

AGQ LABS & TECHNOLOGICAL SERVICES

PFAS Site Characterization and Source Identification

Analytical challenges and investigation methodologies for groundwater and soil matrices.

Mónica Berrios Caballero
Environmental Labs Director



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01

AGQ Labs introduction

AGQ Labs: three decades of environmental science

30+ years supporting environmental, agricultural, industrial and food sectors.



Technical and analytical solutions



International operations and accredited laboratories

Specialization: agronomy · food safety and quality · environmental · microbiology · pharmaceutical and nutraceutical · molecular biology · radioactivity · quality control · geochemical · mining and metallurgy

Environmental characterization, advanced analysis and technical support across the whole project lifecycle.

A technical partner, not only a laboratory



Environmental matrices

Groundwater, soil, surface water, waste and leachate studies.



Site investigation

Characterization of contaminated sites.



Method implementation

EPA 1633A analytical capability.



Technical consulting

Data interpretation for environmental decisions.

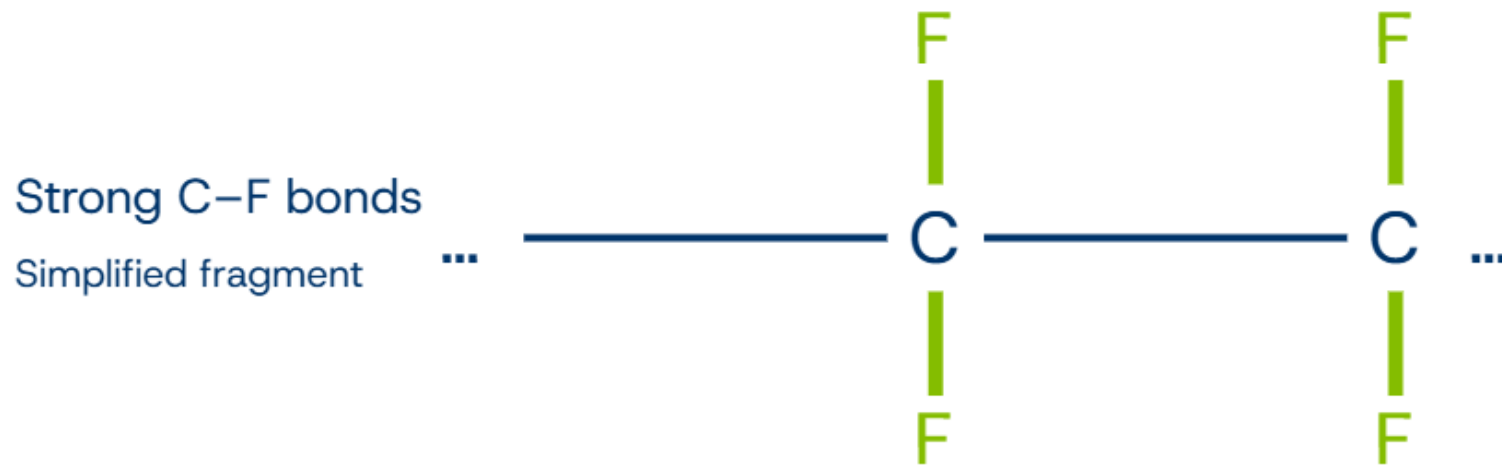
Connect the investigation question to the analytical result.

02

PFAS definitions,
groups and sources

What are PFAS?

Per- and polyfluoroalkyl substances with at least one fully fluorinated carbon ($-\text{CF}_2-$ or $-\text{CF}_3$).



Over 4,700

known compounds

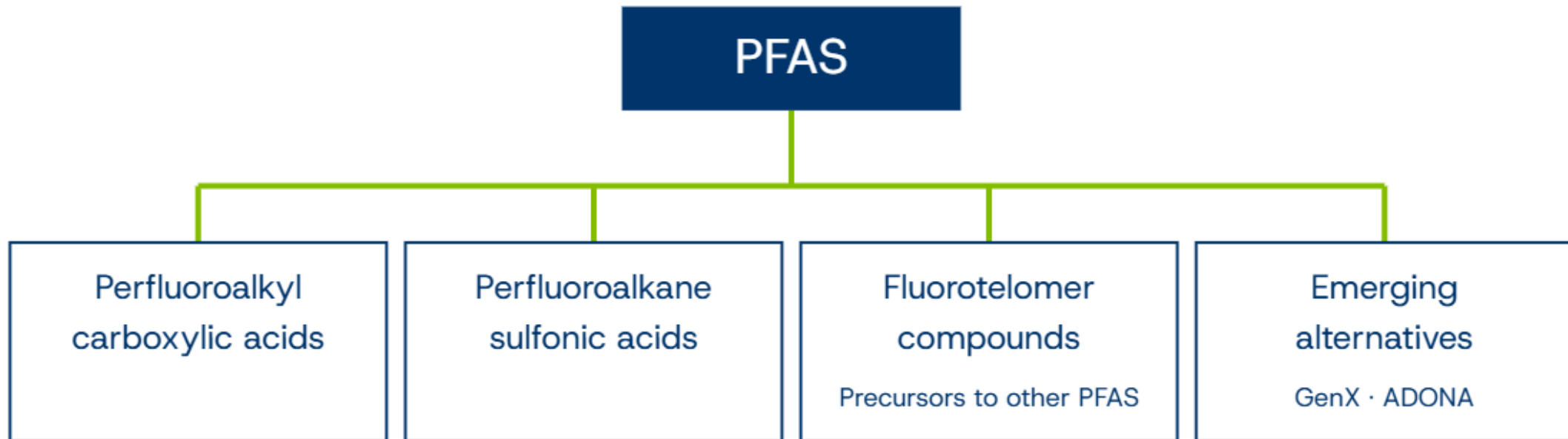
Highly stable

chemically and thermally

Persistent

Bioaccumulation and toxicity vary by compound.

PFAS are a diverse family needing specialized approaches



Selected groups, not an exhaustive taxonomy. Structure influences transport and analytical response.

Knowing the original source is key to site success

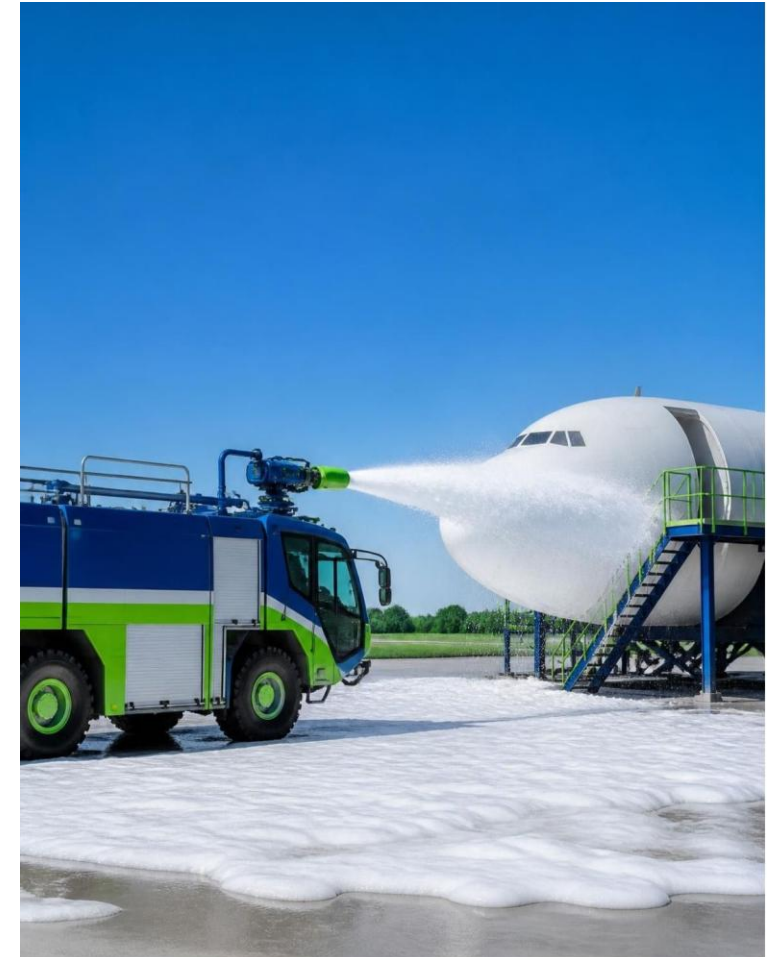
Firefighting foams (AFFF): airports, military facilities, fire training areas

Textile and paper coatings, non-stick cookware, cosmetics, pesticides

Chemical manufacturing and metal plating

Industrial discharges, landfill leachates and wastewater treatment plants

Soil and water → receptors



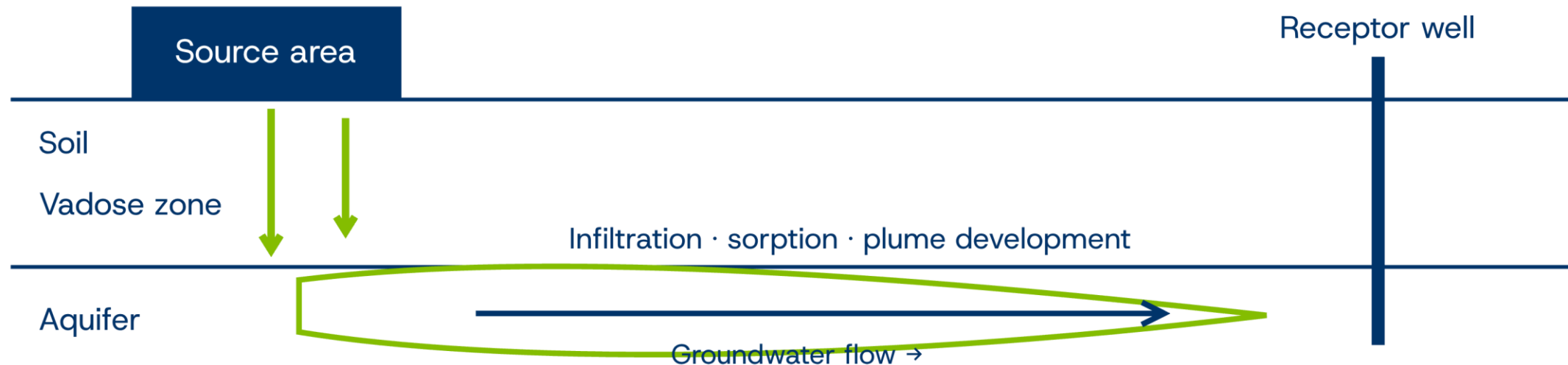
03

PFAS in the environment

PFAS move differently from traditional contaminants

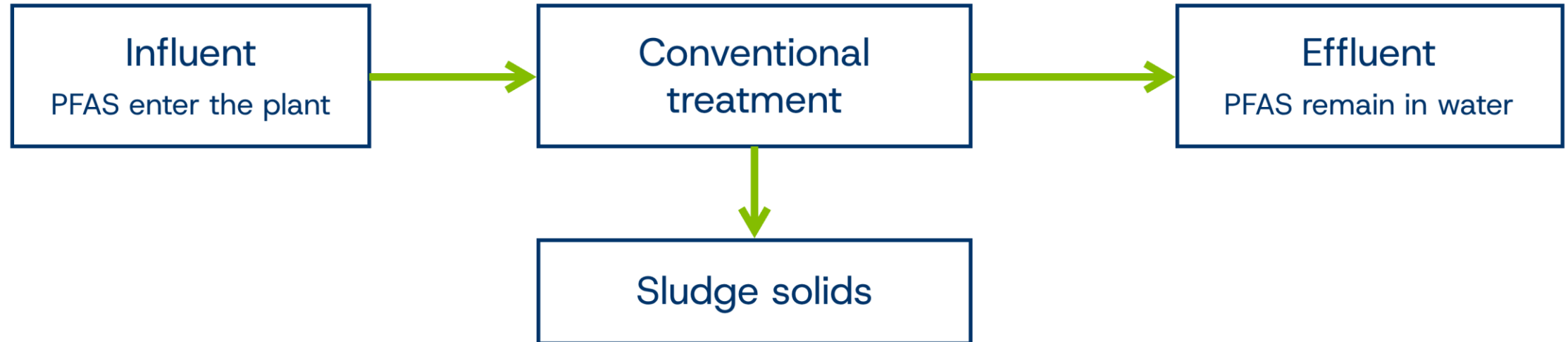
Source area → soil → vadose zone → aquifer → receptors

Long-chain compounds generally sorb more; short-chain compounds often travel farther.



Conceptual model, not to scale. Mobility also depends on geochemistry and site conditions.

Wastewater and sludge are key accumulation nodes



Not fully removed by conventional treatment.

Adsorption onto solids; limited transformation under anaerobic conditions.

Reported ranges: ng/L in water to µg/g in sludge.

From biosolids to groundwater and the food chain

Biosolids application

Biosolids applied to agricultural soils

Agricultural soil

Potential secondary reservoir

Transfer pathways

Plant uptake

Entry into the food chain

Leaching

Potential to groundwater

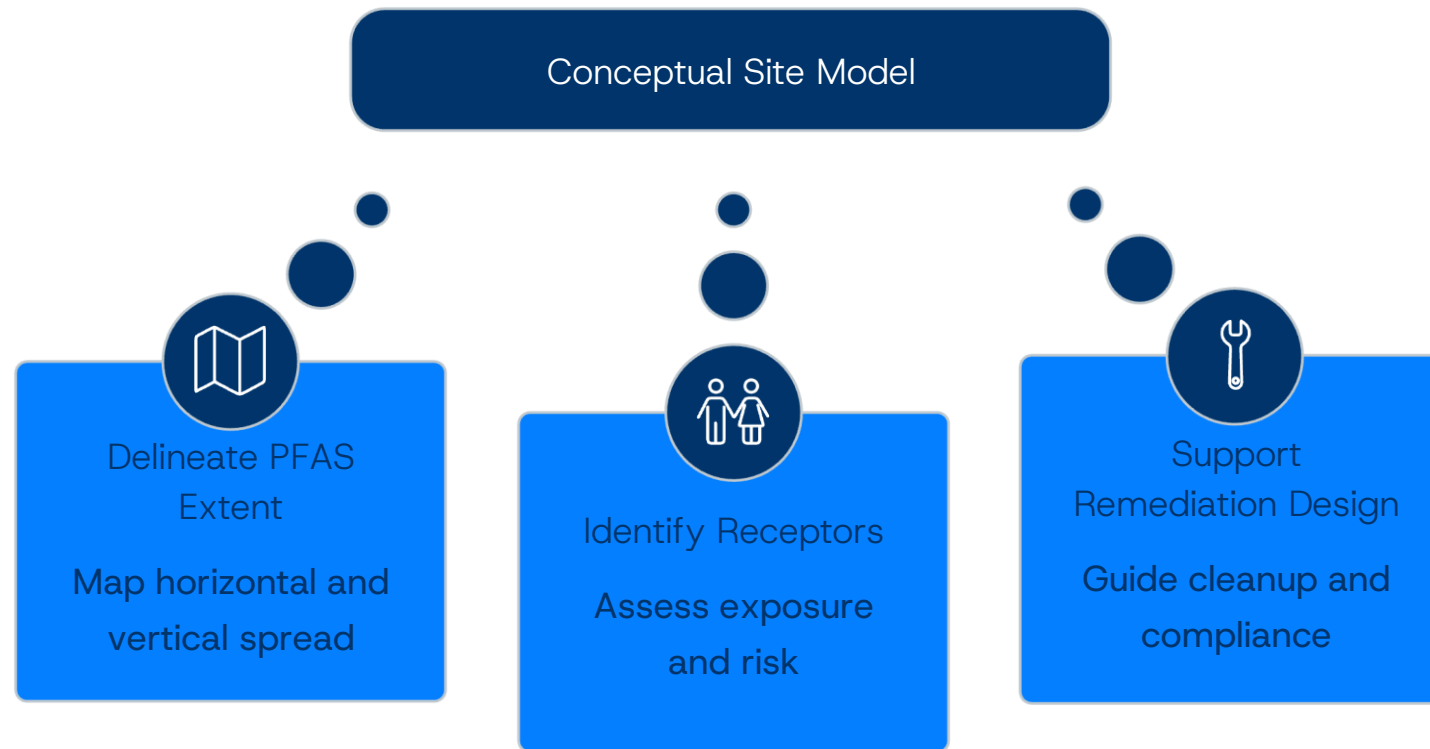
Land application can redistribute contamination beyond the original source.

Pathway potential depends on compound properties, soil conditions and land use.

04

Investigation strategy
and remediation

Accurate characterization is the foundation of PFAS management



The CSM is updated as evidence changes, not fixed after the first campaign.

Successful investigations follow a phased roadmap

Build the CSM, test it in the field, then update management as evidence improves.



01	02	03	04
Historical review	Potential sources	Conceptual site model	Soil investigation
Preliminary assessment.	Identify source areas.	Define pathways and gaps.	Resolve source storage.
05	06	07	
Groundwater investigation	Data evaluation	Long-term monitoring	
Delineate migration.	Assess risk.	Adapt management.	

Remediation: limited today, improving fast

CONVENTIONAL

Removal is not destruction

Conventional approaches do not fully remove PFAS. Captured PFAS require residuals management.

EMERGING

Destruction pathways

Advanced oxidation/reduction, electrochemical oxidation, photocatalysis, plasma and thermal destruction above 1000 °C.

INNOVATIVE

Separation and treatment

Foam fractionation, sonolysis and hydrothermal carbonization of sludge.

Performance is compound-, matrix- and process-specific. Verify destruction and manage by-products.

05

Analytical determination of PFAS

EPA Method 1633A

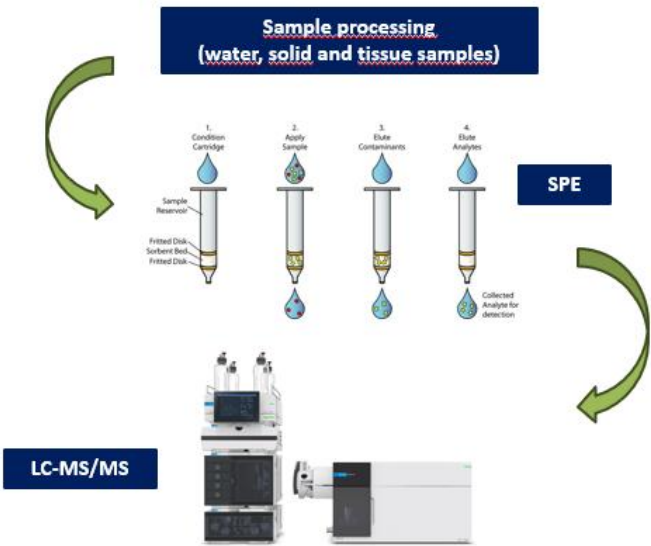
EPA Method 1633A: the reference for reliable data

40

targeted PFAS

Revision A, December 2024

Wastewater, biosolids, leachates and soils.



01

Sampling

Matrix-specific collection.

02

Processing

Prepare the sample.

03

Extraction

SPE and carbon clean-up.

04

LC-MS/MS

Isotope dilution quantification.

05

Report

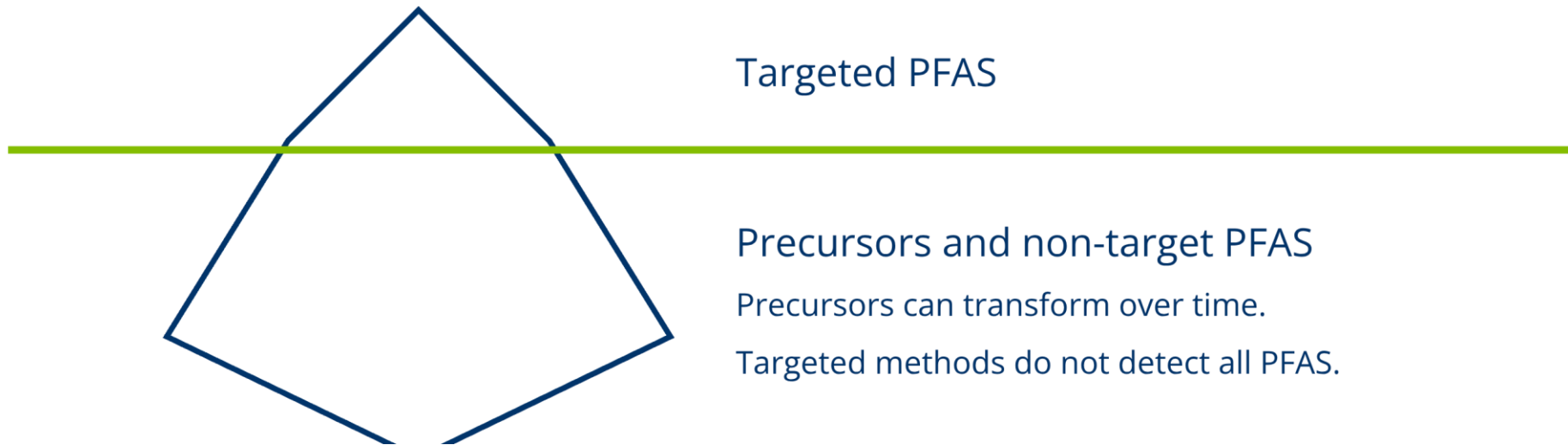
Validated results and qualifiers.

PFAS analysis demands expertise at every step

ANALYTICAL CHALLENGE	REQUIRED RESPONSE
Ultra-trace concentrations	High-sensitivity instrumentation and verified performance.
Background contamination and adsorption losses	Strict sampling protocols, suitable materials and blanks.
Matrix interferences in sludge and biosolids	Effective clean-up and isotope dilution.
Expanding analyte lists	Validated methods that evolve with project requirements.

Confidence depends on the complete chain, not instrument sensitivity alone.

Targeted analysis can hide part of the contamination



TOP Assay

Assess oxidizable precursors.

EOF

Extractable organic fluorine.

High-resolution MS

Expand compound screening.

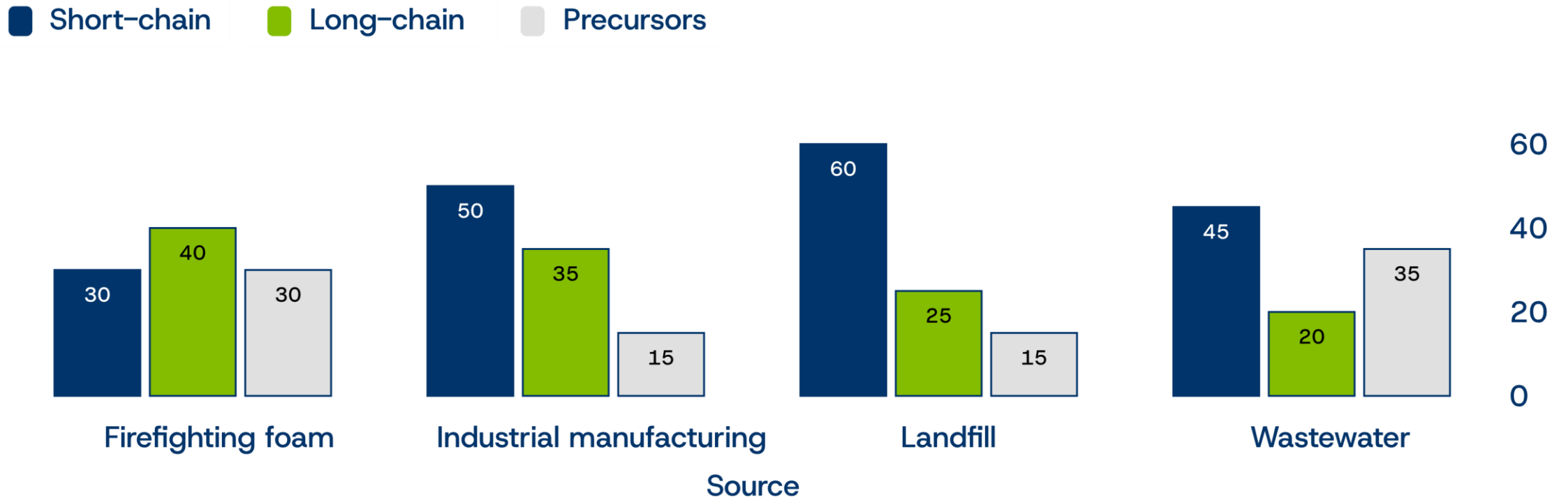
Conceptual iceberg, not a quantified fraction. These tools answer different questions.

06

Source identification,
regulation and conclusions

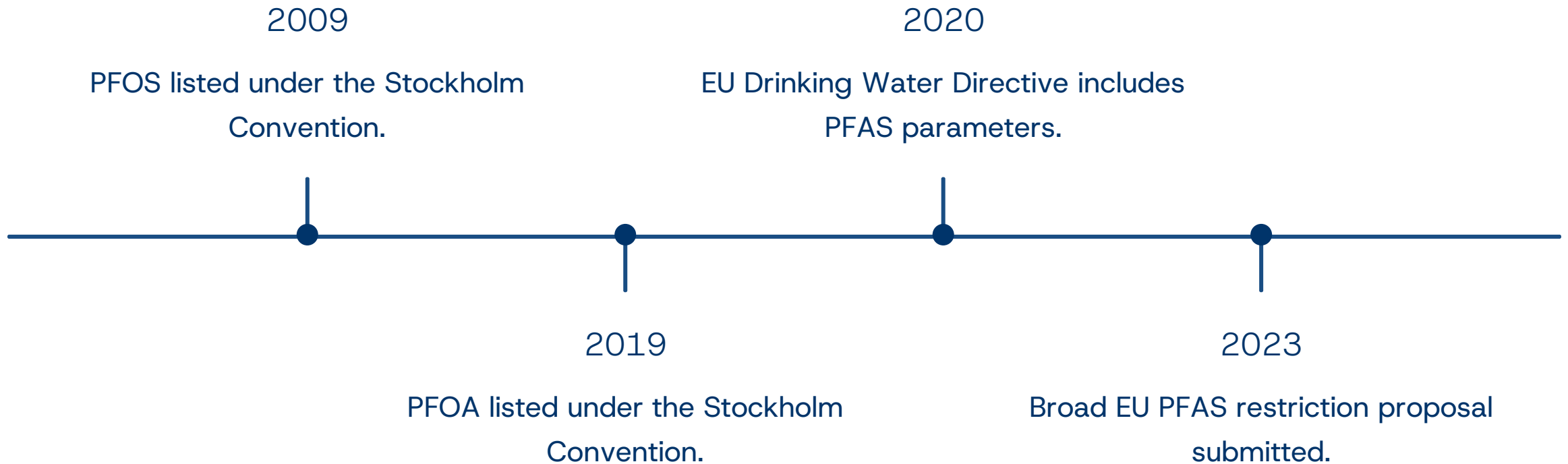
PFAS fingerprints reveal where contamination comes from

Congener profiles, homologue distributions and diagnostic ratios support attribution for regulation, liability, remediation planning and monitoring.



Illustrative PFAS signatures by source. Conceptual values, not measured source fingerprints or attribution thresholds.

Regulation keeps expanding, and so will demand for investigations

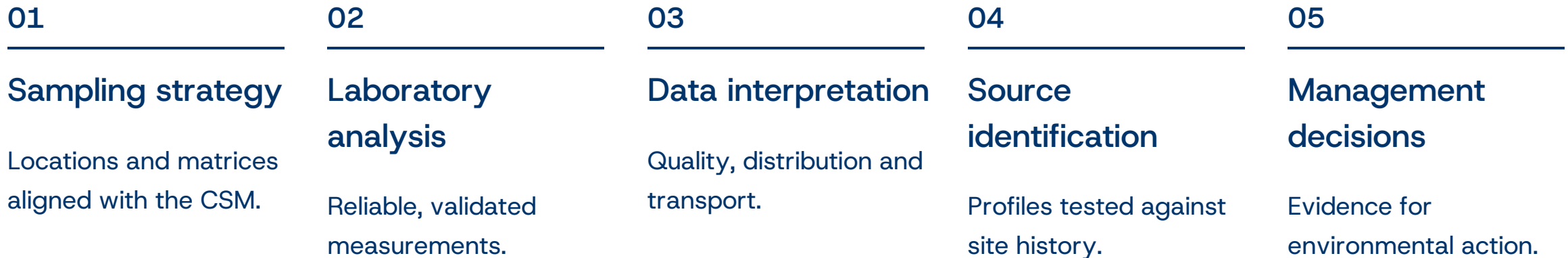


European restriction initiatives.

Drinking water requirements and groundwater monitoring trends.

Future soil regulations and expanding compound lists.

AGQ: an end-to-end solution for PFAS investigations



One connected investigation, from the field question to the management decision.

Conclusions

- 01 PFAS contamination is a growing global environmental challenge.

- 02 Site characterization requires multidisciplinary expertise.

- 03 Understanding PFAS transport is essential for risk assessment.

- 04 Reliable analytical data are fundamental for decision making.

- 05 AGQ supports clients through the complete PFAS investigation process.

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Thank you

Mónica Berrios Caballero

Environmental Labs Director

AGQ Labs & Technological Services

mberrios@agqlabs.com

