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

Technical Memorandum 22-001 August 15, 2022

# Guidelines for Data Reporting

## Summary

This tech memo replaces:

- *Guidelines for Treatment of Non-Detect Values, Data Reduction for Multiple-Detections and Comparison of Quantitation Limits to Cleanup Values,* dated April 2017;
- *Treatment of Non-Detects and Blank Detections in Per- and Polyfluoroalkyl Substances (PFAS) Analysis,* dated April 2019; and
- *Minimum Quality Assurance Requirements for Sample Handling, Reports, and Laboratory Data,* dated October 2019.

This tech memo applies to all submittals to the Department of Environmental Conservation (DEC) Contaminated Sites Program (CSP) and provides guidance on a number of data reporting topics, including the treatment of non-detect values, data reduction for multiple-detections, blank subtraction, contents of laboratory data reports, and laboratory data review checklists.

## Purpose

The purpose of this tech memo is to ensure consistency in data reporting by providing guidance on how to deal with typical data reporting issues. This provides a common reference for both regulators and the regulated community to know how to present data consistently in reports submitted to CSP.

This memo provides clarification on the following issues related to evaluating risk to human health and the environment associated with non-detect or multi-detect analytical results:

- Comparison of non-detects to cleanup levels;
- Calculations using non-detect data; and
- Data reduction associated with multiple results for the same analyte in the same sample.

It also discusses using blank subtraction in data analysis and required documentation to be included with laboratory data reports.

## Actions

CSP is providing the following guidance in dealing with common data reporting issues.

*Non-Detects*

When laboratory data packages report a concentration as non-detect (ND) in a sample, that does not mean that none of that analyte is present in the sample; it means that the analyte was not detected above the Limit of Quantitation (LoQ). If a laboratory has established values for the Limit of Detection (LoD)[1], then ND may mean that the analyte was not detected above the LoD. While it is acceptable for a laboratory data package to use "ND", reports referencing that data should give

[1] LoD and LoQ are defined in 18 Alaska Administrative Code (AAC) 75.990.

more context. When including NDs in a report, the ND should be followed by the LoQ or LoD in parentheses. For example, if a sample was analyzed for benzene and the laboratory reported the concentration as ND with an LoQ of 0.35 mg/L, the result would be reported as "ND (0.35 mg/L)". Alternatively, the result could be reported as "< 0.35 mg/L". CSP may approve other reporting formats on a site-specific basis.

Laboratory reports often include a Method Detection Limit (MDL)[2] for each analyte. However, it is not appropriate to report a concentration as less than the MDL or ND at the MDL. That is because the MDL has a 50% false negative rate; meaning that if there is no detection at the MDL, the analyte could still be present at that concentration. As a result, CSP recommends against using the MDL unless there is site-specific need.

*Comparing Non-Detects to Cleanup Levels*
When reporting a result as ND, it is important to compare the LoQ to the applicable cleanup level. The LoQ should be less than the applicable cleanup level. If the LoQ is greater than the cleanup level and if the laboratory report includes the LoD, then the LoD can be compared to the cleanup level. If both the LoQ and LoD are greater than the cleanup level, then an alternative laboratory with lower limits or approval of an alternative cleanup level according to 18 AAC 75.355(c)(1) may be required.

*Calculations Including Non-Detects*
A number of calculations involve using non-detect data, including calculations of total concentrations (e.g., total aromatic hydrocarbons (TAH)[3], total aqueous hydrocarbons (TAqH), benzene, toluene, ethylbenzene, and xylenes (BTEX), polychlorinated biphenyls (PCBs), etc.), calculations of 95% Upper Confidence Limits (UCL), calculations of cumulative risk, and calculations used in fate and transport models. In these calculations where some or all of the individual concentrations are not detected above the LoQ, an alternative value must be used. It is not permitted to use a concentration of zero. Instead, the following hierarchy should be used to determine which value is appropriate:

- If the substance is detected between the LoQ and LoD with an estimated concentration, use that estimated concentration.
- If no LoD is available and the substance is detected between the LoQ and MDL with an estimated concentration, use that estimated concentration.
- If an LoD is available and the substance is not detected above the LoD, use the LoD as the concentration.
- If no LoD is available and the substance is not detected above the MDL, use the LoQ as the concentration.

For calculation of the total dioxin toxicity equivalent (see DEC's *Procedures for Calculating Cumulative Risk* and World Health Organization 2005 toxicity equivalency factors), the initial summation is based on the above hierarchy approach for the substitution of the non-detect values. In cases where the summation exceeds the cleanup value additional refinement can be performed using the EPA spreadsheet titled "Basic KM TEQ and ISM UCL Calculator" at https://www.epa.gov/superfund/risk-assessment-dioxin-superfund-sites . The spreadsheet will

[2] The Method Detection Limit is sometimes called the Detection Limit (DL). MDL is defined in 18 AAC 75.990.
[3] If TAH and TAqH are applicable, there may be additional requirements from the DEC Division of Water.

provide a statistical approach for handling non-detects when data is sufficient.

In addition, note that for total PCBs the summation should include Aroclors 1016, 1221, 1232, 1248, 1254, and 1260, unless there is a site-specific reason for a deviation. Following sufficient site characterization, there may be a site-specific reason to analyze for fewer Aroclors. Alternatively, a site may require characterization of individual PCB congeners as opposed to characterizing Aroclors. See the U.S. EPA Region 4 Technical Services Section Issue Paper for Polychlorinated Biphenyl Characterization at Region 4 Superfund and RCRA Sites for additional information.

*Multiple Results*
For a variety of reasons, there may be more than one reported result for a single sample. Some of those reasons may be:

- Sample analyzed by multiple analytical methods;
- Sample re-extracted due to quality control failures; or
- Method required second column confirmation.

In these cases, use the highest detected value[4]. In addition, for samples with field duplicates, report the highest detected value.

If results are reported as non-detect by multiple analyses or methods, the undetected result with the lowest LoQ or LoD may be selected for reporting.

*Blank Subtraction*
In this section, the term "blank" applied to any blank (e.g., instrument blank, method blank, trip blank, field blank, etc.). Blank subtraction is not allowed by CSP. Blank subtraction is a process where an analyte is detected in the blank, and the concentration in the blank is subtracted from each field sample to give a lower "corrected" value. Because cross contamination does not occur at an equal amount in all samples, this process leads to poor quality data.

*Minimum Requirements for Laboratory Data Reports for Samples*
Include all analytical laboratory report(s) as part of submittals to CSP for which environmental samples have been collected, analyzed, and reported. The laboratory reports should contain, at a minimum, the following information:

(1) laboratory name, address, telephone number, email address (if available), CS Lab Approval Number, and the name of the person authorizing release of laboratory data; (normally a cover page contains this information);

(2) report date;

(3) a case narrative summary report documenting all discrepancies with the data contained in the report, including but not limited to, sample receipt, holding time(s), documentation and discussion of all quality control (QC) discrepancies and resulting corrective action, a discussion of all matrix interferences including low surrogate recoveries, analyte

[4] A couple exceptions to this rule are in background studies and determining fraction of organic carbon. When determining background concentrations or fraction of organic carbon, use the lowest detected value. See Guidance for Evaluating Metals at Contaminated Sites and Determining the Fraction of Organic Carbon for Methods Three and Four

identifications as appropriate, etc.

(4) type of analysis (gasoline, diesel, etc.);

(5) the preparation and analytical method used and method number (see Table 1 of the *Underground Storage Tank (UST) Procedures Manual*);

(6) the type of matrix;

(7) the field sample number;

(8) the laboratory sample number;

(9) the date the sample was collected;

(10) the date the sample was received;

(11) the date sample was prepared;

(12) the date the sample was analyzed;

(13) the site or project name (from the Chain of Custody);

(14) the concentrations of analyte and limit(s) of quantitation
   a. all solids must be reported on a dry weight basis, for all analytical methods;
   b. Alaska petroleum method results (AK101, AK102 and AK103) must be reported in milligrams per liter (mg/L) for liquids and milligrams per kilogram (mg/kg) for solids; and
   c. all other analytical methods must include the applicable reporting units and limit(s) of quantitation

(15) the dilution factor;

(16) the analyst's name, signature or initials, and date signed;

(17) definitions of any characters used to qualify data;

(18) method blank results per matrix, method, and analytical batch

(19) precision and accuracy values for each sample set, with at least one precision and accuracy evaluation for each set of 20 samples;

(20) a sample receipt form documenting the condition of the samples and the ambient temperature of the interior of the shipping container adjacent to the sample container (or temperature blank) at the time it was received by the laboratory, as well as any quality control failures, such as headspace in volatile organic analyses (VOA) vials, leaking bottles, mislabeled or incorrect sampling containers, etc.;

(21) a copy of the Chain of Custody (COC) for each sample or group of samples, including COC for samples transferred to alternate locations. For more on COCs, see the CSP's Field Sampling Guidance for Contaminated Sites and Leaking Underground Storage Tank Sites.

*Note: The "raw" analytical data, e.g., bench sheets, chromatograms, calibration data, etc., are not required submittals; however, it must be retained on file by the laboratory for at least ten years after the analysis date and made available to DEC, if requested.

*Laboratory Data Review Checklists*
All reports submitted to CSP containing analytical laboratory sample results should contain a completed Laboratory Data Review Checklist in the final report. The Laboratory Data Review Checklist is located online at https://dec.alaska.gov/spar/csp/guidance-forms and should be completed, signed and dated by the environmental consulting firm submitting the report to CSP. It is not to be completed by the analytical laboratory that performed the sample analysis. Submit one Laboratory Data Review Checklist for each laboratory data packet submitted to CSP.

The purpose of the Laboratory Data Review Checklist is to demonstrate that the laboratory followed its quality assurance plan and that the consultant has verified that the laboratory followed its quality assurance plan. The Laboratory Data Review Checklist is not a substitute for the Data Usability Assessment (which is a required part of the Site Characterization Report). The purpose of the Data Usability Assessment is to demonstrate that the consultant has met the Data Quality Objectives in the Site Characterization Workplan and to explain how all of the data quality issues in the individual laboratory reports impact the site as a whole. For more information, see EPA's *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA, February 2006) and EPA's *Guidance on Environmental Data Verification and Data Validation* (EPA, November 2002).

## Regulatory Authority

The actions described in this tech memo are necessary to meet requirements of 18 AAC 75.335, 18 AAC 75.355, 18 AAC 75.360, 18 AAC 75.380, and 18 AAC 78.007.

## References


Alaska Department of Environmental Conservation. (2017). *Determining the Fraction of Organic Carbon (foc) for Methods Three and Four.*

Alaska Department of Environmental Conservation. (2017). *Underground Storage Tank Procedures Manual.*

Alaska Department of Environmental Conservation. (2018). *Guidance for Evaluating Metals at Contaminated Sites.*

State of Alaska. (2021). *18 AAC 75 Oil and Other Hazardous Substances Pollution Control.*

United States Environmental Protection Agency. (2002). *Guidance on Environmental Data Verification and Data Validation.*

United States Environmental Protection Agency (2006). *Guidance on Systematic Planning Using the Data Quality Objectives Process.*

United States Environmental Protection Agency Region 4. (2013). *Technical Services Section Issue Paper for Polychlorinated Biphenyl Characterization at Region 4 Superfund and RCRA Sites.*

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