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Testing airborne and particle-bound PFAS with OTM-45

ALS now offers this advanced method to support compliance and risk assessment.

ALS has recently completed validation of an analytical method for the determination of vapour-phase and particulate-bound PFAS from air in accordance with the US Environmental Protection Agency's (EPA) Other Test Method 45 (OTM-45).

The suite of OTM-45 analyses is now available to clients in advance of NATA accreditation, supporting further knowledge on PFAS air emissions and emerging regulation around waste incineration.

Comparing volatile and semi-volatile methods

Introduced in 2021, the OTM-45 was originally developed for the North American market to better characterise and standardise PFAS in air emissions – a previously underexplored pathway.[1] Despite these international advances, the extent of airborne PFAS contamination across Australia and New Zealand / Aotearoa remains poorly understood.

OTM-45 is often applied alongside Other Test Method 50 (OTM-50), introduced in 2024. The two methods were designed to capture different components of PFAS in air emissions.

There is some conceptual overlap – OTM-50 focuses on volatile PFAS in gas form,[2] while OTM-45 aims to capture semi-volatile PFAS across both particulate and gaseous phases, with particular focus in PFAS emitted from high-temperature generating processes.

OTM-45 also differs as it adapts sampling trains from the Hazardous Waste Test Methods (SW-846) to isokinetically sample air and gas from stationary gas emissions. Used together, they can provide a comprehensive and complementary understanding of PFAS emissions through air.

Both methods are now available for testing in Australia – with OTM-45 tested in our Melbourne laboratory – supporting improved access to PFAS air testing across the region. OTM-50 is exclusively tested in our Ontario, Canada laboratory and can be requested through any of our Australian sites. Read more about our OTM-50 capabilities here.

Environmental sources and transmission

As understanding of PFAS mass flux deepens, regulatory and industry focuses are shifting towards airborne emissions as a potentially significant source of environmental contamination, driving the need for more advanced sampling methods.

Gas phase and particle phase PFAS may be emitted into the environment through a range of sources. Emissions from industrial processes, manufacturing facilities, weathering of PFAS-containing materials and combustion or incineration of PFAS have all been identified as potential vectors of airborne PFAS spread.

Once emitted, PFAS can travel significant distances, with detections reported in remote regions such as Antarctica[3] and other areas that have no known PFAS industries, highlighting the role of air as a key transport pathway.

PFAS has been shown to remain at the air-water interface due to the hydrophobic fluorocarbon backbone and the polar head functional groups.[4] This causes a partitioning between gas and water phases, contributing to its mobility through gas or particulate matter. Short chained-PFAS, generally more water soluble, will likely partition to aqueous aerosols, while low soluble longer-chained PFAS partition onto surface airborne particles.[5]

Once airborne, atmospheric movement shifts PFAS, sometimes thousands of kilometers from its original source. A mixture of wet and dry deposition within the atmosphere then precipitates PFAS back into the environment.

Regulatory drivers of PFAS in air testing

International governments and regulatory bodies have started to identify air as a vector for PFAS movement in the environment, shaping regional responses to air emissions monitoring across Australia and New Zealand / Aotearoa. Thermal treatment and desorption facilities can be a major source of PFAS, owing to their work with highly contaminated samples. While most facilities are required to carry out mass balances to account for any PFAS losses, these may not capture all PFAS species or account for other losses.

The European Union is a key example of government agencies initiating testing mandates of airborne PFAS. Working under Directive 2010/75/EU on Industrial Emissions,[6] better known as the Industrial Emissions Directive (IED), the EU aims to reduce industrial emissions throughout EU member states to safe levels by 2050, with PFAS as a key emission focus. The US EPA is similarly working towards a technical foundation in regulating PFAS in air, with violating polluters sanctioned and fined for environmentally-contaminating air emissions.

Within Australia and New Zealand / Aotearoa, the PFAS National Environmental Management Plan (NEMP 3.1) is the key national guidance addressing PFAS in air, leading the regional case for air emissions to be assessed as a possible vector for PFAS to spread through the environment.[7]

It sits as a strong foundation for industry and commercial action to address the lack of data in the region around PFAS in air, and to seek alignment between environmental monitoring approaches and understanding of atmospheric PFAS dispersion.

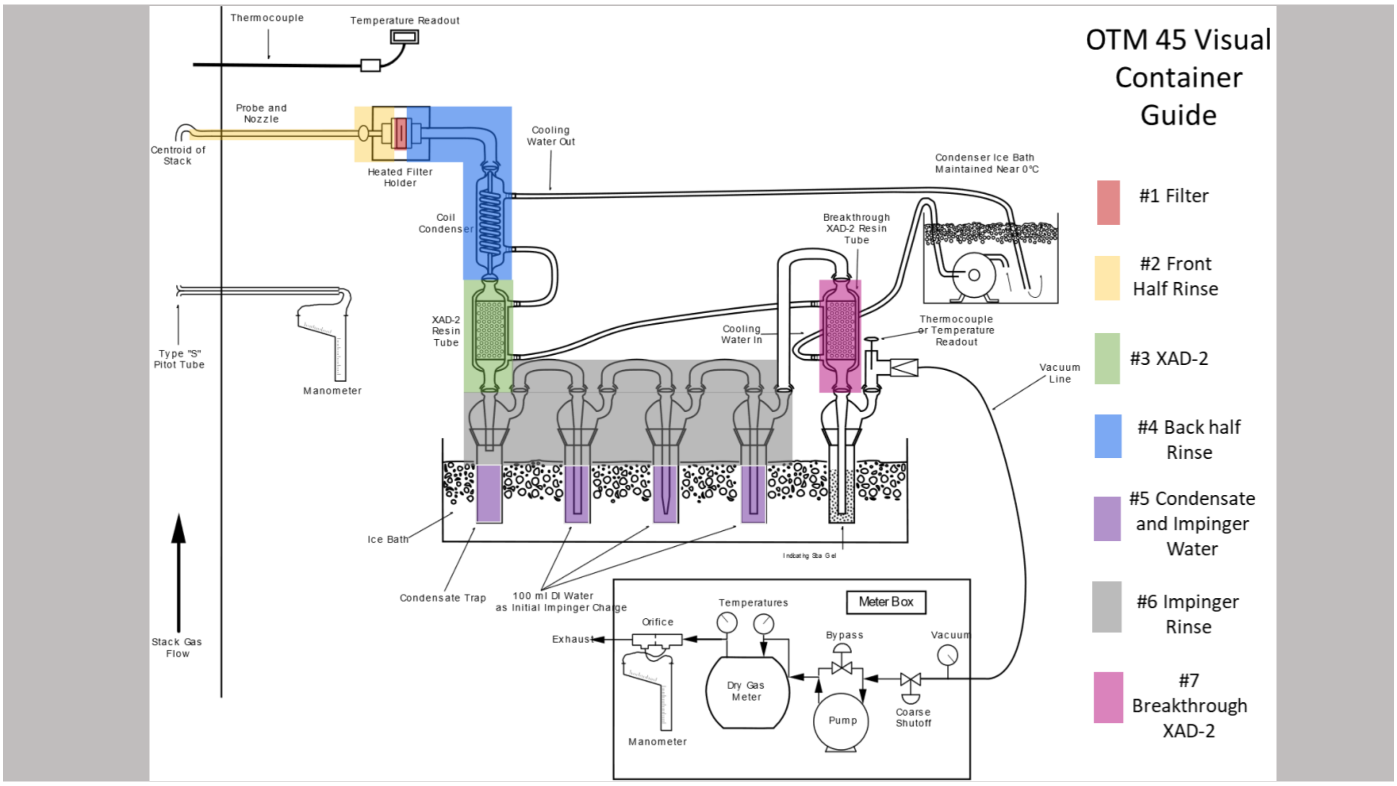
OTM-45, in conjunction with OTM-50, is currently the best-suited method to help support industry in achieving quality and reliable PFAS air sampling and analysis.

Sampling methodology and holding times

OTM-45 analysis, under the ALS Method Code EP331, uses a sampling train adapted from SW-846 Test Method 0010: Modified Method 5, with the removal of potential PFAS contamination sources as a key modification. Air sampling pumps are set to withdraw samples from an air or gas flow, utilising a glass or quartz-filtered probe. Flow is then condensed and deposited through a XAD-2 resin, a polymeric adsorbent provided by ALS. The flow continues through a series of impinger solutions before passing through a final XAD-2 resin breakthrough trap.

The full sampling train generates a series of seven different samples, which are then combined into four for final extraction and analysis through liquid chromatography tandem mass spectrometry (LC-MS/MS).

Figure 1. *OTM-45 sampling train.[1]*



Recoveries are monitored and calculated using a solution of isotopically labelled PFAS standards, fortified onto the first XAD-2 resin tube. Four individual results are generated, before finally, a sum is calculated across all extracts to monitor and assess potential analytical losses.

The OTM-45 method reports PFAS compounds as ng/fraction, providing an accessible and practical format for environmental consultants, project assessors and industry decision-makers working with PFAS in air. For a list of the limits of reporting (LOR) for the 55 PFAS compounds available for analysis, see *Appendix 1* .

Sampling train rinses, impinger solutions and XAD-2 resin samples should be submitted to ALS and extracted within 28 days of a sampling event.

Experience expert PFAS testing with ALS

ALS is a global leader in PFAS testing, with extensive experience supporting complex PFAS investigations and remediation projects.

As regulatory requirements and project needs continue to evolve, we're committed to an expanding scope of accreditation to meet shifting compliance demands, with OTM-45 as the latest addition to our breadth of capabilities. By aligning our PFAS methods with international frameworks, we are able to deliver trusted insights that drive confident compliance and risk assessment strategies.

We hold PFAS testing accreditation through our global network for OTM-50, as well as NATA and IANZ accredited PFAS analysis across a wide range of matrices including soils, biosolids, wastewaters and other environmental samples.

ALS can further support your sampling requirements by providing essential supplies, including pre-loaded PFAS-free XAD-2 resin traps for the OTM-45 method as well as bottles for transportation of impinger solutions, rinsates and the particulate filter.

Get in touch with us

Contact your local ALS Project Manager today for more information about the new OTM-45 method.

Environmental

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Appendix 1

Compound	CAS number	LOR (ng)
Perfluoropropane sulfonic acid (PFPrS)	359868-82-9	0.5
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5
Perfluorononane sulfonic acid (PFNS)	68259-12-1	0.5
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5
Perfluorododecane sulfonic acid (PFDoDS)	79780-39-5	0.5
Perfluoro-4-ethylcyclohexanesulfonic acid (PFECHS)	335-24-0	0.5
Perfluorobutanoic acid (PFBA)	375-22-4	2.5
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5
Perfluorohexanoic acid (PFHxA)	307-24-4	0.5
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5
Perfluorooctanoic acid (PFOA)	335-67-1	0.5
Perfluorononanoic acid (PFNA)	375-95-1	0.5
Perfluorodecanoic acid (PFDA)	335-76-2	0.5
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	0.5
Perfluorooctadecanoic acid (PFODA)	16517-11-6	0.5
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	1.25
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5

Appendix 1

Continuation

Compound	CAS number	LOR (ng)
Perfluoro(2-ethoxyethane) sulfonic acid (PFEESA)	117205-07-9	0.5
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9ClPF-3ONS)	73606-19-6	0.5
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	83329-89-9	0.5
HFPO-DA / GenX	13252-13-6	0.5
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	0.5
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	0.5
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	151772-58-6	0.5
ADONA	2250081-67-3	0.5
3:3 FTCA	356-02-5	0.5
5:3 FTCA	914637-49-3	0.5
7:3 FTCA	812-70-4	0.5
6:2 FTCA / FHEA	53826-12-3	1.25
8:2 FTCA / FOEA	27854-31-5	1.25
10:2 FTCA / FDEA	53826-13-4	1.25
6:2 FTUCA / FHUEA	70887-88-6	0.5
8:2 FTUCA / FOUEA	70887-84-2	0.5
10:2 FTUCA / FDUEA	70887-94-4	0.5
6:2 Fluorotelomer sulfonamide alkylbetaine (6:2FTAB)	34455-29-3	0.5
6:2 diPAP	57677-95-9	1.25
8:2 diPAP	678-41-1	1.25
6:2 / 8:2 diPAP	943913-15-3	1.25

References

1 United States Environmental Protection Agency (US EPA), Other Test Method 45 (OTM-45) Measurement of Selected Per- and Polyfluorinated Alkyl Substances from Stationary Sources, 14 January 2025, accessed 10 July 2026, www.epa.gov/system/files/documents/2025-01/other-test-method-45-rev1-final-1-14-25.pdf.

2 United States Environmental Protection Agency (US EPA), Other Test Method 50 (OTM-50) Sampling and Analysis of Volatile Fluorinated Compounds from Stationary Sources Using Passivated Stainless-Steel Canisters, 14 January 2025, accessed 10 July 2026, www.epa.gov/system/files/documents/2025-01/otm-50-release-1-r1.pdf.

3 P Casal, Y Zhang, JW Martin, M Pizarro, B Jimenez & J Dachs, 'Role of snow deposition of perfluoroalkylated substances at coastal Livingston Island (Maritime Antarctica)', Environmental Science & Technology, volume 51(15), 2017, pp 8460–8470, doi.org/10.1021/acs.est.7b0252.

4 AC Lemay & IC Bourg, 'Interactions between per- and polyfluoroalkyl substances (PFAS) at the water-air interface', Environmental Science & Technology, volume 59(4), 2025, pp 2201–2210, doi.org/10.1021/acs.est.4c08285.

5 Ibid.

6 European Union, Document 32010L0075: Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control), 24 November 2010, viewed 10 July 2026, eur-lex.europa.eu/eli/dir/2010/75/oj/eng.

7 Heads of EPA Australia and New Zealand (HEPA), PFAS National Environmental Management Plan 3.1, 2 June 2026, accessed 10 July 2026, www.dcceew.gov.au/environment/protection/publications/pfas-nemp-3.