Alaska Department of Environmental Conservation
Spill Prevention and Response Division
Contaminated Sites Program

How to Read my PFAS Laboratory Report and Compare my Results to DEC's Action Levels

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Reading laboratory data reports can be confusing. We hope this write-up helps you better understand your per- and poly-fluoroalkyl substances (PFAS) lab results and how they compare to DEC's action levels. Terminology can vary between laboratories.

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) laboratory quality assurance/quality control (QA/QC) practices.

In the client sample results section, you will find the test performed by the lab, the results, and notes on any problems. 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
Perfluorooctanesulfonic Acid (PFOS)	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 was not 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 or "LOQ."

MDL = Method Detection Limit

Each laboratory method has the ability to detect chemicals down to a certain amount, known as the MDL or "method detection limit." Anything below the MDL can't be detected by the lab's test equipment.

In the example above, PFOA was detected at 7.5 ng/L and PFOS was not detected (ND), meaning PFOS was not present in the sample above the MDL. It may be that PFOS was not present at all in the sample, or it could have been present but at a very low amount, 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 standards. Sometimes "qualifiers" are applied to a sample result to note problems or irregularities that may have occurred during testing. 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
Perfluorooctanesulfonic Acid (PFOS)	2.1	B	1.7	0.21	ng/L
Perfluorooctanoic Acid (PFOA)	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 amount is considered estimated.

The "J" qualifier is used whenever the measured amount 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, PFOS 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 find out if the amount reported is from the test area or another source.

How is the sum of the PFAS calculated?

In April 2019, DEC set protective levels ("action levels") for two PFAS. DEC uses the action levels to decide when a different water supply or water treatment is needed to protect human health. Action levels for PFAS are currently based on the sum of two PFAS (PFOS+PFOA).

The sum of the PFAS is calculated by adding the amounts of the substances together. This is a straightforward calculation when all 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. Twice the MDL is a more reliable estimate of the potential maximum concentration (highest amount) in a sample reported as "ND" than the MDL.

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

- In this example, the sum of the PFAS is shown as **2.9 B**‡ ng/L.
- The actual amount of PFAS may be **2.9** 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 adding process.
    - The amount of PFOA, which was detected in a blank sample, may range anywhere from zero (i.e., all of the PFOA is a result of blank contamination) to the value used in the adding process.

Example table showing the sum of the PFAS calculation

PFAS	RL	Reported Value (ng/L)	MDL	Value Used in Summation (ng/L)
PFOA	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 PFAS				**2.9 B**‡

Notes:

‡ - Maximum concentration, the sum of the 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
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