PFAS Risk Mitigation

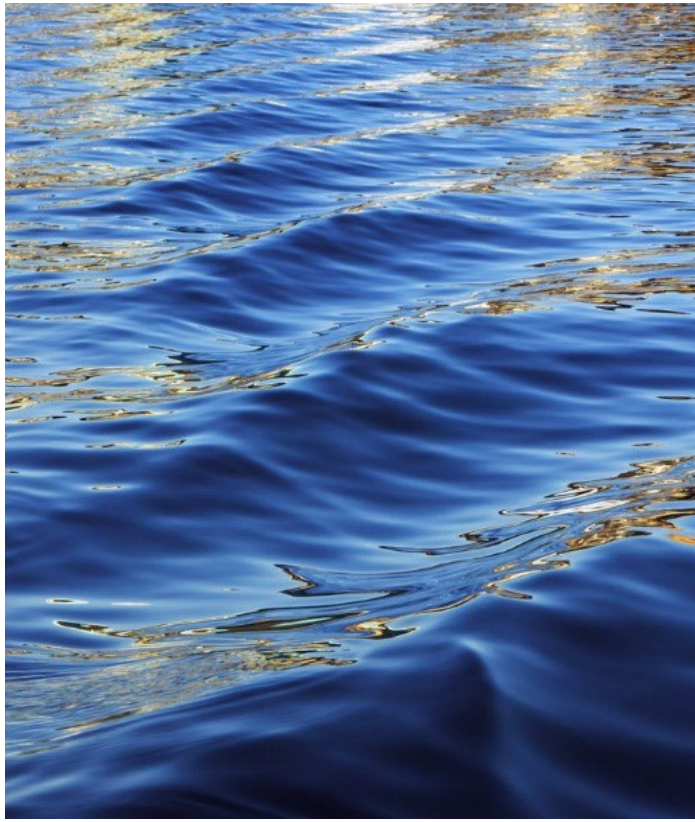
Proactive Identification & Elimination of Potential PFAS Sources: Strategies for Ensuring Safe and Sustainable Utility Operations

Vicky Furnish

May 22, 2025

SOUTHERN CALIFORNIA EDISON®

An *EDISON INTERNATIONAL®* Company



Vicky Furnish

Principal Manager,
Southern California Edison
Environmental Compliance

SOUTHERN CALIFORNIA EDISON®
Energy for What's Ahead®

Vicky is an Environmental Professional with over 20 years of experience in the Environmental, Health, and Safety (EH&S) sector. She possesses a strong foundation in Operational Management, Environmental Regulatory Compliance, Government Relations, and Emergency Management, while navigating regulatory complexities.

Currently, Vicky serves as a Principal Manager at Southern California Edison (SCE), where she leads in the concentrations of natural and cultural resources, water quality and wetlands compliance, hazardous materials and waste management, drinking water, air quality, and sustainability initiatives. In this role, she provides strategic compliance guidance and support that enhances SCE's compliance framework and risk management strategies.

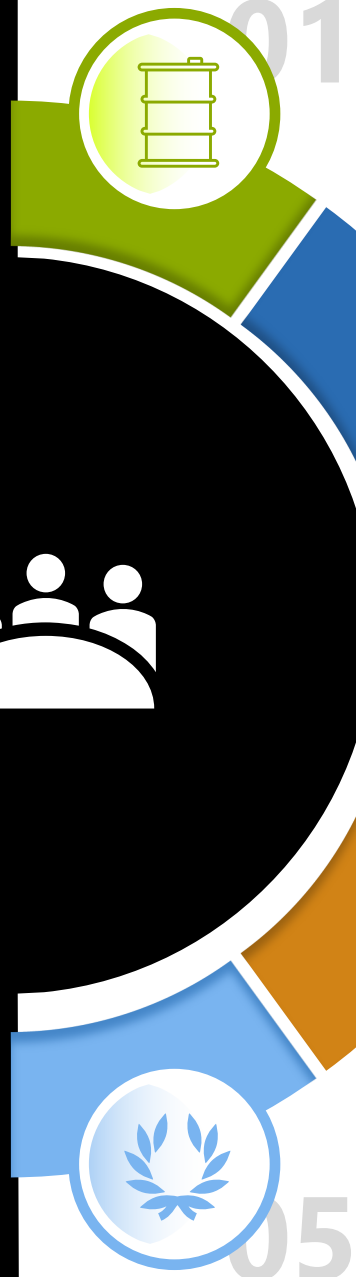
Before her tenure in the utility sector, she held the position of Supervising Environmental Health Specialist with the County of Kern, California. In that capacity, she led the Certified Unified Program Agency (CUPA), exercising delegated enforcement and administrative authority over businesses handling hazardous materials and emergency response. Vicky also contributed as a Chapter Board Member on the Statewide CUPA Forum Board, working in collaboration with the California Environmental Protection Agency (CalEPA) and other governing bodies to implement Unified Programs effectively across California.

Vicky earned a Master of Arts in National Security Affairs, focusing on Homeland Security and Defense from the **N**aval **P**ostgraduate **S**chool and obtained her Bachelors of Science in Biology from St. Mary's College of California. Her academic achievements are further enhanced by her active participation in professional development, as she serves as an adjunct professor at the local college. In addition to her professional roles, Vicky is actively involved with the American Society of Safety Professionals (ASSP) Bakersfield Chapter, where she serves as an active Executive Board Member. She has served as the President, President Elect, Programs, and the current Past President and Nominations Chair. Her outstanding contributions to the field were acknowledged when she was awarded the Safety Professional of the Year by the ASSP Bakersfield Chapter in 2020.

Vicky's commitment to her profession and community is reflected in her relentless pursuit of excellence and her proactive stance on environmental compliance and safety, advocacy and professional community dedicated to creating a safe work environment with sound safety practices and environmental stewardship.

Agenda Topics

The Assessment to understand PFAS and Strategies for Ensuring Safe and Sustainable Utility Operations without the “Forever Chemical”.



01 **Basics of PFAS**
Forever Chemical and its Fate and Transport

02 **Regulatory and Environmental Update**
Where are we heading?

03 **Identifying PFAS Sources**
Pairwise Analysis

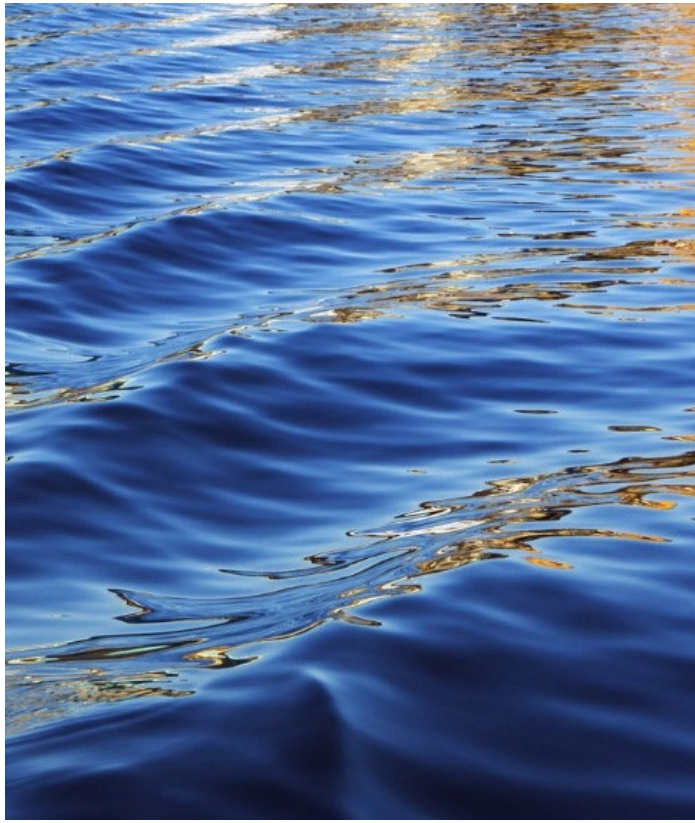
04 **Mitigation Strategies**
Case Study

05 **Conclusion**
Take aways and Q&A

SOUTHERN CALIFORNIA EDISON®

Basics of PHAS

Forever Chemical and Fate and Transport



SOUTHERN CALIFORNIA EDISON®

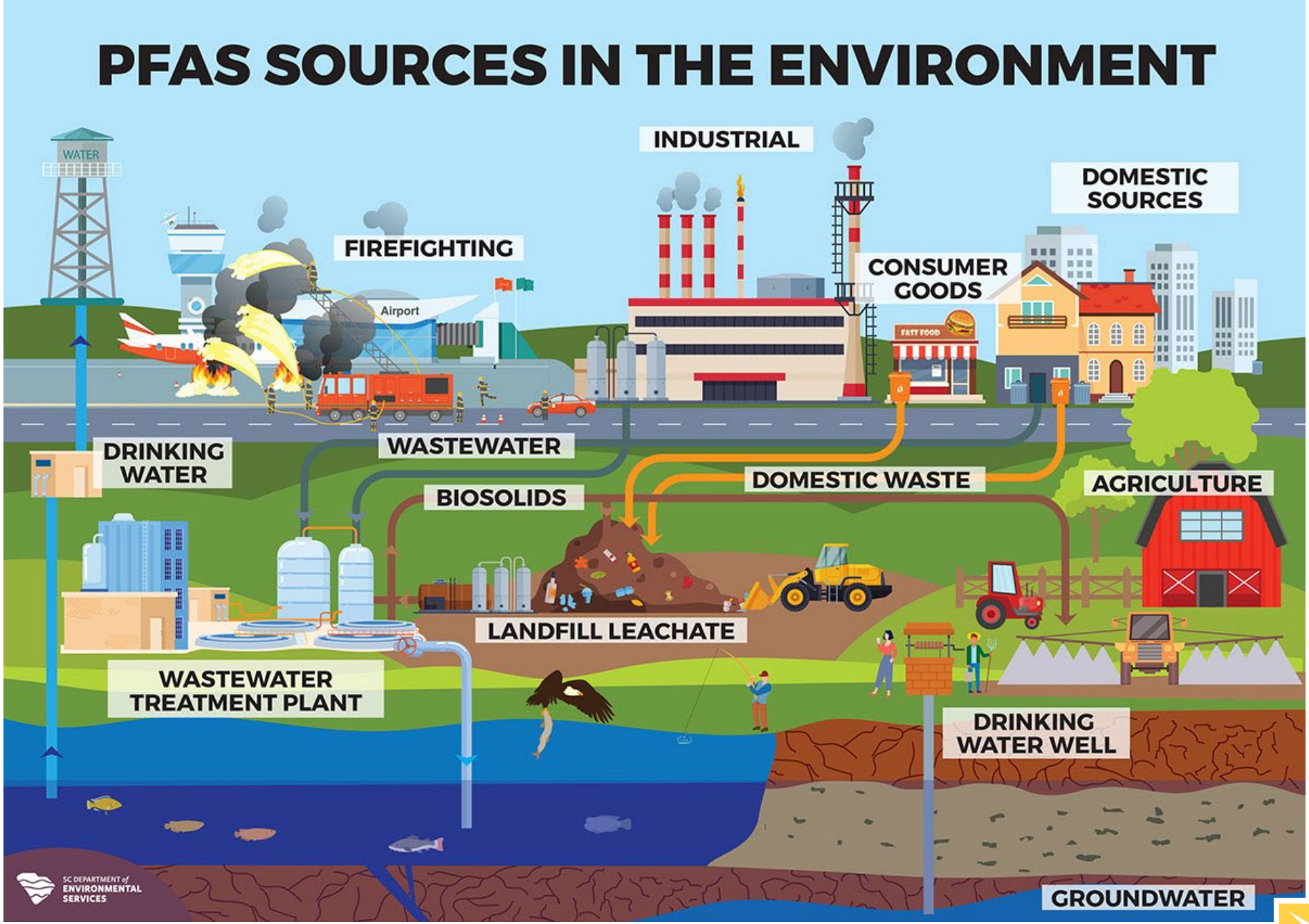
The FOREVER Chemicals

Chemical Compound	Global Use	Environmental Half Life
PFAS (PFOA)	Synthetic compounds used in textiles, food packing, paints, firefighting foam, and cleaning products for water and stain resistant properties.	Compound dependent – Up to 100 years
DDT (Organochlorine Pesticide)	Agricultural and household insecticide use	2- 15 Years
PCBs	Variety of industrial purposes, electric capacitors, transformers, fluorescent light ballasts, paint plasticizer, and resins.	2-15 Years
Dioxins	Pollutant by-product of industrial and natural combustive processes in waste incineration, pesticide manufacturing, fires, accumulation in food chain.	25 – 100 Years

Fate & Transport: Release Pathways

- Wide variety of physical and chemical processes
- Movement of source zone to downstream varies
  - Short and Long Chain Carbons
    - High Water solubility, mobility
    - Greater affinity to partition in sediments, sludge, and soils.
- Process Waste Streams
  - Water, Solid, Air
- Off-Spec Products or Materials
- Discarded packaging with PFAS containing materials
- Control Technology Media
  - Activated Carbon, Ion Exchange Resins, Scrubber Medica
- Used PPE, Cleaning Materials, Rinsate water, dust
- Contained in saleable products
- Spills

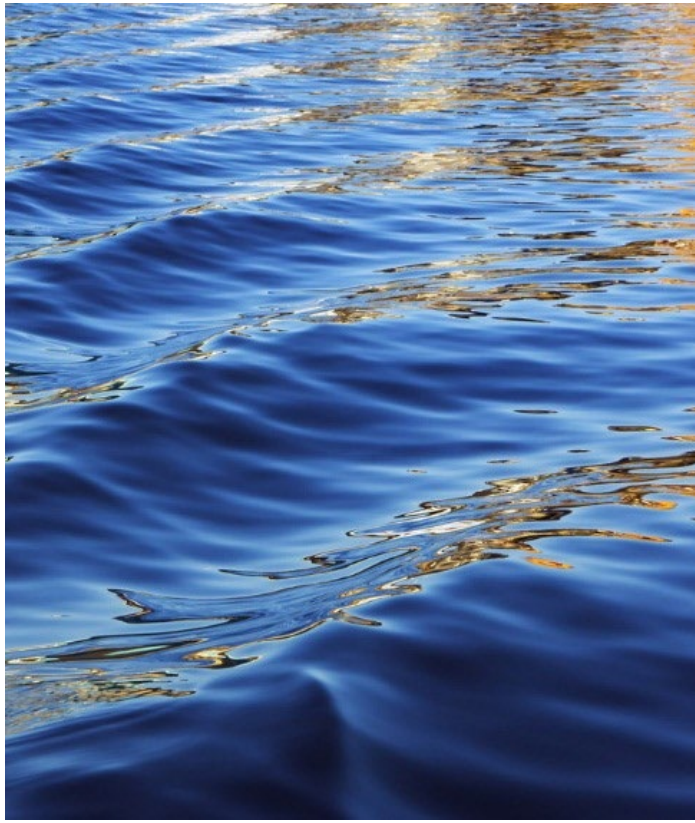
SOUTHERN CALIFORNIA EDISON®



Source: South Carolina Department of Environmental Services: https://des.sc.gov/programs/bureau-water/and-polyfluoroalkyl-substances-pfas

Current PFAS Regulatory and Environmental Update in CA

Where are we heading?



SOUTHERN CALIFORNIA EDISON®

California

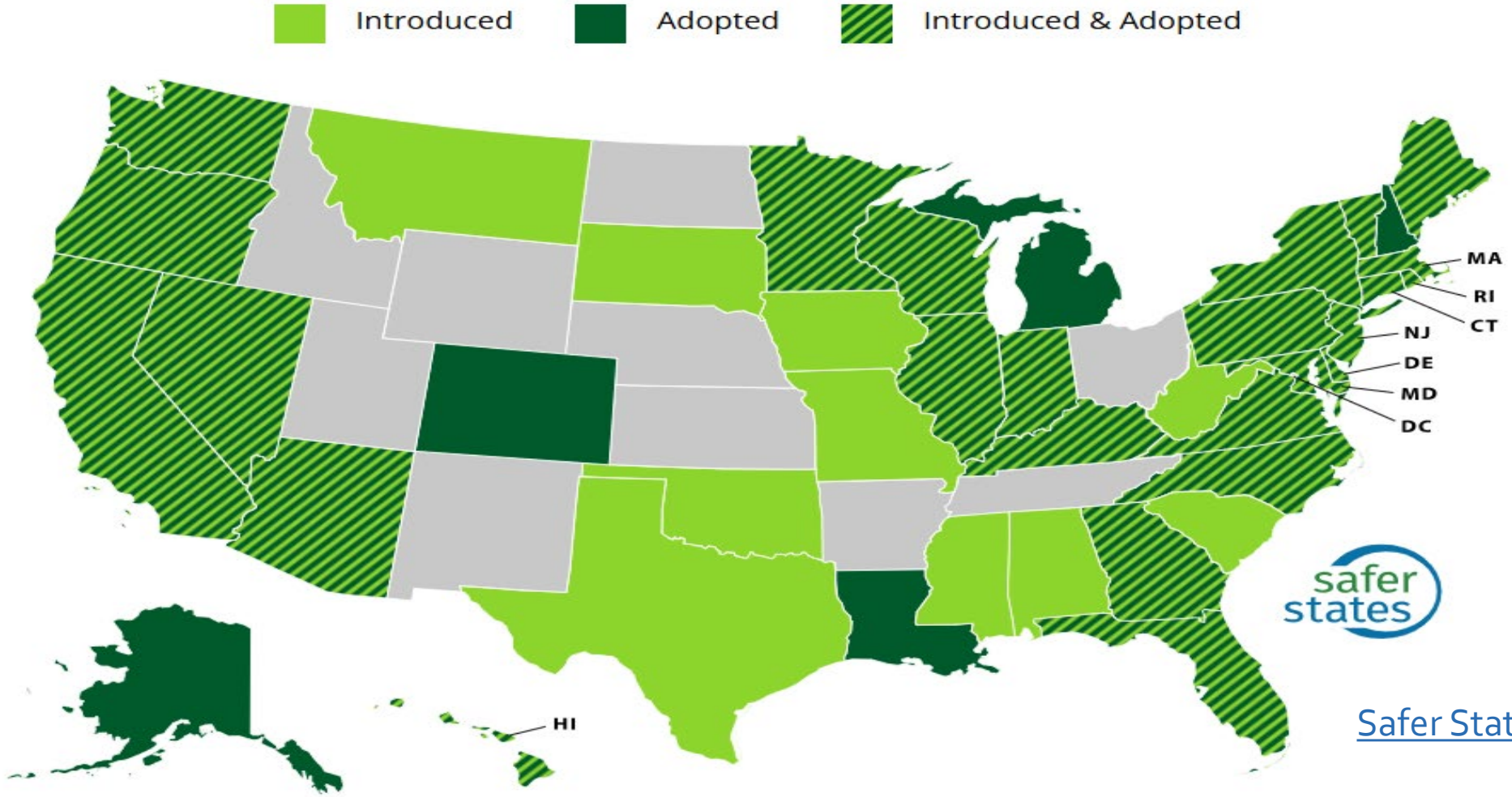
Notable Key Regulations and Provisions to regulating PFAS targeting food packaging, juvenile products, textiles, and cosmetics. Includes alignment with Federal requirements limiting and restricting sale or distribution of products containing PFAS, manufacturers to register and provide statements of compliance and enforcement to ensure compliance.

- AB 1200 (Food Packaging):
  - Prohibits sale of food packaging containing levels >100 ppm, effective Jan 2023
- AB 652 (Juvenile Products):
  - Bans manufacture, distribution, or sale of new juvenile products containing PFAS, effective Jan 2023
- AB 1817 (Textiles:
  - Bans the manufacturing, distribution, and sale of textile articles with phased-in approach for total organic fluorine levels, effective Jan 2025
- AB 347 (General):
  - Requires registration with DTSC by July 1, 2029 for manufactures of covered products, and to develop compliance and enforcement measures by July 2030
- AB 2771 (Cosmetics):
  - Ban of manufacture, sale, delivery, holding, or offer of cosmetic products containing PFAS.
- SB 1044 (AFFF):
  - Phasing out of PFAS in Class B Firefighting Foam
    - Part 139: Airports – September 2024
    - Non Part 139 Facility Exempt Terminals/Oil Refineries – January 2024
    - Terminals/Oil Refineries – January 2028
- SB 101, AB 178, AB 180, SB 154: (Appropriations Bill):
  - Provides fundings for technical and financial assistance to drinking water systems to address PFAS and PFOA substances.
- AB 1181 (PPE):
  - Proposed elimination of the use of PFAS substances and other harmful substitutes in firefighter PPE
- AB 794: (Drinking Water):
  - Adopts emergency drinking water regulations that align with federal standards

SOUTHERN CALIFORNIA EDISON®

Policies to Address PFAS

35 states have introduced **208 policies** to protect people from toxic chemicals.
155 state policies have been adopted in **30 states.**

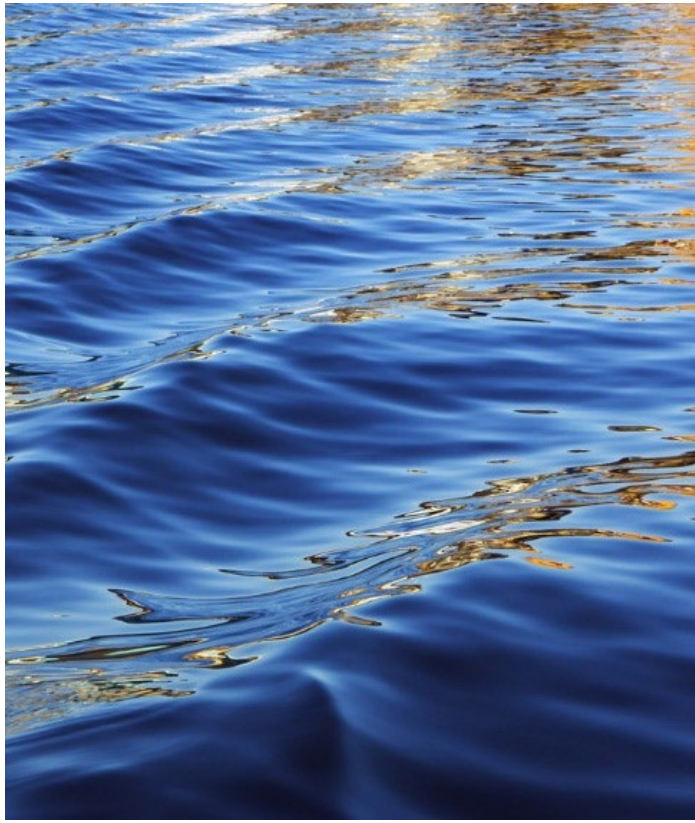


[Safer State Policy Tracker]

Source: Safer States: https://www.saferstates.org/bill-tracker/?toxic_chemicals=PFAS

Identifying PFAS Sources

Pairwise Analysis



SOUTHERN CALIFORNIA EDISON®

Pairwise Comparison Method

Methodology allows to gather input from Subject Matter Experts (SMEs) to assign relative weights to specific criteria based on their importance. These weighted criteria can then be used in further analysis to rank or prioritize items. The methodology involves numerical analysis to assign weights to each criterion, which can then be applied to the characteristics of each item to create a prioritized list. Applying this to determine the risk of chemicals to health and the environment by comparing different factors or chemicals against each other in pairs.

- Define the scope and criteria
  - Identify the relevant chemicals: Determine which chemicals are of interest and need to be assessed.
  - Define the criteria for comparison: toxicity, exposure potential, environmental persistence, and other relevant factors
  - Consider both health and environmental risks: determine the types of effects to be assessed, acute/chronic health/environmental impact

  - Chemicals for Consideration: Utilizing Chemical Database: **3E** Query
    - Identified 80+ Unique Products
      - White Lithium Grease (Aerosol)
      - Loctite Thread Sealant
      - Freon
      - Electro Contact Cleaner
      - Grease
      - Fire Suppression Systems
    - Locations
    - Types of Use
    - Amounts

SAFETY DATA SHEET

1. Identification

Product identifier White Lithium Grease

Other means of identification

Product Code No. 03080 (Item# 1003341)

Recommended use Lubricating grease

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufactured or sold by:

Company name CRC Industries, Inc.

Address 885 Louis Dr.
Warminster, PA 18974 US

Telephone

General Information 215-674-4300

Technical Assistance 800-521-3168

Customer Service 800-272-4620

24-Hour Emergency (CHEMTREC) 800-424-9300 (US)

Website www.crcindustries.com

2. Hazard(s) identification

Physical hazards	Flammable aerosols	Category 1
	Gases under pressure	Liquefied gas
Health hazards	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2A
	Sensitization, skin	Category 1
	Carcinogenicity	Category 2
	Reproductive toxicity	Category 2
	Specific target organ toxicity, single exposure	Category 3 respiratory tra
	Specific target organ toxicity, single exposure	Category 3 narcotic effects
	Aspiration hazard	Category 1
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 2
	Hazardous to the aquatic environment, long-term hazard	Category 2

OSHA defined hazards Not classified.

Label elements

Signal word

Hazard statement

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
1,1-difluoroethane	HFC-152a	75-37-6	30 - 40
methyl acetate		79-20-9	30 - 40
distillates (petroleum), hydrotreated heavy naphthenic		64742-52-5	10 - 20
naphtha (petroleum), hydrotreated light		64742-49-0	10 - 20
2-methylpentane		107-83-5	5 - 10
n-hexane		110-54-3	1 - 3
zinc oxide		1314-13-2	< 1
titanium dioxide		13463-67-7	< 0.3
calcium bis(dinonylnaphthalenesulphonate)		57855-77-3	< 0.2

Specific chemical identity and/or percentage of composition has been withheld as a trade secret.

Chemical Name	SDS Revision Date	SDS Revised after PFAS added to TRI?	Potential fluoridated compound name	CAS#	Constituents	Weight Percent	Fluorinated?	PFAS?	Other PFAS Notes
DURASTAR POLYMER MN631 NATURAL	10/24/2011	No	Modifiers/additives	N/A	Copolyester	>90%	No	No	Main component of plastics is usually a polymer. PFAS would more likely be in modifiers and additives.
				N/A	Modifiers/Additives	<10%	Potentially, need more information	Unknown	The additive identity is unknown and could be PFAS. PFAS have been documented as part of plastic components and resins.

Pairwise Comparison

- Perform Comparison
  - Setup a comparison matrix – comparing chemical or factor against each other
  - Assigning values based on preferences or data
    - Scale of 1-5 to indicate which chemical or factor ism ore important or risky in the pairwise comparison
  - Data Analysis: compare chemicals based on parameters: Toxicity or concentration

Comparison Criteria Matrix:

- Exposure risk
  - Duration of exposure (time)
  - Route of exposure (aerosol v. solid)
  - Frequency of use (events/year))
- Environmental impact
  - Toxicity (acute/chronic)
  - Clarify if we're considering PFAS toxicity or overall product toxicity
  - Potential for Groundwater/soil pollution
- Ease of replacement
  - Cost, Availability
- Effectiveness of replacement
- Quantity in company
  - Volume of materials vs. number of locations in use

- A Scoring Model is used to compute the overall score of an item:

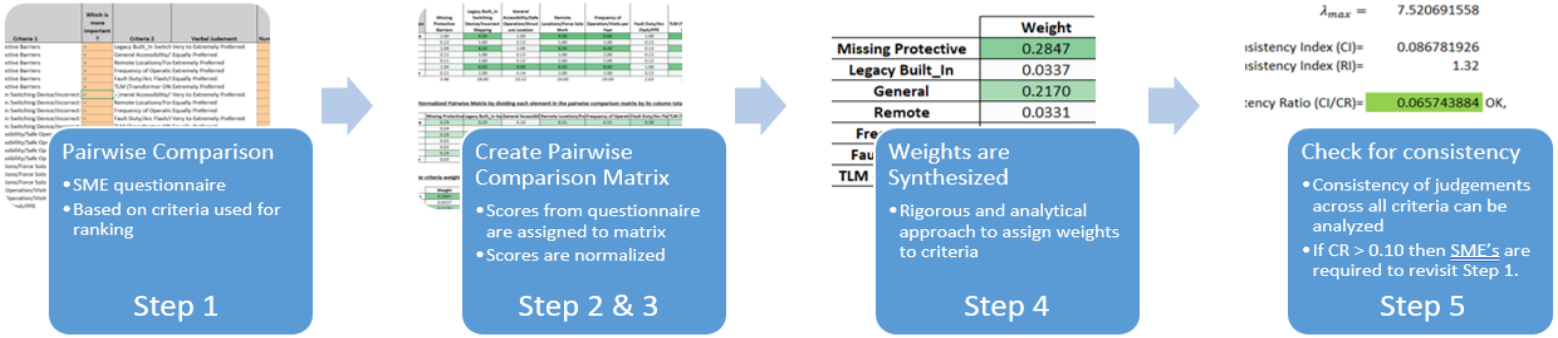
$$S_j = \sum_i w_i \times r_{ij}$$

Where,

$w_i = the\ weight\ for\ criterion\ i$

$r_{ij} = the\ rating\ for\ criterion\ i\ and\ decision\ alternative\ j$

- Weights, w_i , are synthesized using a pairwise comparison analysis for all criteria:



Analysis and Interpretation

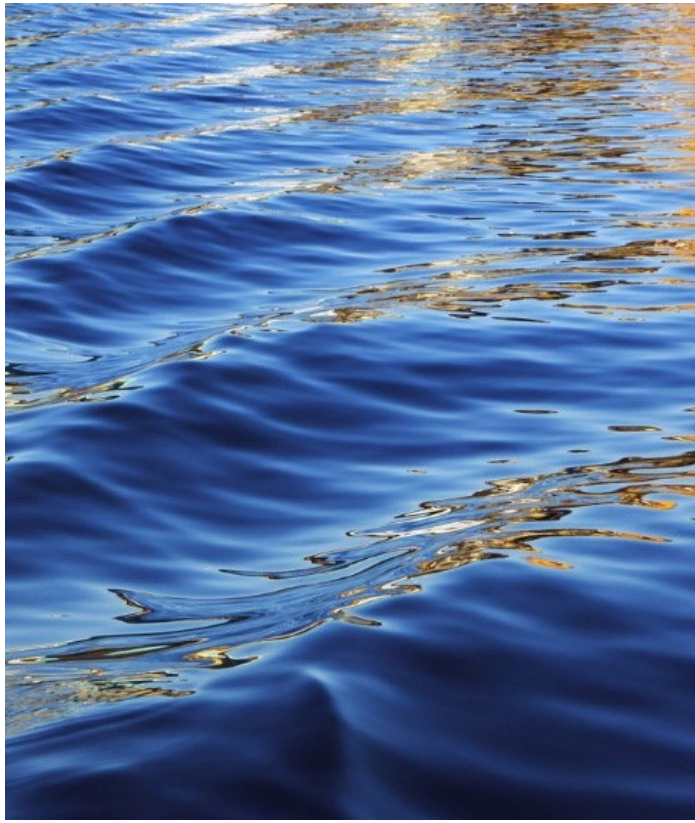
- Calculate Importance weights: results or comparisons can be used to determine the relative importance or risk of each chemical or factor
- Rank Chemicals or factors: Prioritize the chemicals or factors based on their calculated weights.
- Consider consistency: Evaluate the consistency of the pairwise comparisons to ensure reliable results.
- Interpret the findings: Results to guide risk management decisions, such as setting priorities next steps.

Calculated criteria weights by average of each row of the normalized pairwise matrix

Criteria	Weight
Exposure risk	0.2208
Environmental impact	0.2318
Ease of replacement	0.0397
Effectiveness of replacement	0.1958
Quantity in company	0.3118

Mitigation Strategies

Case Study and Results



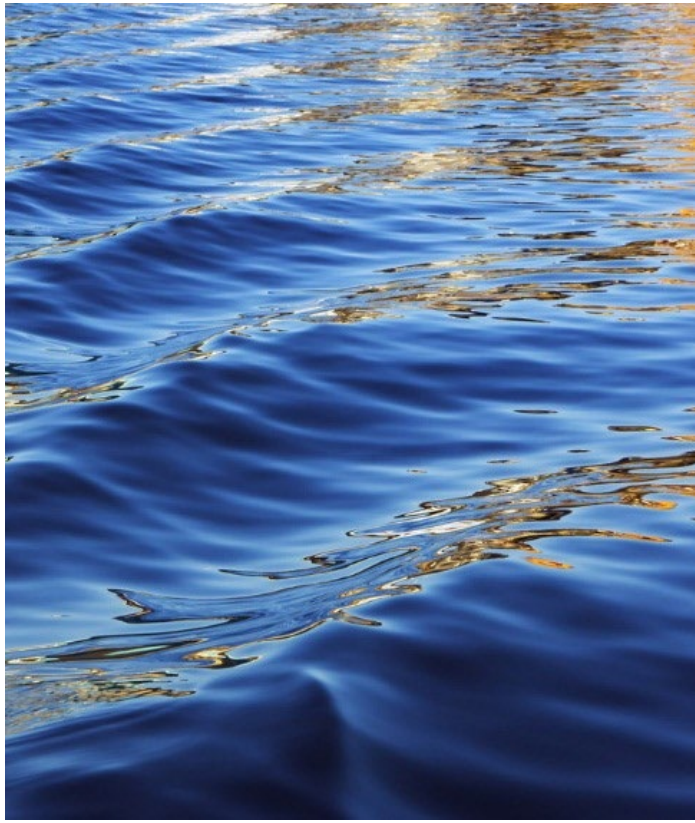
SOUTHERN CALIFORNIA EDISON®

Proactive Strategies

Actions	Connected Regulations (limited)
Develop material balance to quantify waste streams of PFAS to wastewater, solid disposal, air emissions	TRI reporting, CTR reporting, CERCLA, TSCA 8(a)(7) reporting
Records review to understand historic manufacture and import	TSCA 8(a)(7) reporting
Evaluate process changes to isolate PFAS waste streams for separate management	NPDES, RCRA, non-RCRA, Drinking Water, Proposition 65 (CA), CERCLA
Retrieve updated SDS after removal of de minimis exemption in TRI	TRI reporting, CTR reporting, NPDES, RCRA, Drinking Water, Proposition 65 (CA)
Outreach to suppliers and review of industry-specific literature to determine PFAS in process inputs	All of the above + consumer product prohibitions
Ensure Chemical Approval Process flags chemicals of interest	Prop 65, PFAs/PFOA compounds, TSCA, etc

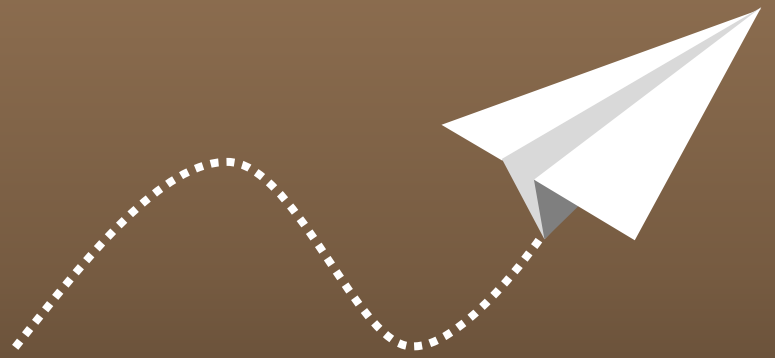
Conclusion

Q&A



SOUTHERN CALIFORNIA EDISON®

Thank You

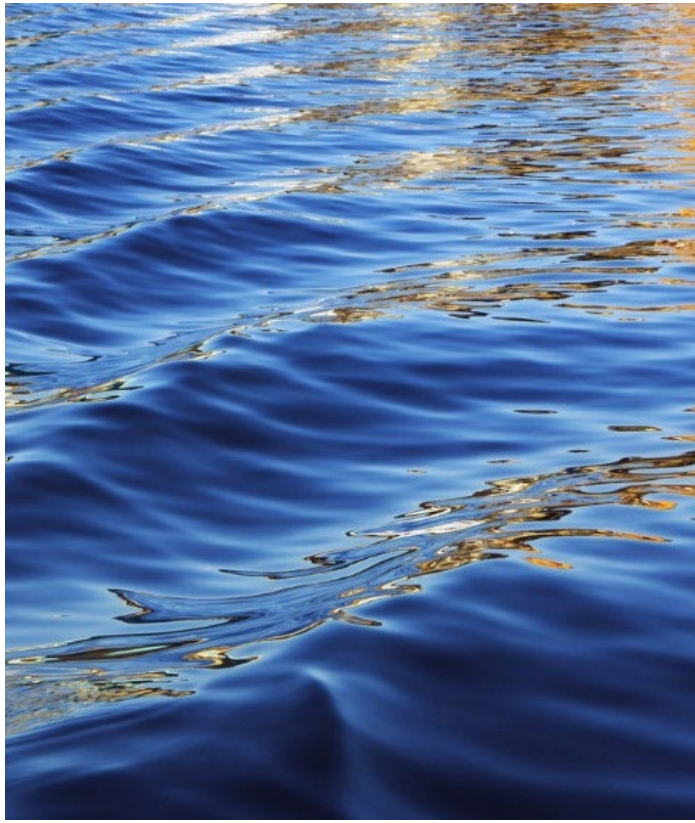


Acknowledgement: Ted Gribble and Grant Davis, SCE Enterprise Risk Management; Randall Jackson, SCE Safety; and our SMEs, SCE Environmental Department.

Vicky Furnish, REHS, M.A
Principal Manager, Environmental Compliance
Southern California Edison
Environmental, Health, Safety and Quality (EHSQ) | Environmental Department
Vicky.Furnish@SCE.com

SOUTHERN CALIFORNIA EDISON®
An *EDISON INTERNATIONAL*® Company

Backup Slides



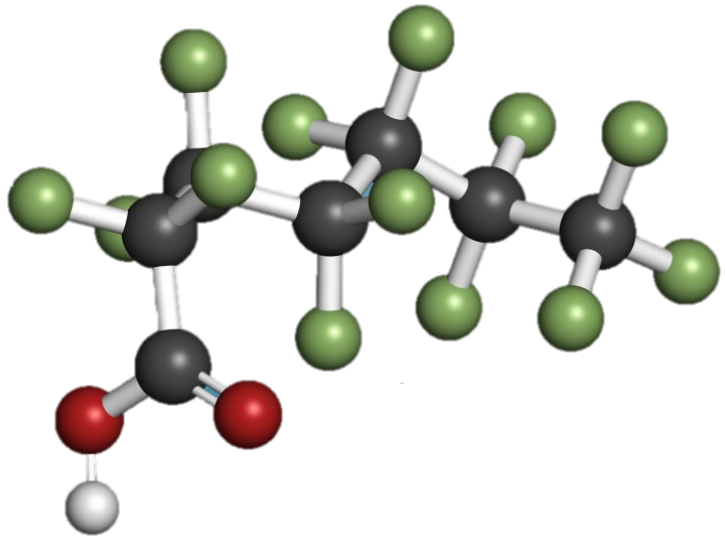
SOUTHERN CALIFORNIA EDISON®

Basics of PFAS and PFOAS

What are Per – and Polyfluoroalkyl Substances (PFAS)?

- Man-Made chemicals widely used since the 1940s
  - Resistant to Heat, Water, and Oil
- Thousands of compounds including the two sub-categories

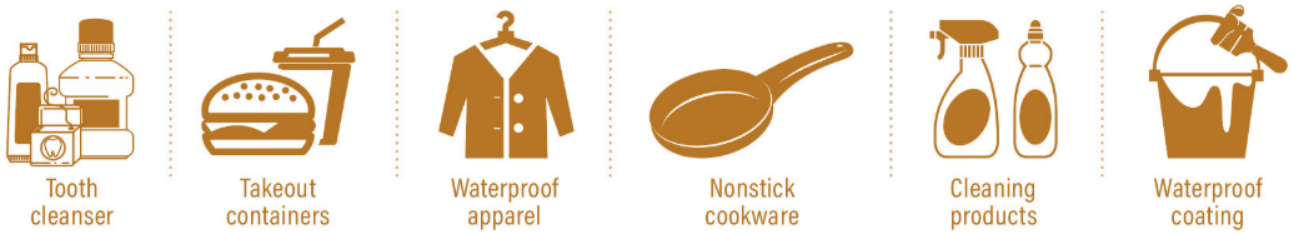
  Fully Fluorinated Carbons with functional hydrophilic groups
  - Perflurooctanoic acid (PFOA)
  - Perflurooctanesulfonic acid (PFOS)



PFOA and PFOS Chemical Compound

  - Fluorocarbon Tail = environmental persistence
    - Highly electronegative fluorine atoms- hydrophobic tail and has weak dispersion forces
    - Strong C-F bond, mainly unreactive tail
    - Distinctive surfactant properties

PFAS Usages



Every day:

- Paints, coatings, adhesives, sealants
- Rubber and plastic parts
- Materials with non-stick, water resistance, chemical resistance properties
- Food packaging
- Water repellent clothing
- Coolants
- Personal care products (dental floss, sunscreen, shampoo/conditioners)

Industrial Applications:

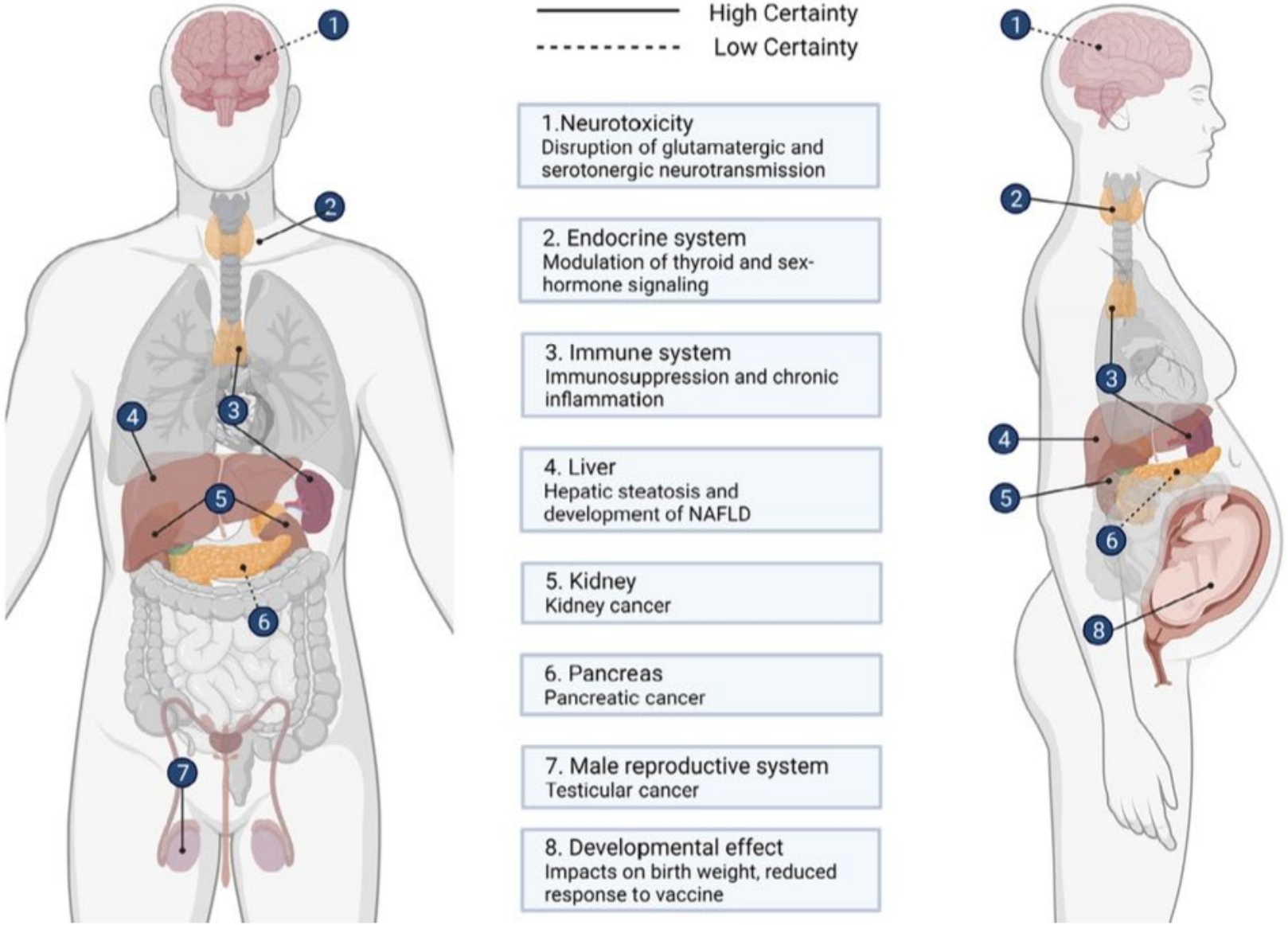
- Paper products coatings for water and grease resistance
- Semiconductor photolithography and etching
- Chrome plating wetting agents/fume suppressant
- Pesticide and herbicides
- Carpet, textiles, and upholstery
- Mining froth flotation
- Solar Photovoltaic Panels
- Fire suppression systems

Highest priority industry categories known or suspected to discharge PFAS by EPA:

- Organic chemicals
- Plastics & synthetic fibers
- Metal Finishing
- Electroplating
- Electric and Electronic Components
- Landfills
- Pulp, Paper, and Paperboard
- Leather Tanning and Finishing
- Plastics molding and forming
- Textile Mills
- Paint Formulating
- Airports
- Military Installations

SOUTHERN CALIFORNIA EDISON®

Toxicological effects of PFAS on human biology. Strong and limited biological effects



Source: PFAS: The "New" Forever Chemicals. UC Davis Veterinary Medicine Lein Laboratory – Pamela Lein, PhD, Professor of Neurotoxicology
https://edition.pagesuite-professional.co.uk/html5/reader/production/default.aspx?pubname=&edid=f2856496-3b7f-4113-8461-af5d282d8066