

# THE WEBINAR WILL BEGIN SHORTLY



DISTILLING THE FACTS FROM FICTION:

**How to Identify and Manage PFAS Risks  
in CRE Transactions**

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# WELCOME



DISTILLING THE FACTS FROM FICTION:

**How to Identify and Manage PFAS Risks  
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## Presenters

Moderator



**Mary Ann Grena Manley**  
15E Communications LLC

Principal  
Toxicologist



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GSI Environmental

Senior Project  
Manager



**Andy Basehoar,**  
PG, LSRP,  
TTI Environmental

Director of  
Research & Data



**Melanie Veltman**  
ERIS

# PFAS Toxicology and Regulatory Overview



ERIS: Distilling the Facts from Fiction:  
How to Identify and Manage PFAS Risks in Commercial  
Real Estate Transactions

8 February 2022

**Dr. Janet Anderson, DABT**

Principal Toxicologist  
GSI Environmental Inc.  
Austin, TX

## Key Take Home Points:



PFAS are not all the same – they are an extremely diverse class of chemicals



Such high variability/uncertainty in toxicology interpretations are rare



No clear consensus on adverse human health effects associated with PFOA or PFOS exposure



Changes in immune parameters, cancer, drive the lowest single-digit part per trillion (quadrillion?) values



Watch for evolving science (more PFAS, mixtures, different media) and evolving regulations

## What is in a Name?



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## PFAS Definitions Vary

Reconciling Terminology of the Universe of Per- and Polyfluoroalkyl Substances: Recommendations and Practical Guidance



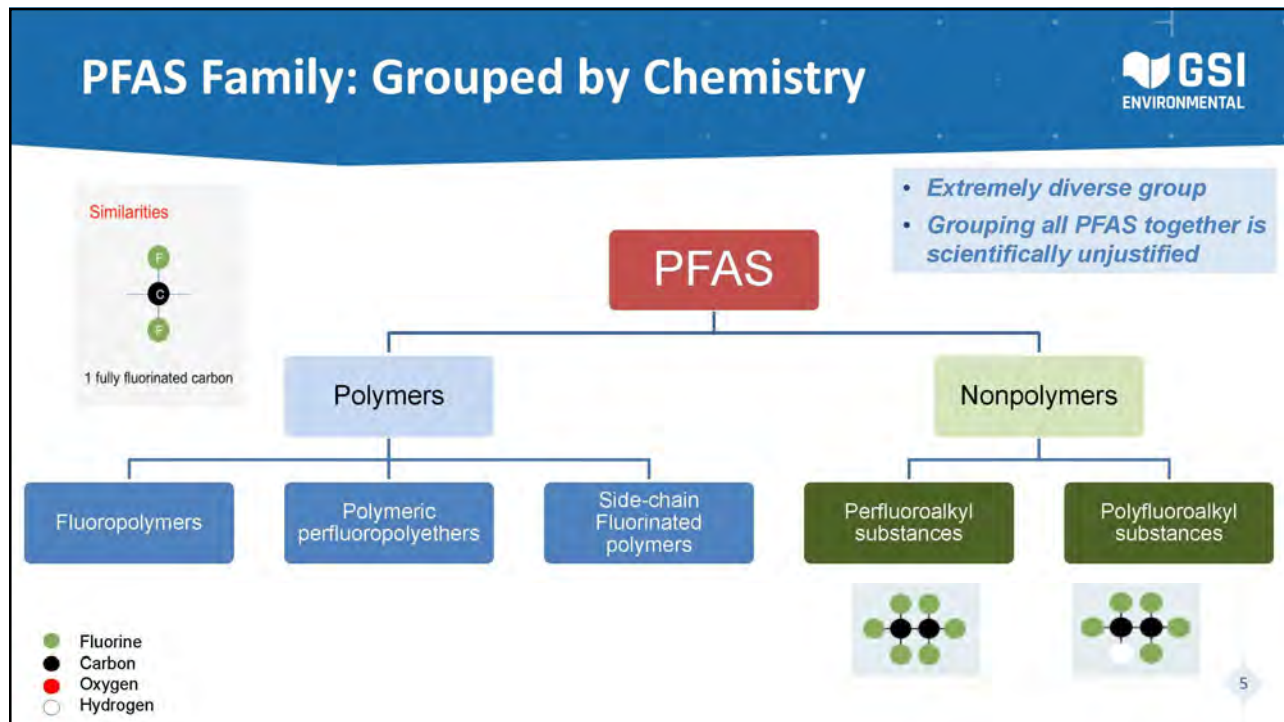
Series on Risk Management  
No. 61

“PFASs” is a broad, general, non-specific term, which should only be used when talking about all the substances included in the PFAS definition... Otherwise, it would introduce **ambiguity, and factual inaccuracies and miscommunication...**”


OECD (2021), *Reconciling Terminology of the Universe of Per- and Polyfluoroalkyl Substances: Recommendations and Practical Guidance*, OECD Series on Risk Management, No. 61, OECD Publishing, Paris, July 2021



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## PFAS: Problematic Qualities

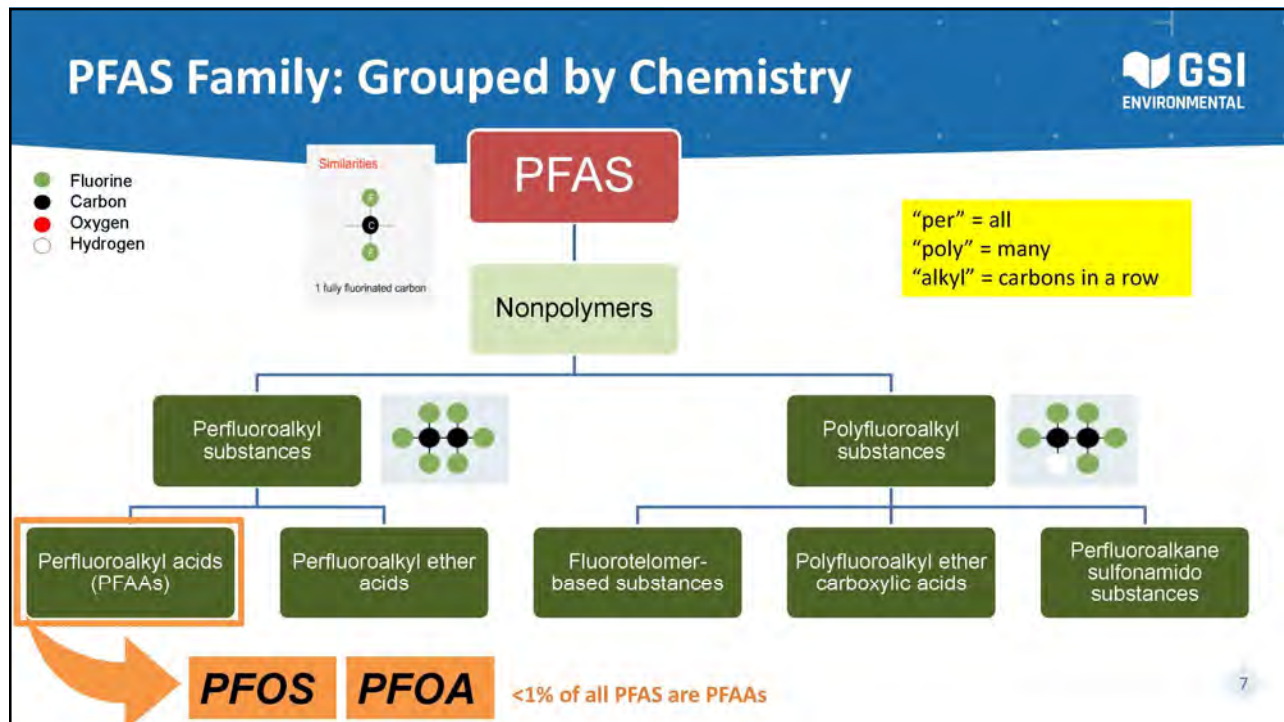


Large and complex class of chemicals:

- ✓ Some are environmentally persistent
- ✓ Some are mobile in the environment
- ✓ Some bioaccumulate in humans/food chain
- ✓ Health advisories at very low (part per trillion!) levels
- ✓ All are likely to be expensive to investigate, remediate, or litigate



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## Why the Concern? Long-Chain Fully Fluorinated Alkyl Acids (PFAAs)

### PFOA (C8)

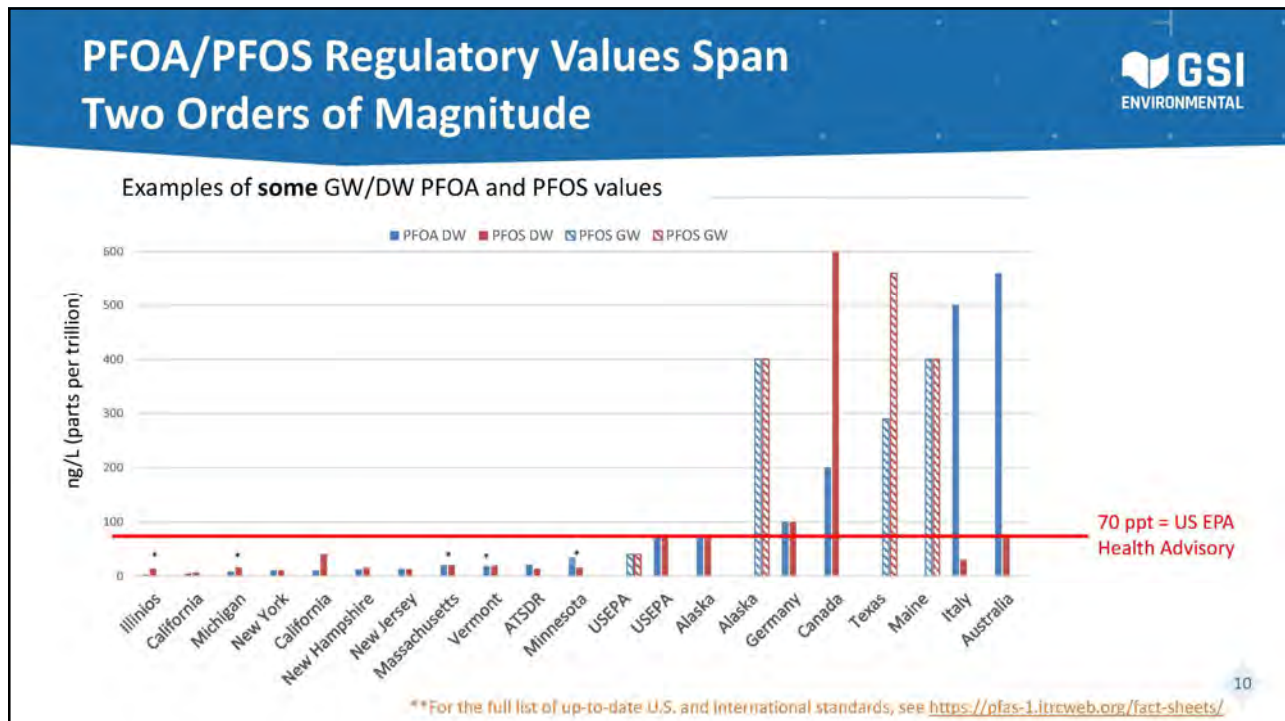
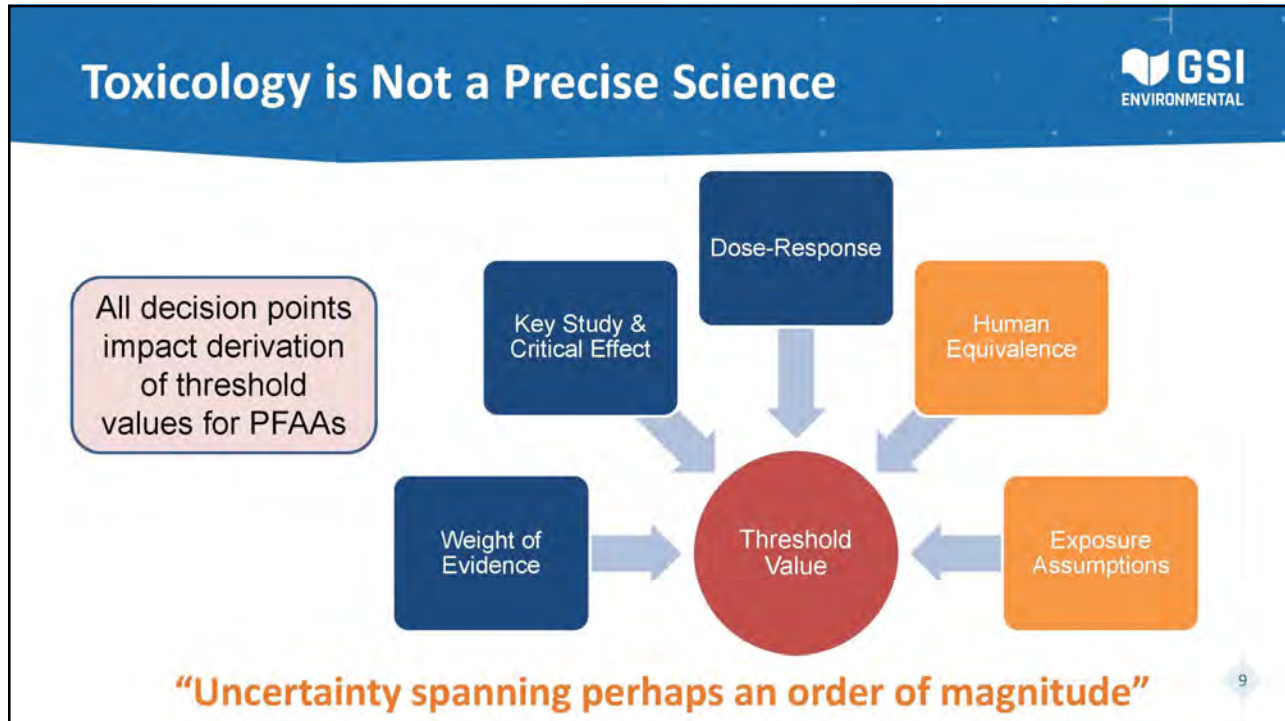
Voluntarily discontinued in the US ≤ 2015

### PFOS

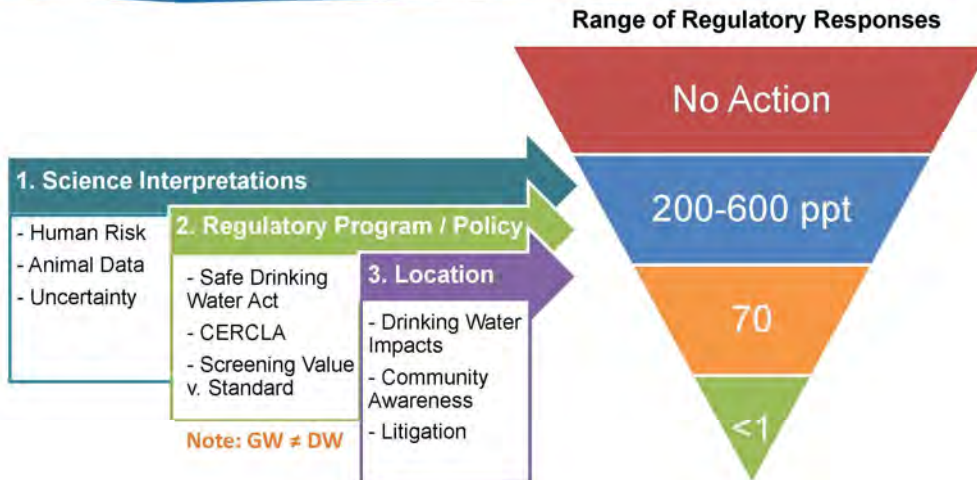
Voluntarily discontinued in the US in 2002

- Anthropogenic chemicals with widespread use since the 1940s
- Evolving science
- Often regarded as
  - Persistent
  - Bioaccumulative
  - Toxic
- May not be representative of other PFAS

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## Why the Inconsistency?



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## PFOA/PFOS Data: Challenging to Interpret



"consistent evidence generally exists for associations with" (2016)

- ↑ cholesterol, liver enzymes
- ↓ antibody response to vaccine
- ↓ birth weight



Australian Government  
Department of Health

"limited or no evidence for any causal link... and any human disease"

Associations with some health outcomes, but...


- limited or no evidence of human disease
- lack of clinical significance
- may be explained by reverse causation or confounding

*There is no consensus opinion on the association between PFOA/PFOS exposure and adverse human health outcomes*

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# Toxicity Assessments at the USEPA



**EPA**  
DRAFT  
DO NOT CITE OR QUOTE

EPA Document No. 822D2109


EXTERNAL PEER REVIEW DRAFT  
Proposed Approaches to the Derivation of a Draft Maximum Contaminant Level Goal for Perfluorooctanoic Acid (PFOA) (CASRN 335-67-1) in Drinking Water

**EPA**  
DRAFT  
DO NOT CITE OR QUOTE

EPA Document No. 822D2102


EXTERNAL PEER REVIEW DRAFT  
Proposed Approaches to the Derivation of a Draft Maximum Contaminant Level Goal for Perfluorooctane Sulfonic Acid (PFOS) (CASRN 1763-23-1) in Drinking Water

- ✓ PFBS
- ✓ GenX
- PFBA
- PFHxA
- PFHxS
- PFNA
- PFOA
- PFOS



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# DRAFT MCLG Determinations



- Considerably lowered RfD for PFOA**

  - › Decreased serum anti-tetanus antibody concentration in children (i.e., reduced vaccine efficacy)
  - › **~13,300 more conservative** than used in USEPA's 2016 PFOA Health Advisory
  - › PFOA ***"is considered likely to be carcinogenic to humans"***
    - › For carcinogens, USEPA typically sets MCLG at 0
- Considerably lowered RfD for PFOS**

  - › Decreased serum anti-diphtheria antibody concentration in children (i.e., reduced vaccine efficacy)
  - › **~2,500 more conservative** than used in USEPA's 2016 PFOS Health Advisory
  - › PFOS carcinogenicity: ***"suggestive evidence of carcinogenicity"***
    - › *"the existing human and animal evidence does not support a strong correlation between the PFOS exposure dose and tumor incidence"*



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## What Else is Happening at the EPA?



- › National PFAS Testing Strategy
- › TRI & TSCA Reporting
- › Safe Drinking Water Act (monitoring, MCLs)
- › Effluent Limitation Guidelines
- › Water Discharges
- › Waste Management and Remediation
- › Air Emissions
- › Research and Development
- › Enforcement and Compliance
- › Public Outreach



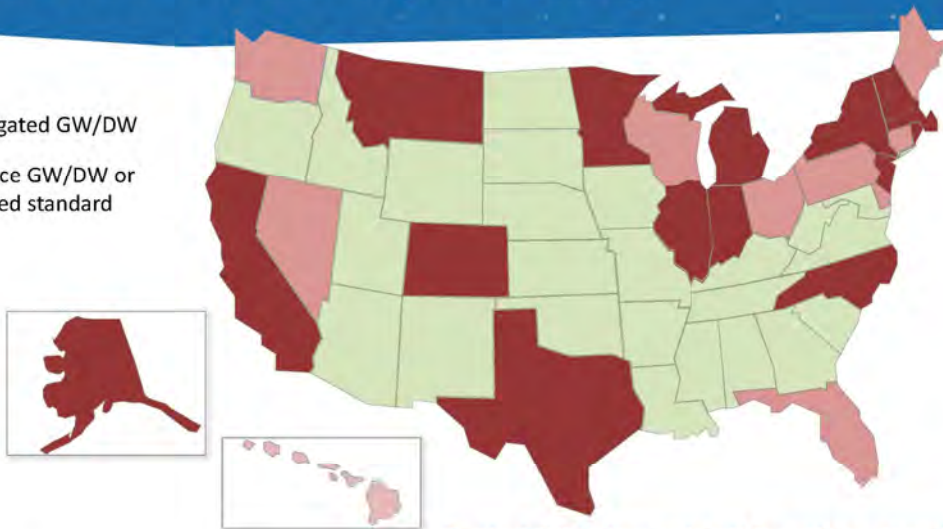
*October 18, 2021*  
comprehensive and ambitious plan for addressing PFAS

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## States Are Still Leading the Charge



- Promulgated GW/DW
- Guidance GW/DW or proposed standard



Note: states may have values for either GW or DW or both  
Disclaimer: some state activity may not be represented

For the full list of up-to-date U.S. and international standards, see <https://pfas-1.itrcweb.org/fact-sheets/>

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## Beyond PFOA/PFOS and Drinking Water



- **Not just PFOA and PFOS**
  - e.g., WI, MN, MI, MA, VT, CA, HI...
- **Surface Water Quality Criteria**
  - e.g., WI, FL, MI
- **Biosolids Land Application**
  - Regulation via Soil-to-Groundwater criteria
- **Industrial Air Standards**
  - MI, NH, NY, MN
- **Novel PFAS Investigations**
  - State collaboration with US EPA (e.g., NC, MI, NJ, NH)



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## What's Next?

### *Trends in Regulation and Litigation*



- Re-opening CERCLA and state superfund sites
- NRD and ecological claims
- NPDES permit violations and challenges
- Product liability
- Medical monitoring
- Fraudulent transfer/ Redevelopment



*It's not just  
drinking water  
and AFFF...*

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## What's Next? Trends in Science

- ✓ Expanded suite of PFAS
- ✓ Toxicity evaluations and Mixtures effects
- ✓ Air, surface water, biosolids
- ✓ Fate & transport, degradation
- ✓ Remediation technology
- ✓ Forensic analysis



*Whose PFAS is it?*

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## Conclusion



### State Actions

- Still moving ahead of federal agencies
- Inconsistent
- Expanding focus
  - to "other" PFAS
  - Non-DW



### EPA

- CERCLA
- MCLs
- CWA (surface water, effluent standards)
- Toxicity info.



### Science & Technology

- Chemical fingerprints and Source identification
- Toxicology and Risk



### Risk Management Actions

- Internal data gathering
- "Phase 1," Due Diligence, internal sampling options
- Tracking regulations

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# PFAS: The Consultant's View

*Presented by*  
**Andy Basehoar, PG, LSRP**

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## What is a REC?

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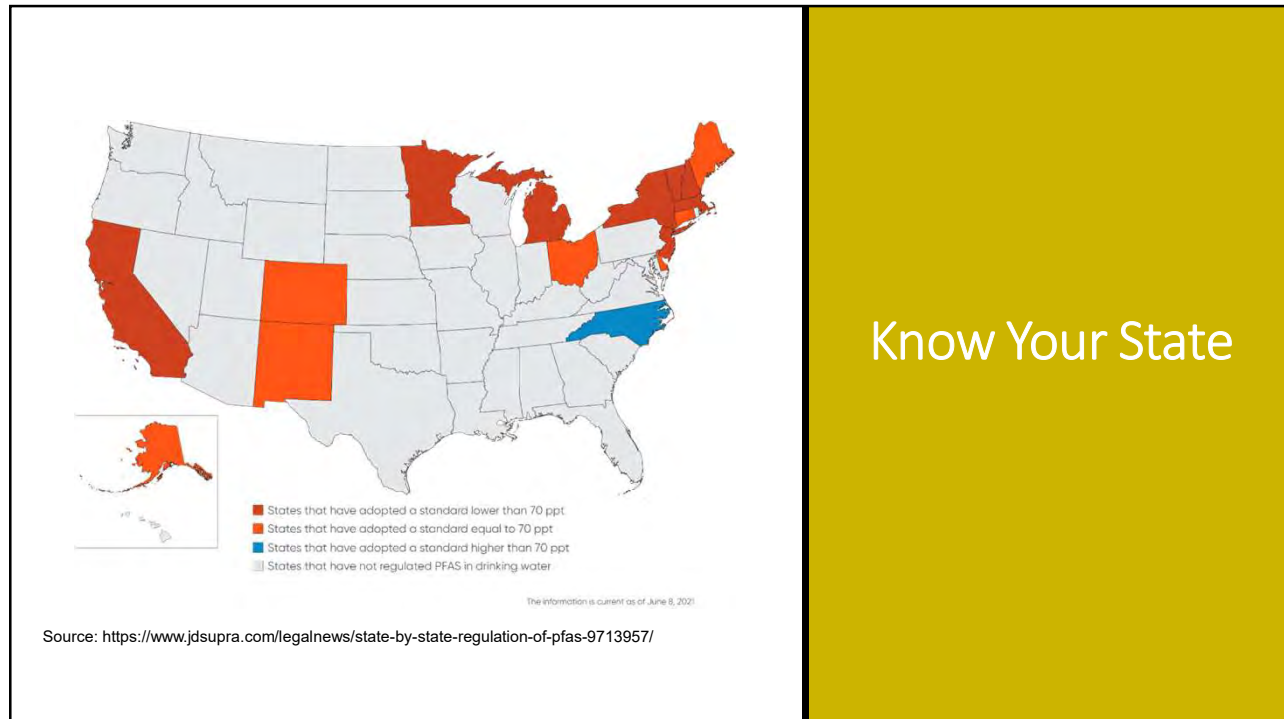
*Recognized Environmental Condition means (1) the presence of hazardous substances or petroleum products in, on, or at the subject property due to a release to the environment; (2) the likely presence of hazardous substances or petroleum products in, on, or at the subject property due to a release or likely release to the environment; or (3) the presence of hazardous substances or petroleum products in, on, or at the subject property under conditions that pose a material threat of a future release to the environment.*

## What is a *Hazardous Substance*?

**Hazardous Substance:** a substance defined as a hazardous substance pursuant to CERCLA 42 U.S.C. §9601(14), as interpreted by EPA regulations and the courts: “(A) any substance designated pursuant to section 1321(b)(2)(A) of Title 33, (B) any element, compound, mixture, solution, or substance designated pursuant to section 9602 of this title, (C) any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, (42 U.S.C. §6921) (but not including any waste the regulation of which under RCRA (42 U.S.C. §§6901 et seq.) has been suspended by Act of Congress), (D) any toxic pollutant listed under section 1317(a) of Title 33, (E) any hazardous air pollutant listed under section 112 of the Clean Air Act (42 U.S.C. §7412), and (F) any imminently hazardous chemical substance or mixture with respect to which the Administrator (of EPA) has taken action pursuant to section 2606 of Title 15. The term does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).”

## What Does ASTM Say?

**Substances Not Defined as Hazardous Substances**—*hazardous substance* means “those substances defined as a *hazardous substance* pursuant to CERCLA, as interpreted by EPA regulations and the courts.” There are some substances that non-*environmental professionals* and others may assume to be *hazardous substances* that are not defined (or not yet defined) as *hazardous substances* under CERCLA through interpretation by EPA regulations and the courts. These substances may include substances about which human understanding is evolving (for example, **per- and polyfluoroalkyl substances**, also known as “**PFAS**”). These and any other “emerging contaminants,” where they are not identified as a *hazardous substance* by CERCLA, as interpreted by EPA regulations and the courts, are not included in the scope of this practice. Some of these substances **may be considered a “hazardous substance”** (or equivalent) under **applicable state laws**. In those instances, where a **Phase I Environmental Site Assessment** is performed to **satisfy both federal and state requirements**, or as directed by the *user* of the *report*, it is permissible to include analysis and/or discussion of these substances in the same manner as any other Non-Scope Consideration. If and when such emerging contaminants are defined to be a *hazardous substance* under CERCLA, as interpreted by EPA regulations and the courts, such substances shall be evaluated within the scope of this practice.



## Know Your State

## PFAS IS A BER

- **Business Environmental Risk:** a risk which can have a material environmental or environmentally-driven impact on the business associated with the current or planned use of a parcel of commercial real estate, not necessarily limited to those environmental issues required to be investigated in this practice.
- **PFAS Compounds** fit in nicely under the definition of a BER.
  - They are an environmentally-driven impact to the parcel.
  - They are not RECs because they are not Federally listed as a hazardous substance.
  - The presence of PFAS at or on the property may significantly impact the viability of the property.

## What Products Contain PFAS?

- Cookware – Teflon (GenX)
- Fast Food Wrappers
- Popcorn Bags
- Polishes, Paints, Waxes
- Stain Repellants
- Cleaning Products
- Chrome Plating Dust Suppression
- Electronics Manufacturing
- Hydraulic Fluids, Fuel Additives
- Aqueous Film Forming Foam(AFFF)



## Where is PFAS a Risk?

- Machine shops
- Paper manufacturing
- Airports/fire fighting training facilities
- Plating operations
- Electronics manufacturing
- Wastewater treatment plants
- Landfills





# How Do We Identify Potential PFAS?

- No RCRA Generator Listings
- Must rely on other sources:
- Fire Insurance Maps
- City Directory
- Safety Data Sheets
- Local Knowledge

#### Waste Code Details

**Hazardous Waste Code:** F008  
**Waste Code Description:** PLATING BATH RESIDUES FROM THE BOTTOM OF PLATING BATHS FROM ELECTROPLATING OPERATIONS IN WHICH CYANIDES ARE USED IN THE PROCESS.

**Hazardous Waste Code:** F009  
**Waste Code Description:** SPENT STRIPPING AND CLEANING BATH SOLUTIONS FROM ELECTROPLATING OPERATIONS IN WHICH CYANIDES ARE USED IN THE PROCESS.

**Hazardous Waste Code:** P106  
**Waste Code Description:** SODIUM CYANIDE (OR) SODIUM CYANIDE NA(CN)

**Hazardous Waste Code:** P121  
**Waste Code Description:** ZINC CYANIDE (OR) ZINC CYANIDE ZN(CN)<sub>2</sub>

#### MATERIAL SAFETY DATA SHEET

CHEMGUARD 3% AFFF C-303

Revision Date: 1/25/2006

#### 1. PRODUCT IDENTIFICATION

Chemical Family: Surfactant mixture, fire fighting foam concentrate  
Aqueous Film Forming Foam

Product name: Chemguard 3% AFFF C-303

Manufacturer: Chemguard, Inc.  
204 South 6th Ave.  
Mansfield, TX 76063  
emergency phone: 817-473-9954

#### 2. COMPOSITION / INFORMATION ON INGREDIENTS

CAS NO.	Common Name	ACGIHPPM		OSHA/PPM		% by wt
		TLV <sub>s</sub>	STEL	PEL		
7732-18-5	water					80% - 90%
57019-52-7	propylene glycol 1-butyl ether	not established				2% - 6%
7487-88-9	magnesium sulfate	N/A	N/A	N/A		1% - 2%
	proprietary mixture	N/A	N/A	N/A		proprietary
	proprietary mixture	N/A	N/A	N/A		proprietary

#### 3. HAZARDS IDENTIFICATION

Routes of entry: Dermal, inhalation and ingestion  
Potential Health Effects: May cause skin and eye irritation.

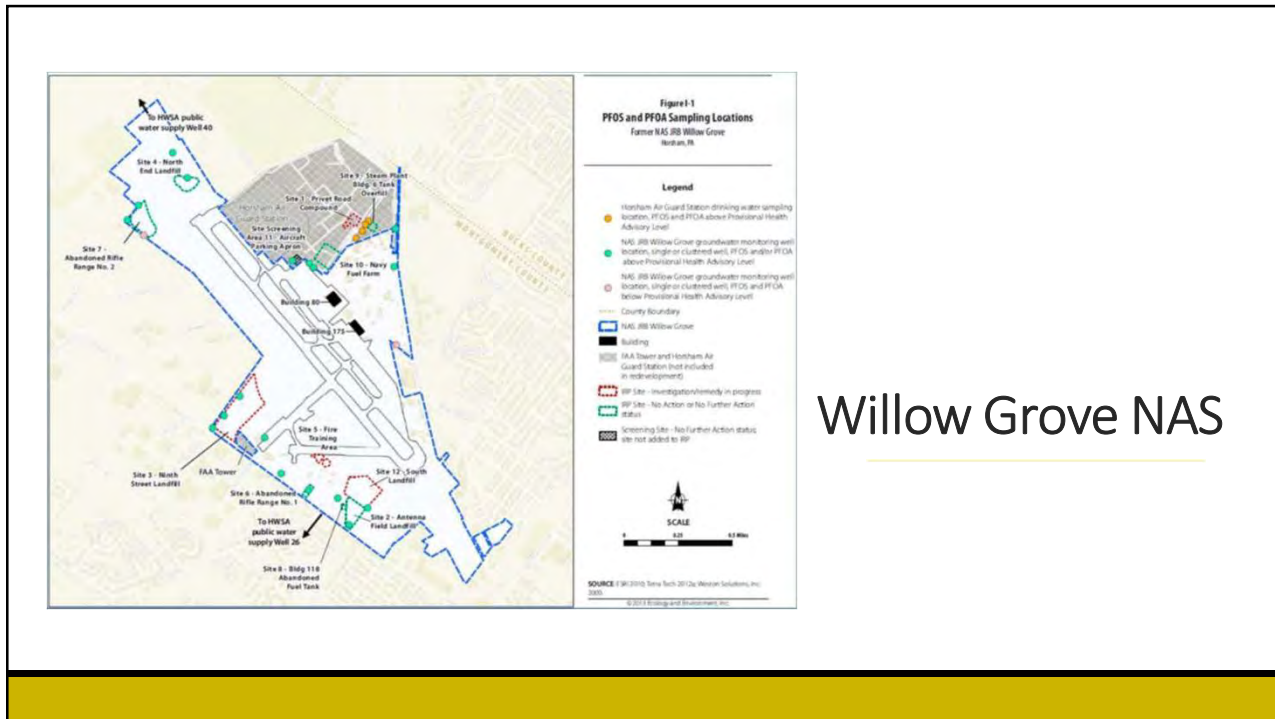
Carcinogenicity: Not a carcinogen.

#### 4. FIRST AID MEASURES

Ingestion: Do not induce vomiting. Call a physician.  
Inhalation: Remove to fresh air.  
Skin: Rinse with water. Wash with soap and water. Contaminated clothing should be washed before re-use.  
Eyes: Rinse with water. Call a physician.

Page 1 of 4

# AFFF SDS



Vianich N	438-1956 79
Vojitovitz John	935-2352 00
Wolfe Brian E	935-8930 85
Woods E M	933-0758 80
W Mangano Joseph F	438-2162 85
114 #Atomic Devlpmnt Corp	438-4100 00
114 #Ferris Plating Co	438-1010 00
114 #United Show Case	438-4100 00
<b>GRAND ST</b>	
115 Huettemann J Jr	933-6327 77
115 #PIE Nationwide	+ 939-5100 86
116 #Lightning Truck Repair	935-1888 77
116 Occupant	NA 86
121 #Schiff Bio Food Products	933-2282 77
122 Occupant	NA 78

← Plating Operation

**City Directory**



Fire Insurance Map

## PFAS Sampling Issues

- Sampling materials may contain PFAS
- PFAS are present in ambient air
- No sampling via Teflon tubing
- No Write in the Rain notebooks
- No Gore-Tex clothing
- No Fluoro-surfactant decon detergents
- Use only lab certified decon water
- No fabric softener in field clothes
- Limited sunscreen and insect repellants
- No Sharpies or permanent markers

Sample Cost:

\$300-\$400/sample

# THANK YOU

Andy Basehoar, PG, LSRP  
andyb@ttienv.com

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erisinfo.com

## PFAS Data Landscape: Scope and Limitations

Melanie Veltman  
Director, Research & Data at ERIS



## What kind of PFAS data coverage does ERIS have?

### US:

- 4 Federal data sources
- 39 State-level data sources (in 32 states)
- The work and the search continue...

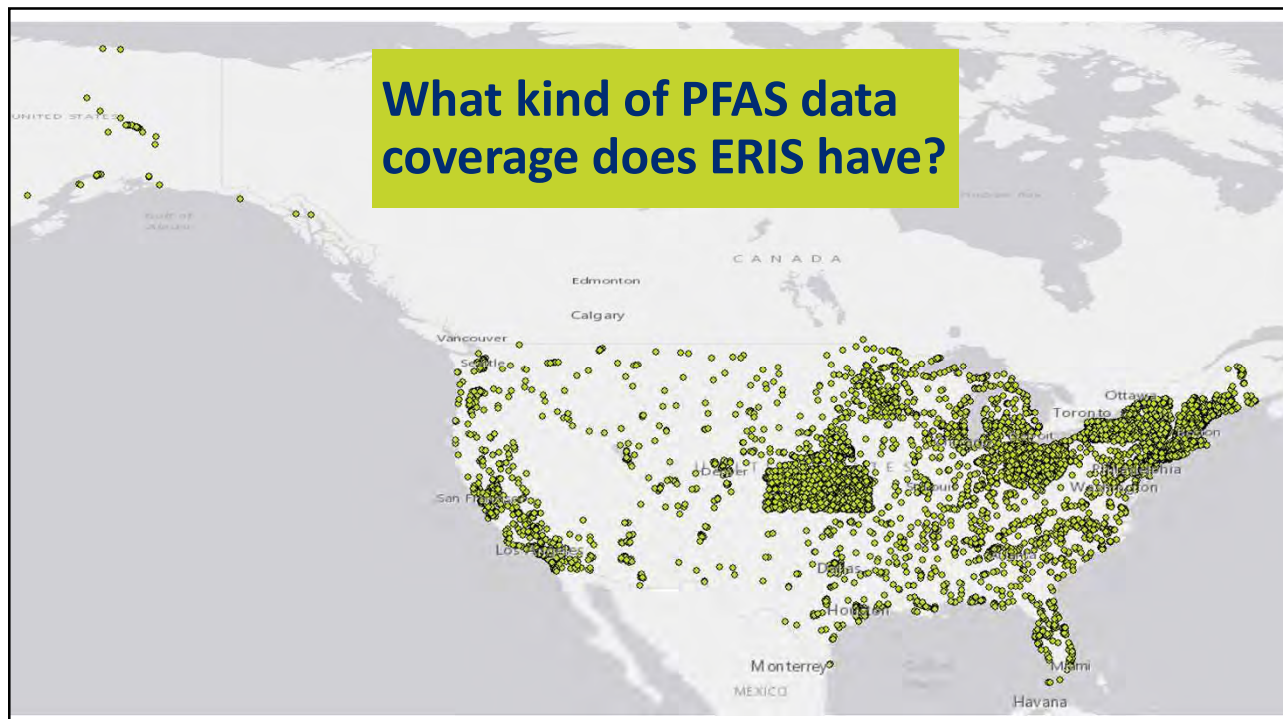
### Canada:

- PFAS contamination is noted in Federal Contaminated Sites
- The search continues...

### Mexico:

- The search continues...

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## What kind of PFAS data coverage does ERIS have?

PFAS data appear in ERIS Direct searches and on Database reports

- Search radius: 0.5 mi

**DATABASE  
REPORT**



**ERIS DIRECT**  
THE FASTEST WAY TO IDENTIFY ENVIRONMENTAL RISK



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## PFAS Data – ERIS' search for data

Search, followed by request for:

- Sites at which there is or has been groundwater or soil sampling or contamination as a result of the use or release or disposal of PFOA/PFOS or PFOA or PFOS-containing materials
- Sites where PFOA/PFOS or a PFOA or PFOS-containing material is currently or ever has been: manufactured, used, stored, disposed of, or released
- Other resources for locations of PFAS/PFOS use/storage/releases/contamination

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## PFAS Data – US Federal

### PFAS NPL - PFOA/PFOS Contaminated Sites

- List of sites where PFOA or PFOS contaminants have been found in drinking water or soil.

### PFAS SSEHRI - SSEHRI PFAS Contamination Sites

- This PFAS Contamination Site Tracker database is compiled by the Social Science Environmental Health Research Institute (SSEHRI) at Northeastern University. All data presented was extracted from government websites, news articles, or publicly available documents, and this is cited in the tracker. Disclaimer: The source conveys this database undergoes regular updates as new information becomes available, some sites may be missing and/or contain information that is incorrect or outdated, as well as their information represents all contamination sites SSEHRI is aware of, not all possible contamination sites. This data is not intended to be used for legal purposes. Limited location details are available with this data. Access the following for the most current information <https://pfasproject.com/pfas-contamination-site-tracker/>

## PFAS Data – US Federal

### PFAS TRI - Perfluorinated Alkyl Substances (PFAS) Releases

- List of Toxics Release Inventory (TRI) facilities at which the reported chemical is a Per- or polyfluorinated alkyl substance.

### PFAS WATER - Perfluorinated Alkyl Substances (PFAS) Water

- Records from the Water Quality Portal (USGS,EPA) where the characteristic (environmental measurement) is a Per- or polyfluorinated alkyl substance.

Coming soon: more EPA data; PFAS potential sites

## PFAS Data – EPA PFAS Master List

[https://comptox.epa.gov/dashboard/chemical\\_lists/pfasmaster](https://comptox.epa.gov/dashboard/chemical_lists/pfasmaster)

There is no precisely clear definition of what constitutes a PFAS substance.

PFASMASTER serves as a **consolidated list of substances** spanning and bounded by the below lists, defining a practical boundary of PFAS chemical space (within DSSTox) of current interest to researchers and regulators worldwide.

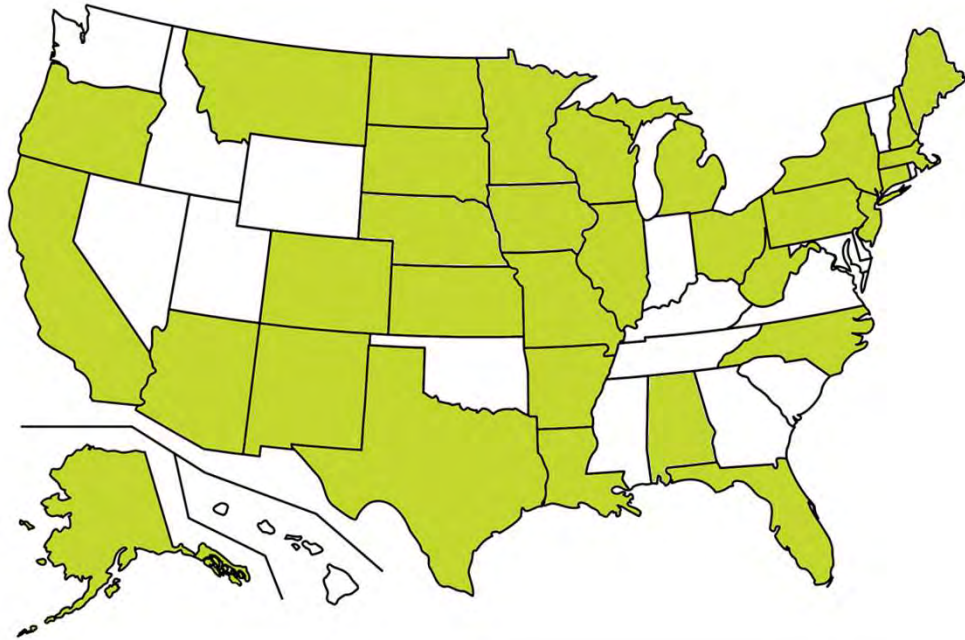
This **PFAS Master List is dynamic**, changing as component lists grow.

## PFAS Data – US State Level

AK	AL	AR	AZ	CA	CO	
CT	FL	IA	IL	KS	LA	
MA	ME	MI	MN	MO	MT	
NC	ND	NE	NH	NJ	NM	NY
OH	OR	PA	SD	TX	WI	WV



# PFAS Data US State Level



# PFAS Data – these are not like permits/program data



## PFAS Data – US State Level data varies

### Groundwater samples with PFAS/PFOA

- (CA, MI, OH, for example)

### State agency identified PFAS as a CoC

- (e.g., project type, program)

### Existing sites where the contaminant is a Per- or polyfluorinated alkyl substance



## PFAS Data – US State Level data varies

### New York – Surveys sent to NY DEC identified facilities

- Class B Fire Suppression Foam Usage Survey sent to Airports, Military Facilities, Bulk Storage Facilities, and State Fire Departments and Fire Training Centers; PFOA/PFOS Facility Identification Survey sent to Industrial/Manufacturing identified by NY DEC.



# PFAS Data – NY surveys

## PFOA/PFOS Facility Identification Survey

If a respondent indicated that the facility used/stored/disposed PFOA/PFOS substances, it does not necessarily mean that there is an environmental/public health concern associated with that facility. DEC is in the process of reviewing/evaluating the returned surveys to determine if additional follow-up or study is needed

Return rate: 164 surveys were sent to facilities; 152 were returned completed as of June 20, 2017.

Questions 1 & 2 relate to name and address; questions 3-5 relate to facility ownership.

Q. 5: Is PFOA/PFOS or a PFOA- or PFOS-containing material currently used at the facility?

Q. 7: Was PFOA/PFOS or a PFOA- or PFOS-containing material formerly used at the facility?

Q. 8: Is PFOA/PFOS or a PFOA- or PFOS-containing material currently stored at the facility?

Q. 9: Was PFOA/PFOS or a PFOA- or PFOS-containing material formerly stored at the facility?

Q. 10: Is PFOA/PFOS or a PFOA- or PFOS-containing material currently manufactured at the facility?

Q. 11: Was PFOA/PFOS or a PFOA- or PFOS-containing material formerly manufactured at the facility?

Q. 12: Is PFOA/PFOS or a PFOA- or PFOS-containing material currently being disposed of or released at the facility?

Q. 13: Was PFOA/PFOS or a PFOA- or PFOS-containing material formerly disposed of at the facility?

Facility ID	Facility name	Facility address	County	Survey complete?	Q. 6	Q. 7	Q. 8	Q. 9	Q. 10	Q. 11	Q. 12	Q. 13
MFG0014	3M - Honeoye	127 East Lake Rd Honeoye, NY	Ontario	YES	NO	NO	NO	NO	NO	NO	NO	NO
MFG0015	3M - Rochester	1999 Mt Read Blvd Rochester, NY	Monroe	YES	NO	NO	NO	NO	NO	NO	NO	NO
MFG0016	3M - Tonawanda	305 Sawyer Ave Tonawanda, NY	Erie	YES	NO	NO	NO	NO	NO	NO	NO	NO
MFG0017	3M/Dynacolor - Brockport	180 State St Brockport, NY	Monroe	YES	NO	NO	NO	NO	NO	NO	NO	NO
MFG0019	Aalborg Instruments & Controls, Inc	20 Corporate Dr Orangeburg, NY	Rockland	YES	NO	NO	NO	NO	NO	NO	NO	NO
MFG0020	Acme Plastics, Inc	570 Union Ave Westbury, NY	Nassau	YES	NO	NO	NO	NO	NO	NO	NO	NO
MFG0021	Acrilex, Inc	198A Miller Pl Hicksville, NY	Nassau	YES	NO	NO	NO	NO	NO	NO	NO	NO
MFG0010	Albany Valve & Fitting Co dba Swagelok Westchester	8 Sprout Creek Ct Ste 3 Wappingers Falls, NY	Dutchess	YES	NO	NO	NO	unknown	NO	unknown	NO	unknown
MFG0022	Aljo-GEFA Precision Manufacturing	205 Bethpage Sweet Hollow Rd Bethpage, NY	Nassau	YES	NO	unknown	NO	unknown	NO	unknown	NO	unknown



# PFAS Data – Kansas Inventory of Potential Sites

## KS – Statewide Inventory of Potential PFAS Sites in Kansas

- Facilities that potentially used, stored, and/or produced PFAS in Kansas. **Includes sites based on Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes** specific to the types of business activities, industry, and/or manufacturing entities related to PFAS use and/or production business.



## PFAS Data – US State Level data varies



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## PFAS Data – the search continues

### 75-day schedule for PFAS data source review

- Each state is on a different schedule, depending on when we first obtained the data
- Same questions as initial search
- Seek to understand state level regulations and how they are implemented and represented in data

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## PFAS Data – Questions, Feedback

We would be happy to answer questions – any time

We would be happy to have feedback on our data – any time

Contact your ERIS Sales team member  
[erisinfo.com/contact](https://erisinfo.com/contact)

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## QUESTIONS?



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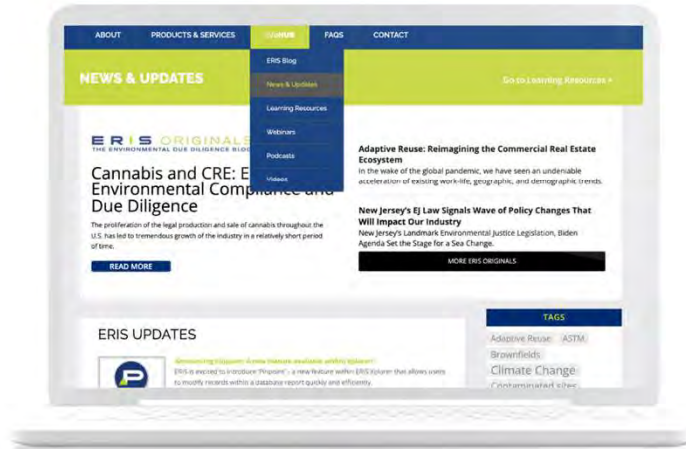


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