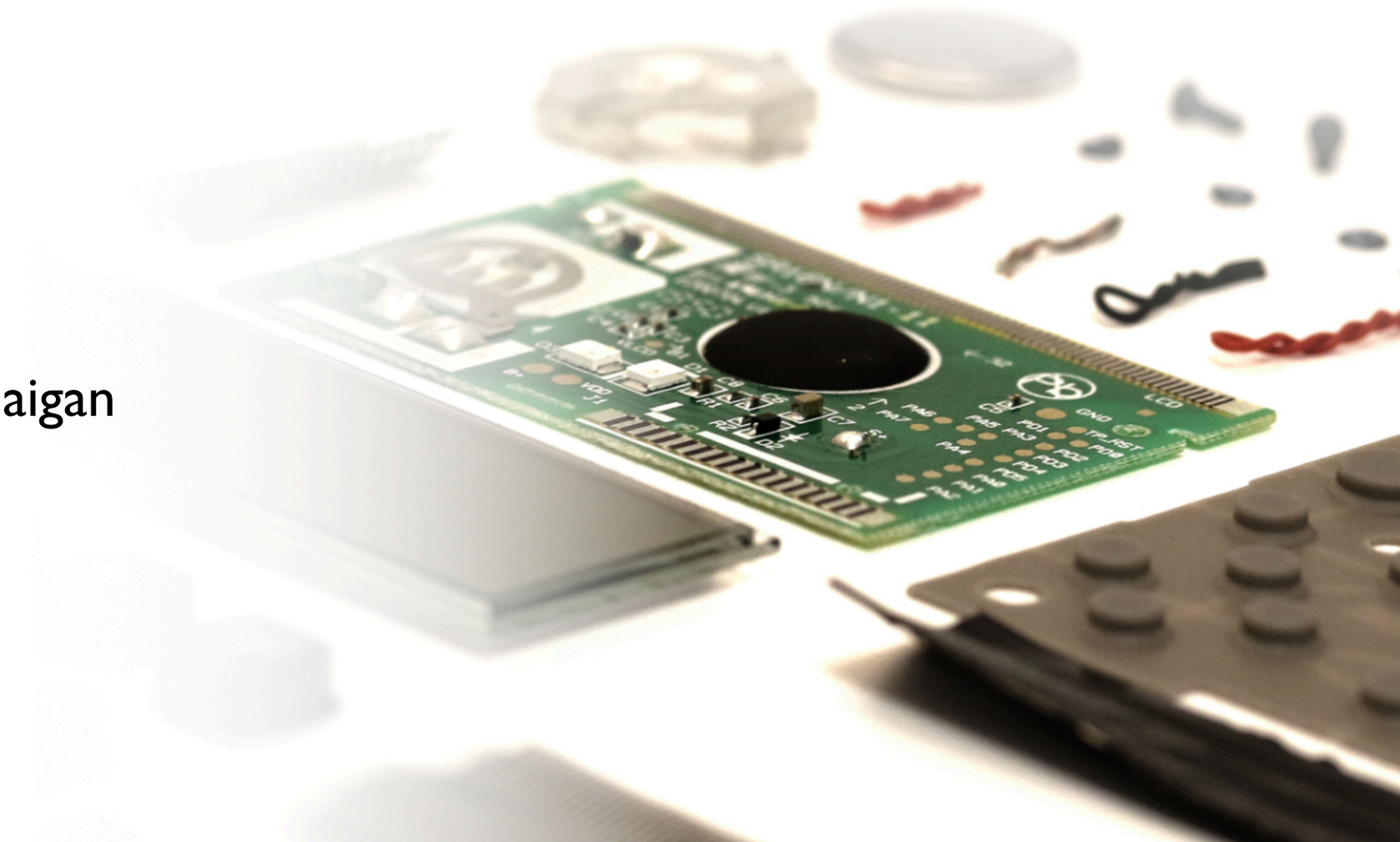
Claigan
Less Journey. More Results.

Claigan Webinar
PFAS Laboratory Test Data

Presented by:
Bruce Calder
VP Consulting Services at Claigan

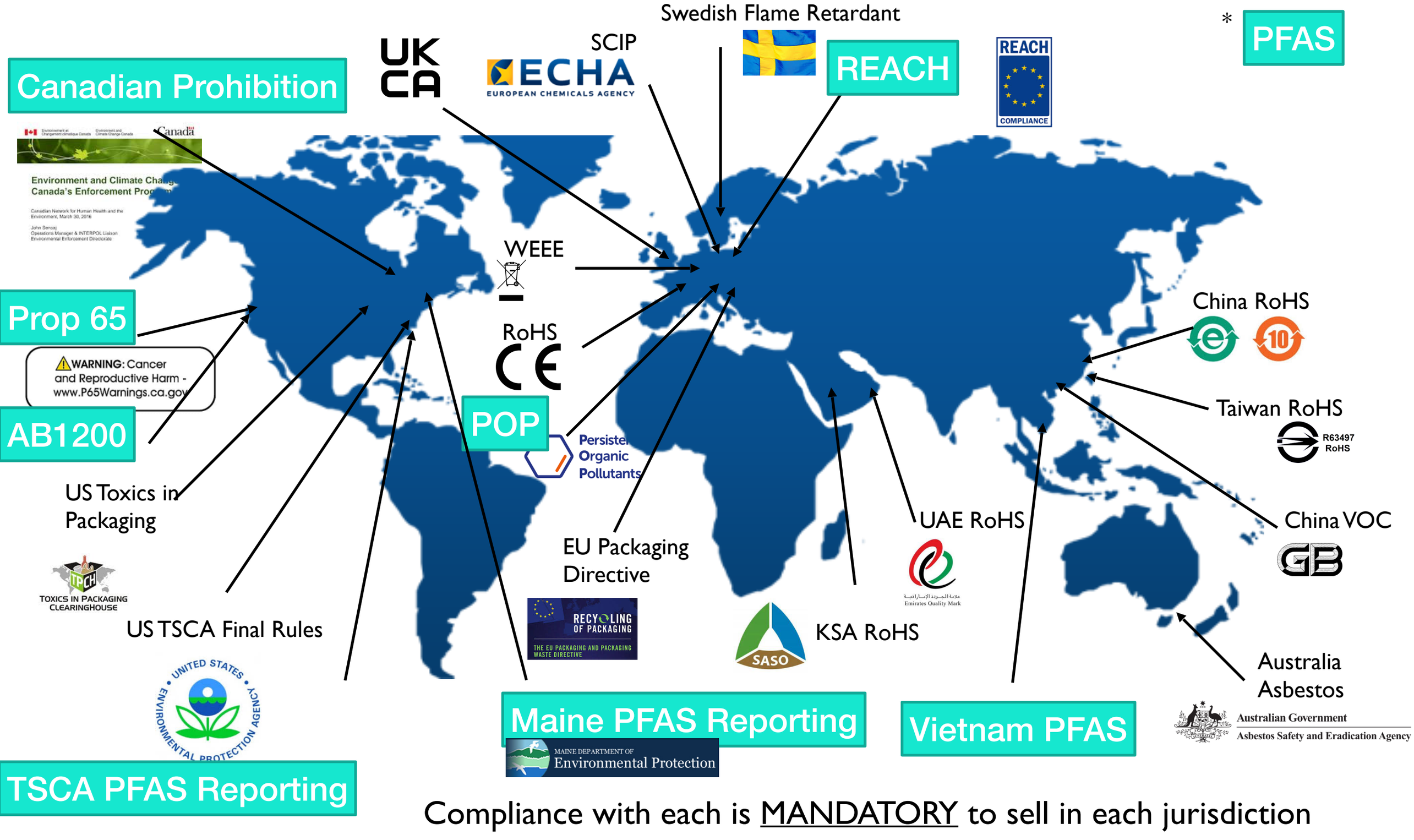
April 5, 2023



Overview - Agenda

- PFAS Regulation Global
- PFAS testing process
- PFAS laboratory results
  - % of products with PFAS
  - Breakdown of reportable PFAS situations
  - Explanation of each main reportable PFAS
    - Occurrence
    - Use
    - Risk of restriction
- Risk based PFAS testing
- Q&A

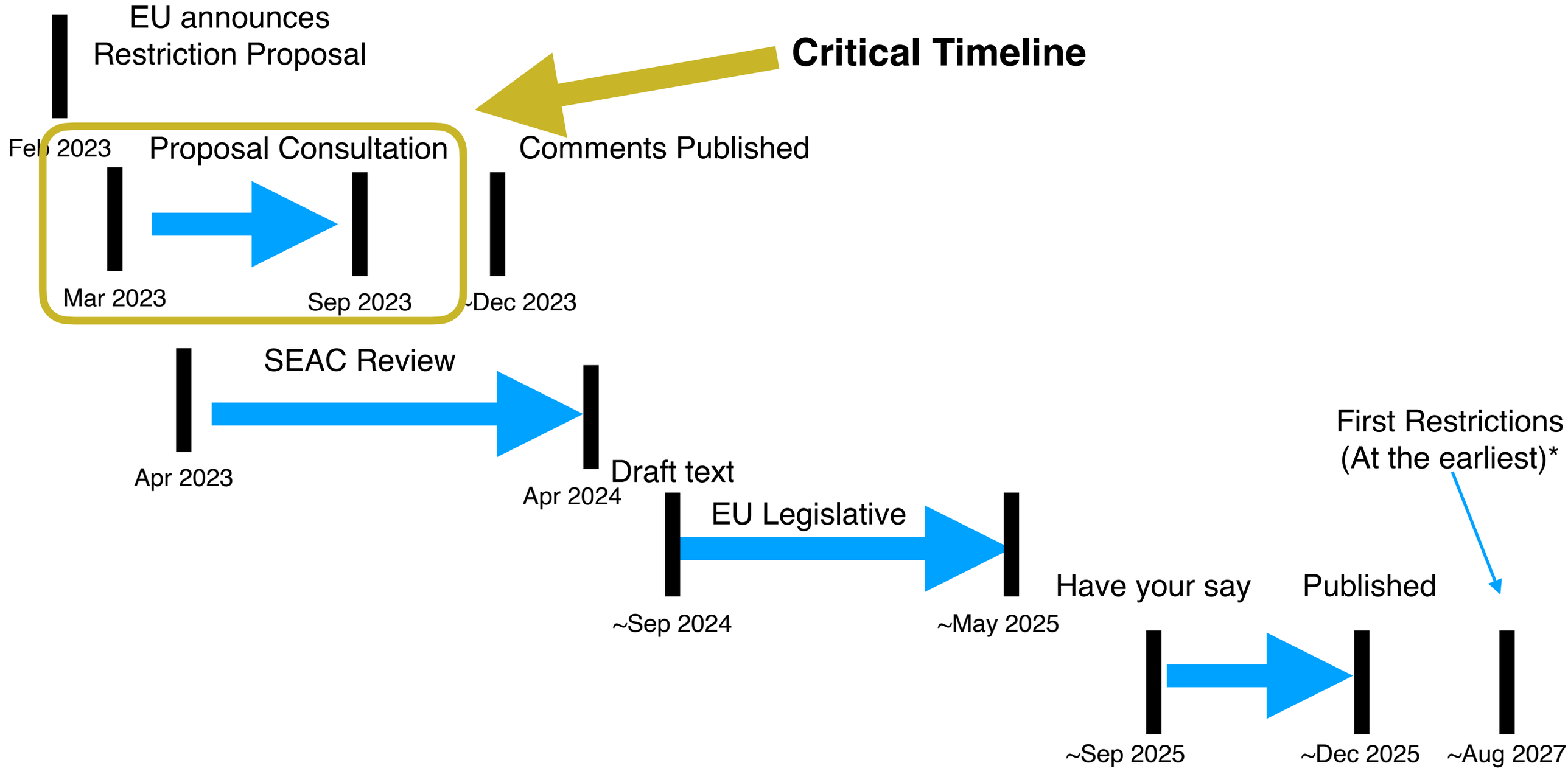
Global Restricted Materials Requirements
Focus on PFAS



Compliance with each is <u>MANDATORY</u> to sell in each jurisdiction

Key Timeline for PFAS

- EU is promoting that proposed ban will be broad
  - Proposed version to be presented February 7 2023



*Note - for some industries, such as medical invasive, restriction closer to ~2038

REACH Restriction

- REACH Restriction Annex 68
  - LC-PFAC Restriction February 25 2023

Derogations (Exemptions)

Entry Nº	Substance name	Conditions[3]	Effective Date[3]
68	C9-C14 PFCAs[1], their salts and C9-C14 related substances[2] [1] Linear and branched perfluorocarboxylic acids of the formula CnF2n+1-C(= O)OH where n = 8, 9, 10, 11, 12, or 13. [2] Any C9-C14 PFCA-related substance having a perfluoro group with the formula CnF2n+1- directly attached to another carbon atom, where n = 8, 9, 10, 11, 12, or 13. Any C9-C14 PFCA-related substance having a perfluoro group with the formula CnF2n+1- that it is not directly attached to another carbon atom, where n = 9, 10, 11, 12, 13 or 14 as one of the structural elements. The following substances are excluded from this designation: • CnF2n+1-X, where X = F, Cl, or Br where n = 9, 10, 11, 12, 13 or 14, including any combinations thereof, • CnF2n+1-C(= O)OX' where n> 13 and X'=any group, including salts.	Shall not be manufactured or placed on the market as substances on their own	25 February 2023
		Shall not be used or placed on the market in: a) another substance, as a constituent; b) A mixture; c) an article, Exception: • The concentration in the substance, mixture or article is < 25 ppb for the sum of C9-C14 PFCAs and their salts or < 260 ppb for the sum of C9-C14 PFCA-related substances. Some derogations include, within others: • The concentration limit shall be 10 ppm for the sum of C9-C14 PFCAs, their salts and C9-C14 related substances where they are present in a substance to be used as transported isolated intermediate for the manufacturing of fluorochemicals with a perfluoro carbon chain length of less than or equal to 6 atoms.	25 February 2023 This deadline changes depending on the use. Main applications include, within others: 4 July 2023: Textiles or oil- and water-repellency for the protection of workers from dangerous liquids that comprise risks to their health and safety. 4 July 2025: Invasive and implantable medical devices. 25 August 2028: Can coating for pressurized metered-dose inhalers. 31 December 2023: Semiconductors on their own and/or semiconductors incorporated in semi-finished electronic equipment. For semiconductors used in spare or replacement parts for finished electronic equipment placed on the market before 31 December 2023, it shall apply from 31 December 2030.

Claigan PFAS Testing

Screening
WD-XRF +
FTIR

If PFAS present

LC-MS/MS
PFOA and similar

SOLVED

<u>REPORTABLE</u> PFAS

- detect F over 50 ppm
- /w FTIR also identifies
  - CAS #
  - Use

Handles

- Maine reporting
- Canada Section 71
- US TSCA reporting
- EU PFAS consultation
- *+ Pre-screening for restricted PFAS*

<u>RESTRICTED</u> PFAS

- detect PFOA family to 25 ppb

Handles

- Prop 65
- EU POP and REACH restrictions
- US TSCA SNUR
- Upcoming Canadian restrictions

Claigan PFAS Polymer Testing

Screening
WD-XRF +
FTIR

If PFAS present

LC-MS/MS
PFOA and similar

SOLVED

REPORTABLE PFAS

- detect F over 50 ppm
- /w FTIR also identifies
  - CAS #
  - Use

Handles

- Maine reporting
- Canada Section 71
- US TSCA reporting
- EU PFAS consultation
- *+ Pre-screening for restricted PFAS*

RESTRICTED PFAS

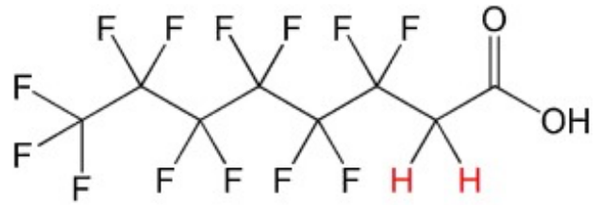
- detect PFOA family to 25 ppb

Handles

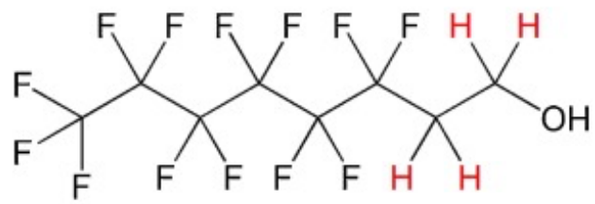
- Prop 65
- EU POP and REACH restrictions
- US TSCA SNUR
- Upcoming Canadian restrictions

PFAS Simplified

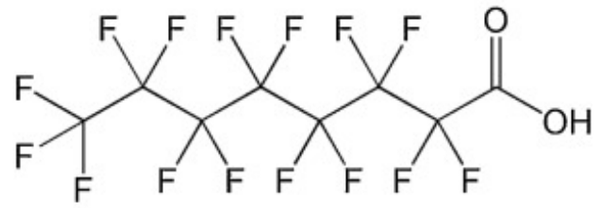
- **Non-Polymer PFAS**
  - Non-repeating PFAS (non-polymer)
  - Normally **'water soluble PFAS'**
    - ie. K-PFOA



6:2 FTCA

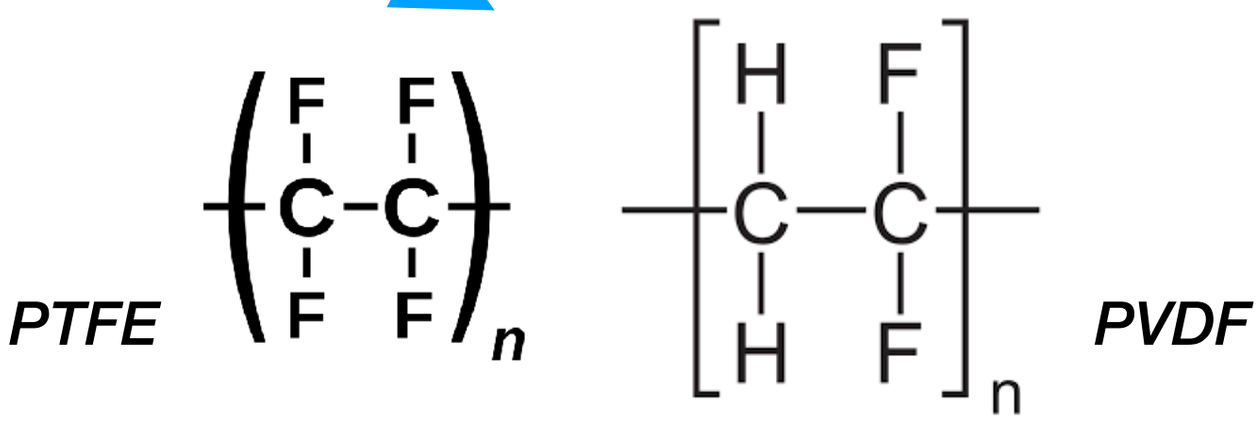


6:2 FTOH



PFOA

- **Polymer PFAS**
  - Repeating chains
  - Normally the **'intentionally added PFAS'**



Intentionally Added PFAS

Screening
WD-XRF +
FTIR

If PFAS present

LC-MS/MS
PFOA and similar

SOLVED

REPORTABLE PFAS
- detect F over 50 ppm
- /w FTIR also identifies
  - CAS #
  - Use

Handles
- Maine reporting
- Canada Section 71
- US TSCA reporting
- EU PFAS consultation
- *+ Pre-screening for restricted PFAS*

RESTRICTED PFAS
- detect PFOA family to 25 ppb

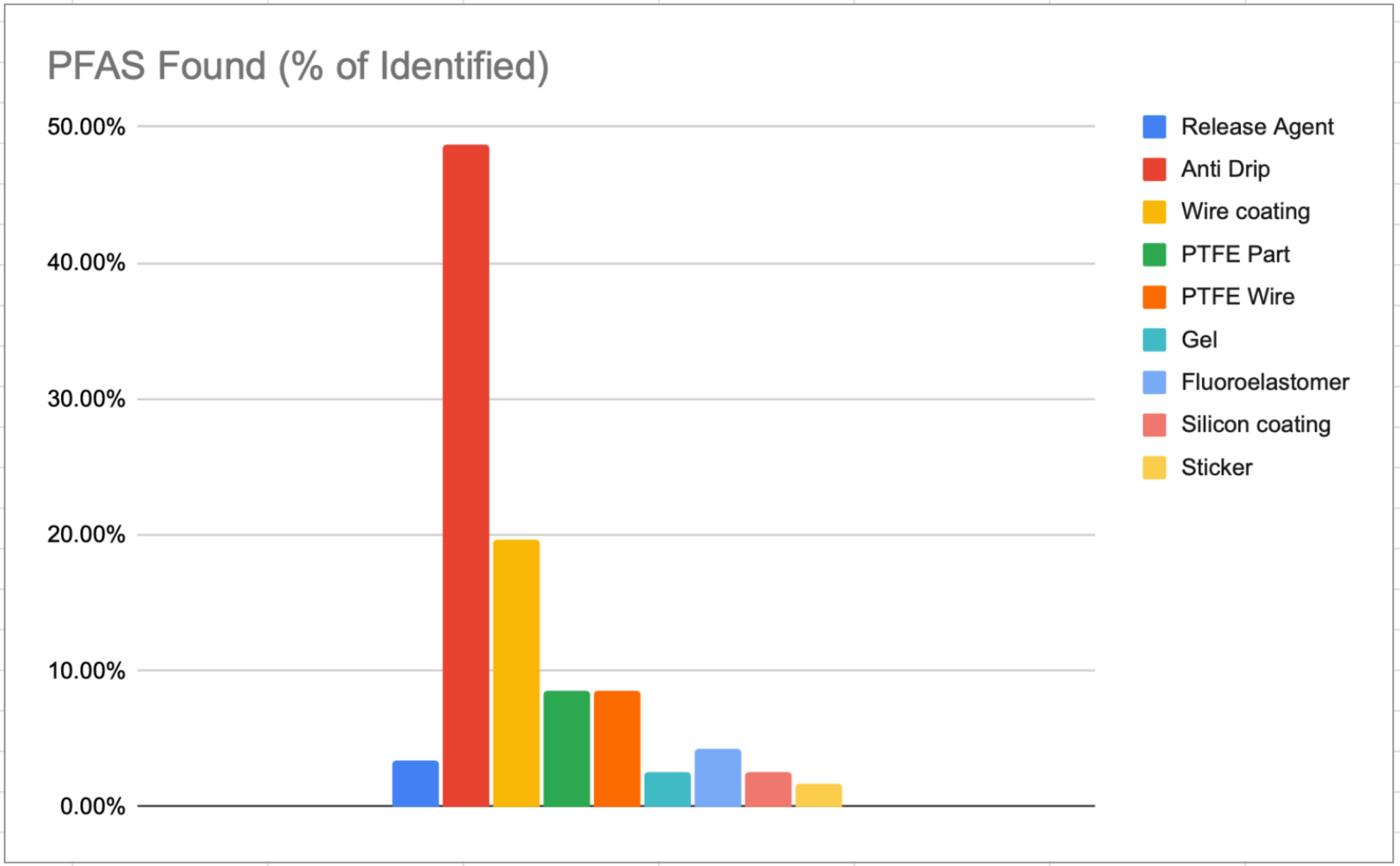
Handles
- Prop 65
- EU POP and REACH restrictions
- US TSCA SNUR
- Upcoming Canadian restrictions

PFAS Results
Claigan Testing

- Products tested in February / March 2023
  - 90% had at least one intentionally added PFAS
  - 100% of complex electronics had intentionally added PFAS

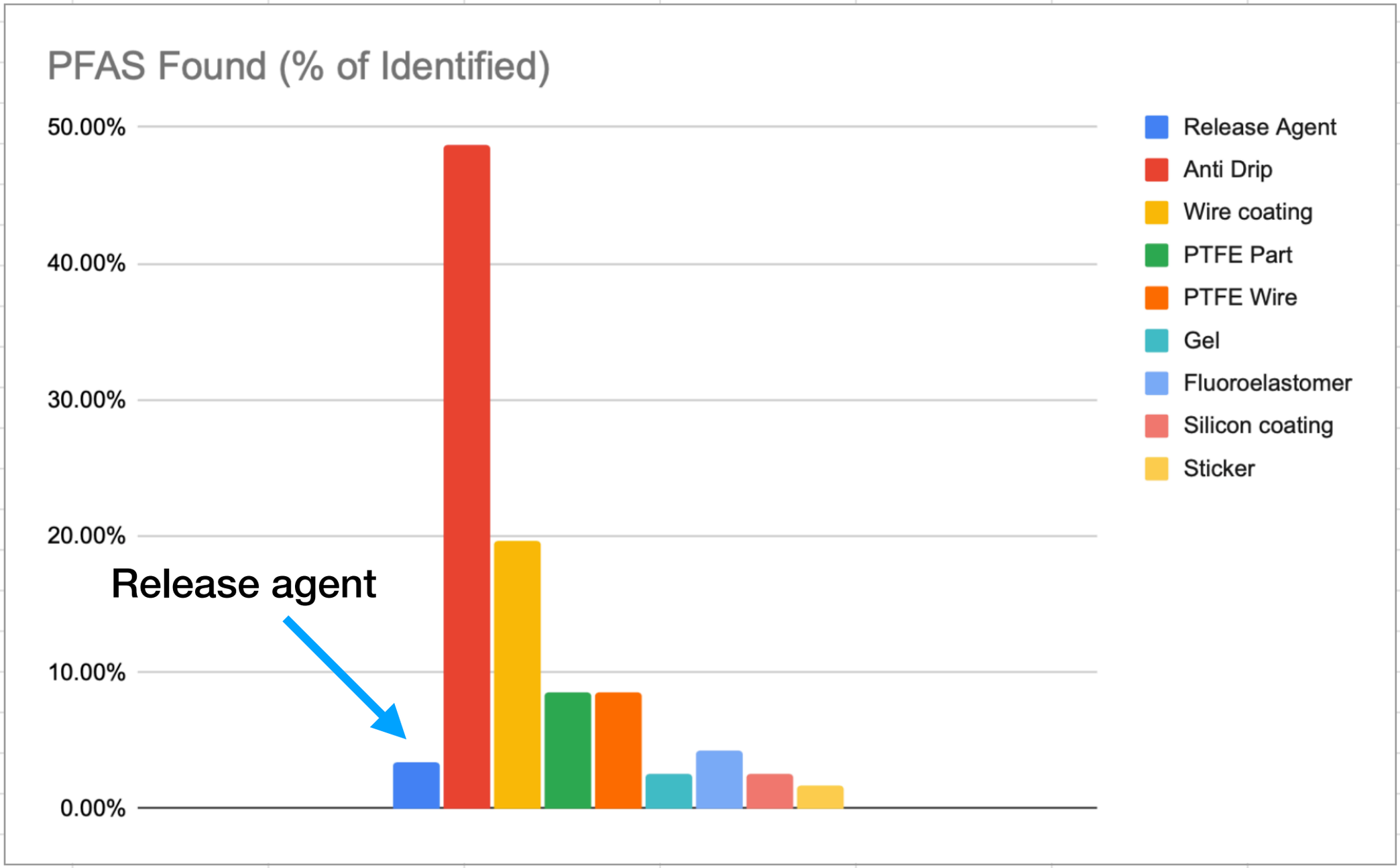
PFAS Testing
Summary of PFAS Positives

- From products tested in February / March 2023
  - Breakdown of detected PFAS



PFAS Testing
Breakdown - Release Agent

- From products tested in February / March 2023
  - Breakdown of detected PFAS



PFAS
Mold Release Agents

- **Very common in electronics and medical devices**
  - Mold release agent between polymer and metal molds
  - Common materials with release agent
    - Polyurethane foam (nearly 100%)
    - Polycarbonate parts

- **Note - supplier data would not identify it**

PFAS Use
Mold Release Agent

- **Use**
  - To enable release of plastics from a metal mold
  - Higher concentration in porous materials such as foam

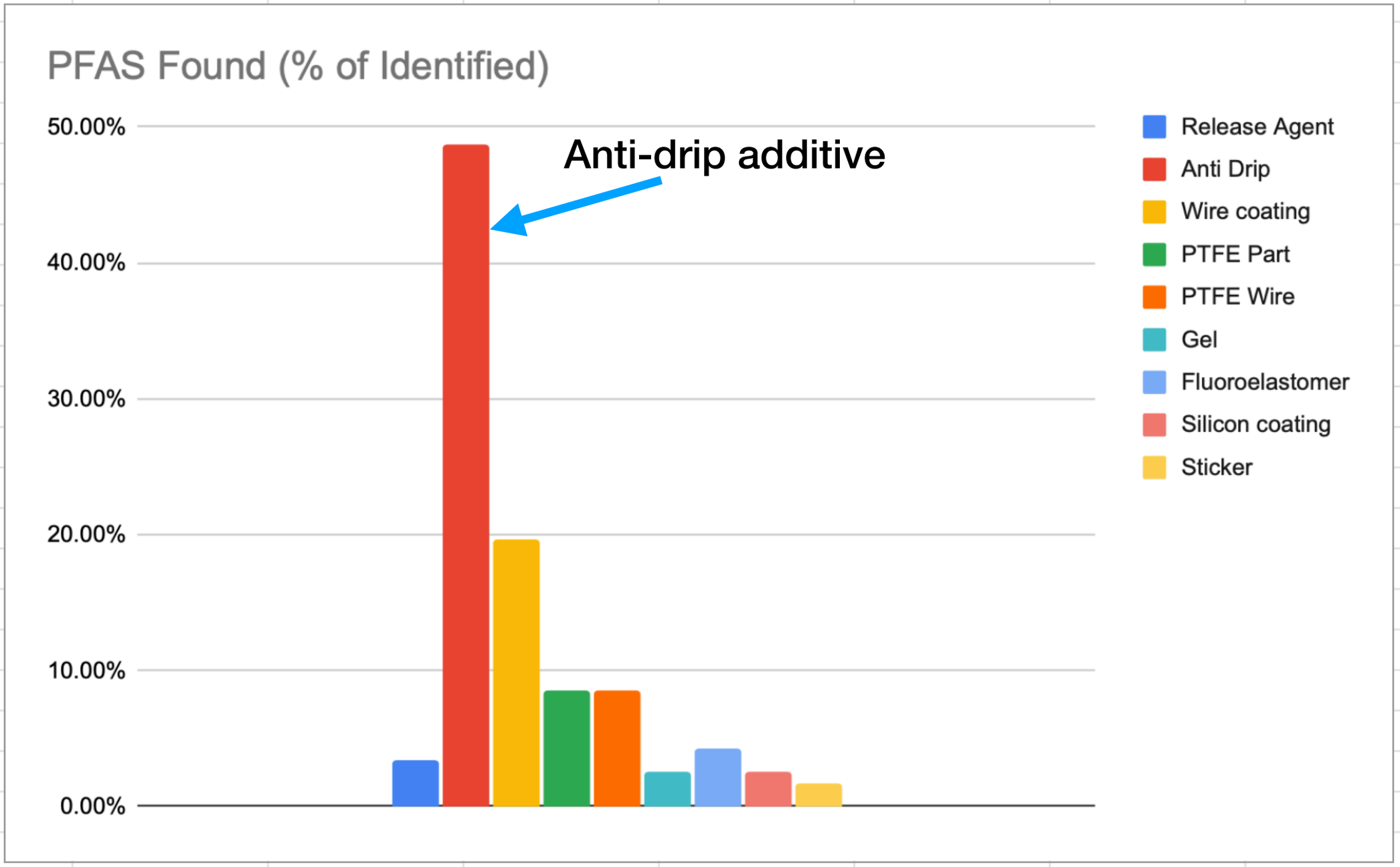
- **Maine reporting**
  - Not reportable (No function in end product)

- **EU PFOA/LC-PFAC Restrictions**
  - Low risk (low concentration use)

- **EU Proposed PFAS Restriction**
  - High risk. Not included in any derogations (exemptions)

PFAS Testing
Positive Test - Anti-drip Additive

- From products tested in February / March 2023
  - Breakdown of detected PFAS



PFAS
Anti Drip Agents

- Anti-Drip Agent
  - Prevents dripping during burning UL94 flame retarded ABS and polycarbonate
  - 0.1% to 0.6% of polycarbonate, ABS, or PC-ABS blend
  - Primarily in plastic housings of electronics

PTFE →

PFBS →

Polycarbonate Matrix	80-85
Polyphosphazene	7-10
Talc	4-6
Polytetrafluoroethylene	0.4-0.6
Potassium salt of perfluorobutane sulfonic acid	0-0.01
Optional Other Additives	0-2

V-0 Vertical Burn	Burning stops within 10 seconds after two applications of ten seconds each of a flame to a test bar. NO flaming drips are allowed.

PFAS Use
Anti-Drip Additive

- **Use**
  - To prevent dripping of plastic during burning

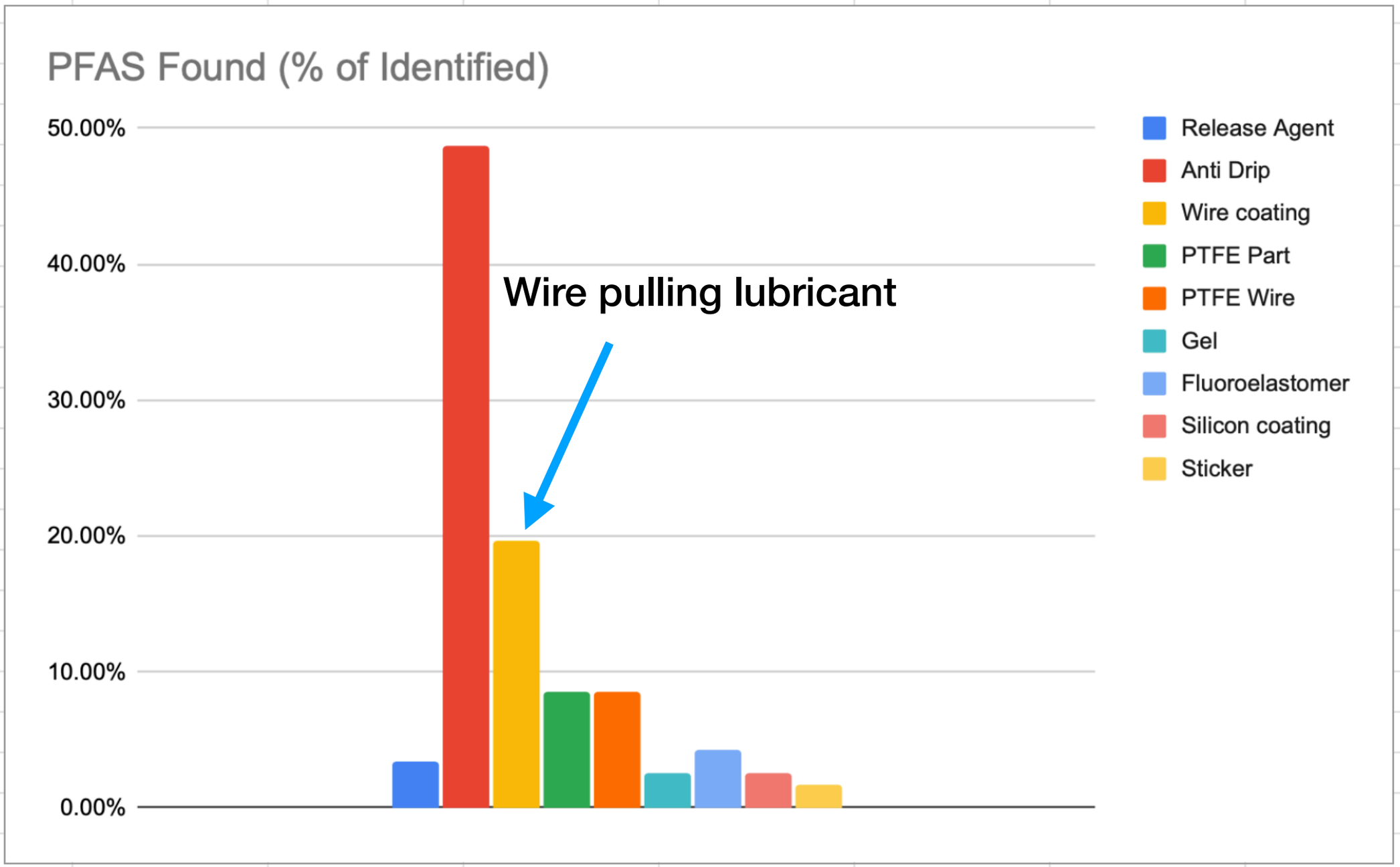
- **Maine reporting**
  - Reportable (Intentionally added)

- **EU PFOA/LC-PFAC Restrictions**
  - Low risk (low concentration use)

- **EU Proposed PFAS Restriction**
  - High risk. Not included in any derogations (exemptions)
  - Restriction would lead to re-design of nearly 100% of electronic products sold on the EU market

PFAS Testing
Positive Test - Wire Pulling Lubricant

- From products tested in February / March 2023
  - Breakdown of detected PFAS



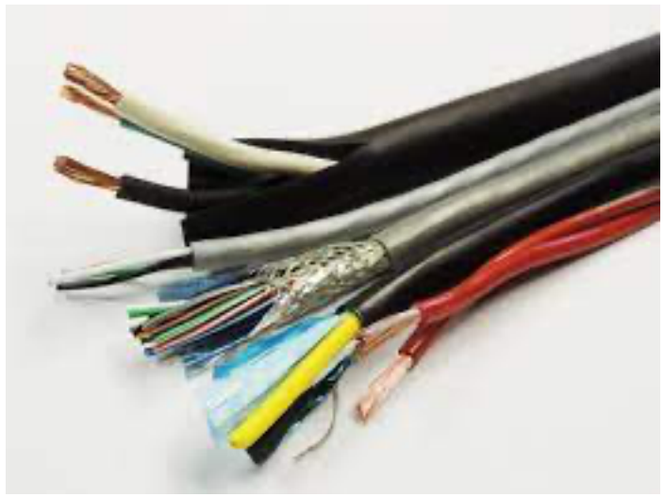
PFAS
Wire Pulling Lubricant

- **Wire pulling lubricant**
  - To enable pulling of wires through cable
  - Lowers friction and increasing durability in flexible cables

- **Note - supplier data would not identify it**

PFAS Use
Wire pulling lubricant

- **Use**
  - To enable pulling of wires into multi strand cable
  - To improve flexibility and durability by reducing internal friction



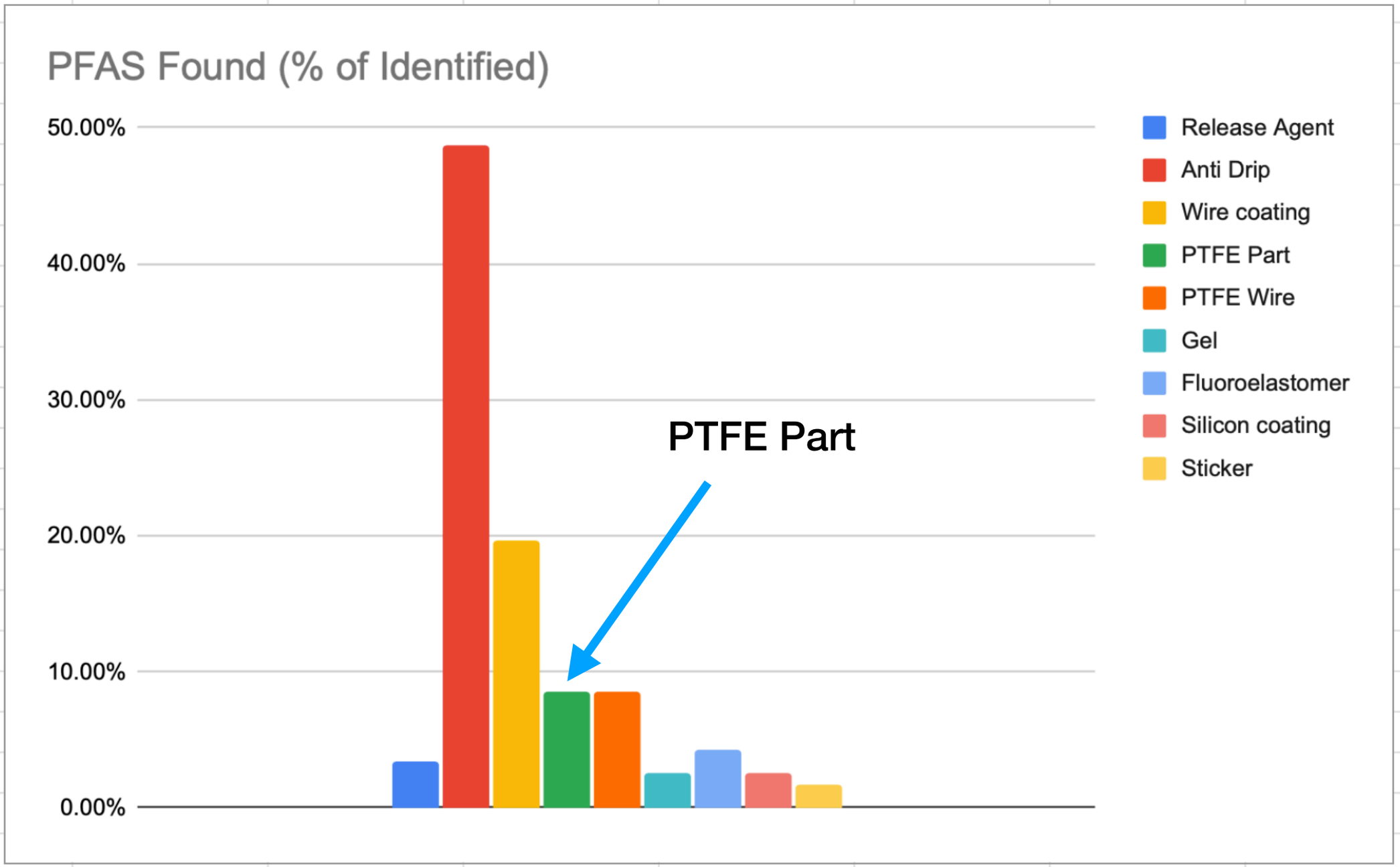
- **Maine reporting**
  - Reportable (has use in final product)

- **EU PFOA/LC-PFAC Restrictions**
  - Low risk (low concentration use)

- **EU Proposed PFAS Restriction**
  - High risk. Not included in any derogations (exemptions)

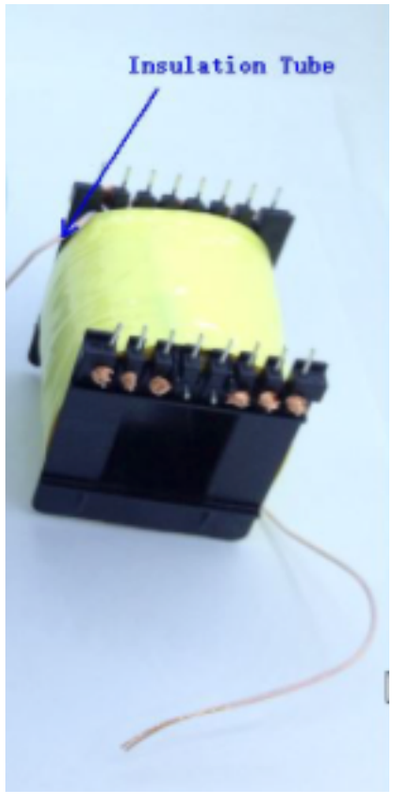
PFAS Testing
Positive Test - PTFE Part

- From products tested in February / March 2023
  - Breakdown of detected PFAS



Solid PTFE Parts

- **Very wide range of applications**
  - Low friction
  - Water and chemical resistant
  - High biocompatibility
  - Dielectric properties
  - High temperature



- Note - supplier data will sometimes identify it

PFAS Use
Solid PTFE Parts

- **Use**
  - Diverse use for low friction, water/chemical resistance, biocompatibility, and dielectric properties

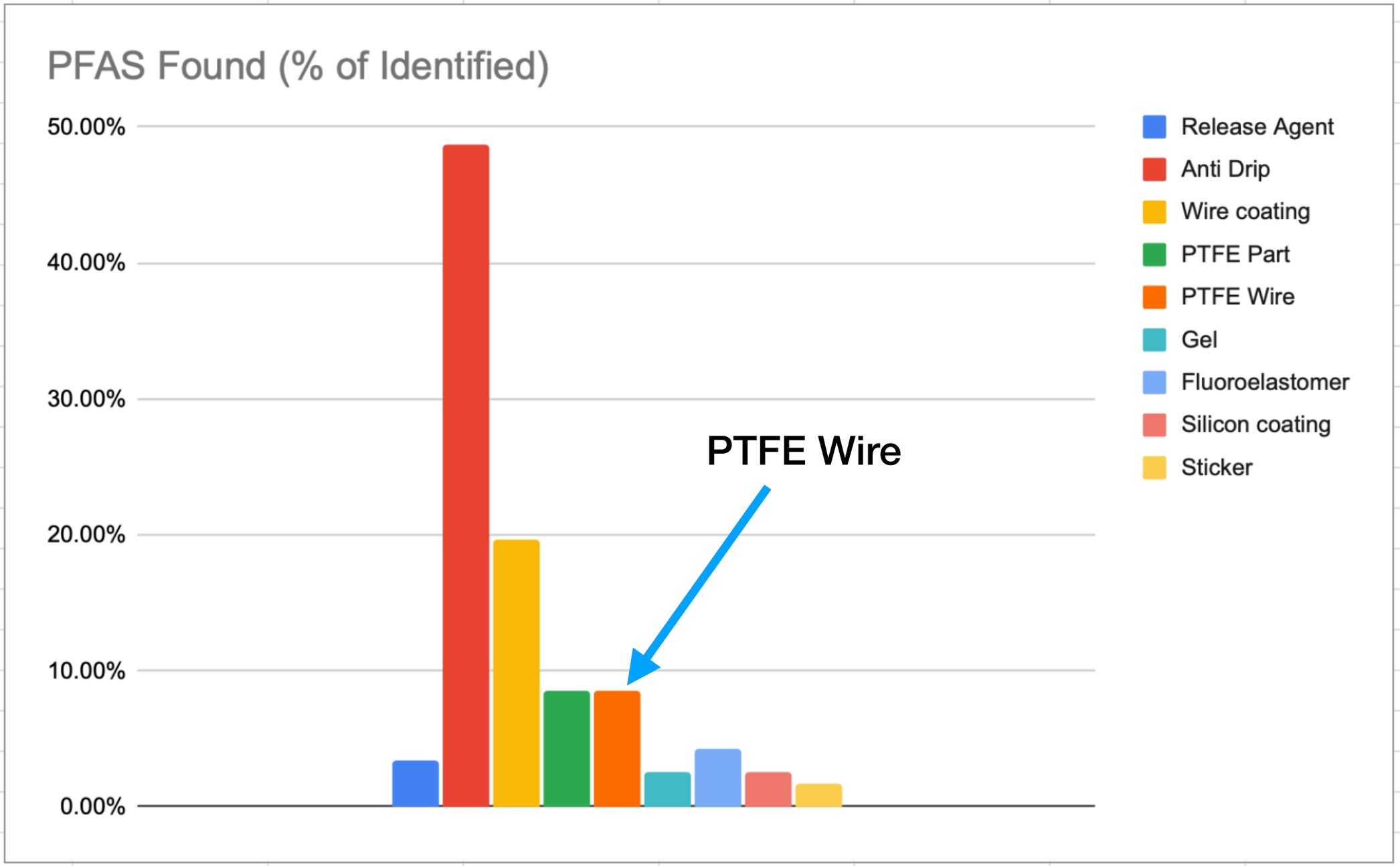
- **Maine reporting**
  - Reportable

- **EU PFOA/LC-PFAC Restrictions**
  - High risk. PFOA/LC-PFAC common in manufacturing

- **EU Proposed PFAS Restriction**
  - High risk. Varied uses. Some medical uses included in derogations (exemptions)

PFAS Testing
Positive Test - PTFE Wire

- From products tested in February / March 2023
  - Breakdown of detected PFAS



PTFE Wires

- **PTFE insulated wire**
  - High temperature resistance
  - Water and chemical resistance
  - Dielectric properties

- Note - supplier data will often identify it

PFAS Use
PTFE Wire

- **Use**
  - Diverse wire applications

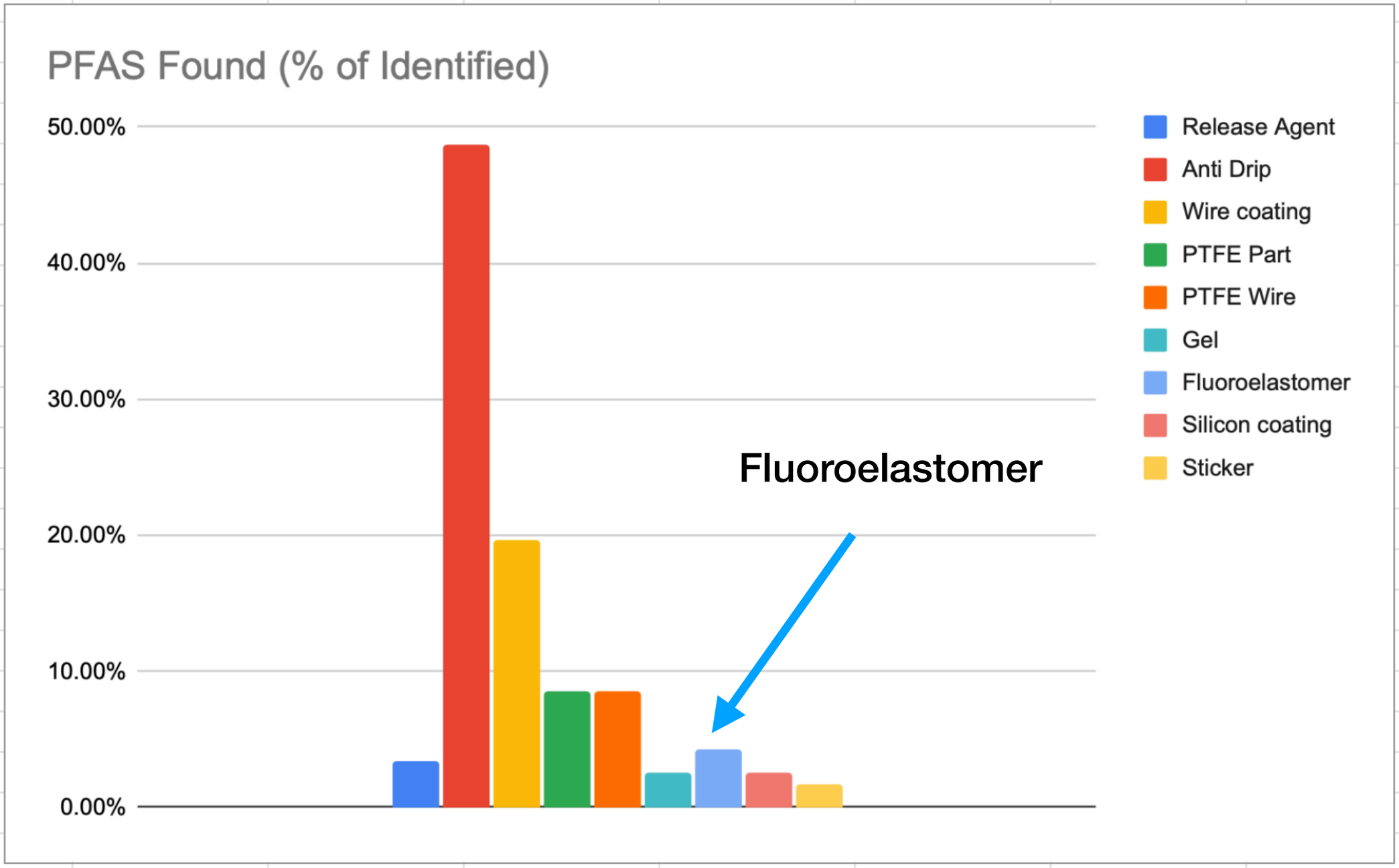
- **Maine reporting**
  - Reportable

- **EU PFOA/LC-PFAC Restrictions**
  - High risk. PFOA/LC-PFAC common in manufacturing

- **EU Proposed PFAS Restriction**
  - High risk. No derogations (exemptions)

PFAS Testing
Positive Test - Fluoroelastomer

- From products tested in February / March 2023
  - Breakdown of detected PFAS



Fluoroelastomer

- **Fluoroelastomer (FKM or 'fluoro-rubber')**
  - Homo-polymer of vinylidene fluoride (VDF) and hexafluoropropylene (HFP)
  - Excellent water and chemical resistance
  - Excellent Temperature resistance
  - Used instead of nitrile or SBR rubber in high performance situations

- Note - supplier data will often identify it

PFAS Use
Fluoroelastomer

- **Use**
  - Chemical or temperature resistant seals
  - Human contacting rubber

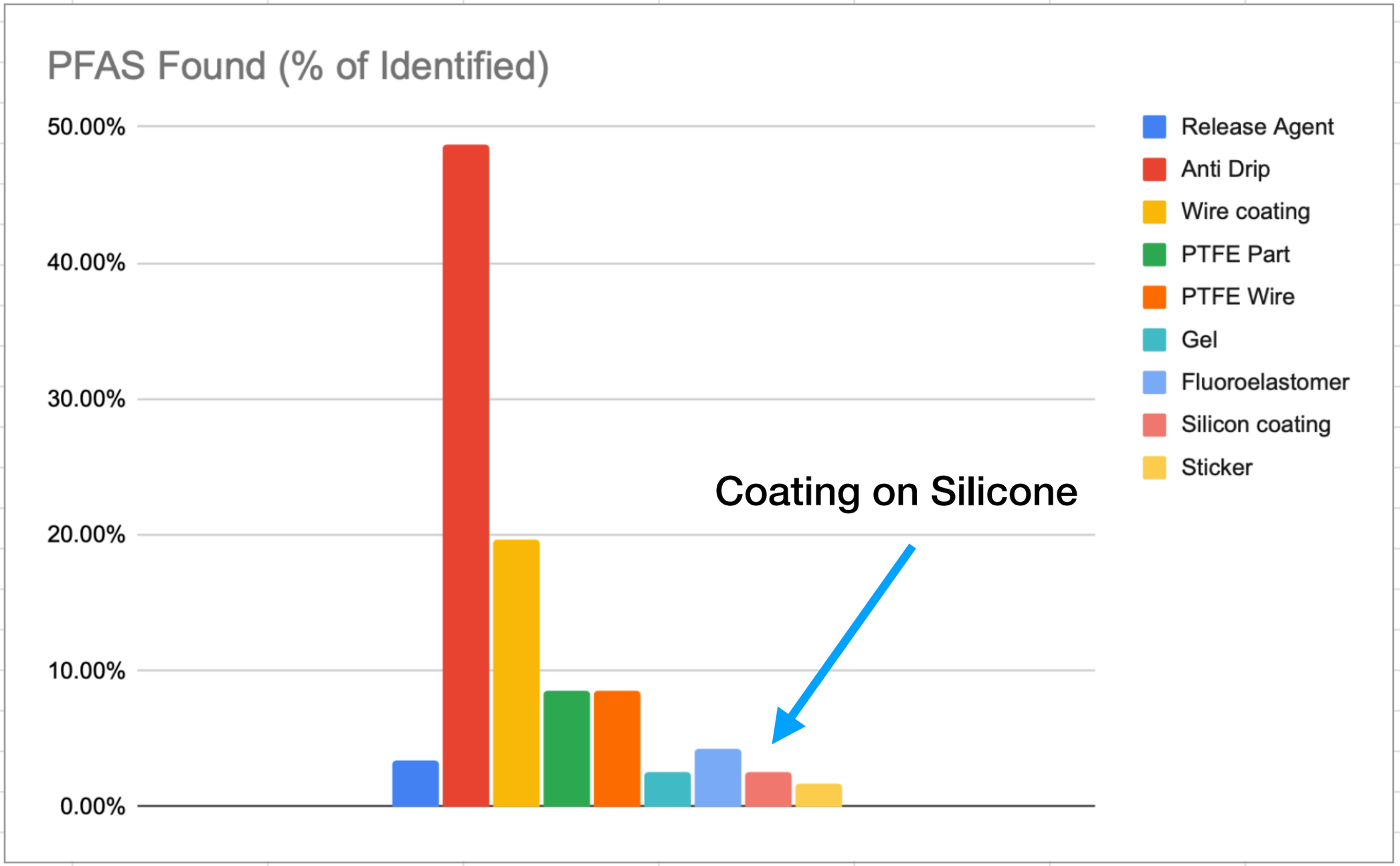
- **Maine reporting**
  - Reportable

- **EU PFOA/LC-PFAC Restrictions**
  - High risk. PFOA/LC-PFAC possible in manufacturing

- **EU Proposed PFAS Restriction**
  - High risk. No derogations (exemptions) except for oil and gas

PFAS Testing
Positive Test - Coating on Silicone

- From products tested in February / March 2023
  - Breakdown of detected PFAS



Coating on Silicone

- **Protective coating on silicone**
  - Thin fluoro coating on silicone rubber
    - Common in repeat human contact situations
  - Protects the silicone from stain, smell, and loss of ‘writing’

- Note - supplier data normally not often identify it

PFAS Use
Coating on Silicone

- **Use**
  - Chemical and stain resistance to silicone
  - Prolonged lifetime of writing on silicone

- **Maine reporting**
  - Reportable

- **EU PFOA/LC-PFAC Restrictions**
  - Low risk. Too low concentration

- **EU Proposed PFAS Restriction**
  - High risk. No derogations (exemptions).

Other PFAS Uses

- **Uses**
  - Lithium batteries
  - PTFE lubricant
  - Water proof stickers
  - PVDF (Kynar) piping
  - PTFE tape
  - Fabric water proofing
  - Food packaging coating

- **Uses with PFOA/LCPFAC derogations (exemptions)**
  - Perfluoroxy (PFA) containers
  - Irradiated PVDF heat shrink

Claigan PFAS Testing

Screening
WD-XRF +
FTIR

If PFAS present

LC-MS/MS
PFOA and similar

SOLVED

<u>REPORTABLE</u> PFAS

- detect F over 50 ppm
- /w FTIR also identifies
  - CAS #
  - Use

Handles

- Maine reporting
- Canada Section 71
- US TSCA reporting
- EU PFAS consultation
- *+ Pre-screening for restricted PFAS*

<u>RESTRICTED</u> PFAS

- detect PFOA family to 25 ppb

Handles

- Prop 65
- EU POP and REACH restrictions
- US TSCA SNUR
- Upcoming Canadian restrictions

Claigan PFAS Testing

Screening
WD-XRF +
FTIR

Reportable
PFAS

Client representative products

- Choose representative products from each product line
- Risk based approach

<u>REPORTABLE</u> PFAS

- detect F over 50 ppm
- /w FTIR also identifies
  - CAS #
  - Use

Reportable PFAS

- Maine reporting
- EU PFAS restriction consultation
- US TSCA reporting
- Canada Section 71

Claigan PFAS Testing

Screening
WD-XRF +
FTIR

Reportable
PFAS

Client representative products

- Choose representative products from each product line
- Risk based approach

<u>REPORTABLE</u> PFAS

- detect F over 50 ppm
- /w FTIR also identifies
  - CAS #
  - Use

Reportable PFAS

- Maine reporting
- EU PFAS restriction consultation
- US TSCA reporting
- Canada Section 71

Contact us - info@claigan.com

Q&A