

# PFAS Technical Group

June 17, 2022

# Agenda

- Welcome and introductions
- [GreenScreen Certified™ for Firefighting Foam](#) – Mark Rossi, Clean Production
- [NSF](#) PFAS-Related Standards & Certifications – Derek DeLand
- Conclusions & next steps



## WI DNR – PFAS Technical Group

GreenScreen Certified for Firefighting  
Foam (and other products)

Mark S. Rossi, PhD

June 17, 2022



Solutions for a safer & healthier tomorrow



BIZNGO FOR  
SAFER CHEMICALS &  
SUSTAINABLE MATERIALS



INVESTOR  
ENVIRONMENTAL  
HEALTH NETWORK



GREENSCREEN  
FOR SAFER  
CHEMICALS



CHEMICAL  
FOOTPRINT  
PROJECT

**We want PFAS-free products**

**But, how do we know an alternative products is ...**



**Safer & environmentally preferable**

**Not a regrettable substitute**

**“PFAS-free”**

# Simplifying the Complexity of Chemical Hazard

To support informed, proactive, and precautionary decision-making



**Chemicals**

**Products**



# Trusted 3<sup>rd</sup> Party



# LEVI STRAUSS & CO.

# Value of GreenScreen Certified



- Independent, non-profit organization
- Comprehensive and detailed evaluation
- Built on globally recognized GreenScreen hazard assessment
- Easy to understand accreditation
- Goes well beyond PFAS-free to:
  - Avoid regrettable substitutes
  - Create a roadmap to preferred



# Simplifying communication of preferred products



# Core Elements



1. Product meets all analytical testing requirements
2. Chemical inventory disclosed under confidentiality
3. Product meets all Restricted Substances List (RSL) requirements
4. All chemicals assessed for hazard using GreenScreen tools

# Foam Concentrate verified PFAS-free



1. Three samples/lots tested at a commercial analytical laboratory
2. Testing for all PFAS by measuring total organic fluorine
3. < 1 ppm total organic fluorine
4. Additional testing required if products made on shared equipment



# Foam Concentrate Not Toxic to Aquatic Life

LC50 or EC50 > 10 mg/L for fish, aquatic invertebrates, and algae



	Effective concentration
Toxicity Category	Range (mg/L)
Super Toxic	< 0.01
Extremely Toxic	0.01 – 0.1
Highly Toxic	0.1 – 1
Moderately Toxic	1 – 10
Slightly Toxic	10 – 100
Practically Nontoxic	100 – 1,000
Relatively Harmless	> 1,000

US Fish and Wildlife Service toxicity scale  
Aquatic EC50 or LC50 (freshwater)

# Chemicals Disclosed under Confidentiality



**CONFIDENTIAL  
DISCLOSURE  
AGREEMENT**

All **additives** present in the product at any level must be disclosed under confidentiality.

- E.g., surfactant

All **chemicals** present in all materials must be disclosed if:

- Intentionally added and present at any level
- Impurity or residual and present at or above 100 ppm in the product

# Value of Chemical Classes



- Efficient and precautionary framework
- Rooted in already well established toxicology methods
- Supports decision-making in absence of complete data
- Supports decision-making for new chemicals coming onto the market daily

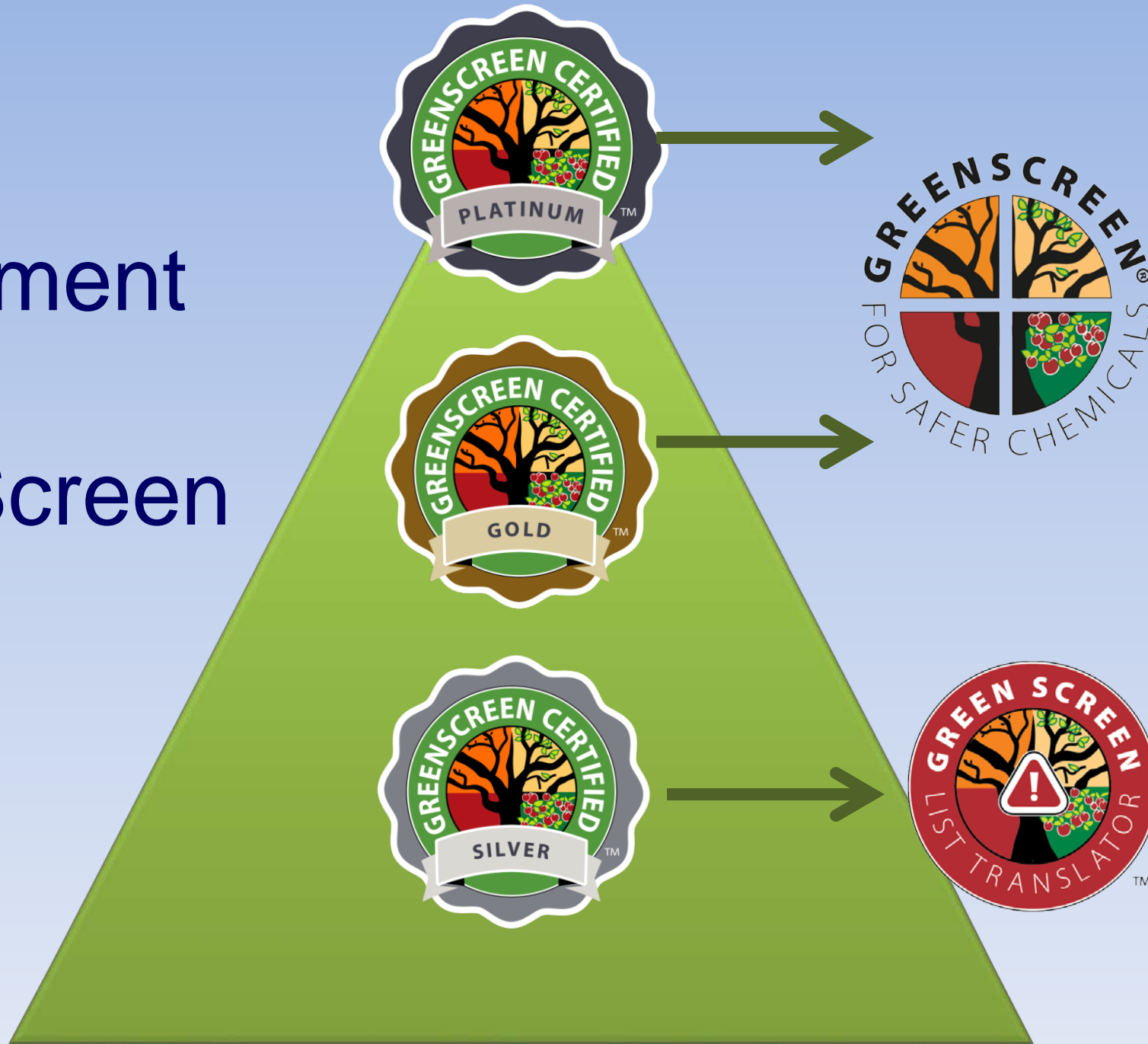


# Firefighting Foam Restricted Substances List (RSL): Chemical Classes of Concern

- Per- and polyfluoroalkyl substances (PFAS)
- Alkylphenols and alkylphenol ethoxylates
- Siloxanes: Cyclic volatile methyl siloxanes
- Organohalogens
- Zero Discharge of Hazardous Chemicals Manufacturing RSL (MRSL)



# Hazard Assessment with GreenScreen Tools



For example, see  
CFP Chemicals of  
High Concern  
Reference List:  
<https://www.chemicalfootprint.org/assessment/survey-resources-2>



# Successes

- First and only standard to define “PFAS-free” products
- Internationally recognized and used: Australia, Europe, Canada, and US
- Manufacturers reformulating products to meet the standard
- Certified firefighting foam products
  - Current: 15 products from 5 manufacturers
  - Coming soon: 20 new products






**BIOEX**® High performance foams

WH...  
HOME • OU...  
**ECOPO**  
**CERTI**  
GreenScre...  
environme...  
derivatives

**NF NATIONAL FOAM**

Search...

HOME | AE...  
**ANGUS FIRE**  
SYNTHETIC EL...



EnviroMail™ 137 - Are your firefighting foams fluorine free?

GreenScreen, a non-government organisation based in the US, offers certification of Class A & B foam concentrates and wetting agents as fluorine free. Under the certification, PFAS-free is defined as PFAS contamination below 0.0001% by weight of the product (1 part per million) measured as total organic fluorine by combustion ion chromatography. This reflects an extremely conservative limit given the level of PFAS intentionally added to achieve foaming/filming properties is in the region of 0.1% by mass.

GreenScreen utilises ALS Australia to perform TOF analysis for its certification of fluorine free firefighting foam products.

GreenScreen Certified™ | GreenScreen® For Safer Chemicals ([greenscreenchemicals.org](https://greenscreenchemicals.org))

Michigan.gov  
Department of Environment, Great Lakes, and Energy

**Michigan PFAS Action Response Team**

HEALTH | DRINKING WATER | INVESTIGATIONS | TESTING | FISH A...

PFAS RESPONSE / PFAS FOAM

**Firefighting Foam and PFAS**

**FLOURINE-FREE AFFF**

Now that we know what to look for, you can learn more information on PFAS-free material from the Known PFAS-free Foam. (this list is accurate as of April 2019). You may also consult the GreenScreen GreenScreen® For Safer Chemicals ([greenscreenchemicals.org](https://greenscreenchemicals.org)). Please note, the State of Michigan product.

Until today no chemicals used  
Dr. Mark S. Ros:

Look for the GreenScreen Certified foam concentrates. Each ingredient independently assessed against various human health and environmental concerns regarding GreenScreen Certified products. [www.greenscreenchemicals.org](https://www.greenscreenchemicals.org)



FOAM CONCENTRATE

MUNICIPAL FIREFIGHTING FOAM

 WISCONSIN DEPARTMENT OF NATURAL RESOURCES

HUNTING FISHING

**FLUORINE-FREE FIREFIGHTING FOAMS**

A few organizations offer lists of what are believed to be fluorine-free firefighting foams, including:

- [Interstate Chemicals Clearinghouse \(IC2\)](#) [exit DNR]
- [Wisconsin State Fire Chiefs Association](#) [exit DNR]
- [GreenScreen™ Certified Products](#) [exit DNR]



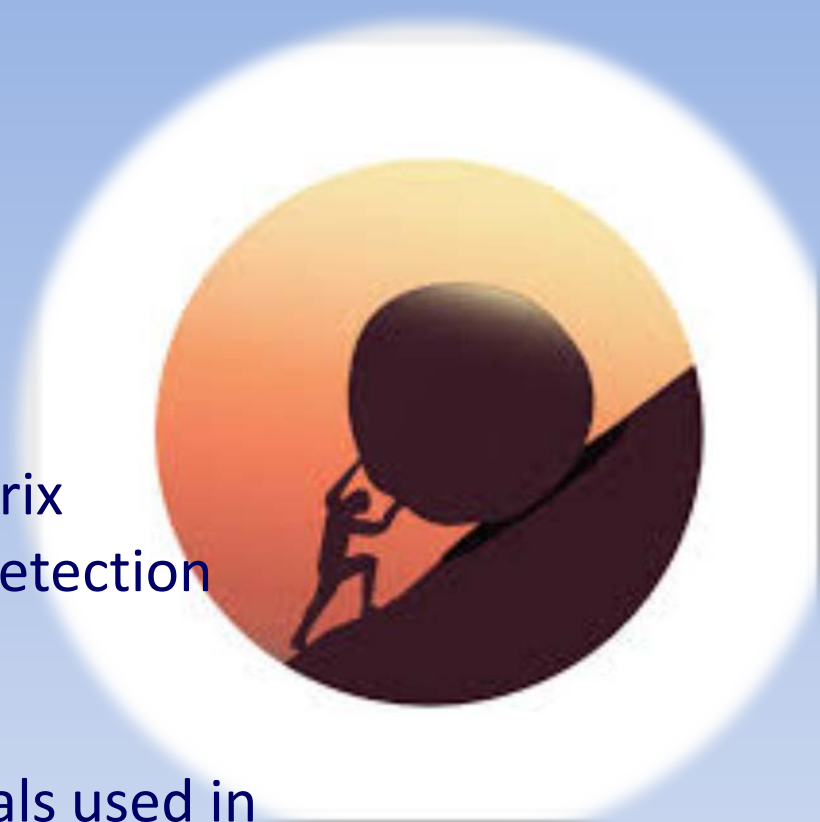
# GreenScreen Certified™ Products > Firefighting Foam

Company	Product Type	Product	Level	Version & Certificate#		
National Foam, Inc.	Firefighting Foam Class A & B fires	MuniF3 Green 3% Synthetic Fluorine Free Foam	Silver	v2.1 #20211138	20	
Angus Fire Ltd	Firefighting Foam Class A & B fires	Frontier 3%	Silver	v2.1 #20211160	2026-07-31	
Verde Environmental, Inc	Firefighting Foam Class A & B Wetting Agent	Micro-Blaze Out	Silver	v2.1 #20211147	2026-07-28	Patented microbial technology; UL Listed; NFPA 18
BIOEX	Firefighting Foam Class A & B Wetting Agent	ECOPOL F	Silver	v2.1 #20211016	2026-03-30	
National Foam, Inc.	Firefighting Foam Class B	UniversalF3 Green 3x3	Silver	v2.1 #20211135	2026-04-21	UL; ULC, LASTFIRE; EN1568 Parts 3 and 4; NFPA 11; NFPA 16

Class A Foam Concentrates  
 Class B Foam Concentrates  
 Class A Wetting Agents  
 Class A&B Wetting Agents

# Challenges

- PFAS Testing
  - Lack of standardized test methods
  - Relevant test methods vary depending on material matrix
  - Test methods evolving with greater accuracy at lower detection levels
- Alternatives
  - Manufacturers may not know, beyond the SDS, chemicals used in alternative formulations to PFAS
    - Suppliers often will not disclose, even to third parties
- Demand
  - Manufacturers need clear, consistent, and loud messaging from purchasers that they want certified products





GreenScreen Certified™ - enhancing  
the health of people and the planet  
by providing PFAS-free and  
preferred products

Firefighting Foam

Food Service Ware

Furniture & Fabrics

Textile Chemicals

Cleaners & Degreasers



## PFAS-free & Preferred Products

- **Firefighting Foam** – 15 products from 5 manufacturers
- **Food Service Ware** – 48 products from 2 manufacturers
- **Furniture & Fabrics** – 4 products from 2 manufacturers
- **Cleaners & Degreasers in Manufacturing** – 8 products from 3 manufacturers
- **Textile Chemicals** – 142 products from 7 manufacturers

*217 products from 19 manufacturers*

*Manufacturers reformulating to meet GreenScreen Certified requirements*

<https://www.greenscreenchemicals.org/certified>



# RSL for Food Service Ware

1. Food Packaging Forum Priority Substances List
2. Alkylphenols and alkylphenol ethoxylates
3. Bisphenols
4. Organohalogens (including chlorinated plastic)
5. Ortho-phthalates
6. Siloxanes: Cyclic volatile methyl siloxanes
7. Parabens
8. Benzophenones
9. Organotin Compounds
10. Compounds of Cadmium, Chromium VI, Lead, and Mercury
11. Antimony-based catalyst in PET
12. Antimicrobials
13. Nanomaterials
14. Diglycidyl ethers of bisphenols
15. MOSH and MOAH
16. Polycyclic Aromatic Amines
17. Other Chemicals of Concern

## GREENSCREEN CERTIFIED PFAS TESTING REQUIREMENTS FOR IMPURITIES/RESIDUALS/NON-FUNCTIONAL CONSTITUENTS

PFAS Testing	Firefighting Foam v2.1	Furniture & Fabric v1.1	Food Service Ware v1.0
Measurement method	Total organic fluorine (TOF)	Total fluorine	Total fluorine
Threshold to pass	< 1 ppm	< 100 ppm	< 100 ppm
Analytical technique	Combustion Ion Chromatography (CIC)	CIC or Ion selective electrode (ISE)	CIC or ISE
Minimum Detection Limit (MDL)	1 ppm TOF	50 ppm or lower	50 ppm or lower
Analytical laboratories	ALS	Any with MDL < 50 ppm; labs include Galbraith (ISE), SGS, and Eurofins	Galbraith



# Thank you! Questions?

Mark S. Rossi, PhD

Executive Director

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# NSF Drinking Water Standards & PFAS

# AGENDA



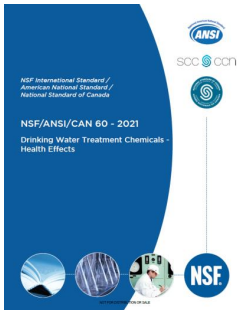
## Who We Are

Mission, History and Standards Development



## Drinking Water Treatment

Addressing PFAS contamination in drinking water



## NSF 60, 61, 600

Addressing PFAS in drinking water contact products

PUBLIC

Public Release Authorized



We are an **independent**, not-for-profit organization dedicated to providing services to **improve public health** and **safety**.



# NSF STANDARDS DEVELOPMENT

## Manufacturers

- Food equipment
- Chemicals
- Nonfood compounds
- Water distribution and treatment
- Recreational water equipment

## Regulators

- USDA
- EPA
- FDA
- CPHC
- HC
- International, national, state and local government agencies

## End Users

- Industry QA/QC
- Equipment specifiers
- Architects
- Academia/educators
- Consumer groups

## CPHC

# Regulatory Involvement

- Participate in Standards Joint Committee
- Write an Issue Paper
- Participate on a task group for a particular issue
- To get involved, contact NSF at [Standards@NSF.org](mailto:Standards@NSF.org)



NSF Standard(s) Impacted: \_\_\_\_\_

**Background:**

*Provide a brief background statement indicating the cause and nature of concern, the impacts identified relevant to public health, public understanding, etc, and any other reason why the issue should be considered by the Committee. Reference as appropriate any specific section(s) of the standard(s) that are related to the issue.*

**Recommendation:**

*Clearly state what action is needed: e.g., recommended changes to the standard(s) including the current text of the relevant section(s) indicating deletions by use of ~~strike-out~~ and additions by highlighting or underlining; e.g., reference of the issue to a Task Group for detailed consideration, etc.*

**Supplementary Materials (photographs, diagrams, reports, etc.):**

*If not provided electronically, the submitter will be responsible to have sufficient copies to distribute to committee members.*

*I hereby grant NSF International the non-exclusive, royalty free rights, including non-exclusive, royalty free rights in copyright, in this item and I understand that I acquire no rights in any publication of NSF International in which this item in this or another similar or analogous form is used.*

Signature\*: \_\_\_\_\_

Company: \_\_\_\_\_

Telephone Number: \_\_\_\_\_ E-mail: \_\_\_\_\_

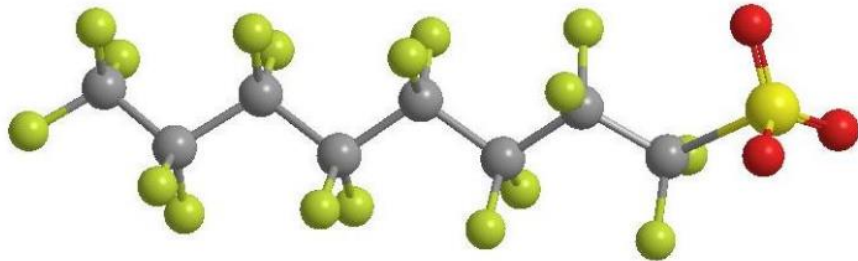
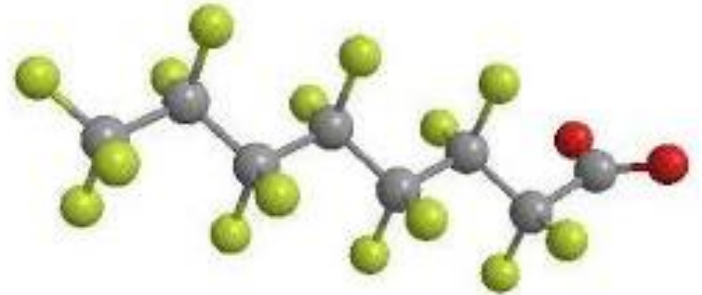
Submission Date: \_\_\_\_\_

*\*Type written name will suffice as signature*

Item No. \_\_\_\_\_  
(For NSF International internal use)  
03/2013

# Perfluorooctanoic Acid (PFOA) & Perfluorooctane Sulfonate (PFOS)

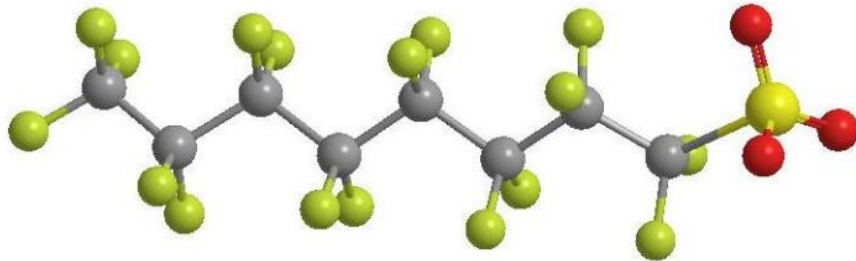
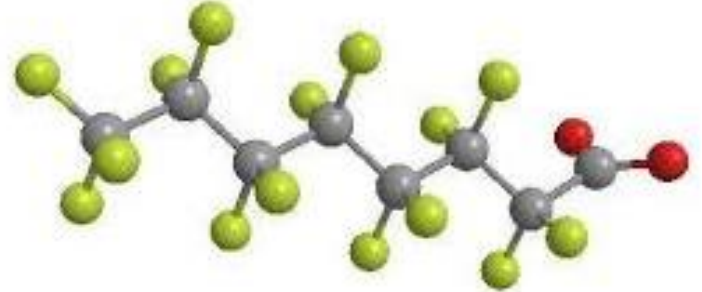
Persistent in the environment  
Widespread human exposure  
Adverse health effects



Previous EPA  
Health Advisory Level  
**70 ppt**  
Combined for PFOA &  
PFOS

# Perfluorooctanoic Acid (PFOA) & Perfluorooctane Sulfonate (PFOS)

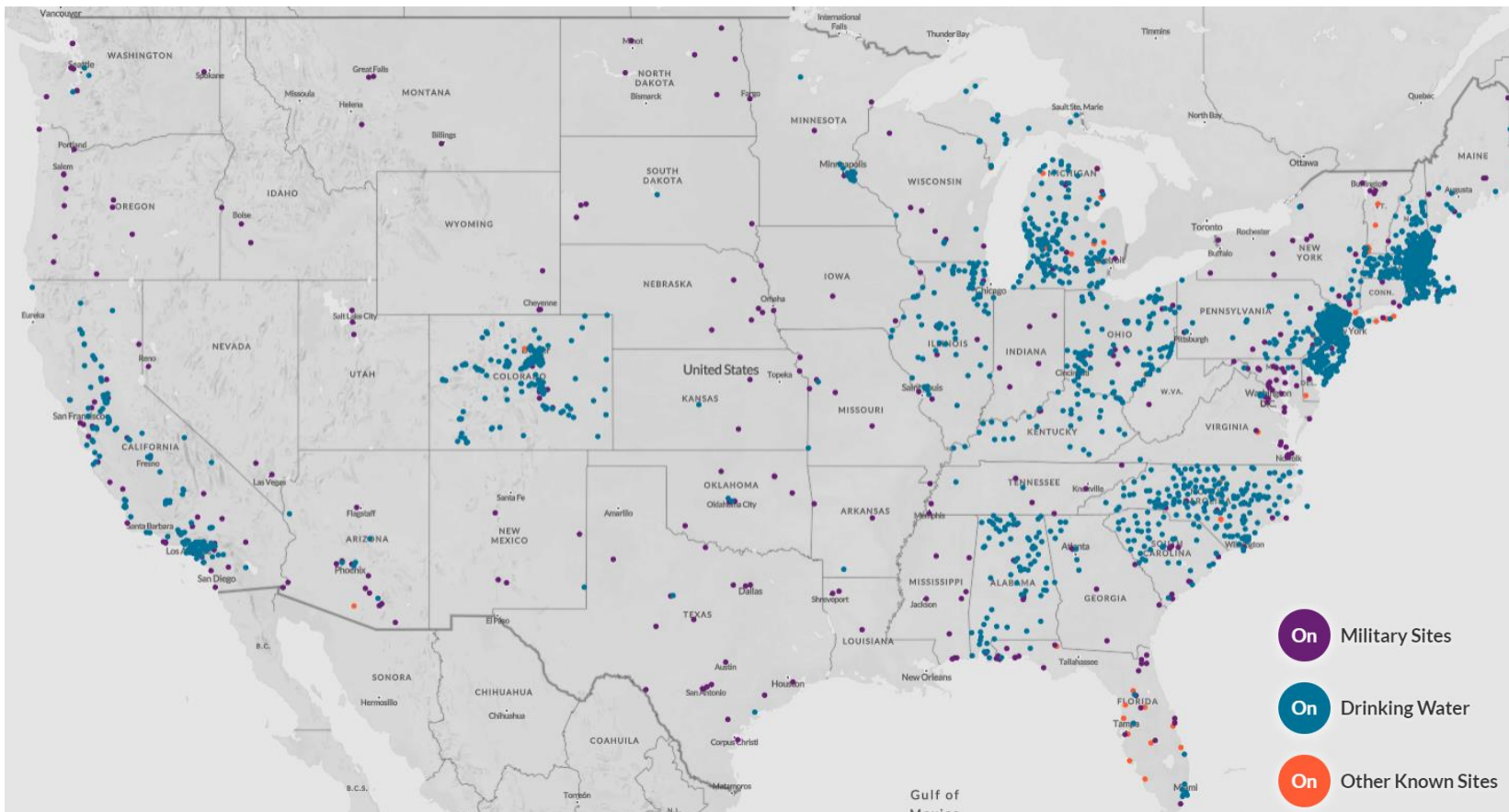
Persistent in the environment  
Widespread human exposure  
Adverse health effects



**New EPA  
Health Advisory Level  
0.004 ppt PFOA  
.02 ppt PFOS**



# So How Widespread Is It?



Source: [https://www.ewg.org/interactive-maps/pfas\\_contamination/map/](https://www.ewg.org/interactive-maps/pfas_contamination/map/)

# NSF/ANSI 53 & 58 Design

For point-of-use filters and reverse osmosis systems claiming to reduce **PFOS and PFOA**

- Challenge Water
  - 1.0 µg/L (1000 ppt) as PFOS
  - 0.5 µg/L (500 ppt) as PFOA
- Tested according to manufacturer provided capacity
  - 120% with PID, 200% without PID
- Effluent must be 0.07 µg/L (70 ppt) or less to obtain certification (95.3% reduction)
- In addition to the performance reduction test, products must meet the material safety and structural requirements of NSF 53 or 58, in accordance with the product type.

# NSF 53 Certified Filters

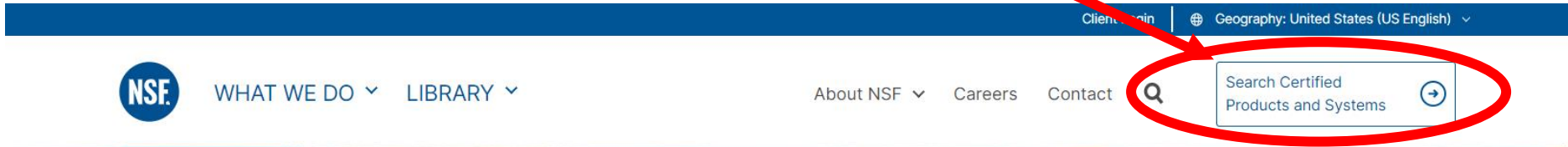
- 13 companies
- Over 140 models certified
- Point of Use (POU) devices
  - Counter top manual fill
  - Counter top connected to sink faucet
  - Plumbed-in to separate tap (including R.O)
  - Refrigerator filters
  - Pour through pitchers
  - Capacities range from 200 – 1325 gallons
- Point of Entry (POE) devices
  - One system certified (164,000 gallons)



# VERIFYING CERTIFIED PRODUCTS – HOW TO SEARCH

[www.nsf.org](http://www.nsf.org)

Click here to search for certified products



# VERIFYING CERTIFIED PRODUCTS – HOW TO SEARCH

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NSF/ANSI/CAN 60

- [Drinking Water Treatment Units](#)

NSF/ANSI 42, 44, 53, 55, 58, 62, 177, 401, NSF P231, P473, P477, NSF/JWPA P72, CSA B483.1

- [Fabricated Ductile Iron Pipe](#)

AWWA C115, C606

Click here to search for certified products



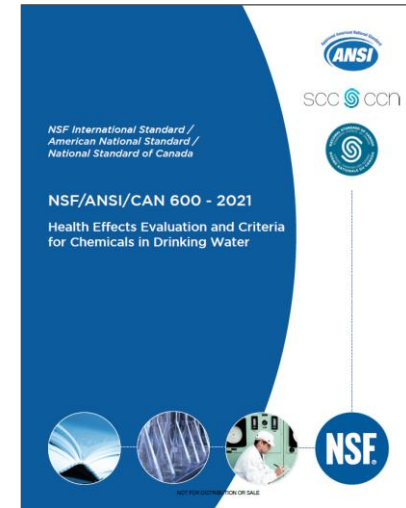
System Tested and Certified by NSF International against NSF/ANSI Standard \_\_\_ for the reduction of \_\_\_.

# Latest Developments

- New HALs for PFOA, PFOS, Gen X, PFBS
  - Orders of magnitude reduction (>10,000x lower for PFOA)
- No enforceable/regulatory levels yet
- Many states already have regulatory levels for PFOA, PFOS and other PFAS
- Adjustment to NSF/ANSI 53 requirements?
  - Work by the Joint Committee is underway. Possible outcomes include:
    - Reduced pass/fail criteria in line with state levels (or forthcoming EPA levels)
    - General PFAS reduction claims and/or individual PFAS chemical reduction claims
    - Development of “phase-in” timeline for any necessary retesting of previously certified products

# NSF/ANSI/CAN 60, 61, 600 & PFAS

- NSF/ANSI/CAN 60: Drinking Water Treatment Chemicals – Health Effects
- NSF/ANSI/CAN 61: Drinking Water System Components – Health Effects
- NSF/ANSI/CAN 600: Health Effects Evaluation and Criteria for Chemicals in Drinking Water



# NSF/ANSI/CAN 60 – PFAS

## General

- No automatic test battery for PFAS under NSF/ANSI/CAN 60
  - Not expected to be found in fluorinated mineral compounds (i.e. sodium fluoride, etc.)
- Every product requires a complete formulation review
  - Provided by manufacturer
  - Requires the CAS # for all chemical constituents
  - NSF audits manufacturer to verify (before cert and annually thereafter)



# NSF/ANSI/CAN 60 – PFAS

## Well Drilling & Development Aids

If PFOS/PFOA identified in a product

- Dose evaluation includes some necessary assumptions (bore hole width/depth, casing width/length, aquifer size, percentage of drilling fluid removed, etc.)
- Pass/fail criteria = 7 ppt or 70 ppt depending on product type

What if PFAS other than PFOA/PFOS are identified?

- A toxicological risk assessment is performed if enough data exists to do so
  - Pass/Fail criteria developed for the PFAS chemical
- If not enough data exists for a formal risk assessment:
  - Tox review still performed in accordance with NSF/ANSI/CAN 600

# NSF/ANSI/CAN 60 – PFAS

## Well Drilling & Development Aids

### Status of things today

- To the best of our knowledge, no well drilling aids certified by NSF have had PFAS chemicals listed as ingredients
- Criteria will likely adjust with new/forthcoming EPA regulatory levels (MCLs, HALs, etc.)
  - NSF/ANSI/CAN 60 Joint Committee is the determining body, not NSF
  - Unknown if any State regulatory levels will be taken up by the NSF/ANSI/CAN 60 Joint Committee for inclusion in the standard
- If you find PFAS concentrations in the products or increased levels in drinking water after use, please let NSF know
  - NSF can only investigate the manufacturer and their processes for the source of contamination
  - Possible contamination from other sources should be examined/ruled out by other entities

## NSF/ANSI/CAN 61 – PFAS

- Similar requirements to NSF/ANSI/CAN 60 (material review, pass/fail criteria, etc.)
- Unlike NSF/ANSI/CAN 60, some specific product material types automatically get tested for PFOA and/or PFOS
  - PTFE, ETFE, Fluoroelastomers, etc. (i.e. thing known to include fluorinated hydrocarbons), some other plastics
- NSF testing has failed some products for PFOA levels, but very, very few

# Takeaways

- NSF Standards are written by Joint Committees consisting of various stakeholders, but anyone can engage and submit Issue Papers
- Complimentary copies of NSF standards are available for regulators
- NSF/ANSI 53 certified filters are available to reduce PFOS/PFOA in drinking water - inclusion of other PFAS chemicals and new pass/fail criteria are on the horizon
- NSF/ANSI/CAN 60 and NSF/ANSI/CAN 600 do have provisions for addressing PFOA, PFOS and other PFAS chemicals
- No current well drilling aids have been certified by NSF with PFAS compounds as ingredients (to the best of our knowledge)
- NSF is committed to our public health mission and helping out whenever we can



**QUESTIONS?**



**Derek DeLand, MPH, REHS/RS**  
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**Regulatory Affairs Division**  
**NSF International**  
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**734-418-6683**

# DNR Updates, Conclusions & Next Steps

