



How to Interpret my PFAS Laboratory Report and Understand how my Results Compare to DEC's Action Levels

Reading laboratory data reports and interpreting their results can be confusing. We hope this write-up will help you understand your laboratory report from the sampling of your water for PFAS (per- and poly-fluoroalkyl substances) and how the results are used and compare to DEC's PFAS action levels. Terminology can vary between laboratories.

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Reading the Results of your Lab Report

Lab reports typically have several sections, including: 1) the cover page, 2) definitions/glossary, 3) the case narrative, 4) the client sample results, and 5) several sections relating to laboratory quality assurance/quality control (QA/QC) practices.

In the client sample results section, you will find the analysis performed by the lab, the test results, and notes that indicate any problems encountered. These notes are called "qualifiers". Most labs use a standard set of qualifiers, which are defined and discussed on page 2 of this write-up. The example below shows the result for two PFAS as reported in the "Client Sample Results" section of the lab report.

Example table showing test results and what the notation means

Analyte	Result	Qualifier	RL	MDL	Units
Perfluorooctanoic Acid (PFOA)	7.5		1.7	0.21	ng/L
Perfluorohexanesulfonic Acid (PFHxS)	ND		1.7	0.14	ng/L

Notes:
 RL = reporting limit
 MDL = method detection limit
 ng/L = nanograms per liter (equal to parts per trillion)

ND = the contaminant has not been detected

If a contaminant is not found in a sample, the "result" column in the laboratory report will show "ND" - not detected. ND means the chemical is not present in the sample at a high enough level for the laboratory equipment to detect.

RL = Reporting Limit

The reporting limit is the lowest concentration of the substance tested that can be reported reliably under normal laboratory conditions. This is sometimes also referred to as the limit of quantitation of "LOQ".

MDL = Method detection limit

Each laboratory method has the ability to detect chemicals down to a certain concentration, known as the MDL or "method detection limit". Anything below the MDL would not have been found because it is below the test equipment's ability to detect it.

In the example above, PFOA was detected at 7.5 ng/L and PFHxS was not detected (ND), meaning PFHxS was not present in the sample above the MDL. It may be that PFHxS was not present at all in the sample, or it could have been present but at a very low concentration, less than 0.14 ng/L.

Data Qualifiers — “J” or “B” next to the result

All laboratory information is reviewed by a chemist to ensure it meets specific quality criteria. Sometimes “qualifiers” are applied to a sample result to note problems or irregularities that may have occurred during analysis. Most labs use a standard set of these codes. The most common qualifiers found in PFAS laboratory reports are “B” and “J” qualifiers.

Example table with data qualifier

Analyte	Result	Qualifier	RL	MDL	Units
Perfluorohexanesulfonic Acid (PFHxS)	2.1	B	1.7	0.21	ng/L
Perfluorononanoic Acid (PFNA)	0.5	J	1.7	0.22	ng/L

Notes:
RL = reporting limit
MDL = method detection limit
ng/L = nanograms per liter (equal to parts per trillion)

“J” qualifier — used to note that the reported concentration is considered estimated.

The “J-flag” is used whenever the measured concentration is lower than the RL but above the MDL.

“B” qualifier — means the chemical was found in both the sample and a “blank”.

When chemicals are found in both the blank and the test sample, the reported value is qualified with a “B” to show the uncertainty in the source of the contamination. In the example above, PFHxS was detected in the sample at a concentration of 2.1 ng/L but it was also detected in the blank, so it is uncertain whether the contamination was present in the water from the test area or whether it was introduced by the laboratory or elsewhere.

A **blank** is a sample container filled with distilled water from outside the test area. A blank should be non-detect for all chemicals, but because PFAS are commonly found in the environment, low-level detections of PFAS can occur in the blank. If a chemical is detected in both the sample and the blank, it is impossible to determine if the concentration reported is from the test area or some other source.

How is the sum of 5 PFAS calculated?

In August 2018, DEC set protective levels (“action levels”) for six PFAS. The action levels determine when an alternative water supply or treatment of water is needed to protect human health. Action levels for PFAS are based on the sum of five PFAS (PFOS+PFOA+PFHxS+PFHpA+PFNA), and PFBS singly.

The sum of the five PFAS is calculated by adding the concentration of the five substances together. This is a straightforward calculation when all five PFAS are detected in a sample. However, if one of these substances is below the level of detection (i.e., reported as “ND”), then a value equal to twice the Method Detection Limit (MDL) is used in the place of the “ND” in the sum. The reason that this is done is that twice the MDL is a more reliable estimate of the potential maximum concentration in a sample reported as “ND” than the MDL.

The sum of five PFAS is noted as being a “maximum concentration” if any of the five substances are not detected (“ND”) in the sample, because the actual concentration could be any concentration below this maximum. This can be best illustrated by example, as shown in the table below.

- In this example, the sum of 5 PFAS is shown as **27.86 B‡** ng/L.
- The actual amount of PFAS may be **27.86** ng/L, or it may be less than this value.
 - The amount of PFOS, which was not detected in the sample, may range anywhere from zero (not present) to the values used in the summation.
 - The amount of PFHxS, which was detected in a blank sample, may range anywhere from zero (i.e., all of the PFHxS is a result of blank contamination) to the value used in the summation.

Example table showing the sum of 5 PFAS calculation

PFAS	RL	Reported Value (ng/L)	MDL	Value Used in Summation (ng/L)
PFHpA	1.7	0.96 J	0.48	0.96
PFOA	1.7	16	0.78	16
PFNA	1.7	8	0.25	8
PFHxS	1.7	2.1 B	0.16	2.1 (could be from test area or other contamination)
PFOS	1.7	ND (as reported by the lab) <1.7 (as documented in a technical report)*	0.4	0.8 (2 x MDL)
Sum of 5 PFAS				27.86 B‡

Notes:

‡ - Maximum concentration, the Sum of 5 PFAS includes one or more result that is not detected greater than the MDL.

B – PFAS compound was found in the blank and sample.

J – Estimated value; Result is less than the RL but greater than or equal to the MDL.

*When a contaminant is not detected, results are generally shown as less than the reporting limit. In other words, the “ND” result from the example shown above would be reported as “<1.7 ng/L”.

For More Information

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To learn more, visit:

DEC’s PFAS website:	dec.alaska.gov/spar/csp/pfas-contaminants/
DEC’s fact sheet on PFAS	dec.alaska.gov/media/10363/dec-pfas-trifold-factsheet-8-24.pdf
U.S. EPA’s website:	epa.gov/pfas
ATSDR’s PFAS fact sheet:	atsdr.cdc.gov/pfc/docs/pfas_fact_sheet.pdf