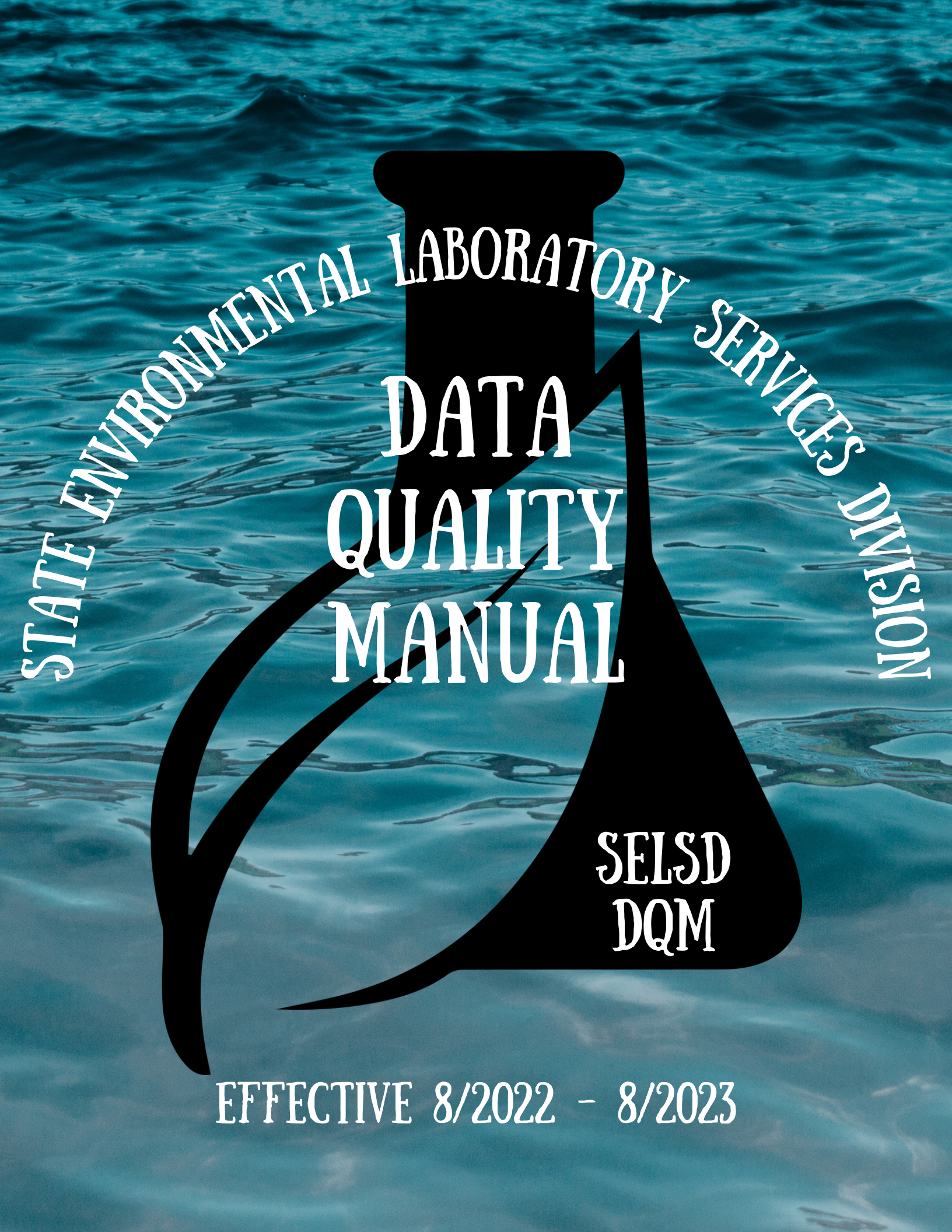
STATE ENVIRONMENTAL LABORATORY SERVICES DIVISION
DATA QUALITY MANUAL
SELSD DQM
EFFECTIVE 8/2022 - 8/2023

SELSD DATA QUALITY MANUAL

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STATE ENVIRONMENTAL LABORATORY SERVICES DIVISION

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1. INTRODUCTION

In support of the State Environmental Laboratory Services Division (SELSD) Quality Assurance Plan (QAP), **9010-QSP01,** and the associated analytical standard operating procedures (SOPs), this Data Quality Manual (DQM) describes quality assurance activities, data quality objectives, and general data generation policies of the SELSD. The QAP addresses Division-wide quality policy and the DQM addresses technical and operational policy.

The SELSD provides technical and analytical support to DEQ programs, state, federal and tribal agencies, municipalities, and private citizens as identified in the Program Support Section 1.4 of the QAP.

The SELSD is composed of Elemental Analysis (Radiochemistry and Metals), Environmental Microbiology, General Chemistry, Gas Chromatography Mass Spectrometry (GC/MS), Gas Chromatography (GC), Sample and Data Management (SDM), Field & Laboratory Customer Assistance (FLCA), Quality Management System (QMS), Safety Team, and the Laboratory Accreditation Program (LAP).

The SELSD is equipped and competent to handle a wide range of environmental samples that include air and emissions, aqueous, biological tissue, chemical waste, drinking water, non-aqueous liquid, and solids. Definitions and examples of these matrices as well as supported test methods can be found in **Appendix C**. All other sample types require notification prior to delivery. Provisions are made on a case-by-case basis. Scopes of certification and accreditation are available upon request. Within the SELSD, the use of the word “analyte” refers to the substance or constituent being measured by the method.

This DQM also provides guidance for meeting certain analytical requirements outlined in Quality Assurance Project Plans (QAPPs or work plans) developed and submitted to EPA Region 6 for DEQ projects that are funded by federal grant dollars.

2. QUALITY ASSURANCE AND QUALITY CONTROL

QMS consists of two primary components: Quality Assurance (QA) and Quality Control (QC). This section of the DQM serves to address the major components of data quality and documents how the SELSD generates data that is appropriate for use. The goal of the SELSD is to generate consistent, reliable, reproducible, and defensible laboratory data of known and documented quality to support the decisions that promote the quality of life in Oklahoma and to meet the analytical needs of our customers. The data generated within SELSD is utilized to make decisions that affect the environment and public health such as risk assessment, contamination extent, bio-trend, and compliance monitoring. Inadequate data could adversely affect these decisions.

2.1. *Quality Assurance*

QA relates to how data is generated and includes the activities the laboratory implements to provide confidence to customers that data has the appropriate quality and meets intended or expected requirements. QA activities, which undergo ongoing assessment and improvement, are maintained, tracked, and reported through a variety of processes that include:

- Laboratory Supplies and Services: The supplies and services SELSD maintains meet or exceed relevant requirements for the methods for which the laboratory is certified, accredited, and/or contractually obligated, and the analytical reagents and standards are of the required or approved quality and traceability. Certificates of Analysis or Quality, however named, are retained and available for review to authorized personnel upon request.
- Laboratory Instrumentation and Equipment: The SELSD maintains an inventory of the instruments and equipment needed for data generation in the Lab Capacity Log **9010-QSL01**. The log includes information such as manufacturer, model, serial number, years in service, lifespan, replacement cost, etc.
- Analyst Training: The SELSD provides analysts with the training needed to effectively complete their analytical work. Prior to reporting generated data, the SELSD demonstrates the ability of the analyst, instrumentation, support equipment, and supplies to perform the relevant method within specified limits and performance criteria. Analysts must successfully perform initial and ongoing Demonstration of Capability as instructed in **9000-QSP02**.
- Laboratory Software, Programs, and Databases: Laboratory software is purchased to aid in the generation, analysis, verification, and reporting of laboratory data. Laboratory software requires verification to ensure that it is working properly and that errors do not occur during the generation of data. Electronic data has proper software support and archival procedures so that data may be accessed for assessments and electronic data review.

2.2. *Quality Control*

QC includes the activities the laboratory implements to assess how well the data meets requirements. Method QC samples are implemented to verify that the analytical system is in control. These samples are used to calculate accuracy and precision and aid in the detection of contamination and other method or instrument performance issues. The environmental programs and associated analytical reference methods typically specify the

minimum QC requirements and frequency and limits for method analysis that must be performed. Where these are not specified, the section manager specifies them. Method QC sample requirements are documented in the method SOPs. Numerous types of laboratory and project QC exist to allow different aspects of the data to be assessed. In general, method QC is conducted to:

- Determine method or instrument sensitivity (Ex: DL/MDL, IDL)
- Determine analyst capability (Ex: IDC, DOC, PT)
- Verify instrument performance (Ex: ICV, ICC, CCC, CCV, IEC, IPC, IS)
- Verify minimum reporting limit (Ex: LOQ, LLOQ, MRL, PQL)
- Determine contamination (Ex: RB, MB, LRB)
- Determine accuracy/recovery (method performance) (Ex: SRM, LCS, LFB)
- Determine precision (sampling and/or analysis) (Ex: Sample Duplicate, MS/MSD, LFM/LFMD, LFS)
- Determine sample and matrix-related issues (Ex: MS, LFM, LFS)

2.3. *Proficiency Testing*

As an external assessment of laboratory performance, the SELSD participates in double blind proficiency testing (PT or PE) studies specific to environmental programs the SELSD supports. This participation demonstrates the laboratory's ability to produce acceptable analytical results according to vendor specified limits. Double blind studies involve sample analyses of "unknown" samples developed and distributed by private or federal sector providers. Each study is conducted a least once annually for overall improvement and monitoring of laboratory performance as well as to maintain EPA certification or TNI or NRSB accreditations.

The SELSD handles and prepares the PT study samples in accordance with the instructions provided by the PT Provider. PT samples are analyzed in accordance with the laboratory's routine SOPs using the same QC, acceptance criteria and staff as used for the analysis of routine environmental samples.

Current SELSD studies:

	PROFICIENCY PROGRAM PARTICIPATION												
Laboratory Section	**WS/WSM [1, 2, 4]**	**CRYPTO [3]**	**WP/WPM [1, 2]**	**HW/SOIL [2, 4]**	**UST [2]**	**USGS-SRS [5]**	**RADON [7]**	**MRAD-AIR [4]**	**MRAD-SOIL [4]**	**LEGIONELLA [2]**	**DW CYANOTOXINS [6]**	**REC. WATER CYANOTOXINS [6]**	**UCMR 5 [4]**
General Chemistry	X		X	X		X							
Elemental Analysis	X		X	X		X	X	X	X				X
Environmental Microbiology	X	X	X							X	X	X	
Gas Chromatography	X		X	X	X								
Gas Chromatography/ Mass Spectrometry	X		X	X									X
Sample and Data Management	X		X	X		X							

1- Phenova
2- NSI Solutions
3- WSLH
4- ERA
5- USGS
6- Eurofins Abraxis
7- Bowser-Morner

The providers, except for the USGS SRS, Cyanotoxins, Legionella, and Radon in Air programs, are regulated by TNI endorsed oversight bodies (PTOBs), or Proficiency Test Provider Accrediting Bodies (PTAB). The oversight groups ensure that providers manufacture their proficiency testing materials and conduct their studies in adherence with the 1998 USEPA *"National Standards for Water Proficiency Testing Studies, Criteria Document"* or the Proficiency Testing Program portion of the TNI Standard, Volume 1, Module 1.

2.4. Data Quality Components

The following components are required for analytical laboratory data to be usable:

- Technically Valid: Data generated by the SELSD is valid in that it is obtained by the instruments, methods and procedures required, approved, or prescribed relative to the end use of the data.
- Traceable: Data must be traceable such that the user can follow the data through the lifecycle from collection to reporting. Data generated by the SELSD is traceable through the use of various forms which include chains of custody (COCs), spreadsheets and logs, instrument and support equipment calibrations and verifications, and bar-coding/QR codes.

- Complete: All relevant actions taken during sample collection and data generation are maintained with the original batch data, including calculations, deviations, professional judgement, flags and qualifications.
- Correct: Data must represent the real-world construction of the actual activities performed during data generation. SELSD data is correct in that standard procedures are followed, method control samples are evaluated to ensure that methods are performing accurately, and questionable data quality is indicated using data flags, qualifiers, project narratives, or customer contacts.
- Consistent: Method precision elements are evaluated to ensure that methods are performing consistently over time and across various project and programs.
- Relevant: Data must meet the requirements given for its intended use. Data objectives are evaluated for program and project requirements and qualified where negative effects to end use may be detected.
- Defensible: Data must be generated in a way that maintains legal defensibility and is supported by sufficient documentation to verify suitability to defend the decisions resulting from the data. The laboratory ensures integrity by:
    - Using custody (bar code) tracking and enhanced storage requirements.
    - Using correct, approved, and controlled documentation.
    - Maintaining the SELSD Ethics and Data Integrity Program and associated training to ensure that employees know proper from improper practices relative to data generation.
    - Maintaining and storing all records related to sample analysis per program requirements as required to facilitate the recreation of data generation.

3. PROJECT PLANNING AND SAMPLE HANDLING

When planning analytical activities, contact the FLCA Manager, Jayme Jones at 405-702-1029 or Jayme.Jones@deq.ok.gov. To achieve the best quality of data and ensure sample integrity, the laboratory will assist in organizing the sampling event including supplying sampling materials, confirming laboratory capacity, ensuring method availability, reporting limits, discussing sample scheduling and delivery options, addressing QA/QC needs, and verifying data reporting and delivery requirements.

3.1. Quality Assurance Project Plans (QAPPs or work plans)

A QAPP or work plan establishes the outline for the planning, implementation, and assessment of a project, and guides data acquisition and decision-making activities. It also describes the quality assurance procedures, quality control specifications, and data quality objectives (DQOs).

Requirements for QAPP or work plan development can be found in the EPA Requirements for Quality Assurance Project Plans (QA/R-5) and additional guidance can be found in EPA Guidance for Quality Assurance Project Plans (G-5).

To assist in the evaluation of customer DQOs, the SELSD has developed a Project Planning Tool (PPT), **9900-QSF06** (see **Appendix F**) which documents and tracks analytical components such as sampling start date and duration, number of samples, analyte, matrix, requested methods, reporting limits, special analytical requests, QC planning and reporting, deliverables, and turnaround time. This planning tool goes beyond the basic information collected on the COC and provides detailed documentation of customer needs. The PPT is utilized whether a QAPP or work plan is relevant to the project or not. To initiate the PPT process, the FLCA Manager must be contacted to receive the QR code/link for access to the PPT Questionnaire that is used to fill out the PPT and facilitate project discussions.

Customers requesting analytical services for environmental projects should review **Appendix C** to evaluate whether the analytical services offered are appropriate to meet specific project DQOs. Customers requesting data for special project applications or alternate reporting levels not addressed in **Appendix C** should contact the FLCA Manager.

Contact selsquality@deq.ok.gov for assistance with documenting or reviewing the analytical components of a QAPP or work plan or setting up QAPP or work plan-based analytics.

3.2. Sample Scheduling and Project Setup (Pre-logging)

Method requirements (such as sample hold time) may necessitate the delivery of certain sample types on a given day of the week for optimal analysis or to ensure analysis can be properly planned. Advanced planning and scheduling of ongoing or large projects allows the laboratory time to prepare to meet specific needs or address laboratory capacity or instrument scheduling during high volume periods.

The SELSD prefers projects be logged prior to collection (pre-logged) so that sampling kits can be prepared with certain site-specific sample information pre-populated on the field COC. Pre-logging samples into the Laboratory Information Management System (LIMS) generates a bar-coded COC with matching sample container labels specific to the sampling event. The LIMS generated label includes a unique alpha-numeric identifier and bar code, other relevant identifiers such as sample description or public water system (PWS) sampling point, the container and preservative type, and the requested analyses for the sample.

Pre-logging samples simplifies the paperwork for the customer, improves traceability, and provides a more efficient way of generating appropriate forms. It also expedites physical sample receipt as pre-logged samples can be received and processing can be initiated more quickly than samples received on an ad-hoc basis.

3.3. Sampling Requirements

Individual environmental programs and projects should reference a QAPP or work plan outlining or referencing their field and sample collection activities. For PWS samples and some general analytical methods, current sampling instructions are provided with the sampling kits and collection/submittal tutorials are provided at https://www.deq.ok.gov/state-environmental-laboratory-services/sample-collection-assistance/. For some analyses, SELSD staff must collect the samples. In other instances, SELSD staff can provide field sampling and technical assistance upon request.

Appropriate and accurate sample collection activities and documentation are essential for traceability and construction of quality data. Compliance samples are cancelled or rejected if received in an improper container, with inadequate volume, incorrect preservation, or beyond the allowable hold time. These requirements can be found in **Appendix C**. Non-compliance samples received as outlined above may be analyzed and flagged/qualified if there is a potential impact to the data quality. See **Appendix B**.

3.3.1. Containers

Samplers should use SELSD-provided containers proven to meet the QA requirements specific for the method used, analyte requested, and any regulatory requirement. These volume specific containers may contain or be supplied with preservatives as required by the reference method. These requirements are essential for proper analysis and materials traceability.

3.3.2. Preservation

Some methods require samples to undergo chemical or thermal preservation. Sample collectors should always preserve samples immediately following collection unless otherwise noted in **Appendix C** or per special instruction from the laboratory. Thermal preservation requirements are highly variable between methods and as such are not included in Appendix C.

If thermal preservation is required, the sample should be packed with sufficient ice to reach and maintain the appropriate preservation temperature immediately

after collection. The use of "blue ice" is highly discouraged because it generally does not maintain the sample at the acceptable temperature. It is recommended such samples be hand delivered, mailed overnight, or shipped via expedited service to SDM to ensure the sample is received at the proper temperature. Samples in the "cooling-down" phase are accepted only if received promptly after collection and packed with adequate ice. These samples will be assessed individually, based on the collection time, collection location, current temperature, and presence of ice.

3.3.3. Hold Time

To be considered valid or not compromised, there is a maximum amount of time that a sample may be held following collection and prior to analysis. Therefore, samples should be delivered to the laboratory as soon as possible after collection. Samples that exceed these holding times may introduce bias and the data could be unfit for use.

3.3.4. Volume

When Business and Customer Support personnel receive a request for containers, the customer is instructed on the proper volume of sample required to obtain valid analytical results. If an insufficient volume is collected, the analysis of all requested analytes and quality control samples may be impossible. Volumes listed in **Appendix C** should only be used as guidance and should be confirmed with Business and Customer Support personnel prior to project onset to avoid additional collection activities.

3.3.5. Sample Labeling

When SELSD provided labels are not used, sample containers must be identified with a unique identifier in permanent ink and contain suitable information to prevent the possibility of confusing or misrepresenting the sample which could render a sample useless.

3.3.6. Chain of Custody (COC)

The COC provides traceable/defensible documentation of sample collection, transport conditions, and transfer activities as well as the type of container and preservative, and date and time of collection to indicate adherence to allowed test holding times. The COC should also contain the sampling location, sample type and the requested analysis. Anyone having physical custody of the samples before and during receipt must sign the COC and record the date and time of all custody transfers. Any special remarks about the sample condition or integrity should also be recorded on the COC. Access the online COC at https://www.deq.ok.gov/state-environmental-laboratory-services/sample-collection-assistance/. See **Appendix A** for a sample COC provided as reference.

3.4. Sample Transport, Storage, and Delivery to the SELSD

New customers or those needing to make updates to their LIMS profile must complete a Customer Profile form. Access the online form at https://www.deq.ok.gov/state-

environmental-laboratory-services/sample-collection-assistance/ or contact SDM. A copy is included in **Appendix I** for reference.

Normal operating hours of SDM are from 8:00 a.m. to 4:30 p.m., Monday through Friday. Samples may be delivered to the SELSD by hand-delivery during business hours or can be mailed or couriered to the following address:

Oklahoma State Environmental Laboratory
P.O. Box 1677
Oklahoma City, OK 73101-1677

For additional questions or special arrangements regarding sample delivery contact SELSD at 405-702-1000 or 1-866-412-3057 and request to speak to a SDM representative. To review the laboratory's policy on after-hours sample delivery, refer to **Appendix H**.

3.5. Accessioning, Acceptance, and Storage of Samples

Access to the SDM area is restricted to authorized personnel through key card access. Samples are received and maintained in SDM until all appropriate receipt activities are complete. SDM personnel:

- Organize and verify the received samples against those indicated on the COC. Ensure sample IDs and any affixed labels match the COC.
- Inspect samples and container to verify receipt conditions and integrity: Container, Condition, Temperature/Preservation, Volume, and Hold Time.
- Gather signatures to document physical custody transfer.
- Samples not already pre-logged are logged into the LIMS and assigned a unique sample identification label and barcode.

If SDM staff are unable to secure all required sample information in a suitable timeframe, samples may be cancelled. Customers are notified of cancelled tests or samples, typically by telephone, and assistance is provided if additional/replacement samples are needed.

SDM staff place accessioned samples in the designated storage location with appropriate thermal preservation, storage conditions (light or heat sensitivity), and isolated from standards and samples known to be highly contaminated. Samples under these conditions are now ready for transfer to the laboratory for analysis.

3.6. Sample Retention & Disposal

The laboratory maintains physical custody of samples until analytical activities have been completed, results verified and reported to the customer, and hold time expired, unless otherwise noted in procedures or requested by the customer. The SELSD assumes the responsibility for the disposal of samples unless the customer has requested that the samples be returned. The SELSD requires documented notification of situations where samples need to be relinquished back to the customer. Such transfers must be documented using a COC process. Samples are disposed of according to procedures and in compliance with regulations. For samples that may be used as evidence in a criminal investigation, the laboratory will follow appropriate procedures to protect the integrity of the sample.

3.7. Sample Subcontracting/Outsourcing

During normal operations, the SELSD may subcontract analytical work to another laboratory due to workload, expertise, or temporary incapacity. The SELSD maintains a register of all subcontractors for tests performed. This work is performed under the following conditions:

- The subcontracted laboratory maintains documented competence for the required field of testing.
- The customer is notified.
- The SELSD assumes responsibility to the customer for the work performed by the subcontracted laboratory.
- The work complies with all relative and regulatory standards.
- The subcontracted laboratory is identified on the final report.
- The SELSD will provide a copy of the subcontractor's report to the client if requested.

4. DATA HANDLING

Environmental monitoring and concerns, such as those addressed in a QAPP or work plan, are assessed and confirmed by analytical data and the resulting decisions are supported by that data. The data must be handled appropriately to ensure there is no loss to the quality of data. This section covers how the SELSD handles analytical data. Additional details can be found in the individual analytical SOPs.

4.1. Raw Data and Data Reduction

Raw data is any data that has been collected but has not been processed for use. In the laboratory, raw data generally refers to the information collected via analytical instrumentation or hand recorded during sample analysis. Data reduction for the laboratory typically refers to the process of converting raw instrument data into more understandable, useful information.

Staff must follow data reduction requirements documented in the reference method, analytical method SOPs and associated WIDs, and this DQM. Some data reduction may also be achieved using instrumentation software and our LIMS. The accuracy of all automatic and manual data reduction is routinely verified.

4.2. Units of Measure

Analytes are typically reported in the units indicated in the reference method or as identified by a regulatory program. Individual SOPs identify the final reporting units for the analyte or method. The typical units for each method can be found in **Appendix C**. Special projects may require different reporting units than those documented in the SOP or DQM. In these cases, the project must be planned to ensure that reporting accommodations can be made.

Concentration variations, program regulations, and project or client requests may necessitate conversion between reported units. Refer to the table below for common conversion information.

Concentration Conversions:

Kg	g	mg	µg	ng	
%	‰	ppm	ppb	ppt	**Kg**
	%	‰	ppm	ppb	**g**
		%	‰	ppm	**mg**
			%	‰	**µg**
				%	**ng**

Kg	g	mg	µg	ng	
%	‰	ppm	ppb	ppt	**L**
	%	‰	ppm	ppb	**mL**
		%	‰	ppm	**µL**

L ≈ Kg
mL ≈ g
µL ≈ mg
% = parts per hundred
‰ = parts per thousand

4.3. Significant Figures and Rounding

To better represent the confidence of the calculated value, it is necessary to know how many digits to retain, where to truncate, and when and how to round the value. Sample results for compliance samples are reported as stated in the regulatory requirements or with the same number of significant figures as documented in the reference method or as designated by the maximum contamination level (MCL) value.

In general, reporting rules are as follows:

- Sample data is not reported with more than three significant figures.
- Sample data is not reported with more decimal places than the limit of quantitation (LOQ).
- Sample data is not rounded and reported if less than the LOQ.
- QC data is reported to one decimal place.

The SELSD LIMS generally uses the following traditional rounding and significant figure rules. However, it also can apply custom rules if needed to meet method or program requirements.

4.3.1. Significant Figures

The significant figures in a calculated number indicate the amount and location of rounding required to appropriately show the accuracy and confidence of the measurement. Only place values that are significant should be reported. Staff should use the significant digit rules in the Significant Figures table below.

The application of the significant figure rules is relevant to all calculations performed during the generation of data, unless a specific format is prescribed in the approved or accepted reference method, program regulations, or customer request, in which case the required or requested format is utilized. Exceptions are applied to vendor-supplied software and in-house spreadsheets that make the application otherwise impossible.

Table: Rules and Tips for the Determination of Significant Figures (sf)

Rule or Tip	Example	# of sf
All non-zero numbers **ARE** significant.	**14.65**	4 sf
All zeros in between non-zero numbers **ARE** significant.	0.**40497**	5 sf
Leading zeros are **NOT** significant. They are placeholders to represent the magnitude or scale of a number.	0.00**4** 0.**523**	1 sf 3 sf
If there are no non-zero digits to the LEFT of the decimal, all zeros in between the decimal and the preceding non-zero values RIGHT of the decimal are **NOT** significant.	0.000**45**	2 sf
Ending zeros after a decimal **ARE** significant **IF** they are accuracy markers.	**15.500**	5 sf
Zeros on the LEFT side of a decimal with a preceding non-zero number **ARE** significant.	**400.5**	4 sf
If you can write the number in scientific notation and eliminate the zeros, they are **NOT** significant.		
Final zeros in a calculated value may or may not be significant, depending on reporting criteria.		
When multiplying or dividing, the calculated result should <u>have as many significant figures</u> as the number with the smallest number of significant figures. The QUANTITY of significant figures in each factor is important; the POSITION is not. In this example, 12 has the smallest number of significant figures (two); the result would therefore also have only two significant figures.	**12** X 14.6 X 735.3 128824.56	1.2 X10^5

When adding or subtracting, the calculated result should <u>have as many decimal places</u> as the number with the smallest number of significant figures. The POSITION of significant figures in each factor is important; the QUANTITY is not. In this example, 12 is significant to the ones place, while the remaining numbers are significant to the tenths place. The final result is significant to the ones position.	**12** + 14.6 + 735.3 761.9	762
You cannot round to "n" significant digits, a digit is either significant, or it is not. Rounding is all-together a different process and is used to reduce any digits in the value that are not significant. Once you determine which digits are significant, you can employ a rounding rule.		

4.3.2. Rounding

Once the significant figures are determined for a type of analysis, rounding rules should be applied to eliminate any unneeded digits. Staff should employ the mathematical rules for rounding listed in the Rounding Rules table below.

For data values below the reporting limit, results are not rounded, and the sample data is reported as less than the given method reporting limit.

For methods that report sample results as a "total" of the individual analytes, the individual analyte results are first rounded according to the rounding rules, then the individual results are totaled and reported.

Table: Rounding Rules

Rules, Tips, and Examples	Value	Result
If the digit to be dropped is **LESS** than 5, drop the digit and leave the preceding digit as is.	15.22**2**	15.22
If the digit to be dropped is **EQUAL** to or **GREATER** than 5, drop the digit and INCREASE the preceding digit by 1.	15.22**6**	15.23
While performing addition or subtraction operations, round to the smallest number of places (i.e., the least precise number). In this example, 11.1 is the least precise number, to the tenths place, so the resulting value is only precise to the tenths place.	**11.1** + 11.12 + 11.13 33.35	33.4
When rounding during multiplication or division, carry all digits through then round the product/quotient to the same number of significant figures as the multiplier/divisor/dividend with the fewest significant figures. In the example, 9.7 has only two significant figures, therefore the product is rounded to two significant figures.	0.0174 x **9.7** / 7.75 0.021778…	0.022

4.4. Correction of Data for Moisture

A measurement of % solids/moisture is determined on soil, sediment, and non-aqueous solid waste samples unless otherwise specified by the requestor. The % solids/moisture value is used during data reduction for calculating final analytical concentrations on a dry weight basis. These values are reported with the sample data when appropriate. Corrections for moisture require the application of the dry weight factor and raise the method reporting limit accordingly.

$$\%\ \text{Solid} = \frac{\text{Sample dry weight}}{\text{Sample wet weight}} * 100 \quad \text{and} \quad \%\ \text{Moisture} = \frac{\text{Sample wet weight}}{\text{Sample dry weight}} * 100$$

5. STATISTICS AND CALCULATIONS

This chapter discusses some of the QC and statistical terms and calculations commonly encountered during the generation of environmental data. The individual method SOPs address the specific procedures required to implement and assess QC requirements.

5.1. Statistics and Calculations

5.1.1. Representative Samples

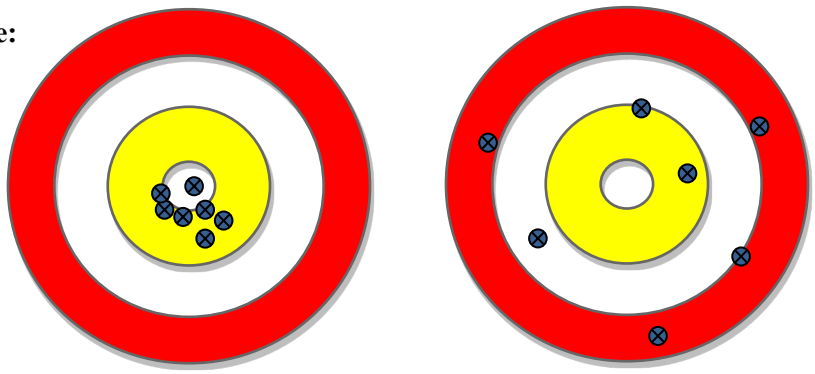
When an environmental concern needs to be addressed, customers/project managers determine the best and most representative locations to characterize the sampling environment. They consider what samples to take, how many to take, where to take them, etc. to obtain the most representative collection of data from which to make decisions. Ideally, the representative samples exactly reflect the composition of the area being sampled; however, due to various types of errors, this is unlikely. When analysis occurs on a single sample of a larger population, uncertainty is introduced and should be accounted for by using precision-related measurements.

5.1.2. Accuracy

Accuracy is an expression of the systematic error (bias) inherent in a measurement system. Accuracy is typically measured through the analysis of reference standards that have been certified to a specific, or known, concentration or value. When the measured value is close to the known value, the accuracy is considered "high". When the accuracy is far from the known value, it is considered "low".

Accuracy is well represented using the "bullseye" graphic. The first image demonstrates seven arrows that have fallen in the center of the target (the expected value). This archer was very accurate in hitting the bullseye. In the second image, the archer has failed to hit the bullseye. This archer had a lower degree of accuracy than the first archer did.

Accuracy Figure:



High Accuracy Low Accuracy

The SELSD assesses accuracy, in general, by calculating "percent recovery" from various types of QC samples. These recoveries must fall within historically determined or method defined limits. Data are either reanalyzed or qualified when accuracy values fall outside of the laboratory or method defined limits.

The accuracy of a sample or standard can be measured using the following Percent Recovery equations:

$$\% \text{ Recovery} = \frac{(\text{spiked sample result - original sample})}{\text{spiked concentration}} \times 100$$

$$\% \text{ Recovery} = \frac{\text{measured value}}{\text{known value}} \times 100$$

The first calculation is used when the measurement value contains a contribution from the sample, such as in the case of matrix spikes, matrix spike duplicates, and surrogate recoveries. The second calculation is used when there is no sample contribution, such as in the case of a laboratory control sample (LCS) and calibration verifications.

5.1.3. Precision

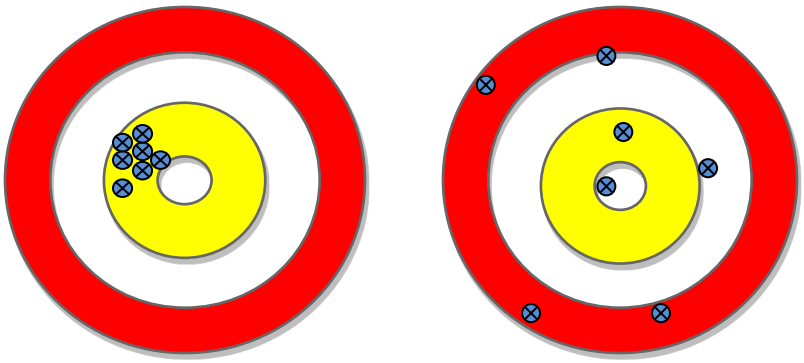
Precision is independent and unrelated to accuracy, and measures reproducibility and repeatability of data. It measures the variability, or random error, during sampling, sample handling, preparation, or analysis and is an expression of the measurement of uncertainty in the calculated mean value of a series of replicate measurements. High precision values result in reduced uncertainty with the data (and vice versa). The SELSD assesses analytical precision through the measurement of sample duplicates, QC sample replicates, and matrix-spike duplicates. Data should be qualified when precision values fall outside of the laboratory or method defined limits.

Project specific precision samples assessed by Project Managers/laboratory customers include:

- **Field duplicate sample (split sample) -** A single sample taken in the field, thoroughly homogenized, divided into two separate containers, and analyzed as two independent samples. Field duplicates measure the precision of the sample collection variability or error. Split samples may also be sent to two different laboratories to assess the reproducibility of the overall measurement process.
- **Field replicate sample (co-located/collocated) –** Samples that are collected from the same site, at the same location, at approximately the same time. These samples measure sampling precision, matrix variations, and variations in environmental concentration.

Precision is also well demonstrated using a “bullseye” example. The first image demonstrates seven arrows that have all fallen close together (they hit “precisely” the same area on the target). This archer was very precise. In the second image, the seven arrows are scattered around the target, and none are concentrated to a specific area. This archer was less precise.

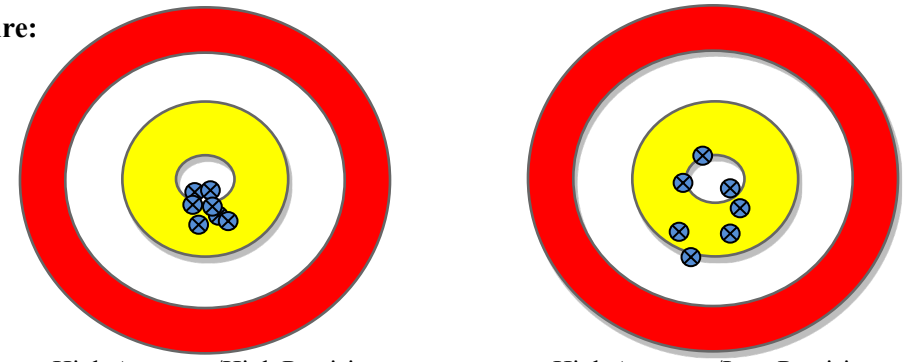
Precision Figure:



High Precision Low Precision

The figure below demonstrates both accuracy and precision in relation to each other. The first image illustrates arrows that are concentrated around the bullseye (high accuracy) and close together (high precision). The second image shows arrows that are on the bullseye (high accuracy) but not close together (low precision). The third image demonstrates arrows that are far from the bullseye (low accuracy) but close together (high precision). The last image shows arrows that are far from the bullseye (low accuracy) and having fallen far from each other (low precision).

A/P Figure:



High Accuracy/High Precision High Accuracy/Low Precision

Low Accuracy/High Precision Low Accuracy/Low Precision

5.1.4. Standard Deviation

Standard deviation, *s* or SD, is a statistical measurement indicating how precise the average is and how well the individual measurements compare to each other. Standard deviation demonstrates the random error present in a measurement

system by measuring the amount of variation from the average of the results. It may be calculated using the following equations:

$$s = \sqrt{\frac{\sum_{t-1}^{N}(X_1-\overline{X})^2}{(N-1)}} = \text{SD} = \sqrt{\frac{(X_1-\overline{X})^2+(X_2-\overline{X})^2+(X_3-\overline{X})^2}{(N-1)}}$$

s = (SD) = Standard deviation
X_i = Value of each individual measurement
N = Number of measurements
$\overline{X}$ = Sample mean of the measurements

5.1.5. % Relative Standard Deviation

To report the standard deviation in relative terms (without units, as a percentage), the %RSD calculation below is used. %RSD calculations are useful for comparing the degree of uncertainty between measurements of varying absolute magnitude, typically when there are at least three measurements for comparison.

$$\%RSD = \frac{s}{\overline{X}} \times 100$$

$\%RSD$ = % Relative Standard Deviation
s = Standard deviation
$\overline{X}$ = Sample mean of the measurements

5.1.6. Relative % Difference

Relative percent difference (RPD) is used to compare the precision between two measurements, such as sample duplicates that are expected to behave similarly.

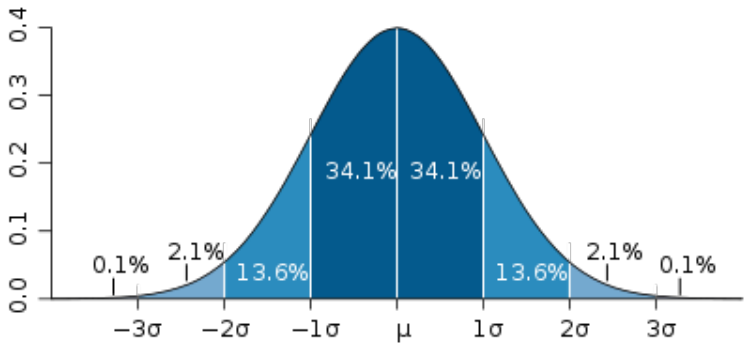
$$RPD = \frac{(X_1 - X_2)}{\overline{X}} \times 100$$

RPD = Relative Percent Difference
$\overline{X}$ = Sample mean of the measurements
X_1 = Value of measurement
X_2 = Value of comparison measurement

5.1.7. Confidence Intervals and Limits

The confidence interval is the range around the mean in which a data value is likely to occur. This interval is defined by the confidence limits which are the upper and lower numbers designating the range. The true value should reside at a stated confidence level. Confidence limits are typically set at 95%, but may also include levels for 90% or 99%, depending on the application or desired confidence. The standard deviation value can be used to determine confidence intervals for the evaluation of replicate data. Confidence limits, determined using a normal distribution under the empirical rule, can be seen in the Normal Distribution figure below:

Normal distribution curve that illustrates standard deviations:



Dark blue is one standard deviation from the mean. For the normal distribution, this accounts for 68.27% of the set; while two standard deviations from the mean (medium and dark blue) account for 95.45%; and three standard deviations (light, medium, and dark blue) account for 99.73%.

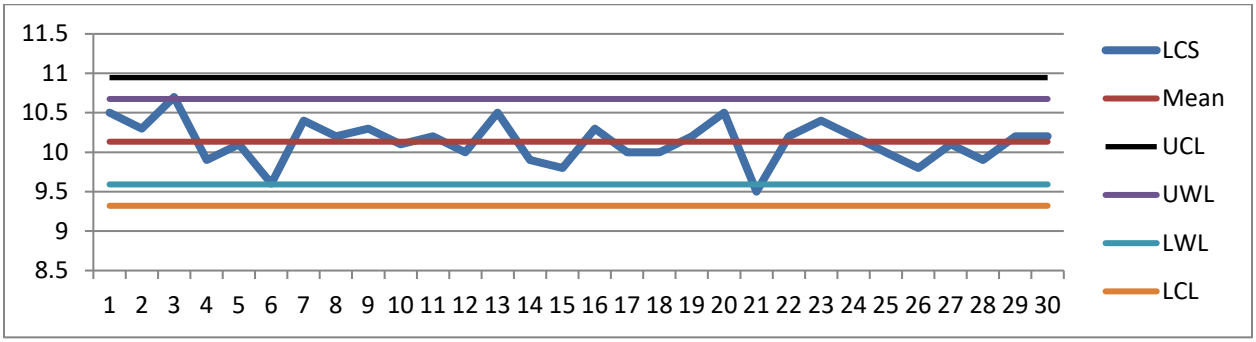
A laboratory application of confidence levels would be the calculation of control limits and warning limits on a control chart.

5.1.8. Control Charts

Control charts are useful to monitor data for analytical performance, method stability, and trends. Control charts are typically developed using a minimum of 20 consecutive data points that are plotted along with a central line, often the mean value for the percent recovery, percent difference, percent relative standard deviation, or other type of normally distributed data. The confidence limits define the region in which a data point must lie for the analytical system to be considered in control. As a general rule, if any data from a batch is reported, the batch QC results must be included in control charts.

The figure below illustrates a control chart with upper and lower warning and control limits. Data points close to the reference line (Mean) represent data with less variation in the inherent error, and points scattered closer to the limits (upper and lower warning limits-UWL, LWL) represent data with larger error variations. Data beyond the upper and lower control limits (UCL, LCL) indicate data that is out of control and should be addressed.

Control Chart Example:



5.2. *Determination of Outliers*

A data point should not be discarded as an outlier without proper explanation or valid justification. This applies to all data points collected (i.e., LFB, LCS, MDL/LOD, linear curves, DOCs, duplicates, etc.). Justifiable reasons for removing outliers would include a known and documented laboratory error or the use of an appropriate statistical outlier test. All such occurrences/exclusions must be documented on the batch record.

5.3. Measurements of Uncertainty

Most analytical results have some inherent degree of uncertainty associated with the measurements. Uncertainty results from the natural variations associated with analytical systems relative to fluctuations in measuring devices, equipment, instruments, standards, chemicals, and reagents; limits associated with the technical aspects of a method or process; characteristics of the sample matrix or individual analytes; and human error in collection, preserving, transporting, analyzing, or evaluating data. Total uncertainty is the sum of all uncertainty caused by measurement errors, personal interpretations, and natural variability.

Uncertainty, though normal, should be accounted for, evaluated, or addressed when the project, program, customer, or regulation requires. The cumulative impact of these errors is important in that they could potentially bias data, creating a situation where the sample concentration is no longer representative of the actual environmental concentration. Estimating the potential impact of errors increases the usability and reliability of the data. For environmental projects, the tolerance levels, if relevant, for this error should be defined in the QAPP or work plan, along with the consequences associated with making decisions based on biased data.

Analytical uncertainty is a component of measurement uncertainty that includes the laboratory activities that are performed as part of analysis. Analytical uncertainty is influenced by numerous everyday activities encountered in the laboratory and can be determined from routine QC samples. Duplicate analyses indicate uncertainty through precision measurements; calibration checks, spiked samples, and reference materials indicate uncertainty through accuracy measurements; and proficiency testing allows for inter-laboratory comparisons. Tracking QC sample data in a control chart with a defined confidence interval can provide an indicator of the fluctuations in method performance over time.

6. DETECTION AND REPORTING LIMITS

Numerous terms are associated with sensitivity of environmental analytical systems. "Detection limit (DL)" is a general collective term that may reference several types of sensitivity limits and refers to the minimum concentration that can be distinguished as actual analyte signal over instrument noise. Some technologies, such as meter systems, will have method detection limits (MDLs) that are based on the readout or display limitations of the instrument. For some technologies, spiking solutions are not available, or MDLs cannot be determined. A DL must be reestablished or verified annually and when there is a change in analyst, instrumentation, technology, method, or following major instrument maintenance that may affect the sensitivity of the method.

6.1. Sensitivity Measurements

- **Limit of Detection (LOD)-** the minimum concentration that can be measured and reported with 99% confidence that the value is larger than zero. The laboratory uses LOD when referring to the laboratory generated DLs, with exception to EPA Region 6 certified drinking water (DW) compliance samples, which will retain the term MDL for the context of certification.
- **Instrument Detection Limit (IDL)-** associated specifically with an instrument and defined as the lowest concentration that can be detected by an instrument.
- **Method Detection Limit (MDL)-** the minimum concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results. MDL studies are routinely demonstrated by the SELSD for the establishment and verification of reliable analyte detection, quantitation, and reporting limits. An acceptable MDL study is required for all suitable methods and analyses prior to reporting data and to validate the LOQ, thereby establishing a relationship between the two. For the scope of this document, MDL is considered interchangeable with LOD.
- **Limit of Quantitation (LOQ)-** the lowest concentration that can reliably be detected with a defined level of precision and accuracy during "normal" operating conditions. Also called the Practical Quantitation Limit (PQL).
- **Reporting Limit (RL)-** the lowest concentration verified by the laboratory with an acceptable degree of precision and accuracy. RL is the minimum value in which the laboratory reports data without qualification. The RL may also be defined as the lowest concentration or amount of the target analyte required to be reported from a data collection project. Also referred to as the Minimum Reporting Limit (MRL).

Routine analyte LOQs are provided in **Appendix C**. These limits are often adjusted based on sample dilution, non-standard initial and final masses, or volumes and % solids. Contact the FLCA Manager, Jayme Jones at 405-702-1029 or Jayme.Jones@deq.ok.gov for additional information regarding RLs for specific QAPP, work plan, or client DQOs.

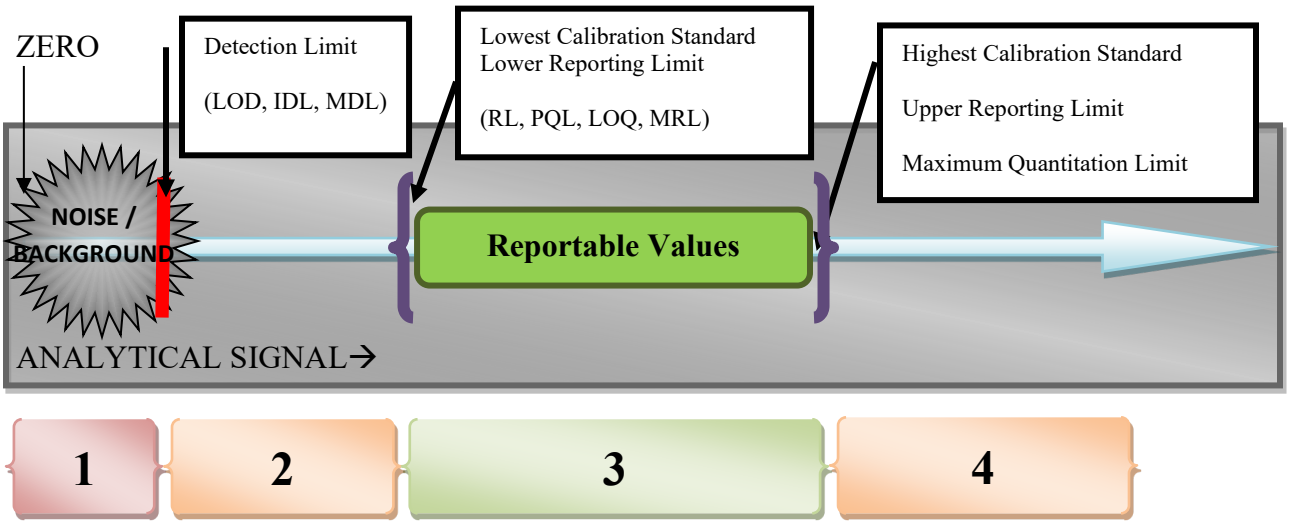
It is essential for Project Managers/laboratory customers and data users to understand that DLs are developed in a clean matrix free of the interferences often found in real-world samples. It may be impossible to obtain a DL for environmental samples that is equivalent to the laboratory generated LOD. In addition, standard RLs may be modified to meet project DQOs, however, the LOD is a measurement-based, calculated value and cannot be "lowered".

6.2. Instrument Sensitivity Relationships:

Sensitivity is affected by the preparation and analytical method utilized; instrumentation and equipment used; analyst capability and experience; standard, reagent and chemical quality; analyte of interest; sample matrix; contamination; background noise; and measurement variability.

The Sensitivity figure below shows the relationship between the various terms and levels of reporting limits.

Sensitivity Figure:



- **Section #1:** In this section, the signal of analyte is often so weak that the instrument cannot differentiate actual analyte signal from instrument noise, even though a small amount of analyte may be present.
- **Section #2:** The detection limit means that an instrument can "see" the analyte but cannot determine the amount of analyte with reliable accuracy or precision. Data reported in this region can only be estimated.
- **Section #3:** This is the area that the instrument can detect an analyte with an acceptable degree of accuracy and precision.
- **Section #4:** This is the area above the highest calibration standard or verified linear range of the instrument. The instrument can "see" the analyte but cannot determine the amount of analyte with reliable accuracy or precision.

7. CALIBRATION AND LINEARITY

7.1. Calibration

Analytical instrumentation and supporting equipment require calibration or verification to ensure proper working order and accurate and precise data. When required, initial calibrations are verified with a second source standard or that of a separate lot, that is traceable to a vendor certified or national standard, when commercially available. Ongoing instrument verification is supported through instrument calibration, vendor service, or per maintenance contracts. Calibration requirements are typically prescribed in the reference method, applicable program, or instrument manufacturers' guidelines. The method SOP includes details for calibration type, concentration range, number of standards used, calibration and verification frequency, calibration standard information, and acceptance criteria.

For methods that do not require a full instrument calibration on each day of use, the calibration curve is verified through the use of a calibration verification check/control sample (i.e., ICV, ICC, CCV, CCC), at minimum of once per analytical batch or as required by the method or program. The method SOPs include procedures for calibration verification, to include the procedure, calculations, associated statistics, concentrations, frequency, acceptance criteria and actions for unacceptable verifications.

Sample results are quantified with an acceptable degree of confidence between the lower concentration limit (lower reporting level and/or lowest calibration standard), and the upper concentration limit (upper concentration limit or highest calibration standard) that define the calibration range. Special requirements apply to data with values beyond (above or below) the verified calibration range.

To ensure proper instrument calibration or calibration verification, standards and materials of the appropriate or required quality and traceability to NIST or other national standards are purchased. Expired standards are not used for calibrations or verifications.

Support equipment calibration and verification procedures can be found in the Support Equipment Calibration SOP, **9015-QSP01,** and the associated WIDs.

7.2. Linearity

Linearity can be determined by measuring an analyte at several concentrations and creating a plot of signal against concentration. The resulting plot is then inspected for areas where a linear relationship exists, which is known as the linear dynamic range (LDR). This linear relationship can be utilized to extrapolate unknown concentrations of analyte in a sample.

The LDR of a method is typically determined by an LDR study, or linear range study (LRS), during method validation or standardization. This linearity may vary based on laboratory specific conditions and is verified by the laboratory at the frequency required by the reference method.

8. ANALYTICAL DATA ASSESSMENT/VERIFICATION

Data verification is conducted during field and laboratory data collection and reporting activities to evaluate the completeness, correctness, and conformance/compliance of a specific set of data against predetermined method, procedural, or contractual requirements that are defined in regulatory standards, project plans, or client requests.

Analytical data assessment includes review and verification of the QA/QC components of the data. This evaluation determines the degree of reliability and defensibility of the data by verifying the quality associated with the SELSD analytical system and by quantifying any errors associated with the measurements. Sufficient records are maintained to re-create the sample preparation, instrument calibration/verification, and analytical processes to facilitate data verification.

Due to the nature and variability of field and analytical measurements, data of questionable quality or certainty are occasionally generated. To retain usability of the data, this information must be communicated to the data user. This can be achieved through the use of data flags, qualifiers, or data narratives. See **Appendix B** for a full list of qualifiers and flags.

Analytical data assessments may occur at the following levels:

1. Analysts Review (Self-Verification) - Data verification begins with the analyst of record (AOR) performing the sample preparation and analysis.
2. Peer Review (Secondary Review) - Peer review is defined as a level of review performed by someone other than the AOR. Peer review is typically performed by a trained analyst but may also be performed by any level of management or QMS.
3. Project Review, Authorization, and Closure- Project review consists of a review of the overall information for a project, including sample collection, receiving, and other tests involved in the sampling event. This level of review checks for overall accuracy and completeness of information in data using method verification criteria in addition to project validation criteria. Typically, the signature of the person who performs project review is the one that appears on the final report.
4. QMS Data Verifications- Periodically, the QMS staff will perform method-based data verifications on raw data, data handling, or data reporting activities. These assessments are to provide additional monitoring of the overall QMS or in support of special project verification and validation.

9. DATA REPORTING

9.1 Report Walkthrough

SELSD analytical results are reported on a standard report template that meets EPA requirements for data reporting. See **Appendix E** for an example final report and tutorial on how to interpret the report. Also, see **Appendix B** for a full list of qualifiers and flags that may appear on the report.

9.2 Data Delivery Options

Delivery preferences are collected through Customer Profile forms (see **Appendix "X"** see section 3.4) with details entered into the unique customer's LIMS account. Delivery options include the following: email, fax, postal mail, or online only. If no preference is made the delivery option will be set to email if one is provided.

PWS compliance data is automatically exported for the customer directly into the OK PWS Compliance database at http://sdwis.deq.state.ok.us/DWW/.

9.3 Corrected Reports

Amendments to authorized and released LIMS final data reports require a corrected final report with a new unique report identification. The corrected report shall be identified as a corrected final report and include a reference to the original report ID as well as a brief description of the correction, reasoning for it, and initials/date. After the corrected report is reissued to the client, the original report shall be maintained and archived.

9.4 Specialized Deliverables

- Preliminary Reports
- EDD
- Summary QC Table
- Full QC Table
- Raw Data
- Specific Customer Request

These deliverables are determined based on the selections made by the customer during the project planning process. If no specialized deliverables are requested, then a final report will be distributed.

Preliminary data reports may be available upon request or when circumstances require sample results to be provided prior to LIMS project authorization. The sample results and/or QC samples may not have been fully reviewed or verified and the values reported on these reports are not considered final. These reports will not have an authorization signature and will show "Preliminary" next to the results.

Data validation is typically performed as a third-party assessment, independent of the utilized laboratory. The SELSD does not typically perform project validation activities, although with special agreement, SELSD management may assist customers with interpreting their data against program requirements, regulatory compliance limits, or health-based risks.

APPENDIX A- SAMPLE CUSTODY DOCUMENTATION

Document defensibility and traceability is becoming more and more critical regarding environmental Projects and Programs. Federally funded environmental programs and evidentiary samples often require appropriate document traceability to ensure data defensibility regarding decisions based on analytical data.

COC forms are generated from the LIMS. Some projects may be pre-logged so that the COC is received with event specific information pre-filled. To obtain an actual sample COC or to inquire about pre-logging, contact the Sample and Data Management Section.

To view a video on how to properly fill out a COC go to:
https://www.youtube.com/watch?v=o0DS7eLAvAw.

This sample COC is provided for reference:

State Environmental Laboratory Services Division
707 North Robinson Ave
Oklahoma City, OK 73102
General Inquires: 1 (405) 702-1000

DO NOT COPY

Project ID: DOE-001_0001
Customer Description: JOHN DOE
Project Description: 2021 DQM EXAMPLE
SubProgram: Private

Return with samples

Sample Information

Sample Collection By: CHN Phone Number:
Collection Notes:
Traceability:

Sample ID	Sample Address and Sampling Location	Collection Date	Collection Time	Container	Requested Analysis
PRIV-1000189-01 ICE 10	Sparkling Spring SS Site 1		AM PM	CPB NA2S2O3 120ML	TC EC PA
PRIV-1000197-01 10	Sparkling Spring SS Site 1		AM PM	CPB HNO3 8OZ	HARDNESS
PRIV-1000197-02 10	Sparkling Spring SS Site 1		AM PM	CPB NONE 1L	ALKALINITY, CHLORIDE, CONDUCTIVITY, PH, SULFATE, TDS, Conductivity_____
PRIV-1001481-01 10	Dirty Spring DS Site 1		AM PM	CPB HNO3 16OZ	TURBIDITY, METALS TOTAL
PRIV-1052187-04 10	Dirty Spring DS Site 1		AM PM	AGB NH4CL 8OZ	552.3

Chain of Custody Record Must Be Signed

Relinquished By: _____ Signature: _____ Date/Time: / / : AM / PM
Received By: _____ Signature: _____ Date/Time: / / : AM / PM
Relinquished By: _____ Signature: _____ Date/Time: / / : AM / PM
Received By: _____ Signature: _____ Date/Time: / / : AM / PM

Delivery Method: ☐ Hand Delivered ☐ Courier ☐ Mail

Receipt Condition: ☐ On Ice ☐ No Ice ☐ SELSD Bottles
Receipt Temp: ℃
Receipt Comments:

Sample ID Key

ICE: Ship Sample on Ice

Page 1 of 1

APPENDIX B- QUALIFIERS AND FLAGS

At times field and analytical activities may run into situations or problems that could impact data quality and results. In these instances, data qualifiers and flags are added to the final analytical data report in an effort to describe impacts to the quality or limitations of the sample data and assist the data user in determining the suitability of the data for their needs. The below list explains qualifiers and flags that could appear on a final laboratory report. SDWIS codes are applied to drinking water compliance samples and are recognized by the state and federal databases; DWW/SDWIS. WQX codes are for ambient water monitoring use in the WQX database. General are qualifiers/flags that can be used for all other customer types where SDWIS or WQX flags are not appropriate or required. Since there are no requirements for private customers, SDWIS qualifiers/flags are used for these customers, where appropriate, as they meet method requirements. If you see a qualifier/flag not on this list or you need additional explanation, contact selsquality@deq.ok.gov for further information.

SDWIS	WQX	GENERAL	CODE	DESCRIPTION
X		X	BR	(BR) Broken in Transit or Shipping
	X		CAN	(CAN) No results reported. Analysis Cancelled
		X	CF	(CF) Corrected Final Report.
		X	CF_ADDRESS	(CF) Corrected Final Report-Address
X		X	CL	(CL) Chlorine Present. Sample Rejected.
	X		CON	(CON) Value Confirmed.
		X	CRYPTO	Cryptosporidium Precision and Recovery
X		X	EH	(EH) Exceeds Hold Time Upon Sample Receipt
		X	ESTIMATED_VALUE	“J” flag definition
	X	X	FIS	(FIS) Internal standard outside of range.
X		X	FZ	(FZ) Frozen Sample
	X	X	H	(H) Analysis Method Hold Time Exceeded
X			HEADSPACE_CONTAINER	Sample has excessive head space. Not suitable for volatiles analysis.
	X		HMSD	(HMSD) Matrix spike duplicate acceptance criteria not met- high
	X		HMSR	(HMSR) High matrix spike recovery, potential high bias.
	X		HTH	(HTH) Hard to homogenize.
X		X	IP	(IP) Invalid Sampling Protocol. Sample rejected.
	X		ISP	(ISP) Improper Sample Preservation. Sample rejected.

SDWIS	WQX	GENERAL	CODE	DESCRIPTION
	X		ISV	(ISV) Insufficient Sample Volume. Sample rejected.
	X	X	J	(J) Estimated Value
X		X	LA	(LA) Lab Accident. Sample cannot be analyzed.
	X		LAC	(LAC) No result reported, lab accident.
	X		LMSD	(LMSD) Matrix spike duplicate acceptance criteria not met- low
	X		LMSR	(LMSR) Low matrix spike recovery, potential low bias.
		X	LOW_VOLUME	Low Volume Total Coliform/E.coli Sample
		X	MATRIX_INTERFERENCE	(MI) Components of the sample other than the analyte may have affected the accuracy or precision of the associated value of the analyte in this sample analysis.
		X	MI	(MI) Matrix Interference
	X		MTRX	(MTRX) Matrix interference, estimated value.
		X	NM_CONTRACT	Sample outsourced to contract lab NM00023
		X	PRESERVATION_FAILURE	Hold Time Exceeded for Unpreserved Sample
		X	QUALITY_CTRL_FAILURE	Quality Control Failure
		X	RADON_CANISTER	Radon Canister Detection
X		X	RC-R	Requestor Cancelled Result/Analyte
X		X	RC-S	Requestor Cancelled Sample
X		X	RC-T	Requestor Cancelled Test
		X	SURROGATE_LOW	Surrogate Recovery Low
		X	TOTAL_COLIFORM_MPN	Total Coliform and E.coli Absent- Private Water
		X	TOTAL_COLIFORM_SDW	Total Coliform Absent- Private Water
		X	UCM	Unresolved Complex Mixture Detected
X		X	VO-S	Insufficient Volume

APPENDIX C- METHOD AND ANALYTE INFORMATION

This appendix contains general analytical information related to the services the SELSD can routinely provide. This information is grouped by analytical section and includes individual analytes, references methods, holding times, container and preservation requirements, and quantitation and/or reporting limits by method. Thermal preservation requirements are highly variable between methods and as such are not included in this table. If you have further questions, contact the SELSD at selsquality@deq.ok.gov.

For reference, here is a key to clarify matrices and reporting limits as well as expanded TNI definitions of these matrices.

- AIR = *Air and Emissions:* Whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbant tube, impinger solution, filter, or other device.
- AQU = *Aqueous:* Any aqueous sampled excluded from the definition of Drinking Water or Saline/Estuarine. Includes surface water, ground water effluents, and TCLP or other extracts.
- BIO = *Biological Tissue:* Any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.
- CW = *Chemical Waste:* A product or by-product of an industrial process that results in a matrix not previously defined.
- DW = *Drinking Water:* Any aqueous sample that has been designated a potable or potential potable water source.
- LIQ = *Non-Aqueous Liquid:* Any organic liquid with <15% settleable solids.
- SAL = *Saline/Estuarine:* Any aqueous sample from an ocean or estuary, or other saltwater source such as the Great Salt Lake.
- SOL = *Solids:* Includes soils, sediments, sludges, and other matrices with >15% settleable solids.

* = TNI Accreditation pending

GCMS						
ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Trihalomethanes (THM)	DW	40 ml amber glass maleic and ascorbic acid	EPA 524.3	14 days	1	µg/L
Total THM	DW	40 ml amber glass maleic and ascorbic acid	EPA 524.3	14 days	4	µg/L
Volatile Organics (VOC)	DW	40 ml amber glass maleic and ascorbic acid	EPA 524.3	14 days	0.5	µg/L
Total THM	DW	40 ml amber glass maleic and ascorbic acid	EPA 524.3	14 days	2	µg/L
Volatile Organics (VOC)	AQU, CW, DW, LIQ, SAL	Clear Glass Vial 40 Milliliter Unpreserved for Purge and Trap Analysis - No headspace	EPA 8260C/5030C	7 days	10	µg/L
m- and p-Xylene	AQU, CW, DW, LIQ, SAL	Clear Glass Vial 40 Milliliter Unpreserved for Purge and Trap Analysis - No headspace	EPA 8260C/5030C	7 days	20	µg/L
1,4-Dioxane	AQU, CW, DW, LIQ, SAL	Clear Glass Vial 40 Milliliter Unpreserved for Purge and Trap Analysis - No headspace	EPA 8260C/5030C	7 days	100	µg/L
Volatile Organics (VOC)	AQU, CW, DW, LIQ, SAL, SOL	Clear Glass Vial 40 Milliliter Unpreserved for Purge and Trap Analysis	EPA 8260C/5035A	14 Days	10	µg/L or µg/kg
m- and p-Xylene	AQU, CW, DW, LIQ, SAL, SOL	Clear Glass Vial 40 Milliliter Unpreserved for Purge and Trap Analysis	EPA 8260C/5035A	14 Days	20	µg/L or µg/kg
1,4-Dioxane	AQU, CW, DW, LIQ, SAL, SOL	Clear Glass Vial 40 Milliliter Unpreserved for Purge and Trap Analysis	EPA 8260C/5035A	14 Days	100	µg/L or µg/kg
Semivolatile Organics (SVOC)	AQU, DW, LIQ	Amber Glass Bottle 1 Liter Preserved with Sodium Thiosulfate	EPA 8270D	7 days	10	µg/L
Semivolatile Organics (SVOC)	SOL	Clear Glass Jar 8 Ounce Unpreserved	EPA 8270D	14 days	333	µg/kg
Semivolatile Organics (SVOC)	CW	Clear Glass Jar 8 Ounce Unpreserved	EPA 8270D	14 days	10	mg/kg or mg/L
Perfluorinated and Polyfluorinated Alkyl Substances (PFAS)	DW	Clear Plastic Bottle 250 Milliliter ammonium acetate	EPA 533*	28 days	0.004	µg/L
Perfluorinated and Polyfluorinated Alkyl Substances (PFAS)	DW	Clear Plastic Bottle 250 Milliliter Trizma Pre-set, pH 7.0	EPA 537.1*	14 days	0.005	µg/L
Percent Moisture	BIO, CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	CLP Inorganic Superfund Method	14 days	0	PERCENT

GENERAL CHEMISTRY

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Color, True	AQU, DW	Clear Plastic Bottle 4 Ounce Unpreserved	EPA 110.2	48 hours	1	CU
Color, Apparent	AQU, DW	Clear Plastic Bottle 4 Ounce Unpreserved	EPA 110.2	48 hours	1	CU
Hardness, Total	AQU, CW, DW	Clear Plastic Bottle 8 Ounce Preserved with Nitric Acid	EPA 130.1	180 days	10	mg/L
Solids, Volatile Suspended (VSS)	AQU, CW, DW	Clear Plastic Bottle 1 Liter Unpreserved	EPA 160.4	7 days	5	mg/L
Oil and Grease	AQU, CW	Clear Glass Jar 1 Liter Preserved with Hydrochloric Acid	EPA 1664B	28 days	5.0	mg/L
Hexavalent Chromium	AQU, CW, DW	Clear Plastic Bottle with Ammonium Sulfate Buffer, pH 9.3-9.7, 4oz/125 mL	EPA 218.6	28 days	0.10	µg/L
Fluoride	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Unpreserved	EPA 300.0	28 days	0.10	mg/L
Sulfate	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Unpreserved	EPA 300.0	28 days	0.50	mg/L
Orthophosphate	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Unpreserved	EPA 300.0	48 hours	0.05	mg/L
Nitrite	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Unpreserved	EPA 300.0	48 hours	0.10	mg/L
Nitrate	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Unpreserved	EPA 300.0	48 hours	0.20	mg/L
Chloride	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Unpreserved	EPA 300.0	28 days	3.0	mg/L
Bromide	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Unpreserved	EPA 300.0	28 days	0.10	mg/L
Chlorite	AQU, CW, DW	Amber Glass Bottle 8 Ounce Preserved with EDA	EPA 300.1	14 days	20	µg/L
Chlorate	AQU, CW, DW	Amber Glass Bottle 8 Ounce Preserved with EDA	EPA 300.1	28 days	20	µg/L
Bromide	AQU, CW, DW	Amber Glass Bottle 8 Ounce Preserved with EDA	EPA 300.1	28 days	10	µg/L
Bromate	AQU, CW, DW	Amber Glass Bottle 8 Ounce Preserved with EDA	EPA 300.1	28 days	5.0	µg/L
Chloride	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Unpreserved	EPA 325.2	28 days	10	mg/L
Chloride	SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 325.2M	28 days	10	mg/kg
Cyanide, Total	AQU, CW, DW	Clear Plastic Bottle 500 mL Preserved with Sodium Hydroxide	EPA 335.4	14 days	0.01	mg/L
Cyanide, Total	SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 335.4M	14 days	0.25	mg/kg
Nitrogen, Ammonia	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Preserved with Sulfuric Acid	EPA 350.1	28 days	0.1	mg/L
Nitrogen, Ammonia	SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 350.1M	28 days	0.1	mg/kg

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Nitrogen, Total Kjeldahl (TKN)	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Preserved with Sulfuric Acid	EPA 351.2	28 days	0.1	mg/L
Nitrogen, Total Kjeldahl (TKN)	SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 351.2M	28 days	0.1	mg/kg
Nitrogen, Nitrite	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Unpreserved	EPA 353.2	48 hours	0.1	mg/L
Nitrogen, Nitrite	SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 353.2M	28 days	0.1	mg/kg
Nitrogen, Nitrate	AQU, CW, DW	Clear Plastic Bottle 8 Ounce Unpreserved	EPA 353.2	48 hours	0.1	mg/L
Nitrogen, Nitrate	SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 353.2M	48 hours	0.1	mg/kg
Nitrogen, Nitrate/Nitrite	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Preserved with Sulfuric Acid	EPA 353.2	28 days	0.1	mg/L
Nitrogen, Nitrate/Nitrite	SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 353.2M	28 days	0.1	mg/kg
Orthophosphate	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Unpreserved	EPA 365.1	48 hours	0.005	mg/L
Orthophosphate, Dissolved	AQU, CW, DW	Flipmate (0.45um) for Dissolved Samples	EPA 365.1	48 hours	0.005	mg/L
Phosphorus, Total	SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 365.3M	28 days	0.01	mg/kg
Phosphorus, Total	AQU, CW, DW	Clear Plastic Bottle 8 Ounce Preserved with Sulfuric Acid	EPA 365.3	28 days	0.01	mg/L
Sulfate	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Unpreserved	EPA 375.4	28 days	10	mg/L
Sulfate	SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 375.4M	28 days	10	mg/kg
Benthic Pheophytin	AQU, BIO	Clear Glass Tube 12 Milliliter Unpreserved	OWRB Benthic Chlorophyll	30 days	0.5	mg/m^3
Benthic Chlorophyll	AQU, BIO	Clear Glass Tube 12 Milliliter Unpreserved	OWRB Benthic Chlorophyll	30 days	0.5	mg/m^3
Pheophytin-a	AQU, BIO	Clear Glass Tube 12 Milliliter Unpreserved	SM 10200H	24 hours	0.5	mg/m^3
Chlorophyll A and Pheophytin	AQU, BIO	Clear Glass Tube 12 Milliliter Unpreserved	SM 10200H	24 hours	0.5	mg/m^3
Periphyton	AQU, BIO	Clear Glass Tube 12 Milliliter Unpreserved	SM 10300C	30 days	0.5	mg/m^3
Alkalinity	AQU, DW	Clear Plastic Bottle 8 Ounce Unpreserved	SM 2320B	14 days	20	mg/L
Acid Neutralizing Capacity	AQU, DW	Clear Plastic Bottle 4 Ounce Unpreserved	WRS12A.4	7 days	20	µEq/L
Solids, Total (TS)	AQU, CW, DW	Clear Plastic Bottle 16 Ounce Unpreserved	SM 2540B	7 days	10	mg/L
Solids, Total Dissolved (TDS)	AQU, CW, DW	Clear Plastic Bottle 16 Ounce Unpreserved	SM 2540C	7 days	10	mg/L
Solids, Total Suspended (TSS)	AQU, CW, DW	Clear Plastic Bottle 16 Ounce Unpreserved	SM 2540D	7 days	5	mg/L
Solids, Settleable (SS)	AQU, CW, DW	Clear Plastic Bottle 1 Liter Unpreserved	SM 2540F	48 hours	0.1	mL/L
Chlorine, Total	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Unpreserved	SM 4500ClG	15 mins	0.1	mg/L
Chlorine, Free	AQU, CW, DW	Clear Plastic Bottle 4 Ounce Unpreserved	SM 4500ClG	15 mins	0.1	mg/L
Oxygen, Dissolved	AQU, CW	Clear Plastic Bottle 1 Liter Unpreserved	SM 4500OG	15 mins	N/A	mg/L

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Demand, Carbonaceous Bio Oxygen (CBOD5)	AQU, CW	Clear Plastic Bottle 1 Liter Unpreserved	SM 5210B	48 hours	2	mg/L
Demand, Biochemical Oxygen (BOD5)	AQU, CW	Clear Plastic Bottle 1 Liter Unpreserved	SM 5210B	48 hours	2	mg/L
Demand, Ultimate Carbonaceous Bio Oxygen (CBOD20)	AQU, CW	Clear Plastic Bottle 1 Liter Unpreserved	SM 5210C	48 hours	2	mg/L
Demand, Ultimate Biochemical Oxygen (BOD20)	AQU, CW	Clear Plastic Bottle 1 Liter Unpreserved	SM 5210C	48 hours	2	mg/L
Chemical Oxygen Demand (COD)	AQU, CW	Clear Plastic Bottle 8 Ounce Preserved with Sulfuric Acid	SM 5220C	28 days	5	mg/L
UV 254	DW	500mL Amber Glass	SM 5910B	48 Hours	0.001	abs/cm
Carbon, Dissolved Organic (DOC)	AQU, CW, DW	Amber Glass Bottle 16 Ounce Preserved with Sulfuric Acid	SM 5310C	28 days	0.5	mg/L
Carbon, Total Organic (TOC)	AQU, CW, DW	Amber Glass Bottle 16 Ounce Preserved with Sulfuric Acid	SM 5310C	28 days	0.5	mg/L

METALS

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Aluminum, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	100	mg/kg
Aluminum, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	1	mg/L
Aluminum, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	5	mg/kg
Aluminum, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	100	µg/L
Aluminum, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	50	µg/L
Antimony, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	10	mg/kg
Antimony, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.02	mg/L
Antimony, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/L
Antimony, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	10	µg/L

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Antimony, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	2	µg/L
Arsenic, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	10	mg/kg
Arsenic, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.02	mg/L
Arsenic, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg
Arsenic, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	10	µg/L
Arsenic, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	2	µg/L
Barium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	5	mg/kg
Barium, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.05	mg/L
Barium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg
Barium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	5	µg/L
Barium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	5	µg/L
Beryllium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	2	mg/kg
Beryllium, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.02	mg/L
Beryllium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg
Beryllium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	2	µg/L
Beryllium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	2	µg/L
Boron, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	20	mg/kg
Boron, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	20	µg/L
Cadmium Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	2	mg/kg
Cadmium, Total	BIO	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	0.02	mg/kg
Cadmium, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.02	mg/L
Cadmium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Cadmium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	2	µg/L
Cadmium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	2	µg/L
Calcium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	50	mg/kg
Calcium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	0.5	mg/L
Chromium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	5	mg/kg
Chromium, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.05	mg/L
Chromium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg
Chromium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	5	µg/L
Chromium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	5	µg/L
Cobalt, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	5	mg/kg
Cobalt, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.05	mg/L
Cobalt, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg
Cobalt, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	5	µg/L
Cobalt, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	5	µg/L
Copper, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	5	mg/kg
Copper, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.05	mg/L
Copper, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg
Copper, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	5	µg/L
Copper, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	5	µg/L
Iron, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	20	µg/L
Lead, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	10	mg/kg
Lead, Total	BIO	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	0.02	mg/kg

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Lead, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.05	mg/L
Lead, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg
Lead, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	10	µg/L
Lead, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	5	µg/L
Lithium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	10	µg/L
Lithium, Total	DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	45 days	9	µg/L
Magnesium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	50	mg/kg
Magnesium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	0.5	mg/L
Manganese, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	5	mg/kg
Manganese, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.05	mg/L
Manganese, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg
Manganese, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	5	µg/L
Manganese, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	5	µg/L
Mercury, Total	AQU, DW	Clear Plastic Bottle 4 Ounce Preserved with Nitric Acid	EPA 245.1	28 days	0.05	ng/L
Mercury, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	28 days	0.0005	mg/L
Mercury, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	28 days	0.25	mg/kg
Mercury, Total	BIO	Clear Plastic Tube 50 Milliliter Unpreserved	EPA 7473	60 days	0.05	mg/kg
Mercury, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	28 days	0.05	µg/L
Molybdenum, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	5	mg/kg
Molybdenum, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.05	mg/L
Molybdenum, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Molybdenum, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	5	µg/L
Molybdenum, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	5	µg/L
Nickel, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	10	mg/kg
Nickel, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.1	mg/L
Nickel, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg
Nickel, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	10	µg/L
Nickel, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	10	µg/L
Potassium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	50	mg/kg
Potassium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	0.5	mg/L
Selenium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	10	mg/kg
Selenium, Total	BIO, CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg
Selenium, Total	AQU	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.1	mg/L
Selenium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	10	µg/L
Selenium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	10	µg/L
Silicon as Silica, Total	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	0.05	mg/L
Silicon, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	50	mg/kg
Silver, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	10	mg/kg
Silver, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.1	mg/L
Silver, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg
Silver, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	10	µg/L
Silver, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	10	µg/L
Sodium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	50	mg/kg

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Sodium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	0.5	mg/L
Strontium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	5	mg/kg
Strontium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	5	µg/L
Strontium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	1	µg/L
Thallium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	10	mg/kg
Thallium, Total	AQU	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.01	mg/L
Thallium, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.01	mg/L
Thallium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg
Thallium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	10	µg/L
Thallium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	1	µg/L
Tin, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	10	mg/kg
Tin, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	10	µg/L
Titanium, Total	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	5	µg/L
Titanium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	5	mg/kg
Uranium, Total	AQU	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	10	µg/L
Uranium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg
Uranium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	1	µg/L
Uranium, Total or Dissolved	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	10	µg/L
Vanadium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	5	mg/kg
Vanadium, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.05	mg/L
Vanadium, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	1	mg/kg

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Vanadium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	5	µg/L
Vanadium, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	5	µg/L
Zinc, Total	BIO	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	0.5	mg/kg or µg/kg
Zinc, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6010D	180 days	5	mg/kg
Zinc, Total	CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	EPA 6020B	180 days	0.05	mg/kg
Zinc, Total	AQU, CW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 6020B	180 days	0.1	ug/L
Zinc, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.7	180 days	5	µg/L
Zinc, Total or Dissolved	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	EPA 200.8	180 days	10	µg/L
Percent Solids*	BIO, CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	CLP Inorganic Superfund Method	14 days	0	PERCENT

MICROBIOLOGY

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Anatoxin-a	AQU, DW	Amber glass bottle with Anatoxin preservative	Abraxis ELISA 520060	3 days	0.15	µg/L
Cylindrospermopsin	AQU, DW	Amber Glass Bottle 4 Ounce Unpreserved	Abraxis ELISA 522011	3 days	0.05	µg/L
Microcystins/Nodularins	AQU, DW	Amber Glass Bottle 4 Ounce Unpreserved	Abraxis ELISA 520011	3 days	0.15	µg/L
Saxitoxin	AQU, DW	Amber Glass Bottle 2 Ounce Preserved with Saxitoxin	Abraxis ELISA 52255B	3 days	0.02	µg/L
Enterococci	AQU, DW	Sterile Clear Plastic Bottle 120 Milliliter Preserved with Sodium Thiosulfate	ASTM D6503-99	6 hours	1	MPN/100mL
Enterococci	AQU, DW	Sterile Clear Plastic Bottle 120 Milliliter Preserved with Sodium Thiosulfate	ASTM D6503-99	6 hours	N/A	present/absent
Fecal Coliforms	AQU	Sterile Clear Plastic Bottle 120 Milliliter Preserved with Sodium Thiosulfate	SM 9222D	6 hours	1	CFU/mL
Giardia	AQU	Clear Plastic Cubitainer 2.5 Gallon Unpreserved	EPA 1623.1	4 days	0.1	CYSTS/L

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Cryptosporidium	AQU	Clear Plastic Cubitainer 2.5 Gallon Unpreserved	EPA 1623.1	4 days	0.1	OOCYST/L
Giardia (Matrix Spike)	AQU	Clear Plastic Cubitainer 2.5 Gallon Unpreserved	EPA 1623.1	4 days	1	PERCENT
Cryptosporidium (Matrix Spike)	AQU	Clear Plastic Cubitainer 2.5 Gallon Unpreserved	EPA 1623.1	4 days	1	PERCENT
Iron-Related Bacteria	AQU, DW	Sterile Clear Plastic Bottle 120 Milliliter Preserved with Sodium Thiosulfate	HACH IRBBART	30 hours	N/A	present/absent
Sulfate-Reducing Bacteria	AQU, DW	Sterile Clear Plastic Bottle 120 Milliliter Preserved with Sodium Thiosulfate	HACH SRBBART	30 hours	N/A	present/absent
Legionella pneumophila	AQU, DW	Sterile Clear Plastic Bottle 120 Milliliter with Sodium Thiosulfate	Legiolert L. pneumophila	30 hours	1	MPN/100mL
Potentially Toxic Cyanobacteria (Identification Only)	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10900C	3 days	80	detect/non-detect
Woronichinia sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Sphaerospermopsis sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Snowella sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Radiocystis sp./Snowella sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Radiocystis sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Pseudanabaena sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Planktothrix sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Microcystis sp./Woronichinia sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Microcystis sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Limnothrix sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Dolichospermum sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Cylindrospermopsis sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Cuspidothrix sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Chrysosporum sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Arthrospira sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Aphanizomenon sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Anabaenopsis sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Anabaena sp.	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine	SM 10200F	3 days	80	cells/mL
Suspected Prymnesium parvum	AQU	Clear Plastic Bottle 1 Liter Preserved with Lugol Iodine and Acetic Acid	SM 10900	3 days	N/A	detect/non-detect
Golden Algae	AQU	Clear Plastic Bottle 1 Liter	SM 10900 QUANT	3 days	2000	cells/mL
Microtox (Acute Aquatic Toxicity)	AQU, DW	Amber Glass Bottle 1 Liter Preserved with Sodium Thiosulfate	SM 8050B	48 hours	N/A	toxic/non-toxic
Pseudomonas aeruginosa	AQU, DW	Sterile Clear Plastic Bottle 1 Liter Preserved with Sodium Thiosulfate	SM 9213E	24 hours	1	CFU/100mL
Heterotrophic Bacteria	AQU, DW	Sterile Clear Plastic Bottle 120 Milliliter Preserved with Sodium Thiosulfate	SM 9215B	6 hours	1	CFU/mL
Heterotrophic Bacteria	AQU, DW	Sterile Clear Plastic Bottle 120 Milliliter Preserved with Sodium Thiosulfate	SM 9215E	6 hours	0.2	MPN/mL
Total Coliforms	AQU, DW	Sterile Clear Plastic Bottle 120 Milliliter Preserved with Sodium Thiosulfate	SM 9222B	24 hours	1	CFU/100mL
Fecal Coliforms	AQU, DW	Sterile Clear Plastic Bottle 120 Milliliter Preserved with Sodium Thiosulfate	SM 9222D	6 hours	1	CFU/100mL
Total Coliform	AQU, DW	Sterile Clear Plastic Bottle 120 Milliliter Preserved with Sodium Thiosulfate	SM 9223B	30 hours	1	MPN/100mL
E. coli	AQU, DW	Sterile Clear Plastic Bottle 120 Milliliter Preserved with Sodium Thiosulfate	SM 9223B	30 hours	1	MPN/100mL

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Total Coliform	AQU, DW	Sterile Clear Plastic Bottle 120 Milliliter Preserved with Sodium Thiosulfate	SM 9223B	30 hours	N/A	present/absent
E. coli	AQU, DW	Sterile Clear Plastic Bottle 120 Milliliter Preserved with Sodium Thiosulfate	SM 9223B	30 hours	N/A	present/absent
Shigella sp.	AQU, DW	Sterile Clear Plastic Bottle 1 Liter Unpreserved	SM 9260E	3 days	1	CFU/100mL
Shigella sonnei	AQU, DW	Sterile Clear Plastic Bottle 1 Liter Unpreserved	SM 9260E	3 days	1	CFU/100mL
Aeromonas sp.	AQU, DW	Sterile Clear Plastic Bottle 1 Liter Preserved with Sodium Thiosulfate	SM 9260L	8 hours	1	CFU/100mL
Aeromonas salmonicida ssp. salmonicida	AQU, DW	Sterile Clear Plastic Bottle 1 Liter Preserved with Sodium Thiosulfate	SM 9260L	8 hours	1	CFU/100mL
Aeromonas hydrophila gr 2	AQU, DW	Sterile Clear Plastic Bottle 1 Liter Preserved with Sodium Thiosulfate	SM 9260L	8 hours	1	CFU/100mL
Aeromonas hydrophila gr 1	AQU, DW	Sterile Clear Plastic Bottle 1 Liter Preserved with Sodium Thiosulfate	SM 9260L	8 hours	1	CFU/100mL
Enterococci sp.	AQU	Sterile Clear Plastic Bottle 120 Milliliter Preserved with Sodium Thiosulfate	EPA 1609.1	6 hours	38	CCE
GC						
ANALYTE	**MATRIX**	**CONTAINER & PRESERVATIVE**	**REFERENCE METHOD**	**HOLDING TIME**	**LOQ**	**UNITS**
EDB, DBCP, and 123TCP	AQU, DW, SAL	Clear Glass Vial 40 Milliliter Preserved with Sodium Thiosulfate	EPA 504.1	14 days	0.02	µg/L
Nitrogen Phosphorus Pesticides	AQU, DW, SAL	Amber Glass Bottle 1 Liter Preserved with Sodium Thiosulfate	EPA 507	14 days	1	µg/L
Chlorinated Pesticides	AQU, DW, SAL	Amber Glass Bottle 1 Liter Preserved with Sodium Thiosulfate	EPA 508	7 days	0.05	µg/L
Toxaphene & Technical Chlordane	AQU, DW, SAL	Amber Glass Bottle 1 Liter Preserved with Sodium Thiosulfate	EPA 508	7 days	0.25	µg/L
Chlorinated Acid Herbicides	AQU, DW, SAL	Amber Glass Bottle 8 Ounce Preserved with Sodium Thiosulfate	EPA 515.3	14 days	4	µg/L
Pentachlorophenol	AQU, DW, SAL	Amber Glass Bottle 8 Ounce Preserved with Sodium Thiosulfate	EPA 515.3	14 days	1	µg/L
Glyphosate	AQU, DW, SAL	Amber Glass vial 60 Milliliters Preserved with Sodium Thiosulfate	EPA 547	14 days	5	µg/L

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Carbamate Pesticides	AQU, DW, SAL	Amber Glass vial 60 Milliliters Preserved with Potassium Dihydrogen Citrate/Sodium Thiosulfate	EPA 531.2	28 days	2	µg/L
Haloacetic Acids (HAA)	AQU, DW, SAL	Amber Glass Bottle 8 Ounce Preserved with Ammonium Chloride	EPA 552.3	14 days	1	µg/L
Monochloroacetic acid	AQU, DW, SAL	Amber Glass Bottle 8 Ounce Preserved with Ammonium Chloride	EPA 552.3	14 days	2	µg/L
Total Haloacetic Acids	AQU, DW, SAL	Amber Glass Bottle 8 Ounce Preserved with Ammonium Chloride	EPA 552.3	14 days	6	µg/L
Chlorinated Pesticides and Polychlorinated Biphenyls	AQU, DW, SAL	Amber Glass Bottle 1 Liter Preserved with Sodium Thiosulfate	EPA 608	7 days	0.05	µg/L
PCBs, Aroclors, Toxaphene & Technical Chlordane	AQU, DW, SAL	Amber Glass Bottle 1 Liter Preserved with Sodium Thiosulfate	EPA 608	7 days	0.25	µg/L
Nitrogen Phosphorus Pesticides	AQU, DW, SAL	Amber Glass Bottle 1 Liter Preserved with Sodium Thiosulfate	EPA 614	7 days	1	µg/L
Gasoline Range Organic Constituents	AQU, DW, LIQ, SAL	Clear Glass Vial 40 Milliliter Preserved with Hydrochloric Acid for Purge-and-Trap Analysis	EPA 8015C/8020A	14 days	20	µg/L
Individual gasoline components	AQU, DW, LIQ, SAL	Clear Glass Vial 40 Milliliter Preserved with Hydrochloric Acid for Purge-and-Trap Analysis	EPA 8015C/8020A	14 days	2	µg/L
m- and p-Xylene	AQU, DW, LIQ, SAL	Clear Glass Vial 40 Milliliter Preserved with Hydrochloric Acid for Purge-and-Trap Analysis	EPA 8015C/8020A	14 days	4	µg/L
Gasoline Range Organic Constituents	CW, LIQ, SOL	Clear Glass Vial 40 Milliliter Unpreserved for Purge-and-Trap Analysis	EPA 8015C/8020A	14 days	20	µg/L or µg/kg
Individual gasoline components	CW, LIQ, SOL	Clear Glass Vial 40 Milliliter Unpreserved for Purge-and-Trap Analysis	EPA 8015C/8020A	14 days	2	µg/L or µg/kg
m- and p-Xylene	CW, LIQ, SOL	Clear Glass Vial 40 Milliliter Unpreserved for Purge-and-Trap Analysis	EPA 8015C/8020A	14 days	4	µg/L or µg/kg
Chlorinated Pesticides	CW, SOL	Clear Glass Jar 8 Ounce Unpreserved	EPA 8081B	14 Days	10	µg/kg
Toxaphene & Technical Chlordane	CW, SOL	Clear Glass Jar 8 Ounce Unpreserved	EPA 8081B	14 Days	50	µg/kg
Polychlorinated Biphenyls (PCB)	CW, SOL	Clear Glass Jar 8 Ounce Unpreserved	EPA 8082A	None	10	µg/kg

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Organochlorine Pesticides in Fish Tissue	BIO	Fish Composite in Clear Glass Jar 8 Ounce Unpreserved	FDA PAM303E4C1	None	See Below	µg/kg
Trifluralin	BIO	Fish Composite in Clear Glass Jar 8 Ounce Unpreserved	FDA PAM303E4C1	None	2	µg/kg
Hexachlorobenzene alpha, beta-BHC gamma, delta-BHC	BIO	Fish Composite in Clear Glass Jar 8 Ounce Unpreserved	FDA PAM303E4C1	None	4	µg/kg
trans, cis-Nonachlor alpha, gamma-Chlordane	BIO	Fish Composite in Clear Glass Jar 8 Ounce Unpreserved	FDA PAM303E4C1	None	5	µg/kg
Heptachlor Epoxide Heptachlor Endrin, Aldrin	BIO	Fish Composite in Clear Glass Jar 8 Ounce Unpreserved	FDA PAM303E4C1	None	6	µg/kg
Endrin ketone Endrin aldehyde Dieldrin	BIO	Fish Composite in Clear Glass Jar 8 Ounce Unpreserved	FDA PAM303E4C1	None	12	µg/kg
trans, cis-Permethrin Total Chlordane Propachlor, Methoxychlor Hexachlorocyclopentadiene Fipronil, Etridiazole Dacthal, Chlorneb Chloropyrifos Chlorothalonil Chlorobenzilate	BIO	Fish Composite in Clear Glass Jar 8 Ounce Unpreserved	FDA PAM303E4C1	None	20	µg/kg
Total DDT, p,p'-DDT p,p'-DDE, p,p'-DDD Endosulfan sulfate Endosulfan I and II	BIO	Fish Composite in Clear Glass Jar 8 Ounce Unpreserved	FDA PAM303E4C1	None	40	µg/kg
PCBs, Aroclors, Toxaphene	BIO	Fish Composite in Clear Glass Jar 8 Ounce Unpreserved	FDA PAM303E4C1	None	60	µg/kg
Total Petroleum Hydrocarbons	AQU, CW, DW, LIQ, SAL	Clear Glass Vial 40 Milliliter Preserved with Hydrochloric Acid	TNRCC 1005M	14 days	1	mg/L
Total Petroleum Hydrocarbons	AQU, CW, DW, LIQ, SAL, SOL	Clear Glass Vial 40 Milliliter Unpreserved	TNRCC 1005M	14 days	10	mg/L or mg/kg

ANALYTE	MATRIX	CONTAINER & PRESERVATIVE	REFERENCE METHOD	HOLDING TIME	LOQ	UNITS
Flashpoint	AQU, CW, DW, LIQ, SAL	Clear Glass Vial 40 Milliliter Unpreserved	EPA 1020B	None	N/A	°F
Percent Moisture*	BIO, CW, SOL	Clear Glass Jar 4 Ounce Unpreserved	CLP Inorganic Superfund Method	14 days	0	PERCENT
RADIOCHEMISTRY						
ANALYTE	**MATRIX**	**CONTAINER & PRESERVATIVE**	**REFERENCE METHOD**	**HOLDING TIME**	**LOQ**	**UNITS**
Gross Beta	AIR	Ziploc Bag	EPA 600/R-11/122	180 days	4	DPM/SWIPE
Gross Alpha	AIR	Ziploc Bag	EPA 600/R-11/122	180 days	3	DPM/SWIPE
Radon 222	AIR	Stainless Steel Radon Canister	EPA 520-5-87005	14 days	0.5	pCi/L
Gamma Emitters	AQU, DW	Clear Plastic Bottle 1 Liter Preserved with Nitric Acid	EPA 901.1	180 days	50	pCi/L
Radium 228	AQU, DW	Clear Plastic Bottle 1 Gallon Preserved with Nitric Acid	GaTech	6 months	1	pCi/L
Radium 226	AQU, DW	Clear Plastic Bottle 1 Gallon Preserved with Nitric Acid	GaTech	6 months	1	pCi/L
Gamma Emitters	AQU, CW, LIQ, SAL, SOL	Clear Glass Jar 4 Ounce Unpreserved	HASL 300	180 days	50	pCi/L
Gross Beta	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	SM 7110B	180 days	4	pCi/L
Gross Alpha	AQU, DW	Clear Plastic Bottle 16 Ounce Preserved with Nitric Acid	SM 7110B	180 days	3	pCi/L
SAMPLE AND DATA MANAGEMENT						
ANALYTE	**MATRIX**	**CONTAINER & PRESERVATIVE**	**REFERENCE METHOD**	**HOLDING TIME**	**LOQ**	**UNITS**
pH	AQU, DW, SAL	Clear Plastic Bottle 4 Ounce Unpreserved	EPA 150.1	15 mins	2	STD UNIT
pH	SOL, CW	Clear Glass Jar 4 Ounce Unpreserved	EPA 9045D	15 mins	2	STD UNIT
Conductivity	AQU, CW, DW, SAL	Clear Plastic Bottle 4 Ounce Unpreserved	SM 2510B	28 days	2	µʊ/cm
Turbidity	AQU, CW, DW, SAL	Clear Plastic Bottle 8 Ounce Unpreserved	SM 2130B	2 days	0.2	NTU

APPENDIX D- REFERENCED WIDS, PROCEDURES, AND DOCUMENTS

The following documents are part of the SELSD QMS and are referenced within the text of this DQM. These documents are available upon request.

DQM Section	Tracking Number	Name	Category
1	9010-QSP01	SELSD Quality Assurance Plan	QMS
2.1	9000-QSP02	Demonstration of Capability	Competency
2.1	9010-QSL01	Lab Capacity Log	QMS
3.1	9900-QSF06	Project Planning Tool (PPT)	Special Projects
7.1	9015-QSP01	Support Equipment Calibration	QMS

APPENDIX E- GUIDE TO THE SELSD REPORT OF ANALYSIS

State Environmental Laboratory Services Division

Physical Address: 707 North Robinson Avenue, Oklahoma City, OK 73102

Mailing Address: P.O. Box 1677, Oklahoma City, OK 73101

(405) 702-1000

selsd@deq.ok.gov

Report of Analysis

00116172.PDF

DOE, John
Attn: JOHN DOE
1254 APPLE ROAD
BANANA, OKLAHOMA 00023

PROJECT SUMMARY

Project: DOE-001_0002
Customer: JOHN DOE
Account: DOE-001
Description: DQM EXAMPLE 2022
Program: Private
Subprogram: Private

AUTHORIZING SIGNATURE

Hunter Nelson

PROJECT SAMPLE SUMMARY

Project Status: Complete
Project Notes: Any special project information about your sample set or project notes will display here.

****BOLD** sample IDs are pending analysis or review and are not finalized.****

Sample ID	Sample Location	Sample Date	Sampler	Received Date	Reciept Temp. (°C)
PRIV-1000189-01	Sparkling Spring SS Site 1	12/17/20 9:00 am	ABC	12/17/20 12:55 pm	2.1
PRIV-1000197-02	Sparkling Spring SS Site 1	12/17/20 9:00 am	ABC	12/17/20 12:55 pm	2.1
PRIV-1001481-01	Dirty Spring DS Site 1	12/17/20 9:00 am	ABC	12/17/20 12:55 pm	2.1
PRIV-1310625-01	Dirty Spring DS Site 1	12/17/20 9:00 am	ABC	12/17/20 12:55 pm	2.1

Customer satisfaction survey can be found at ***https://www.deq.ok.gov/divisions/sels/***

EPA DRINKING WATER CERTIFICATION #OK00013

Report Date: 6/21/2022

State Environmental Laboratory Services Division
Physical Address: 707 North Robinson Avenue, Oklahoma City, OK 73102
Mailing Address: P.O. Box 1677, Oklahoma City, OK 73101
(405) 702-1000
selsd@deq.ok.gov

Report of Analysis

00116172.PDF

Analytical Results

Sample ID: PRIV-1000189-01 1000569.A **QA Code:** 10
Sample Location: Sparkling Spring SS Site 1

Analysis Method: SM 9223B **Analysis:** SM9223B Total Coliforms & E. coli, P/A

Component	Result	Unit	Qualifiers	Analyst	Analyzed On
E. coli	Absent			NOO	12/18/2020
Total Coliform	Absent			NOO	12/18/2020

Analytical Results

Sample ID: PRIV-1000197-02 1000569.C **QA Code:** 10
Sample Location: Sparkling Spring SS Site 1

Analysis Method: EPA 150.1 **Analysis:** EPA150.1 pH

Component	Result	Unit	Qualifiers	Analyst	Analyzed On
pH	6.89	PH		SEJ	12/18/2020

Analysis Method: EPA 310.2 **Analysis:** EPA310.2 Total Alkalinity

Component	Result	Unit	Qualifiers	Analyst	Analyzed On
Total Alkalinity	208	mg/L		AMP	12/18/2020

Analysis Method: EPA 325.2 **Analysis:** EPA325.2 Chloride

Component	Result	Unit	Qualifiers	Analyst	Analyzed On
Chloride	12.5	mg/L		CLJ	01/07/2020

Analysis Method: SM 2510B **Analysis:** SM2510B Conductivity

Component	Result	Unit	Qualifiers	Analyst	Analyzed On
Conductivity	552	µmho/cm		SEJ	12/18/2020

Analysis Method: SM 2540C **Analysis:** SM2540C Total Dissolved Solids

Component	Result	Unit	Qualifiers	Analyst	Analyzed On
Total Dissolved Solids	339	mg/L		JPS	12/18/2020

Analytical Results 12/30/2020

Sample ID: PRIV-1001481-01 1000569.D **QA Code:** 10
Sample Location: Dirty Spring DS Site 1

Analysis Method: EPA 200.8 **Analysis:** EPA200.8 Trace Elements

Component	Result	Unit	Qualifiers	Analyst	Analyzed On
Arsenic, Total	<2.00	µg/L	preliminary	SMT	12/30/2020
Arsenic, Total	<2.00	µg/L	preliminary	SMT	12/30/2020
Chromium, Total	8.70	µg/L	preliminary	SMT	12/30/2020
Chromium, Total	8.70	µg/L	preliminary	SMT	12/30/2020
Selenium, Total	<10.0	µg/L	preliminary	SMT	12/30/2020
Selenium, Total	<10.0	µg/L	preliminary	SMT	12/30/2020
Uranium, Total	<1.00	µg/L	preliminary	SMT	12/30/2020
Uranium, Total	<1.00	µg/L	preliminary	SMT	12/30/2020

Customer satisfaction survey can be found at ***https://www.deq.ok.gov/divisions/sels/***

EPA DRINKING WATER CERTIFICATION #OK00013

State Environmental Laboratory Services Division
Physical Address: 707 North Robinson Avenue, Oklahoma City, OK 73102
Mailing Address: P.O. Box 1677, Oklahoma City, OK 73101
(405) 702-1000
selsd@deq.ok.gov

Report of Analysis

00116172.PDF

Analytical Results

Sample ID: PRIV-1310625-01 **QA Code:** 10
Sample Location: Dirty Spring DS Site 1

Analysis Method: EPA 8260C/5030C **Analysis:** EPA8260C/5030C Volatile Organics (VOC)

Component	Result	Unit	Qualifiers	Analyst	Analyzed On
1,1,1,2-Tetrachloroethane	<10.0	µg/L		HLR	12/29/2020
1,1,1-Trichloroethane	16.0	µg/L		HLR	12/29/2020
1,1,2,2-Tetrachloroethane	<10.0	µg/L		HLR	12/29/2020
1,1,2-Trichloroethane	<10.0	µg/L		HLR	12/29/2020
1,1-Dichloroethane	80.2	µg/L		HLR	12/29/2020
1,1-Dichloroethene	192	µg/L		HLR	12/29/2020
1,1-Dichloropropene	<10.0	µg/L		HLR	12/29/2020
1,2,3-Trichlorobenzene	<10.0	µg/L		HLR	12/29/2020
1,2,3-Trichloropropane	<10.0	µg/L		HLR	12/29/2020
1,2,4-Trichlorobenzene	<10.0	µg/L		HLR	12/29/2020
1,2,4-Trimethylbenzene	<10.0	µg/L		HLR	12/29/2020
1,2-Dibromo-3-chloropropane	<10.0	µg/L		HLR	12/29/2020
1,2-Dibromoethane	<10.0	µg/L		HLR	12/29/2020
1,2-Dichlorobenzene	<10.0	µg/L		HLR	12/29/2020
1,2-Dichloroethane	3.2	µg/L	J	HLR	12/29/2020
	(J) The value is an estimate reported between the detection limit and reporting limit.				
1,2-Dichloropropane	<10.0	µg/L		HLR	12/29/2020
1,3,5-Trimethylbenzene	<10.0	µg/L		HLR	12/29/2020
1,3-Dichlorobenzene	<10.0	µg/L		HLR	12/29/2020
1,3-Dichloropropane	<10.0	µg/L		HLR	12/29/2020
1,4-Dichlorobenzene	<10.0	µg/L		HLR	12/29/2020
1,4-Dioxane	4140	µg/L		HLR	12/29/2020
2,2-Dichloropropane	<10.0	µg/L		HLR	12/29/2020
2-Chlorotoluene	<10.0	µg/L		HLR	12/29/2020
2-Hexanone	<10.0	µg/L		HLR	12/29/2020
4-Chlorotoluene	<10.0	µg/L		HLR	12/29/2020
4-Isopropyltoluene	<10.0	µg/L		HLR	12/29/2020
4-Methyl-2-pentanone	<10.0	µg/L		HLR	12/29/2020
Acetone	<10.0	µg/L		HLR	12/29/2020
Benzene	<10.0	µg/L		HLR	12/29/2020
Bromobenzene	<10.0	µg/L		HLR	12/29/2020
Bromochloromethane	<10.0	µg/L		HLR	12/29/2020

Customer satisfaction survey can be found at ***https://www.deq.ok.gov/divisions/sels/***

EPA DRINKING WATER CERTIFICATION #OK00013

HEADER (page 1 on the example)– Key Points:

- Need to contact us for any reason? Local phone, email, and addresses are listed for your convenience.
- In the upper right corner, there is a QR code that when scanned will take you to the SELSD website.
- The report number is located in the center under "Report of Analysis". This is the number that is referenced on corrected reports.
- The customer's name appears in bold in the upper left margin. Below the name is the location where the customer has elected to have the final report sent and may not represent the location where the sample was physically collected. The customer may elect to receive their report of analysis via email or fax in which case that information will appear in place of an address.

PROJECT SUMMARY (page 1 on the example)- Key Points:

- A Project by SELSD definition is a sampling event and may contain one or a series of samples derived from one or more sampling locations.
- Every SELSD customer is assigned a unique ID to differentiate between customers with the same or similar surnames. In this case, DOE-001 is the Account.
- The Project is a combination of the customer ID followed by a number that represents the number of total projects submitted by that customer. Project DOE-001_0002 is the second project submitted by this customer. If you need or want technical assistance with your samples or test results, please refer to the specific project when contacting SELSD.
- The Description field may include additional information about the project.
- Program and Subprogram are primarily sample categories that help SELSD sort and prioritize its workload and ensure all program specific data quality and reporting requirements are met.
- The signature after the Project Summary section represents the person who closed the project and authorized the data to be reported to the customer.

PROJECT SAMPLE SUMMARY (page 1 on the example)- Key Points:

- In this section under "Project Notes", you will find any specific information about your project that may be pertinent to the collection or analysis of the samples contained in the project.
- In this section you will also see a full listing of all the samples in the project.
- The Sample ID is an alpha numeric unique identifier for each sample container received by SELSD. This number begins with its Program affiliation followed by the unique number. When contacting SELSD for sample assistance, please provide this number as a point of reference to improve service.
- This section contains all information relative to the collection of the sample. You will see the sample location, which includes the sample source and where the sample was physically collected, the sample date and time, and who it was collected by. For customers who have their own sample numbers, this number will appear to the right of the SELSD sample number.
- Also, in this section of the report you will see the date and time when each sample was received by the laboratory and the temperature of the sample when it was received. This is critically important information as many tests run by the laboratory have very specific thermal preservation and holding time requirements.

FOOTER (pages 1-3 on the example)- Key Points:

- Want to provide feedback? Customer surveys are located on the SELSD webpage or follow the link provided.

- SELSD is certified by EPA to perform drinking water analysis (OK00013) and by New Hampshire Environmental Laboratory Accreditation Program (NH ELAP #2338) for *cryptosporidium* and *giardia* testing by EPA method 1623.1.
- The Report Date on the right side of the footer is the date that the report was printed.

ANALYTICAL RESULTS (pages 2-3 on the example)- Key Points:

- This section is organized by sample and then followed directly by data pertaining to each analysis method run on the sample. If there was more than one sample in the project, each sample will be separated by a shaded sample information box. QA Code applies to field QC activities and may not appear on your report depending on the context under which the sample was submitted, and to which program it is affiliated.
- Under the shaded box you will find the Analysis Method(s) used for the testing next to a common name for the Analysis. This section also contains the component name which is highly variable and represents the name of the analyte(s) tested on that sample.
- Once the laboratory completes your analysis, you will receive a single numerical result or a set of results for each test method. In most cases this is a numerical value. However, in some cases as you can see on page 2, the result may be listed as "Present" or "Absent" in response to the presence or absence of a target organism or bacteria.
- Most results are reported in a variety of units based on several factors that include technology used and the sensitivity of the test method, reference ranges, and reporting level requirements.
- For each SELSD test, method LOQ (reporting levels) have been established through vigorous QC procedures. Any result that is preceded with a "<" means that the measured result on your sample is "less than" the established LOQ or reporting limit for that component.
- Sometimes, as you can see on page 2, preliminary reports are issued at the customer's request or to expedite reporting of the test results. In such cases, the sample results have not gone through full data review and authorization and are thus referred to as "preliminary". If there are no such preliminary designations on your test results, they should be considered final and subject to known and documented quality.
- In certain instances, it may be necessary to flag or qualify a sample or test result. As you can see on page 3, a "J" qualifier has been applied to the test result for 1,2-Dichloroethane. Data qualifiers and flags are added to the report of analysis to best describe the quality or limitations of the sample data and assist the data user in determining the usability of the data for their needs. A full list of SELSD flags and qualifiers is provided in **Appendix B**.

If you ever have questions about any report or data provided by the SELSD, please feel free to contact us at the phone numbers or email provided in the header.

APPENDIX F- PPT (PROJECT PLANNING TOOL)

The PPT below is provided to project managers by the FLCA Manager (see Section 3 for contact information) when requested. It is completed and submitted electronically then verified by the FLCA Manager prior to a project being pre-logged and container pick-up scheduled.

STATE ENVIRONMENTAL LABORATORY

PROJECT PLANNING DETAILS FORM

This form is used to document follow up and confirmation of information provided in the Project Planning Initiation Form. This form will also allow additional information and details to be documented that are not captured in the initiation form. These additional details typically pertain to how the SELSD will process the samples internally.

Project Name-Description (Provided on Initiation Form)
Click or tap here to enter text.

Project Manager or Back-Up contacted for the completion of this form. Contact via phone or meeting to discuss. Click or tap here to enter text.

Date of Follow-Up Contact Click or tap here to enter text.

Name of SELSD Staff Completing Form Click or tap here to enter text.

1. **Review Project Planning Tool Initiation Form**

Review the information provided on the initiation form to ensure details and understanding are correct for project scope and requirements. ☐ Click or tap here to enter text.

2. **Lab Location and Business Hours, After Hours**

☐ If DEQ staff is the project manager, does the project manager know the after-hours policy and procedure? *If not, we will provide a copy of the current procedure.*
Choose an item.
-OR-
☐ If non-DEQ staff, does the project manager know the laboratory location and business hours for sample supplies pick up and sample delivery? *After hours not available for non-DEQ staff unless approved by management.*

3. **Analytics**

Discuss requested analytics. Compliance and non-compliance data, federal and state regulations, QAPPs may determine appropriate or acceptable methods. Record the analytes, methods and matrices requested in the table below- Table 3.1.
For test lists, use current reference tools for analyte and method listings.
Ex. RCRA 7, RCRA 8, Priority Pollutants, Routine Chemistry, Routine Metals, Oil and Gas

Table 3.1 Analytics Requested

Analyte or Test List	Method(s)	Matrix
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.

Analytics Requested Notes:
Click or tap here to enter text.

4. Reporting Limits

If the project manager needs to verify reporting limits (i.e., low-level permits) meet requirements for this project, please indicate below. Reporting limits for analytes, methods and matrices identified in the request table will be provided to the project manager before approvals are completed.

Current reporting limits requested? Choose an item.
Reporting Limits Sent to Project Manager by Click or tap here to enter text. On Click or tap to enter a date.

5. Sample Matrix

If solid or sediment- moisture corrections are applied to these results by default unless otherwise indicated. If moisture correction is not needed, results will be reported as wet weight.
Is the matrix or material to be analyzed identified or described on the initiation form? Click or tap here to enter text.
Provide additional details below if needed, especially for abnormal matrices.
Notes: Click or tap here to enter text.

6. Field Quality Control

If field QC is requested, please list field site IDs or descriptors.
Ex. Site 1 Field Duplicate; Site 2 Field Blank

Field Duplicates
Click or tap here to enter text.
Click or tap here to enter text.
Field Blanks
Click or tap here to enter text.
Click or tap here to enter text.

Trip Blanks
Click or tap here to enter text.
Click or tap here to enter text.

7. Analysis Quality Control

Is there a specific site or sites requested for laboratory analysis quality control?
PM can designate which sample will be duplicated or spiked if needed. If not designated, normal laboratory quality controls and frequencies will be used.
Click or tap here to enter text.

8. Reporting

Definitions of deliverables are below. Check next to each one requested for this project. Final reports are always provided.

- ☐ Final Reports Only
- ☐ Preliminary Data or Lab Reports may be provided for any level of reporting but must be indicated.
- ☐ EDD is electronic data deliverable in the form of an excel spreadsheet of sample, test and results information.
- ☐ Summary QC Table is a pass/fail table for each analyte along with the requirements listed.
- ☐ Full QC Table lists all result values, calculation results and requirements listed for each analyte. Includes batch quality control and field quality control evaluations (if known).
- ☐ Raw Data is all raw and traceable data associated with the full laboratory lifecycle of the analysis of samples for this project. Includes raw instrument data, equipment logs, reagent and solutions logs, quality control charts for each analytical method, certificates for standards, etc. This type of packet requires a significant amount of work and time to compile.

9. Additional Details for QAPP Projects

If project has a QAPP- did the PM send a copy of the QAPP to SELSD for review?
Choose an item.
SELSD staff has reviewed the QAPP and understands the Quality Control requirements.
Staff Initials Click or tap here to enter text. Date Click or tap to enter a date.

10. Billing

If invoicing is indicated as billing method on initiation form, ask the following:

- Is a purchase order in place to pay for this project? Choose an item.
- If yes, PO # Click or tap here to enter text.
- Is there a maximum amount for lab services? $Click or tap here to enter text.
- Does the PM need a cost estimate per sample for the analytes requested? ☐Yes ☐ No
- Cost Estimate Per Sample $Click or tap here to enter text.
- Invoice Recipient Name (if other than project manager listed): Click or tap here to enter text.

Lab Use Only

The following sections are for lab use only to document items related to lab activities. These are not a part of the customer interview to complete the above portion.

Lab Capacity

Provide initial details from initiation form and details above to appropriate section managers for capacity assessment. Sample load, frequency, staffing, hold times, supplies and instrument availability should all be considered. Assessment options are accept, delay, reject.

Manager(s) Contacted, Date(s), Assessment: Click or tap here to enter text.

Sample Logging Information

The data intent and use determine the correct program and subprogram.

Program	Includes
☐ SDWA	Compliance, Non-Compliance
☐ PDES	Stormwater, Wastewater
☐ Private	(Research, Education, Contract, etc.)
☐ Contractual	(Other Agency or Tribal)
☐ Lab Priority	Investigation, Criminal/Enforcement, Complaints
☐ ODEQ	RCRA, Superfund, Solid Waste

Subprogram Click or tap here to enter text.

Does Project Manager have a LabWare account in the correct Address Book? If no, use a customer profile form to record account information before logging the project.

Account: Click or tap here to enter text.
Project ID: Click or tap here to enter text.
Project Description: Click or tap here to enter text.
Login Date: Click or tap to enter a date.
Login By: Click or tap here to enter text.

Sample Logging- Log According to Information Provided Above or in the QAPP

Number of Sampling Sites Click or tap here to enter text.

Field QC Samples Click or tap here to enter text.

Sample Point Group- Address(es) or EPA Site ID- Project Manager can send for prelogging if known Click or tap here to enter text.

Sample Point- Site IDs or locations- Project Manager can send for prelogging if known. Click or tap here to enter text.

Notifications

Notify the project manager when the sampling materials- containers, preservatives, Chain of Custody, sample labels, etc. are assembled and ready for pick up.

Date of Notification for Sampling Supply Pick Up: Click or tap to enter a date.
Initials: Click or tap here to enter text.

Additional Project Notes

Previous projects? Click or tap here to enter text.

History or background? Click or tap here to enter text.
Report analyte values between MDL and RL? Click or tap here to enter text.
Sampling Instructions Needed? Click or tap here to enter text.
Preservative requirements, shipping/transport requirements, hold times known? Click or tap here to enter text.
Click or tap here to enter text.

Approvals

1. Project Manager/Customer

Name	Title	Click or tap to enter a date.

2. SELSD Project Planning Management

Name	Environmental Program Manager	Click or tap to enter a date.
Name	Environmental Program Manager	Click or tap to enter a date.

3. Quality Management System

Name	SELSD Quality Assurance Officer or Designee	Click or tap to enter a date.

APPENDIX G- ACRONYMS

Acronym	Term
AOR	Analyst of Record
AQ	Aqueous
CCC	Continuing Calibration Check
CCV	Continuing Calibration Verification
COC	Chain of Custody
CV	Calibration Verification
DL	Detection Limit
DMR	Discharge Monitoring Report
DOC	Demonstration of Capability
DQM	Data Quality Manual
DQO	Data Quality Objectives
DW	Drinking Water
DWW	Drinking Water Watch
FLCA	Field and Laboratory Customer Assistance
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectroscopy
ICC	Initial Calibration Check
ICV	Initial Calibration Verification
IDC	Initial Demonstration of Capability
IDL	Instrument Detection Limit
IEC	Inter-element Correction Check Sample
IPC	Instrument Performance Check
IS	Internal Standard
LAP	Laboratory Accreditation Program
LCS	Laboratory Control Sample
LDR	Linear Dynamic Range
LFB	Laboratory Fortified Blank
LFM/LFMD	Laboratory Fortified Matrix/Laboratory Fortified Matrix Duplicate
LFS	Laboratory Fortified Sample
LIMS	Laboratory Information Management System
LLOQ	Lower Limit of Quantitation
LOD	Limit of Detection
LOQ	Limit of Quantitation
LRB	Laboratory Reagent Blank
LRS	Linear Range Study
MB	Method Blank
MCL	Maximum Contamination Level

MDL	Method Detection Limit
MQL	Minimum Quantitation Level
MRL	Minimum Reporting Limit
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NIST	National Institute of Standards and Testing
NRSB	National Radiation Safety Board
PDES	Pollution Discharge Elimination
PPT	Project Planning Tool
PQL	Practical Quantitation Limit
PT	Proficiency Test
PTAB	Proficiency Test Provider Accreditation Body
PTOB	Proficiency Test Provider Oversite Body
PWS	Public Water System
QA	Quality Assurance
QAO	Quality Assurance Officer
QAP	Quality Assurance Plan
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCS	Quality Control Sample
QMS	Quality Management System
RB	Reagent Blank
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SDWA	Safe Drinking Water Act
SDWIS	Safe Drinking Water Information System
SELSD	State Environmental Laboratory Services Division
SOP	Standard Operating Procedure
SRM	Standard Reference Method
SRS	Standard Reference Sample
SDM	Sample and Data Management
TNI	The NELAC Institute
USGS	United States Geological Survey
WID	Work Instruction Document
WQX	Water Quality Exchange

APPENDIX H- AFTER-HOURS SAMPLE DELIVERY WID

1. IDENTIFICATION AND PURPOSE

Complete sample integrity, the documentation of the history, custody, and traceability of a sample, is recommended for all samples. However, sample integrity is REQUIRED for drinking water compliance samples, RCRA (SW-846) samples, and samples potentially involved in litigation. Sample integrity is accomplished through the application and adherence of appropriate chain of custody procedures, consistent procedures, documentation, and proper sample storage. When samples are delivered by DEQ employees after business hours (8:00-16:30) and then received by Sample Management staff the next business day, there must be documented custody and proper, secure storage of the samples in between.

2. SCOPE AND APPLICATION

This procedure applies to DEQ staff only, specifically internal DEQ samplers, delivery staff and Sample Management staff. Only staff of the DEQ central office have access to the secure location where samples can be delivered after hours. This is not available to other customers. Other customers must contact the laboratory prior to sampling to see if any after-hours needs can be accommodated, which is not guaranteed. Only Sample management staff have access to unlock the secure storage location.

3. SUMMARY OF PROCEDURE

For sample delivery after-hours, DEQ staff completes the sign-in sheet. Staff ensures a sufficient amount of ice is present in the cooler or chest to maintain required sample temperature until receipt the following day. Staff places the paperwork with the cooler or chest into the secure storage area. Staff emails sample management to let them know samples are in the locker area for receipt the next day. The following business day, SM staff checks the locker in the morning and takes custody of the samples if the sign in sheet and documentation have been completed.

4. DEFINITIONS AND ACRONYMS

Custody- Per SW-846, EPA Drinking Water Program and Standard Methods 21st ED, a sample is considered to be in a person's custody if:

i. In a person's physical custody/possession.
ii. In view of the person after being in their possession.
iii. Locked/secured by that person to prevent tampering after being in their possession.
iv. Placed in a designated or identified secured area to prevent tampering after being in their possession.

Sample Management- SSDMS, SM- Statewide Sample and Data Management Section staff; responsible for receipt and accessioning of samples at DEQ central office for the State Environmental Laboratory

5. PERSONNEL QUALIFICATIONS, ROLES AND RESPONSIBILITIES

DEQ Staff- Sample Delivery Staff-

Responsible for providing complete and accurate sample chain of custody paperwork, ensuring that samples are in good condition upon arrival, ensuring that sufficient ice is loaded into the sample cooler or chest so that temperature is maintained

until receipt, completing the log in sheet for after-hours delivery, and communicating any deliveries to sample management staff.

SM Staff-

Sample receipt staff will check the after-hours storage location when prompted, review paperwork and sample conditions, receive and accession samples per procedure, and otherwise communicate any issues to the customer.

6. PROCEDURE

Samples are not officially in SM custody until staff signs for sample receipt the following day.

Samples will not be accessioned if they are not documented on the sign-in sheet.

If samples are not documented on the sign in sheet, the owner of the samples will be contacted. Samples will be accessioned when the owner verifies sample drop off in person and corrects the sign in sheet.

6.1 DEQ staff delivers samples to the designated after-hours delivery location in the loading dock area.
6.2 Delivery staff adds ice to coolers to maintain temperature until the next business day. Ice machine is located in the loading dock area.
6.3 Delivery staff completes all required information on the After-Hours Sign In Sheet located near the secure location. The sign in sheet and this instructional document will be on a clipboard attached to the secure cage.
6.4 Delivery staff places coolers or chests and sample documents, Chain of Custody forms, into the cage and then locks the cage.
6.5 Delivery staff then emails sample management to let them know samples are in the after-hours cage.
6.6. For legal custody, please apply signed custody seals to each container across the lid and also on the cooler over the seam of the lid.

APPENDIX I- CUSTOMER PROFILE

CUSTOMER PROFILE FORM

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY
STATE ENVIRONMENTAL LABORATORY SERVICES

Please fill the form out completely. Use N/A (Not Applicable) for those pieces of information that do not apply.

PART 1.

Have you or someone in your household/company filled out or provided this information to the SELS previously? ☐ YES ☐ NO

If yes, list company/person(s) who this account can be associated with: _____
Please fill out the form again if any information has changed.

PART 2.

☐ Business Company Name: _____
☐ Private Customer *Check one box to the left that represents your customer type account*

Point of Contact: _____
Designate who will be a contact for questions for this account. If name is same as above, write "Same"

Mailing Address: _____

City: _____

State: _____ Zip: _____

Phone Number: _____

Email Address: _____

PART 3.

Preferred Method of Laboratory Result Reporting: ☐ Email ☐ Mail
Email or address provided above will be used. If another address needs to be used (e.g. billing purposes), note below in additional information

Additional Information: _____

_____

LABORATORY USE ONLY

Account ID: _____ Date Received: _____/_____/

Circle One: New / Update Received By (Initials): _____