



EPA/EGLE Fume Suppressant Study

July 9, 2020

EGLE Water Resources Division (WRD), Emerging Pollutants Section
The United States Environmental Protection Agency (EPA) Region V
EPA Office of Research and Development (ORD)

Source Identified



- Chrome plating facility using PFOS-free fume suppressants
- Discontinued use of PFOS-based fume suppressants in 2013

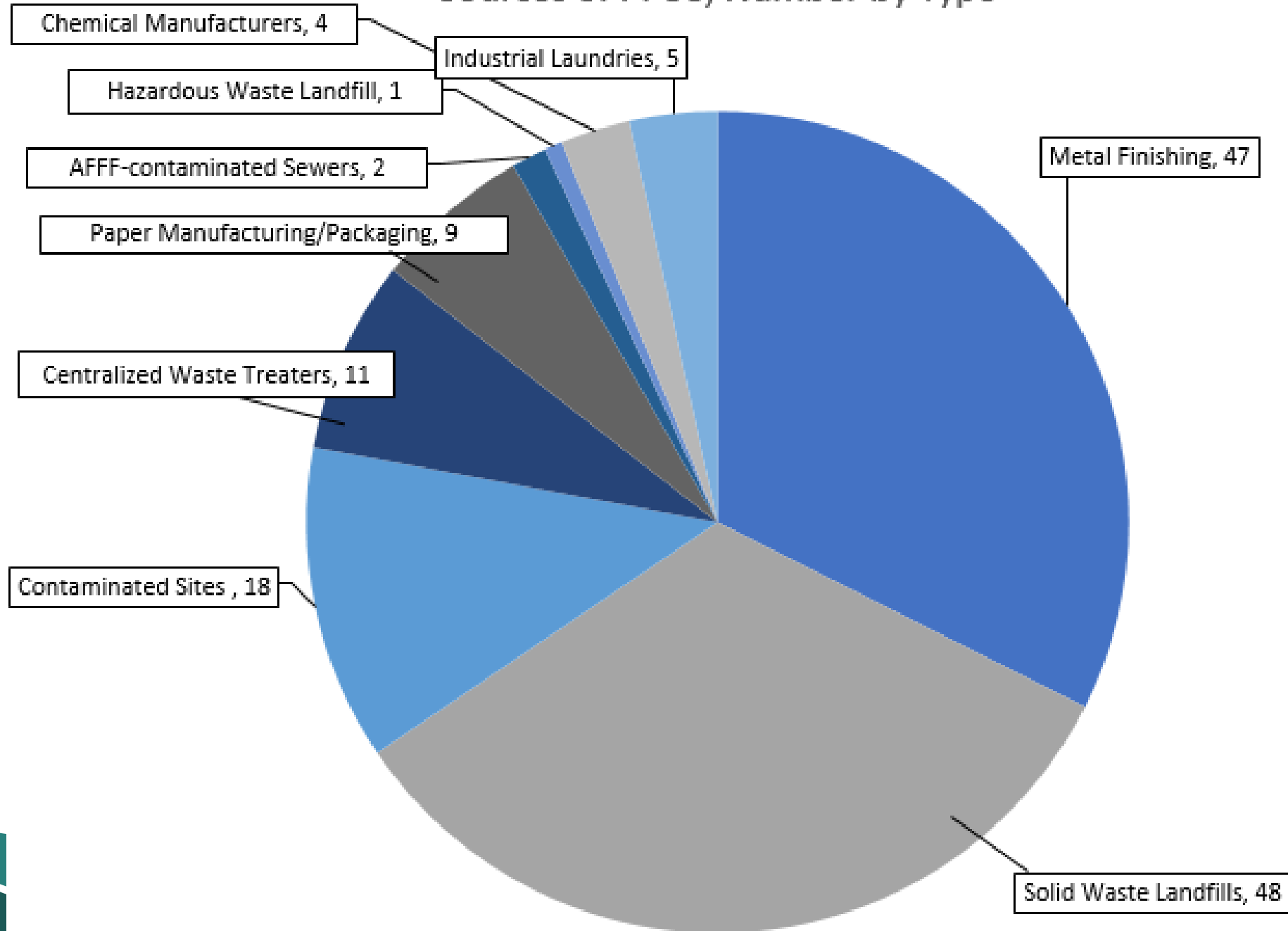
NPDES Requirement: Industrial Pretreatment Program (IPP)

- For WWTPs w/IPPs: require source evaluation and follow up
- To ensure WWTPs are not passing through PFOS or PFOA greater than water quality standards
- To prevent interference with management of biosolids
- Current permit requirement, new pollutants

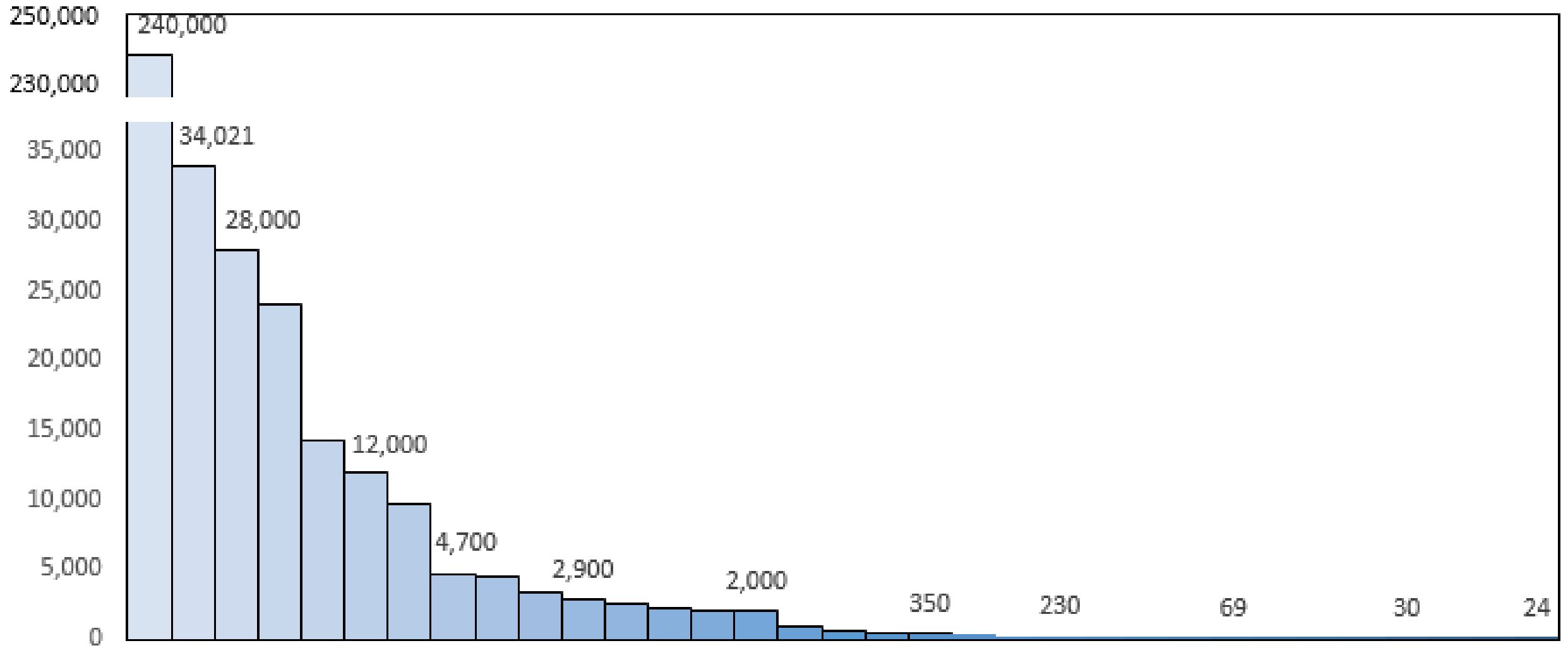
Sources of PFOS to WWTPs in Michigan

| Industry/Category/Type | Total Number Evaluated * | Number (%) Sources of PFOS by Type** | Range Effluent PFOS exceeding screening level of 12 ppt |
|-----------------------------------|--------------------------|--------------------------------------|---------------------------------------------------------|
| Solid Waste Landfills*** | 57 | 49 (86%) | 20-5,000 |
| Metal Finishing | 320 | 47(15%) | 20 to 240,000 |
| · Chrome Plating | 50 | 33 (66%) | 24-240,000 |
| · Chromate Conversion Coating | 24 | 12 (50%) | 16-9,950 |
| Contaminated sites | 40 | 20 (50%) | 14-34,000 |
| Centralized Waste Treaters (CWTs) | 17 | 11 (65%) | 13-8400 |
| Paper manufacturing, packaging | 14 | 9 (64%) | 16-410 |
| Industrial laundry facilities | 7 | 5 (71%) | 24-69 |
| Chemical manufacturers | 17 | 4 (24%) | 18-4,600,00 |
| AFFF-contaminated sewers | 2 | 2 (100%) | 240-45,000 |

Sources of PFOS, Number by Type

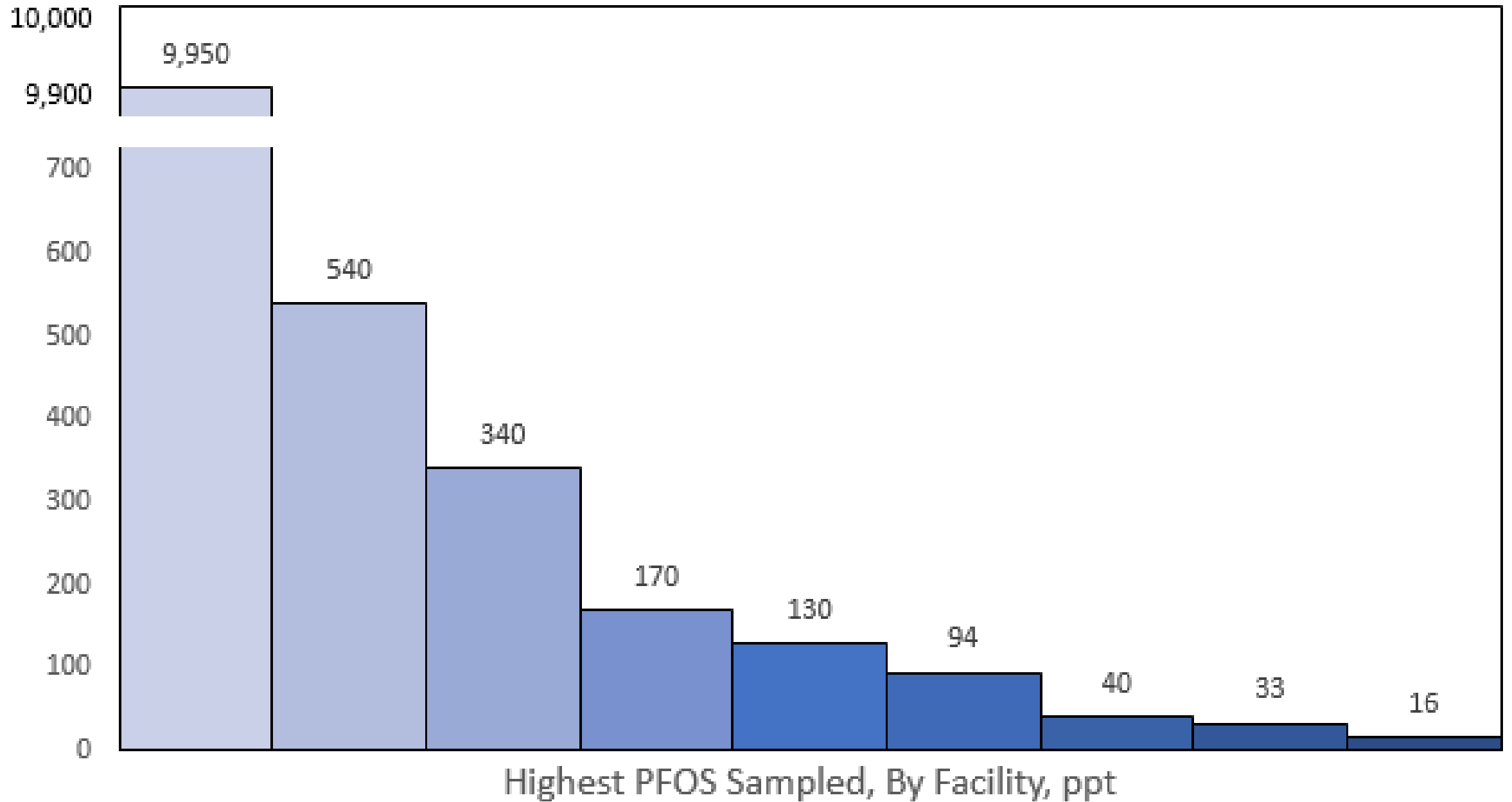


Chrome Plater Sources, Highest Effluent PFOS Sampled, ppt



Highest Effluent PFOS sampled, by Facility

Chromate Conversion Coating Sources, Highest PFOS Effluent Sampled, ppt



Purpose of Study

Is PFOS in chrome plater effluent linked to currently-used products?

- Analyze Fume Suppressants for PFAS
 - Ø Is PFOS present?
 - Ø Are precursors to PFOS present?
- Analyze Chrome Plater Effluent for PFAS (prior to any pretreatment for PFAS)
 - Ø Compare to Currently-Used Products

Fume Suppressant Study Design

- Sample 11 chrome platers (some with chrome etching):
 - 11 effluent samples
 - 12 fume suppressant samples (9 different products, 3 replicates)
 - Includes a sister plant (newer) that never used PFOS-containing fume suppressant (but does use PFAS-containing product)
- Analyze with Targeted and Non-Targeted Analysis

EPA/EGLE Fume Suppressant Study Team



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Types of Analysis

- **Targeted Analysis:** Reports exact quantities of specific “targeted” chemicals (24 MPART Minimum Analytes + GenX)
- **Non-Targeted Analysis:** more qualitative but can detect unanticipated chemicals and show relative abundance of various compounds

Approaches to Chemical Measurements

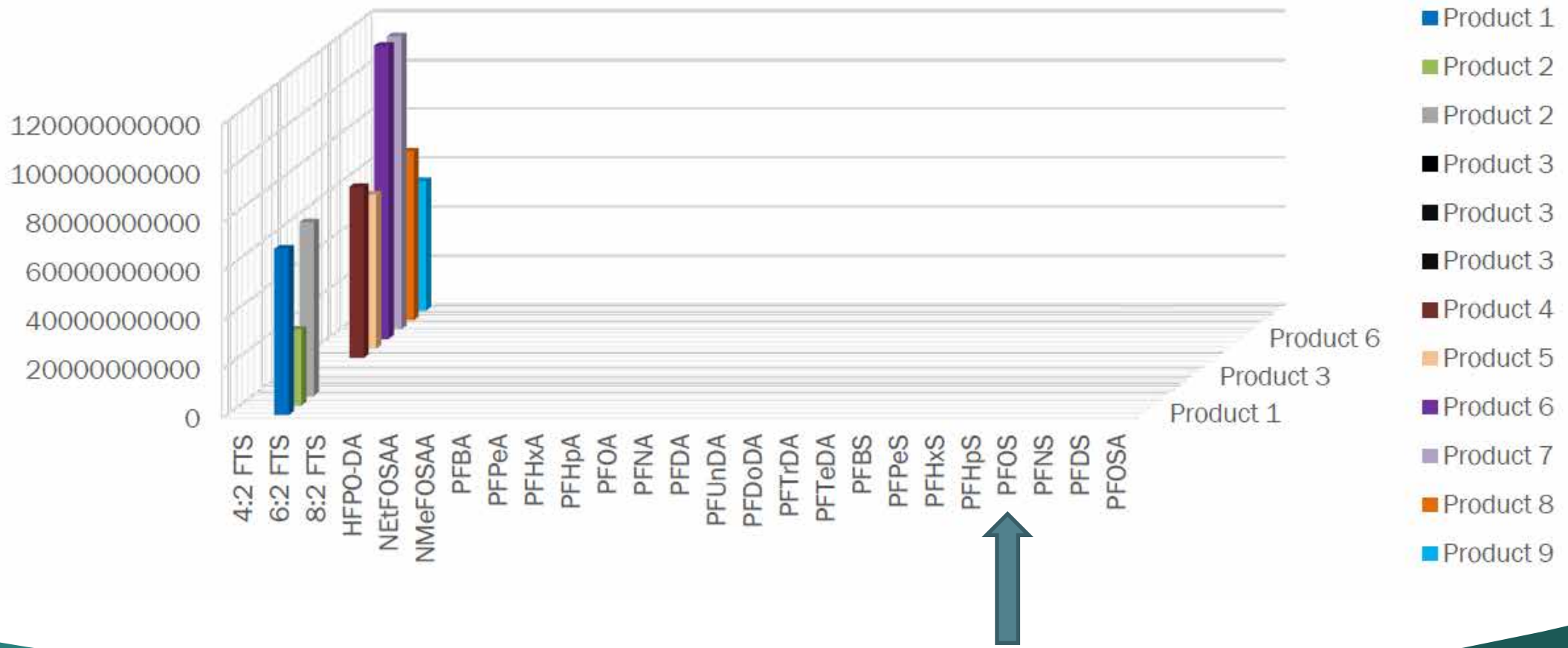
| | <u>Targeted</u> | <u>Screening</u> | <u>Discovery</u> |
|---------------------------|-------------------------|-----------------------------|-----------------------|
| Chemical Targets | Few, selected chemicals | 100s – 100,000s per library | Any chemical |
| Method of Analysis | Focused method | Non-Targeted Method | Non-Targeted Method |
| Chemical Structure | Known | Known in library | Unknown |
| Reference Data | Available | Some, maybe simulated | Some, maybe simulated |
| Standards | Available | For common compounds | Unlikely |

Complex, More Time-Consuming Analysis



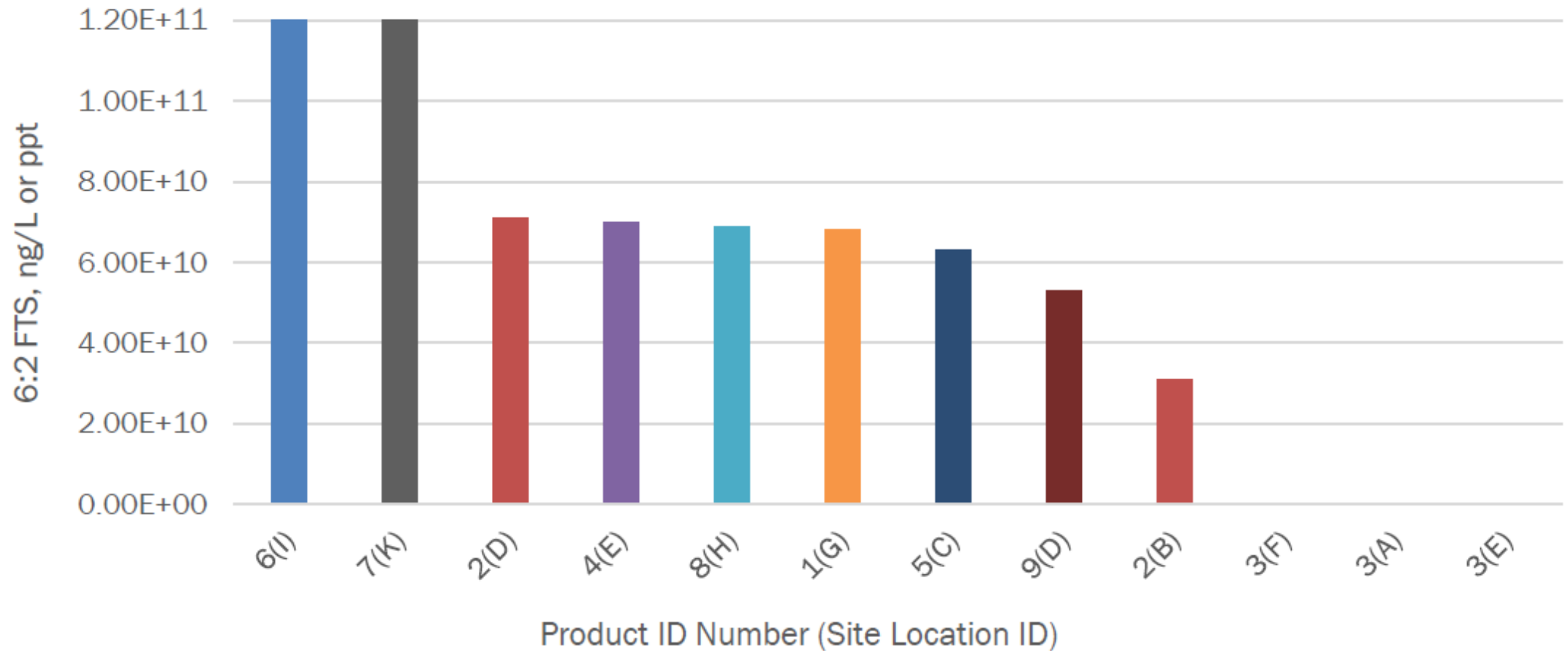
Is PFOS in Currently-Used Fume Suppressants? No

Figure 1. PFAS in Fume Suppressants, ng/L or ppt



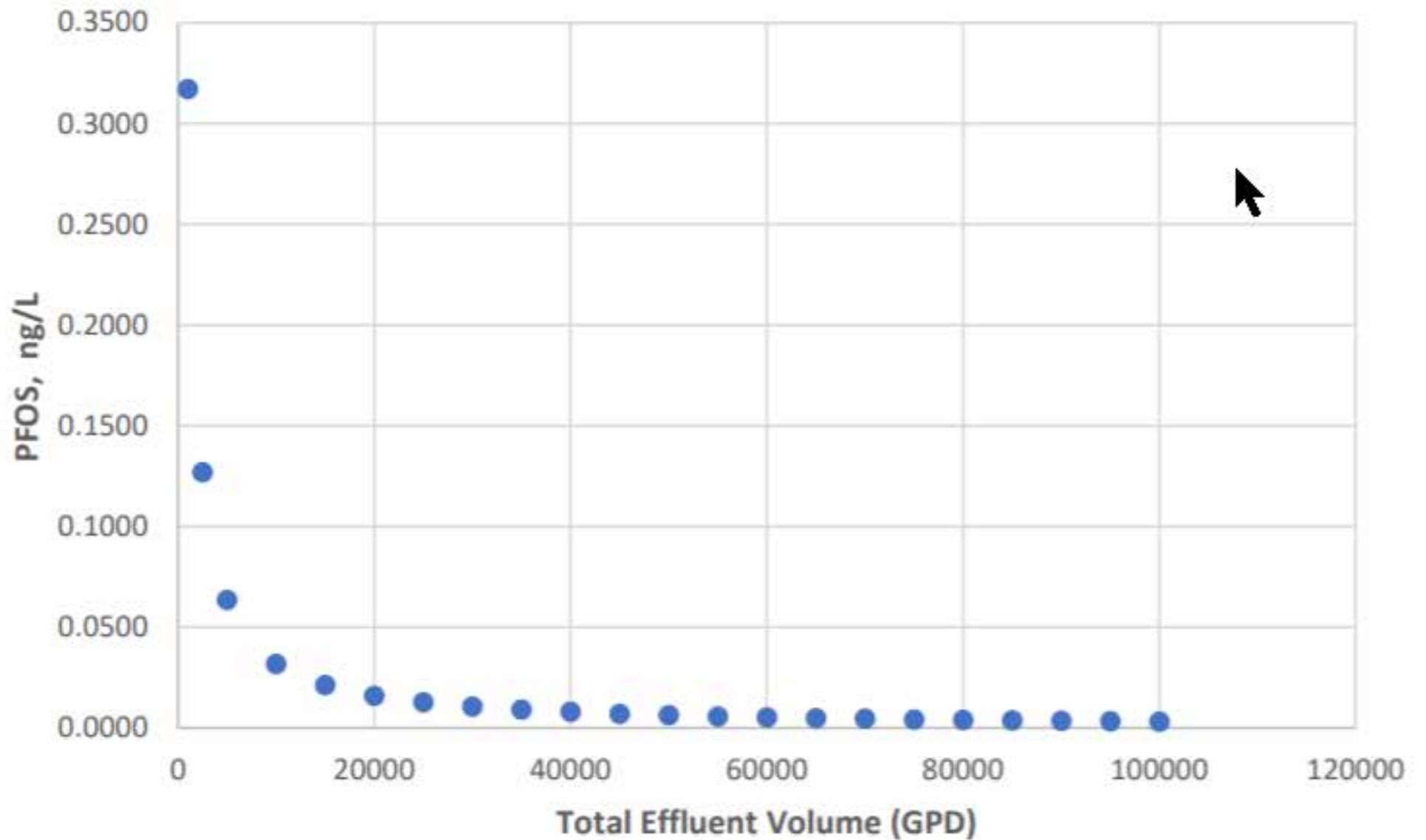
What PFAS are in Fume Suppressants? 6:2 FTS

Figure 2: 6:2 FTS Concentration in Fume Suppressants



Product Analysis Reporting Limits

Figure 1. PFOS in Effluent with 1000 ng/L in Fume Suppressant

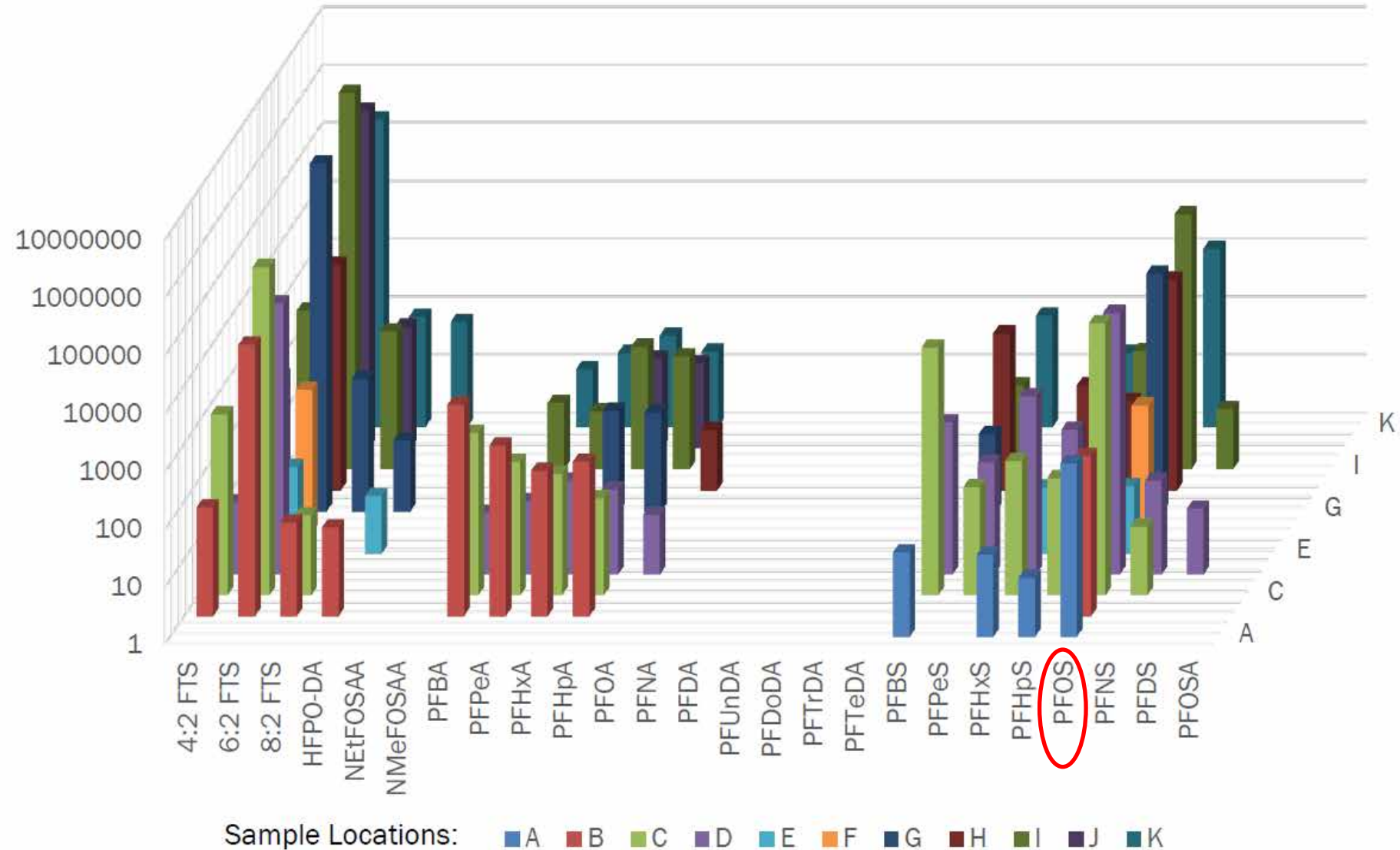


Is 6:2 FTS (or 6:4 FTS) a PFOS precursor?

- Neither 6:2 FTS (or 6:4 FTS) are precursors to PFOS.
- Both are shorter-chain PFAS that cannot break down to the longer-chain PFOS.

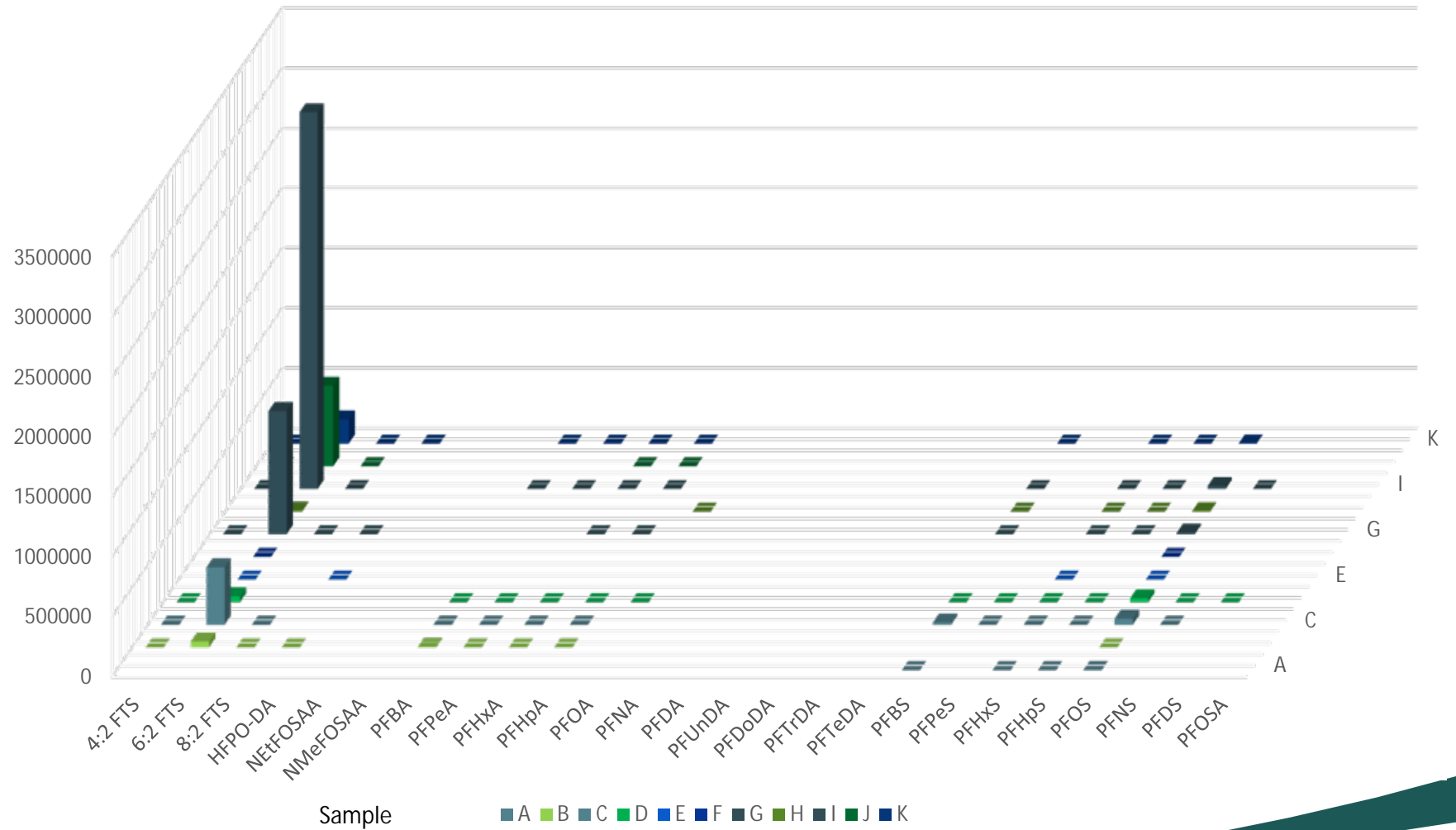
Which PFAS are in Chrome Plater Effluent?

Figure 3: PFAS in Effluent Prior to Treatment, ppt or ng/L



Which PFAS are in Chrome Plater Effluent?

PFAS in Effluent Prior to Treatment, ppt or ng/l



PFAS in Effluent

- Most PFAS is 6:2 FTS, likely from current products (except at platers using Product 3)
- Are other PFAS in effluent breakdown products from 6:2 FTS?
 - Beyond scope of this study
 - Terminal breakdown products are PFPeA, PFHxA, and 5:3 FTCA
 - Intermediates? Unclear

| Location Sample ID | Total (ppt) | 6:2 FTS (ppt) | PFOS (ppt) | 23 Other PFAS Analytes (ppt) |
|--------------------|-------------|---------------|------------|------------------------------|
| I | 3,166,509 | 3,140,000 | 25,300 | 1,209 |
| G | 1,043,339 | 1,030,000 | 12,700 | 639 |
| J | 672,399 | 672,000 | ND | 399 |
| C | 556,393 | 482,000 | 51,700 | 22,693 |
| K | 204,615 | 203,000 | 1,200 | 415 |
| D | 85,455 | 49,500 | 33,700 | 2,255 |
| B | 58,239 | 51,000 | 610 | 6,629 |
| H | 12,837 | 7,880 | 4,330 | 627 |
| A | 1,130 | ND | 1,060 | 70 |
| F | 452 | 294 | 158 | ND |
| E | 71 | 32 | 15 | 24 |

Simplified Effluent Data
(prior to any PFAS pretreatment)

Substantial Reductions in PFOS Concentrations at WWTPs

| Municipal WWTP | PFOS, Effluent (ppt, most recent ^{**}) | PFOS Reduction in Effluent (highest to most recent) | Actions Taken to Reduce PFOS |
|----------------|--------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|
| Lapeer | 8.4 | 99% | Treatment (GAC) at source (1) |
| Wixom | 18* | 99% | Treatment (GAC) at source (1) |
| Ionia | <7.5 | 99% | Treatment (GAC) at source (1) |
| Port Huron | 13* | 99% | Source control/reduction at source |
| Howell | 4.3 | 97% | Treatment (GAC/resin) at source (1) |
| Bronson | 6.9 | 95% | Treatment (GAC) at source (1) |
| Kalamazoo | 3.1 | 92% | Treatment (GAC) at sources (2), change water supply |
| K I Sawyer | 13* | 95% | Eliminate leak AFFF, some cleaning |
| GLWA (Detroit) | 30* | 23% | Treatment (GAC) at sources (9) |
| Belding | 7.2 | 49% | Restricted landfill leachate quantity accepted |

*Greater than Water Quality Standards

**Data received/processed as of April 30, 2020

Summary

- No currently-used fume suppressants contained PFOS or PFOS precursors
- PFOS found in untreated effluent is likely due to historical use and the nature of “forever chemicals”
- Currently-used fume suppressants may contain other PFAS compounds, primarily 6:2 FTS

PFAS Reports & Information

- [EPA/EGLE Fume Suppressant Study Report](#)
- [Summary Report, Municipal Wastewater and Biosolids/Sludge & PFAS](#)
- [MPART Wastewater Treatment Plants/Industrial Pretreatment](#)
- [Industrial Pretreatment Program PFAS Initiative](#)

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