., and N.M.; and Stephanie Smith, individually and as next friend on behalf of her minor child F.S. Defendant(s): Robert Gordon, in his official capacity as the Director of the Michigan Department of Health and Human Services; Dana Nessel, in her official capacity as Attorney General of the State of Michigan; Linda S. Vail, in her official capacity as the Health Officer of Ingham County; and Carol A. Siemon, in her official capacity as the Ingham County Prosecuting Attorney. Federal Western District Court of Michigan (Supported Plaintiffs)	COVID – Exposure, Exposure Control, PPE, Masks and Engineering Controls	Closed Testified in Trial via Zoom on 9/28/2021	Case No. 1:20-cv-1016	2021-2021
Mr. Scott Davison Davison IP Let Them Breathe; Reopen California Schools Vs. Gavin Newsom et al.	Plaintiff(s): Let Them Breathe; Reopen California Schools. Defendant(s): Gavin Newsom, in his official capacity as Governor of the State of California; Department of Public Health of the State of California; Dr. Tomas Aragon, in his official capacity as Director and State Public Health Officer of the Department of Public Health of the State of California; Dr. Mark Ghaly, in his official capacity as Secretary of the Department of Health and Human Services of the State of California; Dr. Naomi Bardach, in her official capacity as Successful Schools Team Lead and Safe Schools for All Team Lead for the Department of Health and Human Services of the State of California; and DOES 1-50, inclusive. Superior Court of the State of California, County of San Diego, North County Division (Supported Plaintiffs)	COVID – Exposure, Exposure Control, PPE, Masks and Engineering Controls	Closed	Case No. 37-2021-00031385-CU-WM-NC	2021-2022
Mr. Adam G. Giangreco Giangreco Law Group, PC 2390 Western Avenue Guilderland, NY 12084	Plaintiff(s): L.T and M.T. by their parent Jeffrey N. Thomas, JEFFREY N. THOMAS as parent of L.T and M.T.; T.L., B.L., R.L., A.L. by their parent Karen LeClair; KAREN LECLAIR as parent of T.L., B.L., R.L., A.L.; J.S. by his parent Danielle Schipano; DANIELLE SCHIPANO as parent of J.S.; B.P by his parent Andrea Penamora, ANDREA PENAMORA as parent of B.P.; E.W. by her parent Joseph Whitehead; and JOSEPH WHITEHEAD as	COVID – Exposure, Exposure Control, PPE, Masks and Engineering Controls	Closed	Case 1:21-cv-01034-LEK-DJS	2021-2022

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	parent of E.W. Defendant(s): Howard A. Zucker, in his official capacity and in his individual capacity. United States District Court, Northern District of New York (Supported Plaintiffs)				
Mr. Louis F. Leo, IV Florida Civil Rights Coalition, PLLC 112 Bartram Oaks Walk, Ste. 104 #600112 Saint Johns, FL 32259-3268	Plaintiff(s): Dustin Lloyd et al. Defendant(s): School Board of Palm Beach County et al. United State District Court, Southern District of Florida (Supported Plaintiffs)	COVID – Exposure, Exposure Control, PPE, Masks and Engineering Controls	Closed	Case No. 9:21-cv-81715-KMM	2021-2022
Mr. Nick Whitney AndersonGlenn LLP 1075 Deerwood Park Blvd., Suite 105 Jacksonville, FL 32256	Plaintiff(s): Kyle and Taran Helm, individually and as next friends for Jane Doe 1, Jane Doe 2, and Jane Doe 3 et al. Defendant(s): Duval County School Board United States District Court, Middle District of Florida, Jacksonville Division (Supported Plaintiffs)	COVID – Exposure, Exposure Control, PPE, Masks and Engineering Controls	Closed	Case No.: 3-21-cv-00900-MMH-JRK	2021-2022
Mr. Patrick D. McMurtray Frazer PLC Burton Hills II 30 Burton Hills Blvd., Suite 450 Nashville, TN 37215	Arthur Shelton, III, Complaint, Arthur Shelton; Raymond Ault; William Ayres; Lydell Bangloy; Mark Baska; Martin Birch, Sr.; Robert Brent; Coy Breshears; Eveleen Smith, Individually and as Surviving Spouse of Danny Campbell, Deceased; Robert Caruso; Gary Chesser; Sheila Childers; Cora Coonich; Kyda Cooper; Courtney Dennis; Audrey Derany; Gerald Eidem; Danny Fedeli; Sharon Ferraro; Vanessa Figueiras; Heidi Fischer; Janet Frost, Individually and as surviving Spouse of Bobby D. Frost, Deceased; Amanda Garren; Daniel Guerrieri; John Hall; Michael Hall; Raymond Hawke; Elton Hodges; Bruce Holland; Michael Hope; Lonnie Hug; Michael Jackson; Debporah Kirschenbaum; Carey Klepees; Patricia Knudson; Jerry LaMaster; Jerry Lister; Susan Litz; Rolan Logan; Warner Long; Franklin B. Manoy; Darrin Marasco; Jovita Martinez; Margaret Moon; Thomas Moore; Charles Myers; James Nichols; Randolph Nicholson; David Oldham; Fawn Orr; Dennis Paden; Volodimir Palashnyuk; Jay Parker; Stephen Partyka; Gerald Paull; Michael Powell; Gerald Purdum; Sheila Reyes, Personal Representative of the Estate of Brent Ray, Deceased; Darla Ricci; John Richter; Clotilde Rigg; Louis Risch; David Roller; Thomas Rugel; Ian Schorvitz, Individually and as Surviving Son of David Schorvitz, Deceased; Dymphna Sclesky; Theodore Shelton; Richard Sivley; Linda Smith; Philip Smith; Steven R. Smith; Pearl Sobocinski; Tinmothy Spain; Rachael St. Godard; Michael Stahulak; Jerry Strauser; John Sturman; Galen Templer; Beverly C. Thomas; Sharon Treadway, Individually	Exposure to Roundup Deposed by Defendant on 8/24/2021 Allen Shelton Case	Testified in Trial May 12-13, 2022 Defense Decision	FRA-21-003 Case No.: 1816-CV21575	2021-2022

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	and as Surviving Spouse of Ronald Treadway, Deceased; Donna Trombley; Billy Tucker; Charles Vincent; Joseph Virden; Steven Volz; Vicki Wall; Rick Warchol; Mary Anne Watters; Gary Wilkerson; Melissa Wilkinson; Frances Wood, Personal Representative of the Estate of Bill Wood, Deceased, Plaintiffs, vs. Monsanto Company; Osborn & Barr Communications, Inc.; Osborn & Barr Holdings, Inc., Defendants; In the Circuit Court of Jackson County, State of Missouri at Kansas City, Jury Trial Demanded.				
Mr. Patrick D. McMurtray Frazer PLC Burton Hills II 30 Burton Hills Blvd., Suite 450 Nashville, TN 37215	Cheryl Ellis; Jamie Malone; Robert Marshall; Robert S. Martino; Charles Mathews; Dale J. Mayberry; Branden Mayse; Margaret McBride, Individually and as Surviving Spouse of Richard McBride, Deceased; Wendell McCarty; Virgil McDaniel; Jerry McGee; Sonia McIntyre; Richard Mendez; Kathy Menzemer; Weba Smith-Moody, Individually and as Surviving Spouse of Gerald Moody, Deceased; Arnold Y. Moss; Daniel Munroe; Jacqueline Murphy; William Nabors; Marty Naquin; Daina Nehira, Individually and as Surviving Child of Satoru Nehira, Deceased; Daniel Norden; Jermaine D. O'Guin; Louise O'Shields, Individually and on Behalf of the Estate of Mark O'Shields, Deceased; Victor Otero; Kenneth Owen; David Peay; Bonni Pederson, Individually and as Surviving Spouse of Craig Pederson, Deceased; Carol K. Perex; John P. Petraitis; Joseph Pizzuto; Matthew Price; William Price; William Privett; David Proctor; Kevin Reichler, Individually and as Surviving Spouse of Linda Reichler, Deceased; Darrell Reynolds; Sandra K. Rickerson; Lesley Riddle; Betty Rodd; Mark Rodenkirch; Guadalupe Rodriguez; Randall Roth; Moel Sanford; Robert Sechriest; Caroline Shuler, Individually and as Surviving Spouse of Brian Shuler, Deceased; Betty Sisco; Tammy Slone; Linda Smart; Frederick Smith; Virginia Smith; Timmy Spolarich; Merville Steen, Individually and as Surviving Spouse of Lavonne Steen, Deceased; Karrie A. Kuroda, Individually and as Surviving Spouse of Melvin L. Stewart, Deceased; Cristin Stoecker; Theresa Deisher, Individually and as Surviving Mother of Henry Streuli, Deceased; Deborah Stults; Joseph Swalve, Individually and as Surviving Child of Kevin Swalve, Deceased; David Tapio; Vincent Tavernite; Richard Tharp, Individually and as Surviving Spouse of Betty Tharp, Deceased; Jeffrey Thomas; Roger Tobin; Vernon E. Totty, Jr.; Rocky Towles; Nina Venezia, Individually and as Surviving Spouse of Paul Venezia, Deceased; Dolores Verdier, Individually and as Surviving Spouse of Swane Verdier, Deceased; Joseph Walland; Katrina Walsh; Susan Jane Wamsher, Individually and as Surviving Spouse of	Exposure to Roundup Deposed 01/11/22 – Ellis Case	Closed	FRA-21-004 Case No.: 1816-CV14453	2021-2002

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April 6, 2026
Petty Expert Report – CeramFab and WYG Plaintiffs - NS Train Derailment in East Palestine, OH

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	Douglas Wamsher; Cynthia Ward; Barbara Weary; Douglas Weber; Daniel A. Weil; Robert Weis; Vera Wells; Audrey Whiddon; Kim White, Individually and as Surviving Spouse of Edward White, Deceased; Eric White; Tamara Williams, Individually and as Surviving Spouse of Calvin Williams, Deceased; George Williams; Hermelinda Zavala, Plaintiffs, vs. Monsanto Company; Osborne & Barr Communications, Inc.; Osborn & Barr Holdings, Inc., Defendants; In the Circuit Court of Jackson County, State of Missouri, at Independence, Jury Trial Demanded.				
Weitz & Luxenberg P.C. Ms. Robin Greenwald Mr. Jerry Kristoff 700 Broadway New York, NY 10003. Levin Papantonio Thomas Mitchell Rafferty & Proctor, P.A. 316 South Baylen Street Pensacola, FL 32502	Plaintiff(s): Earl Neal et al. Defendant(s): Monsanto Company In the Circuit Court of the City of St. Louis, State of Missouri. (Supported Plaintiffs)	Exposure to Roundup Deposed 11/12/2021 and 11/17/2021	Negotiated Settlement 04/05/2022	WL-21-001 Case No. 1722-CC10773	2021-2022
Mr. Wesley A. Bowden, Esq. Levin Papantonio Rafferty, Proctor, Buchanan, O'Brien, Barr and Mougey, P.A. 316 South Baylen Street Pensacola, FL 32502, Mr. Gary Douglas, Esq. Douglas & London, PC 859 Maiden Lane, 6th Floor New York, New York 10038, etc.	Plaintiff(s): Plaintiffs' Steering Committee. Defendant(s): 3M Company, E. I. du Pont de Nemours and Company and its related entities including the Chemours Company (referred to collectively as "DuPont"), and the Telomer Defendants. United States District Court for the District of South Carolina – Charleston Division. (Supported Plaintiffs).	PFAS MDL – Standards of Care, Warnings, PPE. Deposed 7/21/2021.	Negotiated Settlement 08/29/2023	LEV-21-002 In re Aqueous Film-Forming Foams Products Liability Litigation, MDL 2:18-mn-2873-RMG.	2021-2023
Mr. Peter J. Flowers Meyers & Flowers 225 West Wacker Dr., #1515 Chicago, IL 60606	Plaintiff(s): Charlene Tenbrink and James Krause Cases Defendant(s): Syngenta Crop Protection, LLC, Syngenta AG, Chevron Phillips Chemical Company, LP, and Growmark, Inc. In the Superior Court of the State of California, County of Contra Costa	Paraquat Dichloride Deposed 01/11/2023	On-Going	MEY-22-001 Case Nos. JCCP 5031	2022-Present
Mr. R. Dean Hartley Hartley Law Group, PLLC 7 Pine Avenue Wheeling, WV 26003	Plaintiff(s): Rhonda Kay Wheeler, Individually and as Administratrix of the Estate of Charles Wheeler, Deceased. Defendant(s): Union Carbide Corporation, a New York corporation; Rhone-Poulenc, Inc., a New York corporation; Bay Crop Science, LP f/k/a Aventis Cropscience USA, LP, a Delaware corporation; and Oliver Fuels & Oils, Inc. f/k/a Oliver Industries, Inc., a West Virginia corporation.	Exposure to Aromatic-Hydrocarbon Products, Asbestos, PCBs, Dioxins	Negotiated Settlement 06/06/2024	HAR-22-003 Civil Action No.: 18-C-1484	2022-2024

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	In the Circuit Court of Kanawha County, West Virginia. (Supported Plaintiffs)				
Weitz & Luxenberg P.C. Ms. Robin Greenwald Mr. Jerry Kristoff 700 Broadway New York, NY 10003. Levin Papantonio Thomas Mitchell Rafferty & Proctor, P.A. 316 South Baylen Street Pensacola, FL 32502	Plaintiff(s): Martin Griswold et al. Defendant(s): Monsanto Company In the Circuit Court of the City of St. Louis, State of Missouri. (Supported Plaintiffs)	Exposure to Roundup Deposed 10/6-7/2022	On-Going	WL-22-001 Case No. 1922-CC11226, 1922-CC11237, 1922-CC09039, 1922-CC10879, 1922-CC09140.	2022 to Present
Ms. Mariah Gondeiro Advocates for Faith & Freedom Southern California Murrieta, CA 92562	Plaintiff(s): Calvary Chapel San Jose, a California Non-Profit Corporation; Pastor Mike McClure, an Individual; Southridge Baptist Church of San Jose California dba Southridge Church, a California Non-Profit Corporation; Pastor Micaiah Irmler, an individual; Plaintiffs, vs. Defendant(s): Gavin Newsom, in his official capacity as the Governor of California, Tomas Aragon. M.D., in her official capacity as the acting California Public Health Officer: Santa Clara County; Sarah H. Cody, MD, in her official capacity as Santa Clara County Public Health Officer; Mike Wasserman, in his official capacity as Santa Clara County Supervisor; Cindy Chavez, in her official capacity as a Santa Clara Cunty Supervisor; Dave Cortese, in his official capacity as a Santa Clara Count Supervisory; Susan Ellenberg, in her official capacity as a Santa Clara County Supervisor; Joe Simitian, in his official capacity as a Santa Clara County Supervisor; and The Santa Clara County Board of Advisors, Defendants. (Plaintiff in the Federal Case and Defendant in the State Case).	Mask Mandates	Deposed 1/17/23 & 3/8/23 (Federal Case)	Case No. 20-cv-03794	2022-2023
Mr. Christopher Lin U.S. Army Trial Defense Service Pacific Rim Region (Hawaii Field Office)	Plaintiff(s): Department of the Army Office of the Center Judge Advocate, Tripler Army Medical Center, Tripler AMC, Hawaii 96859 Defendant(s): Major Kyle M. Robins, Medical Company, Desmond T. Doss Health Clinic, Schofield Barracks, Hawaii (Supported Defendants)	Mask Mandates Testified via Zoom at Hearing on 1/23/23	Decision Reached	-	2022-2023
Mr. William Pierson Law Office of William E. Pierson, Jr./PC The Delmar Building 108 S. Washington St., Suite 202 Seattle, WA 98104	Plaintiff(s): State of Washington, Department of Health, Chiropractic Quality Assurance Commission Defendant(s): Gordon A. Myco (Supported Defendant)	Mask Mandates Report Submitted as Testimony to Commission on 1/25/23	Plaintiff Decision – Under Appeal	No. M2021-722	2022-2023

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Mr. R. Dean Hartley Hartley Law Group, PLLC 7 Pine Avenue Wheeling, WV 26003	Plaintiff(s): Toni L. Snoke and Brian Snoke, her husband Defendant(s): Covestro LLC	Exposure to Benzene	Negotiated Settlement	HAR-22-002	2022-2025
Mr. R. Dean Hartley Hartley Law Group, PLLC 7 Pine Avenue Wheeling, WV 26003	Plaintiff(s): Justin R. Nisperly Defendant(s): Hess Corporation, Gulfport Energy Corporation, Antero Resources Corporation, Heritage Cooperative, Inc., Pilot Thomas Logistics, LLC, Sandbox Logistics, LLC, Taylor Frac, LLC, Stingray Energy Services, LLC, Profrac Services, LLC. (Supported Plaintiff)	Frac Sand, Diesel Fumes and Exhaust, and other toxic chemical products.	Negotiated Settlement 04/2025	HAR-23-001 Case No. 23-CV-141	2023-2025
Ms. Jo Anna Pollock Simmons Hanly Conroy One Court Street Alton, IL 62002	Plaintiff(s): Plaintiffs Steven McKay, Susan Scheufele, Neely Jack, Dawn Baughman, David Anderson, James Ross, Jon Luke Affeltranger, Rosemary Mozuch, Charles Mozuch, Lance Beck, Clarissa Cohan, Rollerena Auto Sales LLC, Harold Feezle, DalQan Holdings, LLC, Valley View MPH LLC, Competition & Luxury Vehicle Club of Darlington, LLC (together, "Plaintiffs") filed a Master Consolidated Class Action Complaint on May 4, 2023. Dkt. No. 31. (Kayla Baker and Gregory Swan also were originally named Plaintiffs, but the Court granted their motion to withdraw, as both Plaintiffs and proposed class representatives, on March 13, 2024.) Plaintiffs filed their First Amended Master Consolidated Class Action Complaint on August 14, 2023, to include claims against new Defendants OxyVinyls LP, GATX Corporation, General American Marks Company, and Trinity Industries Leasing Company Class Action for impacted Plaintiffs – Settlement included: Residents, property owners, and businesses located within 20 miles of the Derailment Site in East Palestine, Ohio. Settlement Class Members: Seth A. Katz of Burg Simpson Eldredge Hersh & Jardine, P.C.; M. Elizabeth Graham of Grant & Eisenhofer P.A.; and Jayne Conroy of Simmons Hanly Conroy. The Court also appointed T. Michael Morgan of Morgan & Morgan, P.A. as a Co-Lead Counsel (see: https://www.classaction.org/media/east-palestine-train-derailment-settlement-agreement.pdf.) Defendant(s): Norfolk Southern Corporation and Norfolk Southern Railway Company, OxyVinyls LP, GATX Corporation, General American Marks Company, and Trinity Industries Leasing Company, et al. In the in the U.S. District Court for the Northern District of Ohio	Norfolk RR Derailment in East Palestine, OH & resulting environmental contamination (VOCs, SVOCs, VC, PAHs, Furans and Dioxins	Negotiated Settlement 05/2024	SIM-23-001 Case No.: East Palestine Train Derailment, Case No. 4:23-cv-00242-BYP	2023-2024

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ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	(Supported Plaintiffs)				
Mr. Ted Gianaris PHV 19151-2022 Gianaris Trial Lawyers One Court Street Alton, IL 62002	Plaintiff: Mr. Jason Derrick Gimmy. Defendants: Shell USA (f/k/a Shell Oil Company and Equilon Enterprises, LLC); BP Products North America, Inc.; Apex Oil Company, Inc.; Sinclair Oil Company; and Premcor Refining Group. Court: In the Circuit Court of the Third Judicial Circuit, Madison County, IL. (Supported Plaintiff)	Benzene from Petroleum Products	On-Going	GIA-23-001 Case No. 2022LA001325	2023-Present
Mr. Ted Gianaris PHV 19151-2022 Gianaris Trial Lawyers One Court Street Alton, IL 62002	Plaintiff: Greg J. Wasserman. Defendants: CSX Transportation, Inc. Court: In the Court of Common Pleas, Cuyahoga County, Ohio. Judge: Honorable Shannon M. Gallagher (Supported Plaintiff)	Diesel Fumes and Exhaust, Diesel Fuel and Benzene-Containing Products Deposed on 3/14/2025 & 3/18/2025	Negotiated Settlement 02/2026	GIA-23-002 Case No. 962507	2023-2026
Mr. Ted Gianaris PHV 19151-2022 Gianaris Trial Lawyers One Court Street Alton, IL 62002	Plaintiff: Mr. Luis Jimenez and Mrs. Maria Jimenez. Defendants: Johnson & Johnson, Chattem, Inc., a Sanofi Company, d/b/a Gold Bond, Block Drug Company, Inc., Block Drug Corporation, The Gold Bond Sterilizing Powder Company, Walmart, Inc., Walgreens, Co., Dr. Scholls, LLC, Premier Brands of America, Inc., Dollar General Corporation, Whittaker, Clark & Daniels, Inc., Brenntag Specialties, Inc., Brenntag North America, Charles B. Chrystal Company, Inc., Stephan Co., individually and as successor-in-interest to Old 97 Company, Vi-Jon, LLC, Merck & Co., Inc., Pfizer, Inc., Rio Tinto Minerals, Inc., Barretts Minerals, Inc., Specialty Minerals, Inc., Perrigo Company, Bayer Consumer Care Holdings, LLC, f/k/a Bayer Consumer Care, Inc., Bayer Health Care, LLC, a subsidiary of Bayer AG, Family Dollar Stores, Inc., Waste Management of Illinois, Inc., Waste Management, Inc., BFI Waste Systems of North America, LLC, Browning-Ferris Industries of Illinois, BFI Modern Landfill, Inc., Allied Waste Services of North America, LLC, d/b/a Republic Services, Allied Wast Industries, Inc., Onyx Waste Services, Inc., Veolia ES Solid Waste Midwest, Inc., Advanced Disposal Services Solid Waste Midwest, LLC, Advanced Disposal Services Orchard Hills Landfill, Zion Landfill, Inc., and Groot Industries, Inc.. Court: In the Circuit Court of Cook County, Illinois County Department, Law Division. (Supported Plaintiffs).	Baby Powder Products (containing asbestos) by Johnson and Johnson, Walmart (Equate) and Dollar General (DG Body)	On-Going	GIA-23-003 Case No. 2023-L-011613	2023-Present

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Mr. R. Dean Hartley, Attorney & Owner, Hartley Law Group, PLLC 7 Pine Ave, Wheeling, WV 26003	Plaintiff: David Miller Defendants: GENERAL MOTORS LLC, a Delaware limited liability company, SAFETY-KLEEN SYSTEMS, INC., a Wisconsin corporation, SHELL CHEMICAL, LP, d/b/a Shell Oil Company, a Delaware limited partnership, EXXON MOBIL CORPORATION, a New Jersey corporation, HESS CORPORATION, a Delaware corporation, BP AMOCO CHEMICAL COMPANY, as successor-in-interest to BP Chemicals, Inc., a Delaware corporation, BP PRODUCTS NORTH AMERICA, INC., as successor-in-interest to BP Exploration & Oil, Inc., d/b/a BP Oil Company, a Maryland corporation, THE B'LASTER CORPORATION, an Ohio corporation, CRC INDUSTRIES, INC., a Pennsylvania corporation, 3M COMPANY, a Delaware corporation, E.I. DU PONT DE NEMOURS AND COMPANY, a Delaware corporation, GENUINE PARTS COMPANY, a Georgia corporation, HENKEL CORPORATION, individually and as successor-in-interest by merger or acquisition to Loctite Corporation, a Delaware corporation, WD-40 COMPANY, a Delaware corporation, UNITED STATES STEEL CORPORATION, as successor-in-interest to USX Corporation, USS Chemicals Division, a Delaware corporation, NITEO PRODUCTS, LLC, a Delaware limited liability company, TECHNICAL CHEMICAL COMPANY, a Texas corporation, BERRYMAN PRODUCTS OF DELAWARE, INC., as successor-in-interest by merger or acquisition to Berryman Products, Inc., a Delaware corporation (Supported Plaintiff)	Auto Mechanic, Gasoline, Diesel, Diesel Exhaust, Benzene-Containing Products	Negotiated Settlement 2025	HAR-23-002	2023-Present
Weitz & Luxenberg P.C. Ms. Robin Greenwald Mr. James Bilsborrow 700 Broadway New York, NY 10003	Plaintiff(s): Morland, Jr., Emory Defendant(s): Monsanto Company In the United States District Court for the Southern District of Georgia, Brunswick Division BRUNSWICK DIVISION (Supported Plaintiffs)	Exposure to Roundup Deposed on 12/31/2024	On-Going	WL-24-001 Case No. 2:20-cv-24	2024-Present
Mr. Wesley A. Bowden, Esq. Levin Papantonio Rafferty, Proctor, Buchanan, O'Brien, Barr and Mougey, P.A. 316 South Baylen Street Pensacola, FL 32502, etc.	Plaintiff(s): Plaintiffs' Steering Committee – State of North Carolina, ex. Rel. Joshua H. Stein, Attorney General. Defendant(s): 3M Company, E. I. du Pont de Nemours and Company and its related entities including the Chemours Company (referred to collectively as "DuPont"). State of North Carolina, County of Cumberland, In the General Court of Justice, Superior Court Division.	PFAS's and GenX Deposed on 2/27/2025	On-Going	LEV-24-002 Case No.: 20-CV-55612	2024-Present

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	(Supported Plaintiffs).				
Weitz & Luxenberg P.C. Ms. Robin Greenwald Mr. James Bilsborrow 700 Broadway New York, NY 10003	Plaintiff(s): Hoge, W.L. Defendant(s): Monsanto Company United States District Court, Northern District of California, Case No.: MDL No. 2741 (Supported Plaintiffs)	Exposure to Roundup Deposed on 04/25/2024	On-Going	WL-24-002 Case No. 3:19-cv-04606-VC	2024-Present
Mr. Raphael Metzger, ESQ., SBN 116020 Metzger Law Group 555 E. Ocean Blvd., Suite 800 Long Beach, CA 90802	Plaintiff(s): Plaintiff: Mr. Gustavo Reyes-Gonzalez. Defendants: AAROHA RADIANT MARBLE & GRANITE SLABS, a California corporation; ANTOLINI LUIGI & CSPA, an Italian corporation; ARCHITECTURAL SURFACES, INC. a Texas corporation; ARIZONA TILE, L.L.C., an Arizona limited liability company; AZZARI APPLIANCES, PLUMBING, FLOORING, CABINETS LLC, a California limited liability company; BEST CHEER STONE INC. a California corporation; CAESARSTONE USA, INC., a California corporation; C&C NORTH AMERICA, INC., a Delaware corporation; CAMBRIA COMPANY LLC, a Minnesota corporation; COLOR MARBLE STONE, INC. a California corporation; COMPAC QUARTZ INC. a corporation; COSENTINO GROUP, a Spanish corporation; DAL-TILE DISTRIBUTION, INC., a Delaware corporation; E. I. DUPONT DE NEMOURS AND COMPANY a Delaware corporation; ELITE STONE & CABINET, INC., a California corporation; F A INTERNATIONAL STONE COMPANY, a business entity; GRAMAR STONE CENTER, INC. a California corporation; INTERNATIONAL MARBLE & GRANITE SUPPLY COMPANY an Illinois corporation; JACOBE ENTERPRISES, INC., a California corporation; M S INTERNATIONAL INC., a California corporation; MARBLE SYSTEMS, INC. a Virginia corporation; MARBOLIS INC. a California corporation; MARMOL EXPORT CORPORATION a California corporation; NGY GROUP (ORANGE COUNTY) INC. a California corporation; OLLIN INTERNATIONAL, INC. a California corporation; PACIFIC SHORE STONES LLC a California limited liability company; PACIFIC STONE DESIGN, INC., a California corporation; PACIFIC STONE DESIGN CENTER, INC., a California corporation; PACIFICA TILE & STONE, INC., a California corporation; PARAGON INDUSTRIES, INC., a California corporation; PARSODA U.S.A., INC., a California corporation; PENTAL GRANITE AND MARBLE, LLC, a Washington corporation; POLAR STONE US, a California corporation; QORTSTONE, INC. a California corporation; STONE STUDIO INC. a California corporation; STONEWARE ENTERPRISES a California	Exposure to Silica Deposed on 05/06-08/2024 Testified in Trial on 07/08-09/2024	Decision for the Plaintiffs – 2024-08-07	MET-23-001 Case No. 22STCV31907	2023-2024

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	corporation; STRICTLY STONES a business entity; SURFACE CONCEPTS & SLABS, INC., a California corporation; T&L GRANITE COUNTERTOP WAREHOUSE a business entity; TERRAZZO & MARBLE SUPPLY CO. OF ILLINOIS, an Illinois corporation; THE SLAB STUDIO a business entity; US SURFACE WAREHOUSE, LP a Texas limited partnership; VADARA QUARTZ SURFACES a California business entity; VENETIAN TILE & STONE GALLERY, a Nevada corporation; WALKER ZANGER, INC., a New York corporation and DOES 1 through 100, inclusive, Defendants. Court: Superior Court of the State of California for the County of Los Angeles, Central District. (Supported Plaintiffs)				
Weitz & Luxenberg P.C. Ms. Robin Greenwald Mr. James Bilsborrow 700 Broadway New York, NY 10003	Plaintiff(s): Delorme-Barton, Karen Defendant(s): Monsanto Company United States District Court, Northern District of California, Case No.: MDL No. 2741 (Supported Plaintiffs)	Exposure to Roundup Deposed on 11/20/2024	Negotiated Settlement 2025-01-30	WL-24-003 Case No. 3:16-cv-02741-VC	2024-2025
Weitz & Luxenberg P.C. Ms. Robin Greenwald Mr. Gregory Stamatopoulos 700 Broadway New York, NY 10003	Plaintiff(s): Stephen Klein; part of Judy Abernathy, et al. Defendant(s): Monsanto Company In the Circuit Court of St. Louis County, State of Missouri (Supported Plaintiffs)	Exposure to Roundup	Negotiated Settlement 2024-08-08	WL-24-004 Case No. 19SL-CC00607	2024
Mr. R. Dean Hartley, Attorney & Owner, Hartley Law Group, PLLC 7 Pine Ave, Wheeling, WV 26003	Plaintiff(s): Browning, Jerry A. Defendant(s): CSX Transportation, Inc., a Virginia corporation In the Circuit Court of Kanawha County, WV (Supported Plaintiffs)	Exposure to Asbestos, Diesel Fuel, Diesel Exhaust, Creosote, Silica and Pesticides. Deposed on 2/28/2025	Negotiated Settlement 2025-04-15	HAR-24-001 Civil Action No. 23-C-213	2024-2025
Weitz & Luxenberg P.C. Ms. Robin Greenwald Mr. James Bilsborrow 700 Broadway New York, NY 10003	Plaintiff(s): Lacey & Mark Storms Defendant(s): Monsanto Company In the Circuit Court of Northern District of California.	Exposure to Roundup	Ongoing	WL-24-005 Case No. 2023 L 003158	2024-Present
Weitz & Luxenberg P.C. Ms. Robin Greenwald 700 Broadway New York, NY 10003	Plaintiff(s): John "Jay" Rossman Defendant(s): Monsanto Company In the Circuit Court of Cook County, IL, 2 County Department – Law Division.	Exposure to Roundup Deposed on 11/20/2024	Negotiated Settlement 2025-01-30	WL-24-006 Case No. 2023 L 003158	2024-2025
Weitz & Luxenberg P.C. Mr. Gregory Stamatopoulos	Plaintiff(s): Rebecca Dietrich f/k/a Rebecca Gebo as the personal Representative of the Estate of Ronald Gebo,	Exposure to Roundup	Ongoing	WL-24-007	2024-Present

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ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Weitz & Luxenberg The Fisher Building 3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	Deceased. Defendant(s): Monsanto Company In the Circuit Court of the Norther District of California.	Deposed on 5/22/2025		MDL No. 2741 Case No. 3:16-md-02741-VC Case No. 3:17-cv-00168-VC	
Weitz & Luxenberg P.C. Ms. Robin Greenwald 700 Broadway New York, NY 10003	Plaintiff(s): Adam Byrd, et al., including Samuel Romano, Jr., Defendant(s): Monsanto Company. In the Circuit Court of County of St. Louis, State of Missouri.	Exposure to Roundup Deposed on 12/10/2024	Negotiated Settlement 2025-04-30	24-008 Case No. 18SL-CC03320	2024-2025
Weitz & Luxenberg P.C. Ms. Robin Greenwald 700 Broadway New York, NY 10003	Plaintiff(s): Terry Aikins, et al., including Jeremy Guess. Defendant(s): Monsanto Company. In the Circuit Court of the County of St. Louis, State of Missouri.	Exposure to Roundup	Closed	24-008 Case No. 18SL-CC04847	2024-2024
Weitz & Luxenberg P.C. Ms. Robin Greenwald 700 Broadway New York, NY 10003	Plaintiff(s): Richard Carlson, et al., including estate of Hazel Wise. Defendant(s): Monsanto Company In the Circuit Court of the County of St. Louis, State of Missouri.	Exposure to Roundup Deposed on 12/20/2024	Negotiated Settlement 2025-04-30	24-008 Case No. 19SL-CC05786	2024-2025
Weitz & Luxenberg P.C. Ms. Robin Greenwald 700 Broadway New York, NY 10003	Plaintiff(s): Adam Byrd, et al., including Wayne Sharp. Defendant(s): Monsanto Company In the Circuit Court of the County of St. Louis, State of Missouri.	Exposure to Roundup Deposed on 12/17/2024	Negotiated Settlement 2025-04-30	24-008 Case No. 118SL-CC03320	2024-2025
Weitz & Luxenberg P.C. Ms. Robin Greenwald 700 Broadway New York, NY 10003	Plaintiff(s): Terry Aikins, et al., including Thomas Hughen. Defendant(s): Monsanto Company. In the Circuit Court of the County of St. Louis, State of Missouri.	Exposure to Roundup Deposed on 12/20/2024	Negotiated Settlement 2025-04-30	24-008 Case No. 18SL-CC04847	2024-2025
Weitz & Luxenberg P.C. Ms. Robin Greenwald 700 Broadway New York, NY 10003	Plaintiff(s): Terry Aikins, et al., including LaVanna Danielson-Wright. Defendant(s): Monsanto Company In the Circuit Court of the County of St. Louis, State of Missouri.	Exposure to Roundup Deposed on 12/10/2024	Negotiated Settlement 2025-04-30	24-008 Case No. 18SL-CC04847	2024-2025
Mr. Raphael Metzger, ESQ., SBN 116020 Metzger Law Group 555 E. Ocean Blvd., Suite 800 Long Beach, CA 90802	Plaintiff: Mr. Jose Raul Garcia-Leon Defendants: ADB GLOBAL TRADE, LLC, an Illinois limited liability company; AGOURA HILLS MARBLE AND GRANITE, INC., a California corporation; AKG TRADING (USA), INC., a California corporation; ARCHITECTURAL SURFACES, INC., a Texas corporation; ARIZONA TILE, L.L.C., an Arizona limited liability company; ARRIAGA USA, INC., a California corporation; BEST CHEER STONE INC., a California corporation; C & C NORTH AMERICA, INC., a Delaware	Exposure to Silica Deposed on 12/23/2024 402 Hearing: March 4-6, 2025 Testified in Trial:	Ongoing	MET-24-001 Case No. 23STCV11602	2024-Present

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	corporation; CAESARSTONE USA, INC., a California corporation; CAMBRIA COMPANY LLC, a Minnesota corporation; COLOR MARBLE INC., a California corporation; COMPAC USA INC., a Florida corporation; COSENTINO GROUP, a Spanish corporation; CSI – ALL THINGS STONE, a Canadian business entity; CSS DISTRIBUTIONS, INC., a California corporation; DAL-TILE DISTRIBUTION, INC., a California corporation; DELTA STONE PRODUCTS, INC., a Utah corporation; DMD MARBLE & GRANITE, INC., a California corporation; DOUBLE BAY COMPANY, INC., a Hawaii corporation; E. I. DUPONT DE NEMOURS AND COMPANY, a Delaware corporation; EMPIRE MARBLE & GRANITE, INC., a California corporation; EUROSTONE AMERICA INTERNATIONAL INC., a California corporation; EUROPEAN MARBLE & GRANITE, a business entity; EUROPEAN SURFACES LLC, a California limited liability company; FRANCINI, INC., a California corporation; G&G MARBLE & QUARTZ, INC., a California corporation; GLOBAL STONE TRADING, INC., a California corporation; GMG STONE, INC., a California corporation; IMPERIAL TILE & STONE, a business entity; INTERNATIONAL MARBLE & GRANITE SUPPLY, INC., an Illinois corporation; JACOBE ENTERPRISES, INC., a California corporation; LX HAUSYS AMERICA INC., a New Jersey corporation; MS INTERNATIONAL INC., a California corporation; MODERN STONE INC., a California corporation NEW MARBLE UNLIMITED, INC., a California corporation; PACIFIC SHORE STONES, LLC, a California limited liability company; PACIFIC STONE TILE & MARBLE, a business entity; PARAGON INDUSTRIES, INC., a California corporation; PARSODA U.S.A., INC., a California corporation; PENTAL GRANITE AND MARBLE, LLC, a Washington limited liability company; PLANET STONE, INC., a California corporation; SAN FERNANDO MARBLE & GRANITE INC., a California corporation; SEIEFFE CORPORATION, a California corporation; SOUTHLAND STONE U.S.A., INC., a California corporation; STONE MART CORP., a California corporation; STONEVILLE USA, INC., a California corporation; STYLENQUAZA LLC, a Texas limited liability company; TRI-STONE & TILE, INC., a California corporation; VADARA QUARTZ SURFACES, a business entity; VERONA QUARTZ, INC., a California corporation; WALKER ZANGER, INC., a New York corporation; and DOE DEFENDANTS Nos. 1 through 100, inclusive, Defendants. Court: Superior Court of the State of California for the	April 29-30, 2025			

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	County of Los Angeles, Central District.				
Mr. Wesley A. Bowden, Esq. Levin Papantonio Thomas Mitchell Rafferty & Proctor, P.A. 316 South Baylen Street Pensacola, FL 32502	IN RE: Aqueous Film-Forming Foams (AFFF) Professional Injury Liability Litigation In the United States District Court for the District of South Carolina Charleston Division (Supported Plaintiff(s))	AFFF Expert Support Deposed 5/2/2025	On-going	LEV-22-002 MDL No.: 2:18-mn-2873-RMG	2022-Present
Mr. Raphael Metzger, ESQ., SBN 116020 Metzger Law Group 555 E. Ocean Blvd., Suite 800 Long Beach, CA 90802	Plaintiff: Mr. Jose Guadalupe-Rodriguez Defendants: AKG TRADING (USA), INC.; ANTOLINI LUIGI & C. S.P.A.; ARCHITECTURAL SURFACES GROUP, LLC; ARIZONA TILE, L.L.C.; ARRIAGA USA, INC. (DBA STONELAND USA); BELLA STONE & TILE; BMOSAICS, INC. (DBA IMPERIAL TILE & STONE); C & C NORTH AMERICA, INC.; CAB620, INC. (FKA PARSODA U.S.A., INC., DBA PACIFICA WHOLESALE TILE & STONE) CAESARSTONE LTD (FKA CAESARSTONE SDOT-YAM LTD.); CAESARSTONE USA, INC.; CAMBRIA COMPANY LLC; COLOR MARBLE, INC.; CMI PROJECT GROUP INC.; COLORQUARTZ USA INC.; COMPAC CORPORATE SOCIEDAD LIMITED; COMPAC USA INC; COSENTINO GLOBAL SOCIEDAD LIMITADA; COSENTINO INDUSTRIAL SA; COSENTINO SA; COSTCO WHOLESALE CORPORATION; DAL-TILE DISTRIBUTION, LLC; DAL-TILE INTERNATIONAL INC.; DAL-TILE TENNESSEE, LLC; DAL-TILE, LLC; DMD MARBLE & GRANITE, INC.; DURANGO MARBLE & GRANITE LLC; EIDP, INC. (FKA E. I. DU PONT DE NEMOURS AND COMPANY); ELIT TILE CORP.; ELITE QUARTZ MFG LLC; ELITE STONE GROUP INC (FKA ELITE STONE & CABINET INC.) ELITE STONE INC., FRANCINI, INC.; G & G MARBLE & QUARTZ, INC.; HIRSCH GLASS CORP.; HOME DEPOT U.S.A., INC.; HYUNDAI L&C USA, INC.; HYUNDAI L&C USA LLC; IKEA US RETAIL LLC; JACOBE ENTERPRISES, INC.; LOWE'S HOME CENTERS, LLC; LX HAUSYS AMERICA, INC.; M S INTERNATIONAL, INC.; MOHAWK INDUSTRIES, INC.; NEW MARBLE UNLIMITED, INC.; O M G STONE WORKS INC. (DBA OLYMPIA MARBLE & GRANITE); OLYMPUS MARBLE INC., PACIFIC SHORE STONES, LLC; RIO MARBLE & TILE INC.; RIO STONES, INC.; RMC | EUROSURFACES PORTUGAL, S.A; S. & E. STONE, INC.; SAN FERNANDO MARBLE & GRANITE INC.; STONE MART CORP. STONEVILLE USA, INC.; SURFACE WAREHOUSE, L.P.; UNITED MARBLE & TILE, INC.; VERONA QUARTZ INC.; VERONA QUARTZ SURFACES, LLC; WALKER & ZANGER, LLC; WEST COAST MARBLE AND GRANITE, INC.; and Doe Defendants	Exposure to Silica	Ongoing	MET-24-005 Case No. 23STCV08440	2024-Present

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	1 – 100 Defendants. Court: Superior Court of the State of California for the County of Los Angeles, Central District.				
Mr. Raphael Metzger, ESQ., SBN 116020 Metzger Law Group 555 E. Ocean Blvd., Suite 800 Long Beach, CA 90802	Plaintiff: Mr. Cesar Manuel Gonzalez Quiroz Defendants: AMERICAN MARBLE & ONYX COMPANY, INC.; ANTOLINI LUIGI & C. S.P.A.; ARCHITECTURAL SURFACES GROUP, LLC; ARIZONA TILE, L.L.C.; ARRIAGA USA, INC. (DBA STONELAND USA); BEST CHEER STONE INC.; BEST-WAY MARBLE & TILE CO., INC.; BMOSAICS, INC. (DBA IMPERIAL TILE & STONE); C & C NORTH AMERICA, INC.; CAB620, INC. (FKA PARSODA U.S.A., INC., DBA PACIFICA WHOLESALE TILE & STONE); CAESARSTONE LTD (FKA CAESARSTONE SDOT-YAM LTD.); CAESARSTONE USA, INC.; CALIFORNIA-QUARTZ; CAMBRIA COMPANY LLC; CMI PROJECT GROUP, INC.; COLOR MARBLE INC.; COLORQUARTZ USA INC.; COMPAC ATLANTA, LLC; COMPAC CORPORATE SOCIEDAD LIMITADA; COMPAC QUARTZ, INC.; COMPAC USA INC.; COSENTINO INDUSTRIAL SA; COSENTINO GLOBAL SOCIEDAD LIMITADA; COSENTINO SA; COSTCO WHOLESALE CORPORATION; DAL-TILE DISTRIBUTION, LLC; DAL-TILE INTERNATIONAL INC.; DAL-TILE, LLC; DAL-TILE TENNESSEE, LLC; DELTA STONE PRODUCTS, INC.; EIDP, INC. (FKA E. I. DU PONT DE NEMOURS AND COMPANY); ELITE QUARTZ MFG LLC; EMPIRE MARBLE AND GRANITE, INC.; EURO STONE AMERICA INTERNATIONAL, INC.; EUROPEAN SURFACES LLC (DBA EUROSTONE); FRANCINI, INC.; GEM INTERNATIONAL, INC.; GLOBAL STONE TRADING, INC.; HIRSCH GLASS CORP; HOME DEPOT U.S.A., INC.; HYUNDAI L&C USA, INC.; HYUNDAI L&C USA LLC; ICESTONE, LLC; IKEA US RETAIL LLC; JACOBE ENTERPRISES, INC.; LOWE'S HOME CENTERS, LLC; LX HAUSYS AMERICA, INC.; M S INTERNATIONAL, INC.; MODERN STONE, INC; MOHAWK INDUSTRIES, INC.; NEW MARBLE UNLIMITED, INC.; PACIFIC SHORE STONES, LLC; PACIFICA TILE & STONE, INC.; PARAGON INDUSTRIES, INC. (DBA BEDROSIANS TILE & STONE); PLANET STONE, INC.; POLYCOR VETRAZZO, INC.; QUARTZ MASTER LLC; RAPHAEL STONE CA, INC.; SAN FERNANDO MARBLE & GRANITE INC.; SEIEFFE CORPORATION; SOUTHLAND STONE, U.S.A., INC.; SPECTRUM QUARTZ LLC; STONE GALLERY, LLC; STONE MART CORP.; STONETILEDEPOT OF VIRGINIA LLC; STONETILEDEPOT.COM, LLC;	Exposure to Silica Deposed on 3/11/2025 & 3/28/2025 402 Hearing on 1/16/2026	Ongoing	MET-24-002 Case No. 24STCV01477	2024-Present

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	STONEVILLE USA, INC.; SURFACE WAREHOUSE, L.P.; THE PLANET STONE GLOBAL CORPORATION; VERONA QUARTZ INC.; VERONA QUARTZ SURFACES LLC; WALKER & ZANGER, LLC; WILSONART LLC; and Doe Defendants 1 - 100, inclusive, as required by California law on joint and several liability pursuant to California Civil Code § 1431.2 enacted by the People of the State of California.. Court: Superior Court of the State of California for the County of Los Angeles, Central District.				
Mr. Raphael Metzger, ESQ., SBN 116020 Metzger Law Group 555 E. Ocean Blvd., Suite 800 Long Beach, CA 90802	Plaintiffs: Mr. Juan Rodrigo Gonzales-Morin (deceased), Maria Del Socorro Sanchez-Quezada, as Guardian ad Litem of her minor daughters, Alondra Gonzalez, Candelaria Gonzalez, and Blanca Lizeth Virgen Sanchez, and in that representative capacity, as Successor in Interest of Decedent, Juan Rodrigo Gonzales-Morin. Defendants: 101 GRANITE COUNTERTOP LLC, a California limited liability company (previously sued as Doe Defendant No. 1); AMAZING TILE & STONE, LLC, a California limited liability company (previously sued as Doe Defendant No. 2); ANTONIELLO & CO., INC., a California corporation (previously sued as Doe Defendant No. 3); ARCHITECTURAL SURFACES, INC., a Texas corporation; ARIZONA TILE, L.L.C., an Arizona limited liability company; ARRIAGA USA, INC., a California corporation (previously sued as Doe Defendant No. 4); BEST CHEER STONE INC., a California corporation (previously sued as Doe Defendant No. 5); BREWSTER MARBLE CO., INC., a California corporation (previously sued as Doe Defendant No. 6); BUENA TILE SUPPLY, INC., a California corporation (previously sued as Doe Defendant No. 7); C & C NORTH AMERICA, INC., a Delaware corporation; CAL TILE CENTER, INC., a California corporation (previously sued as Doe Defendant No. 8); CAESARSTONE USA, INC., a California corporation; CAMBRIA COMPANY LLC, a Minnesota corporation; CERAMIC TILE ART, INC., a California corporation (previously sued as Doe Defendant No. 9); COLOR MARBLE INC., a California corporation (previously sued as Doe Defendant No. 10); COSENTINO GROUP, a Spanish corporation; CSS DISTRIBUTIONS INC., a California corporation (previously sued as Doe Defendant No. 11); DAL-TILE DISTRIBUTION, INC., a California corporation, (previously sued as Doe Defendant No. 12); E. I. DUPONT DE NEMOURS AND COMPANY a Delaware corporation; EDGEBANDING SERVICES INC., a California	Exposure to Silica Deposed on 12/27/2025 402 Hearing on 2/23/2026	Ongoing	MET-24-007 Case No. 22STCV37000	2024-Present

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ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	corporation (previously sued as Doe Defendant No. 13); EL SEGUNDO MARBLE & GRANITE, INC., a California corporation (previously sued as Doe Defendant no. 14); ELIT TILE CORP., a California corporation (previously sued as Doe Defendant No. 15); EURO STONE AMERICA INTERNATIONAL INC., a California corporation (previously sued as Doe Defendant No. 16); EUROPEAN ART STONE, INC., a California corporation (previously sued as Doe Defendant No. 17); EUROPEAN SURFACES LLC, a California limited liability company (previously sued as Doe Defendant No. 18); F & J MARBLE & TILE, a California business entity (previously sued as Doe Defendant No. 19); FOOTHILL TILE & STONE INC., a California corporation (previously sued as Doe Defendant No. 20); FRANCINI, INC., a California corporation; GEM INTERNATIONAL, INC., a California corporation (previously sued as Doe Defendant No. 21); GRANIX STONE, INC., a California corporation (previously sued as Doe Defendant No. 22); GREEK MARBLE, INC., a California corporation (previously sued as Doe Defendant No. 23); HEARTLAND BUILDERS INC., a California corporation (previously sued as Doe Defendant No. 24); HOMECO INC., a California corporation (previously sued as Doe Defendant No. 25); HYUNDAI L&C USA LLC, a California limited liability company (previously sued as Doe Defendant No. 26); IMPERIAL TILE & STONE, a California business entity (previously sued as Doe Defendant No. 27); INTERNATIONAL TILE & STONE, INC., a California corporation (previously sued as Doe Defendant No. 28); JACOBE ENTERPRISES, INC., a California corporation; JERUSALEM STONE COLLECTION, INC., a California corporation (previously sued as Doe Defendant No. 29); LIDAN CORPORATION, a California corporation (previously sued as Doe Defendant No. 30); LILLY INDUSTRIES, a California corporation (previously sued as Doe Defendant No. 31); M S INTERNATIONAL INC., a California corporation; M&M MARBLE & GRANITE, INC., a California corporation (previously sued as Doe Defendant No. 32); MAJESTIC GRANITE, INC., a California corporation (previously sued as Doe Defendant No. 33); MARBLE & TILE USA, INC., a California corporation (previously sued as Doe Defendant No. 34); MARBLE BROS, INC., a California corporation (previously sued as Doe Defendant No. 35); MARBLEX CORP., a California corporation (previously sued as Doe Defendant No. 36); MARBOLIS INC., a California corporation				

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	(previously as Doe Defendant No. 37); MODERN STONE INC., a California corporation (previously sued as Doe Defendant No. 38); MOUNT ENTERPRISES, INC., a California corporation (previously sued as Doe Defendant No. 39); NEW MARBLE UNLIMITED, INC., a California corporation (previously sued as Doe Defendant No. 40); OLLIN INTERNATIONAL, INC., a California corporation (previously sued as Doe Defendant No. 41); PACIFIC SHORE STONES, LLC, a California limited liability company (previously sued as Doe Defendant No. 42); PACIFICA TILE & STONE, INC., a California corporation; PARAGON INDUSTRIES, INC., a California corporation (previously sued as Doe Defendant No. 43); PARAMOUNT QUALITY STONE INC., a California corporation (previously sued as Doe Defendant No. 44); PARSODA U.S.A., INC., a California corporation; PENTAL GRANITE AND MARBLE, LLC, a Washington limited liability company; PLANET STONE, INC., a California corporation (previously sued as Doe Defendant No. 45); PRESTALE USA LP, a California limited partnership (previously sued as Doe Defendant No. 46); QORTSTONE, INC., a California corporation; RAPHAEL STONE CA, INC., a California corporation (previously sued as Doe Defendant No. 47); RIO MARBLE & TILE, INC., a California corporation (previously sued as Doe Defendant No. 48); RIO STONES, INC., a California corporation (previously sued as Doe Defendant No. 49); ROCK MILL TILE & STONE, a California business entity (previously sued as Doe Defendant No. 50); ROYAL STONE & TILE, a California business entity (previously sued as Doe Defendant No. 51); SAN FERNANDO MARBLE & GRANITE INC., a California corporation (previously sued as Doe Defendant No. 52); SOUTHLAND STONE U.S.A., INC., a California corporation (previously sued as Doe Defendant No. 53); STONE LIMITED INTL, INC., a California corporation (previously sued as Doe Defendant No. 54); STONE MART CORP., a California corporation (previously sued as Doe Defendant No. 55); STONE SOURCE, LLC, a California limited liability company (previously sued as Doe Defendant No. 56); STONE WEST, INC., a California corporation (previously sued as Doe Defendant No. 57); STONEVILLE USA, INC., a California corporation (previously sued as Doe Defendant No. 58); TERRAZZO & MARBLE SUPPLY CO. OF ILLINOIS, an Illinois corporation; THE WORLD OF STONE, a California business entity (previously sued as Doe Defendant No. 59); TRI-STONE & TILE, INC., a California corporation (previously sued as Doe Defendant No. 60); TROPICAL MARBLE &				

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	GRANITE, INC., a California corporation (previously sued as Doe Defendant No. 61); UNIVERSAL TILE & MARBLE, INC., a California business entity (previously sued as Doe Defendant No. 62); US SURFACES, a California business entity (previously sued as Doe Defendant No. 63); VADARA QUARTZ SURFACES a California business entity; VELAGUI STONE, INC., a California corporation, previously sued as Doe No. 64; VERONA QUARTZ, INC., a California corporation; WALKER ZANGER, INC., a New York corporation; WEST COAST MARBLE AND GRANITE, INC., a California corporation (previously sued as Doe Defendant No. 65); WESTSIDE TILE & STONE, INC., a California corporation (previously sued as Doe Defendant No. 66); ZUNIGA MARBLE & GRANITE, a California corporation (previously sued as Doe Defendant No. 67); and DOES DEFENDANTS Nos. 68 through 100, inclusive. Court: Superior Court of the State of California for the County of Los Angeles, Central District.				
Mr. Ted Gianaris PHV 19151-2022 Gianaris Trial Lawyers One Court Street Alton, IL 62002	Plaintiff: Michael Jerome Woodward Defendants: Norfolk Southern Railway Company Court: In the Circuit Court for Hamilton County, TN (Supported Plaintiff)	Diesel Exhaust, Blowing Dusts, Visible Silica Dusts and Welding Fumes Deposed on 4/3/2025	Negotiated Settlement on 1/26/2026	GIA-24-003 Civil Action No. 22C708	2024-2026
Weitz & Luxenberg P.C. Mr. Gregory Stamatopoulos The Fisher Building 3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	Plaintiff(s): Connie S. Finneman Defendant(s): Monsanto Company In the United States District Court, Eastern District of Missouri. & United States District Court, Northern District of California	Exposure to Roundup Deposed on 5/22/2025	On-Going	WL - 25-001 Case No. 4:18-cv-01792 & MDL. No. 2741 – Case No. 16-md-02741-VC	2025-Present
Weitz & Luxenberg P.C. Mr. Michael Piggins Weitz & Luxenberg The Fisher Building 3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	Plaintiff(s): Teopisto Abalde et al.; report specifically for the Jimmy D. Griffin Case Defendant(s): Monsanto Company In the Circuit Court of St. Louis County, State of Missouri.	Exposure to Roundup Deposed on 5/15/2025	On-Going	WL - 25-002 Case No. 19SL-CC01242	2025-Present
Weitz & Luxenberg P.C. Ms. Emma Dietz Weitz & Luxenberg The Fisher Building	Plaintiff(s): Betsy Morrigan et al.; report specifically for the Thanh-Van Williams Case Defendant(s): Monsanto Company	Exposure to Roundup Deposed on 5/14/2025	On-Going	WL - 25-003 Case No. 20SL-CC05216	2025-Present

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	In the Circuit Court of St. Louis County, State of Missouri.				
Weitz & Luxenberg P.C. Mr. Gregory Stamatopoulos The Fisher Building 3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	Plaintiff(s): Mr. Alanzo Chapell. Defendant(s): Monsanto Company In the Circuit Court of the St. Louis County, State of Missouri.	Exposure to Roundup	On-Going	WL - 25-004 Case No. 24SL-CC03950	2025-Present
Weitz & Luxenberg P.C. Mr. Gregory Stamatopoulos The Fisher Building 3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	Plaintiff(s): Kathryn Whealen. Defendant(s): Monsanto Company In the Circuit Court of the St. Louis County, State of Missouri.	Exposure to Roundup	On-Going	WL - 25-005 Case No. 24SL-CC-03970	2025-Present
Weitz & Luxenberg P.C. Mr. Gregory Stamatopoulos The Fisher Building 3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	Plaintiff(s): Joseph Benisch, et al., Defendant(s): Monsanto Company In the Circuit Court of the St. Louis County, State of Missouri.	Exposure to Roundup	On-Going	WL - 25-006 Case No. 19SL-CC05327	2025-Present
Mr. R. Dean Hartley, Attorney & Owner, Hartley Law Group, PLLC 7 Pine Ave, Wheeling, WV 26003	Plaintiff(s): Mr. Michael Gardill Defendant(s): Bayer US LLC, Employer State of West Virginia, Workers' Compensation Board of Review.	Exposure to Benzene	On-Going	WL - 25-001	2025-Present
Mr. R. Dean Hartley, Attorney & Owner, Hartley Law Group, PLLC 7 Pine Ave, Wheeling, WV 26003	Plaintiff(s): Stephanie Dempsey, Administratrix of the Estate of Carl Dempsey, Deceased. Defendant(s): Norfolk Southern Railway Company.	Diesel Fumes and Exhaust, Diesel Fuel and Benzene-Containing Products	On-Going	WL - 25-002	2025-Present
Weitz & Luxenberg P.C. Ms. Robin Greenwald 700 Broadway New York, NY 10003 Cooney & Conway Mr. Michael Cooney 120 North LaSalle Street, Suite 3000, Chicago, Illinois 60602-2415	Plaintiff(s): Cynthia Nack. Defendant(s): Monsanto Company Circuit Court of Cook County, IL, County Department – Law Division.	Exposure to Roundup Deposed on 1/27/2026	Negotiated Settlement 2026-02-25	WL - 25-014 Case No. 2024 L 005336	2025-2026
Weitz & Luxenberg P.C. Ms. Robin Greenwald 700 Broadway New York, NY 10003 Cooney & Conway Mr. Michael Cooney 120 North LaSalle Street, Suite 3000, Chicago, Illinois 60602-2415	Plaintiff(s): Susan Frantzen, individually and as Independent Administrator of the Estate David G. Frantzen. Defendant(s): Monsanto Company Circuit Court of Cook County, IL, County Department – Law Division.	Exposure to Roundup Deposed on 1/27/2026	Negotiated Settlement 2026-02-25	WL - 25-015 Case No. 2021 L 002818 (Consolidated with 2019 L 010612)	2025-2026

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
Weitz & Luxenberg P.C. Ms. Robin Greenwald 700 Broadway New York, NY 10003 Cooney & Conway Mr. Michael Cooney 120 North LaSalle Street, Suite 3000, Chicago, Illinois 60602-2415	Plaintiff(s): Caroline Hernandez. Defendant(s): Monsanto Company Circuit Court of Cook County, IL, County Department – Law Division.	Exposure to Roundup Deposed on 1/27/2026	Negotiated Settlement 2026-02-25	WL - 25-016 Case No. 24 L 004935	2025-2026
Weitz & Luxenberg P.C. Ms. Robin Greenwald 700 Broadway New York, NY 10003 Cooney & Conway Mr. Michael Cooney 120 North LaSalle Street, Suite 3000, Chicago, Illinois 60602-2415	Plaintiff(s): Joseph Laluya. Defendant(s): Monsanto Company Circuit Court of Cook County, IL, County Department – Law Division.	Exposure to Roundup Deposed on 1/27/2026	Negotiated Settlement 2026-02-25	WL - 25-017 Case No. 24 L 005335	2025-2026
Weitz & Luxenberg P.C. Ms. Robin Greenwald 700 Broadway New York, NY 10003 Cooney & Conway Mr. Michael Cooney 120 North LaSalle Street, Suite 3000, Chicago, Illinois 60602-2415	Plaintiff(s): Charles Powell. Defendant(s): Monsanto Company Circuit Court of Cook County, IL, County Department – Law Division.	Exposure to Roundup Deposed on 1/27/2026	Negotiated Settlement 2026-02-25	WL - 25-018 Case No. 24 L 4938	2025-2026
Weitz & Luxenberg P.C. Ms. Robin Greenwald 700 Broadway New York, NY 10003 Cooney & Conway Mr. Michael Cooney 120 North LaSalle Street, Suite 3000, Chicago, Illinois 60602-2415	Plaintiff(s): Mark Szymski. Defendant(s): Monsanto Company Circuit Court of Cook County, IL, County Department – Law Division.	Exposure to Roundup Deposed on 1/27/2026	Negotiated Settlement 2026-02-25	WL - 25-019 Case No. 24 L 005337	2025-2026
Weitz & Luxenberg P.C. Mr. Gregory Stamatopoulos The Fisher Building 3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	Plaintiff(s): Atlas Jones as part of: Dale Engel, Joshua D. Feldman, Penka Hristova, Donna Hutto, individually and on behalf of the Estate of Kevin Hutto, Jennifer Jackson; Atlas Jones, Paul Maselli, Individually and on behalf of The Estate of Elizabeth R. Maselli, Louie B. Webb, Jr. Defendant(s): Monsanto Company In the Circuit Court of the St. Louis County, State of Missouri.	Exposure to Roundup Deposed on 12/12/2025	On-Going	WL - 25-021 Case No. 24SL-CC03389	2025-Present
Weitz & Luxenberg P.C. Mr. Gregory Stamatopoulos	Plaintiff(s): Dale Engel as part of: Dale Engel, Joshua D.	Exposure to Roundup	On-Going	WL - 25-022	2025-Present

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
The Fisher Building 3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	Feldman, Penka Hristova, Donna Hutto, individually and on behalf of the Estate of Kevin Hutto, Jennifer Jackson; Atlas Jones, Paul Maselli, Individually and on behalf of The Estate of Elizabeth R. Maselli, Louie B. Webb, Jr. Defendant(s): Monsanto Company In the Circuit Court of the St. Louis County, State of Missouri.	Deposed on 12/11/2025		Case No. 24SL-CC03389	
Weitz & Luxenberg P.C. Mr. Gregory Stamatopoulos The Fisher Building 3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	Plaintiff(s): Paul Maselli, Individually and on behalf of The Estate of Elizabeth 'Robin" Maselli as part of: Dale Engel, Joshua D. Feldman, Penka Hristova, Donna Hutto, individually and on behalf of the Estate of Kevin Hutto, Jennifer Jackson; Atlas Jones, Paul Maselli, Individually and on behalf of The Estate of Elizabeth R. Maselli, Louie B. Webb, Jr. Defendant(s): Monsanto Company In the Circuit Court of the St. Louis County, State of Missouri.	Exposure to Roundup Deposed on 12/12/2025	On-Going	WL - 25-023 Case No. 24SL-CC03389	2025-Present
Weitz & Luxenberg P.C. Mr. Gregory Stamatopoulos The Fisher Building 3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	Plaintiff(s): Jennifer Jackston as part of: Dale Engel, Joshua D. Feldman, Penka Hristova, Donna Hutto, individually and on behalf of the Estate of Kevin Hutto, Jennifer Jackson; Atlas Jones, Paul Maselli, Individually and on behalf of The Estate of Elizabeth R. Maselli, Louie B. Webb, Jr. Defendant(s): Monsanto Company In the Circuit Court of the St. Louis County, State of Missouri.	Exposure to Roundup Deposed on 12/17/2025	On-Going	WL - 25-024 Case No. 24SL-CC03389	2025-Present
Weitz & Luxenberg P.C. Mr. Gregory Stamatopoulos The Fisher Building 3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	Plaintiff(s): Joshua Feldman as part of: Dale Engel, Joshua D. Feldman, Penka Hristova, Donna Hutto, individually and on behalf of the Estate of Kevin Hutto, Jennifer Jackson; Atlas Jones, Paul Maselli, Individually and on behalf of The Estate of Elizabeth R. Maselli, Louie B. Webb, Jr. Defendant(s): Monsanto Company In the Circuit Court of the St. Louis County, State of Missouri.	Exposure to Roundup Deposed on 12/17/2025	On-Going	WL - 25-025 Case No. 24SL-CC03389	2025-Present
Weitz & Luxenberg P.C. Mr. Gregory Stamatopoulos The Fisher Building 3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	Plaintiff(s): Donna Hutto, individually and on behalf of the Estate of Kevin Hutto as part of: Dale Engel, Joshua D. Feldman, Penka Hristova, Donna Hutto, individually and on behalf of the Estate of Kevin Hutto, Jennifer Jackson; Atlas Jones, Paul Maselli, Individually and on behalf of The Estate of Elizabeth R. Maselli, Louie B. Webb, Jr. Defendant(s): Monsanto Company In the Circuit Court of the St. Louis County, State of Missouri.	Exposure to Roundup Deposed on 12/12/2025	On-Going	WL - 25-026 Case No. 24SL-CC03389	2025-Present
Weitz & Luxenberg P.C. Mr. Gregory Stamatopoulos The Fisher Building 3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	Plaintiff(s): Louie Webb as part of: Dale Engel, Joshua D. Feldman, Penka Hristova, Donna Hutto, individually and on behalf of the Estate of Kevin Hutto, Jennifer Jackson; Atlas Jones, Paul Maselli, Individually and on behalf of The Estate	Exposure to Roundup Deposed on 12/11/2025	On-Going	WL - 25-027 Case No. 24SL-CC03389	2025-Present

ATTORNEY/LAW FIRM	CASE (Plaintiff(s) and Defendant(s) & Role	SUBJECT	DECISION	Project #/Case #	TIMEFRAME
	of Elizabeth R. Maselli, Louie B. Webb, Jr. Defendant(s): Monsanto Company In the Circuit Court of the St. Louis County, State of Missouri.				
Weitz & Luxenberg P.C. Mr. Gregory Stamatopoulos The Fisher Building 3011 W. Grand Blvd., 24th Floor Detroit, MI 48202	Plaintiff(s): Penka Hristova as part of: Dale Engel, Joshua D. Feldman, Penka Hristova, Donna Hutto, individually and on behalf of the Estate of Kevin Hutto, Jennifer Jackson; Atlas Jones, Paul Maselli, Individually and on behalf of The Estate of Elizabeth R. Maselli, Louie B. Webb, Jr. Defendant(s): Monsanto Company In the Circuit Court of the St. Louis County, State of Missouri.	Exposure to Roundup Deposed on 12/11/2025	On-Going	WL - 25-028 Case No. 24SL-CC03389	2025-Present
Brayton Purcell LLP Mr. James Nevin 222 Rush Landing Road Novato, CA 94945	Plaintiff: David Calef and Violeta Krasnic. Defendants: Unilever United States, Inc.; Conopco, Inc., Tigi Linea Corp., USA, Inc., Alberto-Culver International, Inc., Sauve Brands Company, LLC; CVS Pharmacy, Inc., Safeway, Inc., Target Corporation, Walgreen Company, Voyant Beauty, LLC (Formerly DOE 1); Kik Custom Products, Inc., Aerosols Danville, Inc.; Aeropres Corporation (Formerly DOE 2); Diversified CPC International, Inc. (Formerly DOE 3); Aux Sable Liquid Products LP (Formerly DOE 4); Aux Sable Liquid Products, Inc.; BP Energy Company, (Formerly DOE 5); DOES 6 through 300, inclusive, as required by California law on joint and several liability pursuant to California Civil Code § 1431.2 enacted by the People of the State of California, Court: In the Superior Court of the State of California for the County of San Francisco.	Exposures to Benzene in Dry Shampoo Products	Ongoing.	BRAY-26-001 Case #: CGC23607240	2026 - Present
Cory Watson, P.C. Mr. Jon C. Conlin, Principal 2131 Magnolia Ave. s Birmingham, AL 35205	Plaintiff(s): Ceramfab, Inc., Ceramsource, Inc, Yonggong, LLC, WYG Refractories, LLC and CeramSource, Inc. Defendant(s): Norfolk Southern Corporation and Norfolk Southern Railway Company. In the U.S. District Court for the Northern District of Ohio.	Chemical Contamination from Train Derailment and Burn.	On-Going	CWA - 26-001 Case No. 4:2023cv02206	2026 - Present

Case: 4:23-cv-02206-BYP Doc #: 117-5 Filed: 09/08/26 461 of 465. PageID #: 5497

Engineering & Expert Services, Inc.©

APPENDIX F

Retention Agreement – Rates and Terms and Conditions of

Stephen E. Petty, P.E., C.I.H., C.S.P./EES Group, Inc.

EES GROUP
ENGINEERING & EXPERT SERVICES
1701 E. Atlantic Boulevard · Suite 5 · Pompano Beach · FL 33060 · Phone: 754-220-8844 · Fax: 754-220-8783

January 28, 2026

Mr. Jon C. Conlin, Principal
Cory Watson, P.C.
2131 Magnolia Ave. s
Birmingham, AL 35205

Re: Stephen Petty Expert Witness Consulting Agreement and General Conditions

Dear Mr. Conlin,

Thank you for your interest in the expert witness services of Stephen Petty and EES Group, Inc. Below, please find our consulting agreement and General Conditions.

This agreement is entered into between Stephen E. Petty and EES Group, Inc., (Consultant), and Mr. Jon C. Conlin & Cory Watson Attorneys (Client).

The purpose of this agreement is to procure the services of Stephen Petty and EES Group, Inc. as an expert in CeramFab, Inc. et al., v. Norfolk Southern Corporation et al., OHND 23-cv-02206-BYP. EES Group, Inc. is not dependent upon the findings that they render, or on the outcome of any legal action, mediation, arbitration, or the amount or terms of any settlement of the underlying legal cause, nor on any contractual arrangement between Client and any other person or party.

Client shall not identify any EES Group, Inc. staff as testifying expert(s) until the expert agrees to be disclosed as a testifying expert. Until that time, and upon execution of this agreement, the EES Group, Inc. expert shall be designated as a consulting expert.

Fees for services provided by EES Group, Inc. follow. Out-of-pocket expenses will be billed at cost plus 10%:

Labor	Hour
Stephen E. Petty, P.E., C.I.H., C.S.P.	$625.00
Sr. Engineer	$325.00
Project Engineer	$250.00
Technician/ Industrial Hygienist	$225.00
Paralegal/Administrative Assistant	$125.00

For testimony at deposition or trial, Mr. Petty shall be compensated at the rate of $3,000 per half day (≤ 4 hours) and $5,000 per day (> 4 hours; maximum of 8 hours per day) plus travel and expenses if applicable. If continuous time for deposition/trial is to exceed eight hours, testimony will be billed as a second day, at the rates previously defined. The tabulated rates above shall apply to time while travelling, should it be necessary. These rates for testimony shall apply both while waiting to give testimony, whether at an office or court and for time taken for breaks or meals, as well as for time spent actually giving testimony. Deposition payments must be received by EES Group, Inc. prior to or at the start of the deposition in order for experts to testify. EES Group, Inc. reserves the right to cancel testimony if account balances are not current. If less than 48 hours' notice is given for the cancellation of a deposition or trial, a minimum of one-half day fee of $3,000 will be charged. The client is responsible for payments to EES Group, Inc. as outlined in this contract, regardless of any arrangement the client has with any party or parties he represents. EES Group, Inc. will issue invoices on a semi-monthly/monthly basis, or whatever other interval is deemed appropriate. Invoices are due upon receipt, and shall be considered delinquent if unpaid more than thirty days after their date of issuance. In the event that a bill remains unpaid for sixty or more days after the date of issuance, EES Group, Inc. shall have the unrestricted right to resign from performing additional services for Client on any and all cases that they are working on for Client's firm.

In the event of a Daubert (or state equivalent) motion of the above-referenced case(s), EES Group, Inc. wants to be part of the Daubert phase each step of the way. As soon as the Daubert motion is received from Defense, we would like to review it immediately (along with relevant exhibits to the motion). EES also reserves the right to review the draft of your opposition before it is filed at least five days (preferably 7) before it is due. EES will review, provide comments, and return it to you right away. If the defense is permitted a reply brief, we ask that you also sent that to EES. Finally, when the court rules, the decision be sent to EES as well. If these steps are not followed, EES Group, Inc. reserves the right to withdraw from this case(s).

EES Group, Inc. carries a comprehensive insurance package, including $2 million general liability insurance. Certificates will be provided upon request.

One signed faxed, e-mailed, or mailed copy of this letter will serve as our authorization to proceed. This agreement is effective for a period of thirty (30) days. The attached General Conditions are part of this work order.

If we can answer any questions, please do not hesitate to contact our office at (754) 220-8844.

Approved by EES Group, Inc.:

Stephen E. Petty, P.E., C.I.H., C.S.P.
President

1/29/26
Date

Approved by Cory Watson, P.C.:

Mr. Jon C. Conlin, Principal

1/28/26
Date

Attachment

Engineering & Expert Services, Inc. (EES Group, Inc.)
General Conditions

1. **PARTIES & WORKSCOPE:** Engineering & Expert Services, Inc. (hereinafter referred to as EES) shall include said company, its affiliates, suppliers, or subcontractors performing the work. "Work" means the specific services to be performed by EES as set forth in EES's proposal, and these General Conditions. Client refers to the person or business entity ordering the work to be done by EES. If the client is ordering the work on behalf of another, the client represents and warrants that the client is the duly authorized agent of said party for the purpose of ordering and directing said work. Unless otherwise stated in writing, the client assumes sole responsibility for determining whether the quantity and nature of the work ordered by the client is adequate and sufficient for client's purposes. The ordering of work from EES constitutes acceptance of the terms of EES's proposal and these *General Conditions*.

2. **SCHEDULING OF WORK:** The services set forth in EES's proposal will be accomplished in a timely, efficient, and professional manner by EES personnel at the prices quoted. If EES is required to delay commencement of the work, or if upon starting the work, EES is required to stop or interrupt the progress of its work as a result of changes in the scope of work requested by the client, to fulfill the requirements of third parties, or other causes beyond the direct reasonable control of EES, additional charges will be applicable and payable by the client. Additional charges will be billed at rates so stated in the proposal.

3. **CONFIDENTIALITY:** EES agrees not to violate the confidentiality of the client through the release or disclosure of contractual agreements, testing results, processing procedures and any other information made available by the client in the conduct of said project, without client's express consent, except where such disclosure is required by a court or governmental agency of competent jurisdiction.

4. **INSURANCE:** EES shall maintain all appropriate Workmen's Compensation and General Liability Insurance.

5. **LIMITED WARRANTY:** Materials supplied by EES are warranted per the manufacturer's written warranty. Installation is warranted for six months, ordinary use, wear or tear, or damage from abuse or accident accepted. NO OTHER WARRANTY IS EXPRESSED OR IMPLIED.

6. **PAYMENT:** The client shall be invoiced at least once each month for work performed during the preceding period. The client agrees to pay each invoice upon its receipt. Past due payments shall bear interest at the rate of 1 1/2% per month on the outstanding balance until paid. In the event of default in payment or any other terms of this Agreement by client, EES may, at its option: (i) terminate this Agreement; or (ii) declare the unpaid balance due and payable, without notice or demand to client, and sue and recover from client said amount, together with all reasonable costs and attorney's fees incurred by EES relating to its enforcement or preservation of its rights hereunder.

7. **TERMINATION:** This Agreement may be terminated by either party upon seven (7) days written notice. In the event of termination, EES will be compensated by the client for all services performed up to and including the termination date.

8. **INDEMNITY:** The client, and if the client is acting as an agent for a principal in ordering work from EES, then also said principal, agrees to indemnify, defend and hold EES, its officers, employees and agents harmless from any and all claims, suits, losses, costs and expenses, including but not limited to, court costs and reasonable attorney's fees arising or alleged to have arisen out of or resulting or alleged to have resulted from the performance of EES's work on or about the project and caused in whole or in part by any negligent, willful or wanton act or omission of the client or the client's principal or any party directly or indirectly employed by the client or the client's principal or anyone for whose costs the client or the client's principal may be liable except to the extent, and only to such degree, as such claim, suit, loss or damage is caused by the sole negligence or willful, or wanton act of EES, its officers, agents, employees or anyone for whose acts EES may be liable. In the event that the client or the client's principal shall bring any suit, cause of action, claim or counterclaim against EES, and to the extent that EES shall prevail upon such suit, cause of action, claim or counterclaim, the person or business initiating such actions shall pay EES the costs expended by EES to answer and/or defend against such suit, cause of action, claim or counterclaim, including reasonable attorney's fees, witness fees, and other related expenses.

9. **NOTICE OF COMMENCEMENT:** This contract constitutes an immediate and continuing request by EES that it be provided with a copy of the Notice of Commencement on this project from the owner and execution of this agreement constitutes acknowledgment by client of this request. Owner shall prepare and record a Notice of Commencement on this project and respond timely to requests for copies of the Notice of Commencement by sub-trades. EES shall not start work until it has received proof that a Notice of Commencement has been recorded by the owner with the County Recorder and shall be entitled to an extension of time for every day of delay caused by a late filing of the Notice of Commencement.

10. **DIRECT PAYMENTS:** Owner shall make no direct payments to subcontractors or suppliers on the project without giving ten (10) day written notice to EES of its intention to do so. If EES disputes or contests this direct payment in writing to the owner within this ten (10) day period, owner will refrain from any such direct payment unless EES is adjudged bankrupt, insolvent or in receivership.

11. **COMPLETE AGREEMENT:** Client and EES mutually agree that the EES written proposal and these *General Conditions* comprise the full and entire agreement between the parties and no other agreement or understanding has been entered into or will be recognized, and that all negotiations, acts, or representations made prior to the ordering of work shall be deemed merged in, integrated and superseded by the EES proposal and these general conditions. This agreement may be amended only by an instrument in writing signed by both parties.