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Fire Fighting Foam Coalition

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Bulletin

Analytical Method for Measuring PFAS in AFFF Firefighting Foam Concentrates

SGS AXYS Analytical Services Ltd. (AXYS), working on behalf of the Fire Fighting Foam Coalition Inc. (FFFC) and in conjunction with the United States Naval Sea Systems Command (Navsea), has developed an analytical method to quantitatively determine the concentration of specific per and polyfluoroalkyl substances (PFAS) in AFFF¹ and AR-AFFF¹ firefighting foam concentrates.

The FFFC/AXYS method can consistently and accurately measure the concentrations of PFOS and PFOA in a foam concentrate to a reporting limit of 10 ng/mL (ppb). This is significantly lower than most currently available analytical methods have been able to consistently achieve due to the complex nature of the foam concentrate matrix, which includes fluorosurfactants, hydrocarbon surfactants, solvents and stabilizers. The method is currently validated for the 29 PFAS compounds shown below, including important short-chain (<7 CF chain length) analytes such as 6:2 FTS and PFHxA. Additional analytes could be added in the future, or as part of a pre-determined, project-specific scope.

The method was validated at AXYS with a select set of

tests on AFFF and AR-AFFF concentrate samples provided by FFFC and AFFF concentrate samples provided by Navsea. Further validation by multiple laboratories and with an expanded set of foam concentrates is part of the next phase. The FFFC/AXYS method is not currently applicable to fluoroprotein (FP) or film-forming fluoroprotein (FFFP) foams, although such a capability could be developed in the future.

FFFC set out to develop an analytical method in response to the increasing demand for foam users to report PFOS and PFOA levels. Any qualified analytical laboratory experienced with the use of liquid chromatography/mass spectrometry (LC-MS/MS) should be able to successfully perform the method. User guidance and a detailed method document are available to assist in promoting and implementing its use.

FFFC is recommending use of the method whenever AFFF or AR-AFFF firefighting foam concentrates are required to be tested for PFOS, PFOA and other relevant PFAS levels. FFFC is promoting its acceptance in all regulatory settings that require foam concentrates to be tested for the presence of legacy long-chain PFAS.

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¹ AFFF (aqueous film-forming foam) and AR-AFFF (alcohol-resistant aqueous film-forming foam) are the most effective foam agents currently available to fight high-hazard flammable liquid fires in military, industrial and aviation applications.

Method Analytes

Analyte ¹	Name	Nominal Reporting Limit (ppb or ng/mL)
PFBA	Perfluorobutanoic acid	40
PFPeA	Perfluoropentanoic acid	20
PFHxA	Perfluorohexanoic acid	10
PFHpA	Perfluoroheptanoic acid	10
PFOA	Perfluorooctanoic acid	10
PFNA	Perfluorononanoic acid	10
PFDA	Perfluorodecanoic acid	10
PFUnA	Perfluoroundecanoic acid	10
PFDoA	Perfluorododecanoic acid	10
PFTtDA	Perfluorotridecanoic acid	10
PFTeDA	Perfluorotetradecanoic acid	10
PFBS	Perfluorobutane sulfonate	10
PFPeS	Perfluoropentane sulfonate	10
PFHxS	Perfluorohexane sulfonate	10
PFHpS	Perfluoroheptane sulfonate	10
PFOS	Perfluorooctane sulfonate	10
PFNS	Perfluorononane sulfonate	10
PFDS	Perfluorodecane sulfonate	10
PFDoS	Perfluorododecane sulfonate	10
4:2 FTS	4:2 fluorotelomer sulfonate	40
6:2 FTS	6:2 fluorotelomer sulfonate	40
8:2 FTS	8:2 fluorotelomer sulfonate	40
PFOSA	Perfluorooctanesulfonamide	10
N-MeFOSA	N-Methylperfluorooctanesulfonamide	10
N-EtFOSA	N-Ethylperfluorooctanesulfonamide	10
N-MeFOSAA	N-Methylperfluorooctanesulfonamidoacetic acid	10
N-EtFOSAA	N-Ethylperfluorooctanesulfonamidoacetic acid	10
N-MeFOSE	N-Methylperfluorooctanesulfonamidoethanol	100
N-EtFOSE	N-Ethylperfluorooctanesulfonamidoethanol	100

¹Target analytes are determined as the total of linear and branched isomers.