PFAS in Air - Just the Facts

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This presentation aims to provide an overview of occurrence and sources of per- and polyfluoroalkyl substances (PFAS) in air with a focus on sampling and analytical techniques to identify and quantify known compounds of concern, and new compounds identified as products of incomplete combustion – an important consideration for destruction technologies.

PFAS are a type of synthetic chemical that are persistent and can travel long distances in the environment. These chemicals are used in various products and can be released into the air through industrial processes, waste treatment plants, biogas- and energy from waste facilities, as well as other sources. (ref: European Chemicals Agency, State of Michigan-gov). This can include volatile PFAS in the gas phase, or PFAS that have sorbed onto particulate and are expelled through vent or stack.

PFAS in the air can be inhaled, potentially leading to complications affecting the liver and kidneys, compromised immune systems, and developmental or reproductive concerns. While inhalation exposure is likely less prevalent than ingestion or dermal exposure, it is a recognized pathway for PFAS to enter the body (EPA).

Certain PFAS exhibit distinct volatility characteristics based on their chemical properties. For some compounds, such as perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) that have low vapor pressures and high water solubility, their ability to partition from water into the air is restricted (EPA). Conversely other PFAS contain certain functional groups and properties that enhance their volatility, enabling them to more readily transition from aqueous environments into the atmosphere.

There are different approaches being used to target the different types of PFAS in air,based on their structure and properties, particularly volatility and polarity. The first air method developed by the US EPA is OTM-45, targeting polar, semi-volatile and particulate bound PFAS which includes many of the known compounds of concern typically included in standard methods for water (EPA methods 1633, 533, and 537.1) with some additional compounds for a total of 49. This method was developed for stack emissions from stationary sources, relying on filter, sorbent tubes, and a series of impingers for sample collection, with the final extracts analyzed by LC-MS/MS. Details on a project as part of a study of PFAS in air using an Orbo 1500- PUF/XAD will also be discussed where ALS achieved reasonable data based on a similar in-house method, that is not supported by OTM-45.

OTM-50 focuses on volatile PFAS, primarily products of incomplete combustion with a target list of 30 compounds distinct from OTM-45, relying on canister sampling and analysis by GC-MS. ALS has been developing a method for non-polar volatile PFAS in ambient air and soil vapour based on EPA OTM-50 method compound list and quality control criteria. Various columns have been evaluated to determine which is best suited and delivers the best chromatography. Instrument parameters were also evaluated to optimize performance. This presentation will explore the development of PFAS air testing methods—new to Canada—while highlighting the challenges, lessons learned and provide an update on ALS capabilities

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Tammy Chartrand

As the National PFAS Program Lead, Tammy Chartrand is responsible for leading ALS's market position related to the retention and growth of PFAS service offerings in Canada. Her focus is primarily engaging with the public sector, external stakeholders, and industry leaders while also supporting operational leadership and building the knowledge capacity of the service delivery team. Tammy works closely with the global network of ALS labs to stay at the forefront of PFAS analysis, collaborating on research, standardization practices and stay up to date with the latest global PFAS regulations and trends. She holds a Bachelor of Science degree from the University of Ottawa and has over 10 years of experience in the environmental industry. Tammy started her career with ALS in 2016, following several years in the Federal public sector. She has been involved in the PFAS space supporting operations and client engagement since 2021.

Darlene Hoogenes-Stastny

Darlene has been working in the environmental industry for over 30 years. Her experience working for environmental laboratories spans waters, soils and in the last 10 years has come to include tissues and air chemistry. From 2010 to present Darlene has been the contract lead for a standing offer agreement with the Department of National Defence (DND) which includes the Royal Military College-Environmental Services Group. On a federal level DND has been instrumental in initiating PFAS testing and requesting expansion of compound lists and lower detection limits, as well as investigation into air testing for PFAS compounds. Darlene is currently the ALS Canada-National Air Quality Specialist. Her early career experience includes 7 years in health care (geriatrics), 3 years in the automotive industry, as well as 2 years in environmental compliance. She is an associate member of AWMA (Air & Waste Management Association), and a CET (certified environmental technologist). When she is not researching facets of air chemistry testing or providing equipment demonstrations, Darlene can be found riding horseback, enjoying her family time, and traveling