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

Technical Memorandum Date: March 2017

Data Quality Objectives, Checklists, Quality Assurance Requirements for Laboratory Data, and Sample Handling

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. 18 AAC 78 contains regulations specific to Leaking Underground Storage Tanks (LUST) and associated site cleanup. The Underground Storage Tanks (UST) Procedures Manual, adopted by reference in 18 AAC 78.007 and 18 AAC 75.355, contains specific requirements for laboratory quality assurance (QA).

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(b)(2)(B) & (G); 75.335(c)(3) & (4); 75.355(a); 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 guidelines:

1. Requires an evaluation of data quality objectives during project scoping and work plan preparation.
2. Summarizes the minimum requirements for laboratory data packages that must be included in all reports containing analytical data submitted to the CS program.
3. Requires the completion of CS data review checklists for each laboratory data package.
4. Requires a narrative summary of data quality and usability for each report submitted to CS program.
5. Specifies the protocols for sample shipping and receipt.

1. Data Quality Objectives

Data quality objectives (DQO) are a systematic planning tool based on the scientific method that clarifies study objectives, defines the appropriate type, quantity and quality of data and specifies tolerable levels of potential decision errors needed to answer specific environmental questions to support proper environmental decisions. Utilizing the DQO process helps ensure that planned environmental data collection activities result in sufficient information being collected to make decisions that will meet the goals of the study. This leads to more efficient use of resources. DEC staff and the qualified environmental professional project team should agree on project data quality objectives during the development of the work plan, before sampling occurs. Each work plan submitted to the CS program should describe the following with regard to the DQO process:

1. The goals of the study (describe the problem, develop a Conceptual Site Model, list the goals and questions to be answered)
2. Identification of information inputs (describe the information and data needed to answer

the study questions and meet the goals)
3. Definition of the boundaries of the study (area of concern, media of concern, spatial and temporal variability, constraints)
4. Proposed analytical approach (individual sample results vs. 95% UCL on the mean, action levels, background levels, calculating exposure point concentrations for risk assessment, target receptors, etc.,)
5. Specification of performance or acceptance criteria (potential decision errors from sampling and measurement errors/variability)
6. Methods and Procedures to obtaining the data (number of samples, sample types (grab, multi-increment), collection methods, sample volumes, sample locations and depths, sample handling, preservation, packaging, analytical methods, etc.)

The full DQO process is described in the U.S. EPA's *Guidance on Systematic Planning Using the Data Quality Objectives Process*. This document can be accessed here: https://www.epa.gov/sites/production/files/2015-06/documents/g4-final.pdf.

2. Minimum Requirements for Laboratory Data Reports for Samples
(Modified from UST Procedures Manual Section 8.4.2)

The complete analytical laboratory report(s) shall be included as part of all submittals to the department 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) type of analysis (gasoline, diesel, etc.);

(5) the preparation and analytical method used and method number (see Tables 1 of the UST Procedures Manual);

(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 prep;

(12) the date analyzed;

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

(14) the concentrations of analyte 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. At a minimum this will include for all organic analyses 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 ADEC if requested.

3. Laboratory Data Review Checklists

All reports submitted to the Department 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/csguidance.htm and must be completed, signed and dated by the firm submitting the report to the Department. 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 the Department. 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.

4. Data Quality Assurance Assessment

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 DQO's 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 data quality 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, data that is usable or non-rejected versus the total number of results is quantified. There is an 85% minimum goal per the DEC Underground Storage Tank Procedures Manual for usable data. To aid in assessing laboratory data usability, the CS program recommends adhering to the most current version of EPA's *Contract Laboratory Program National Functional Guidelines for Data Review*. You can access these guidance documents here: https:/www.epa.gov/clp/contract-laboratory-program-national-functional-guidelines-data-review.

Laboratory analytical results that are determined to be 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, non-detected laboratory data with 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.

5. 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

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 CSP.

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 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