Session C: Transene's Switch to Safer PFAS-Free Products

Spring TUR Conference
April 12, 2023

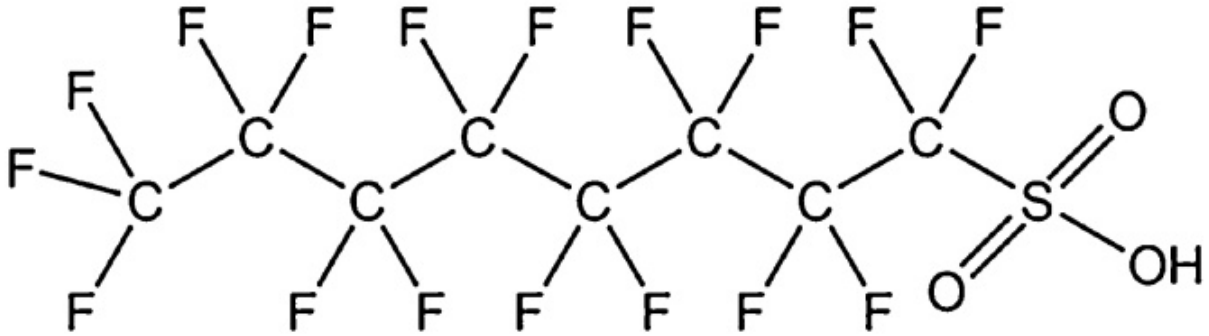
Session Overview

Topic	Presenter
PFAS chemicals: environmental/human health hazards, reporting considerations	Heather Tenney, TURI, TURA Program Manager
Electronics industry use of PFAS	Chris Christuk, Transene, President
Researching new formulations for Transene	Mohammad Bagheri Kashani, UMass Lowell Doctoral student, Plastics Engineering
Gaining customer acceptance of new formulations	Chris Christuk, Transene, President
Questions & Answers	All

What are PFAS?

- Fluorinated carbon chain
- Large class of chemicals - 4,700 identified by OECD

Example – PFOS:



TURA SAB PFAS Evaluation

To understand the characteristics of a range of PFAAs, the SAB examined eight substances of varying chain lengths: PFNA (C9); PFOS and PFOA (C8); PFHpA (C7); PFHxA and PFHxS (C6); and PFBA and PFBS (C4).

The SAB then reviewed two ethers (GenX and ADONA), and phosphonic and phosphinic acids (PFPA and PFPiAs) of varying chain lengths.

The SAB reviewed various health impacts as well as a number of degradation/transformation pathways, through which a PFAS precursor breaks down into one of the end degradation products.

Chronic Health Effects

	PFNA	PFOA	PFOS	PFHpA	PFHxA	PFHxS	PFBA	PFBS	GenX	ADONA	PFPA/ PFPiA
Cancer		Kidney, Testicular							X		
Immunotoxicity	X	Ulcerative colitis	X					X	X		
Thyroid		X			X	X	X	X		X	X
Endocrine (other than thyroid)					X	X	X	X			
Hematological		cholesterol				X	X	X			
Liver/metabolic	X			X	X	X	X	X	X	X	X
Reproductive	X	PIH							X	X	X
Developmental	X			X	X		X	X	X		
Neurodevelopmental						X					
Neurotoxicity	X				X	X		X			
Asthma						X		X			
Other	Mutagenicity				Kidney			Kidney	Kidney		Acute toxicity

Note: The SAB did not conduct a literature review for PFOS and PFOA due to the volume of information available through authoritative bodies and large-scale epidemiological studies.

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Health and Environmental Effects

- **Highly persistent and mobile in the environment**
  - Do not break down under normal environmental conditions
- **Bioaccumulative**
  - In animals or plants
- **Health effects include:**
  - Effects on endocrine system, including liver and thyroid
  - Immunotoxicity (with implications for vaccines)
  - Metabolic effects
  - Developmental effects
  - Neurotoxicity

Persistence, Presence in the Environment, and Bioaccumulation

	PFNA	PFOA	PFOS	PFHpA	PFHxA	PFHxS	PFBA	PFBS	GenX	ADONA	PFPA/ PFPiA
Persistence	X	X	X	X	X	X	X	X	X	X	X
Bioaccumulation	X	X	X	X	X	X	X	X	X		X
Presence in the environment	X	X	X	X	X	X	X	X	X		
Presence in biota, including humans	X	X	X	X	X	X	X	X	X		X

PFAS Tracking and Reporting: TRI and TURA

	Report to TRI	TURA tracking starting	Report to DEP	How Reportable	Threshold
TURA Certain PFAS NOL	---------	January 1, 2022	July 1, 2023	As a category	25,000 lbs. manufactured/ processed; 10,000 lbs. otherwise used
172 TRI/TURA PFAS – 2020	July 1,2020	January 1, 2021	July 1, 2022	Individually	100 lbs. (de minimis exemption applies; see MassDEP website for details)
Four TRI PFAS - 2021	July 1, 2021	January 1, 2023	July 1, 2024		
Four TRI PFAS - 2022	July 1, 2022				
Nine TRI PFAS - 2023	July 1, 2023	Anticipated January 1, 2024	Anticipated July 1, 2025		

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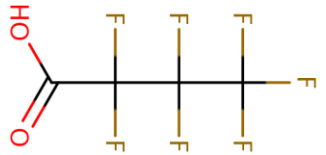
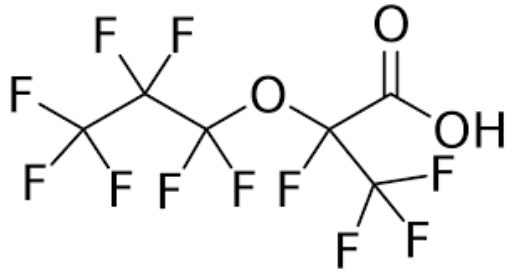
TURA Certain PFAS NOL Category

For the 2022 Reporting Year, the Certain PFAS NOL category was added under TURA. The Certain PFAS NOL category is defined as those PFAS that contain:

- a perfluoroalkyl moiety with three or more carbons
  (e.g., $–C_nF_{2n}–$, n ≥ 3; or $CF_3–C_nF_{2n}–$, n ≥ 2)



- a perfluoroalkylether moiety with two or more carbons
  (e.g., $–C_nF_{2n}OC_mF_{2m}–$ or $–C_nF_{2n}OC_mF_m–$, n and m ≥ 1)



wherein for the example structures shown, the dash (–) is not a bond to a hydrogen and may represent a straight or branched structure, and that are not otherwise listed.

PFAS Guidance

Lists were generated from PFAS that are known to be in commerce

Tables include PFAS reportable individually at 100lbs, individually at normal thresholds, as part of Certain Halogenated Compounds and as part of PFAS NOL

These lists are **NOT exhaustive.**

What to do if your SDS does not have CAS

Expected Uses in Massachusetts

- Plastics and Resins
- Coatings
- Metal Finishing
- Textiles
- Paper

Expected Uses in Massachusetts

- Electronic Components
- Surface cleaning
- Petroleum Products
- AFFF

Daikin Unidyne TG-5543 Textile DWR

* **SECTION 3: Composition/information on ingredients**

Information on ingredients:

Fluoroalkyl acrylate copolymer	*20-30%*
9002-92-0 Poly(oxyethylene)alkyl(C12-14)ether *Xi R36/38* *Acute Tox. 4, H302; Skin Irrit. 2, H315; Eye Irrit. 2, H319*	*<5%*
24800-44-0 Tripropylene glycol	*1-10%*
3-Methoxy-3-methylbutan-1-ol	*1-10%*
7732-18-5 Water	*60-70%*
Others	*<5%*

Additional information: *For the wording of the listed hazard phrases refer to section 16.*

3M Novec 4300

IF INHALED: Remove person to fresh air and keep comfortable for breathing.
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy t
Continue rinsing.
Immediately call a POISON CENTER or doctor/physician.
If skin irritation or rash occurs: Get medical advice/attention.
Wash contaminated clothing before reuse.
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
In case of fire: Use a fire fighting agent suitable for flammable liquids such as dry chemical or carbon dioxide extinguish.
Absorb spillage to prevent material damage.

Storage:
Store in a corrosive resistant container with a resistant inner liner.
Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal:
Dispose of contents/container in accordance with applicable local/regional/national/international regulations.

2.3. Hazards not otherwise classified
May cause chemical gastrointestinal burns.

SECTION 3: Composition/information on ingredients

Ingredient	C.A.S. No.	% by Wt
ACETIC ACID	64-19-7	78 - 81 Trade Secret *
1-Propanesulfonic acid, 3-[hexyl[(nonafluorobutyl)sulfonyl]amino]-2-hydroxy-, monoammonium salt	606967-06-0	19 - 22 Trade Secret *

*The specific chemical identity and/or exact percentage (concentration) of this composition has been withheld secret.

Best Practices

1. Get a new SDS yearly
2. Keep copies of SDS/Supplier correspondence
3. Reach out on ALL products as a first pass
4. Train purchasing staff to question fluorinated products

Other resources for uses

Per- and Polyfluoroalkyl Substances and Alternatives in Coatings, Paints and Varnishes (CPVs) (oecd.org)

Gluge 2020: An overview of the uses of per- and polyfluoroalkyl substances (PFAS) - Environmental Science: Processes & Impacts (RSC Publishing)

EPA Multi-industry Multi-Industry Per- and Polyfluoroalkyl Substances (PFAS) Study – 2021 Preliminary Report (epa.gov)

MN metal finishing PFAS in the metal plating and finishing industry (state.mn.us)

What does DEP expect from filers in the first reporting year? ***Facilities should:***

Evaluate	Evaluate chemicals used at the facility
Send	Send inquiry letters to manufacturers requesting information on PFAS content of suspected PFAS containing materials.
Keep	Keep records of letters sent and responses received.
Follow up	Follow up with manufacturer if you do not hear back from them and keep records of these follow-ups.

What does DEP expect from filers in the first reporting year? ***Facilities should:***

FILE ON-TIME even if you have not received manufacturers' information (alert DEP via email at TURA.program@mass.gov if you are still awaiting a manufacturers' response)

Include an **estimate of your PFAS usage** in your filing and add a comment in the Form S, Section 5 data field stating that you have estimated your PFAS usage. **If a chemical contains fluorine, assume it is in the PFAS category until better information is available.**

Email the TURA program at **TURA.program@mass.gov** and describe how you estimated your PFAS in your Form S. Put **"PFAS estimated"** in the subject line.

When you receive the PFAS information from the manufacturer, submit an amended summary report via eDEP. You will be billed for any additional compounds when the filing is amended.

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What does DEP expect from filers in the first reporting year? ***Facilities should:***

If your facility reports a chemical included in both the 1047 Halogenated Compounds NOL (C1-C4) and 1300 Certain PFAS NOL chemical categories, you must report both categories.

Please refer to the TURA Reporting appendices pgs. 101 and 105 https://www.mass.gov/lists/massdep-toxics-use-reduction-policies-guidance

In the Form S Section 5 data field state the reported chemical(s) by name which falls into both categories and send an email to the TURA.Program@mass.gov alerting MassDEP of the entries.

Put **"Both Categories"** the subject line. Chemicals reported in both categories will only be billed one fee.

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The Massachusetts Toxics Use Reduction Institute

www.turi.org

126 John Street, Suite 14
Boott Mills West
Lowell, MA 01852

Heather Tenney
heather@turi.org

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