Maryland
Department of
the Environment

Guidance on Interpreting PFAS Laboratory Reports

Background

The purpose of this document is to assist public water system owners and operators, their customers, and others with how to interpret PFAS laboratory reports and how to compare them to the EPA Health Advisory Level for PFOA + PFOS and the levels the Maryland Department of the Environment is using to direct the actions of Public Water Systems when PFOA + PFOS are present in drinking water.

Laboratory Reporting Overview

Laboratory reports can have several sections. Sections typically included in a report include: a cover page, definitions or glossary, case narrative, sample results, and laboratory quality assurance/quality control (QA/QC) practices. Reports will contain a list of contaminants tested for, their concentrations, reporting units, methods used for analysis, and sometimes reports will highlight elevated levels of contaminants.

Figure 1 provides an example of how PFAS compounds are reported. Table 1 defines key parts of a laboratory's results table.

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid	9.2		4.7	1.9	ng/L	1		533	Total/NA
Perfluoropentanoic acid	33		1.9	0.47	ng/L	1		533	Total/NA
Perfluorohexanoic acid	30		1.9	0.47	ng/L	1		533	Total/NA
Perfluoroheptanoic acid	12		1.9	0.47	ng/L	1		533	Total/NA
Perfluorooctanoic acid	19		1.9	0.47	ng/L	1		533	Total/NA
Perfluorononanoic acid	12		1.9	0.47	ng/L	1		533	Total/NA
Perfluorodecanoic acid	0.65	J	1.9	0.47	ng/L	1		533	Total/NA
Perfluorobutanesulfonic acid	12		1.9	0.47	ng/L	1		533	Total/NA
Perfluoroheptanesulfonic acid	4.2		1.9	0.47	ng/L	1		533	Total/NA
Perfluoropentanesulfonic acid	12		1.9	0.47	ng/L	1		533	Total/NA
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	20		9.4	1.9	ng/L	1		533	Total/NA
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	5.0		1.9	0.47	ng/L	1		533	Total/NA
Perfluorohexanesulfonic acid - DL	120		19	4.7	ng/L	10		533	Total/NA
Perfluorooctanesulfonic acid - DL	150		19	4.7	ng/L	10		533	Total/NA
Perfluorohexanoic acid	32		1.9	0.47	ng/L	1		EPA 537.1	Total/NA
Perfluoroheptanoic acid	11		1.9	0.47	ng/L	1		EPA 537.1	Total/NA
Perfluorooctanoic acid	23	*	1.9	0.47	ng/L	1		EPA 537.1	Total/NA
Perfluorononanoic acid	15	*	1.9	0.47	ng/L	1		EPA 537.1	Total/NA
Perfluorodecanoic acid	0.74	J	1.9	0.47	ng/L	1		EPA 537.1	Total/NA
Perfluorobutanesulfonic acid	11	*	1.9	0.47	ng/L	1		EPA 537.1	Total/NA
Perfluoroundecanoic acid	0.84	J *	1.9	0.47	ng/L	1		EPA 537.1	Total/NA
Perfluorohexanesulfonic acid - DL	140		19	4.7	ng/L	10		EPA 537.1	Total/NA
Perfluorooctanesulfonic acid - DL	170	*	19	4.7	ng/L	10		EPA 537.1	Total/NA

Figure 1: PFAS Reporting Example

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Laboratory Report Component	Description
Client ID	What the client (e.g., State samplers, Public Water System, or other individual) labels the samples
Lab ID	Identifier corresponding to client ID, allowing lab to track within their system
Analyte	Specific PFAS compound being tested for
Result	Concentration of respective PFAS in the sample
Reporting Limit (RL)	Lowest concentration at which an analyte can be measured within a reasonable degree of accuracy and precision (generally ± 20%)
Method Detection Limit (MDL)	Lowest concentration at which an analyte can be detected in a sample but its level is too low to be measured accurately; laboratory specific number dependent on lab instruments and analyst skill
Unit	Standard of measurement; laboratories typically report PFAS concentrations in nanograms per liter (ng/L); 1 ng/L approximately equals 1 part-per-trillion (ppt)
Dilution Factor (Dil Fac)	Ratio of the initial volume of a concentrated solution to the final volume; typically used when a sample has extremely high concentrations of PFAS (or other compounds)
Method	Analytical method used for the determination of PFAS compounds; Two common drinking water methods are EPA Method 537.1 and EPA Method 533
Non-Detect (ND)	If an analyte is not detected during analysis, then a "ND" is reported in the results table. This does not necessarily mean the compound is not present; it is not at high enough levels to be detected by the laboratory equipment/procedure.

Table 1: Laboratory Report Components and Description

Laboratory Qualifiers

Once analysis is completed, a chemist from the laboratory reviews all information to certify the water sample meets quality standards. Qualifiers may be attached to data to give detailed information about the result(s). Laboratory qualifiers may indicate limitations, biases, estimations, etc. in the data. The most common qualifiers are "B" and "J" values.

When a "B" is marked next to a result, this means that a compound was found in both the blank (used for QA/QC as a clean sample) and field sample. When a "J" value is marked next to a result, this means that the reported amount is estimated. This is typically reported when the measured amount is lower than the reporting limit, but above the method detection limit.

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Comparing Laboratory Results to EPA's Health Advisory Level

The Maryland Department of the Environment (MDE, or "the Department") is using the EPA Health Advisory Level of 70 ppt as an action level for two PFAS compounds (PFOA, PFOS). The HAL is based on the sum of PFOA and PFOS concentrations in the sample(s). MDE will use this action level to determine actions a water system should take to minimize their customer's drinking water exposure.

When comparing Public Water System or individual well test results to the EPA HAL, the sum of PFOA and PFOS should first be calculated. If above the 70 ppt threshold, then the system or individual should take actions to reduce exposures as outlined in MDE's Private Well Factsheet.

If only one of the compounds is detected in the sample (compound 1) and the other compound (compound 2) is reported as "ND" then the appropriate approach is to add the measured level for compound 1 to a value 2 times the MDL for compound 2. For example, if a laboratory reports 20 ng/L (ppt) for PFOS and ND for PFOA (with a MDL of 0.30 ng/L or ppt) for PFOA), then it is appropriate to multiply the PFOA MDL of 0.30 ppt by 2 (result is 0.60 ppt) and then add that to the measured value of 20 ppt for PFOS. In this example, the sum of the two compounds would be 20.60 ± ng/L or ppt.

Questions

For more information on MDE's guidance, please contact Rebecca Warns at rebecca-ann.warns@maryland.gov. Additional information on how MDE is managing PFAS risks can be found here.

Sources Considered

waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/drinkingwaterlabs/detectionlimitsdefinition.pdf

extension.psu.edu/how-to-interpret-a-water-analysis-report

pubs.usgs.gov/circ/circ1133/conversion-factors.html