ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION DIVISION OF SPILL PREVENTION AND RESPONSE CONTAMINATED SITES PROGRAM

Technical Memorandum Date: October 2019

Minimum Quality Assurance Requirements for Sample Handling, Reports, and Laboratory Data

Background

The Alaska Department of Environmental Conservation (DEC) has developed cleanup regulations for oil and other hazardous substances under the site cleanup rules, 18 AAC 75 Article 3. DEC also regulates Leaking Underground Storage Tanks (LUST) and their associated site cleanup under 18 AAC 78. *The Underground Storage Tanks Procedures Manual* (the UST Procedures Manual), adopted by reference in 18 AAC 78.007 and 18 AAC 75.355, contains specific requirements for laboratory quality assurance (QA). Other QA requirements are discussed in DEC's *Field Sampling Guidance*.

Purpose

The Contaminated Sites (CS) Program oversees characterization and cleanup of sites under both 18 AAC 75 & 78. As such, the CS Program has received work plans and reports with different levels of laboratory and field data quality and varying degrees of quality assurance depending on the regulations being applied at the site. The QA guidelines described in this memorandum below are necessary to meet requirements of 18 AAC 75.335; 75.355; 75.360(2) and 18 AAC 78.007. In order to ensure consistency in quality assurance across the CS Program and acquire data sufficient to make defensible environmental decisions, this technical memorandum spells out the following requirements:

1. Summarizes the minimum requirements for laboratory data packages that must be included in all reports containing analytical data submitted to the CS Program.
2. Requires the completion of CS data review checklists for each laboratory data package.
3. Requires a narrative summary of data quality and usability for each report submitted to CS Program.
4. Specifies the protocols for sample shipping and receipt.

1. Minimum Requirements for Laboratory Data Reports for Samples

The complete analytical laboratory report(s) shall be included as part of all submittals to DEC for which environmental samples have been collected, analyzed and reported. The laboratory reports shall 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 containing 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 identifications as appropriate, etc.

(4) product type (e.g. gasoline, diesel, etc.);

(5) the preparation and analytical method used and method number (see Appendix D-F of the Field Sampling Guidance);

(6) the type of matrix;

(7) the field sample number;

(8) the laboratory sample number;

(9) the date sampled;

(10) the date received;

(11) the date sample was prepared;

(12) the date analyzed;

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

(14) the concentrations of analyte(s) and limit(s) of detection

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

c. All other analytical methods must include the applicable reporting units and limit(s) of detection

(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. For all organic analyses this will include, at a minimum, surrogate recoveries and laboratory control sample/duplicate (LCS/LCSD) recoveries and relative percent difference (RPD);

(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;

(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 section below on "Sample Shipment and Receipt by Laboratories."

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

2. **Laboratory Data Review Checklists**

All reports submitted to DEC containing analytical laboratory sample results shall contain a completed Laboratory Data Review Checklist in the final report. The Laboratory Data Review Checklist is located online at http://dec.alaska.gov/spar/csp/guidance-forms/ and must be completed, signed and dated by the firm submitting the report to DEC. It is not to be completed by the analytical laboratory that performed the sample analysis. One Laboratory Data Review Checklist must be submitted for each laboratory data packet submitted to DEC. The purpose of the Laboratory Data Review Checklist is to verify the data and document that quality control measures were evaluated; it is not intended to be used for a data quality or usability assessment.

3. **Data Quality Assurance Assessment and Reporting**

QA assessment is a two-step process. The first step is to assess the quality of the data generated and to identify and summarize any quality control problems noted after the data and field notes are reviewed. The second step is to determine whether or not the quality of the data is sufficient for the intended purpose. This two-step process should be discussed and summarized in each report submitted to the CS Program. Furthermore, a QA assessment narrative summary must be included as a specific text section of the final report. All laboratory results, including laboratory quality control (QC) sample results, must be reviewed and evaluated for quality and usability. The QA assessment summary must include a discussion of any effects on data quality and/or usability due to field sampling and laboratory quality control discrepancies.

The assessment of data quality, at a minimum, will describe the following five (5) parameters for all analytical results with respect to the impact that any discrepancies have on the quality of the data.

1. Precision
    a. Field duplicate(s) - minimum of 1 per every 10 field samples for each matrix sampled, for each target analyte.
    b. Laboratory sample duplicates and/or spike duplicates (Laboratory control samples or matrix spikes).

2. Accuracy
    a. Laboratory QC samples percent recoveries– spikes (laboratory control samples and/or Matrix Spikes).
    b. Surrogate percent recoveries.

3. Representativeness
    a. Degree to which data characterizes actual site conditions.
    b. Consistency with conceptual site model (CSM) and project objectives in the approved work plan.

4. Comparability (if applicable)
    a. Field screening vs. laboratory data correlation.
    b. Standard methods, procedures, quantitation units, and reporting formats between lab reports and between laboratories, if more than one used.

5. Sensitivity and Quantitation Limits
    a. Analytes with limits of detection (LOD) or limits of quantitation (LOQ) greater than the regulatory cleanup levels and/or project required goals.
    b. Blank results (trip blank and method blanks) less than LOD or LOQ.

Once the quality of the data is determined, the data should be evaluated for usability by considering whether data meets project objectives defined in the work plan. Furthermore, the usability assessment should provide an evaluation of suitability of the data for decision making purposes. All types of data (e.g. sampling, on-site analytical, off-site laboratory) are relevant to the usability assessment. During this evaluation, the percentage of data that is usable or non-rejected versus the total number of results is quantified. There is an 85% minimum goal for usable data.

The usability assessment, should be discussed in the QA assessment summary. Laboratory analytical results that have been qualified or rejected should be reported in the following way:

- Biased or rejected should be identified and discussed in the QA assessment summary.
- Laboratory data that is rejected should not be shown in report tables or discussed in the report results.
- Laboratory data that is qualified should be listed with a qualifying flag in the report tables and narrative.

Additionally, analytes that are not detected, but have laboratory quantitation limits greater than the CS program-approved cleanup levels should also be identified in the report tables and text. If corrective actions were taken to address the usability of the data, this should be explained in the QA assessment summary.

4. Sample Shipping and Receipt by Laboratories

Sample transport and receipt by laboratories must be performed and documented in a standardized and appropriate way in order to ensure the laboratory data generated is representative of environmental site conditions. This section provides the requirements for sample shipping and receipt by laboratories.

Chains of Custody

It's essential that within any data collection phase involving physical samples, the handling of sample media by all parties be documented. A chain of custody form should be shipped along with the samples and document the "chain of custody" (i.e. the date and person responsible for the various sample handling steps associated with each sample). A chain of custody seal is used to ensure the integrity of samples in a container when the container is outside the possession of the sampler or the analytical laboratory. If a chain of custody seal must be broken, the breaker must:

- Identify the need for breaking the seal;
- Document the condition of the contents (such as whether or not the gel ice is still frozen);
- Note anything added to or removed from the container (such as gel ice or paperwork);
- Leave the broken seal on the container;
- Re-seal the container with a new chain of custody seal; and
- Document the breaking and re-sealing on the chain of custody form

Samples that are continuously under the sampler's direct control until hand-delivered to the laboratory are not required to have Chain of Custody seals. However, hand-delivered samples must be

documented on the chain of custody. Improper chain of custody documentation may result in sample results being rejected by CS Program.

Sample Receipt Forms

The analytical laboratory shall have a written sample acceptance policy and provide sample receipt forms that document quality control failures. These failures include (but are not limited to):

- Cooler temperature outside acceptable range
- Exceedance of holding times
- Missing temperature blank
- Sample vials leaking
- Headspace in volatile organic assessment (VOA) water vials
- Incorrect preservation used
- Other deviations from sample receipt standard operating procedures
- Mislabeled samples or samples without a unique identification and label
- Use of inappropriate sample containers

For questions and more information contact:
Todd Blessing CSP Quality Assurance Officer at (907)269-7699
Brian Englund, CSP Chemist at (907) 269-7526