Analytical Services Division

Rocky Flats Environmental Technology Site

STATEMENT OF WORK

for

SAFE DRINKING WATER GENERAL CHEMISTRY

MODULE DW01-D

August 29, 2002

Approved: _____
Analytical Services

Reviewed For Classification
By: Roger S. Cichorz U/NU
ASD Project Lead – T130C
Date: August 29, 2002

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CHANGE DESCRIPTION FORM

Instructions:	DW01-C.1 is being transmitted in its entirety.

Module:	DW01	**Version:**	D	**Effective Date:**	August 29, 2002
Originator:	Ed Brovsky	**Description:**	Safe Drinking Water General Chemistry		

Affected Pages	Section No.	Change Description
Cover Page	N/A	New version and Effective date
General	Entire Document	DW01-C.1 was reformatted to meet BOA deliverable requirements. Because of the extensive changes required to accomplish this task, no revision markers are included.

INTRODUCTION

This module provides the technical requirements, quality control procedures, and an analysis structure that will generate data of known and documented quality for the identification and quantitation of Safe Drinking Water General Chemistry parameters. The work being performed is required to ensure the health of the Rocky Flats' employees and subcontractors.
The Laboratory shall employ safe handling procedures, obtain the required licensing for handling the samples, utilize generally accepted good laboratory practices in the performance of contract requirements, and shall follow the quality assurance/quality control (QA/QC) program specified herein.

Drinking water analysis will be conducted per Environmental Protection Agency (EPA), 40 CFR Part 141 - 143, "Safe Drinking Water Act" in accordance with EPA standard methods listed in 40 CFR 136 and 141. Updates to these methods shall be used by the Laboratory once the methods are promulgated and approved for use by the Site. The CTR shall provide the Laboratory implementation dates for any new methods.

EXHIBIT A:

SUMMARY OF REQUIREMENTS

1. GENERAL REQUIREMENTS

This module comprises eight Exhibits for the determination of general chemical parameters for Safe Drinking Water. Exhibit A provides an overview of the Safe Drinking Water General Chemistry module and its general requirements. Exhibit B contains the reporting and deliverables requirements which are in addition to GR01 requirements.. Exhibit C contains constituent lists with Line Item Codes and method requirements. Exhibit D defines any specific applications of these procedures for Safe Drinking Water analysis. Exhibit E contains general and specific laboratory QA/QC requirements. Exhibit F contains the evidentiary requirements including chain-of-custody, document control requirements that the Laboratory must follow in processing samples under this subcontract, and specifies requirements for written laboratory Standard Operating Procedures (SOPs). To ensure proper understanding of language utilized in this subcontract, Exhibit G contains a glossary of terms. Exhibit H contains the references which are specific to this module.

1.1. SOW Compliance

Sample analyses shall meet all the requirements specified in this Statement of Work (SOW). All work performed under this SOW shall be done by the Laboratory under the guidance of the CTR, or if applicable, by designated agents in accordance with contractual agreements.

1.2. Terms and Acronyms

The Laboratory shall use the Exhibit G glossary meaning when a term is used in the text without definition.

1.3. Key Identifiers

The terms *Report Identification Number* (RIN) and *Analytical Batch* are key to this SOW. Exhibit G gives precise definitions of these terms.

1.4. Potential Hazards Advisement

The samples to be analyzed by the Laboratory are from the Rocky Flats Environmental Technology Site and may contain potentially hazardous radioactive, inorganic, biological, and/or organic materials. The Laboratory should be aware of the potential hazards associated with the handling and analysis of these samples.

1.5. Nuclear Regulatory Commission (NRC) License

Laboratories seeking eligibility to receive radioactive or mixed radioactive/hazardous samples shall possess a valid NRC License or a State Radioactive Materials License for radionuclides regulated under the Atomic Energy Act, or must be an exempt facility as designated by a Federal Government Agency. The Laboratory shall provide suitable NRC- or State-licensed facilities to handle analyses of samples that have elevated activity levels. All analyses of radioactive samples, as well as radiochemical analyses, shall be conducted in licensed or exempted facilities. The Laboratory shall notify the CTR of all existing limits on receipt, amounts, and radionuclides that the Laboratory is authorized to handle. Samples without elevated activity levels may be analyzed in non-licensed facilities. Licenses shall be submitted to the CTR, or their designee,

prior to the preaward audit, and upon CTR request. Licenses shall be made available for inspection during on-site audits.

1.5.1. Licensed laboratories shall submit all amendments to their NRC (or State) License to the CTR within five days of amendment receipt.

1.5.2. The Laboratory shall have a radioactive materials inventory system in place that allows an inspection of their current nuclear materials inventory (except exempt Federal facilities).

1.5.3. Loss of the NRC license or amendments which restrict the receipt of radioactive or mixed radioactive/hazardous samples may result in a **Subcontract Termination** for these types of samples.

1.6. **Timelines**

Timelines given in terms of days are to be interpreted as calendar days throughout this SOW unless otherwise noted.

1.7. **Sample Size**

The Laboratory shall specify the amount of sample (weight or volume) required to perform analytical determinations. The amount of sample required shall initially be submitted with the Laboratory's bid for services and thereafter in writing to the CTR whenever the Laboratory's analytical needs change.

1.8. **Sample Shipments**

Sample shipments to the Laboratory's facility will be scheduled and coordinated by the CTR. The Laboratory Shipping/Receiving Officer shall communicate with the CTR by telephone, fax, or e-mail using appropriate documentation as necessary throughout the process of sample scheduling, shipment, analysis, and data reporting, to ensure that samples are properly processed.

1.8.1. Samples will routinely be shipped directly to the Laboratory through a delivery service. The Laboratory shall be available to receive sample shipments during regular working hours, and with 24 hours advance notice on weekends and holidays on an as-needed basis. As necessary, the Laboratory shall be responsible for any handling or processing required for the receipt of sample shipments, including pick-up of samples at the nearest servicing airport, bus station, or other carrier service within the Laboratory's geographical area.

1.8.2. If there are problems with samples (e.g., broken or leaking containers) or sample documentation/paperwork (e.g., missing, incomplete, or conflicting COC forms), the Laboratory shall immediately contact the CTR for resolution.

1.9. **Retention of Unused Sample**

The Laboratory shall retain unused samples for 60 days after the receipt of the data by the CTR or his/her designee. This requires the retention of samples in a secure, stable environment consistent with preservation requirements. After this time period has elapsed, the Laboratory shall contact the CTR in writing to determine the final disposal of the unused samples. Special requests to dispose of samples prior to the 14 days shall be made in writing to the CTR. The Laboratory shall have written approval from the CTR before any samples are disposed or returned.

1.10. **Technical Audits**

The Laboratory shall be subject to routine, on-site technical audits as described in Exhibit E of this SOW.

1.11. **Information Release**

Communication by Laboratory staff of analytical results, procedures, data, or similar matters shall be performed in accordance with procedures established in this module. In no case shall reports, results, or raw data be released to a third party without prior written approval of the CTR. This SOW constitutes written approval for release of routine reports, etc., to the State of Colorado, CDPHE.

2. LABORATORY ACCREDITATION

2.1. **Required Accreditations**

The laboratory shall provide all of the following Safe Drinking Water certifications:

- Certification by the Colorado Department of Health and the Environment (CDPHE) for the Drinking Water parameters for which the Laboratory desires consideration.
- If the Laboratory is not certified by the CDPHE but is certified by the Federal government or another state, it is solely the responsibility of the Laboratory to determine the reciprocity of such certifications with the CDPHE certification. Proof of such reciprocity shall be submitted with the contract proposal.

3. ACTION RESPONSE TO LABORATORY RESULTS

3.1. **Action Response to Laboratory Results**

For any noncompliance results the laboratory shall notify the Site immediately by telephone according to Table A1. The laboratory may not leave a voice mail message. Both persons delegated in a priority shall be contacted. If the persons delegated as the first contacts are not available, the second set of contacts shall be called, etc. The CTR will provide the Subcontractor with updates to this list as contact information changes.

TABLE A1 NOTIFICATION PRIORITY LIST

PRIORITY	CONTACTS	
FIRST	**GREG SOLLNER** Work Phone – (303) 966-3541 Pager – (303) 212-3178 Home Phone – (303) 838-9759	**LAURA JOHNSON** Work Phone – (303) 966-6401 Pager – (303) 212-3961 Home Phone – (303) 453-1064
SECOND	**BOB NININGER** Work Phone – (303) 966-4663 Pager – (303) 212-3195 Home Phone – (303) 664-5343	**ED BROVSKY** Work Phone – (303) 966-2883 Pager – (888) 212-0543 Home Phone – (303) 280-6487
THIRD	**SHIFT SUPERINTENDENT** (303) 966-2914	

4. FACILITY, INSTRUMENTATION, AND KEY PERSONNEL REQUIREMENTS

4.1. **Facility**

The Laboratory facility shall meet all requirements of the base analytical methods (i.e., required methods listed in Exhibit C) and the Laboratory Health and Safety Program specified in Exhibit A Section 5. The Laboratory shall ensure that the facility condition, construction, and organization are

sufficient for safe and effective analytical operations. Adequate bench space, ventilation, lighting, and temperature control shall be demonstrated.

4.2. **Instrumentation:**

The Laboratory shall have sufficient analytical equipment and capability to meet all terms and conditions of this SOW, including all equipment requirements specified in base methods used to perform the analyses.

4.3. **Organizational and Key Position Requirements**

The Laboratory organization shall be clearly structured with well-defined responsibilities for each individual in the management system. This system shall ensure that sufficient resources are maintained to perform the requirements of the SOW. Specifically, all key administrative positions and key technical positions shall be assigned to individuals. The Laboratory shall maintain a chart or diagram illustrating the Laboratory's organizational structure and all key position assignments. The Laboratory shall provide this chart to the CTR twenty-one days prior to the preaward audit and within fourteen days following changes to key positions.

Unless otherwise noted, the following technically relevant experience may be substituted for educational requirements, such that:

- A Master's degree equals a Bachelor's degree and four years of experience
- A Bachelor's degree equals:
  - ◊ An Associate's degree and four years of experience, which equals
  - ◊ A High School diploma and eight years of experience.

The Laboratory shall provide resumes for personnel holding key positions prior to the preaward audit and within fourteen days of assigning personnel to key positions thereafter. Résumés shall include position description, title, education (pertinent to the duties performed for this SOW), number of years of experience (pertinent to the duties performed for this SOW), month and year hired, previous experience, and publications. An updated chart or diagram illustrating the Laboratory's new organizational structure shall accompany résumé submission.

A qualifying individual may fill more than one key position unless stated otherwise. Failure to maintain individuals in each Key Position may result in a **Subcontract Termination**.

4.3.1. ***Key Administrative Positions***

Laboratory Director:

Responsibility:	Responsible for all aspects of the analytical laboratory.
Academic Training:	A master's degree (or equivalent) in a science discipline.
Experience:	A minimum of six years of laboratory experience, with at least three years of experience in a supervisory capacity. Must have a minimum of two years in a drinking water laboratory.

Technical Supervisor:

Responsibility:	Responsible for all technical efforts of an analytical laboratory section.
Academic Training:	A master's degree (or equivalent) in a science discipline.
Experience:	A minimum of four years of laboratory experience, with at least two years of experience in a supervisory position. Must have a minimum of one year experience in general chemical analysis of drinking water.

Project Manager

Responsibility:	Responsible for overall aspects of this SOW (from sample receipt through data delivery), and serves as the primary contact for the CTR.
Academic Training:	A bachelor's degree (or equivalent) in a science discipline.
Experience:	A minimum of three years of laboratory experience.

Quality Assurance Officer: The Quality Assurance Officer (QAO) shall be a full-time laboratory specific position. The QAO shall have direct access to management at a level where appropriate action can be effected.

Responsibility:	Responsible for assuring the Laboratory's QA Program meets all requirements of this SOW. Reports directly to upper management.
Academic Training:	A bachelor's degree (or equivalent) in a science discipline.
Experience:	A minimum of four years of laboratory experience, including at least two years of applied experience with QA principles and practices in an analytical laboratory. Must have documented education in statistics and quality control procedures.

Health and Safety Officer

Responsibility:	Responsible for overseeing the Health and Safety Program including personnel monitoring activities for hazardous, chemical, and radiological (if applicable) contaminates.
Academic Training:	A bachelor's degree (or equivalent) in a science discipline and certification in industrial hygiene. For laboratories analyzing radioactive samples, the academic training shall also include course work in radiation health and safety.
Experience:	A minimum of four years of experience in chemical safety, including at least two years of applied experience with laboratory health and safety practices. For laboratories analyzing radioactive samples, experience shall include two years of applied radiological health and safety practices.

Shipping/Receiving Officer

Responsibility:	Responsible for all shipments to and from the Laboratory facility.
Academic Training:	Certification as a "Hazmat" Employee in accordance with 49 CFR 172.
Experience:	A minimum of one year of experience in the transportation of hazardous materials.

Information Systems Specialist

Responsibility:	Responsible for management and quality control of all aspects of the Laboratory computer information systems including operation and maintenance, documentation, and training. Responsible for maintaining laboratory data base integrity, including overview of data entry, data updating, and quality control. Responsible for data and system security, backup and archiving.
Academic Training:	A bachelor's degree with four or more intermediate courses in programming, information management, database management systems, or systems requirements.

Experience: A minimum of three years experience in data or systems management or programming including one year experience with software being utilized for analytical data management.

5. LABORATORY HEALTH AND SAFETY PROGRAM

5.1. Facility

The Laboratory shall ensure that the facility condition, construction, and organization are sufficient for safe and effective analytical operations. Adequate bench space, ventilation, lighting, and temperature control shall be demonstrated.

5.2. Hazardous or Radioactive Constituents

Sample preparation for all tests involving actual or possible hazardous or radioactive constituents shall be performed in an environment that follows ALARA concepts and principles and meets applicable regulatory requirements .

5.2.1. Sample preparation for all analysis involving actual or possible hazardous or radioactive constituents shall be performed within a functional hood (125 ± 25 linear feet per minute average face velocity) or glove box.

5.3. Health & Safety Programs Content

At a minimum, the Laboratory shall develop and maintain effective programs in all of the following health and safety areas:

- respiratory protection
- occupational injury and illness reporting meeting the requirements of 29 CFR 1904
- chemical hygiene and hazard communication
- waste management
- safety training

5.4. Safety Training

The Laboratory shall provide and document safety training for all personnel.

5.5. Health and Safety Officer

The Health and Safety Officer shall have the responsibility and authority to stop unsafe work that may jeopardize the health of the Laboratory staff and/or the environment.

5.6. Chemical Hygiene/Hazard Communication Program

The Laboratory shall have a documented Chemical Hygiene/Hazard Communication Program reflecting actual process operations. This program shall meet the requirements of 29 CFR 1910.1400 and shall ensure the following:

5.6.1. ***Protective Apparel & Safety Equipment***: Protective apparel and safety equipment are available and compatible with the degree of protection required for the substances handled. Signs and labels clearly identifying emergency information and equipment shall be prominently posted.

5.6.2. ***Safety Inspections***: Safety inspections for housekeeping, safety showers, eyewash stations, fire extinguisher, emergency lighting, and any other areas of concern are routinely performed and documented.

5.6.3. ***Fume Hoods***: Fume hood operation in compliance with ANSI/AIHA Z9.5-1992 (Laboratory Fume Hood Section) and ANSI/ASHRAE 110-1195 procedures and documentation is maintained.

5.6.4. ***Federal & State Regulations***: Federal and State regulations, including radioactive material license requirements, for performing and documenting environmental monitoring of airborne concentrations and laboratory surface contamination for radioactive and highly toxic chemicals are met and documented.

5.6.5. ***Spill Control***: A spill control policy developed and implemented. This policy shall address spill containment, cleanup, reporting, and emergency procedures.

5.6.6. ***Chemical Labeling***: Chemicals not in their original containers are clearly marked or labeled.

5.6.7. ***Material Safety Data Sheets (MSDSs)***: A MSDS for each laboratory chemical is accessible to employees.

6. WASTE MANAGEMENT

6.1. Waste Management Program

The Laboratory shall develop, implement, and maintain a Waste Management Program documenting procedures and operating conditions for the handling, storage, shipment, and disposal of hazardous and/or radioactive waste in accordance with Federal, State, and local laws and regulations.

6.2. Effluent Monitoring Program

The Laboratory shall establish and document, in accordance with applicable Federal, State and local regulations, an Effluent Monitoring Program to ensure discharges to sanitary sewers meet regulatory limits.

6.3. Waste Disposal

Unless directed otherwise by the CTR, the Laboratory shall be responsible for the proper disposal of all waste generated during the analysis of Site samples. This includes waste categorized as hazardous waste, medical waste, low-level (radioactive) waste, and mixed waste (radioactive and hazardous). Waste forms include, but are not limited to, the following:

- Excess original sample (unless authorized for returned to the Site by the CTR)
- Sample analysis residue
- Sample extracts, digestates, and leachates
- Excess chemicals
- Laboratory materials contaminated by the sample (e.g., lab coats, glassware, pipette tips, planchets, and sample containers)

Evidence of improper waste disposition or documentation may result in a **Subcontract Termination**.

6.3.1. ***Waste Disposal Documentation***: The Laboratory shall certify the disposition and disposal location of waste generated from the analysis of Site samples and shall maintain the records as required by any applicable Federal, State, and/or local laws. These records shall be available for inspection during on-site audits and upon request.

6.3.2. ***Return of Unused Samples***: The Site will only accept the return of unused samples when authorized in writing by the CTR at the time of sample confirmation.

At the time of analysis request, the CTR will identify, in writing, whether unused sample(s) are to be returned to the Site for disposal or the responsibility for disposal belongs to the Laboratory.

EXHIBIT B:

REPORTING AND DELIVERABLE REQUIREMENTS

1. INTRODUCTION

DW01 Exhibit B contains reporting and deliverable requirements applicable to all Safe Drinking Water General Chemistry Line Item Codes (LICs) defined in DW01 Exhibit C. Requirements for Sample Data Packages (SDPs), Supporting Documentation Packages (Support Packages), and other deliverables specific to Safe Drinking Water General Chemistry are detailed in the following tables:

Table B-1. Turnaround Time/Package (TATPKG) Codes
Table B-2. Standard Deliverable Sample Data Package
Table B-3. Standard Deliverable Plus Raw Data Sample Data Package
Table B-4. Other Deliverables
Table B-5. Supporting Documentation

2. SCHEDULE FOR SDP DELIVERABLES

Turnaround times will start when the last sample within a RIN is received at the subcontractor's facility. In cases where samples for a given RIN are received on multiple days, the Final Data Package for such RINs will be due the appropriate numbers of days after the last sample in the RIN has been received.

Sample Data Package deliverables consist of two categories, Standard Deliverable and Standard Plus Raw Data Deliverable, with delivery times ranging from 24 hours to 5 days.

2.1. Turnaround Time (TAT) and Data Package Category

RFETS will use a Turnaround Time/Package (TATPKG) Code on the Chain-of-Custody (COC) form to request TAT and the Sample Data Package Category. This information will be provided under the "Sample Analysis" column of the COC. Table B-1 identifies the TATPKG Codes and their associated TAT and Data Package Category. Unless otherwise noted, all days are listed as calendar days from the Validated Time of Sample Receipt (VTSR) of the last sample in a RIN to the date the deliverable is received by the CTR.

Table B-1: TATPKG Codes

TATPKG Code	TAT/Data Package Category
28dR	28 Day/Results Only Deliverable
28dS	28 Day/Standard Deliverable
28dF	28 Day/Standard Plus Raw Data Deliverable
21dR	21 Day/Results Only Deliverable
21dS	21 Day/Standard Deliverable
21dF	21 Day/Standard Plus Raw Data Deliverable
14dR	14 Day/Results Only Deliverable
14dS	14 Day/Standard Deliverable
14dF	14 Day/Standard Plus Raw Data Deliverable
7dR	7 Day/Results Only Deliverable
7dS	7 Day/Standard Deliverable
7dF	7 Day/Standard Plus Raw Data Deliverable

Table B-1: TATPKG Codes (continued)

TATPKG Code	TAT/Data Package Category
3dR	3 Day/Results Only Deliverable
3dS	3 Day/Standard Deliverable
3dF	3 Day/Standard Plus Raw Data Deliverable
48hrR	2 Day/Results Only Deliverable
48hrS	2 Day/Standard Deliverable
48hrF	2 Day/Standard Plus Raw Data Deliverable
24hr[1]R	1 Day/Results Only Deliverable
24hrS[1]	1 Day/Standard Deliverable
24hrF[1]	1 Day/Standard Plus Raw Data Deliverable

[1] For all samples that require a 24 hour TAT the Final Sample Data Package for samples received before noon are due by noon of the next working day. Samples received after Noon are due before noon of the day following the next working day. The following examples illustrate several cases:

Samples received Wed before 12 Noon - deliverable is due Thurs before Noon

Samples received Fri before 12 Noon - deliverable due Mon before Noon

Samples received Fri after 12 Noon - deliverable due Tues before Noon

2.2. Request for Laboratory Services

Prior to sample shipment, the CTR will obtain written confirmation from the laboratory that they agree to receive samples for requested LICs, deliverable turnaround times and data package category. The CTR will solicit laboratory confirmation by submitting to the laboratory a "Laboratory Confirmation Form" that identifies the specifics of the requested services. The Laboratory shall notify the CTR within 24 hours of receiving the confirmation form of their intent to accept or decline receipt of the sample(s). Any technical or administrative problems associated with meeting terms of the request shall be identified and resolved with the CTR prior to any samples being shipped. Any deliverables received after the agreed upon delivery schedules shall be considered late.

2.3. EDD Delivery Requirements

The EDD shall be delivered at the same turnaround time requested for the sample data package and shall meet the requirements of Appendix A. The CTR shall provide the subcontractor with an email address for submitting EDDs if different than specified in Appendix A.

2.4. Notification Requirements for Late Deliverables

The Laboratory shall notify the CTR immediately of any problems or laboratory conditions that affect the timeliness of analyses and data reporting. In particular, the Laboratory shall notify the CTR in advance regarding sample data that will be delivered late and shall specify the estimated delivery date.

3. SAMPLE DATA PACKAGE REQUIREMENTS

The DW01 SOW includes three SDP report deliverable categories identified as "Results Only Deliverable (Table B-2)," "Standard Data Package Deliverable (Table B-3), and Standard Plus Raw Data Deliverable (Table B-4).

3.1. General Requirements

3.1.1. ***Hardcopy Original Documents***: Any component of sample data package deliverables provided as a hardcopy shall be original documents when possible. Photocopies of

original documents shall be included in the sample data package when the original is bound in a logbook maintained by the Laboratory. Photocopies of original documents may also be submitted if the original data were previously submitted under another RIN.

3.1.2. ***Pagination***: The complete sample data package shall be single sided and consecutively paginated.

3.1.3. ***Colored Paper***: Under no circumstances shall colored paper be used in a hardcopy sample data package deliverable.

3.1.4. ***Acceptance, Resubmission, and Reporting Limits***: The general and specific requirements listed in Exhibit B Sections 8 and 9 shall be met unless stated otherwise.

3.2. **Results Only Data Package Deliverable**

The following is a listing of the deliverables required for the Results Only Data Package Deliverable category. This category contains the minimum components required for a data package deliverable. All components contained in this category shall also be included in the Standard Deliverable Package and the Standard Data Plus Raw Deliverable Package.

TABLE B-2: RESULTS ONLY DELIVERABLE

Component Name	Description
Cover Page(s)	The cover page shall contain standard header information, sample information and Electronic Image Deliverable Certification Statement. **Header Information:** The following header information shall be included on all Reporting forms. • ***Laboratory Name*** • ***Subcontract Number*** • ***Report Identification Number*** (RIN) • ***Laboratory Report Identification Number*** **Sample Information** (In Tabular Form) • ***Bottle Number*** • ***Customer Number*** • ***Laboratory Identification Number*** • ***Line Item Code*** (LIC) • ***Analytical Batch Identification*** • ***Sample Matrix*** **Electronic Image Deliverable Certification Statement** (See Electronic Image Deliverable Requirements, Exhibit B, Section 3.5)
Chain of Custody	See Section 3.5.2, and Exhibit F for COC requirements.

TABLE B-2: RESULTS ONLY DELIVERABLE (continued)

Component Name	Description
Case Narrative	A narrative describing all problems or unusual circumstances encountered in the analytical processing of samples shall be prepared. At a minimum, the narrative shall address each of the following items, even if no deficiencies or unusual occurrences were experienced: • Any problems or deficiencies identified at the time of sample receipt • Method reference numbers and revisions • Descriptions of matrix interferences • Description of required dilutions • Explanations of any QC deficiencies, missed holding times, or inability to meet acceptable detection limits as listed in 40CFR or 10% of the MCL, whichever is greater. • A statement indicating that no QC deficiencies were noted if applicable. • Reasons for reanalysis, reanalysis Analytical Batch Identification Numbers, and a synopsis of the reanalysis Analytical Batch QC assessment • Explanations and descriptions of all deviations from routine protocols, including deviations from approved SOPs, detection limit modifications, etc. If it was necessary to contact the CTR for instructions due to the nature of the deviation, the Laboratory shall document those instructions in the narrative.
Sample Summary	**Header Information:** (Include the same information identified for this item under the "Cover Page" Component.) **Sample Information**: Sample Information may be presented in a continuous tabular format by sample by requested analyte. Consecutive samples may be reported in the same table. Individual sample result summary forms are not required. The following information, at a minimum, shall be included unless otherwise noted: • ***Customer Sample Number*** • ***Laboratory Sample Number*** (Optional) • ***Analyte Name*** • ***Analytical Result*** (Reported in same units identified for the Maximum Contaminate Level (MCL)as defined in DW01, Exhibit C unless noted otherwise on COC.) • ***Analyte*** **Maximum Contaminate Level (MCL)**

3.3. Standard Data Package Deliverable

The following is a listing of hardcopy deliverables required for the Standard Data Package Deliverable category. This category contains all the components required for the Results Only Data Package plus a QC summary.

TABLE B-3: STANDARD DATA PACKAGE DELIVERABLE

Component Name	Description
Results Only Deliverable	All components contained in the Results Only Data Package deliverable.
QC Summary	**Header Information:** (Include the same information identified for this item under the "Cover Page" Component.) **QC Sample Information (Include for all applicable QC Samples)**: • ***Analytical Batch Identification*** • ***QC Sample Identification*** • ***QC Sample Type*** (i.e., LCS, PB, MB, etc. if not imbedded in QC Sample Identification) • ***Analyte*** • ***Analytical Result*** (In appropriate units) • ***Known Value*** (as appropriate) • ***% Recovery*** (as appropriate) • ***Analysis* Date**

3.4. **Standard Data Package Plus Raw Data Deliverable**

The following is a listing of the deliverables required for the Standard Data Package Plus Raw Data Deliverable category. This category contains all the components required for the Standard Data Package plus preparation and instrument raw data.

TABLE B-4: STANDARD DATA PACKAGE PLUS RAW DATA DELIVERABLE

Component Name	Description
Standard Deliverable	All components contained in the Standard Data Package deliverable.
Raw Data	**Preparation Raw Data:** Sample Preparation raw data shall be documented in the form of: • ***Bench sheets and/or preparation logs containing, at a minimum, the following:*** ▪ Analytical Batch identifier ▪ Date of preparation ▪ Identifier for the Laboratory SOP for the preparation ▪ Identifiers for all sample and QC solutions prepared ▪ Balance identifiers with the dates of use ▪ Initial and final weights and volumes for all samples and QC samples including gross weights and tare weights where applicable ▪ Pipette identifiers and dates of use (if applicable) ▪ Comments describing any significant sample ▪ Changes or reactions that occur during preparation ▪ Indication of percent moisture and pH, as applicable ▪ Signatures and dates of all analysts and reviewers

TABLE B-4: STANDARD DATA PACKAGE PLUS RAW DATA DELIVERABLE (continued)

Component Name	Description
Raw Data (continued)	***Instrument run logs*** **Calibration Raw Data** All associated raw data used to calibrate the instrument, used for continuing calibration, etc. **Sample Analysis Raw Data** All raw data associated with the generation of sample results. This includes data for analyses performed but not used for reporting. **QC Raw Data** Raw data for all quality control analyses included, not limited to, initial calibration, continuing calibration, matrix spike, duplicate, blanks, LCS, serial dilution, MSA, etc.

3.5. **Electronic Image Deliverable**

The subcontractor shall provide an electronic image, in Portable Document Format (PDF), for all components contained in the "Standard Deliverable" category. An electronic image of the "Standard Plus Raw Data Deliverable" is required for all components except Raw Data. The Site encourages, however, the transmittal of Raw Data as a PDF file whenever possible. When printed, the Electronic Image Deliverable shall meet all content and reporting requirements identified for sample data packages.

The following additional requirements shall be met for the Electronic Image Deliverable:

3.5.1. ***Certification Statement***

The cover page shall contain the following statement:

"*I certify that this electronic image, and all hardcopies produced from this image accurately represent the data and are in compliance with the RFETS specific requirements, both technically and for completeness, other than the conditions detailed above or in the sample data package narrative. Release, by submission through email, of the data contained in this electronic image and the computer-readable EDD (as applicable), has been authorized by the Laboratory Manager or the Manager's designee.*"

- This statement shall be directly followed by the typed name of the Laboratory Manager or his/her designee including title, and the date of the authorization.
- In the event that the Laboratory Manager or his/her designee cannot validate all data reported for each sample, he/she shall provide a detailed description of the problems associated with the sample(s) in the sample data package narrative.

3.5.2. ***Hardcopy Deliverables***

The subcontractor shall not deliver any hardcopy deliverables that have already been provided as an electronic image deliverable. Delivery of the original COC and all CTR additional requests for hardcopies are exceptions to this requirement.

The following requirements shall be met for Hardcopy Deliverables:

- Original Chain of Custody (COC): The original COC shall be delivered to the CTR within 3 business days of Electronic Image transmittal.

- Raw Data: Raw data, provided in hardcopy, shall be delivered to the CTR within 3 business days of Electronic Image transmittal. Raw data shall be sequentially numbered beginning with the page number following the last page of the PDF document. A cover letter shall accompany the raw data indicating the Laboratory Name, Contractor Sample Numbers, LIC(s) associated with the data package, and a statement indicating that the first *xxx* pages of the deliverable were transmitted electronically (where *xxx* is the last page of the electronic deliverable).
- CTR Request: The subcontractor shall provide an additional hardcopy for all or any part of a deliverable category (Standard Deliverable or Standard Plus Raw Data Deliverable) within 7 calendar days of CTR request.
- The Site will produce all needed hardcopy data packages by combining a printed copy of the Electronic Image Deliverable with associated hardcopy transmittals.

3.5.3. ***Electronic Image Transmittal***

- The Electronic Image Deliverable shall be transmitted to the Site by email. The Site will reply to all transmittals with an email confirming receipt. No other means of transmittal will be accepted at this time. The Site is currently evaluating alternate methods of transmittal, and as these methods become available for use, the subcontractor will be notified. The CTR shall provide the subcontractor with an email address for submitting Electronic Image data packages.
- The date of data delivery shall be the date of email transmission of the Electronic Image Deliverable provided the complete data package (original COC and applicable Raw Data) is received within 3 business days of the electronic delivery. Otherwise the official date of delivery will be the date the complete package is received.

3.5.4. ***Electronic Image Guidelines***

- Wherever possible, pdf files should be created by printing directly to Adobe Acrobat as this results in maximum legibility and minimum file size.
- Scanned images should be scanned in black and white (1 bit) mode at 150 to 300 dpi. Lower dpi is preferable but may not be acceptable for small text.
- Consideration should be given to scanning in color only for low contrast color print. Legibility, however, is more important than file size.
- Portable document format (pdf) files should be version 1.3 or higher.

4. ELECTRONIC DATA DELIVERABLE (EDD)

Requirements for the Electronic Data Deliverable (EDD) are specified in Appendix A. An EDD is required for all analyses identified in Exhibit C unless otherwise directed in writing by the CTR.

4.1. Systematic Errors:

Systematic errors in the EDD deliverable may result in a Subcontract Termination.

5. REQUIREMENTS FOR STATE REPORTING DELIVERABLES

5.1. Monthly Summary Report

The Laboratory shall submit a summary report of all analyses that complied with the SDWA standards to the Colorado Department of Public Health and the Environment (CDPHE) and to the CTR on the final day of each calendar month.

5.2. **Nonconformance Reports**

The Laboratory shall submit analytical results for each nonconformance to CDPHE only after notifying RFETS of the nonconformance as directed in DW01 Exhibit A/Section 3 or upon written direction from the CTR.

6. REQUIREMENTS FOR OTHER DELIVERABLES

Requirements for other deliverables are specified in Table B-5.

TABLE B-5 OTHER DELIVERABLES

Item	Schedule	Recipient	Reference Exhibit/Section
Signed copy of COCs and discrepancy reports	Relayed by fax or email within 24 hours of sample receipt	CTR	Exhibit F/Section 2
Supporting Documentation	Available during audits and within 7 days of request	Maintained at Laboratory	Exhibit B/Section 7 Exhibit F/Sections 4 and 5
Notification of accidental damage, theft, or malicious mischief of samples or results	Written notification within 48 hours of loss or damage	CTR	Exhibit F/Section 2
Security procedures and documentation of individuals having access to secure areas	Available during audits and upon request	CTR	Exhibit F/Section 4
Notification of problems or Laboratory conditions that affect timeliness of analysis, data reporting, missed holding times, etc.	Immediate telephone notification, written confirmation and explanation within 3 days	CTR	Exhibit B/Section 2
Resubmission requests	7 days from request for a Standard Deliverable. Additional or Revised Data Shall not exceed 3 working days	CTR	Exhibit B/Section 8
EDD resubmittal requests	7 days from request. Additional or Revised Data Shall not exceed 3 working days	CTR	Exhibit B/Section 8.2
Documentation of document shipments	Available during audits and upon request (rethink, include email notification of receipt, lab proof for appeal)	Maintained at Laboratory	Exhibit F/Section 4
Sample shipping container Return (coolers)	2 weeks after VTSR	Sender	Exhibit F/Section 3
List of Active SOPs (including Corporate and lab specific Health and Safety Plan)	21 days prior to pre-award audit and within 14 days of the addition of new or amended SOP(s)	CTR	Exhibit B/Section 7
Written notification of new or amended SOPs	Within 14 days of change	CTR	Exhibit F/Section 6
Requested SOPs	3 days from request	CTR	Exhibit F/Section 6
QA plan	21 days prior to pre-award audit during audits and upon request	CTR	Exhibit E/Section 3
QA Training	Available during audits and upon request	CTR	Exhibit E/Section 3

TABLE B-4 OTHER DELIVERABLES (continued)

Item	Schedule	Recipient	Reference Exhibit/Section
Organizational chart/diagram	21 days prior to pre-award audit 14 days following change in key personnel	CTR	Exhibit A/Section 3
Résumé of individuals holding key positions	21 days prior to pre-award audit 14 days of assigning new personnel to key positions	CTR	Exhibit A/Section 3
Waste disposal records	Available during audits and upon request	Maintained at Laboratory	Exhibit A/Section 5
Standards and reference materials certificates	Available during audits and within 7 days of request	CTR	Exhibit E/Section 6
Copies of radioactive license	21 days prior to pre-award audit, available during audits and upon request	CTR	Exhibit A/Section 1
Amendments to radioactive license	5 days after receipt	CTR	Exhibit A/Section 1
Audit corrective action response	As determined during audit debriefing	Lead Auditor	Exhibit E/Section 10
Intralaboratory certification documentation by analyst	Available during audits and upon request	Maintained at Laboratory	Exhibit E/Section 4
Check weight and Balance certifications	Available during audits and upon request	Maintained at Laboratory	Exhibit E/Section 5
Thermometers and temperature recording device certifications	Available during audits and upon request	Maintained at Laboratory	Exhibit E/Section 5
Automatic pipette and sample dispenser calibration documentation	Available during audits and upon request	Maintained at Laboratory	Exhibit E/Section 5
Refrigerator temperature documentation	Available during audits and upon request	Maintained at Laboratory	Exhibit E/Section 5
Instrument maintenance/repair documentation	Available during audits and upon request	Maintained at Laboratory	Exhibit E/Section 5
Water purity monitoring and corrective action documentation	Available during audits and upon request	Maintained at Laboratory	Exhibit E/Section 6
Sample handling documentation	Available during audits and upon request	Maintained at Laboratory	Exhibit F/Sections 2, 3, & 4
List of PE Program Participation	21 days prior to pre-award audit	CTR	Exhibit E/Section 9
Last two PE sample results	21 days prior to pre-award audit	CTR	Exhibit B/Section 10
Standards/SRM Certificates as required by method	Available during audits and within 7 days of request	CTR	Exhibit E/Section 6
Laboratory Accreditations & Certifications	21 days prior to pre-award audit and within 14 days following Laboratory receipt of new, amended or revoked certifications.	CTR	Exhibit A/Section 2, Exhibit E/Section 14

TABLE B-4 OTHER DELIVERABLES (continued)

Item	Schedule	Recipient	Reference Exhibit/Section
Performance Evaluation Sample Analysis Results	21 days prior to pre-award audit 7 days from receipt of results Minimum frequency annually	CTR	Exhibit B Section 9, Exhibit E Section 9
Root cause and corrective action reports for failed PE samples	21 days from receipt of results	CTR	Exhibit E/Section 9
Proof of Laboratory certifications	21 days prior to pre-award audit and upon request	CTR	Exhibit E/Section 14
Internal Audit Reports	Available during audits and upon request	Maintained at Laboratory	Exhibit E/Section 11

7. SUPPORTING DOCUMENTATION

The Laboratory shall maintain supporting documentation relevant to analyses performed on Site samples. This documentation shall be maintained per the Document Retention requirements identified in Exhibit F and shall be available during audits or upon request.

7.1. Minimum Documentation Requirements

Table B-6 lists the minimum required documentation that shall be maintained by the Laboratory.

TABLE B-6 SUPPORTING DOCUMENTATION

Deliverable Section Title	Reference (Exhibit/Section Number)
Quality Records	Exhibit F/Section 4
Copy of Sample Data Package (hardcopy or electronic)	Exhibit B/Section 6.3
Original logs logbooks, and other Quality Records	Exhibit B/Section 6 Exhibit F/Section 4
Standard Operating Procedures	Exhibit B/Section 6 Exhibit F/Sections 4 and 6
Software Quality Assurance	Exhibit B/Section 6 Exhibit F/Section 5

7.2. Internal COC Requirements

The Support Package shall include sample receipt, storage, tracking, and internal COC records as required in Exhibit F.

7.3. Copy of the Sample Data Package

The laboratory shall maintain a copy or the ability to reproduce a copy of all components of the Standard or Standard Plus Raw Data Deliverables.

7.4. Original Logs Sheets and /or Logbooks

Logs and/or logbooks including, but not limited to, preparation logs, instrument run logs, balance calibration logs, and instrument maintenance logs shall be maintained by the laboratory and made available during audits.

7.5. **Standard Operating Procedures**

The Laboratory shall maintain current and superceded copies of SOPs used in the generation of Site data. SOPs shall be available during audits. Uncontrolled copies of SOPs shall be provided to the CTR within 3 days of request. Specific SOP requirements are identified in Exhibit F.

7.5.1. ***List of Active SOPs***: The Laboratory shall provide the CTR a complete list of all active SOPs relevant to this SOW at the time of subcontract award. The list shall include procedure identifier, title, and effective date. During the term of performance of the subcontract, the Laboratory shall provide the CTR with an updated SOP list within 14 days of the effective date of new or amended SOPs.

7.6. **Software Quality Assurance**

The Laboratory shall maintain a historical file of software revisions and associated validation documentation as described in Exhibit F.

8. DATA ACCEPTANCE AND RESUBMISSIONS

8.1. **Complete Deliverables**

Performance calculations, used in the determination of payment, are based on the receipt date of *complete* deliverables. Subcontractor submitted deliverables, both hardcopy and electronic, that are deficient in content, contain errors, are illegible or include inaccuracies will not be considered as a *complete* deliverable until acceptable corrections are received.

8.2. **Resubmission Requirements**

The subcontractor may be required to submit or resubmit data as a result of a CTR request, an incomplete deliverable, or an amendment to a previously submitted deliverable. Resubmissions fall under three category types as described below:

Previously Submitted Deliverables: A resubmission of a deliverable without change from what was originally submitted (duplicate report).

Additional Data: Submission of data to a previously submitted deliverable that was not included in the original submission.

Revised Data: Submission of data that differ form the original submission.

8.2.1. ***Turnaround Requirements for Resubmitted Deliverables***

The subcontractor shall provide the CTR or their designee Previously Submitted deliverables within 7 calendar days of request. Additional or Revised Data shall be submitted to the CTR or their designee immediately upon request. CTR receipt of Additional or Revised Data shall not exceed 3 working days.

8.2.2. ***Identification of Resubmitted Deliverables***

Resubmissions shall be clearly marked to allow proper processing of the deliverables upon receipt. The identification requirements for the three resubmission categories are provided below for the identified deliverable types:

8.2.2.1. **Electronic Image**: All Electronic Image resubmissions shall be transmitted as a complete stand-alone document that includes all components of the initially submitted deliverable.

<u>Cover Page</u>: The following information shall appear at the very top of the Electronic Image required Cover Page:

- The first line shall state: "**Duplicate Report**", for previously submitted deliverables**,** or "**Revised Report**" for deliverables containing Additional or Revised data.
- Non-Compliance Notification (NCN) Number requesting the resubmission (when applicable).
- A description of what changed
- List of pages containing new or revised information (do not list pages affected by pagination only).
- A sequential two digit Revision number shall be appended to the end of the Laboratory Report Identification Number, i. e., Rev 01. This number shall correspond to the revision number provided in the electronic image file name.

Affected Pages: The top right corner of all pages containing new or revised information shall be marked with "**Revised**" followed by the date of resubmittal. Pages that change because of pagination only shall not be given a designation.

File Name: The following designations shall be appended to the end of the pdf file name for Resubmitted Deliverables:

- **_DUP** for Previously Submitted Deliverables
- **_REVxx** for Additional or Revised Data, where "**xx**" is a two-digit number identifying the number of resubmissions beginning with 01.

8.2.2.2. **Raw Data** (not included in the Electronic Image) : A cover page shall accompany the resubmittal of all hardcopy raw data and shall contain the following information:

Cover Page

- The first line or top of the cover page shall state: "**Duplicate Raw Data", "Supplementary Raw Data**", or "**Revised Raw Data**" as designated by the resubmission category, followed by the date of resubmittal. Resubmittals that contain both additional and revised data shall be flagged as "**Revised Raw Data**".
- Non-Compliance Notification (NCN) Number requesting the resubmission (when applicable)
- A description of what changed and a list of the affected pages (Additional or Revised Raw Data only).
- Laboratory Name
- Contractor Sample Numbers
- LIC(s) associated with the raw data

Affected Pages: The top right corner of all affected pages shall be marked with "**Appended**" or "**Revised**" followed by the date of resubmittal. Pages that contain both Additional and Revised Data shall be flagged as "**Revised**". For Additional or Revised Raw Data, only the affective pages shall be included in the resubmission. These pages shall be paginated for insertion into the original document. Revised pages shall have the same page numbers as the original, and additional pages shall be numbered as the previous page followed by a letter, e.g., 14a, 14b, 14c.

8.2.2.3. ***EDD***

Contractor Requested EDD Resubmissions: The text section of the email containing the resubmitted EDD file shall include the Non-Compliance Notification (NCN) Number requesting the resubmission (when applicable).

Unsolicited EDD Resubmissions: The subcontractor shall include a reason for an unsolicited EDD resubmission in the text section of the email containing the new EDD file.

File Name: The following designations shall be appended to the end of the file name for Resubmitted EDDs:

- **_DUP** for previously submitted EDDs with no changes from the original.
- **_REVxx** for EDDs containing Additional or Revised Data, where "**xx**" is a two digit number identifying the number of resubmissions beginning with 01. This number is independent of the number used to track electronic image data packages.

9. REPORTING - LIMITS AND REQUIREMENTS

9.1. Media Types and Reporting Units

Media types and reporting units are specified in Exhibit C and Appendix A.

9.2. Significant Figures

Sample results shall be reported to the same number of significant figures as provided for the MCLs in Exhibit C. Rounding Rules are provided in Exhibit G.

9.3. Sample Dilutions

Sample dilutions are allowed when necessary to quantify a requested analyte. All required analytes must meet the required detection limits unless otherwise stated.

9.3.1. When dilutions are required due to off-scale responses, the Laboratory shall dilute the sample as necessary to return the response to approximately the midpoint of the valid analytical range. The Laboratory shall not dilute the results to below required detection limits.

9.3.2. When dilutions are required due to analytical interferences, the Laboratory shall use the least dilution necessary to eliminate the interference or reduce the interference to acceptable levels. The Laboratory shall notify the CTR when dilutions cause results to fall outside of reporting limits. Upon CTR request, proof demonstrating intermediate dilutions could not eliminate the interference shall be provided. This information shall be included as part of the narrative.

9.3.3. When a dilution is warranted both original and diluted results shall be reported as separate analyses.

9.4. Reanalysis

9.4.1. When reanalysis is performed due to QA failure, the Laboratory shall report a single final result.

9.4.2. Reanalysis shall be explained in the sample data package narrative.

9.4.3. All reanalyses shall be traceable to the reanalysis analytical batch identification and to the reanalysis analytical batch QC samples.

9.4.4. QA/QC requirements for analytical batches containing samples requiring reanalysis shall be identical to those for the initial analyses and given a unique laboratory sample number.

9.4.5. Certain reanalyses are considered separate sample analyses for which the Laboratory will be paid. The CTR will request reanalysis on a case-by-case basis.

9.5. **Results of Intercomparison/Performance Evaluation (PE) Sample Analysis**

9.5.1. Intercomparison study/PE sample analyses results shall be reported in accordance with requirements specified in the PE program.

9.5.2. PE samples shall be carried through the entire analytical procedure specified with the PE samples.

9.5.3. PE samples shall be run using routine analysis procedures, where possible. The Laboratory shall analyze the PE samples within the required holding times and delivery schedules.

9.5.4. The Laboratory shall provide to the CTR its Site Identification Code (SIC) for PE programs in which they participate, and allow the Site to directly access PE results through the use of the Laboratory's SIC. The Laboratory shall send the CTR copies of the last two PE results 21 days prior to pre-award audit, and within seven days of receiving PE results thereafter.

EXHIBIT C:

SAFE DRINKING WATER GENERAL CHEMISTRY ANALYTE LIST

1. INTRODUCTION

The constituents required for DW01 Safe Drinking Water General Chemistry are listed in the following tables of this Exhibit. Each constituent or group of constituents are associated with a Line Item Codes (LICs) that is used to identify an analysis requests. The constituent identifications, method requirements, and reporting limits with the required reporting units are also included for each constituent. Note: An asterisk (*) in a LIC (e.g., DW01*101) denotes the latest revision letter of the DW01 SOW.

2. ANALYTICAL CATEGORIES AND LINE ITEM CODES

The following Table C1 provides a single Line Item Code for all constituents in an analytical category and reference to a following table in this exhibit for a single constituent LIC in an analytical category. The single LIC that references an analytical category is used when all constituents in an analytical category are to be analyzed.

TABLE C1 ANALYTICAL CATEGORY LINE ITEM CODES

Analyte Category	Line Item Code (LIC)
Inorganics - All Constituents in Table C2	DW01D001
Inorganics - Single Constituents in Table C2	See Table C2
Organics - All Regulated VOCs in Table C3 (EPA 524.2)	DW01D004
Organics - Single Regulated VOC in Table C3 (EPA 524.2)	DW01D018
Organics - Unregulated VOCs & THMs in Table C4 (EPA 524.2)	DW01D005
Organics - Single Unregulated VOC in Table C4 (EPA 524.2)	DW01D019
Organics - All Trihalomethanes (THMs) in Table C5 (EPA 524.2)	DW01D017
Organics - Halo acetic acid - All Constituents in Table C6	DW01D020
Organics - Base/Neutral/Acid Compounds in Table C7 (EPA 525.2)	DW01D011
Organics -Carbamate Pesticides in Table C8 (EPA 531.1)	DW01D012
Organics -DBCP & EDB Compounds in Table C9 (EPA 504)	DW01D013
Organics -Herbicides in Table C10 (EPA 515.1)	DW01D014
Organics -Pesticides & PCB in Table C11 (EPA 505)	DW01D015
Organics -Pesticides in Table C12 (EPA 525.2)	DW01D016
Organics - Other synthetic constituents in Table C 13	See Table C13
Secondary Contaminants - All Constituents in Table C14	DW01D007
Secondary Contaminants - Single Constituents in Table C14	See Table C14
SDWA Corrosivity Tests - All Constituents in Table C15	DW01D009
SDWA Corrosivity Tests - Single Constituents in Table C15	See Table C15
Turbidity in accordance with 40 CFR 141.74 (a) (1)	DW01D010

3. ANALYTICAL CATEGORY CONSTITUENT LISTS

The following Tables C-2 through C-15 list the constituents which are required, at a minimum, to be analyzed when an analytical category LIC listed in Table C-1 is requested. Some of the following tables also list LICs for single constituents that may be used to request individual constituents when all constituents in an analytical category are not required.

3.1. Regulated Inorganics

The following TABLE C-2 lists all the required inorganic constituents for the LIC DW01∗001 with the Maximum Contaminate Level (MCL), and holding time of each constituent. Each individual constituent also has a LIC that is used to request the individual constituent when all constituents in this analytical category are not required. The acceptable detection limits shall be those listed in 40CFR 141.23 (a)(4)(i) and 141.89 (a)(1)(ii) or 10% of the MCL, whichever is greater.

TABLE C-2 INORGANICS

LIC	Constituent	MCL (mg/L)	Holding Time
DW01D001	All of the Following:		
DW01D021	Antimony	0.006	6 months
DW01D022	Arsenic	0.05	6 months
DW01D023	Barium	2	6 months
DW01D024	Beryllium	0.004	6 months
DW01D025	Cadmium	0.005	6 months
DW01D026	Chromium	0.1	6 months
DW01D027	Cyanide as free CN	0.2	14 days
DW01D028	Mercury	0.002	28 days
DW01D029	Nickel	0.1	6 months
DW01D030	Nitrate-N	10	28 days
DW01D031	Nitrite-N	1	48 hours
DW01D032	Total Nitrate/Nitrite-N	10	48 hours
DW01D033	Selenium	0.05	6 months
DW01D034	Thallium	0.002	6 months

3.2. **Regulated Volatile Organic Compounds (VOCs) for 40 CFR 141.24 (f)**

The following TABLE C-3 lists all the required volatile organic constituents for the LIC DW01∗004 with the required detection limit by the EPA Method 524.2, the Maximum Contaminate Level (MCL), and holding time of each constituent. A single constituent in Table C3 is requested with the LIC DW01∗018 appended with the constituent name. Results for all constituents in Table C3 shall be within the acceptable limits specified in 40 CFR 141.24(f)(17)(i)(C), (D) &(E) and 40CFR 141.24(f)(17)(ii)(B) and shall be reported in ug/L.

TABLE C-3 REGULATED VOLATILE ORGANIC COMPOUNDS (EPA 524.2)

LIC DW01∗004 Requires All of the following constituents:	**Detection Limit ug/L**	**MCL (ug/L) (40 CFR 141.61)**	**Holding Time (days)**
Benzene	0.5	5	14
Carbon Tetrachloride	0.5	5	14
Monochlorobenzene	0.5	100	14
para-1,2-Dichlorobenzene	0.5	75	14
o-1,4-Dichlorobenzene	0.5	600	14
1,2-Dichloroethane	0.5	5	14
1,1-Dichloroethylene	0.5	7	14
cis-Dichloroethylene	0.5	70	14
trans-1,2,-Dichloroethylene	0.5	100	14
Dichloromethane (Methylene Chloride)	0.5	5	14
1,2 Dichloropropane	0.5	5	14
Ethylbenzene	0.5	700	14
Styrene	0.5	100	14
Tetrachloroethylene	0.5	5	14
Toluene	0.5	1000	14
1,2,4-Trichlorobenzene	0.5	70	14
1,1,1-Trichloroethane	0.5	200	14
1,1,2-Trichloroethane	0.5	5	14
Trichloroethylene	0.5	5	14
Vinyl Chloride	0.5	5	14
Xylenes (total)	0.5	10,000	14

3.3. **Unregulated Organic compounds for 40 CFR 141.40 (e)**

The following TABLE C-4 lists all the unregulated volatile organic compounds and trihalomethanes (THMs) required for the LIC DW01∗005 and 40 CFR 141.40 (e). A single constituent in Table C4 is requested with the LIC DW01∗019 appended with the constituent name. These chemicals are not regulated (i.e. MCLs are not established) at this time. Analysis is performed to establish historical records of the presence of these chemicals. Analysis for this section shall be conducted per 40 CFR 141.40 (g) and (h). Results for all constituents shall be reported in ug/L.

TABLE C-4 UNREGULATED ORGANIC COMPOUNDS (EPA 524.2)

LIC DW01∗005-Requires All of the following Constituents:	**Holding Time (days)**
Bromobenzene	14
Bromodichloromethane	14
tribromomethane (Bromoform)	14
Bromomethane	14
Chlorodibromomethane	14
Chloroethane	14
Trichloromethane (Chloroform)	14
Chloromethane	14
o-Chlorotoluene	14
p—Chlorotoluene	14
Dibromomethane	14
m-Dichlorobenzene	14
1,1-Dichloroethane	14
1,3-Dichloropropane	14
2,2-Dichloropropane	14
1,1-Dichloropropene	14
1,3-Dichloropropene	14
1,1,1,2-Tetrachloroethane	14
1,1,2,2,-Tetrachloroethane	14
1,2,3-Trichloropropane	14

3.4. **Total Trihalomethanes (TTHMs) for 40 CFR 141.30**

The following TABLE C-5 lists all the unregulated trihalomethanes (THMs) required for the LIC DW01∗017 and 40 CFR 141.30 (e). These chemicals are not individually regulated (i.e. MCLs are not established) at this time. However, the total trihalomethane concentration must not exceed 100 ug/L for some water systems. Analysis for this section shall be conducted per 40 CFR 141.30 (e). Results for all constituents shall be reported in ug/L.

TABLE C-5 TRIHALOMETHANES (EPA 524.2)

LIC DW01∗017-Requires All of the following Constituents:	**Holding Time (days)**
Bromodichloromethane	14
Tribromomethane (Bromoform)	14
Chlorodibromomethane	14
Chloroform	14

3.5. **Halo Acetic Acids (HAA5)**

The following TABLE C-6 lists all the Halo-Acetic acids (HAA5) required for the LIC DW01∗020. These chemicals are not individually regulated (i.e. MCLs are not established) at this time. However, the total concentration of the 5 acetic acids have a Maximum Contaminant Goal of 60 ug/L for the Site water system. Results for all constituents shall be reported in ug/L.

TABLE C-6 HALO-Acetic Acids (HAA5)

LIC DW01∗020-Requires All of the following Constituents:
Monochloro-Acetic Acid
Dichloro-Acetic Acid
Trichloro-Acetic Acid
Monobromo-Acetic Acid
Dibromo-Acetic Acid

3.6. **Synthetic Organic Chemicals**

The following TABLES C-7 through C-13 list all the required organic constituents for the analytical category of synthetic organic chemicals required per Article 5.2.3 and 5.3.4 (6) of the Colorado Primary Drinking Water regulations. Each table includes the Maximum Contaminate Level (MCL) and holding time of each constituent. Each of the following TABLES C7 through C13 contain a list of the organic constituents for an analytical category of synthetic organic chemicals with the LIC used to request all of the analytes in the table, and reference to the an acceptable analytical method. Analysis for this section shall be conducted in accordance with 40 CFR 141.40. Results for all constituents shall be reported in ug/L.

TABLE C-7 BASE/NEUTRAL/ACID COMPOUNDS (EPA 525.2)

LIC DW01∗011-Requires All of the following Constituents:	**MCL (ug/L)**	**Extraction Hold Time (days)**	**Analysis Hold Time (days)**
Benzo(a)Pyrene	0.2	7	30
Di(2-ethylhexyl)adipate	400	7	30
Di(2-ethylhexyl)phthalate	6	7	30
Hexachlorobenzene	6	7	30
Hexachlorocyclopentadiene	50	7	30

TABLE C-8 CARBAMATE PESTICIDES (EPA 531.10)

LIC DW01∗012-Requires All of the following Constituents:	**MCL (ug/L)**	**Extraction Hold Time (days)**	**Analysis Hold Time (days)**
Aldicarb	100	7	30
Aldicarb sulfone	100	7	30
Aldicarb sulfoxide	100	7	30
Carbaryl	N/A	7	30
Carbofuran	40	7	30
Methomyl	N/A	7	30
Oxamyl (Vydate)	100	7	30
3-Hydroxycarbofuran	N/A	7	30

TABLE C-9 DBCP & EDB (EPA 504)

LIC DW01∗013-Requires All of the following Constituents:	MCL (ug/L)	Extraction Hold Time (days)	Analysis Hold Time (days)
Dibromochloropropane	0.2	28	30
Ethylene dibromide	0.05	28	30

TABLE C-10 HERBICIDES (EPA 515.1)

LIC DW01∗014- Requires All of the following Constituents:	MCL (ug/L)	Extraction Hold Time (days)	Analysis Hold Time (days)
2,4-D (2,4-Dichlorophenoxyacetic acid)	70	14	30
2,4,5-TP - (Silvex)	50	14	30
Dalapon	200	14	30
Dicamba	N/A	14	30
Dinoseb	7	14	30
Pentachlorophenol	1	14	30
Picloram	500	14	30

TABLE C-11 Pesticides and PCB's (EPA 505)

LIC DW01∗015-Requires All of the following Constituents:	MCL (ug/L)	Extraction Hold Time (days)	Analysis Hold Time (days)
Alachlor	2	7	30
Atrazine	3	7	30
Aldrin	N/A	7	30
Chlordane	2	7	30
Dieldrin	N/A	7	30
Endrin	2	7	30
Heptachlor	0.4	7	30
Heptachlor Epoxide	0.2	7	30
Lindane	0.2	7	30
Methoxychlor	40	7	30
PCB	0.5	7	30
Simazine	4	7	30
Toxaphene	3	7	30

TABLE C-12 Pesticides (EPA 525.2)

LIC DW01∗016-Requires All of the following Constituents:	MCL (ug/L)	Extraction Hold Time (days)	Analysis Hold Time (days)
Butachlor	N/A	7	30
Metolachlor	N/A	7	30
Metribuzin	N/A	7	30
Propachlor	N/A	7	30

TABLE C-13 OTHER SYNTHETIC ORGANIC CHEMICALS

LIC	Constituents	Method	MCL ug/L	Extraction Hold Time (days)	Analysis Hold Time (days)
DW01D035	2,3,7,8-TCDD (Dioxin)	1613	3∗10E-5	7	30
DW01D036	Diquat	549.1	20	7	30
DW01D037	Endothal	548.1	100	7	30
DW01D038	Glyphosate	547, 6651	700	7	30

3.7. Secondary Contaminants

The following TABLE C-14 lists all the required inorganic constituents for the LIC DW01∗007 with the Maximum Contaminate Level (MCL), and holding time of each constituent. Each individual constituent also has a LIC that is used to request the individual constituent when all constituents in this analytical category are not required. Analysis for this section shall be conducted in accordance with 40 CFR 143.4 (b).

TABLE C-14 SECONDARY CONTAMINANTS

Line Item Code	Constituent	MCL
DW01D007	All of the Following:	
DW01D040	Aluminum	0.05 - 0.2 mg/L
DW01D041	Chloride	250 mg/L
DW01D042	Color	15 Color Units
DW01D043	Copper	1.3 mg/L
DW01D044	Iron	0.3 mg/L
DW01D045	Lead	0.015
DW01D046	Manganese	0.05 mg/L
DW01D047	Odor	3 threshold odor number
DW01D048	pH	6.5 - 8.5
DW01D049	Silver	0.1 mg/L
DW01D050	Sulfate	250 mg/L
DW01D051	Surfactants (mg/l LAS)	0.5 mg/L
DW01D052	Total Dissolved Solids (TDS)	500 mg/L
DW01D053	Zinc	5 mg/L

3.8. **SDWA Corrosivity Tests**

The following TABLE C-15 lists all the required tests for the LIC DW01∗009. Each individual constituent also has a LIC that is used to request the individual constituent when all constituents in this analytical category are not required. Analysis for this section shall be conducted in accordance with 40 CFR 141.23 (k) (1).

TABLE C-15 SDWA CORROSIVITY TESTS

Line Item Code	Constituent	MCL
DW01D009	All of the Following:	
DW01D054	Alkalinity	-
DW01D055	Calcium Hardness	-
DW01D056	Langlier Index	-
DW01D048	pH	6.5 - 8.5
DW01D052	Total Dissolved Solids (TDS)	500 mg/L

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EXHIBIT D:

ANALYTICAL METHODS

1. INTRODUCTION

This Exhibit contains the analytical methods requirements for industrial hygiene sample analysis.

2. METHOD SELECTION AND APPLICATION

2.1. Method Selection

Methods used for analysis must meet all the following requirements:

2.1.1. Methods must be selected from the Approved Method Sources described below.

2.1.2. Sample pretreatment, digestion, and analysis procedures must be appropriate to the regulatory requirements.

2.1.3. Sample pretreatment, digestion, and analysis procedures must achieve the detection limits specified in DW01 Exhibit C for each listed constituent. Any anomalies that prohibit the achievement of the required detection limits shall be documented in the Narrative section of the Sample Data Package.

2.1.4. The Laboratory must be in strict compliance with all requirements in the these methods which are stated as "must" or "shall."

2.1.5. Additional method requirements and quality assurance measures are listed in DW01 Exhibits D and E. In the event method requirements and quality assurance measures in approved methods sources appear to be less stringent than those specified in DW01 Exhibits D or E, the requirements of DW01 Exhibits D and E shall prevail.

2.2. Implementation of Method Updates

The Laboratory shall use Updates to cited methods once the methods are promulgated and approved for use by the Site. The Laboratory shall notify the Site of the intention to use a method update. The Contractor Technical Representative (CTR) shall provide the Laboratory with implementation dates for any new methods.

2.3. Approved Method Sources

2.3.1. *EPA-600/R-93-100* - "Methods for the Determination of Inorganic Substances in Environmental Samples"

2.3.2. *EPA-600/R-93-111*: "Methods for the Determination of Metals in Environmental Samples - Supplement I"

2.3.3. *EPA-600/4-88-039:* "Methods for the Determination of Organic Compounds in Drinking Water"

2.3.4. *EPA-600/4-90-020:* "Methods for the Determination of Organic Compounds in Drinking Water - Supplement 1"

2.3.5. *EPA-600/R-92-129:* "Methods for the Determination of Organic Compounds in Drinking Water - Supplement II"

2.3.6. *ASTM Methods:* "The Annual Book of ASTM Standards"

2.3.7. *SM Methods:* "Standard Methods for the Examination of Water and Wastewater" 18th edition.

2.3.8. "Supplement to the 18th edition of Standard Methods for the Examination of Water and Wastewater"

2.3.9. *EPA-600/R-94-173:* "Technical Notes of Drinking Water Methods"

2.4. **Interpretation of Base Method Requirements**

Analyses performed must meet requirements of the methods selected from the Approved Method Source.

2.4.1. The Laboratory shall be in strict compliance with all requirements in these methods which are stated as 'must' or 'shall.'

2.4.2. Additional method requirements: Additional method requirements and quality assurance measures are listed in DW01 Exhibit E. In the event method requirements and quality assurance measures in approved methods sources appear to be less stringent than those specified in Module DW01, the requirements of Module DW01 shall prevail.

2.5. **Base Method Modifications**

Standard methods may be modified or alternative methods substituted only with the written consent of the CTR.

3. SAMPLE HOLDING TIMES AND PRESERVATION REQUIREMENTS

Requirements for sample holding times and preservation of samples for all safe drinking water general chemistry analyses are specified in the latest revisions of the methods.

4. ADDITIONAL REQUIREMENTS FOR ALL METHODS

The purpose of this section is to provide specific guidance for analyses specified in DW01 Exhibit C. This section is not intended to be a comprehensive requirements document, rather it is intended to clarify and supplement requirements found in Approved Method Sources. The objective is to increase uniformity between requirements of different approved method sources, where possible, while still meeting or exceeding minimum method requirements. The following requirements apply to all determinations regardless of the Approved Method Source:

4.1. **Inorganic Analyses**

- **Glassware Preparation:** Glassware should be washed in a warm detergent solution and thoroughly rinsed first with tap water and then with reagent water. This cleaning procedure is sufficient for general analytical needs, but the individual procedures must be referred to for precautions to be taken against contamination of glassware. It is advantageous to maintain separate sets of suitably prepared glassware for the nitrate, mercury, and lead procedures due to the potential for contamination from the laboratory environment.

4.2. **Organic Analyses**

- **Glassware Preparation:** Glassware should be washed in a detergent solution and thoroughly rinsed first in tap water and then in reagent water. Glassware should have a final organic solvent rinse or must be baked at 400° C for 30 minutes and then dried or cooled in an area free of organic contamination. Glassware should be covered with organic-free aluminum foil during storage.

4.3. **Sample Preparation**

Sample digestion and preparation requirements of approved methods shall be followed.

4.4. **Matrix Spike Sample Frequency**

The frequency of preparation and analysis of spiked samples must meet all requirements of methods chosen from the Approved Method Source.

4.5. **Duplicate Sample Analysis Frequency**

The frequency of analysis of laboratory duplicate/matrix spike duplicate samples must meet all requirements of methods used from the Approved Method Source.

4.6. **Method Blank and Blank Checks**

All analysis and reporting requirements for method blank and blank checks shall be met.

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EXHIBIT E:

QUALITY ASSURANCE/QUALITY CONTROL

REQUIREMENTS

1. INTRODUCTION

This Exhibit outlines minimum requirements for Laboratory QA/QC Programs. These programs are designed to ensure that each Laboratory generating data for this SOW has systems for assuring that the precision, accuracy, completeness, and representativeness of data generated are known and documented. These requirements do not release the Laboratory from maintaining additional QC checks on method and instrument performance. Evidence that the implementation of QA/QC program requirements fail to control activities that could have an impact on the validity of data or that established program requirements are not being followed may result in a **Subcontract Termination**.

2. THE QUALITY ASSURANCE PROGRAM

The Laboratory shall establish a QA Program with the objective of providing sound analytical measurements. This program shall incorporate a QA Plan, QC procedures, corrective action systems, and documentation required during data collection as well as the quality assessment measures performed by management to ensure acceptable data. Some QA Program requirements are summarized in Table E-1. The "Reference" column refers to the document, exhibit and section number, and/or title where more details may be found. This reference column is intended as an aid in locating requirements, but is not expected to be all-inclusive.

TABLE E-1 QA PROGRAM REQUIREMENTS SUMMARY

Requirement	Reference (Exhibit/Section)
Development and implementation of a QA Program and documentation of the key elements of that QA Program through a written QA Plan	Exhibit E/Sections 2 and 3
Preparation of and adherence to written SOPs	Exhibit F/Section 6
Adherence to the analytical methods and associated QC and documentation requirements	Exhibits C, D, E, and F
Verification of analytical standards and documentation of the purity of reference standard materials and the purity and accuracy of solutions obtained from commercial suppliers	Exhibit E/Section 6
Participation in performance evaluation programs, including adherence to corrective action procedures	Exhibit E/Section 9
Participation in on-site Laboratory evaluations, including adherence to corrective action procedures	Exhibit E/Section 10
Submission of all raw data and pertinent documentation	Exhibit B/Sections 3 and 4
Submission of original documentation	Exhibit B/Sections 2, 3, and 4

3. QUALITY ASSURANCE PLANS

The Laboratory shall implement and maintain a written QA Plan that presents the policies, organization, objectives, and specific QA and QC activities designed to achieve the data quality requirements of this SOW.

3.1. **Schedules:**

The Laboratory shall provide the CTR with a copy of the QA Plan 21 days prior to the preaward audit. The QA Plan shall also be delivered upon written request by the CTR and made available during on-site Laboratory evaluations.

3.2. **QA Plan Review:**

The Laboratory's management shall regularly review the status and adequacy of the QA Plan and develop and maintain a system to promote continuous quality improvement, including a system to monitor laboratory performance.

3.3. **QA Training:**

The Laboratory staff shall receive QA training appropriate to their participation. Training shall be performed as necessary to assure that each staff member understands the QA and technical requirements applicable to their work. Documentation of training, whether specific or general, shall be maintained by the Laboratory and be available during on-site inspections and upon CTR request.

3.4. **References:**

The QA Plan shall be based on one or more of the following references: 10 CFR 830.10, DOE Order 414.1A, ANSI/ASQC E4-1994, ASME-NQA-1-1989, ISO 9000, and/or Good Laboratory Practice Standards (40 CFR 792). Complete references are included in Exhibit H. Additional information relevant to the preparation of a QA Plan can be found in DOE, EPA, and ASTM publications.

3.5. **QA Plan Key Elements:**

The QA Plan shall address all key elements listed below. Requirements associated with these elements are found in this Exhibit, other Exhibits in DW01, and the references cited in the previous paragraph. Where procedures are indicated below, the QA Plan shall include these procedures in text or by reference.

3.5.1. ***Laboratory QA Policy and Objectives***

3.5.2. ***Organization and Personnel***

- Staff resumes
- Education and experience requirements
- Indoctrination and training procedures and requirements
- QA management organization
- Assignment of QC and QA responsibilities
- QA management reporting relationships

3.5.3. ***Facilities and Equipment***

- Guidance for measuring and test equipment calibrations
- Procedures for maintaining measurement system stability and reproducibility
- Maintenance activities and schedules
- Instrumentation and backup alternatives

3.5.4. ***Control of Purchased Items and Services***

- Criteria for approving vendors
- Requirements for assuring procurements identify or reference quality criteria
- Procedures for acceptance of purchased items

3.5.5. ***Document Control***

- Procedures for measurement process documentation
- Sample and data tracking/custody procedures and documentation requirements
- Logbook content, format, maintenance, and archiving
- Laboratory notebook policy
- RIN file organization, preparation, and review procedures
- Procedures for preparation, approval, review, revision, and distribution of SOPs

3.5.6. ***Analytical Methodology***

- Sample/extract handling and storage procedures
- Sample preparation/extraction procedures
- Standard preparation procedures
- Calibration procedures and frequency
- Sample analysis procedures

3.5.7. ***Data Generation***

- Data collection procedures
- Data reduction procedures
- Data review procedures
- Data reporting and authorization procedures
- Data management procedures
- Software QA procedure

3.5.8. ***Quality Control Program***

- Confirmation of Laboratory materials (e.g., solvent, reagents, etc.)
- Control of age-sensitive materials
- Reference material analysis
- Internal QC checks
- Corrective action and determination of QC limit procedures

3.5.9. ***Quality Assurance Program Assessment***

- Data audits
- Systems audits
- Performance audits
- Corrective action procedures
- QA reporting procedures
- Control of nonconformances

3.5.10. ***Statistical Quality Control Plan***

The Laboratory's Quality Assurance Plan must include a statistical quality control plan and documentation that shows data determined from the analytical process have statistical accuracy and precision.

4. PERSONNEL

4.1. QA Personnel

QA personnel shall operate independently from cost and schedule considerations and shall have the responsibility and authority to stop unsatisfactory work.

4.2. Analyst Certification

- Procedures shall be in place for the establishment and implementation of an intralaboratory certification program for the indoctrination and training of personnel performing activities under this SOW (analysts). This program must define how sufficient analyst proficiency is defined, achieved, maintained, and documented.
- Analysts that have not passed intralaboratory certification for a method shall not conduct analyses under this SOW. The certification documentation shall be maintained by the Laboratory and be available during on-site inspections and upon CTR request.
- Analysts shall be recertified at least every two years.

5. MEASURING AND TESTING EQUIPMENT (M&TE)

5.1. General Requirements for M&TE:

The Laboratory shall establish and document calibration methods and intervals for M&TE. M&TE shall include analytical instruments, balances, thermometers, pipettes and other devices used to generate analytical results and to demonstrate compliance to procedural requirements. Also included is equipment used to demonstrate other aspects of conformance to this contract, such as sample preservation.

5.1.1. The Laboratory shall assign unique identifiers to all M&TE.

5.1.2. All data generated by M&TE must be labeled with the unique M&TE identifier.

5.1.3. The Laboratory shall identify the instrument manufacturer, model, instrument configuration, and instrument settings (e.g., temperature programs, gas flows, etc.) on Laboratory bench sheets or appropriate instrument logbook unless these parameters are precisely specified in SOPs.

5.1.4. The Laboratory shall maintain records (and if applicable, mark equipment) indicating calibration status. Records shall include the unique equipment identifier, calibration interval, traceable standard identifiers, chronological equipment condition history, and the personnel performing the calibration.

5.1.5. Standards used for M&TE calibrations shall meet analytical standards requirements of Exhibit E.

5.1.6. The Laboratory shall establish a system to identify and prevent the use of M&TE that do not meet performance standards. Failure to meet standards may be due to M&TE that are out-of-calibration, are under expired certification status, or exhibit conditions indicating compromised performance.

5.2. Instrument Maintenance, Repair, Configuration

5.2.1. The Laboratory shall document all maintenance and repairs on laboratory instrumentation, including date of maintenance/repair and personnel performing the task.

5.2.2. The Laboratory shall develop preventive maintenance schedules in accordance with instrument manufacturer recommendations.

5.2.3. Any repair, reconfiguration, or replacement of an instrument component shall be followed by verification of the calibration of the system. If the calibration verification

parameters are not met, an appropriate calibration shall be performed. If instrument components are changed, the Laboratory shall also verify and report instrument parameters as specified in Exhibit B of this module.

5.2.4. Instrument maintenance/repair documentation shall be maintained by the Laboratory and be available upon request and during on-site audits.

5.3. **Balances**

5.3.1. Balances shall be located in an area where the environment has little or no effect on the measurement accuracy.

5.3.2. All balances shall be calibrated and labeled annually by a certified technician.

5.3.3. Working weights used for daily balance verifications shall be certified annually.

5.3.4. The type, grade, and class of weights used for balance verifications shall meet all requirements of "Working standards for calibration and precision analytical work," as stated in ASTM E 617, *Laboratory Weights and Precision Mass Standards*.

5.3.5. ***Daily Balance Verification Requirements***

5.3.5.1. The Laboratory shall check weigh the balance, at a minimum, every working day prior to use.

5.3.5.2. Check weighing shall be performed at two points within the balance range using certified working weights.

5.3.5.3. Results of check weight measurements shall be documented by the Laboratory. Documentation of check weight measurements shall be maintained at the Laboratory and be available for review during an on-site inspection and within seven calendar days of CTR request.

5.3.6. Check weight and balance certifications shall be maintained by the Laboratory and be available upon request and during on-site audits.

5.4. **Thermometers and Temperature Recording Devices**

5.4.1. Liquid-in-glass thermometers shall be calibrated against an NIST traceable standard at a five year interval.

5.4.2. Liquid-in-glass thermometers shall be inspected annually for conditions that may degrade performance. At a minimum, this inspection must include examination for evidence of liquid column separation and evidence of other conditions that might affect the column.

5.4.3. Thermometer and temperature device certifications and documentation of annual inspections shall be maintained by the Laboratory and available upon request and during on-site audits.

5.5. **Refrigerators**

5.5.1. The temperature of refrigerators used to store Site samples shall be verified and documented every working day. Documentation shall be maintained by the Laboratory and available upon request and during on-site audits.

5.5.2. The Laboratory shall develop and implement procedures for sample and extract storage and preservation in the event of refrigerator failure.

5.5.3. The Laboratory shall clearly identify refrigerators exceeding temperature requirements to prevent use until corrective actions have been completed.

5.6. **Automatic Pipettes and Dispensers**

5.6.1. The Laboratory shall verify the accuracy of all non-Class A pipettes and automatic sample dispensers used for quantitative measurement. This verification shall be performed monthly or whenever degradation of measuring equipment performance is suspected, whichever is more frequent. Conditions that may initiate immediate recalibration include but are not limited to: Evidence of corrosion, leakage, movement of continuously-adjustable volume settings, improper treatment such as dropping and exposure to nonroutine temperatures, or degradation of laboratory performance as indicated by control charts.

5.6.2. Pipette and automatic sample dispenser calibration documentation shall be maintained by the Laboratory and be available upon request and during on-site audits.

6. ANALYTICAL STANDARDS AND REAGENTS REQUIREMENTS

This Section contains requirements for acquisition, maintenance, and documentation of standards and reagents. It is the responsibility of the Laboratory to obtain those analytical reference standards required for direct analytical measurements and for the purpose of traceability.

6.1. **Laboratory Water**

6.1.1. The Laboratory shall have a water system capable of providing laboratory water meeting the American Society for Testing and Materials (ASTM) specifications for Type II water (ASTM D1193).

6.1.2. The Laboratory's water system shall be monitored with each use. Results of this monitoring shall be recorded at least once each day the system is in use. The conductivity shall not exceed 1.0 µS/cm at 25° C (i.e., the resistivity shall be greater than 1.0 MΩ cm at 25 ^{o} C). If this level is exceeded, the Laboratory shall take immediate corrective action before the water can be used for sample determinations under this SOW. Monitoring and corrective action documentation shall be maintained by the Laboratory and available upon request and during on-site audits.

6.2. **Purchase of Analytical Reagents and Standards**

6.2.1. The Laboratory shall have a documented program for controlling the quality of purchased reagents and standards.

6.2.2. The Laboratory shall have an established system for approving vendors to procure supplies and services. All analytical reagents shall be obtained from these approved vendors.

6.2.3. Material Safety Data Sheets (MSDSs) received from reagent suppliers shall be maintained by the Laboratory and submitted upon CTR request.

6.3. **Purchase of Standards:**

Whenever possible, the Laboratory shall purchase NIST Standard Reference Materials (SRMs), NIST-traceable SRMs, or NIST-approved certified reference materials. If appropriate NIST reference materials are unavailable, the Laboratory can purchase standards necessary to perform the analyses required in this SOW from other approved suppliers. Analytical reference standards purchased from these other suppliers must meet the following criteria:

6.3.1. The supplier must provide standard values with error estimates and a description of the statistical method for obtaining these estimates. (Additional information concerning statistical certification of analytical standards can be found in QA/QC requirements of applicable NIOSH/OSHA methods or other applicable method references.)

6.3.2. The Laboratory shall perform an independent verification of the supplier-determined standard value. This verification shall be performed by absolute or comparison methods; however, if a comparison method is used, the comparison shall be to two standard sources independent of the supplier. Laboratory and supplier standard values shall be identical at the 5% significance level.

6.4. **Standard Certificates:**

Standard certificates shall be kept on file in the Laboratory and available to laboratory personnel. Copies of the standard certificates shall be made available during on-site inspections or within 7 calendar days of request. Standard certificates shall include, at a minimum, all of the following items:

- An identifier for the standard unique to the actual material (or lot) certified
- Identification of the certifying entity
- Signature of a representative of the certifying entity, a certificate printed on official letterhead, or a certificate affixed with certification seals
- A description of the material certified [including matrix and values for parameter(s) certified]
- Error estimates for certified parameter values
- Definition of a finite certification period
- Certificates for NIST-traceable standards must contain SRM identifiers of all NIST materials used for traceability and a description of the process used for relating parameter values to NIST values shall be included.

6.5. **Maintaining Traceability to Primary Standards:**

The certified material received by the Laboratory from NIST or other certifying entity is defined as the primary standard. The Laboratory shall be able to trace all standards used in analysis back to the certificates maintained on file. Traceability shall include control and NIST traceability for all measurement equipment used to prepare dilutions and/or reconfigurations of the primary; this measurement equipment includes, but is not limited to, pipettes, balances, and volumetric glassware.

To maintain traceability, all standards used must be prepared, handled, and stored according to the applicable instructions in this Module, and referenced documents. Proper storage and handling of chemical standards must be addressed in analyst training programs, SOPs, and facility requirements in order to safeguard against decomposition and contamination and to minimize risk of human exposure. Inability to document traceability of standards to NIST or other recognized standards agencies may result in a **Subcontract Termination**.

6.6. **Documentation of the Verification and Preparation of Chemical Standards and Reagents**

6.6.1. The Laboratory must maintain the necessary documentation to show that the standards used in the performance of Site analysis conform to requirements. Supporting documentation such as standard logs, weighing logs, calculations, and detection system spectra (whether produced by the Laboratory or purchased from chemical supply houses) shall be maintained by the Laboratory and may be subject to review during on-site inspection visits. Standard preparation documentation must be provided by the Laboratory if requested by the CTR for verification of SOW compliance.

6.6.2. Standard logs shall be kept for all weighing and dilutions performed for standard preparation and/or verification. All subsequent dilutions of the primary standard shall be recorded and all calculations for determining their concentrations are to be documented. Standard logs shall contain the following information:

- Primary standard identification
- Secondary standard tracking identification number
- All compounds or components of the standard
- Weight or volume of primary standard used
- Final volume or dilution data
- Final concentration or activity with units
- Preparer's initials
- Preparation date
- Secondary standard expiration date

6.7. Labeling Standards and Reagents

6.7.1. The Laboratory shall label all purchased stock mixtures and reagents with the following information:

- Date received
- Date opened (Required when used to establish expiration date)
- Expiration date

6.7.2. All secondary standard solutions shall be clearly labeled with a unique identification that is traceable to a standards preparation log. If the container size precludes this requirement, this information shall be documented in a logbook maintained at the Laboratory. Labels shall contain, as a minimum, the following information:

- Secondary standard tracking identifier
- Preparer's initials
- Preparation date
- Secondary standard expiration date

6.8. Expiration Dates for Reagents and Standards

6.8.1. Expiration dates established by the manufacturer shall be used when available. The Laboratory shall not use original stock standard solutions or reagents beyond the expiration date provided by the manufacturer.

6.8.2. If an expiration date is not defined, the Laboratory shall document how the shelf life of the reagent/standards is determined.

6.8.3. The expiration date (manufacturer or laboratory established), date received, and date opened shall be clearly identified on all reagent/standard solution containers. If an expiration date is not required, it shall be indicated on the container.

7. METHOD SPECIFIC QC REQUIREMENTS

7.1. Default Protocols

Where base methods do not require specific QC protocols, the Laboratory's SOPs shall specify requirements that meet or exceed parallel requirements found in equivalent methods.

7.2. Standard Curve

A standard curve composed of at least a reagent blank and three standards covering the sample concentration range is to be prepared at the beginning of each day for which samples are to be run. If calibration is too extensive, then the standard curve is to be verified each day by analysis of at least one reagent blank and one standard. If the checks are not within the control limits, then the instrument shall be recalibrated.

7.3. **Reagent Blank**

The reagent blank, or an equivalent, shall be carried through the entire analytical procedure. The blank results should not exceed the Method Detection Limit (MDL).

7.4. **Matrix Spike**

A known spike shall be added to at least 10% of the samples unless the specific method requires a different percentage. If the spike results are not within the control limits, then a standard should be run through the entire procedure to determine if the problem is due to the matrix or some other aspect of the procedure.

7.5. **Inorganic Constituents**

- **Turbidity:** If the drinking water sample contains less than 1 nephelometric turbidity unit (NTU) and is properly preserved, the sample may be analyzed directly (without digestion) when using one of the following total element techniques: Graphite Furnace AA, ICP/AES, ICP/MS, or Direct Flame Aspiration AA. Turbidity should be measured on the preserved sample just prior to when the metal analyses are initiated. For gaseous hydride determination of arsenic, antimony, or selenium, or for the determination of mercury by the cold vapor technique, the proper digestion technique must be followed to ensure that the element is in the proper chemical state for analysis.
- **Turbidity Standards:** Sealed liquid turbidity standards purchased from the instrument manufacturer must be verified at least every 4 months. This verification is to be documented. The standards are to be replaced when they do not fall within 15% of the assigned value of the standard. Solid turbidity standards composed of plastic, glass, or other materials are not reliable and should not be used.

7.6. **Secondary Contaminants**

- **Visual Comparison Devices:** If visual comparison devices such as color wheels or sealed ampules are used for determining free chlorine residual, the standards incorporated into such devices should be calibrated every 4 months. These calibrations are to be documented. By comparing standards and plotting such a comparison , a corrective factor can be derived and applied to future results obtained on the now calibrated apparatus.

8. DATA MANAGEMENT

Data management activities include specifying the acquisition, entry, update, correction, deletion, storage, and security of computer readable data and files. DW01 Exhibit F contains procedural requirements for data management and software QA.

9. LABORATORY EVALUATION SAMPLES

Although intralaboratory QC may demonstrate laboratory and method performance that can be tracked over time, an external performance evaluation (PE) program is an essential feature of a QA program. As a means of measuring laboratory and method performance, the Laboratory shall participate in interlaboratory comparison studies. Results from the analysis of these laboratory evaluation samples will be used to verify the Laboratory's continuing ability to produce acceptable analytical data. The results are also used to assess the precision and bias of the analytical methods for specific analytes.

9.1. **Required Participation**

The Laboratory shall participate a Performance Evaluation (PE) program that reflects the analyses specified in this SOW.

- **Inorganic chemicals:** Achieve quantitative results on the PE analyses that meet the acceptance limits listed in 40 CFR 141.23(k)(6)(ii)

- **Volatile Organic Compounds:** Achieve quantitative results on the PE analyses that are within the acceptance limits listed in 40 CFR 141.24(f)(17)(i)(C) and (D) and 40 CFR 141.24 (f)(17)(ii)(B) for 85% of the volatile organic chemicals.
- **Other Organic Compounds:** Achieve results that meet the acceptance limits listed in 141.24(h)(19)(i)(B).

9.2. **Frequency**

The minimum required frequency of participation in inter-laboratory comparison studies is quarterly.

9.3. **Blind Standards:**

Standards for interlaboratory comparison studies shall be submitted to the Laboratory as single-blind or double-blind samples. That is, true values shall not be available to the Laboratory or to any person affiliated with the Laboratory before final results have been submitted to the agency which issued the standard. The agency issuing these standards shall not be affiliated with the Laboratory.

9.4. **Unacceptable Performance:**

Production of a value falling outside the warning limits, as calculated by the program, will result in a probationary period until the next reporting period for that compound, element, or isotope. If the Laboratory fails a second evaluation, the Laboratory will not receive samples for analysis by the failed method until an acceptable PE score has been achieved. Root cause and corrective action reports for PE samples outside of acceptable limits are to be submitted to the CTR within 21 days from receipt of the scores.

9.5. **Acknowledgment of PE Score Disclosure:**

The Laboratory understands that the PE scores and the names of laboratories under this SOW will be available to the DOE and any other appropriate organization and/or individual procuring analytical services for DOE.

9.6. **Site-Provided PE Samples**

9.6.1. PE samples may be sent either by the CTR or the end-user, and may be used for subcontract action. Sample sets may be provided to participating laboratories as frequently as on a RIN-by-RIN basis as a recognizable QC sample of known composition, as a recognizable QC sample of unknown composition, or not recognizable as a QC material.

9.6.2. Laboratories are required to analyze Site PE samples and return the data package and all raw data within the SOW required turnaround time.

9.6.3. At a minimum, the results are evaluated for parameter identification, quantification, and sample contamination.

9.6.4. The Laboratory shall provide a response regarding its performance on laboratory evaluation samples as requested by the CTR

10. ON-SITE LABORATORY EVALUATIONS

10.1. **Audit Types:**

The Laboratory may be subject to three types of audits: pre-award, routine, and follow-up.

10.1.1. Pre-award: A pre-award audit is a comprehensive audit performed prior to subcontract award, or if the Laboratory will perform previously unaudited analyses.

10.1.2. Routine: A routine audit is a comprehensive audit performed to verify adherence to and effectiveness of QA/QC requirements. The Laboratory shall be subject to routine, on-

site audits not more than two times per calendar year during performance of this SOW. The preliminary pre-award audit performed prior to subcontract award does not count as one of these routine audits.

10.1.3. Follow-up: A follow-up audit verifies that adequate corrective action has been implemented by the Laboratory in response to a previous audit.

10.2. **Schedules and Notifications:**

On-site inspections, surveillance, or audits for the purpose of identifying and resolving deficiencies or verifying corrective actions may be performed at any time during performance of the subcontract. Unannounced and announced inspections may be performed at any time during the subcontract period; written notification shall be provided to the Laboratory for announced inspections. Laboratories shall make all requested data and documentation related to this SOW available during audits.

10.3. **Corrective Action Reports in Response to Audit Reports:**

Following an on-site evaluation, the auditors will conduct an audit closing conference with laboratory staff to discuss identified deficiencies and establish a schedule for corrective action. The Laboratory shall address corrective actions taken to resolve the deficiencies identified during the on-site visit according to the schedule set during the audit closing conference. Failure to meet the established timeline for responding to the identified deficiencies and/or failure to meet the established corrective action schedule may result in a **Subcontract Termination**.

11. INTERNAL AUDIT PROGRAM

The internal audit program shall incorporate the following requirements:

- The Laboratory shall implement and maintain an internal audit program, which includes corrective action procedures.
- Internal audits shall be conducted by personnel knowledgeable of, but independent from, the operations performed.
- Internal audits shall be conducted in accordance with written procedures and/or checklists. Audit reports shall identify the auditors, personnel interviewed during the audit, a synopsis of the audit scope, and a summary of the final results in sufficient detail to enable corrective action. The report shall be signed by the appropriate management and submitted for retention as specified in DW01, Exhibit B, Section 4. Internal audit reports shall be maintained at the Laboratory and made available for review during on-site audits, and upon request from the CTR.

12. NONCONFORMANCES:

Nonconformances must be identified, documented, evaluated, and resolved. Conditions adverse to quality shall be promptly identified and corrected.

- Nonconforming items shall be identified and/or segregated until disposition.
- The identification of adverse conditions and corrective actions shall be documented and reported to laboratory management.
- The Laboratory shall implement a corrective action tracking system to ensure follow-up actions are taken to confirm and document corrective action implementation.

13. PERFORMANCE CRITERIA

Laboratory performance will be continually assessed by the CTR. The general areas of performance that are monitored include, but are not limited to: delivery schedules, sample data package completeness, EDD accuracy and PE program participation.

13.1. Sample Data Package (SDP) Delivery Expectations:

The Laboratory shall meet the delivery schedules outlined in Exhibit B of this module. The Site shall use turn around times as defined in the glossary (Exhibit G) and Table B-1 to assess conformance to delivery schedules.

EXHIBIT F:

EVIDENTIARY REQUIREMENTS

1. INTRODUCTION

The purpose of this Exhibit is to describe the evidentiary requirements that must be followed for the preparation and analysis of Site samples for Safe Drinking Water General Chemistry under this SOW.

2. SAMPLE CHAIN-OF-CUSTODY

Each labeled sample will have a chain-of-custody (COC) record generated by the Contractor and will include evidence of continuous custody of samples inclusive of sample shipment (if applicable), sample receipt, sample preparation, and sample analysis. However, this requirement is satisfied by the Laboratory designee(s) signing the receipt form (or COC) upon sample receipt for shipment (if applicable) or at the Laboratory. At a minimum, each COC record will list the sample identification, sample date, list of sample containers, tests to be performed on the contents of each container per procedure, and a TATPKG Code. Once the appropriate COC or receipt form is signed, the Laboratory assumes full responsibility for the samples regardless of position in the analytical process.

2.1. Sample Custody Receipt

The Laboratory shall maintain appropriate chain-of-custody records for all samples. At a minimum the Laboratory shall perform the following:

1. Sign and date/time the field or Contractor COC records indicating sample receipt.
2. Assign a unique laboratory identification or tracking number to the sample.
3. Write the laboratory identification number on the COC record or sample receiving report.
4. Fax or email a signed copy of the COC to the CTR within 24 hours of sample receipt. This transmittal shall include, if applicable, documentation regarding any discrepancies encountered between samples received and COC records, discovery of lost, damaged, or destroyed samples, and any internal laboratory “discrepancy reports” and their resolutions.

2.2. Definition of Sample Custody

The Laboratory shall have procedures ensuring that sample custody is maintained and documented. A sample is in the Laboratory's custody if:

- The sample is in the Laboratory's or the Laboratory's authorized agent's possession, or
- The sample is in the Laboratory's view after being in possession, or
- The sample is in the Laboratory's possession and is locked up, or
- The sample is placed in a designated secure area, accessible only to the Laboratory or the Laboratory's authorized agents (if applicable).

2.3. Sample Integrity

The Laboratory shall assure the integrity and security of all samples. The Laboratory shall maintain internal COC records or other written/electronic records documenting all phases of sample handling from receipt through disposal.

3. SAMPLE RECEIVING REQUIREMENTS

3.1. Radiological Screening

The Laboratory shall establish, implement, and document procedures to ensure that the sample's radioactivity levels are consistent with the accompanying documentation and that Laboratory regulatory levels are not exceeded.

3.2. Sample Custodian

The Laboratory shall designate a sample custodian responsible for receiving all samples and an alternate custodian to receive samples in the event that the sample custodian is not available.

3.3. Shipping Container Inspection

The condition of shipping containers, sample containers, and custody seals (intact or not intact) shall be inspected upon receipt by the sample custodian or alternate.

3.4. Opening Containers

To minimize personnel exposure to possible radiological or hazardous materials, Shipping containers shall be opened in a contamination-free area that follows ALARA concepts and principles and meets applicable regulatory requirements.

3.5. Return of Shipping Containers

The Laboratory shall return shipping containers to the sender within 2 weeks of sample receipt.

4. DOCUMENT CONTROL PROCEDURES

Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings that include quantitative or qualitative acceptance criteria that can be used to determine whether activities are satisfactorily accomplished. Revisions to instructions, procedures, and drawings that affect the process or are technical in nature shall receive the same level of review and approval by the affected parties as the original document. Editorial changes may be made to instructions, procedures, and drawings without review and approval. Document control shall include measures by which documentation can be controlled, tracked, and updated in a timely manner to ensure that applicability and correctness are established. Control measures shall be used to ensure that documents are reviewed for adequacy, approved for release by authorized personnel, and distributed to and used at the location of the prescribed activity.

4.1. Quality Records

Quality records shall include but not limited to, documents such as operating logs, results of reviews, inspections, tests, assessments, monitoring of work performance, material/sample analyses, calibration records and sub-contractor evaluations/results. Records shall also include closely related data such as qualifications of personnel, procedures, and equipment. Inspection and test records shall include, as a minimum, the identification of the inspector or data recorder, the type of observation, the results, the acceptability, and the action taken to correct any deficiencies noted.

4.2. General Requirements

4.2.1. All Laboratory documents and required retention copies shall be complete and legible.

4.2.2. All observations and results recorded by the Laboratory shall be on preprinted laboratory forms or shall be entered into permanent laboratory logbooks.

4.2.3. The Laboratory name and a descriptive form name shall be included on all laboratory documents used to record information related to the preparation and analysis of Site samples.

4.2.4. Unused portions of documents (raw data forms, bench sheets, COC documentation, etc.) shall be Z'd out, initialed, and dated in black or blue ink.

4.2.5. All records shall be maintained in black or blue ink.

4.2.6. When columns are used to organize information recorded on laboratory records such as preprinted forms or logbook pages, the information recorded in that column shall be identified in a column heading.

4.2.7. To preserve confidentiality, references to the Site shall not appear in any documents accessible to non-laboratory personnel. Any sample handling documentation that are not a part of other deliverable items shall be available during audits and upon request.

4.2.8. QC sample identification on all documentation shall unequivocally denote the QC type (e.g., laboratory control samples, blanks and duplicates) either through the identifier or by cross-referencing the identifier with the QC type. QC identifiers shall be unique.

4.2.9. Sample data must be labeled with Site Sample Numbers or with lab identifiers cross-referenced to Site Sample Identifiers on the Sample Data Package Cover Page.

4.2.10. Data labels must clearly identify samples designated as duplicates, spiked samples, sample serial dilutions, controls, and blanks.

4.2.11. The identification scheme used must provide an unequivocal and unique link between all samples and QC samples (lab duplicate, spiked sample, laboratory control sample, preparation blank) prepared as an analytical batch.

4.2.12. All standards referenced in raw data must be identified by the unique identifier assigned as required in Exhibit E Section 6.

4.2.13. All numerical data shall be accompanied by applicable units.

4.3. Raw Data Labeling Requirements

Results must be presented with all raw data necessary for the CTR to assess their validity. This verification process involves such processes as recalculating reported values and qualifiers from raw data and tracing all standards to valid reference materials. In order to perform this verification, the following rules must be followed for labeling all raw data submitted in Sample Data Packages (SDPs) Plus Raw Data deliverables (SDP Plus Raw Data). Preparation, instrument, and other raw data must meet the following labeling requirements:

4.3.1. Sample data must be labeled with the Site Sample Identifiers or with the Laboratory Identifiers cross-referenced to the Site Sample Identifiers on the SDP Plus Raw Data Cover Page.

4.3.2. All data generated by M&TE must be labeled with the unique M&TE identifier.

4.3.3. Data labels must clearly identify samples designated as duplicates, spiked samples, controls, and blanks. The identification scheme for all QC codes shall be defined in a description table that is included in the Sample and QC Results Deliverable Section of the SDP Plus Raw Data.

4.3.4. The identification scheme used must provide an unequivocal and unique link between all samples and QC samples (laboratory duplicate, spiked sample, laboratory control sample, and preparation blank) prepared as an analytical batch. For example, a preparation blank labeled as “PB” appended by the Analytical Batch Identifier (see Exhibit G) would provide this link.

4.3.5. All standards referenced in raw data must be identified by the unique identifier assigned as required in Exhibit E, Section 6.

4.3.6. Applicable units shall accompany all numerical data.

4.4. **Error Correction**:

Corrections and updates to supporting documentation and raw data shall be performed in a manner that preserves record integrity. The following procedures must be followed when correcting errors:

4.4.1. A single line shall be drawn through the error and the correct information recorded in black or blue ink.

4.4.2. No information shall be obliterated or made unreadable.

4.4.3. All corrections, additions, and crossed out information shall be initialed and dated in black or blue ink.

4.4.4. Use of correction fluid is prohibited.

4.5. **Requirements for Logbooks**

4.5.1. The Laboratory's name, address and a unique logbook identifier shall appear on the cover of all logbooks. The type of activity recorded within a logbook shall be on the cover of the logbook.

4.5.2. Pages in both bound and unbound logbooks shall be sequentially numbered.

4.5.3. Logbook entries shall be dated (month/day/year) and signed by the person responsible for performing the activity at the time an activity is performed.

4.5.4. Logbook entries shall be in chronological order.

4.6. **Requirements for Preprinted Forms:**

Preprinted laboratory forms shall contain the name of the Laboratory, revision identifier or revision date (month/day/year), and signature/initials of the person responsible for performing the activity at the time an activity is performed.

4.7. **Document Control Officer:**

4.7.1. The Laboratory shall assign a Document Control Officer (DCO) responsible for the organization and assembly of the SDP, SDP Plus Raw Data, Electronic Image, and EDD.

4.7.2. Before releasing analytical results, the DCO shall assemble and cross-check the information on custody records, laboratory bench sheets, personal and instrument logs, and other relevant records. This check shall ensure that data pertaining to each particular sample or SDP are consistent throughout the SDP, SDP Plus Raw Data, Electronic Image, and EDD.

4.8. **Document Numbering and Inventory Procedures**

4.8.1. In order to provide document accountability of the completed analysis records, each item in a SDP and SDP Plus Raw Data shall be assembled as described in Exhibit B of this module.

4.8.2. All documents relevant to each RIN or analytical batch, including logbook pages, bench sheets, instrument logs, re-preparation records, re-analysis records, records of failed or attempted analysis, and custody records, shall be inventoried.

4.8.3. The DCO shall be responsible for ensuring that all documents generated are placed for inventory and are maintained at the Laboratory for review during on-site inspection or for reproduction.

4.9. **Shipping Sample Data Packages and Support Packages**

The Laboratory shall document shipment of deliverable packages to the recipients. These shipments require custody seals on the containers placed such that they cannot be opened without damaging or breaking the seal. The Laboratory shall document what was sent, to whom, the date, and the method (carrier) used.

4.10. **Corrections and Updates to Submitted Deliverables**

The record of changes as corrections and updates to data originally generated, submitted, and/or resubmitted shall be documented to allow traceability of updates. Documentation shall include the following for each change:

4.10.1. Hand changes to submitted deliverables shall include the initials of the person making the change or changes. Data changes shall be implemented and reviewed by a person or group independent of the source generating the deliverable.

4.10.2. Change documentation shall be retained according to the schedule of the original deliverable.

4.10.3. Resubmitted deliverables shall be reevaluated as a part of the Laboratory's internal inspection process prior to resubmission. The entire deliverable, not just the changes, shall be inspected.

4.10.4. The Laboratory Manager shall approve changes to originally submitted deliverables.

4.10.5. Documentation of data changes may be requested by laboratory auditors.

4.10.6. All resubmission requirements identified in Exhibit B shall be met.

4.11. **Storage of Site Files**

4.11.1. The Laboratory shall maintain Site documents in a secure location that is protected from damage and deterioration.

4.11.2. The Laboratory shall maintain written records and documents to be used as evidence for each analytical activity. Documents and records maintained by the Laboratory shall be legible, identifiable, and retrievable.

4.12. **Document Retention:**

Documentation and records generated by the Laboratory shall be retained at the laboratory facility for a period of five calendar years. After this period, records may be disposed of with the following provisions:

4.12.1. Six months prior to the date the Laboratory intends to dispose of documentation and records related to Site sample analyses, the Laboratory shall notify the CTR or designated representative in writing. Documentation and records shall not be disposed without written approval from the CTR.

4.12.2. The Site retains the right to request physical reproduction of the documentation and records by the Laboratory at any time during the retention period.

4.13. **Handling of Confidential Information**

4.13.1. A Laboratory conducting work under this SOW may receive Site-designated confidential information. Confidential information shall be handled separately from other documentation developed under this SOW. To accomplish this, the following procedures for the handling of confidential information have been established.

4.13.2. The CTR shall notify the Laboratory prior to sample receipt concerning confidentiality requests.

4.13.3. All confidential documents shall be under the supervision of a designated DCO.

4.13.4. Any samples or information received with a request of confidentiality shall be handled as "confidential." A separate locked file shall be maintained to store this information and shall be segregated from other nonconfidential information. Data generated from confidential samples shall be treated as confidential. Upon receipt of confidential information, the DCO logs these documents into a Confidential Inventory Log. The information is then made available to authorized personnel but only after it has been signed out to that person by the DCO. The documents shall be returned to the locked file at the conclusion of each working day. Confidential information may not be reproduced except upon approval by the CTR. The DCO will enter all copies into the document control system. In addition, this information may not be disposed of except upon approval by the CTR. The DCO shall remove and retain the cover page of any confidential information disposed of for one year and shall keep a record of the disposition in the Confidential Inventory Log.

5. SOFTWARE QA DOCUMENTATION REQUIREMENTS

The Laboratory shall maintain a program that addresses measures taken to ensure computer programs used to generate data are validated, verified, and documented for both vendor-supplied and in-house software packages. This program shall incorporate the "Computer Hardware and Software" requirements from ANSI/ANQC E4-1994. This program shall include the following minimum requirements:

- Software validation shall occur before initial use and following subsequent revisions.
- A correlation between the validation documentation and the software shall be established.
- A historical file of software revisions and associated validation documentation shall be maintained. The historical file shall be maintained in chronological order.
- Computer programs and analytical data on electronic media shall be handled, stored, safeguarded, and controlled to prevent damage and deterioration.

5.1. Software Documentation

Systems design interface and Software Development Life Cycle (SDLC) documentation shall be required for each computer program that (1) is capable of being tested and evaluated independently and (2) is a part of a software system affecting the quality of analytical tests. Software design shall (1) depict top-down structured development with major modules satisfying an identifiable contract requirement and (2) be approved by management and quality assurance personnel prior to use. Program development will depict a top-down structured format with data flow and program control being identifiable and traceable. Program modules will be traceable to the applicable software design requirement. Original Equipment Manufacturer (OEM) provided software which are not modified are exempt from the requirements of this paragraph.

5.2. Software Testing

Verification of computer programs affecting the quality of analytical tests shall be performed and documented. Test requirements and acceptance criteria shall be estimated prior to testing. Software verification testing shall be performed by qualified individuals that are not part of the development effort or who report to the Contractor's Manager responsible for software development. Models, methods, assumptions, and the computer environment which are used in the test shall be identified and documented. OEM provided software packages which are not modified shall be verified by using data for which the correct results are known.

5.3. Software Control

Configuration Management methods shall be established to ensure that changes to computer software which affect the quality of analytical tests are properly controlled and approved.

Analytical test results shall be traceable to the version(s) of software used in the analysis, data collection, evaluation and/or reporting of test results.

5.4. Security of Software

Policy and procedures shall be established which will ensure the security of the software affecting the quality of analytical test results. This includes the loss and the unauthorized use of the computer software. Both software and electronic data shall be backed up at a documented frequency. The frequency of backup shall be based on the amount of data and the impact of the loss of data or software on the organization.

5.5. Error Control

Policy and procedures shall be established to evaluate, control, and correct data entry errors or program problems which affect the quality of analytical test results. Software errors found during use shall be reported to the appropriate level of management. In the case of field/laboratory-developed software, personnel shall be assigned to verify all errors and document the error notification and all corrective actions. Error handling shall include all users so that previously reported data may be evaluated and corrective actions may be tracked.

6. STANDARD OPERATING PROCEDURES

A Standard Operating Procedure (SOP) is a written document that provides step-by-step directions or requirements for performance of certain tasks. These procedures are necessary to ensure that analytical data produced under this SOW are acceptable.

6.1. Required Procedures

Each of the following operations, in addition to those operations specified in following subsections, shall be included in Laboratory SOPs:

- Instrument Calibration/Calibration Verification
- Reagent/Preparation Blanks
- Method Spike/Method Spike Duplicate Analysis
- Matrix Spike/Matrix Spike Duplicate Analysis
- Performance Evaluation (PE) Sample Studies
- Method Detection Limit (MDL) Determination
- Sample Dilutions
- Linear Range Definition
- Interference Check Sample (ICS) Analysis (ICP-ES and ICP-MS only)
- Serial Dilution Analysis (ICP-ES and ICP-MS only)
- Inter-element Corrections(ICP-ES and ICP-MS only)
- Surrogate Spike Analysis

6.2. The Laboratory SOP Program

The Laboratory shall establish a system and implement procedures that define when SOPs are required and that define processes by which SOPs are created, reviewed, approved, controlled, updated, and retained. At a minimum, this system shall define, establish, and implement the following:

6.2.1. Document Control: A document control process shall be established to identify the title, unique SOP identifier, current revision, custodian, and copy number of all SOPs. The process shall insure that procedures are approved for release only by authorized personnel. Document control procedures shall be designed to preclude the use of

outdated or inappropriate SOPs and insure that outdated or uncontrolled SOPs shall not be in the possession of Laboratory personnel.

6.2.2. Periodic SOP Review: SOPs shall be reviewed periodically and updated as necessary when subcontract, facility, or Laboratory procedural modifications are made.

6.2.3. Document Retention: Current SOPs and superseded revisions of SOPs shall be retained as accountable documents by the Laboratory as described in Exhibit F, Section 4.12.

6.2.4. Document Availability: Current SOPs shall be available at specific work stations as appropriate. SOPs shall be available during an on-site laboratory evaluation. A complete set of SOPs shall be available for inspection at such evaluations. During on-site evaluations, Laboratory personnel may be asked to demonstrate the application of the SOPs.

6.2.5. Format and Content Requirements: The format for SOPs may vary depending upon the kind of activity for which they are prepared. However, at a minimum, SOPs shall accurately describe the activity as performed at the Laboratory and include QC acceptance criteria and corrective action procedures. Additional content requirements follow.

6.3. SOP Delivery Requirements

6.3.1. Twenty-one days prior to the pre-award audit, a complete list of SOPs relevant to this SOW shall be sent to the CTR. The list shall include procedure identifier, title, and effective date.

6.3.2. Within the twenty-one days period prior to the pre-award audit, the CTR will request copies of specific SOPs selected from this list. The Laboratory shall deliver to the CTR copies of the requested SOPs within three calendar days from when the request is received.

6.3.3. During the term of performance of the subcontract, the Laboratory shall notify the CTR, in writing, of new or amended SOPs applicable to this SOW within 14 days of the change. This notification shall identify the new or amended SOP(s) and include a revised SOP list. In the case of updated SOPs, a brief description of the change shall be included.

6.3.4. The CTR may request a copy of an SOP at any time. The Laboratory shall deliver SOP copies to the CTR within three calendar days after the request is received.

6.4. Requirements Common to all Laboratory SOPs

All SOPs shall:

- Be functional (i.e., clear, comprehensive, up-to-date, and sufficiently detailed) to permit duplication of results by qualified analysts.
- Describe actual processes as performed in the Laboratory.
- Include QC acceptance criteria and corrective action procedures
- Be consistent with current DOE regulations, EPA regulations, State regulations, and SOW requirements.
- Be consistent with instrument manufacturer's specific instruction manuals.
- Provide for the development of documentation that is sufficiently complete to record the performance of all tasks required by the protocol.
- Describe the mechanism for demonstrating the validity of data reported by the Laboratory and explain the action taken for missing or inconsistent results.

- Describe the corrective measures and feedback mechanism used when analytical results do not meet protocol requirements.

6.5. **Requirements for Evidentiary SOPs**

The Laboratory shall develop and use adequately written SOPs to ensure sample and data accountability. Evidentiary SOPs shall include specific procedures for the following processes as they are performed by the Laboratory.

6.5.1. Sample Receipt and Logging

6.5.1.1. The Laboratory shall have written SOPs for receiving and logging samples. At a minimum, these procedures shall describe the systems and performed tasks that ensure fulfillment of Sample Receiving Requirements of Exhibit F Section 3.

6.5.1.2. The Laboratory shall have detailed SOPs describing the procedures and equipment used for radiological screening of Site samples specified in Exhibit F Section 3.

6.5.2. Sample Identification

6.5.2.1. The Laboratory shall have written SOPs describing steps taken to ensure fulfillment of Sample Identification Requirements of Exhibit F Section 2.

6.5.2.2. If the Laboratory assigns unique laboratory identifiers, written SOPs shall include a description of the method used to assign these identifiers. SOPs shall provide instructions for building cross-references to Site sample numbers.

6.5.2.3. If the Laboratory uses prefixes or suffixes in addition to sample identification numbers, the written SOPs shall include their definitions.

6.5.3. Sample Security and Protection

The Laboratory shall have written SOPs for sample security and protection. At a minimum, these procedures shall describe the systems and performed tasks that ensure fulfillment of Sample Protection and Integrity requirements of Exhibit F, Section 2.

6.5.4. Internal Chain-of-Custody

The Laboratory shall have written SOPs for the Internal Chain-of-Custody requirements of Exhibit F Section 2. These SOPs shall include procedures for sample identification, chain-of-custody , sample receiving, and sample tracking.

6.5.5. Laboratory Document and Information Control

The Laboratory shall have written SOPs for laboratory document and information control.

6.5.6. Laboratory Waste Management

The Laboratory shall have written SOPs for laboratory waste management including the handling and tracking of unused samples.

6.6. **Requirements for Analytical SOPs**

The Laboratory shall have written SOPs for performing sample analysis. At a minimum these procedures shall address all issues listed in this section.

6.6.1. Analytical SOPs shall include acceptance limits for each method used to report results under this SOW.

6.6.2. Analytical SOPs shall include steps required to perform the analysis. A reference to a standard, published method is not an acceptable substitute for an analytical SOP. However, laboratory SOPs may reference a published item (such as standard methods or

instrument manuals) for procedural steps if steps in the published item are used verbatim. References shall include version or published date.

6.6.3. Analytical SOPs shall include examples of laboratory documents, forms, and logbook formats used to document activities. Formulas for all calculations used to derive analytical results shall be included in the SOP. Calculations performed by computer codes written, supplied, and controlled by instrument manufacturers are exempt from this requirement.

6.6.4. Analytical SOPs shall address procedures to prevent sample contamination during sample preparation, sample analysis, glassware cleaning, and sample storage.

6.6.5. The Laboratory shall address QC items required under this SOW that are not included (or are incomplete) in the analytical method.

6.6.6. Analytical SOPs shall include all steps necessary to ensure traceability of standards and tracers used in sample analysis QA/QC.

6.6.7. Analytical SOPs shall address equipment maintenance and calibration.

6.6.8. Analytical SOPs shall describe calculations of MDLs and MCLs, whichever is required by this Module.

6.6.9. Analytical SOPs shall describe the purchase, receipt, storage, preparation, control of expiration date, and disposal of outdated standards and stock solutions.

6.7. **Requirements for Quality Management SOPs:**

The Laboratory shall have written SOPs for technical and managerial review of laboratory operations, Sample Data Package preparation, Support Package preparation, laboratory data review, and laboratory self-inspection systems. At a minimum, procedures shall document the following information:

- Data flow and chain-of-command for data review;
- Procedures for measuring precision and bias;
- Evaluation of parameters for identifying systematic errors;
- Procedures to assure that deliverables are complete and compliant with the requirements in Exhibit B;
- Procedures to assure that electronic data deliverables are complete and compliant with the requirements in Appendix A;
- Demonstration of internal QA inspection procedure (demonstrated by supervisory sign-off on personal notebooks, internal PE samples, etc.);
- Frequency and type of internal audits (e.g., random, quarterly, spot checks, perceived trouble areas);
- Demonstration of problem identification-corrective actions and resumption of analytical processing and the sequence resulting from internal audits (i.e., QA feedback);
- Documentation of audit reports (internal and external), Laboratory responses to audit reports, and corrective actions taken to correct identified deficiencies.
- The routine use of control charts as specified in this Module.
- Tracking and identifying trends for nonconforming items, and for implementing corrective action procedures.

6.8. **Requirements for Document Organization SOPs**

The Laboratory shall have written SOPs for the organization and assembly of all documents relating to each Site RIN. The procedures shall ensure that all document assembly and organization requirements of Exhibits B, E, and F and Appendix A are specified. The system shall include a document numbering and inventory procedure, a description of the method used

by the Laboratory to verify consistency and completeness of the Support Package, and procedures for the shipment of the deliverables.

6.9. **Requirements for Data Management SOPs:**

The Laboratory shall have written SOPs for the management, handling, and reporting of data. At a minimum, these procedures shall include the following:

- Procedures for controlling data entry errors;
- Procedures for reviewing changes to data and deliverables and ensuring traceability of updates;
- Software QA procedures for testing, modifying and implementing changes to existing computing systems including hardware, software, and documentation or installing new systems;
- Database security, backup and archival procedures including recovery from system failures;
- System maintenance procedures and response time;
- Individual(s) responsible for system operation, maintenance, data integrity and security; and
- Specifications for staff training procedures.

6.10. **Requirements for Software QA SOPs:**

The Laboratory shall have written SOPs addressing measures taken to ensure computer programs used to generate data are validated, verified, and documented for both vendor-supplied and in-house software packages. These SOPs shall incorporate the "Computer Hardware and Software" requirements from ANSI/ANQC E4-1994. SOPs shall also address all requirements listed in Exhibit F, Section 5.

6.11. **Requirements for Laboratory Health and Safety SOPs:**

The Laboratory shall have written SOPs for laboratory health and safety.

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EXHIBIT G:

GLOSSARY OF TERMS AND ACRONYMS

1. INTRODUCTION

Exhibit G contains the glossary of terms and acronyms contained in DW01.

2. GLOSSARY OF TERMS

ALIQUOT: A measured portion of a field sample or working standard taken for analysis.

ALKALINITY: The measurement of constituents in a water supply which determine alkaline conditions. The alkalinity of water is a measure of its capacity to neutralize acids.

ANALYSIS DATA SHEET: A form used to tabulate and report sample analysis results for target analytes. In CLP-SOW reporting protocols, this form is usually designated as *Form 1*. For non-CLP methods, the Analysis Data Sheet should contain, at a minimum, the following information: Site sample numbers and Laboratory sample identifiers, measured concentrations with units for all requested analytes, and necessary comments. Quality control and concentration qualifiers shall also be included when appropriate.

ANALYSIS DATE/TIME: The date and military time (24-hour clock) of the initiation of counting of a sample, standard, or blank in a radioactive counting system.

ANALYSIS RUN: The actual instrumental analysis of the sample preparations, from the time of instrumental calibration through the running of the final check.

ANALYTE: The specific component measured in a chemical analysis; the parameter/isotope of interest.

ANALYTICAL BATCH: A set of samples analyzed together as a unit for the purpose of method QA/QC. An analytical batch may contain several RINs. It is also possible that several analytical batches could comprise a single RIN. Each analytical batch shall have a unique identifier that associates client and QC samples within the batch.

ANALYTICAL PREPARATION METHOD: - A method (digestion, dilution, extraction, fusion, etc.) used to dissolve or otherwise release the analyte(s) of interest from its matrix and provide a final substrate or solution containing the analyte in a form which is suitable for instrumental or other analysis methods.

ANALYTICAL SAMPLE: A substance or sample submitted from an outside entity to the laboratory for analysis.

ASTM TYPE I WATER: Reagent water with a conductivity of less than 0.1 µmho/cm at 25° C and has been polished with a 0.45 µm membrane filter. For additional specifications, refer to ASTM D1193-77, "Standard Specification for Reagent Water."

ASTM TYPE II WATER: Deionized water with a conductivity of less than 1.0 µmho/cm at 25° C. For additional specifications, refer to ASTM D1193-77, "Standard Specification for Reagent Water."

BACKGROUND CORRECTION: A technique for measuring background (non-analyte) contribution to the instrument signal and performing mathematical compensation for the resulting error.

BLIND SAMPLE: A surrogate sample containing known amounts of analyte(s) of interest, submitted as an audit sample.

BOTTLE IDENTIFICATION NUMBER: A unique identifying number assigned to each sample container associated within a RIN and Sample Event. This number begins at '001' and increases sequentially until the event changes.

CALIBRATION: The establishment of an analytical curve relating the response of an instrument to a quantifiable characteristic of the analyte in known standards.

CALIBRATION STANDARDS: A series of known standard solutions used by the analyst for calibration of the instrument (i.e., preparation of the analytical curve).

CHEMICAL YIELD: The yield determined by a physical or radiochemical measurement of the recovered carrier or tracer.

COEFFICIENT OF VARIATION (CV): The standard deviation as a percent of the arithmetic mean.

COLD VAPOR: An Atomic Absorption method to test for the presence of mercury.

CONTRACTOR TECHNICAL REPRESENTATIVE (CTR): Person responsible for providing technical oversight of the subcontract.

CONTAMINATION: The introduction into water of sewage or other foreign matter that will render the water unfit for its intended use.

CONTROL LIMITS: A range within which specified measurements results must fall to be compliant. Control limits may be mandatory, requiring corrective action if exceeded, or advisory, requiring that noncompliant data be flagged.

CUSTODY SEAL: Adhesive seal applied to sample bottles to maintain Chain of Custody until sample is delivered to the Laboratory.

DAY: Unless otherwise specified, day shall mean calendar day. There are 365.25 days per year.

DETECTION LIMIT: A stated limiting value which designates the lowest concentration that can be estimated or determined with confidence and that is specific to the analyte and analytical procedure used. For the purpose of this SOW, the Detection Limit shall be the Method Detection Limit specific to the analyte and analytical procedure.

DISSOLVED: The concentration of an analyte determined on a sample which has been filtered in the field prior to preservation. Protocols for sample pretreatment for dissolved analytes are specific to analyte and procedure source.

DRINKING WATER

1) A water supply, treated or untreated which is intended for human consumption and which is considered to be free of disease causing bacteria, cysts or viruses. Safe potable water, fit to drink.
2) A potable water that has or is to be treated additionally, to enhance aesthetic quality and/or reduce mineral content plus other known or unknown, undesirable substances: by one or more point-of-use water processing devices or systems or purified bottled water.

DRY WEIGHT: The weight of a sample based on percent solids. The weight after drying in an oven at 103-105 C until a constant weight is obtained.

DUPLICATE SAMPLE: A second aliquot of a sample that serves as a Batch QC Sample, demonstrating analytical method precision and sample homogeneity.

EFFICIENCY: A measure of the fraction of actual disintegrations in the sample which are counted by a detector.

ENERGY CALIBRATION: The correlation of the multichannel analyzer (MCA) channel number to decay energy, obtained from the location of peaks from known radioactive standards..

ERROR: An estimation of the analytical measurement uncertainty, expressed as an error term with a specific analytical result, or as a typical value for a specific analytical technique.

FIELD BLANK: A sample prepared in the field by transferring ASTM Type II Water to a clean sample container. The field blank is used to indicate the presence of contamination due to sample collection and handling.

FIELD SAMPLE: A portion of material received to be analyzed that is contained in single or multiple containers and identified by a unique Site sample number.

HARDNESS (water): A condition caused by dissolved salts of calcium, magnesium, and iron, such as bicarbonates, carbonates, sulfates, chlorides, and nitrates.

HOLDING TIME: The elapsed time expressed in days from the date of sampling until the date of analysis for which sample data will be considered valid.

Holding time = (sample analysis date - sampling date)

INDEPENDENT STANDARD: A standard solution that is composed of analytes from a different source than those making up the standard used for the initial calibration.

INSPECTION PERIOD: This is the period from the day after the receipt of data until the day the Laboratory receives notification of the nonconformities or acceptance of the data.

IN-HOUSE: At the Laboratory facility which is identified in the subcontract.

INTERFERENTS: Undesired substances that affect quantification of the parameter of interest.

INTERNAL STANDARD: A material present in or added to samples that serves as an intensity reference for spectral measurements.

LABORATORY: Synonymous with subcontractor as used herein.

LABORATORY CONTROL SAMPLE (LCS): A QC sample (control) of known analyte value. Laboratory control samples are analyzed using the same sample preparation, reagents, and analytical methods employed for the Client samples processed as part of the Analytical Batch.

LABORATORY RECEIPT DATE: The date on which a sample is received at the Laboratory facility, as recorded on the shipper's delivery receipt. Also referred to as VTSR (validated time of sample receipt).

LABORATORY REPORT IDENTIFICATION: The laboratory's identification for samples contained in a RIN for a Parameter Specific Analytical Module.

LABORATORY REPORTING LIMIT (LRL): Also known as the Practical Quantitation Limit (PQL) and/or Minimum Quantitation Limit (MQL). The lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The LRL is a multiple of Method Detection Limit (MDL) and is highly dependent on sample matrices, analyte, and analytical method.

LINE ITEM CODE: This code, included on the COC or other documentation received with samples, designates the analyte prescription.

MATRIX: The predominant material of which the sample to be analyzed is composed. For the purpose of this SOW, a sample matrix is either water, soil/sediment, or waste. Matrix is not synonymous with phase (liquid or solid).

MATRIX BLANK: Synthetic sample containing no measurable amount of analyte being assessed.

MATRIX SPIKE: An aliquot of a sample fortified with known quantities of specific parameters and subjected to the entire analytical procedure in order to judge the appropriateness of the method for the matrix by measuring recovery.

MAXIMUM CONTAMINANT LEVEL (MCL): The maximum level of a contaminant allowed in water by federal law. Based on health effects and currently available treatment methods.

METHOD DETECTION LIMIT (MDL): For organic and inorganic analyses, the MDL is defined as the minimum concentration of an analyte that can be determined with 99% confidence that the true value is greater than zero. Instructions for the determination of MDL are usually provided by, and specific to, the method of analysis (40 CFR Part 136).

MIXED WASTE: Waste containing both radioactive and hazardous components as defined by the Atomic Energy Act and the Resource Conservation Recovery Act respectively.

MODULES: Documents which, together, make up the complete Statement of Work for the analysis of samples collected at the Site. Modules are identified by their two-letter descriptor, module number, and version letter designation**.**

NEAT STANDARD: A pure original analyte obtained from a chemical supply house.

NIST-TRACEABLE STANDARD: A Standard Reference Material (SRM) purchased either directly from the National Institute of Standards and Technology (NIST) or the other approved vendors who provide the traceability certificate to the NIST.

PERCENT SOLIDS: The proportion of solid in a sample determined by drying an aliquot of the sample.

PREPARATION BATCH: A group of samples prepared at the same time in the same location using the same method.

PREPARATION BLANK (reagent blank, method blank): An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The preparation blank should be carried through the complete sample preparation and analytical procedure and is used to assess contamination resulting from the entire analytical process.

PROCESSING DESIGNATOR: Designations used to identify, on a COC, sample data package turnaround requirements, i.e., Routine, Priority, Rush, etc.

PROTOCOL: A compilation of the procedure to be followed with respect to sample receipt and handling, analytical methods, data reporting and deliverables, and document control. Used synonymously with the Statement of Work (SOW).

PURGEABLE ORGANICS: Volatile Organic Compounds which can be forced out of the water sample with relative ease through purging. \

QC SAMPLE: For a batch of samples for radiochemical analysis, these are the Preparation Blank, the Duplicate Sample and the Laboratory Control Sample. For other analysis methods, QC samples typically include the following when required by the PSA Modules: preparation blanks, laboratory duplicate samples, spiked samples, spiked duplicates, and laboratory control samples.

RADIOACTIVE WASTE: Solid, liquid, or gaseous materials containing radionuclides regulated under the Atomic Energy Act of 1954 as amended, and of negligible economic value considering recovery costs.

REPORT IDENTIFICATION NUMBER (RIN): A grouping of samples identified by the CTR to be included in a single sample data package for a given PSA Module. An RIN may be comprised of more than

one analytical batch, in which case, each analytical batch shall have a unique identifier that associates client and QC samples within the batch. Conversely, if two or more RINs are combined into one analytical batch, each RIN data package must contain all required QC results. RINs are formatted as YY*NNNN, where YY is the 2-digit designator for the Federal fiscal year in which the sample was assigned, * is the letter P, J, or L, and NNNN designates a four-digit number.

RESOLUTION PERIOD: The time allowed for the correction of non-compliant sample data package or response to a Client's question.

ROUNDING RULES: If the number following those to be retained is less than five, the number is dropped, and the retained numbers are kept unchanged. As an example, 11.443 is rounded off to 11.44. If the number following those to be retained is five and if there are no numbers other than zeros beyond the five, the number is dropped, and the last place number retained is increased by one if it is an odd number or it is kept unchanged if an even number. As an example, 11.435 is rounded off to 11.44 while 11.425 is rounded off to 11.42. If the number following those to be retained is greater than five, the number is dropped, and the last place number retained is increased by one. If a series of multiple operations is to be performed (add, subtract, divide, multiply), all numbers are carried though the calculations. Then the final answer is rounded to the proper number of significant figures.

SAMPLE DATA PACKAGE: A deliverable that includes data from analysis of all samples in one RIN including analytical and field samples, PE sample, sample reanalyses, blanks, spikes, duplicates, and LCSs.

SAMPLE DATA PACKAGE NARRATIVE: The section of the sample data package describing all problems or unusual circumstances encountered in the analytical processing of the sample. The narrative should include descriptions of matrix interferences, dilutions required, explanations of any Quality Control deficiencies, method modifications and all other information that might affect the validation of the data.

SAMPLE EVENT NUMBER: A unique identifier number beginning at ‘001 that identifies a sampling event(s) within an individual RIN. This identifier increases sequentially until the RIN changes.

SAMPLE NUMBER (SITE SAMPLE NUMBER): A unique identification number generated by concatenation of the Report Identification Number, Sample Event Number, and the Bottle Identification Number. The format for the site sample number is YY*NNNN-EEE.BBB, where YY*NNNN’ is the RIN (* may be any character), ‘EEE’ is the sample event number that starts at ‘001’ and increases sequentially until the RIN changes and resets the sample event number back to ‘001’, ‘BBB’ is the Bottle Identification Number that starts at ‘001’ and increases sequentially for all sample bottles taken within an event. The following is an example of a site sample number: 97J1234-001.001. All components of the sample number may be found on the COC.

SECONDARY STANDARD: A standard solution prepared at a medium concentration by dilution of the stock standard. Secondary standards also may be purchased from a chemical supply house.

SITE: The Rocky Flats Environmental Technology Site.

SITE SAMPLE IDENTIFIER: See SAMPLE NUMBER.

SOIL: Synonymous with soil/sediment or sediment as used herein.

SPIKE: In radiochemical analysis, an accurately measured amount of tracer quantitatively introduced or transferred into a sample aliquot.

STATEMENT OF WORK (SOW): As used herein, the Safe Drinking Water General Chemistry requirements module (DW01).

STOCK STANDARD: A standard solution at a relatively high concentration which can be diluted to derive other standards. Stock standards may be purchased from a chemical supply house or prepared from neat compounds at the Laboratory. Synonymous with parent or primary standard.

SUPERNATANT: Liquid material above a precipitate or solid.

SUPPORT PACKAGE: Short form of *Supporting Documentation Package*.

SUPPORTING DOCUMENTATION PACKAGE (Support Package): The Supporting Documentation Package (Support Package) is an ordered compilation of Laboratory information relevant to all aspects of data integrity for a single RIN. Much of this information is included by reference to Laboratory document storage locations. One Support Package is complied for each RIN and is maintained by the Laboratory.

TOTAL DISSOLVED SOLIDS (TDS): The filterable residue or solids capable of passing through a glass fiber filter and dried to a constant weight a 180°C. TDS in an indicator test used for water analysis and is also a measure of the mineral content of Bottled Water, drinking water, surface water and groundwater.

TOTAL RECOVERABLE: The concentration of an analyte determined in a non-filtered sample following an sample digestion procedure specific to the analyte and procedure.

TURN AROUND TIME (TATPKG Code): A performance measure used to assess Laboratory compliance to delivery schedules. The elapsed time from the date a Laboratory receives a sample(s) (VTSR) to the date the Site receives the completed deliverable as stated in Exhibit B, Table B-1.

VALIDATED TIME OF SAMPLE RECEIPT (VTSR): Synonymous with Laboratory Sample Receipt Date as used herein.

WATER: Synonymous with aqueous or wastewater as used herein.

WET WEIGHT: The weight of a sample aliquot including moisture (non-dried).

WORKING STANDARD: A daily calibration standard solution prepared by diluting the secondary standard. Working standards are prepared at multiple concentrations from the same secondary standards.

10% FREQUENCY: A frequency specification during an analytical sequence allowing for no more than 10 analytical samples between required calibration verification measurements, as specified by the Statement of Work.

3. ACRONYMS

AA	Atomic Absorption
ALARA	As Low As Reasonably Achievable
AED	Atomic Emission Detection
AES	Atomic Emission Spectroscopy
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
APHA	American Public Health Association
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
CDPHE	Colorado Department of Public Health and the Environment
COC	Chain-of-Custody
CTR	Contractor Technical Representative
CV-AAS	Cold Vapor Atomic Absorption Spectrometry
DCO	Document Control Officer
DEAR	Department of Energy Acquisition Regulations
DI	Deionized (water)
DOE	Department of Energy
DOT	U. S. Department of Transportation
dpm	Disintegration Per Minute
ECD	Electron Capture Detector
EDD	Electronic Data Deliverable

ELPAT	Environmental Lead Proficiency Analytical Testing Program
EPA	U. S. Environmental Protection Agency
EQL	Estimated Quantitation Limit
FID	Flame Ionization Detector
FLAA	Flame Atomic Absorption Spectrometry
FPD	Flame Photometric Detector
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
GFAA	Graphite Furnace Atomic Absorption Spectrometry
GLP	Good Laboratory Practice
HPLC	High Pressure Liquid Chromatography
IC	Ion Chromatography
ICP	Inductively Coupled Plasma
ICPES	Inductively Coupled Plasma Emission Spectrometry
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
IDL	Instrument Detection Limit
IR	Infra-red
ISE	Ion-Specific Electrode
LRL	Laboratory Reporting Limit
MAPEP	Mixed Analyte Performance Evaluation Program
M&TE	Measuring and Testing Equipment
MB	Matrix Blank
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
MG	milligram
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MSDS	Material Safety Data Sheet
MTHM	Maximum Trihalomethanes
N/A	Not Applicable
NB	No Bid
ND	Not Determined
NEG	No Established Guidelines
NARA	National Archive Record Act
NIOSH	National Institute of Occupational Safety and Health
NIST	National Institute of Standards and Technology
NLLAP	National Lead Laboratory Accreditation Program
NPD	Nitrogen Phosphorous Detector
NRC	Nuclear Regulatory Commission
NTU	Nephelometric Turbidity Unit
NVLAP	National Voluntary Laboratory Accreditation Program
OSHA	Occupational Safety and Health Act
OSWER	U. S. EPA Office of Solid Waste and Emergency Response
PAT	Proficiency Analytical Testing Program
PB	Preparation Blank
PCB	Polychlorinated Biphenyls
PE	Performance Evaluation
PN	Price Negotiable
PPM	Parts per million
QA	Quality Assurance
QAO	Quality Assurance Officer

QC	Quality Control
RFETS	Rocky Flats Environmental Technology Site
RIN	Report Identification Number
SDP	Standard Data Package
SIC	Site Identification Code
SOP	Standard Operating Procedure
SOW	Statement of Work
SRM	Standard Reference Material
TAT	Turnaround Time
TATPKG	Turnaround Time /Package Code
TCD	Thermoconductivity Detector
TTHM	Total Trihalomethanes
UG	Microgram
USEPA	United States Environmental Protection Agency
UV	Ultraviolet Detector
VAS	Visible Absorption Spectrophotometry
VTSR	Validated Time of Sample Receipt
XRD	X-Ray Diffraction

EXHIBIT H:

REFERENCES

1. REFERENCES

This list is provided for reference only. Some publications may have been updated or superceded.

1.1. **40 CFR Part 141:** National Primary Drinking Water Regulations

1.2. **40 CFR Part 136**: Guidelines for Establishing Test Procedures for the Analysis of Pollutants

1.3. **40 CFR Part 143**: National Secondary Drinking Water Regulations

1.4. **40 CFR Part 792:** Good Laboratory Practice (GLP) Standards

1.5. **EPA-600/R-93-100** - "Methods for the Determination of Inorganic Substances in Environmental Samples"

1.6. **EPA-600/R-93-111**: "Methods for the Determination of Metals in Environmental Samples - Supplement I"

1.7. **EPA-600/4-88-039*:*** "Methods for the Determination of Organic Compounds in Drinking Water"

1.8. **EPA-600/4-90-020*:* "**Methods for the Determination of Organic Compounds in Drinking Water - Supplement 1"

1.9. **EPA-600/R-92-129*:*** "Methods for the Determination of Organic Compounds in Drinking Water - Supplement II"

1.10. **ASTM Methods*:*** "The Annual Book of ASTM Standards"

1.11. SM Methods***:*** **"Standard Methods for the Examination of Water and Wastewater" 18th edition.**

1.12. "Supplement to the 18th edition of Standard Methods for the Examination of Water and Wastewater"

1.13. **EPA-600/R-94-173***:* "Technical Notes of Drinking Water Methods"

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APPENDIX A:

ELECTRONIC DATA DELIVERABLE REQUIREMENTS

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1. INTRODUCTION

The purpose of the Electronic Data Deliverable (EDD) module is to define a data format that enables efficient return of quality analytical data in support of the Rocky Flats Environmental Technology Site (Site) closure mission.

This requirements specification re-iterates the format to be used to generate an electronic data deliverable from laboratories that perform analyses on samples taken by the Site. The goal of the requirements is to receive quality electronic data for various Site program databases. For questions regarding the electronic data deliverable or other subcontract specifications, contact your Kaiser-Hill Co., L.L.C., Analytical Services Division Contract Technical Representative (CTR).

This document derives from the EDD specification that has been in use at RFETS since 1997 and will continue for an indefinite interim period during the transition to operations under the Rocky Flats site specific version of the national analytical services procurement.

2. GENERAL DESCRIPTION OF THE ELECTRONIC DATA DELIVERABLE (EDD)

The general record structure consists of a header record followed by analytical data records related by the Line Item Code (LIC) in the header which identifies a specific analysis. This grouping of one header record and multiple related detail records is referred to as a data group or packet. All analytical data records that follow a header record will be associated with that header record. Detailed formats for the Radiochemistry and General Chemistry analytical module formats are provided in Section 4.0 of this document. General Chemistry is defined to include Organic, Inorganic, Wet Chemistry and Miscellaneous Chemistry parameters.

All fields in the EDD are required to be filled, unless otherwise specified. For example, Qualifier fields may be blank-filled if certain conditions exist. Or a field may not be designated as relevant for certain data conditions. Refer to the field definitions in Section 4.0 for specific examples.

All EDDs are to be submitted electronically via e-mail. See Attachment A, “EDD Delivery Process,” of this document for instructions.

2.1. CHARACTER FIELDS

All character fields, unless otherwise specified, shall be **UPPER CASE** standard printing ASCII characters. Any exceptions to case sensitivity will be explicitly listed in the specific module. All character fields must be left-justified and padded to the right with blanks. Additionally, all fields within the records will be padded to the right with blanks to the end of the field. Fields are delimited within the EDD by fixed column specifications. If data does not start at the correct column position in the record, data errors will occur and the EDD will be rejected.

2.2. END-OF-LINE SPECIFICATION

The end of every data line will contain a carriage return/line feed combination (CR/LF) to signify the end of that line of text compatible with the MS-DOS convention. (Unix systems do not follow the DOS convention; the provider must ensure that any submitted EDDs meet the DOS convention.) Any additional data placed after the last specified field on any line is not according to specification and may cause data errors.

2.3. NUMERIC FIELDS

Numeric fields are unrestricted decimal numbers that may be represented in scientific notation. The format for scientific notation is as follows:

signed_decimal_mantissa[e|E][+|-]integer_exponent

with no spaces within the number itself. A negative sign (-) or a plus sign may precede the integer_exponent as indicated by [+|-] in the notation; the plus sign (+) is optional. There is no requirement concerning the location of the decimal point or left or right justification of the number in the field.

Negative numbers are allowed where appropriate(in general chemistry, negative numbers are only allowed in QC samples). Negative numbers will have the minus sign immediately preceding the number itself. Plus signs are not allowed in positive numbers with the exception of the exponent in scientific notation format.

All numerical fields are required to be delivered in consistent formatting. For example, a LIC may not be submitted containing both a standard numeric format and scientific notation. Additionally, all EDDs submitted within the same LIC must contain consistent numerical formatting over time.

2.4. REPORTING QUALITY CONTROL DATA

This EDD module provides a means of reporting QC data. Lab QC samples (for example, blanks, matrix spikes, etc.) are to be reported electronically using this version.

2.4.1. *QC Derived From Site Samples*

Matrix spikes and laboratory duplicates derived from Site samples are to be reported with the sample identifier in the Sample Number field as if they were normal Site samples with their specific Result Identifier fields reported as LDn, MSn or MDn, where LD, MS, and MD are Laboratory Duplicate, Matrix Spike, and Matrix Spike Duplicate respectively, and the "n" designator identifies the nth analysis attempt performed on the respective QC. For radiological analyses using Site samples as duplicates, report the Relative Error Ratio (RER) field on the LD1 result.

2.4.2. *QC Derived From Non-Site Samples*

For matrix spikes and laboratory duplicates derived from non-Site samples, report the Laboratory Sample Number in the both the Sample Number field and the Laboratory Sample Number fields with the appropriate Result Identifiers of LDn, MSn or MDn, where LD, MS, and MD are Laboratory Duplicate, Matrix Spike, and Matrix Spike Duplicate respectively, and the "n" designator identifies the nth analysis attempt performed on the respective QC. Laboratory duplicates using non-site samples must report the initial sample result as LD1 and the duplicate sample reported as LD2. Reanalyses should use sequentially higher numbered pairs. For radiological analyses where non-site samples are used as duplicates, report the RER field with the LD2 or second result. Paired results are not required for MS or MD QC samples when non-Site samples are involved.

Refer to Attachment C, "**Result Identifiers,"** of this document for acceptable QC item result identifiers.

2.5. REPORTING RESULTS FOR UNDETECTED ANALYTES

An analyte is said to be "Undetected by a method" if either no result could be computed or the computed result is less than a method-specific detection limit. This method-specific detection limit is often called the Method Detection Limit (MDL) for organic analyses or the Instrument Detection Limit (IDL) for Inorganics. A Radiochemistry Limit is often called the Minimum Detectable Activity (MDA). This definition is the basis for the following rules:

2.5.1. ***Organics***

- All analytical results below the MDL are reported with a U qualifier. Results with concentrations greater than the MDL but less than the Required Detection Limit (RDL) as stated in this document are to be reported with a J qualifier.
- Refer to Section 4.2.1 and Attachment E, "Result Qualifiers," of this document for additional acceptable result qualifiers and definitions.

2.5.2. ***Inorganics***

- ***Metals***: All analytical results below the IDL are reported with a U qualifier. Results with concentrations greater than the IDL but less than the RDL are to be reported with a B qualifier.
- ***Nonmetals***: All analytical results below the MDL are reported with a U qualifier. Results with concentrations greater than the MDL but less than the RDL are to be reported with a B qualifier.
- ***Result Qualifiers***: Refer to Section 4.2.1 and Attachment E, "Result Qualifiers," of this document for additional acceptable result qualifiers and definitions.

2.5.3. ***Radiochemistry***

- For all detected analytes, report the result value with no U result qualifier assigned.
- For all undetected analytes for which a result was computed, report the result value as the result with the appropriate qualifier as allowed for in Attachment E, " Result Qualifiers," of this document. This differs from the rules for Organics and Inorganics in that the actual result is still reported even though the analyte was undetected.

2.6. FIELD DEFINITIONS

Field definitions are contained in the format description in Section 4.

2.7. DATA PROTECTION AND PRIVACY CONSIDERATION

The information provided to the laboratory and the data results returned are covered under the privacy act of 1974 and shall be protect from unauthorized access with applicable federal law. 10 CFR 1008 Privacy Act and (Public Law 93-579).

2.8. FILENAMING

Filenames should be constructed to be unique and easily cross-referenced by the laboratory with the Report Identification Number.

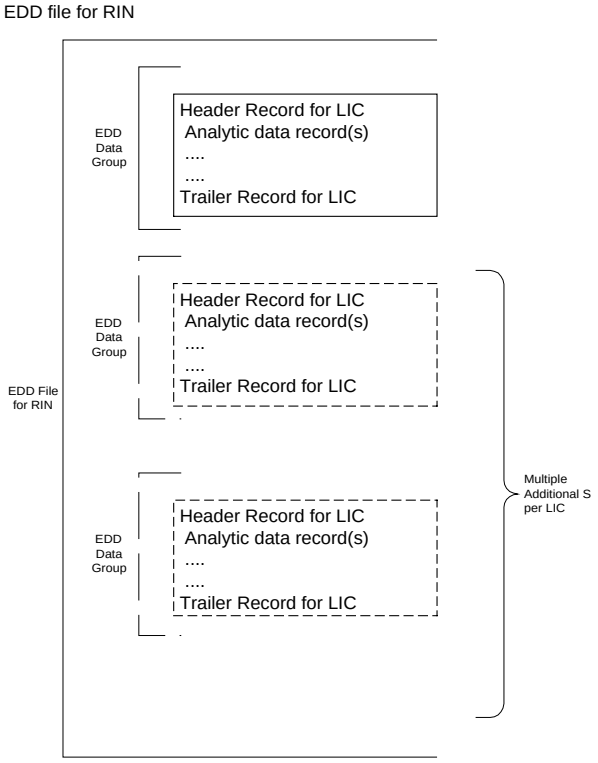
Files sent via e-mail may be zipped for compression provided they are packaged as a self-extracting executable. Some mail servers wrap attached files in unexpected places. Zipping the file may be a remedy for such a problem.

3. GUIDELINES FOR EDD FILE CREATION

Creation of the EDD must follow the format specifications outlined in section 4.0 of this document. Failure to follow specifications will be cause for data rejection and require resubmittal. EDDs are processed by the Site through various levels of automatic data checking. A basic EDD checker program will be provided to all participating laboratories. The lab's process must include submitting files only if they have passed successfully through the checker. Any files that fail to pass the checker on receipt at the Site will be immediately rejected, which will impact the lab's turnaround performance. If there are problems with the checker program, contact the Analytical Services Division's CTR.
EDDs are used to expedite loading data into Site databases and to avoid re-transcription from the data report package. Accordingly, all data reported **in the EDD must match the "hardcopy" of the data**

report. All environmental sample data submitted with the hardcopy must be included in the EDD. This includes dilutions, re-analysis or re-extraction of samples.

An EDD file will not contain data for more than a single RIN. However, a RIN may be comprised of multiple report package modules corresponding to the various Line Item Codes (LICs) requested for analysis. Within the data file for a RIN, multiple data groups for LICs may be present provided they are delineated by the appropriate Header and Trailer records. The Header record is essential for associating the RIN and LIC as well as the Lab Identifier with the analysis records. LICs cannot be combined within



an EDD data group. The following diagram illustrates the LIC group data relationship within an EDD file.

While it is preferred that all the data for a RIN be presented within a single file, if necessary, multiple files for a RIN can be submitted provided the integrity of the LIC data group is maintained. Partial deliverable of a LIC is not acceptable, i.e., all the data for the LIC must be delivered in a single data group.

4. EDD FORMATS FOR RAD AND NON-RAD ANALYTICAL DATA

Radiochemistry (RAD) and Non-Radiochemistry (Non-RAD) EDDs follow the general structure of a header record, analysis records and a closing trailer record. The order, specific content and field sizes may vary between the two types.

4.1. RADIOCHEMISTRY EDD FORMAT FORM

Header Line Format RAD Data			
Column(s)	**Field Name**	**Field Type**	**Format/Contents**
1-10	RIN Number	Character (10)	Report Identification Number assigned by the Site (found on the Site COC).
11-20	File Date	Character (10)	(MM/DD/YYYY) Date of EDD creation.
21-30	Line Item Code	Character (10)	Line Item Code as requested on Site COC.
31-40	Laboratory ID	Character (10)	Laboratory ID as provided by the Site.
Note: All character fields are left-justified and padded to the right with blanks.			

Analytical Data Line Format RAD Data			
Column(s)	**Field Name**	**Field Type**	**Format/Contents**
1-15	Analytical Batch ID	Character (15)	Unique number internal to laboratory performing analysis that links all the related QC and analytical data. (See definition of Analytical Batch in Attachment G, Basic Ordering Agreement.)
16-35	Sample Number	Character (20)	Sample Number i.e. Bottle Number assigned by the site as stated on the Site COC
36-55	Laboratory Sample Number	Character (20)	Laboratory Sample Number (assigned by the laboratory)
56-65	Sample Receipt Date	Character (10)	(MM/DD/YYYY) Date Lab received sample
66-75	Sample Volume Received	Character (10)	Required for Line Item Code LSC-*-003 (Tritium Bubbler). Reporting units are (ml).
76-85	Date Analyzed	Character (10)	(MM/DD/YYYY) Date analysis performed
86-90	Result Identifier	Character (5)	Code that differentiates between analytical results, duplicates, spikes, and QC items. See Attachment C of Appendix A for acceptable values.

Analytical Data Line Format RAD Data			
Column(s)	**Field Name**	**Field Type**	**Format/Contents**
91-106	CAS Number	Character (16)	Formal CAS number for the analyte. Site specified constituent ids shall be used when formal numbers are not available. Contact the CTR if CAS number is unknown. Must match the Site's identifier for target analytes.
107-136	Isotope	Character (30)	Descriptive name of the analyte. Refer to the analyte name in the Line Item Code table.
137-146	Result (measured value)	Character (10)	Analytical Result associated with the analysis of this analyte.
147-156	Result Units	Character (10)	"Result Units" shall be in the same units given for the analyte RDL.
157-161	Result Qualifier	Character (5)	See GR03 Attachment E - Result Qualifiers, for acceptable values.
162-171	Total Propagated Error at 2 sigma	Character (10)	The square root of the sum of the squares of the 2-sigma error terms from all stages of the measurement processes involved.
172-181	Percent Tracer Recovery	Character (10)	Percentage of sample recovery for the added tracer or carrier, as applicable. (Required for all samples containing a tracer recovery)
182-191	MDA	Character (10)	Minimum Detectable Amount (required for all samples)
192-201	RER*	Character (10)	Equivalency test at 1 sigma. (required on duplicate sample)
202-204	Field Not Used	Character (3)	The contents of this three character field will be ignored for data generated under the Requirements of GR03.
205-214	LCS Relative Bias	Character (10)	As required per BOA Attachment J, Section 2.3.2.5.
Note: All character fields are left-justified and padded to the right with blanks.			

* Relative Error Ratio (RER) as defined in the Basic Ordering Agreement, Statement of Work for Laboratory Analytical Services, Attachment J, "General Radioanalytical Requirements," Section 2.3.3.

Trailer Line Format RAD Data			
Column(s)	**Field Name**	**Field Type**	**Format/Contents**
1-3	$$$	Character (3)	"$$$" End of data group designator.
Note: All character fields are left-justified and padded to the right with blanks.			

4.2. NON-RADIOCHEMISTRY EDD FORMAT FORM

Header Line Format NON-RAD Data			
Column(s)	**Field Name**	**Field Type**	**Format/Contents**
1-10	RIN Number	Character (10)	Report Identification Number assigned by the Site. (found on the Site COC).
11-20	File Date	Character (10)	(MM/DD/YYYY) Date of EDD creation.
21-30	Line Item Code	Character (10)	Code as listed on Chain of Custody form sent with samples. See Standard Services analytical module for correct code format.
31-40	Laboratory ID	Character (10)	Laboratory ID as provided by the Site.
Note: All character fields are left-justified and padded to the right with blanks.			

Analytical Data Line Format NON-RAD Data			
Column(s)	**Field Name**	**Field Type**	**Format/Contents**
1-15	Analytical Batch ID	Character (15)	Unique number internal to laboratory that links all the related QC and analytical data. (See definition of Analytical Batch in Attachment G, Basic Ordering Agreement.)
16-35	Sample Number	Character (20)	Sample Number i.e. Bottle Number assigned by the site- as stated on the Site COC
36-55	Laboratory Sample Number	Character (20)	Laboratory Sample Number (assigned by the laboratory)
56-65	Sample Receipt Date	Character (10)	(MM/DD/YYYY) Date Lab received sample
66-75	Date Analyzed	Character (10)	(MM/DD/YYYY) Date analysis performed

Analytical Data Line Format NON-RAD Data			
Column(s)	**Field Name**	**Field Type**	**Format/Contents**
76-95	Matrix	Character (20)	Matrix of sample as identified by Line Item Code. See GR03 Attachment B – Sample Matrix Types, for acceptable values.
96-100	Result Identifier	Character (5)	Code that differentiates between analytical results, duplicates, spikes, and QC items. See Appendix A, Attachment C - Result Types, for acceptable values.
101-116	CAS Number	Character (16)	Formal CAS number for the analyte. Site specified constituent ids shall be used when formal numbers are not available. Contact the CTR if CAS number is unknown. Must match the Site's identifier for target analytes.
117-176	Analyte	Character (60)	Descriptive name of the analyte. Refer to the analyte name in the Line Item Code table.
177-186	Result (measured value)	Character (10)	Analytical Result associated with the analysis for this analyte.
187-196	Result Units	Character (10)	See Appendix A, Attachment D - Units of Measure, for acceptable values.
197-201	Result Qualifier	Character (5)	See Appendix A, Attachment E - Result Qualifiers, for acceptable values.
202-211	Dilution Factor	Character (10)	Required for diluted samples only. Recorded as a numeric value (i.e. 2.5, 5, 10, 100, etc.)..
212-221	Detection Limit	Character (10)	Detection Limit as stated in the hardcopy report. See discussion in Section 2.5, "Reporting Results for Undetected Analytes.".
222-224	Secondary Result Type	Character (3)	Code to designate analytical results for tentatively identified compounds (TIC) or surrogates (SUR)..
225-234	Extraction Date	Character (10)	(MM/DD/YYYY) The date of sample preparation at the lab for all samples that require preparation or extraction, including lab generated samples.
Note: All character fields are left-justified and padded to the right with blanks.			

Trailer Line Format NON-RAD Data			
Column(s)	**Field Name**	**Field Type**	**Format/Contents**
1-3	$$$	Character (3)	"$$$" End of data group designator.
Note: All character fields are left-justified and padded to the right with blanks.			

5. APPENDIX A - ATTACHMENTS

5.1. ATTACHMENT A - EDD DELIVERY PROCESS

EDD files shall be provided via E-Mail. Submission of EDDs electronically is the preferred method of data transmittal. The E-Mail address for sending EDD files is:

Analytical.Services@rfets.gov

The Site will reply with an email confirming receipt. If a confirmation is not received within a reasonable time, i.e. one business day, call the Analytical Services CTR.

If necessary, EDDs may be submitted on a diskette, to:

Kaiser-Hill Company, L.L.C.
Analytical Services Division
10808 Hwy 93, Unit B
Building T130C
Golden, Colorado 80403-8200

Should a laboratory supply EDDs on a diskette, the following conditions apply:

- Diskettes must be PC-compatible, 3.5 inch high-density 1.44 megabyte diskettes.
- Diskettes must be formatted and recorded compatible with a Microsoft Windows operating environment.

5.2. ATTACHMENT B - SAMPLE MATRIX TYPES

AIR - Sample of confined air.

FAUNA - Sample of animal tissues, bodies or composite; including mammals, insects, reptiles and amphibians.

FISH - Sample of aquatic vertebrate.

FILTER - Sample composed of any type of filter.

FLORA - Sample of any type of plant.

LIQUID - Sample of oils, solvents, or other non-aqueous liquids.

WATER - Sample of aqueous media. This sample matrix type shall also be used for all TCLP analysis.

SOIL - Sample of soil or sediment.

SOLID - Sample of asphalt, crushed glass or other solids.

SLUDGE - Sample of chemical sludge, mixtures of which are neither solid nor liquid.

WIPE - Sample of any material used as a wipe.

5.3. ATTACHMENT C - RESULT IDENTIFIERS

QC Item types

PBn - Preparation Blank, for Radiochemistry analysis only (includes blank filters submitted by RFETS to be utilized as QC samples), n identifies the nth analysis attempt performed on a Prep Blank (i.e. PB1, PB2, etc).

RBn - Reagent Blank (prep. blank for tritium). Radiochemistry only, used to identify reagent blank analysis, n identifies the nth analysis attempt performed on a Reagent Blank, (i.e. RB1, RB2, etc.)

LCn- Laboratory Control Sample, n identifies the nth analysis attempt performed on a laboratory control sample (i.e. LC1, LC2, etc.). Only LCn spike compounds (%REC) are to be reported.

LDn- Laboratory Duplicate, n identifies the nth analysis attempt performed on a laboratory duplicate (i.e. LD1, LD2, etc.). Re-analysis of a replicate sample shall be designated by

incrementing to the next nth value (i.e. a re-analysis or dilution of LD1 shall be designated LD2).

MBn- Method Blank, General Chemistry only, n identifies the nth analysis attempt performed on a method blank (i.e. MB1, MB2, etc.).

MSn- Matrix Spike, General Chemistry only, n identifies the nth analysis attempt performed on a matrix spike (i.e. MS1, MS2, etc.). Only MSn spike compounds (% REC)are to be reported.

MDn- Matrix Spike Duplicate, General Chemistry only, n identifies the nth analysis attempt performed on a matrix spike duplicate (i.e. MD1, MD2, etc.). Only MDn spiked compounds are reported as %REC.

*Since the QC item type is a Key in the RFETS system, QC item types are to be reported with an unique identification that is tied to the nth analysis attempt in which it was performed.

Analytical Result identifiers

DLn- Laboratory Dilution, n identifies the nth analysis attempt performed on a laboratory sample (i.e. DL1, DL2, etc.).

RXn- Re-extraction, n identifies the nth analysis attempt performed on a re-extraction (i.e. RX1, RX2, etc.).

TRn- Target Compound, n identifies the nth analysis attempt performed on a target compound (i.e. TR1, TR2, etc.).

All results submitted in the hardcopy report for environmental samples must be reported in the EDD. For example, the initial analysis is reported with a result identifier of TR1. If a method QC criteria was not met and a re-analysis required, the 2nd analysis is reported as TR2. Additionally, if a dilution is now required the 3rd set of data is reported as DL1.

All surrogates and TICs are to be reported with the same analytical result identifier as their parent sample but are also to include the secondary result type of either SUR or TIC.

Only RFETS sample numbers are to utilize DLn, RXn, and TRn. These Result Identifiers are not to be utilized for QC samples.

5.4. ATTACHMENT D - UNITS OF MEASURE

C/100ML -	Counts per 100 milliliters
DPM -	Disintegration per minute
DPM/ML -	Disintegration per minute per milliliters
DPM/FILTER -	Disintegration per minute per filter
MG/L -	Milligrams per liter
MG/KG -	Milligrams per kilogram
UMHOS/CM -	Micromhos per centimeter
PCI/G -	Picocuries per gram
PCI/L -	Picocuries per liter
S.U. -	Standard Units (for pH analysis results)
UG/KG -	Micrograms per kilogram
UG/L -	Micrograms per liter

UG/WIPE -	Micrograms per wipe, used for PCBs
% -	For general chemistry use with percent solids, percent moisture, etc.
DEG C	Degrees Celsius (Ignitability)
NTU -	Turbidity
%REC -	For use with percent recovery on quality control samples including LC(n)*, MS(n), MSD(n) and Surrogates results.
Y -	Yes (Drinking Water module only)
N -	No (Drinking Water module only)

For all units, the standard alphabetical character will be utilized, symbols are not acceptable.

* If an error occurs during preparation/analysis that results in the exclusion of an analyte/isotope in the laboratory control sample, the laboratory shall:

a) Re-extract/re-analyze the analytical batch if holding time has not expired and there are adequate sample volumes.

b) If holding time has expired or inadequate sample volumes remain for a re-extraction/re-analysis, perform the following:

1. Contact the laboratory appropriate RFETS Contract Technical Representative (CTR);
2. Write a Non-Conformance Report and submit to the CTR;
3. Include discussing in the report Case Narrative and include same discussion when submitting the EDD. In both cases reference NCR; and
4. In the EDD Result column include “NS” with units of %REC and “R” as the laboratory qualifier.

5.5. ATTACHMENT E - RESULT QUALIFIERS

Gen. Chem. Qualifiers

Organic

A - TIC - suspected aldol-condensate product - organic

B - Analyte found in blank and sample-organic;

D - Component identified using secondary dilution factor-organic;

E - Concentration exceeds calibration range of instrument-organic;

I - Interference - organic

J - Estimated value, > MDL but < RDL - organic

U - Undetected, analyzed for, but not detected

Inorganic

B - Estimated value, result > IDL but < RDL -inorganic

E - Estimate due to suspected interference - inorganic

M - Replicate instrument readings not within control limits - inorganic

N - Spiked recovery not within control limits - inorganic

S - Determined by method of additions - inorganic

U - Undetected, analyzed for, but not detected

W - Analytical spike recoveries not within control limits - inorganic

* - Duplicate agreement not within control limits - inorganic

+ - Determined by method of additions, correlation coefficient not within control limits - inorganic

Radiochemistry Qualifiers

U - Results < MDA (The result being reported is less than the MDA. If the MDA is blank, the ERROR is used as the limit.)

J - Result < RDL and no undetected "U" qualifier assigned (The result is less than the required detection limit (RDL) and no undetected ("U") qualifier is assigned.)

B - Reagent blank without "U" qualifier - result ≥ MDA (The reagent blank associated with this sample had a result without an undetected ("U") qualifier and the result is greater than or equal to the MDA for this sample.