Chemical Compliance Sample Collection, Analysis, and Reporting

Addendum 1

(Revision 3)

to the

Quality Assurance Project Plan for the Texas Commission on Environmental Quality Public Water System Supervision Program Relating to the Safe Drinking Water Act

Effective

November 10, 2022

List of Acronyms

CFR	Code of Federal Regulations
COC	chain of custody
DOC	Demonstration of Capability
DQI	data quality indicator
DSG	Data Support Group
DSHS	Department of State Health Services
DQI	Data Quality Indicator
DWQT	Drinking Water Quality Team
DWS	Drinking Water Standards
DWSG	Drinking Water Sampling Guide
FB	field blank
HAZWOPER	Hazardous Waste Operations and Emergency Response
LFB	laboratory fortified blank
LFM	laboratory fortified matrix
LIMS	Laboratory Information Management System
LRB	laboratory reagent blank
MB	method blank
MCL	maximum contaminant level
MDL	method detection limit (minimum detection limit)
MRL	minimum reporting limit (practical quantitation limit)
MSE	matrix specific effect
NELAC	National Environmental Laboratory Accreditation Conference
NPDWR	National Primary Drinking Water Regulations
NSDWR	National Secondary Drinking Water Regulations
OW	Office of Water
PT	proficiency testing
PWS	public water system
PWSS	Public Water System Supervision
QA	quality assurance
QAP	quality assurance plan
QAPP	quality assurance project plan
QAS	Quality Assurance Specialist
QC	quality control
QMP	quality management plan
SCL	Secondary Contaminant Level
SCMP	Sample Contract Management Plan
SDWA	Safe Drinking Water Act
SDWIS	Safe Drinking Water Information System
SOC	synthetic organic chemical
SOP	standard operating procedure
SOW	scope of work
TAC	Texas Administrative Code
TB	trip blank
TNI	The NELAC Institute
VOC	volatile organic chemical
WSD	Water Supply Division

(A) Project Management

A1 Approval Signatures

The following individuals are signatories to this QAPP Addendum because they are responsible for the management and assurance of quality of the work described.

A1.1 TCEQ

Michele Risko, Section Manager

TCEQ/OW/WSD/Drinking Water Standards Section (DWSS)

Signature: _____ Date: 09/14/2022

Kasy Stinson, Team Leader

TCEQ/OW/WSD/DWSS/Drinking Water Quality Team

Signature: Kasy Stinson Date: 9/14/2022

Emily Smith, TCEQ Project Manager

TCEQ/OW/WSD/DWSS/Drinking Water Quality Team

Signature: Emily Smith Date: 09/14/2022

Jessica Hoch, Program Lead Quality Assurance Specialist

TCEQ/Office of Water (OW)/Water Supply Division (WSD)

Signature: _____ Date: 09/13/2022

A1.2 Laboratory Acknowledgment and Agreement

All laboratories participating in the Public Water System Supervision (PWSS) Program must submit Laboratory Acknowledgement and Agreement documentation. The current version can be obtained on the TCEQ PWSS Program webpage or directly by request to PWSQA@tecq.texas.gov.

Laboratory signatures obtained directly within this Addendum are equivalent to the Laboratory Acknowledgment and Agreement documentation described above. No submission of additional documentation is required.

A1.2.1 Texas Department of State Health Services (DSHS)

Grace Kubin, Director

Laboratory Services Section, Environmental Services Branch

Signature: Grace Kubin Date: 09/14/2022

Carl Hogberg, Manager

Laboratory Services Section, Environmental Services Branch

Signature: Carl Hogberg Date: 9/14/2022

Joseph Zenon, QA Manager

Laboratory Services Section, Environmental Services Branch

Signature: Joseph Zenon Date: 9/14/2022

Kimberly Hamilton, QA Officer

Laboratory Services Section, Environmental Services Branch

Signature: Kim Hamilton-Houdek Date: 09/14/2022

A1.2.2 Lower Colorado River Authority (LCRA) Environmental Laboratory Services

Dale Jurecka, Manager

Signature: _____ Date: 9/14/22

Angel Mata, QA Manager

Signature: _____ Date: 09/13/2022

A1.2.3 Drinking Water Compliance Sampling Services Contractor

Eric W. Muehlberger, P.G., Project Manager

Signature: Eric W. Muehlberger Date: 9/15/2022

Zachary Evans, QA Manager

Signature: Zachary Evans Date: 9/15/2022

A2 Table of Contents

A3 Distribution

The PWSS Program Lead Quality Assurance Specialist (QAS) ensures the individuals on the distribution list in Section A3 of the QAPP Programmatic document receive a copy of the Programmatic QAPP and Addenda. Redistribution occurs when amendment or revision is approved and published.

The Team Leader of the Drinking Water Quality Team ensures the QAPP, and any subsequent revision, is distributed to the participants specified in Section A4 of this QAPP Addendum.

The Project Manager for the Drinking Water Compliance Sampling Services Contract (DWCSSC) ensures the QAPP, and any subsequent revision, is distributed to all project participants listed in Table A3.1. The DWCSSC Project Manager also ensures QAPP is distributed to any additional participating laboratories or stakeholders not listed in Table A3.1.

Table A3.1 QAPP Addendum Distribution List

Name	Title	Organization	Email
Eric Muehlberger, P.G.	Project Manager	Antea USA, Inc.	Eric.Muehlberger@anteagroup.us
Jenn Torres	QA Manager	Antea USA, Inc.	Jenn.Torres@anteagroup.us
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Kimberly Hamilton	Laboratory QA Officer	DSHS	Kimberly.Hamilton@dshs.texas.gov

The current version of the Programmatic QAPP and Addenda are on the TCEQ PWSS Program webpage at <tceq.texas.gov/drinkingwater/pwss.html>.

A4 Project Organization

The TCEQ Drinking Water Quality Team (DWQT) oversees activities related to chemical compliance. This team is organized within the Drinking Water Standards Section (DWSS) of the Water Supply Division (WSD). See Section A4 of the main QAPP document for roles and responsibilities of key individuals in TCEQ WSD including the Lead QAS, Deputy Director, Assistant Deputy Director, Section Manager, etc.

The individual/groups listed below administer, oversee, and/or participate directly in the stated activities related to chemical compliance sample collection, analysis, and reporting.

A4.1 TCEQ Drinking Water Quality Team

- Maintains working knowledge of rules and regulations applicable to this QAPP Addendum.
- Maintains requirements for chemical sampling and analysis and incorporates into documents (e.g., sampling schedule, forms, SOPs, DWSG, QAPP Addendum 1, etc.) and provides to sampling contractor and laboratories, as applicable.
- Certifies, audits, and oversees samplers to ensure the sampling contractor complies with all QA practices for the collection of compliance drinking water samples.
- Coordinates with designated, accredited laboratories and oversees activities to ensure data of known and defensible quality.
- Coordinates with Data Support Group (DSG) for the receipt, QC, and migration of data reported by laboratories. DSG maintains responsibility for coordination with laboratories for any corrections needed for data reported.
- Notifies team leader if there are deviations from required protocols specified in the QAPP Addendum and/or referenced documents. Initiates corrective action as required.
- Performs applicable personnel responsibilities per the TCEQ Quality Management Plan (QMP), Appendix C. The current QMP revision can be found on the TCEQ web page at <www.tceq.texas.gov/agency/qa/qmp>.

In addition to the activities described above, the DWQT leader is responsible for maintaining lines of communication with WSD management about activities described in this QAPP Addendum, and elevating issues when identified.

The roles of the TCEQ contract manager and the project manager have additional responsibilities related to the development, maintenance, and/or implementation of the sampling contractor's contract and SOW as specified in the TCEQ QMP, Appendix C. The TCEQ project manager is the point of contact for the sampling contractor project manager.

Contact information for the Drinking Water Quality Team is located on the TCEQ website <https://www.tceq.texas.gov/drinkingwater/chemicals> and a proxy box email is available for all chemical compliance questions at PWSChem@tceq.texas.gov.

A4.2 Sampling Contractor

The sampling contractor's SOW referenced in Attachment 1 of this QAPP Addendum specifies roles and responsibilities for the following individuals.

- project manager
- project specialists: QA and data management
- technicians/samplers

- administrative staff

The roles and responsibilities defined in the contractor SOW apply to subcontractor employees, as applicable.

A4.3 Laboratories

Analytical work described below is performed by the laboratories specified in this QAPP Addendum.

- DSHS
    - Organics, minerals, metals, disinfection byproducts, radionuclides, free cyanide, endothall, glyphosate, diquat, and PCB analysis
- LCRA-ELS
    - Organics, minerals, metals, and disinfection byproducts
- Specified TNI Accredited Laboratory that has submitted Laboratory Acknowledgment and Agreement documentation prior to beginning work
    - Asbestos

The laboratories are responsible for implementing the following requirements.

- Sign the QAPP and/or submit adherence documentation.
- Maintain TNI accreditation and EPA certification (as applicable) for relevant method and matrix in order to analyze samples. Implements all relevant provisions.
- Adhere to project-specific analysis requirements described in this QAPP Addendum.
- Coordinate with sample contractor to analyze chemical compliance samples and report results per this QAPP Addendum.
- Report deviations from this Addendum to TCEQ immediately and initiate corrective action(s) as required.
- Maintain chemical compliance testing records per Section A9 of this QAPP Addendum.

Laboratory directors, QA Managers, and Technical Managers (however named) are responsible for the maintenance and implementation of the laboratory quality system; and perform duties in accordance with their quality manual and applicable laboratory accreditation and/or certification standards. These duties involve, but are not limited to client services as defined in the TNI Standard and related to this QAPP.

A5 Problem Definition/Background

Congress passed the SDWA in 1974 to protect public health by regulating the nation’s public drinking water supplies. The SDWA authorizes the EPA to set national health-based water quality standards for drinking water to protect against

both naturally-occurring and man-made contaminants. The TCEQ also sets secondary drinking water regulations, which are standards for contaminants that may cause cosmetic effects (such as skin and tooth discoloration) or organoleptic effects (such as taste, color or odor). The federal regulations that address the SDWA include 40 Code of Regulations (CFR) §141 *National Primary Drinking Water Regulations* (NPDWR); 40 CFR §142, *NPDWR Implementation*; and 40 CFR §143 *National Secondary Drinking Water Regulations* (NSDWR).

The State of Texas retains primary enforcement authority for the 1974 SDWA and its amendments, by maintaining a PWSS Program consistent with federal regulations. As one part of its primacy agreement, the TCEQ WSD is responsible for determining PWS compliance with requirements related to drinking water standards contained in 30 TAC §290 Subchapter F: *Drinking Water Standards Governing Drinking Water Quality and Reporting Requirements for PWSs*. These rules require the collection and analysis of drinking water samples to determine whether chemicals contaminants are present in the public's drinking water above the limits set by regulation.

This QAPP Addendum describes the technical and quality activities related to the sample collection, analysis, and reporting of chemical compliance data. Chemical compliance samples are collected by DWCSS contract staff for laboratory testing and reported to the TCEQ to verify that the water public water systems provide to the public meets all federal and state standards.

A6 Project/Task Description

Under this Programmatic QAPP Addendum, chemical drinking water samples are collected, analyzed, and reported to the TCEQ WSD to ensure compliance with federal drinking water standards per the SDWA as described in Section A5. The regulated and unregulated contaminant types collected, analyzed, and reported under this Programmatic QAPP Addendum include:

- Inorganic contaminants
- Volatile organic contaminants
- Synthetic organic contaminants
- Disinfection byproducts
- Radionuclides
- Secondary constituents

All activities under the TCEQ PWSS Program and addressed under this QAPP Addendum are funded through a combination of State, local, and appropriate Federal Funds for Program Management. For the field portion of this project, the TCEQ specifies its requirements in this QAPP Addendum pursuant to those defined in the Sampling Contract including:

- The *DWSG*, Current Edition (provided as a separate document)
- TCEQ *QMP* (most recent edition) <tceq.texas.gov/agency/qa>

- *PWSSP Programmatic QAPP*
- *Manual for the Certification of Laboratories Analyzing Drinking Water (Certification Manual) 5th Edition, Supplement 1, and Supplement 2*
- National Drinking Water Regulations, 40 CFR §141, 142, 143
- Rules and Regulations for PWSs, 30 TAC §290 Subchapter D & F
- PWS Water Analysis Form (included in the *DWSG*; or approved Electronic Data Collection format)
- COC (included in the *DWSG*)
- Field Report (included in the *DWSG*)
- Electronic Data Reporting Format (included in the *DWSG*)
    - Monthly Sample Collection Analysis Reports (SCARs)
    - Monthly Field Reports

The DWCSS contractor adopts and incorporates guidance and requirement documents above into their documents. The DWCSS contractor reviews their documents on an annual basis and any updates are incorporated into their program documents which are reviewed and approved by the TCEQ DWCSS contract manager. The following are a list of these documents.

SCMP (provided as a separate document) which includes*:*

- *Quality Assurance Plan (QAP)*
- SOPs
    - Office, Vehicle and Sampler Auditing
    - Internal/External Communication
    - Sample Collection Data Entry QA/QC
    - Field Instrumentation
    - Internal GPS Device on the Tablet
    - Sample Collection
    - Sampling and Appointment Scheduling
    - Sampler Training
    - Data Management and Validation
- Health and Safety Plan

For the laboratory portion of this project, the TCEQ specifies its requirements for analysis and reporting in this QAPP Addendum pursuant to federal regulations, state rules, approved analytical methods, laboratory standards and procedures, and project-specific TCEQ requirements, including:

- National Drinking Water Regulations, 40 CFR §141, 142, 143

- Rules and Regulations for Public Water Systems, 30 TAC §290
- Environmental Testing for Laboratory Accreditation and Certification, 30 TAC §25
- TCEQ Environmental Laboratory (NELAP) Accreditation Requirements, 30 TAC §5 <tceq.texas.gov/field/qa/env_lab_accreditation.html>
- PWSSP Programmatic QAPP
- TCEQ QMP
- TCEQ DWSG, Current edition (Provided as a separate document)
- The NELAC Institute, National Environmental Laboratory Accreditation Program Standard
- Manual for the Certification of Laboratories Analyzing Drinking Water (Certification Manual) 5th Edition, Supplement 1, and Supplement 2
- EPA and TCEQ approved analytical test methods (See Section B4)
- Laboratory quality manuals or quality system manuals (however named) and standard operating procedures
- TCEQ project-specific data management and reporting requirements as included or referenced in this document

Description of Tasks

The processes described below to manage, collect, analyze, report, and use chemical compliance data are a joint effort of the TCEQ, its DWCSS contractor, and the laboratories. This Programmatic QAPP Addendum addresses Steps 2 and 3 and reflects the activities of the sampling contractor and the laboratories. Steps 1, 4, and 5 are the responsibility of the TCEQ and associated activities are described in the Programmatic QAPP. An overview of these work activities is included in the flow chart in Exhibit 1 of this QAPP Addendum.

- TCEQ PWSS Program staff oversees sampling, analysis, and reporting; develops applicable requirements; and provides them to the DWCSS contractor and the laboratories.
    - Develops Sampling Contract *Scope of Work* (Exhibit 2) and maintains requirements and forms for chemical sampling and analysis, including but not limited to this Programmatic QAPP Addendum.
    - Generates routine sampling schedule based on available data contained within SDWIS.
    - Certifies and audits samplers to ensure the sampling contractor and authorized subcontractors comply with all QA practices for the collection of compliance drinking water samples.
    - Coordinates with designated, accredited laboratories to ensure data of known and acceptable quality.
- DWCSS contractor collects samples per TCEQ requirements and provides them to a designated accredited laboratory.

    - Maintains S*CMP* including *QAP* and SOPs consistent with TCEQ requirements.
    - Manages, trains, and evaluates samplers on sample collection activities, required documentation, and communication procedures.
    - Conducts field sampling and submits samples to designated laboratories.
    - Maintains and reports all sampling and associated data and information to the TCEQ, as required.
    - Meets with the TCEQ and subcontractors as required in the sampling contract.
    - Participates in TCEQ audits.
    - Attends TCEQ annual refresher training event.
- Drinking Water Compliance Laboratories analyze samples and provide electronic results and analytical reports to the TCEQ.
    - The laboratories specified in Section A4.3 receive, analyze, and report samples according to protocols defined within this Addendum and referenced documents.
- TCEQ PWSS Program staff receives, reviews, migrates and manages data, and determines compliance based on data reported and takes appropriate actions.
    - Maintains sampling records on all water systems. Ensures required chemical data are submitted.
    - Receives, evaluates, and records sample analysis results.
    - Updates schedules to reflect changes in sample sites, system status, or performance.
    - Maintains NPDWR compliance data in the Safe Drinking Water Information System (SDWIS).
    - Determines compliance with maximum contaminant level (MCL) requirements and generates appropriate compliance documentation.
    - Notifies affected systems and regional field offices if a system is in violation.
    - Maintains NPDWR compliance data in SDWIS.
    - Determines compliance with public notification requirements; generate appropriate compliance documentation.
    - TCEQ Office of Compliance and Enforcement (OCE) takes appropriate legal action against PWSs that violate state rules, consistent with federal regulations.

A7 Quality Objectives and Criteria

The chemical data collected under this PWSS Programmatic QAPP Addendum are used to determine the chemical compliance status of public drinking water systems. As a result, the TCEQ can provide better protection of the health of all Texas

citizens currently served by a public water system and all those who consume water from such systems.

The data quality objectives described below and measurement performance criteria in Exhibit 3 ensure that the type and quality of the analytical data generated meet the goals of the SDWA and support defensible compliance decisions and actions by the TCEQ.

Data Quality Objectives

Sensitivity

Sensitivity refers to the ability of an instrument or method to discriminate between different levels of an analyte by producing a different response. Sensitivity requirements specific to the analysis of drinking water include the method detection limit (MDL) and the method reporting limit (MRL). Most drinking water methods require MDL calculations for all analytes.

Note: MDL calculations do not apply to the analysis of disinfection byproducts for drinking water analyses. However, very specific requirements regarding MRLs apply. MDL and MRL requirements are defined and explained in Section B5 of this document.

Bias

Bias refers to the systematic distortion of a measurement which makes it different from the true value. A measurement is considered unbiased when the value reported does not differ from the true value. Bias is controlled by the use of field and laboratory blanks, proficiency testing samples, calibration standards, quality control samples, etc. To control for bias, this project includes acceptance criteria and corrective actions for specific quality control samples as listed in Exhibit 3 and further defined in Section B5. Otherwise, all applicable procedures in rules, regulations, and requirements (e.g., analytical methods, SOPs, etc.) are followed. Results are compared against criteria defined in the methods and used during the evaluation of analytical performance.

Precision

Precision is the degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves. It is a measure of agreement among replicate measurements and is an indication of random error.

Precision is controlled by the use of duplicate samples for all analyses. To control for precision, this project includes acceptance criteria and corrective actions for specific quality control samples as listed in Exhibit 3 and further defined in Section B5. Otherwise, all applicable procedures in the rules, regulations, and requirements (i.e., analytical methods, SOPs) are followed. Results are compared against criteria defined in the methods and used during the evaluation of analytical performance.

Representativeness

Representativeness refers to the degree to which the data accurately represents the frequency distribution of a specific variable in the population. Sample site selection, the appropriate sampling protocols adherence to the sampling schedule, and use of approved analytical methods as defined in the Sampling Contract, the *DWSG* and this Programmatic QAPP Addendum (and all referenced documents) ensure that the measurement data represents the conditions at the sampling site.

Comparability

Comparability refers to the degree in which methods or data sets are considered to be similar. Confidence in the comparability of data sets for drinking water compliance is based on sampler training, approved sampling and analysis methods and quality assurance protocols in accordance with requirements described in the DWCSS Contract, the *DWSG*, and this Programmatic QAPP Addendum *(*and all referenced documents). Comparability is also guaranteed by standard reporting protocols described in Section B10 of the document.

Completeness

The completeness of the data is basically a relationship of how much of the data are available for use compared to the total potential data. To determine compliance, 99.9% must be collected and analyzed as enforcement may be necessary when results are not reported. This may occur when a sample is not collected because a PWS cannot be contacted, refuses sampling, or when a sampling site is unavailable. Additionally, the possibility of sample or data loss due to accidents, insufficient sample volume, broken or lost samples, laboratory issues, etc. is to be expected. The processes in place for these situations are described in the DWCSS Contract, the sampling contractor's S*CMP*, the *DWSG*, and this Programmatic QAPP Addendum so that these occurrences can be reported to the TCEQ and samples recollected (See Section C1).

Data Integrity

Data collected and reported under this Programmatic QAPP Addendum are managed in such a way to ensure the confidentiality, integrity, and availability of data and information. Data management policies and procedures ensure data and information are recoverable and used for their intended purposes.

The DWCSS contractor shall establish and maintain a documented data integrity system that includes 1) data integrity training, 2) signed data integrity documentation for all Project Managers and Project Specialists, including those individuals with quality assurance or data management responsibilities, 3) periodic monitoring of data integrity, and 4) data integrity procedure documentation. The data integrity procedures shall be signed and dated by the contractor Lead Project Manager. Data integrity training shall be provided as a formal part of new employee orientation and shall also be provided on an annual basis for current employees.

Compliance

All rules, regulations, and requirements associated with this Programmatic QAPP Addendum have been developed to be consistent with state rules and federal regulations pursuant to the SDWA. Adherence to this QAPP Addendum will ensure data are collected, analyzed, and reported according to statute.

A8 Special Training/Certification

All sampling and laboratory staff have the necessary training and certifications needed to meet the requirements of the work defined in this Programmatic QAPP Addendum. Appropriate supervision is provided for employees undergoing training. Personnel performing specific tasks are qualified on the basis of appropriate education, training, experience and/or demonstrated skills, as required. Continued competence is monitored and, where competence is not achieved, the need to retrain personnel is required. Training and certification requirements for this project are summarized below.

Sample Collector/Sampler Personnel Training and Verification

Personnel who collect samples shall be trained in the proper collection technique for all types of samples which they collect. Their technique shall be reviewed by experienced sampling or laboratory personnel. [MCLADW, Ch. IV, 1.4]

The DWCSS Contract and the *DWSG* specify the TCEQ training and certification requirements for sampling staff. Additional detail, specific to TCEQ training requirements, is provided in DWQT SOP #12-06*: Authorization to Collect Chemical Compliance Samples*. This SOP describes the process for TCEQ evaluation and certification of sample collection staff by written and/or practical examination. It also describes mandatory monthly contractor performance evaluations, TCEQ-led and contractor-led field audits, and requirements for training documentation.

Training documents must be approved by TCEQ before samplers are approved to collect samples. The DWCSS contractor has developed and maintains a *SCMP* which addresses training and includes a sampler training SOP that is summarized below.

After the DWCSS contractor completes training and testing of new samplers, he/she is tested by TCEQ and authorized to collect samples. The sampler is issued an authorization letter from the TCEQ which is good through the end of the fiscal year or the end of the contract.

On an annual basis, the TCEQ and/or the DWCSS contractor conducts sampler refresher training and evaluation on all samplers. This training is typically held at TCEQ's Central Office in Austin, Texas or online. Besides being a general refresher training effort, the goal is to address any recurring and/or significant sampling issues or problems that have arisen during the previous year, and to train the samplers relative to any new sampling methods and/or protocols that will be added to the DWCSS Contract. The contractor also conducts quarterly meetings via teleconference to discuss topics that arise between annual meetings.

The DWCSS contractor's QA manager monitors sample rejection rates on a weekly and monthly basis. Samplers that do not meet contract deliverables are subject to remedial training and disciplinary action, up to and including termination. The TCEQ also evaluates sampler performance monthly (statistical) and yearly (field audits) to ensure continued compliance with collection requirements.

Training records shall be maintained for all personnel. These shall include all job-related formal education and training taken by the analyst which pertains to any aspect of his/her responsibilities, including but not limited to analytical methodology, laboratory safety, sampling, quality assurance, data analysis, etc. [MCLADW, Ch. IV, 1.6]

In addition to sample collection training, sampling staff must attend a 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) Training and obtain a TCEQ Class D Operator's License or better within 90 days after onset of the DWCSS contract term or first day of employment. All training records are submitted to the TCEQ for verification.

The DWCSS contractor must document and maintain certification demonstrating the competency of individuals using or generating environmental data in accordance with EPA directive FEM 2012-02 Rev.1. Certification may include training records, certificates, or educational credentials. This process is referred to as demonstration of capability (DOC). An initial DOC is required for all DWCSS contract samplers for all routine sample types prior to any sample collection without direct supervision. Ongoing DOC is also required at least annually. Procedures for initial and ongoing DOC shall be included in the DWCSS contractor's QMP.

Laboratory Staff Training and Verification

Laboratory training requirements are specified in both the *TNI Standard* and the *Certification Manual* and include Data Integrity Training. In general, laboratory personnel possess adequate experience and knowledge to perform all technical tasks assigned. Laboratory quality manuals contain functional job descriptions of project personnel and describe training to keep personnel updated on regulations and methodologies and require that they have demonstrated proficiency for the methods they perform (e.g., Initial Demonstrations of Capability).

Laboratory management authorizes specific personnel to operate particular types of equipment, to perform particular types of testing, to evaluate results and to issue test reports. Records of the relevant competence, educational and professional qualifications, training, skills and experience of all technical personnel and contracted personnel are maintained by the laboratory. This information, including initial and ongoing demonstrations of capabilities is readily available and includes the date on which authorization and competence was confirmed and the confirming authority.

Laboratory Accreditation and Certification

Laboratories performing work under this QAPP are required to be accredited for the chemical analysis of drinking water, consistent with 30 TAC §25 *Environmental Testing for Laboratory Accreditation and Certification*.

The DSHS Laboratory Services Section is the principal state laboratory for Texas and thus is also certified by the EPA for the analysis of drinking water, as required by federal primacy requirements in 40 CFR §142.10(b)(4).

Independent of the laboratories' certification status noted above, the laboratories that generate data under this Programmatic QAPP Addendum are subject to the applicable provisions of both Quality Standards – the *TNI Standard and the* EPA *Certification Manual.*

In general, the *TNI Standard* and the EPA *Certification Manual* contain equivalent provisions. However, the *TNI Standard* does not specify promulgated analytical methods and/or contain provisions specific to the analysis of drinking water. In order to analyze data under this Addendum, laboratories must comply with the additional requirements in the EPA *Certification Manual* specific to the PWSS Program and incorporate relevant practices into their operations. The use of the word "must" in the EPA *Certification Manual* includes elements that are required by the federal drinking water regulations.

Proficiency Testing (PT) Samples

Both the *TNI Standard* and the EPA *Certification Manual* require successful analysis of initial and on-going PT samples. Both Programs require (1) PT samples be handled as routine samples, (2) PT samples be obtained from an approved provider, and (3) PT sample results be within the acceptable limits established by 40 CFR Part 141. Acceptance limits are specified on the TNI website.

The DWCSS contractor is required to analyze at least two (2) TNI-compliant proficiency testing (PT) samples per year for pH, free residual chlorine and total residual chlorine. The DWCSS contractor shall maintain a history of at least two (2) successful performances out of the most recent three (3) PT samples.

A9 Documents and Records

The documents and records that describe, specify, report, or certify field and laboratory activities are listed in Table A9.

Table A9. Documents and Records

Document/Record	Description	Location/Distribution
Sampling, Analysis and Reporting of Chemical Compliance Data - QAPP Addendum 1	QAPP Addendum to PWSS Program QAPP documenting QA/QC practices related to chemical compliance sampling, analysis and reporting.	Distributed to each person/organization on the List in Section A3 and posted on the TCEQ website

Table A9. Documents and Records

Document/Record	Description	Location/Distribution
DWCSS Contract	Contract between the TCEQ and the DWCSS contractor authorizing chemical sampling of drinking water to ensure protection of public health.	Signed and retained by the TCEQ and the DWCSS contractor
Sampling Schedule and Amendments	List of PWS samples for collection compiled by the TCEQ from PWS data in SDWIS.	The TCEQ provides to the DWCSS contractor and laboratories at the beginning of the year with monthly updates thereafter
SCMP and associated SOPs	Document developed by DWCSS contractor detailing processes to ensure TCEQ sample collection requirements are executed correctly. Includes SOPs related to communication, auditing, scheduling, sample collection, data entry, training, as well as acquisition of equipment and supplies.	DWCSS contractor provides to the TCEQ within 90 days of contract execution
DWCSS contractor *QAP*	DWCSS contractor document detailing quality assurance measures to ensure all elements of the Drinking Water Compliance Contract Scope of Work are carried out correctly.	DWCSS contractor provides to the TCEQ within 90 days of contract execution
DWCSS contractor Health and Safety Plan.	Plan developed by the DWCSS contractor to outline health and safety practices to protect sampling staff including how to determine if a material is contaminated and how to protect one's self from contamination.	DWCSS contractor provides to the TCEQ within 90 days of contract execution
Announcements and minutes of meetings between the DWCSS Contractor and its subcontractors	Records completed by the DWCSS contractor to document regular (no fewer than quarterly) meetings with its subcontractor to provide information from the TCEQ, performance feedback, and ongoing training on sampling, sampling protocols, and customer service.	DWCSS contractor provides meeting notices and agenda to the TCEQ at least 10 working days prior to the meeting. The DWCSS contractor provides meeting minutes to the TCEQ with 5 days after the meeting.
DWCSS Contractor PWS Contact Database	Database developed by the TCEQ and maintained by the DWCSS contractor. Contains names of PWSs and responsible officials, addresses, and phone numbers.	Maintained by the DWCSS contractor and surrendered to the TCEQ upon request
Sample collection data	Data collected by DWCSS contractor for the TCEQ to update the sampling schedule. Includes but is not limited to TCEQ ID#, PWS ID#, PWS collection site, sample type, collection date and time, etc.	The DWCSS contractor submits weekly on Monday to the TCEQ.
DWSG	Primary TCEQ sampling guidance based on state and federal rules, regulations, and requirements, including analytical method requirements.	TCEQ document distributed to sampling personnel
PWS Water Analysis Form (or electronic equivalent)	Sample submission form (or electronic equivalent) to be submitted with the COC with every sample shipment. Contains but is not limited to PWS ID#, TCEQ ID#, Date and Time collected, Sampling	The DWCSS contractor submits completed forms or data with each sample shipment to the laboratory. The DWCSS contractor

Table A9. Documents and Records

Document/Record	Description	Location/Distribution
	Location, Sampler's signature, analysis type, chlorine residual, pH, etc.	submits COC forms to the TCEQ with invoice.
Field Reports	Report required to be filled out by DWCSS contractor when there are PWS changes, the inability to contact a PWS after 3 attempts, and/or the inability to collect scheduled samples.	The DWCSS contractor submits completed forms to the TCEQ monthly as applicable.
COC Form (or electronic equivalent)	Form required for all samples collected by the DWCSS contractor to ensure sample integrity as well as legally and technically defensible data.	The DWCSS contractor submits completed COC with each sample shipment to the laboratory. The DWCSS contractor submits completed COC records to the TCEQ with invoice.
TCEQ SOP #12-06 Authorization to Collect Chemical Compliance Water Samples	TCEQ procedure used to demonstrate proficiency of samplers in sample collection and site identification techniques, basic PWS information, etc.	TCEQ document detailing training and certification of samplers
Field Staff Training/Certification Records	The DWCSS contractor documents sample collection training records, 40-hour HAZWOPER and refresher training, and proof of Class D Operator Certification to the TCEQ as proof of meeting TCEQ training and certification requirements. New sampler training records include (1) names of trainer and trainees (2) trainer qualifications (3) training date(s) (4) list of PWSs visited during training (5) list of TCEQ IDs collected during training, and (6) trainer comments.	The DWCSS contractor submits training records to the TCEQ within 30 days of completing training events. Training documents must be approved by TCEQ before samplers are approved to collect samples.
Contractor QA Report	Report developed by the DWCSS contractor which documents QA activities the preceding month including training and audits.	The DWCSS contractor submits to the TCEQ monthly
Field equipment maintenance/calibration logs	Records documenting maintenance and calibration were performed as required by contractor SOPs.	The DWCSS contractor field samplers maintain. Surrendered upon request to the TCEQ.
Sample Collection Analysis Report (SCAR)	Electronic version of the PWS Water Analysis Form which is completed by DWCSS contractor field samplers. Contains TCEQ required information on the Analysis Form.	The DWCSS contractor fills out on tablet in the field, saves, and prints. Sampler and PWS official both sign. Sampler maintains one copy and gives another to PWS official.
Sample collection records/field notes	Notes taken by individual samplers of each sample collected.	The DWCSS contractor field samplers maintain. Surrendered upon request to the TCEQ.

Table A9. Documents and Records

Document/Record	Description	Location/Distribution
Laboratory quality manuals	Manuals that document (or reference) the laboratories' policies, systems, program, procedures, and instructions to the extent necessary to assure the quality of analytical results.	Laboratories develop and maintain according to laboratory policy. Submitted to the TCEQ upon request.
Laboratory SOPs	Documents that accurately reflect phases of laboratory activities such as analytical methods, handling customer complaints, corrective action procedures, verification and validation of data, etc.	Laboratories develop and maintain according to laboratory policy. Submitted to the TCEQ upon request.
Laboratory staff qualification/training records	Records of relevant authorizations, competence, educational and professional qualifications, experience, training (including data integrity training) required per the laboratory quality system standards to verify laboratory compliance.	Laboratories maintain according to laboratory policy. Submitted to the TCEQ upon request.
Chain of custody records	Record required for all samples collected by the DWCSS contractor to document submittal and receipt by laboratory. Ensures sample integrity as well as legally and technically defensible data.	Laboratories and the DWCSS contractor maintain according to laboratory policy. Submitted to the TCEQ monthly.
Laboratory analytical records including but not limited to person responsible for performing analysis; date and time of analysis; results of sample and QC analyses; calibration/ maintenance records; proficiency testing and DOC documentation	Records documenting the performance of laboratory activities and requirements including this QAPP Addendum.	Laboratories develop and maintain. Maintained at the laboratories for 5 years. Available for review during TCEQ audits or upon request. Radiochemical records must be kept for 10 years.
Laboratory data reports/results	Analytical results reported to the TCEQ in electronic formats according to Appendix J of the *DWSG* so the TCEQ can use the data for compliance determinations. (See information below on Analysis Reports).	Laboratories submit to the TCEQ weekly (electronic data) or monthly (PDF reports) after analysis is complete.
Maximum Contaminant Limit (MCL) Exceedance Report	Laboratory report required from laboratories when individual analytical results exceed the MCL.	Laboratories submit to the TCEQ as needed when an analytical result rounds up to the next digit above the MCL (i.e., if an MCL= 10 an exceedance report should not be sent to TCEQ until result reached 10.5 or higher).

Table A9. Documents and Records

Document/Record	Description	Location/Distribution
Corrective Action Documentation	Provided by sampling and analytical staff to document the identity and correction of identified deficiencies in a timely manner.	Laboratories and the DWCSS contractor develop and submit to the TCEQ per Section C2 of this document.

Maintenance of Sampling Records by the DWCSS Contractor

Sampling records (paper and electronic) which are developed and/or maintained by the DWCSS contractor under the DWCSS Contract belong to the State of Texas. These include but are not limited to the Sample Collection Database, COCs, PWS Water Analysis Forms, Sample Collection Analysis Reports, PWS contact information, etc. The dispensation of these records is addressed in the DWCSS Contract. They must be relinquished upon request or at the completion or termination of the contract.

(B) Data Generation and Acquisition

B1 Sampling Process Design

The sampling processes for chemical compliance samples have been designed by the TCEQ according to requirements specified in 40 CFR §141,142 and 143 of the federal drinking water regulations and 30 TAC §290 of the state's drinking water rules.

The TCEQ sampling process design requirements are documented within the DWCSS Contract and the *DWSG* which is the TCEQ primary guidance for chemical compliance sampling procedures. The DWCSS Contract and the *DWSG* include requirements related to sample schedules, analyte groups, sample sites, rates of sample collection, sampling protocols, quality control procedures, documentation, training, audits, etc.

Annual sample schedules are developed by the TCEQ based on data contained in SDWIS pursuant to federal and state drinking water regulations and rules. Consistent with the monitoring framework, the contractor sampling staff collects all samples per the annual sampling schedule and any updates provided by the TCEQ. The DWCSS Contract requires that sample collection be spread out evenly around the state throughout the year so the sample flow to the laboratories is consistent and all samples are collected. Most drinking water quality chemical monitoring is conducted at sample sites representing entry points to the water distribution system. These locations provide the most representative data for water quality that has been treated and is available for human consumption. The TCEQ DWCSS Contract Manager works closely with the sampling contractor to ensure elements of the DWCSS Contract and the *DWSG* are followed. The DWCSS contractor's scheduling SOP shall incorporate TCEQ requirements and is used by sampling staff to implement sample processes related to sample and appointment scheduling.

B2 Sampling Methods

TCEQ sampling method requirements are consistent with 40 CFR §141,142 and 143 of the federal drinking water regulations and 30 TAC §290 of the state's drinking water rules. As noted in Section B1, the TCEQ primary document containing requirements for drinking water sampling methods is the *DWSG.* The sampling contractor is required by the DWCSS Contract to follow the field measurement and sampling procedures described in the *DWSG*.

TCEQ requirements related to field measurements and sample collection (e.g., planning, supplies, sampling equipment, collection techniques, sample volumes, preservation, forms, chain of custody, holding times, shipping, etc.) are included in Chapters 8, 9 and 10 of the *DWSG*. The tables in Chapter 9 of the *DWSG* summarize sampling requirements by analyte and/or analyte group. The sampling contractor's sampling SOP shall incorporate all applicable TCEQ sampling requirements as indicated above.

Following sample collection, field samplers deliver or ship samples to the laboratory in a manner described in the DWCSS Contract so they arrive at the laboratories Monday through Friday. Prior approval must be received from the TCEQ for samples shipped on the weekend or holidays.

Established processes to address and document sampling anomalies are defined in both the DWCSS Contract and the *DWSG*. These include processes to address the inability to collect a sample, rejected samples, sample invalidation, etc.

When sampling deficiencies and non-conformances are identified by the DWCSS contractor or the TCEQ, they are corrected and documented in a timely manner according to Section C1 of this document.

B3 Sample Handling and Custody

The sample handling and custody requirements for chemical compliance data are designed by the TCEQ according to requirements specified in 40 CFR §141,142 and 143 of the federal drinking water regulations and 30 TAC §290 of the state's drinking water rules. Specific TCEQ requirements for sample handling and custody are contained within the DWCSS Contract and the *DWSG.* These documents address requirements for holding times and how samples shall be handled, transported, and received by the laboratory. They also indicate how sample information and custody shall be documented. Procedural deficiencies and non-conformances are addressed in Section C1 of this document. A summary of TCEQ field and laboratory requirements is provided below. The sampling contractor's *SCMP* and sampling SOP provide additional detail on how the contractor implements the TCEQ requirements.

Sample Custody Summary

The documentation for sample custody for all events up to the arrival of the sample at the laboratory is the chain-of-custody (COC) form. Every shipment of samples must be accompanied by a completed COC.

Each COC lists custody information including: unique sample ID numbers (TCEQ ID), date and time of collection, number of containers, required analyses, PWS ID, and sampler name. The COC is signed and dated by the sampler when released to the shipper, and then by the laboratory when received by the laboratory's sample custodian.

If any information blanks, signature blanks, or the official change of possession signatures and times are not completed on the COC, a gap will exist in the documentation of sample custody prior to arrival at the laboratory. In such an event, the laboratory custodian will reject the sample(s) or contact the PWSSP Lead Quality Assurance Specialist for guidance.

Sample integrity is protected by preventing sample contamination, whether intentional or accidental, after the sample is placed in a container. The cleanliness of shipping containers used by the sampling contractor is the sampling contractor's responsibility.

The receiving laboratories have sample custodians who examine all arriving samples for complete and proper documentation, intact security packing tape, and proper preservation. The custodians examine samples upon receipt and make sure samples are intact, and that hold times, temperature, and preservation are within specifications. Samples that arrive at the laboratory within 24 hours of sample collection, due to the close proximity of a PWS to the laboratory, may not yet have reached the appropriate temperature by the time they arrive at the laboratory. These samples shall be considered acceptable ONLY if packed on ice or with frozen gel/ice packs immediately after sample collection and delivered while the samples were in the process of reaching an appropriate equilibrium temperature. [MCLADW, Supplement 1, p. 6] Invalid samples are rejected. An exception to this pertains to the analysis of nitrate/nitrite group (NO32) samples. When these samples are ordered, and the hold time has been exceeded for the nitrite analysis, the lab shall process and analyze the sample for nitrate and report the nitrite result as rejected for exceeding hold time.

Requirements for sample invalidation are included in Chapter 12 of the *DWSG*. The laboratories will provide the TCEQ and/or the DWCSS contractor with a list of rejected samples at least weekly by email. The DWCSS contractor is responsible for rescheduling rejected samples during the same period in which they were originally scheduled.

The laboratory custodian accepts delivery of properly collected samples by signing the final portion of the official COC. The sample custodian attaches a special laboratory sample number to the COC and the same number to the sample container and enters the receipt of the sample into a laboratory sample inventory database. This database notes the date of receipt and the date of completion. Any possible information that could identify the source of the sample is then traceable by using the inventory database maintained by the sample custodian, or by the PWS ID on the sample container. The laboratory also has a protocol limiting entry of non-staff. The limited access to samples in the entire inventory allows for sample

security at the laboratory. It is assumed that samples in tape-sealed shipping containers are secure whether being transported by staff vehicle, by common carrier, or by commercial package delivery.

B4 Analytical Methods

Field Measurements

The TCEQ requirements for field measurements as listed in the *DWSG,* Section 11 were developed pursuant to state and federal regulations. Section 11 includes information for parameters which must be measured in the field by the sample collectors. These parameters include chlorine residual, temperature, pH, and location information including GPS coordinates. The DWCSS contractor Program/QA Manager is responsible for adherence to these methods, including training, initial and ongoing demonstration of capability (DOC), calibration, maintenance, and documentation. The sampling contractor uses various SOPs to collect field measurement data including documents detailing instrumentation, data entry and locational data collection and QC.

Laboratory Methods

The promulgated laboratory methods for analysis of samples under the Safe Drinking Water Act NPDWRs are listed in 40 CFR §141 Subpart C. <https://www.epa.gov/dwanalyticalmethods/approved-drinking-water-analytical-methods>.

The methods for analysis of samples under the NSDWRs are listed in 40 CFR §143.

Note: Only the methods listed in Exhibit 3 of this document for which the laboratories are accredited/certified are used to analyze drinking water samples. These methods reflect those in Chapter 9 of the *DWSG.* The laboratories and the TCEQ have agreed on the use of these methods. Method changes must be discussed with the TCEQ and approved prior to implementation.

Adherence to the method requirements is the responsibility of the QA Officers of each individual laboratory. Laboratory QA Officers ensure that the essential elements of each method are incorporated into their SOPs and project-specific requirements are followed. Laboratory personnel verify the correct use of methods during sample/result QC and migration and refer method failure to their respective QA Officer or designee. Corrective action procedures are addressed in Section C1 of this document.

If the PWSSP Lead Quality Assurance Specialist becomes aware of analytical procedure changes mandated by the EPA, the laboratory QA Officers are immediately notified. Usually, the laboratory QA Officers receive this information directly from the EPA.

B5 Quality Control

The technical QC activities which are implemented to control the quality of chemical data reported to the TCEQ PWSS Program is a function of both field sampling and laboratory analysis.

The *DWSG*, Chapters 5 and 9 specify and define the field QC samples that must be collected with each sample type or group and include requirements for field blanks, trip blanks, method blanks, and duplicate samples.

Laboratory QC requirements include initial demonstrations of capability, method detection limit determinations, and the analysis of blanks, fortified blanks and matrices, and other samples as a continuing check on performance. Minimum, program-specific QC requirements, acceptance criteria, and corrective actions for QC samples are defined and the calculations are specified in this section. Other QC samples are run as required by the methods, quality standards, laboratory *Quality Manuals*, and SOPs.

Field Quality Control Definitions and Evaluation

Quality control samples associated with the collection of chemical drinking water samples are discussed in the *DWSG* and include requirements for field blanks (for VOCs, glyphosate, and EPA method 504.1), trip blanks, method blanks, and duplicate and triplicate samples. The definitions and required frequency of these samples are addressed in Chapters 5 and 9 of the *DWSG*. They are summarized below and include information on acceptability criteria. The sampling contractor's SOPs shall incorporate these requirements. They also address the QC requirements and required documentation for field measurements including accuracy checks, calibration tolerance checks, etc.

Field Blanks or Field Reagent Blanks (FB)

FBs are collected with all VOCs, glyphosate, and EPA Method 504.1 drinking water samples to rule out air contamination in the event of detection. VOC FBs are only analyzed by the laboratory if there are sample detections. In general, FB concentrations should be below the MDL for a regulated or significant monitored compound. **Note**: EPA Method 504.1 and 547 (glyphosate) require the ongoing analysis of FBs. In the event that a chemical is detected in a water sample and its associated FB at approximately the same level, air contamination is a possibility and the result is reported to the TCEQ with the data.

Trip Blanks (TB)

The *DWSG*, Section 6, requires that TBs be prepared prior to the sampling event in the actual sample containers and kept with the samples throughout the sampling event. They are then packaged for shipment with the other samples and sent for analysis. TBs are not routinely collected unless specifically requested by the PWSSP Lead Quality Assurance Specialist.

Method Blanks for Asbestos Samples (MB)

The *DWSG*, Chapter 9 requires one (1) MB (an empty container) for every 20 asbestos samples to confirm the absence of background levels of asbestos. An acceptable bottle blank level is defined as 0.01 MFL >10 µm. Results of all asbestos blanks are reported with asbestos data.

Duplicate, Triplicate, and Split Samples

The DWCSS contractor collects additional QA/QC samples for some analytes and/or some analyte groups as specified in the *DWSG*, Chapters 5 and 9. Duplicate/triplicate samples are collected and analyzed per the approved methods and are used to rerun samples if a target analyte concentration needs to be confirmed due to elevated concentrations as defined in Exhibit 3 and explained under Sample Result Confirmation later in this section. These approved methods include the SOC5 group and EPA methods 515.4 and 531.1. Split samples are collected at the direction of the PWSSP Lead Quality Assurance Specialist and are analyzed to monitor performance across laboratories.

Laboratory Measurement Quality Control Requirements and Acceptability Criteria

Adherence to the laboratory QC procedures defined in this section will ensure that analyses meet the QC requirements of the PWSS Program. As specified previously, the QC samples defined below are the minimum criteria and apply specifically to analysis of regulated contaminants performed for the PWSS Program. The interpretation of individual QC samples is considered within the context of multiple factors as indicated in the following sections. There are a number of data qualifiers specific to the data collected under this QAPP that are used if they apply. These qualifiers are needed for the TCEQ to validate the data and properly code the results in SDWIS. Otherwise, laboratories follow internal protocols to qualify data before submitting it to the TCEQ. A table of specific qualifier codes required by the TCEQ PWSS Program is included in Table B5.1. Unsatisfactory data rejected by the laboratory due to QC failures is addressed in Section B10.

Table B5.1. Data Qualifier Codes

Qualifier Code	Text for the qualifier or sample comment.	Notes for Analysts on the Application of these Comments in the Analytical Report and in the EDD
B	Target analyte detected in laboratory reagent blank at or above method acceptance criteria.	Qualifier applied to all corresponding analyte results in the sample set.
F	Target analyte detected in associated field blank at or above minimum reporting level.	Used for 524.2, 547, and 504.1 to inform water systems of the issue. Water systems may not receive the field blank results.

Not prescribed. Use laboratory specific qualifier	The associated laboratory fortified blank recovery outside (above or below) method acceptance limits.	Qualifier applied to all corresponding analyte results in the associated samples
Not prescribed. Use laboratory specific qualifier	The laboratory fortified matrix recovery outside (above or below) method acceptance limits due to either suspect matrix or "bad acting" compounds.	Qualifier applied to its corresponding analyte results in the associated sample set. Add note to explain high or low bias if information not contained within code
X	The Minimum Reporting Limit (MRL) verification check did not meet the acceptance limits.	Qualifier applied to all corresponding analyte results in the associated sample set.
Not prescribed. Use laboratory Specific qualifier	Duplicate RPDs exceeded the method acceptance limit.	For sample duplicates, qualifier applied to its corresponding analyte result. Use only if target analytes are >4x reporting level so that the statistic is meaningful. For LFB/LFB duplicates, qualifier applied to all corresponding analyte results in the associated sample set. For LFM/LFM duplicates, qualifier applied to the affected analyte results in the sample that was spiked.
Not applicable	Sample result confirmed by reanalysis	Note or comment applied to the affected analyte(s) in the sample

Method Detection Limit (MDL)

The MDL (also known as the limit of detection) is the minimum concentration of a substance that can be measured and reported with confidence that the analyte concentration is greater than zero. Initial MDL calculations for all regulated contaminants analyzed under this QAPP are required, except for disinfection byproducts (Analyte Group DBP2) as indicated in Exhibit 3. MDL calculations are required even though laboratories do not report concentrations below the MRL. If there are no requirements in the analytical methods for computing the MDL, the procedure given in 40 CFR Part 136, Appendix B is followed. **Note**: MDL requirements included in any applicable EPA Method Update Rules that become effective will be followed.

For the purpose of monitoring radioactivity concentrations in drinking water, the MDL is that concentration which can be counted with a precision of plus or minus 100 percent at the 95 percent confidence level (1.96σ where σ is the standard deviation of the net counting rate of the sample).

MDLs must be less than the minimum reporting limit (MRL) for every analyte.

Minimum Reporting Limits (MRL) and MRL Verifications

It is the policy of the PWSS Program not to use J-flagged (i.e., estimated) data for compliance purposes; therefore, the laboratories must comply with the MRL requirements defined in this section and Section B10 regarding reporting.

MRLs are equivalent to the lowest non-zero calibration standard in a multi-point calibration curve, as adjusted for dilution factors, when applicable. MRL concentrations must be below the associated maximum contaminant level (MCL) or secondary contaminant level (SCL) for any given analyte.

The MRLs for the organic compounds are listed in Appendix I of the *DWSG* and are hard coded in SDWIS. **Note**: Detection limits listed in Appendix I are the MRLs for the purpose of reporting under this QAPP. It is understood that for a small sub-set of synthetic organic chemicals the EPA MDLs can be met; however, the SDWIS required MRL reporting requirements may be higher than a laboratory's actual quantitation limit. In these cases, applicable results shall be "J flagged" in the result-associated comment to indicate the detection is estimated.

The MRLs for all other regulated analytes reported under this Programmatic QAPP Addendum must be below the MCL or SCL as defined in Exhibit D of the *DWSG.*

In accordance with the EPA *Certification Manual for of Laboratories Analyzing Drinking Water*, *5th edition*, laboratories must run a LFB at their MRL every analysis day and not report contaminants at levels less than the level at which they routinely analyze their lowest standard. The process of running a LFB at the MRL every analysis day is known as a MRL Verification in this QAPP.

An MRL verification consists of a sample of deionized water free from the analytes of interest spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes at the MRL. It is used to assess the performance of the measurement system at the lower limits of analysis.

The percent recovery of the MRL verification is calculated using the following equation in which %R is percent recovery, S_R is the sample result, and S_A is the reference concentration for the verification sample:

$$\%R = {}^{S_R}/_{S_A} \times 100$$

Acceptance criteria are used to determine the acceptability of the MRL verification samples as defined in the analytical methods or laboratory protocols. The laboratory will locate and fix problems before continuing if MRL verification samples are out of control. **Note**: For methods involving long lists of analytes, (e.g., EPA 524.2 and 525.2) the laboratory may evaluate marginal MRL verification exceedances according to the TNI Standard EL-V1M4-2017-Rev2.2, page 17.)

If laboratory actions do not bring the system into compliance before continuing the analysis, then the data may need to be qualified and reported to the TCEQ with the

appropriate qualifier code. If the MRL verification is "high" but all sample results are below the MRL, the applicable sample results are reported to the TCEQ with a qualifier code as indicated in Table B5.1 with a note indicating "high" bias in the result comment field of the electronic data deliverable and in the analytical report. If the MRL verification is "low" and applicable sample results are below the MRL, or the MRL verification is "high" and applicable sample results are above the MRL, the laboratory should contact the TCEQ before reporting the data. Sample results may need to be rejected and samples recollected as described in Section B10.

Note: For disinfection byproducts (DBP), the laboratory must verify the accuracy of the calibration curve at the MRL concentration by analyzing an MRL verification with a concentration less than or equal to 110% of the MRL with each batch of samples. The measured concentration for the MRL verification must be ±50% of the expected value, if any field sample in the batch has a concentration less than 5 times the regulatory MRL. Method requirements to analyze higher concentration check standards and meet tighter acceptance criteria for them must be met in addition to the MRL check standard requirement.

Laboratory Reagent Blank (LRB)

An LRB is a sample of reagent water which is processed simultaneously with and under the same conditions as the samples through all steps of the analytical procedures. LRBs are analyzed at a rate of one per preparation batch. The LRB is used to document the absence of contamination from the laboratory equipment, the reagents, and/or the apparatus.

Acceptance criteria are used to determine the acceptability of the LRB as defined in the analytical methods and listed in Exhibit 3. In general, LRBs should yield values for individual analytes less than the MRL (or values that do not impact the sample analysis results) or corrective action will be implemented before continuing with the analysis. Samples associated with a contaminated blank are evaluated by the laboratory as to the best corrective action for the samples (e.g. reprocessing, result qualification, result rejection). In all cases, the corrective actions are documented; and, if applicable, a qualifier code is reported with the individual sample results as specified in the Table B5.1.

Laboratory Fortified Blank (LFB)

An LFB is an aliquot of reagent water to which known quantities (per the method) of the analyte(s) are added in the laboratory. The LFB applies to batches of up to 20 samples and is analyzed exactly like a sample. Its purpose is to determine whether the analytical system is in control and whether the laboratory is capable of making accurate measurements.

The percent recovery of the LFB is calculated using the following equation in which %R is percent recovery, Cs is the measured LFB concentration, and S is the actual concentration of analyte added to the reagent blank:

$$\%R = {}^{Cs}/_{S} \times 100$$

Acceptance criteria are used to determine the acceptability of the LFB as defined in the analytical methods and listed in Exhibit 3. The laboratory will locate and fix problems before continuing if LFBs are out of control. **Note:** For methods involving long lists of analytes (e.g., EPA 524.2 and 525.2), the laboratory may evaluate marginal LFB exceedances according to the TNI Standard EL-V1M4-2017-Rev2.2, page 17.

If laboratory actions do not bring the system into compliance before continuing the analysis, then the data may need to be qualified and reported to the TCEQ with a data qualifier as noted in Table B5. If LFBs are "high" but all sample results are below the MRL (or other appropriate reporting limit) the applicable sample results are reported to the TCEQ with a qualifier code as indicated in Table B5 with a note indicating "high" bias in both the electronic data deliverable and in the analytical report. If the LFB is "low" and applicable sample results are below the MRL (or other appropriate reporting limit) or the LFB is "high" and applicable sample results are above the MRL, the laboratory should contact the TCEQ before reporting the data. Sample results may need to be rejected and samples recollected as described in Section B10.

Laboratory Duplicates

A laboratory duplicate is an aliquot taken from the same (or second) container as an original sample under laboratory conditions and processed and analyzed independently. Laboratory duplicates are prepared in the laboratory either by splitting aliquots of samples, LFBs, or LFMs. The sample, the LFB, or the LFM and their duplicates are carried through the entire preparation and analytical process. Laboratory duplicates are used to assess precision of all analyses and are performed at a rate of one per preparation batch or per the method, whichever is more stringent.

Precision is evaluated using the relative percent difference (RPD) between duplicate results as defined by 100 times the difference (range) of each duplicate set, divided by the average value (mean) of the set. For duplicate results, S_1 and S_2, the RPD is calculated from the following equation:

$$RPD = \frac{|S_1 - S_2|}{\left(\frac{S_1 + S_2}{2}\right)} \times 100$$

Acceptance criteria are used to determine the acceptability of laboratory duplicates as defined in the analytical methods and listed in Exhibit 3. The laboratory will locate and fix problems before continuing if laboratory duplicates are out of control.

Note: Sample duplicate pairs may yield very high RPDs when sample concentrations are very low (e.g., when concentrations are very close to the lower limits of detection or quantitation). In these circumstances, laboratories should follow internal procedures to address the issue. The lab may use the absolute

difference ($|S_1 - S_2|$) to evaluate the results and determine/document acceptance. Alternatively, duplicates may be reanalyzed using a fortified blank or fortified matrix. If laboratory actions do not bring the system into compliance before continuing the analysis, then the affected data may need to be submitted with a qualifier code as described in Table B5.

Laboratory Fortified Matrix (LFM)

An LFM is an aliquot of a sample to which known quantities of the method analyte(s) is/are added in the laboratory. The LFM is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentration of the analytes in the sample matrix must be determined in a separate aliquot and the measured value in the LFM corrected for background concentrations. LFMs are prepared according to method requirements.

The percent recovery of the LFM is calculated using the following equation in which %R is percent recovery, Cs is the measured fortified sample concentration, C is the measured sample background concentration, and S is the actual concentration of analyte added to the reagent blank:

$$\%R = {}^{(Cs - C)}/_{S} \times 100$$

Acceptance criteria are used to determine the acceptability of LFMs as defined in the analytical methods and listed in Exhibit 3. If the recovery of any analyte falls outside the designated LFM recovery range and the laboratory performance for that analyte is shown to be in control (i.e., the LRBs and the LFB are in control), the recovery problem encountered with the LFM is judged to be either matrix- or solution-related, not system-related. In these situations, the applicable sample result(s) must be reported to the TCEQ with a qualifier code as described Table B5.1.

Sample Result Confirmation

After the laboratory analyst reviews the data during the Tier 1 laboratory review (as described in Section D2), laboratories may repeat analyses (if sufficient sample volume and holding times are available) as "unexpected" or "elevated" results are observed as defined in Exhibit 3. If the results of reanalyzed samples corroborate the results of the first sample, the laboratory reports the results of the first sample and provides a qualifier with the applicable data on the electronic data deliverable and analytical report that the result was confirmed by re-analysis.

If the results of the second sample do not corroborate the first sample's results, the sample should be analyzed a third time if holding time and sample volume allow. If the results of reanalyzed samples support the results of the second sample, the laboratory reports the results of the second sample and provides a comment on the electronic data deliverable and analytical report that the result was confirmed by reanalysis. If consistencies cannot be resolved, the laboratory shall contact the

TCEQ before data are validated and reported to the TCEQ. Sample results may need to be rejected and samples recollected.

Note: Dilutions and/or previously extracted samples may be analyzed to meet this requirement. Some PWSs routinely produce drinking water with "unexpected" or "elevated" results of some contaminants. This may be confirmed by consulting the Drinking Water Watch website. Documentation of this occurrence on the analytical report is sufficient to confirm results and reanalysis is not necessary.

B6 Instrument/Equipment Testing, Inspection, and Maintenance

Field Instruments and Equipment

TCEQ requirements for field equipment testing, inspection, and maintenance are specified in the DWCSS Contract and the *DWSG*. For consistency, all equipment used by sampling staff must be of the same make and model, unless an exception is granted by the PWSSP Lead Quality Assurance Specialist. Additional detail regarding maintenance, including preventive maintenance, is contained within the sampling contractor's *SCMP* and the associated instrumentation SOP. The DWCSS contractor's Program/QA Manager is responsible for oversight of maintenance, including development of procedures and maintenance schedules, equipment lists, inspection and routine maintenance, maintenance of spare parts, etc. Individual maintenance activities are assigned to sample collectors. Chemical sampling equipment is inspected and tested upon receipt and is assured appropriate for use. In the event of an instrument failure, the DWCSS contract Project Managers are responsible for assuring that the instrument is tagged, and proper maintenance is performed and documented in the instrument's maintenance logbook. Tags are removed once instruments are repaired.

Laboratory Instruments and Equipment

Requirements for testing, inspection, and maintenance of laboratory instruments and support equipment are specified in the *TNI Standard* and the EPA *Certification Manual* (see Equipment Checklist, Chapter IV, pages 44 -50), as well as the approved analytical methods, individual laboratory quality manuals, and all relevant SOPs. In general, laboratory equipment and its software are properly maintained, comply with the test method concerned, and are checked and calibrated before being put into use. The laboratory QA Officer (or designee) is responsible for verification of maintenance requirements including development of procedures and maintenance schedules, equipment lists, inspection and routine maintenance, maintenance of spare parts, etc. Individual maintenance activities are assigned to laboratory analysts.

B7 Instrument/Equipment Calibration and Frequency

Field Instruments and Equipment

TCEQ requirements for field instrument/equipment calibration are consistent with 30 TAC §290.46 and specified in the DWCSS Contract and the *DWSG*.

Instruments/equipment requiring calibration and/or verification includes, but is not limited to:

- equipment for disinfectant residual analysis [30 TAC §290.46(s)(2)(C)]
- thermometers [MCLADW, Ch. IV, 7.1.5]
- pH meters [30 TAC §290.46(s)(2)(A)]

Further detail regarding calibration of field instruments/equipment is included in the sampling contractor's *SCMP* and the associated field instrumentation SOP. The sampling contractor's QA Manager is responsible for the control of field calibrations, including staff training on proper procedures, maintenance of associated SOPs, review of calibration results, the accuracy and stability of calibration standards, record maintenance, etc.

Laboratory Instruments and Equipment

Relative to laboratory instruments and support equipment, requirements in the *TNI Standard* and the EPA *Certification Manual* (see Equipment Checklist, Chapter IV, pages 44 -50 of the *Manual*) apply, as well as the approved analytical methods, individual laboratory quality manuals, and any relevant SOPs.

Calibration methods and documentation for all laboratory analytical equipment and instruments used to analyze drinking water compliance samples are the responsibility of the respective laboratory QA manager (or designee). In general, laboratory equipment/instruments and their software are properly maintained, comply with the test method concerned, and are checked and calibrated before being put into use. Every piece of equipment/instrument has a specialized procedure for calibration and a special type of standard used to verify calibration. Calibrations are documented by the person performing the calibration. Records are accessible for verification during either a laboratory audit or upon request.

B8 Inspection/Acceptance of Supplies and Consumables

Field Supplies and Consumables

TCEQ requirements for inspection/acceptance of field supplies and consumables are specified in the DWCSS Contract and the *DWSG*. The DWCSS contractor is responsible for procuring all supplies used in the field including, but not limited to: precleaned sample collection containers, chemicals and reagents of method-specified purity (or at minimum analytical reagent grade or American Chemical Society (ACS) grade) [MCLADW, Ch. IV, 4.1.1], and reagent grade water for field blanks.[MCLADW, Ch. IV, 4.3.1] Containers and reagents used for collection must

be free from the analytes of interest (target analytes). Demonstration of this requirement may be achieved by using pre-certified containers and reagents (with lot-specific certification), or those that are lot tested by the manufacturer, contractor or laboratory. Chemical reagents are properly labeled and used within their respective expiration dates. Supplies are inspected by DWCSS contract staff to ensure they meet criteria and standards. Further detail regarding the quality assurance of supplies and consumables are provided in the DWCSS contractor's *SCMP.* When applicable, reagents must be NIST-certified.

The DWCSS contractor must ensure traceability of all consumables, field supplies and reagents. Chemicals, bottle ware, and reagents must be adequately tracked with lot numbers and expiration dates so that it can be determined what was utilized in the collection of specific samples. This includes buffers to calibrate pH meters, DPD packets used in determining chlorine residuals, dechlorinating agents, acid/bases used to adjust pH, etc.

Laboratory Supplies and Consumables

Supplies and consumables used in the analytical laboratories are the responsibility of the individual branch supervisor, group manager, team leader, or QA officer. Requirements documented in quality standards (including both the *TNI Standard* and the EPA *Certification Manual*), individual laboratory quality manuals, analytical methods, and SOPs are followed.

B9 Non-Direct Measurements

Not applicable.

B10 Data Management

The field and laboratory data that are managed and reported under this Programmatic QAPP Addendum are summarized in the Flow Chart in Exhibit 4 and described below. These data management processes are consistent with federal and state drinking water rules and regulations and facilitate EPA reporting and TCEQ enforcement as necessary. The sampling contractor and the laboratories maintain internal computer hardware and software systems which are compatible with TCEQ systems; as such, they are able to provide data and documentation in the necessary formats. In addition, data integrity policies and procedures are in place which ensure the protection of data and information as needed (e.g., recoverable and used for its intended purpose, etc.).

Maintenance and Reporting of Field Data

Field sampling data include, but are not limited to: PWS ID #, TCEQ ID #, date and time collected, sampling location, sampler's initials, water system representative's signature, Analysis Type, chlorine residual, pH, GPS coordinates, etc. The TCEQ requirements for managing field data are included in the DWCSS Contract and the *DWSG.* Additional detail regarding data management is provided in the sampling contractor's *SCMP* and their SOPs for electronic data collection (EDC). Sampling

data/records as listed in Section A9 of this document are collected and/or managed in the formats below and submitted weekly or monthly to the TCEQ:

- Sample Collection Database File
- Sample Collection Analysis Report PDF Files
- Chain of Custody Records PDF Files

The DWCSS contractor utilizes an EDC system. The PWS Water Analysis forms and COC forms are generated electronically on a hand-held field tablet capable of running the required software and a portable printer. The tablets operate in a mobile mode that allows the device to work offline while still validating and saving data. Pertinent information about drinking water samples (TCEQ sample ID, sample location, containers, preservatives, comments, etc.) provided in the TCEQ Annual Sample Schedule are displayed on the mobile device during collection for reference, with fields generally formatted like PWS Analysis Forms. Instead of one form per sample, a sample collection analysis report (SCAR) form is given to the PWS representative. These SCAR forms have valid sampler and PWS representative signatures contained on the document, and contain all samples collected during that particular site visit.

Maintenance and Reporting of Laboratory Data

Laboratory data collected under this Programmatic QAPP Addendum are maintained within the laboratory in accordance with each laboratory's quality manual and relevant SOPs. The DWCSS contractor submits a COC to the laboratories with each collected sample.

Laboratories that provide data to the TCEQ for use in compliance are required to submit data as described below. The names of TCEQ individuals to whom the data are reported are listed in Appendix L of the DWSG. Electronic sample and result data must be reported to the TCEQ as described below under *Electronic Data Deliverable Requirements* no later than one week after analysis is completed. PWSs are subject to monitoring/reporting violations if data are received more than ten days after the end of the compliance period.

PDFs of analytical reports and COCs must be submitted to the TCEQ and each PWS on a monthly or more frequent basis. Analytical reports in PDF format must meet TNI reporting requirements. Specific analyte requirements related to MCL violations are provided below.

- Inorganic Chemicals (other than Nitrate and Nitrite) and Radiochemical Sample Analysis Data MCL exceedances must be emailed to the Inorganic/Organic Compliance Officer within 72 hours after samples are analyzed.
- Nitrate and nitrite data follow the protocol described above under Inorganic Chemicals, with one notable exception. The TCEQ evaluates exceedance reports as soon as possible the same day to determine the need for an acute Notice of Violation and immediate public notice. This special attention is required due to the acute nature of nitrate and nitrite health effects, and the resulting EPA

requirements for rapid follow-up. The laboratories are required email results of nitrate or nitrite analyses that exceed the maximum contaminant level to the Inorganic/Organic Compliance Officer within 24 hours of sample analysis.

- Result reports for organic and disinfection byproducts (total trihalomethanes and haloacetic acids) should be organized into groups of regulated chemicals, monitored chemicals, screened chemicals, other chemicals, and tentatively identified compounds.

Electronic Data Deliverable Requirements

Laboratories must submit analytical results to the TCEQ electronically. TCEQ requires data to be submitted as described in the *DWSG*, Appendix J using two separate files (tables): *Sample* and *Result*. The *Sample* file must be submitted to TCEQ as soon as possible after samples are received. *Result* files must be submitted to the TCEQ as soon as the samples are analyzed and no later than 1 week after analysis.

Sample

The *Sample* file contains information about the sample itself, including: collection date / time, collector, laboratory, sample point ID's (EP001, etc.) and the corresponding addresses where the samples were collected.

Result

The *Result* file contains the individual analytical results. The collection date must match what is reported in the associated *Sample.*

Note: Samples and/or results may be invalidated and rejected at the laboratory due to issues with samples, containers, documentation, holding time, unresolvable QC sample issues, insufficient sample volume, etc. Laboratories handle sample rejections according to the *DWSG*. Sample and result rejections are reported to the TCEQ utilizing an appropriate rejection code as listed in Appendix F of the *DWSG* with no corresponding results. The laboratory is responsible for notifying the sampling contractor and the TCEQ daily of rejected samples and results, so they can be recollected when possible. All sample rejection occurrences must be reported electronically to the TCEQ.

Laboratory Analysis Report and COC Reporting Requirements

The TCEQ retains copies of laboratory analysis reports, and COCs in the TCEQ Central File Room for a period of time in accordance with state and federal record retention requirements. Therefore, all laboratories are required to submit scanned PDFs of the following on CD once a month:

- Laboratory's COCs
- Laboratory Analytical reports provided to the PWS

Laboratory analysis reports are consistent with requirements contained with the *TNI Standard*, Volume 1, Module 2, Section 5.10 and include at a minimum the information necessary for the TCEQ interpretation and validation of data as well as the information needed for records maintenance as follows:

- Sample results
- Units of measurement
- Collection site information
- Date and time of collection
- MRL and MDL (LOD), including units
- The person responsible for performing the analysis
- The analytical technique/method used
- Quality control sample results, including concentrations, units, recoveries and acceptance criteria for:
    - MRL check samples (include spike concentration, result, % recovery, and % recovery limits)
    - LFBs (include spike concentration, result, % recovery, and % recovery limits)
    - LFMs(include original result, spike concentration, result, % recovery, and % recovery limits)
    - Blanks(include result and reporting limit)
    - Laboratory duplicates(include RPD and maximum RPD)
- Data qualifiers with definitions
- Definitions of any abbreviations or codes
- Comments or case narratives

Laboratory Analysis Report and COC Coding

Appendix J of the DWSG specifies coding requirements for electronic data.

The following metadata is needed to successfully code PDFs of analysis reports and COCs being submitted to the TCEQ Central File Room. Coding criteria must be entered in the following order with an underscore separating the data.

1. **Series Code:** PWS
2. **Primary ID:** County Code (3 digits) and Identification (4 digits) (This is the 7-digit PWS ID)
3. **Document Type:** AC
4. **Document Date:** YYYYMMDD (Collection Date)
5. **Document Name:** Analysis Report

Example 1: PWS_1010014_AC_20150928_Analysis Report (printed on paper, top right corner)

Example 2: PWS_1010014_AC_20150928_Analysis Report.PDF (electronic file name)

Note**:** There must be a space between "Analysis" and "Report."

(C) Assessment and Oversight

C1 Assessments and Response Actions

C1.1 Corrective Actions (CA)

All project participants (e.g., laboratory, contractor, TCEQ, etc.) involved with work associated with this QAPP are responsible for identifying deficiencies when there are nonconformances with required procedures specified in it, including referenced documents (e.g., DWCSS Contract, the *DWSG*, methods, laboratory manuals, SOPs, etc.). Deficiencies may be identified internally or externally during the performance of routine work or during audits and oversight, such as:

- Routine quality control procedures
- Observations
- Audits
- Management reviews
- Feedback from customers

Most nonconformances are not "deficiencies" as addressed in this section. Project participants routinely encounter, document, and correct technical or procedural nonconformances at the point of origin using established procedures. These nonconformances are documented at the point of origin and are maintained with the applicable project records.

However, the level of corrective action described in this section may be warranted if established procedures don't prevent a situation from recurring, if the error is a unique nonconformance, or if it is determined to be a significant deviation.

C1.1.1 Deficiencies Requiring a Corrective Action Plan (CAP)

Deficiencies are nonconformances that cannot be corrected by established procedures and will require actions to be defined and documented in a corrective action plan (CAP). Upon detection of a deficiency, project participants are responsible for notifying their management.

Deficiencies requiring a CAP may be identified and initiated by a project participant or a CAP may be requested by the PWSS Program Lead Quality Assurance Specialist, or designee.

When deficiencies are identified by the laboratory or contractor, the TCEQ must be notified of the circumstances by email within 24 hours. CAPs must be documented and submitted to PWSQA@tceq.texas.gov within 14 days of notification.

Deficiencies requiring a CAP may involve, but are not limited to, the following:

- Integrity of results are jeopardized
- Intentional misrepresentation of data or information
- Nonconformances with state or federal regulations
- Repeat nonconformances or deviations from standard practices
- Result in significant recollection of samples
- Sample collection errors
- Equipment failure
- Samples arriving at the laboratory with incomplete or incorrect sample submission form or COCs, or with sample integrity in doubt
- Samples lost in transit or in laboratory accidents
- Failure to meet acceptance limits when analyzing EPA Proficiency Test samples
- Data calculations using incorrect formulas

The preparation of CAPs is assigned to appropriate staff by managers (e.g., laboratory, contractor, TCEQ) who are responsible for assuring that CAPS are:

- Appropriately prepared, reported, implemented, and verified effective.
- Implemented in ways that will most likely eliminate the problem and prevent recurrence.
- Forwarded to PWSQA@tceq.texas.gov within 14 days of initial notification.

The PWSS Program Lead Quality Assurance Specialist, or designee, receives and reviews CAPs to determine if actions planned to resolve the deficiency are acceptable, provides feedback on any items determined to be insufficient, tracks reported CAPs, and may monitor implementation. Appropriate staff may be designated to review and track corrective actions that are not deemed significant, as described in C1.1.3.

If CAPs submitted by a laboratory are determined to be unacceptable, the PWSS Program may withhold samples until such time that an acceptable CAP is submitted.

Note: If a laboratory is required to issue an amended analysis report as part of a CAP, they are required to submit a copy to TCEQ in electronic form. All corrected reports and data must be clearly marked to identify them as "corrected" or "amended" and shall include the reason for the correction. Electronic data must be clearly identified as corrected in order to avoid duplicated data in the database of record.

C1.1.2 Required Content for a CAP

The procedure for preparing a CAP following the identification of a deficiency begins with an investigation to determine the root cause(s). Procedures for CAPs are specified in laboratory, contractor, or PWSS Program SOPs. Management selects and implements CAPs that will mostly like eliminate the problem, prevent recurrence, and are appropriate for the magnitude and degree of risk of the deficiency.

CAPs must include the following information:

- Description of the deficiency
    - What happened, how was it identified, and the date identified?
- Root cause
    - What was the underlying cause? Why did the deficiency occur?
- Programmatic or data impact(s)
    - How did the deficiency affect data or program decisions and what was reviewed (including timeframe) to determine the impact?
- Corrective action taken
    - What was done to correct the deficiency?
- Timeline for corrective action(s)
- Documentation
    - How will the corrective action(s) be documented?
- Actions to prevent recurrence
    - What actions will be taken to prevent the deficiency from occurring again? These must be distinctly different from the corrective actions.
- Timeline for action(s) to prevent recurrence
- Documentation
    - How will the preventative action(s) be documented?
- Verification of effectiveness
    - Who will verify effectiveness, when will verification occur, and how will verification be documented?

The TCEQ QA Program has developed a standardized template form that may be used, TCEQ QAF-005. This template can be accessed through the TCEQ Quality Assurance webpage at <tceq.texas.gov/agency/qa>. The form is also available by request at PWSQA@tceq.texas.gov.

C1.1.3 Significant Deviations

The PWSS Program Lead Quality Assurance Specialist determines whether an identified or reported deficiency is a significant deviation as defined by, but not limited to, any of the following:

- It jeopardizes the integrity of results or conclusions.
- Results in non-conformance with state or federal regulations.
- Was associated with the intentional misrepresentation of data or information.

The Lead Quality Assurance Specialist will forward information related to CAPs for significant deviations as described within the Programmatic QAPP, Section C1.1.3.

C1.2 Assessments and Audits

C1.2.1 Field Assessment and Response Actions

TCEQ requirements for field assessments are specified in the DWCSS Contract and the TCEQ SOP #12-06: *Authorization to Collect Chemical Compliance Samples*, Section 6.0 Audits. Additional detail regarding assessment and response is provided in the contractor's *SCMP* and associated training SOP.

Assessments of field activities are divided between internal and external audits. Internal audits are conducted by the DWCSS contractor's QA Manager and external audits are conducted by the TCEQ. Internal audits are further divided between technical audits of field samplers (on staff offices, vehicles, and data management practices) and Management Quality Reviews. These activities are summarized below.

Technical Audits

The DWCSS contractor's QA Manager audits all samplers at least once each year to ensure compliance with established SOPs. The process includes pulling sample reports from each collector for review and verifying that they are correctly completed and compares them to associated field notes. Field audits are also conducted to ensure adherence to the QAPP and established drinking water sample collection procedures as documented in the *DWSG*. The audit reports for each sampler are submitted with the monthly invoice and are reviewed by the TCEQ PWSSP Quality Assurance Specialist. The DWCSS contractor also conducts field sampler office audits. This process is discussed in Section D2.

Sample collectors and field sampler offices also participate in audits conducted by the TCEQ to confirm that the sample collectors are following all required processes and guidelines. The TCEQ DWCSS Contract Manager or designee investigates public water system concerns with specific samples or the sampling process to ensure that established SOPs and contract requirements are followed. The TCEQ PWSSP Quality Assurance Specialist audits the contractor to ensure compliance with the QAPP and DWSG. The TCEQ audits sample collectors and field sampler offices on a rotating basis. All samplers are audited at least once every two years by the TCEQ. The

results of these performance audits are reviewed by the TCEQ PWSSP Quality Assurance Manager and Division management; approved, and then shared with the sampling contractor. The DWCSS contractor is required to reply in writing detailing changes made to correct any noted non-conformances and, if applicable, retraining is conducted.

Management Quality Reviews

Management quality review meetings are conducted as needed by the DWCSS contractor's project managers to discuss technical audit results, examine handling of PWS officials, laboratory complaints, conflicting data issues, and general project performance. The meetings are attended by the DWCSS contractor's Program Manager, Project Managers, and Project Specialists and those in attendance brainstorm solutions to issues.

C1.2.2 TCEQ Programmatic and Financial Oversight of Sampling Contractor

According to provisions in the DWCSS Contract, the TCEQ DWCSS Contract Manager monitors the sampling contractor's programmatic and financial performance. The TCEQ may perform evaluations of performance which may be a factor for selection in future contracts. In addition, the DWCSS Contract allows the TCEQ to inspect all financial records, data, and facilities. Financial records must be maintained according to generally accepted accounting principles and be available for review during the term of the contract and three years thereafter.

C1.2.3 Laboratory Assessment and Response Actions

QA Officers and Laboratory Managers conduct internal assessments and implement response actions for their respective organizations according to quality standards, laboratory quality manuals, and SOPs.

Laboratory accreditation audits are conducted by the TCEQ per 30 TAC §25 – *Environmental Testing Laboratory Accreditation and Certification*. The TCEQ Laboratory and Quality Assurance Section (LQAS) audits laboratories in accordance with the TNI Standard. The LQAS maintains a list of accredited laboratories and their fields of accreditation. A list of accredited laboratories is maintained on the TCEQ website at <tceq.texas.gov/agency/qa/env_lab_accreditation.html>.

Audits of drinking water laboratories may also be conducted by the PWSSP Lead Quality Assurance Specialist (or designee) to ensure requirements of the PWSS Program, as specified in the EPA *Certification Manual* and PWSSP QAPP, are followed.

C1.3 Authorization to Stop Work

TCEQ management will authorize work stoppage if conditions are identified that indicate compliance is in jeopardy or if primacy requirements are not being met. The PWSS Program Lead Quality Assurance Specialist, Grant Manager, or TCEQ QA Manager may also request a work stoppage.

C2 Reports to Management

Sampling Contractor Reporting

TCEQ requirements for sampling contractor reports are specified in the DWCSS Contract and the *DWSG*, Chapter 10*.* Additional detail regarding sample reports is provided in the *SCMP*.

In addition to billing requirements in the General Conditions of the DWCSS Contract, the sampling contractor is required to submit the following reports to the TCEQ with the monthly invoice. These reports are described in Section A9 of this document. The following list does not include data and associated records described in Section B10.

- Monthly field reports
- QA reports (including internal audit reports)
- Meeting announcements and minutes
- Reports on field staff training and certification

Laboratory Reporting

There are no laboratory reports to management required for this project. Forms (COCs and Analysis forms) are submitted with the data (as described in Section B10), but these are not considered to be reports for the purpose of this Addendum.

(D) Data Validation and Usability

D1 Data Review, Validation, and Verification

The purpose of this section is to define the requirements that are used to review, accept, reject or qualify data in an objective and consistent manner. Data Review involves both verification and validation as defined below. The implementation of associated activities provides a way to decide the degree to which each data item has met its quality specifications as described in this document. Verification and validation of data generated for this project are a shared responsibility of the DWCSS contractor, the laboratories, and the TCEQ staff. The methods discussed in Section D2 are those conducted by the sampling contractor and the laboratories. The activities conducted by the TCEQ staff are discussed in the Programmatic QAPP.

- Verification: Evaluating the completeness, correctness, and conformance/compliance of a specific data set against method, procedural, or contractual requirements.
- Validation: A sample and analyte-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance (i.e., data verification) to determine the quality of a specific data set.

D2 Verification and Validation Methods

This section describes the sampling contractor's and the laboratories' methods for verifying and validating data as well as how any issues are conveyed to the TCEQ.

Verification Methods

The primary goal of verification is to document that the applicable methods, procedures, and contractual requirements were met during field measurements/sampling and laboratory analysis. In general, verification checks to see if sampling and analysis matched QAPP requirements, if SOPs were followed, and project specific DQOs were met. Verification involves the comparison of data and information to applicable requirements and identifying exceptions and missing documentation.

Verification of field and laboratory data prior to reporting is the responsibility of the sample collectors and laboratory analysts as well as both the field and laboratory QA Officers as described below.

Verification of Field Data

Field data are verified to ensure they are correct, complete, and comply with standards in this QAPP Addendum. Field data receive two levels of review before they are submitted to the laboratories. In addition, field data are reviewed by the TCEQ after they are submitted. Data are also reviewed during field sampler office audits. These multiple levels of review ensure that the data are accurate, complete, and comply with programmatic requirements. Potential issues are identified by both the manual examination of data and documentation, and electronically using data queries.

The first level of review is performed by field samplers who carefully enter data and information on their mobile devices prior to acceptance and printing the SCAR. After the field sampler prints the SCAR, he/she reviews it for typographical and transcription errors.

After the field samplers load the data to the server, the data are electronically queried and verified by the DWCSS contractor to detect any errors prior to submitting the data to the laboratories. Electronic data verifications include units, decimal places, date, time, completeness, and reasonableness. In addition, the sampling contractor's project managers verify GPS data against Google Earth on a daily basis to determine if any measurement is 50 meters or more from the original measurement. The DWCSS contractor may cancel samples if errors are identified before samples are analyzed by the laboratories. If errors are detected the samples must be recollected.

Field sampling staff and project managers also verify field data as part of annual field sampler office audits. Field sampler office audits involve the review of the following items:

- Use of properly maintained instruments

- Use of instruments that have verified calibration
- Proper use of supplies (e.g., unexpired reagents)
- Following appropriate SOPs
- Making careful and complete records of field activities
- Completeness and correctness of field records
- Review of QC measures performed in the field
- Identification of anomalous field test data

Field sampler office audits are used by DWCSS contract management to verify compliance with procedures which could have an impact on the validity of data. The sampling contractor's auditing SOP describes this process and provides the checklists used to verify and document practices related to equipment maintenance and calibration, supplies, compliance with SOPs, data management, documentation, etc.

The TCEQ further verifies field data upon receipt using MS Access database queries, SDWIS Lab to State software, and XML Sampling software. In addition, the TCEQ verifies at least five (5) percent of printed (PDF) reports against the electronic data received from the labs. Any errors that are identified will be reported to the originating entity for correction. The percentage of reports verified for accuracy is subject to increase if a pattern of errors is identified. Detailed information related to the TCEQ review of data is contained in the Programmatic QAPP and the TCEQ SOP: *Chemical Data Migration and Quality Control Work Instruction.*

Verification of Laboratory Data

All laboratory data are verified to ensure they are correct, complete, and comply with standards in this QAPP Addendum. All laboratory data receive three levels of review before they are submitted to the TCEQ. These three levels of review ensure that the data are accurate, complete, and traceable, and that all quality control measures are reviewed and evaluated prior to reporting. Potential issues are identified by both the manual examination of data and documentation, and electronically using special software and electronic queries. Issues which can be corrected using established procedures are corrected and documented. If an issue cannot be corrected, then associated data are qualified or rejected and reported to the TCEQ as described in the section below related to the validation of data. Laboratory quality manuals and SOPs include processes for verifying laboratory data as follows.

Once analytical data and quality control data are generated by the instrument/analysis, the analyst reviews the data per laboratory and project requirements, including but not limited to the use of correct methods/procedures and analyte list, list of consumables and reagents used, correct use of MDL and MRL, documentation of interference, proper transcriptions and calculations, compliance with holding times, correct preservatives and containers, etc. The analyst also reviews and evaluates all quality control data and determines if the

data are acceptable to report or if any or all of the samples must be re-analyzed. The analyst and/or team leader is also responsible for determining if any results need to be rerun/confirmed per Section B5 of this document. Any deviations or anomalies are documented, including whether they apply to the entire batch of samples or just to one or more samples.

The data receive a secondary review by a laboratory supervisor or another designated qualified data reviewer. The second level review also ensures that the data are free from transcription and calculation errors. The reviewer evaluates all quality control data and confirms whether data are acceptable to report or if any or all of the samples must be re-analyzed. Upon approval, the reviewer documents any additional comments or instructions.

Upon completion of the first and second tiers of data review, the team leader, the laboratory manager (or designee) or the laboratory project manager (or designee) closely scrutinizes the data as part final report package. He/she will review the final reports for completeness, clarity, and unusual conditions. Elevated results are critically reviewed to verify they were calculated correctly, confirmed, and rerun, if needed as indicated in Exhibit 4. The third-tier reviewer may check with supervisors and analysts to verify information and ensure that any discrepancies or notations are properly documented in the comments or case narrative that is part of the final report package.

As described in the section above on the verification of field data, the TCEQ further verifies laboratory data upon receipt using MS Access database queries, SDWIS Lab to State software, and XML Sampling software. In addition, the TCEQ verifies at least five (5) percent of printed (PDF) reports against the electronic data received from the labs. Any errors that are identified will be reported to the originating laboratory for correction. The percentage of reports verified for accuracy is subject to increase if a pattern of errors is identified. Detailed information related to the TCEQ review of data is contained in the Programmatic QAPP which includes the SOP: *Chemical Data Migration and Quality Control Work Instruction.*

Validation Methods

Data validation extends the process of verification to determine whether the data sets meet the requirements of the project-specific intended use as described in this QAPP Addendum; that is, if the data results are of the right type, quality, and quantity to support their intended use. Data validation also attempts to give reasons for sampling and analysis anomalies, and the effect that these anomalies have on the overall value of the data. For example, determining if out of control results from out-of-control LFMs apply to individual samples or the analytical system is a validation step. The application and reporting of rejection codes is also part of validation. The correction of data, when needed is also discussed in this section.

Validation of Field Data

Field data are validated by the DWCSS contractor at the time of collection and upon receipt by the contractor's central office as described in the section above on the verification of field data. Once the data entry is completed and the sampler has completed review and acceptance, no changes can be made on the mobile device. After sample collection is completed and electronic sample collection data is generated, no modifications or corrections are permitted. Field sampling anomalies are sometimes detected "after the fact" during the field sampling office audits. Preprinted labels and automatically uploaded data on the field tablets (i.e. date and time of sampling) help to preclude errors and to facilitate the tracking of the samples through the analyses and the data documentation processes so that errors are minimized. If an issue is detected, the sampling contractor in coordination with the TCEQ will determine what effect it has on the overall value of the reported data, including the possibility of invalidating previously reported data. For example, inaccurate and/or incomplete forms and documentation may call into question the true nature of the sampling point, the analyses requested, the use of appropriate sampling methodologies and/or the overall sampling protocol. As such, the quality of the sample may be suspect, and both the field and laboratory data may be invalidated.

In the event of the discovery of a field issue that (1) jeopardizes the integrity of previously reported result, (2) results in a non-conformance of a state or federal regulation, or (3) results in the significant recollection of samples, the sampling contractor must contact the TCEQ within 24 hours of detection and submit a CA Report within 14 days which may involve the resubmittal of data and information. (See Section C1). In addition, the sampling contractor must re-submit the data.

Validation of Laboratory Data

All data are validated as needed by the laboratories prior to reporting in accordance with the QA/QC requirements specified in the analytical methods, internal SOPs, and the technical specifications outlined in this QAPP Addendum. In the first, second, and third levels of data review described previously, to validate data, reviewers give reasons for analysis anomalies, and the effect that these anomalies have on the overall value of the data. The comments associated with the validations are used by the laboratory manager or project manager (or designee) to confirm if data qualifiers or rejection codes are applicable.

The rationale for any anomalies in the QA/QC of the laboratory data are documented in the comments or case narrative which is provided to the TCEQ program area with the analytical test report. Laboratory qualifier codes or rejection codes are provided in the comment field on the sample or result table to explain the anomalies. Unacceptable data (i.e., data that do not meet the QC criteria) are reported and the proper qualifier code is submitted to the TCEQ with the sample results as described in Section B5.

Corrections to Laboratory Data

Corrections to handwritten errors are made using a single horizontal line drawn through the error, with the correction clearly written next to the original and the initials of the person making the correction and the date of the correction.

Corrections to electronic data in LIMS can be made only by personnel given specific security rights to do so. Changes to work order or sample information may be made after the login review process is completed only by authorized personnel. After the data validation step has been completed, only authorized personnel are allowed to make changes to analytical data and a reason for the change must be provided.

In the event a laboratory analytical report must be revised or amended, the laboratory QAO or designee will contact the TCEQ PWSSP Lead Quality Assurance Specialist or program area within 24 hours of discovery and regenerate the entire report with the revision date and original report date along with a CA Report. See Section C1 of this document. Corrected electronic data must also be submitted to TCEQ.

D3 Reconciliation with User Requirements

The DWCSS contractor and laboratories verify and validate data against the Project's defined objectives prior to final reporting stages. If there are any problems with sampling and analysis, these issues are addressed immediately to ensure that data quality objectives are met. If the issue cannot be resolved, the sample and/or results will be qualified or rejected and reported to the TCEQ as such. Only data that have been validated with appropriate qualifiers and/or rejection codes are provided to the TCEQ PWSS Program.

Further data review and reconciliation with user requirements are conducted by the TCEQ as discussed in the Programmatic QAPP. Data meeting project requirements will be used by the TCEQ PWSS Program to determine PWS compliance with chemical drinking water standards. Data which do not meet requirements will not be used for this purpose. The TCEQ may revise past compliance determinations in the event invalid data are discovered after the fact.

Exhibit 1: Flow Chart of Work Activities

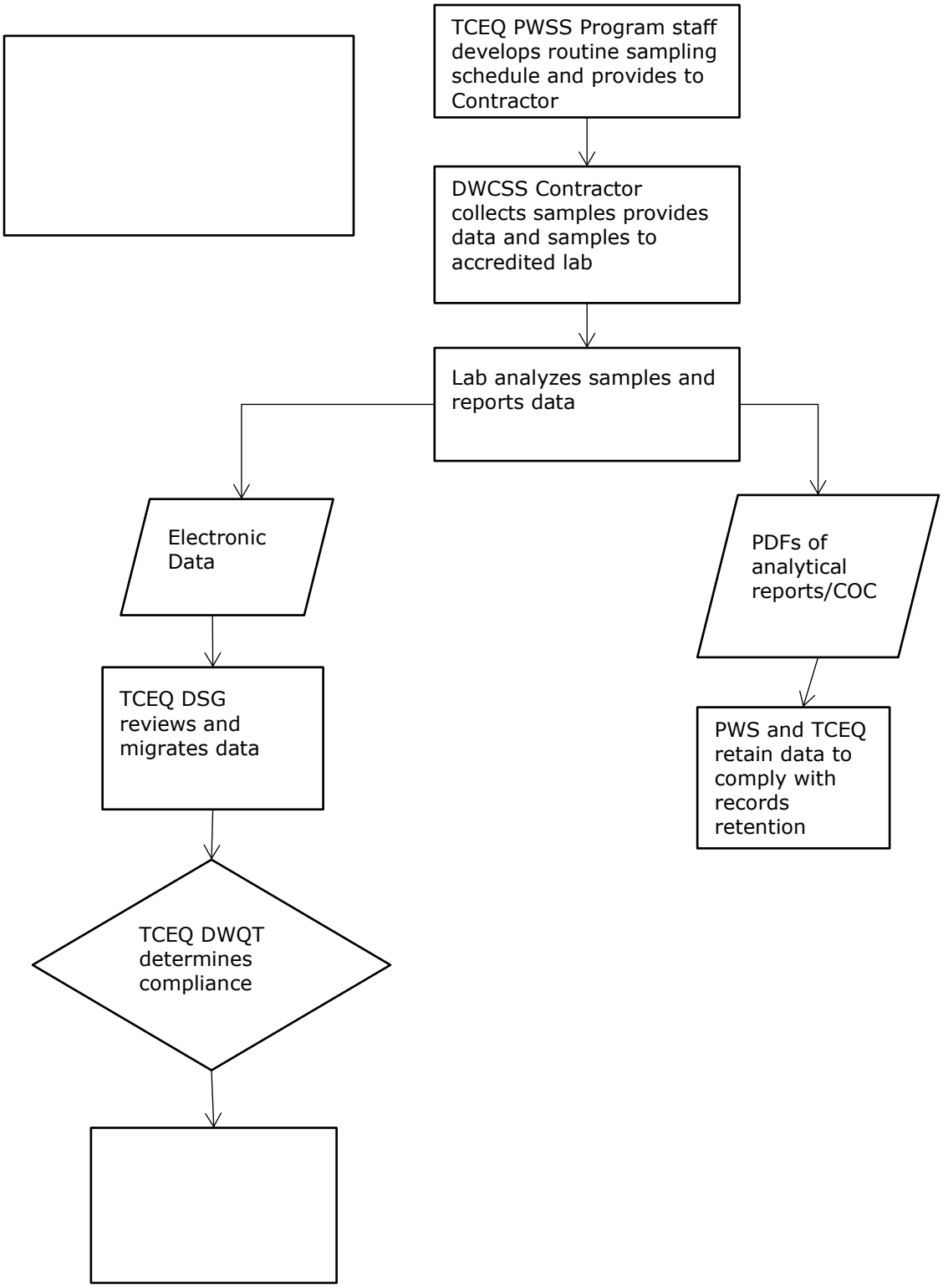

Exhibit 2: DWCSS Contract and Scope of Work

Incorporated by reference, Drinking Water Compliance Sampling Services Contract, current version.

Exhibit 3: Laboratory Measurement Performance Specifications

Analyte	Code	Method	Minimum Reporting Limit (MRL) Verification	Laboratory Reagent Blanks (LRB)	Lab duplicate (RPD of LD)	Lab Fortified Blank (% Recovery of LFB)	Laboratory Fortified Matrix (% Recovery of LFM)	Confirmation of Sample Results
Asbestos	1094	EPA 100.2	N/A	</=0.01MFL>10 um	See EPA 100.2	See EPA 100.2	N/A	Confirm/rerun if >MCL
Gamma Radiochemical	BETA	EPA 901.1	N/A	Recount if target analytes > required detection limit/required MDA	Recount if RPD >20. If still exceeds, qualify data	Recount if recovery is outside 90 – 110%	N/A	Analyzed as follow up to samples that exceed 50 pCi/L for gross beta radioactivity
Beta Radiochemicals	BETA	EPA 905.0	N/A	Recount if blank > RDL (Required Detection Limit). If still exceeds, rerun batch. If target analyte is not detected in associated samples, no rerun required	Recount if RPD >20 or RER >2. If still exceeds, rerun batch	Recount if recovery is outside 80 - 120%. If still exceeds, rerun batch	Recount if recovery is outside 80 -120%. If still exceeds, rerun batch	Analyzed as follow up to samples that exceed 50 pCi/L for gross beta radioactivity
Beta Radiochemicals	BETA	EPA 906.0	N/A	Recount if blank > RDL (Required Detection Limit). If still exceeds, rerun batch. If target analyte is not detected in associated samples, no rerun required	Recount if RPD >20 or RER >2. If still exceeds, rerun batch	Recount if recovery is outside 90 - 110%. If still exceeds, rerun batch	Recount if recovery is outside 80 -120%. If still exceeds, rerun batch	Analyzed as follow up to samples that exceed 50 pCi/L for gross beta radioactivity

Analyte	Code	Method	Minimum Reporting Limit (MRL) Verification	Laboratory Reagent Blanks (LRB)	Lab duplicate (RPD of LD)	Lab Fortified Blank (% Recovery of LFB)	Laboratory Fortified Matrix (% Recovery of LFM)	Confirmation of Sample Results
Beta Radiochemicals	BETA	EPA 200.7	N/A	Locate & correct problem before continuing if any target analyte >MRL	Locate & correct problem before continuing if outside control charts limits not to exceed 20%	Locate & correct problem before continuing if any outside 85-115%	If any outside 70 - 30% compare results to LRB and LFBs to determine matrix specific effects (MSE).	Analyzed as follow up to samples that exceed 50 pCi/L for gross beta radioactivity
Radionuclides	RAD	EPA 200.8	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Rerun if any target analyte >MRL	Locate & correct before continuing if over 20%	Rerun if any recovery not with 85-115%	If outside 70 - 130% compare results to LRB and LFBs to determine MSE.	Confirm/Rerun if any regulated contaminant >2x MCL
Radionuclides	RAD	EPA 900.0	N/A	Recount if >RL. If still exceeds, rerun batch. If target analyte is not detected in associated samples, no rerun is required.	Recount if RPD >20 or RER >2. If still out of control, rerun batch	Recount if outside 80 – 120%. If still out of control, rerun batch	Recount if outside 70 – 130%. If still out of control, rerun batch	Confirm/Rerun if any regulated contaminant >2x MCL
Radionuclides	RAD	SM 7500-RAD	N/A	Recount if >RDL. If still exceeds, rerun batch. If target analyte is not detected in associated samples, no rerun is required.	Recount if RPD >20 or RER >2. If still out of control, rerun batch	Recount if outside 80 – 120%. If still out of control, rerun batch.	Recount if outside 70 – 130%. If still out of control, rerun batch	Confirm/Rerun if any regulated contaminant >2x MCL
Radionuclides	RAD	SM 7500-RAC	N/A	Recount if >RL. If still exceeds, rerun batch. If target analyte is not detected in associated samples, no rerun is required.	Recount if RPD >20 or RER >2. If still out of control, rerun batch	Recount if outside 90 – 110%. If still out of control, rerun batch	Recount if outside 80 – 120%. If still out of control, rerun batch	Confirm/Rerun if any regulated contaminant >2x MCL

Analyte	Code	Method	Minimum Reporting Limit (MRL) Verification	Laboratory Reagent Blanks (LRB)	Lab duplicate (RPD of LD)	Lab Fortified Blank (% Recovery of LFB)	Laboratory Fortified Matrix (% Recovery of LFM)	Confirmation of Sample Results
Radionuclides	RAD	SM 7500-UC	N/A	Recount if >RL. If still exceeds, rerun batch. If target analyte is not detected in associated samples, no rerun is required.	Recount if RPD >20 or RER >2. If still out of control, rerun batch	Recount if outside 90 – 110%. If still out of control, rerun batch	Recount if outside 80 – 120%. If still out of control, rerun batch	Confirm/Rerun if any regulated contaminant >2x MCL
Cyanide	1024 / CNFR	EPA 335.4	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if target analytes >MDL	Locate & correct problem before continuing if over 20%	Locate & correct problem before continuing if outside 80 - 120%	If not within 80 - 120% compare results to LRB and LFBs to determine MSE.	Confirm/rerun if >1/2 MCL
Cyanide	1024 / CNFR	SM 4500-CN	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if >1/2 MRL	Locate & correct problem before continuing if over 20%	Locate & correct problem before continuing if outside control charts limits	If not within control limits compare results to LRB and LFBs to determine MSE.	Confirm/rerun if >1/2 MCL
Cyanide	1024 / CNFR	Quickchem 10-204-00-1-X	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct before continuing if >1/2 MRL	Locate & correct problem before continuing if over 20%	Locate & correct problem before continuing if recovery outside control charts limits	If not within control limits compare results to LRB and LFBs to determine MSE.	Confirm/rerun if >1/2 MCL
Disinfection Byproducts	DBP2	EPA 524.2	Locate & correct problem if any target analyte outside ±50% of the expected value, if any field sample in the batch has a concentration less than 5 times the regulatory MRL	Locate & correct problem before continuing if any target analyte >MRL	Locate & correct problem before continuing if over 30%	Locate & correct problem if any recovery not within 70 -130%	N/A	Run duplicate sample if TTHM or HAA5 result is > 2X the MCL

Analyte	Code	Method	Minimum Reporting Limit (MRL) Verification	Laboratory Reagent Blanks (LRB)	Lab duplicate (RPD of LD)	Lab Fortified Blank (% Recovery of LFB)	Laboratory Fortified Matrix (% Recovery of LFM)	Confirmation of Sample Results
Disinfection Byproducts	DBP2	EPA 552.2	Locate & correct problem if any target analyte outside ±50% of the expected value, if any field sample in the batch has a concentration less than 5 times the regulatory MRL	Locate & correct problem if LRB interference in excess of MDL for that analyte	Locate & correct problem before continuing if over 30%	Locate & correct problem if outside 70 – 130% Note: LFB criteria established for continuing calibration evaluated as LFB	If not within 70 - 130% compare results to LRB and LFBs to determine MSE. If MSE, report applicable sample with high or low bias qualifier	Run duplicate sample if TTHM or HAA5 result is > 2X the MCL
Diquat (and Paraquat)	2032	EPA 549.2	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem if LRB produces a peak that prevents the determination of target analyte	Locate & correct problem before continuing if over 30%	Locate & correct problem before continuing if outside 70-130%	If not within 70 - 130% compare results to LRB and LFBs to determine MSE	Confirm/Rerun extract if detected
EDB/DBCP	504	EPA 504.1	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if >MDL	Locate & correct problem before continuing if over 30%	Locate & correct problem before continuing if outside 70-130%	If not within 65 - 135% compare results to LRB and LFBs to determine MSE	Confirm/Rerun 2nd sample if detected
Endothall	2033	EPA 548.1	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if LRB produces a peak that prevents the determination of endothall	Locate & correct problem before continuing if over 30%	Locate & correct problem before continuing if outside control chart 75 – 115%	If not within control limits compare results to LRB and LFBs to determine MSE	Confirm/Rerun extract if detected
Glyphosate	2034	EPA 547	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if LRB produces a peak that prevents the determination of glyphosate	Locate & correct problem before continuing if over 30%	Locate & correct problem before continuing if outside control chart limits	If not within control limits compare results to LRB and LFBs to determine MSE	Confirm/Rerun extract if detected

Analyte	Code	Method	Minimum Reporting Limit (MRL) Verification	Laboratory Reagent Blanks (LRB)	Lab duplicate (RPD of LD)	Lab Fortified Blank (% Recovery of LFB)	Laboratory Fortified Matrix (% Recovery of LFM)	Confirmation of Sample Results
Haloacetic Acids	2456	EPA 552.2	Locate & correct problem if any target analyte outside ±50% of the expected value, if any field sample in the batch has a concentration less than 5 times the regulatory MRL	Locate & correct problem before continuing if LRB interference in excess of MDL	Locate & correct problem before continuing if over 30%	Locate & correct problem before continuing if outside 70 - 130% (LFB = CCV)	If not within control limits compare results to LRB and LFBs to determine MSE. If MSE, report applicable sample with high or low bias qualifier.	Run duplicate sample if HAA5 result is > 2X the MCL
Metals (Applies to contaminants listed under EPA's NPDWRs)	MTL	EPA 200.7	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if any target analyte >MRL	Locate & correct problem before continuing if over 20%	Locate & correct problem before continuing if any recovery outside 85-115%	If not within 70 - 130% compare results to LRB and LFBs to determine MSE	Confirm/Rerun if any regulated contaminant >MCL
Metals (Applies to contaminants listed under EPA's NPDWRs)	MTL	EPA 200.8	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if any target analyte >MRL	Locate & correct problem before continuing if over 20%	Locate & correct problem if any recovery outside 85-115%	If not within 70 - 130% compare results to LRB and LFBs to determine MSE	Confirm/Rerun if any regulated contaminant >MCL
Metals (Applies to contaminants listed under EPA's NPDWRs	MTL	EPA 245.1	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Rerun if >2.2 x MDL or >10% of determined sample concentration whichever Is greater	Locate & correct problem before continuing if over 20%	Locate & correct problem if any recovery outside 85-115%	If not within 70 - 130% compare results to LRB and LFBs to determine MSE.	Confirm/Rerun if mercury concentration is detected
Minerals (Applies to contaminants listed under EPA's NPDWRs)	MIN	EPA 300.0	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	<MDL	Locate & correct before continuing if over 20%	Locate & correct problem if any recovery outside 90 - 110%	If outside Method A 80 - 120% Method B 75 - 125% compare results to LRB and LFBs to determine MSE	Confirm/Rerun if any target analyte is >MCL

Analyte	Code	Method	Minimum Reporting Limit (MRL) Verification	Laboratory Reagent Blanks (LRB)	Lab duplicate (RPD of LD)	Lab Fortified Blank (% Recovery of LFB)	Laboratory Fortified Matrix (% Recovery of LFM)	Confirmation of Sample Results
Minerals (Applies to contaminants listed under EPA's NPDWRs)	MIN	EPA 353.2	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct before continuing if >1/2 MRL	Locate & correct before continuing if over 20%	Locate & correct problem if any recovery outside 90 - 110%	If not within 90 - 110% compare results to LRB and LFBs to determine MSE	Confirm/Rerun if any target analyte is >MCL
Minerals (Applies to contaminants listed under EPA's NPDWRs)	MIN	SM 2320B	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct before continuing if >1/2 MRL	Locate & correct before continuing if over 20%	Locate & correct problem before continuing if outside control chart limits	If outside control chart limits compare results to LRB and LFBs to determine MSE	Confirm/Rerun if any target analyte is >MCL
Minerals (Applies to contaminants listed under EPA's NPDWRs)	MIN	SM 2510 B	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct before continuing if >1/2 MRL	Locate & correct before continuing if over 20%	Locate & correct problem before continuing if outside control chart limits	If outside control chart limits compare results to LRB and LFBs to determine MSE.	Confirm/Rerun if any target analyte is >MCL
Minerals (Applies to contaminants listed under EPA's NPDWRs)	MIN	SM 2540C	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct before continuing if >1/2 MRL	Locate & correct before continuing if over 20%	Locate & correct problem before continuing if outside control chart limits	If outside control chart limits compare results to LRB and LFBs to determine MSE.	Confirm/Rerun if any target analyte is >MCL
Minerals (Applies to contaminants listed under EPA's NPDWRs)	MIN	SM 4500 HB	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct before continuing if >1/2 MRL	Locate & correct before continuing if over 20%	Locate & correct problem before continuing if outside control chart limits	If outside control chart limits compare results to LRB and LFBs to determine MSE	Confirm/Rerun if any target analyte is >MCL
PCBs	2383	EPA 508A	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if DCB >/=0.025ng/uL	Locate & correct problem before continuing if >30%	Locate & correct problem before continuing if outside 80- 120%	If outside 70 - 130% compare results to LRB and LFBs to determine MSE.	Confirm/Rerun if any regulated analyte >MRL.

Analyte	Code	Method	Minimum Reporting Limit (MRL) Verification	Laboratory Reagent Blanks (LRB)	Lab duplicate (RPD of LD)	Lab Fortified Blank (% Recovery of LFB)	Laboratory Fortified Matrix (% Recovery of LFM)	Confirmation of Sample Results
PCBs	2383	EPA 508.1 (Test used as a qualitative screen)	N/A	Locate & correct problem before continuing if >PRL	N/A	N/A	N/A	Rerun if any regulated analyte >PRL(pattern recognition level). If PCBs are detected in any sample >PRL the laboratory will request an unpreserved sample for Method 508A to quantitate PCBs.
Nitrate/Nitrite	NO32	EPA 300.0	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if >MDL	Locate & correct before continuing if over 20%	Locate & correct before continuing if outside 90 - 110%	If Method A outside 80 - 120% and Method B 75 - 125% compare results to LRB and LFBs to determine MSE.	Confirm/Rerun if > MCL
Nitrate/Nitrite	NO32	EPA 353.2	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if > ½ MRL	Locate & correct before continuing if over 20% as a rolling limit	Locate & correct before continuing if outside control chart limits (not to exceed 90-110%)	If outside 90 - 110%. Compare results to LRB and LFBs to determine MSE.	Confirm/Rerun if > MCL
Nitrate	NO32	EPA 300.0	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if >MDL	Locate & correct before continuing if over 20%	Locate & correct before continuing if outside 90 - 110%	If Method A outside 80 - 120% and Method B 75 - 125% compare results to LRB and LFBs to determine MSE.	Confirm/Rerun if > MCL
Nitrate	NO32	EPA 353.2	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if > ½ MRL	Locate & correct before continuing if over 20% as a rolling limit	Locate & correct before continuing if outside control chart limits (not to exceed 90-110%)	If outside 90 - 110%. Compare results to LRB and LFBs to determine MSE.	Confirm/Rerun if > MCL

Analyte	Code	Method	Minimum Reporting Limit (MRL) Verification	Laboratory Reagent Blanks (LRB)	Lab duplicate (RPD of LD)	Lab Fortified Blank (% Recovery of LFB)	Laboratory Fortified Matrix (% Recovery of LFM)	Confirmation of Sample Results
Nitrite	NO32	EPA 300.0	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if >MDL	Locate & correct before continuing if over 20%	Locate & correct before continuing if outside 90 - 110%	If Method A outside 80 - 120% and Method B 75 - 125% compare results to LRB and LFBs to determine MSE.	Confirm/Rerun if > MCL
Nitrite	NO32	EPA 353.2	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if > ½ MRL	Locate & correct before continuing if over 20% as a rolling limit	Locate & correct before continuing if outside control chart limits (not to exceed 90-110%)	If outside 90 - 110%. Compare results to LRB and LFBs to determine MSE.	Confirm/Rerun if > MCL
Secondaries	SEC	EPA 200.8	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if any target analyte >MRL	Locate & correct problem before continuing if over 20%	Locate & correct problem before continuing if any recovery outside 85-115%	If outside 70 - 130% compare results to LRB and LFBs to determine MSE.	Confirm/Rerun if any contaminant >2x SCL
Secondaries	SEC	EPA 200.7	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if any target analyte >MRL	Locate & correct problem before continuing if over 20%	Locate & correct problem before continuing if any recovery outside 85-115%	If outside 70 - 130% compare results to LRB and LFBs to determine MSE.	Confirm/Rerun if any contaminant >2x SCL
Secondaries	SEC	EPA 300.0	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if any target analyte >MDL	Locate & correct problem before continuing if over 20%	Locate & correct problem before continuing if any recovery outside 90 - 110%	If recovery for Method A outside 80 - 120% or Method B outside 75 - 125% compare results to LRB and LFBs to determine MSE.	Confirm/Rerun if any contaminant >2x SCL
Secondaries	SEC	SM2540C	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct before continuing if any analyte >1/2 MRL	Locate & correct problem before continuing if over 20%	Locate & correct problem before continuing if any recovery outside control charts	If outside control chart limits compare results to LRB and LFBs to determine MSE	Confirm/Rerun if any contaminant >2x SCL

Analyte	Code	Method	Minimum Reporting Limit (MRL) Verification	Laboratory Reagent Blanks (LRB)	Lab duplicate (RPD of LD)	Lab Fortified Blank (% Recovery of LFB)	Laboratory Fortified Matrix (% Recovery of LFM)	Confirmation of Sample Results
SOC Group 5	SOC5	EPA 525.2	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if any target analyte >MRL	Locate & correct problem before continuing if over 30%	Locate & correct problem before continuing if any recovery outside 70 -130%	If any recovery not within 70 -130% compare results to LRB and LFBs to determine MSE	Confirm/Rerun if any regulated analyte >MCL
SOC Group 5	SOC5	EPA 508.1	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if any target analyte >MRL	Locate & correct problem before continuing if over 30%	Locate & correct problem before continuing if any recovery outside 70 -130%	If any recovery not within 65-135% compare results to LRB and LFBs to determine MSE	Confirm/Rerun if any regulated analyte >MCL
SOC Method 515.4	515	EPA 515.4	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if peak RT window of any analyte that prevents the quantitation of a target analyte	Locate & correct problem before continuing if over 30%	N/A	If any recovery not within 70 -130% compare results to LRB and LFBs to determine matrix specific effects	Run 2nd sample if any regulated analyte>MCL
SOC Method 531.1	531	EPA 531.1	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if LRB produces a peak that prevents the determination of target analyte	Locate & correct problem before continuing if over 30%	Locate & correct problem before continuing if outside control chart limits	If any recovery not within 65 -135% compare results to LRB and LFBs to determine matrix specific effects	Rerun if any regulated analyte >MCL
Trihalomethanes	2950	EPA 524.2	Locate & correct problem if any target analyte outside ±50% of the expected value, if any field sample in the batch has a concentration less than 5 times the regulatory MRL	Locate & correct problem before continuing if any target analyte >MRL	Locate & correct problem before continuing if over 30%	Locate & correct problem if any recovery not within 70 -130%	N/A	Run duplicate sample if TTHM result is > 2X the MCL.

Analyte	Code	Method	Minimum Reporting Limit (MRL) Verification	Laboratory Reagent Blanks (LRB)	Lab duplicate (RPD of LD)	Lab Fortified Blank (% Recovery of LFB)	Laboratory Fortified Matrix (% Recovery of LFM)	Confirmation of Sample Results
Volatile Organic Chemicals	VOC	EPA 524.2	Locate & correct problem before continuing if any target analyte outside method or laboratory acceptance limits	Locate & correct problem before continuing if any target analyte >MRL	Locate & correct problem before continuing if over 30%	Locate & correct problem if any recovery not within 70 -130%	N/A	Run duplicate sample if any regulated analyte >MCL. Field blanks are analyzed when there are detections of regulated compounds, MTBE or natural gases.

Exhibit 4: Data Management Flow Chart