Environmental Monitoring and Measurement Activities Relating to the Underground Injection Control (UIC) Program

Quality Assurance Project Plan (QAPP)

Revision No. 1

Prepared on March 3, 2025

Prepared in cooperation with the Texas Commission on Environmental Quality (TCEQ)
and the U.S. Environmental Protection Agency (EPA)
QTRAK # 25-328
U.S. EPA Approval Date: June 23rd, 2025
Effective Period: July 27, 2025 – June 23, 2028

Questions concerning this QAPP should be directed to:
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Lead UIC Quality Assurance Specialist (QAS)
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A. PROJECT MANAGEMENT AND INFORMATION/DATA QUALITY OBJECTIVES

A1. TITLE PAGE

Title: Environmental Monitoring and Measurement Activities Relating to the Underground Injection Control (UIC) Program Quality Assurance Project Plan (QAPP)

Date of Preparation: March 2025

Prepared By: Texas Commission on Environmental Quality

Period of Applicability: Fiscal Year 2026

Revision Date: N / A

A2. APPROVAL PAGE

Texas Commission on Environmental Quality

Office of Waste

Radioactive Materials Division

Name: Ashley Forbes

Title: Deputy Director

Signature: _____ Date: 5/29/25

Name: Kathryn Ploch

Title: Underground Injection Control Grant Manager

Signature: _____ Date: 5/29/2025

Name: Bryan Smith P.G.

Title: Section Manager, Underground Injection Control Section

Signature: Bryan Smith Date: 5/29/25

Name: Tamara Young

Title: UIC Program Coordinator, Lead UIC Program QA Specialist

Signature: Tamara Young Date: 5/28/2025

Office of Compliance & Enforcement

Critical Infrastructure Division

Name: Kelly W. Cook

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Signature: Kelly W. Cook Date: 6/03/2025

Name: Lana D'Souza

Title: Section Manager, Radioactive Materials Compliance and Chemical Reporting

Signature: Lana DSouza Date: 5/30/2025

Enforcement Division

Name: Amy Settemeyer

Title: Deputy Director

Signature: Amy Settemeyer Date: 06/05/2025

Name: Madelyn Flannagan, P.G.

Title: Section Manager, Waste Enforcement Section

Signature: Madelyn A. Flannagan Date: 6/5/2025

Regional Areas

Name: David A. Ramirez

Title: Area Director, Border and Permian Basin

Signature: David A. Ramirez Date: 06/09/2025

Name: Joel Anderson

Title: Area Director, Central Texas

Signature: Joel C Clark Date: 6/6/25

Name: Randy Ammons

Title: Area Director, North Central and West Texas

Signature: Randy J. Ammons Date: 06/09/2025

Name: Susan Clewis

Title: Area Director, Coastal & East Texas Area

Signature: Susan Clewis Date: 06/09/2025

Office of Compliance & Enforcement

Program Support and Environmental Assistance

Name: Andy Gardner

Title: Deputy Director

Signature: Andy Gardner Date: 5/30/2025

Name: Heba Kawasmi

Title: QA Specialist

Signature: Heba Kawasmi Date: 5/29/2025

Office of Air

Air Monitoring Division

Name: D. Jody Koehler, M.S.

Title: TCEQ Quality Assurance Manager, Air Monitoring Division

Signature: _____ Date: 06/13/2025

United States Environmental Protection Agency, Region 6

Name: Denise Hamilton

Title: Chief, Community Infrastructure Section, Water Division

Signature: _____ Denise K. Hamilton _____ Date: _06/23/2025_____

Name: Mike Vaughan

Title: UIC Project Officer, Community Infrastructure Section, Water Division

Signature: ____Mike Vaughan 6/18/2025 Date: _____

Name: Kara Allen

Title: Quality Assurance Manager

Signature: _____ Date: _____

Contract Laboratories

In lieu of signatures from participating contract laboratories, contracts executed by the Office of Compliance and Enforcement (OCE), Program Support and Environmental Assistance Division (PSEAD) and the Office of Waste (OOW) Radioactive Materials Division (RMD) staff contain the following language:

> CONTRACTOR or PERMITTEE shall perform all work in accordance with requirements and procedures set forth in the Quality Assurance Project Plan (QAPP) required by each program/project for which the particular analysis is requested and specified on the chain-of-custody (COC) document or the request for analysis (RFA) form. CONTRACTOR or PERMITTEE shall be solely responsible for ensuring that it has a copy of the current QAPP from the program/project which is requesting analysis prior to commencing any analysis. CONTRACTOR or PERMITTEE shall be responsible for obtaining copies of all applicable QAPPs from TCEQ.

Laboratories shall state in their standard operating procedures (SOPs) the sample and waste disposal procedures. The procedures shall ensure that all waste samples and by-products from the laboratories that meet the definition of a hazardous waste comply with UIC regulations.

Laboratories listed in the Distribution List are current as of March 3, 2025. If you have questions, please contact PSEAD Laboratory Contract Manager Sonya Riebock (817) 588-5913. The current list of contract laboratories can be found at OCE Contracted Labs.

A3. TABLE OF CONTENTS, DOCUMENT FORMAT, AND DOCUMENT CONTROL

APPENDICES

Document Format

In compliance with U.S. EPA Order CIO 2105-P-01-0, this Underground Injection Control (UIC), Quality Assurance Project Plan (QAPP), describes how environmental information operations are planned, implemented, documented, and assessed during the life cycle of a project. The QAPP describes in comprehensive detail the necessary Quality Assurance (QA) and Quality Control (QC) requirements and other technical activities implemented by the Texas Commission on Environmental Quality (Commission or TCEQ) on behalf of the State of Texas and the United States Environmental Protection Agency (EPA) to ensure that the results of the environmental information operations performed will satisfy the stated performance and acceptance criteria.

The Texas Water Code (TWC), Chapter 5, Section 5.134, Use of Environmental Testing Laboratory Data and Analysis, sets the minimum standard for environmental testing laboratory data and analysis used by TCEQ in making decisions relating to the following matters under the Commission's jurisdiction:

- permits or other authorizations,
- compliance matters,
- enforcement actions,
- or corrective actions.

The Commission may only accept such data related to these decisions if the data and analysis is prepared by an environmental testing laboratory accredited under the Texas Laboratory Accreditation Program (TLAP) using National Environmental Laboratory Accreditation Conference (NELAC). Title 30 of the Texas Administrative Code (TAC) Chapter 25 (relating to Environmental Testing Laboratory Accreditation and Certification) describes requirements for accreditation of environmental testing laboratories and defines conditions under which a laboratory may qualify for an exception.

The TCEQ assesses laboratories using The NELAC Institute's (TNI), National Environmental Laboratory Accreditation Program (NELAP), 2016 TNI Standards. This includes requirements related to proficiency testing. The UIC QAPP complies with the quality assurance requirements stated in the TCEQ Quality Management Plan (QMP).

Document Control

The title, version number, date of the version, and page numbers in relation to the number of pages can be found in Section A1 and in the header of every page of this document.

A4. PROJECT PURPOSE, PROBLEM DEFINITION, AND BACKGROUND

The U.S. Environmental Protection Agency provides grant funding to the TCEQ for the development and implementation of the Texas UIC Program through a Performance Partnership Grant (PPG) governed by 40 CFR Part 35. EPA grants that involve environmental information operations require a Quality Management Plan (QMP) which documents how an organization will plan, implement, and assess the effectiveness of its quality assurance and quality control operations. The TCEQ describes the agency's organizational arrangements, processes, procedures, and requirements of TCEQ's QA program in the TCEQ QMP. While the QMP outlines the framework and policies for quality assurance within the TCEQ, the Quality Assurance Project Plan (QAPP) specifies the detailed procedures and quality control activities for implementing these policies in specific environmental data operations.

This TCEQ UIC QAPP follows the *Quality Assurance Project Plan Standard (CIO 2105-s-02)*. It documents how the TCEQ UIC Program uses EPA's data quality objective (DQO) process or a comparable systematic planning process, and outlines the organization, planning, implementation, and assessment of environmental data operations related to UIC activities. It also specifies the QA and QC activities that will be applied.

Project Purpose and Problem Definition

The passage of the Safe Drinking Water Act in 1974 provides the foundation for the regulation of underground injection in the United States. The Injection Well Act, which is Chapter 27 of the Texas Water Code, and Title 3 of the Texas Natural Resources Code provide the statuary authority for regulation of underground injection in Texas. The Injection Well Act (the Act) divides the regulatory responsibilities between the Railroad Commission of Texas (RRCT) and the TCEQ. Both state agencies have full authority for those underground injection wells within their own jurisdiction as defined in the Act. The TCEQ has a continuing obligation to maintain a UIC Program. The six types of injection wells and which agency has jurisdiction for each are summarized below:

- Class I wells, which are used to inject hazardous and nonhazardous wastes, and certain radioactive wastes, such as byproduct material from uranium recovery and low-level radioactive waste, into deep, confined formations, are regulated by the TCEQ. Class I hazardous wells are regulated by the UIC Program and the Resource Conservation and Recovery Act (RCRA).
- Class II wells, which are related to oil and gas production, are regulated by the RRCT.
- Class III wells, which are used for dissolution mining of minerals, are regulated by the TCEQ (i.e., in-situ uranium, sulfur, and sodium sulfate) or the RRCT (i.e., brine);
- Class IV wells, which are generally banned, may be authorized by the TCEQ in certain environmental cleanup operations. These wells can be operated only with federal or state approval under the RCRA or Superfund programs.
- Class V wells, which are used to inject nonhazardous fluids either into or above an underground source of drinking water (USDW), are regulated by either the TCEQ or the RRCT (i.e., geothermal energy production), depending on the type of well.

- Class VI wells, which are used for injection of carbon dioxide (CO_2) below a USDW for long-term storage (geologic sequestration). The RRCT has jurisdiction over the onshore and offshore injection for geologic storage of CO_2 in the state; however, RRCT is applying for primary enforcement authority from EPA to regulate Class VI injection wells. The TCEQ performs a review on these applications and issues a letter of determination in accordance with TWC, Chapter 27.

This document does not directly address requirements of RCRA in 1976 as amended by the Hazardous and Solid Waste Amendments in 1984, or the Texas Solid Waste Disposal Act. For UIC requirements related to RCRA compliance please refer to the TCEQ RCRA QAPP.

Project Background

The UIC Program is designed to protect USDWs and provide a safe and cost-effective way for industries, municipalities, and small businesses in Texas to dispose of wastewater, extract mineral resources, store water for future recovery, and prevent pollution of USDWs in Texas, in accordance with 40 Code of Federal Regulations Part 144 – Part 148. TCEQ requires the regulated community to obtain and comply with permits, authorizations or registrations to ensure compliance with state and federal regulations. The requirements of these permits, authorizations or registrations are as stringent as federal requirements and, in some cases, are more stringent. In addition, the regulated community engaging in UIC Program activities must comply with all state and federal regulations identified or referenced in this QAPP.

Testing and Monitoring Activities

UIC program obligations translate into adhering to Title 40 CFR Parts 144-148, *Test Methods for Evaluating Solid Waste:- Physical/Chemical Methods* (SW-846) or other U.S. EPA approved methods, and the Hazardous and Solid Waste Amendments (HSWA) of 1984 Sections 3004 and 3005, during the following:

- Investigations of hazardous waste generators, transporters, and treatment, storage and disposal facilities;
- Investigations of Treatment, Storage and Disposal (TSD) facilities to ensure these entities are properly managing hazardous waste;
- Collection and analysis of groundwater samples to determine the presence and extent of contamination;
- Review of environmental data provided from external sources in permit and compliance plan applications, reports required by rule for generators, reports required by permits and compliance plans, waste characterization plan, facility investigations, corrective action plans, risk assessments, closure plans, and waste determinations to safeguard the environment and public health against releases/contamination, and to verify contamination is remediated to the appropriate level; and
- Establishment of appropriate field and laboratory analysis procedures for all applicable pollutants to ensure consistency and conformity with regulations and proven methods.

The only required use of an SW-846 method is the measurement of method-defined parameters (MDPs), for example, Method 1311: Toxicity Characteristic Leaching

Procedure (TCLP) which is discussed in more detail below. These are parameters having regulatory concentration limits based on the outcome of the specified method of analysis performed as prescribed in the method without deviation. For example, in order to determine whether the levels of hazardous constituents in a particular waste stream are equal to or greater than the toxicity characteristic (TC) levels specified in 40 CFR §261.24, waste generators must test their waste using SW-846 Method 1311: Toxicity Characteristic Leaching Procedure. If concentrations of contaminants measured in the TCLP leachate are greater than or equal to the regulatory levels specified in 40 CFR §261.24 Table 1, the waste is a hazardous waste and is subject to RCRA Hazardous Waste regulation. The U.S. EPA has determined the TCLP is the only reliable method for demonstrating a waste does not exceed the maximum TC levels. The U.S. EPA describes the TCLP as a required method-defined parameter. The MDPs are discussed in more detail in Section B of the QAPP.

Third Edition SW-846 Update IIIB (2005) includes revised Chapter Seven and eleven revised methods, including method revision to remove a requirement to use the SW-846 Chapter Nine, "Sampling Plan".

The U.S. EPA Methods Innovation Rule, published in the Federal Register as a Final Rule on June 14, 2005, removes unnecessary requirements in the RCRA regulations to use only SW-846. With the exception of approximately 25 MDPs incorporated by reference in the RCRA regulations at 40 CFR §250.11, SW-846 methods are now guidance.

The TCEQ will not accept an alternative method for UIC MDP compliance. Modifications to reference methods can be made for all other methods if QC measurement criteria, as designated in this QAPP, can be met and if the regulated entity is not restricted by a permit. When a regulated entity is operating under a permit, a modification to a method or use of an alternate method may require a modification to the permit.

Entities covered by this QAPP include:

- Anyone who owns or operates an in-situ recovery operation for uranium, sulfur, and sodium sulfate (Class III wells); and
- Anyone who owns or operates Class I, Class IV or V wells.

Decision Makers

- U.S. EPA;
- TCEQ Executive Staff (Executive and Directors);
- TCEQ Deputy Directors, Section Managers, and staff of the Air Monitoring Division, CID, ENF, PSEAD, and RMD;
- TCEQ Area and Region Directors, Section Managers, and staff of the Regional Offices; and
- Regulated Community.

Principal Data Users

- U.S. EPA;
- TCEQ Executive Staff;

- TCEQ Deputy Directors, Section Managers, and staff of the RMD, CID, ENF, Regional Offices, and PSEAD;
- TCEQ Area and Region Directors, Section Managers, and staff of the Regional Offices; and
- Regulated Community.

Annual QAPP Reviews, Certifications, and Revisions

This QAPP shall be reviewed in its entirety and certified annually by the Lead UIC QAS. A letter certifying this annual review must be submitted to the TCEQ Laboratory & QA Section no later than 90 days prior to the QAPP anniversary date to prevent QAPP expiration and interruption in work due to issuance of a stop work order. Amendments approved following QAPP approval must be included as an attachment along with the letter. Only non-substantive changes not affecting the project design or quality or quantity of work to be performed can be included in the annual certification letter. This includes organizational changes or schedule changes based on a contract amendment that do not impact data deliverables. If changes beyond these are necessary, a QAPP amendment must be submitted and approved before the changes are implemented and before the annual review may be certified. The TCEQ UIC programs are required to review the QAPP and provide certification of annual reviews to the Lead UIC QAS. The Lead QAS will provide certification of annual reviews to EPA Region 6 Project Officer no later than 30 days before QAPP anniversary date. If the QAPP expires, work described within this document must be halted. If the project will extend beyond the third QAPP anniversary date, a full QAPP revision is required.

A5. PROJECT TASK DESCRIPTION

The UIC Program is designed to protect USDWs and provide a safe and cost-effective way for industries, municipalities, and small businesses in Texas to dispose of wastewater, extract mineral resources, store water for future recovery, and prevent pollution of USDWs in Texas. The TCEQ requires permits, authorizations and corrective action procedures executed by the regulated community that are as stringent as federal requirements and, in some cases more stringent to verify compliance with state and federal regulations. In addition, the regulated community engaging in UIC program activities must comply with all state and federal regulations identified or referenced in this UIC QAPP.

TCEQ UIC Participating Divisions

State implementation, management, and oversight of the UIC Program is coordinated by three offices within the TCEQ: the Office of Waste (OOW), the Office of Compliance and Enforcement (OCE), and the Office of Air (OA). The OOW includes the Radioactive Materials Division (RMD), which reviews applications for permits and authorizations for Class I, Class III, Class IV, and Class V UIC wells. The OCE includes the Program Support and Environmental Assistance Division (PSEAD), the Critical Infrastructure Division (CID), the Enforcement Division (ENF), and Regional Offices, which work together to ensure compliance with UIC activities through investigations, outreach, and enforcement. The PSEAD coordinates efforts between the TCEQ Central Office and TCEQ's Regional Offices. The CID conducts investigations, inspections, and reviews plugging reports for Class III wells. The ENF investigates violations of state environmental laws. The OA includes the Air Monitoring Division (AMD), which ensures the collection, analysis, and display of quality environmental data, and audits and issues accreditations to environmental laboratories. In instances where implementation, management and oversight of the UIC program requires waste classification, RCRA compliance, or remediation of contaminated media under 30 TAC Chapters 335 or 350, those tasks and requirements are described in the TCEQ RCRA QAPP.

The following divisions within the OOW, OCE and the OA have functions and responsibilities as defined in this UIC QAPP. These functions and responsibilities are briefly described below.

Radioactive Materials Division (RMD)

The RMD is responsible for:

- Permitting of Class I and Class III injection wells;
- Permitting subject to 30 TAC §335.47(c)(3)
- Authorization of production areas for *in situ* uranium mining;
- Authorization of Class IV injection wells used for environmental remediation at RCRA or Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) sites,
- Authorization of Class V injection wells for aquifer remediation, stormwater management, aquifer storage and recovery, aquifer recharge, heating and cooling and other miscellaneous uses;

- Observing demonstrations of mechanical integrity testing as well as construction and plugging activities of certain Class V UIC wells;
- Reviewing environmental data submitted by UIC facilities pursuant to permit requirements;
- Reviewing environmental data submitted with an application for permit (new, renewal, amendments, and modifications) by UIC facilities;
- Reporting annual UIC program information to U.S. EPA in accordance with federal UIC Rules (40 CFR §144.8(b)(2)) as well as grant-related reporting;
- Rulemaking in response to state and federal mandates; and maintaining and updating of UIC Program primary enforcement authority within TCEQ's jurisdiction.

Critical Infrastructure Division (CID)

The CID, Radioactive Materials Compliance and Chemical Reporting Section is responsible for the following as it relates to the UIC Program:

- Investigating uranium mining facilities (Class III wells, production areas) to determine compliance with permitting and regulatory requirements;
- Inspecting the on-site laboratories at the uranium mining facilities;
- Reviewing groundwater data submitted by uranium mining facilities;
- Coordinating with RMD, UIC Permits Section on reviewing plugging reports for the Class III wells submitted by uranium mining facilities;
- Coordinating with RMD, UIC Permits Section on 7520 reports for semi-annual and federal fiscal year to U.S. EPA Region 6 related to the TCEQ UIC program; and
- Coordinating with the RMD, UIC Permits Section on an annual narrative report to U.S. EPA Region 6 related to the TCEQ UIC program.

Enforcement Division (ENF)

The Enforcement Division is responsible for investigating violations of state environmental laws and, when necessary, developing formal enforcement cases in accordance with state statutes and agency rules. Their responsibility in implementation of the UIC program includes:

- Initiating enforcement actions from Enforcement Action Referrals;
- Tracking enforcement activities;
- Reviewing and responding to notices and disclosures submitted pursuant to the Texas Environment, Health, and Safety Audit Privilege Act; and
- Administering the Compliance History program.

Monitoring Division (MD) Laboratory and Quality Assurance Section

TCEQ QA Management and TLAP reside in this section of the Monitoring Division. The Laboratory and Quality Assurance Section's supporting role for the UIC programs includes:

- Auditing and issuing accreditations to environmental laboratories in accordance with 30 TAC Chapter 25;
- Reviewing the UIC QAPP for completeness and correctness according to U.S. EPA QA/R-5 and TCEQ QMP current revision; and
- Assessing the compliance of requirements for quality systems.

Task components rely on guidance provided in the 40 CFR Parts 144-148, SW-846 and HSWA Sections 3004 and 3005 in order to maintain a consistent scientific basis for decision making. The management portion of this component uses guidance provided in the U.S. EPA Guidance for Quality Assurance Project Plans, (U.S. EPA QA/G-5), the Performance Partnership Grant (PPG), and agency policy and procedures.

Regional Offices and Program Support and Environmental Assistance Division (PSEAD)

The Program Support and Environmental Assistance Division is responsible for coordination efforts that include the central office and regional offices assigned within four areas: North Central and West Texas, Coastal and East Texas, Border and Permian Basin, and Central Texas. This field operations network, consisting of 16 Regional Offices, is responsible for the following as it relates to the UIC program:

- Conducting investigations of hazardous waste generators, transporters, TSD, and other facilities to ensure that these entities are properly managing solid and hazardous waste;
- Collecting and analyzing groundwater samples to verify the presence of contamination;
- Collecting and analyzing waste samples to determine proper waste characterization;
- Observing demonstrations of mechanical integrity testing of Class I UIC wells;
- Observing construction and plugging of Class I UIC wells.
- Performing investigations of Class I UIC wells;
- Developing enforcement action referrals for violations identified during investigations;
- Reviewing investigation progress and monitoring reports, including sampling analysis, to determine appropriate action; and
- Executing contracts with external laboratories for sample analyses (see page 8).

A6. INFORMATION/DATA QUALITY OBJECTIVES AND PERFORMANCE/ACCEPTANCE CRITERIA

Purpose

This section defines minimum criteria for all entities meeting regulatory compliance under this UIC QAPP. The UIC program uses a systematic process for planning data collection activities. The purpose of this element is to document the data quality objectives (DQOs) of a project and to establish performance criteria for the mandatory systematic planning process and measurement system to be used to generate data under this UIC QAPP.

Data Quality Objectives

This section describes the quality of data needed for project decision making under the UIC program. The data submitted by the regulated entities as well as the data generated by this agency from its contract and agency laboratories must be of known, traceable, documented, and reported quality. The data must also be sufficient in its intended use which is to support the decision-making process used to prevent pollution of USDWs in Texas. The following qualitative and quantitative approaches define the UIC Program DQO process.

Intended Use of Data

Data generated for use in the UIC program may be used for the following purposes:

- Determining the presence and the extent of contamination in the environmental media of concern (i.e., soil, water, and air);
- Determining the concentration and/or classification of a waste through a hazardous waste determination;
- Determining regulatory compliance issues and initiating cleanup activities through enforcement actions, permitting procedures, or other applicable means, as necessary, to achieve cleanup of a site;
- Defining operating conditions for permitted injection well facilities; and
- Determining the compliance of an injection well facility with applicable state and federal regulations.

Type of data needed to support agency decisions

The type of data needed to support TCEQ decisions includes the following:

- Representative waste and media samples analyzed by an environmental laboratory accredited by TCEQ (unless excepted by 30 TAC §25.6) according to requirements contained in the TWC 5.134 and 30 TAC Chapter 25 (Environmental Testing Laboratory Accreditation and Certification), Subchapters A and B, with appropriate laboratory analytical results in accordance with the procedures and protocols of SW-846, or other approved protocols of documented analytical methods from the U.S. EPA, the American Society for Testing and Materials, other organizations nationally recognized as having scientifically valid methods, by the agency Executive Director, or a laboratory method completely documented in an appropriate standard;

- Data supported by documented sample collection and handling procedures;
- Site specific data on non-permitted facilities that manage hazardous waste;
- Trend analysis and planning;
- Qualified data in the databases such as the Internal Data Applications (IDA), the Permitting and Registration Information System (PARIS), and RCRA Information (RCRAInfo);
- Well operating and maintenance information including demonstrations of mechanical integrity.

Conditions under which the data should be collected

Sample collection procedures are outlined in the SW-846 and U.S. EPA protocols. Data are also collected to determine whether generators, permittees, receivers and transporters have used proper or improper waste classification and waste management practices including disposal and recycling of waste. These samples may be taken any time an investigator needs to make these determinations or the generator is required to report this information. Sample collection procedures that support data to demonstrate compliance with RCRA/UIC programs by the regulated community must be consistent with procedures outlined in SW-846 and U.S. EPA protocols and documented on COC forms retained at the on-site laboratory or commercial laboratory for a minimum of 5 years.

Tolerable limits on the probability of making a decision error due to uncertainty in laboratory data

The decision maker relies on state and federal regulations (40 CFR Parts 144-148 and 260-270 and 30 TAC Chapters 289, 305, 331, 335 and 350) in evaluating the allowable uncertainty in the data submitted by the regulated community. The primary goal of this QA program is to ensure the accuracy and completeness of the data which ultimately will be used to determine the status of the sites investigated. To achieve this accuracy and completeness, all sampling, analysis, and data management activities will be conducted in accordance with pre-set standards, and these activities will be reviewed regularly to maintain full compliance with the standards. This program has been designed so that corrective action can be implemented quickly, if necessary, without causing undue expense or delay. The standards and review procedures the TCEQ will use to attain optimum accuracy and completeness of data are outlined in this plan.

All contractors, subcontractors, and permittees to the TCEQ will be required to follow these standards and procedures, at a minimum. All data submitted to the TCEQ, used to demonstrate compliance with the UIC program, shall be of known and documented quality. The minimum QC procedures a laboratory needs to follow are in the SW-846 Manual, other U.S. EPA methods, and the 2016 TNI Standards. However, as stated in Chapter 2 of SW-846, “the performance data included in these methods are for guidance purposes only, and are not intended to be and must not be used as absolute QC acceptance criteria…” Therefore, additional performance standard criteria have been added in this UIC QAPP. For radiological data, the analytical data requirements including the quality control parameters and acceptance criteria must adhere to and comply with the U.S. EPA Multi-Agency Radiological Laboratory Analytical Protocols

(MARLAP). For more information regarding QA/QC criteria for methods used to meet compliance with the UIC program, refer to Section B4.

Holding Times

Samples collected under this program will be analyzed within designated holding times specified by U.S. EPA protocols set for samples collected under this program to ensure better probability of sample integrity. Please refer to Section B2 for more information and tables.

A7. DISTRIBUTION LIST

Texas Commission on Environmental Quality

Office of Waste: Beth Seaton, Director (512) 239-2526

Radioactive Materials Division

Ashley Forbes (512) 239-0493, Bryan Smith, P.G. (512) 239-6075, Kathryn Ploch (512) 239-6577, and Tamara Young (512) 239-6582 MC 233

Office of Compliance & Enforcement: Craig Pritzlaff Director (512) 239-5150

Enforcement Division

Amy Settemeyer (512) 239-1853, Madelyn Flannagan, P.G. (512) 239-1853 MC 219

Critical Infrastructure Division

Kelly Cook (512) 239-0044, Lana D'Souza (512) 239-6644

TCEQ Regional Areas and Area Directors

Border and Permian Basin

Area Director David A. Ramirez (956) 430-6048 MC R 15

Regional Directors

- Region 6 - El Paso, Ryan Slocum (432) 620-6135
- Region 7 – Midland, Ryan Slocum (432) 620-6135
- Region 15 - Harlingen, Jaime A. Garza (956) 430-6030
- Region 16 - Laredo, Jaime A. Garza (956) 430-6030

Central Texas Area

Area Director Joel Anderson (210) 403-4010 MC 148

Regional Directors

- Region 9 - Waco, David Mann (254) 761-3002
- Region 11 - Austin, Lori Wilson (512) 239-1635
- Region 13 – San Antonio, George Ortiz (210) 403-4030

Coastal and East Texas

Area Director Susan Clewis (361) 881-6996 MC 172

Regional Directors

- Region 5 - Tyler, Leroy Biggers (903) 535-5112
- Region 10 - Beaumont, Kathryn B. Sauceda (409) 899-8747
- Region 12 - Houston, Nicole Bealle (713) 767-3623
- Region 14 – Corpus Christi, Melanie Edwards (361) 881-6940

North Central and West Texas

Area Director Randy J. Ammons (806) 796-7613 MC R2

Regional Office Directors

Region 1 - Amarillo, Guy Wilkins (806) 468-0516

Region 2 - Lubbock, Christopher Mayben (806) 796-7604

Region 3 - Abilene, Mike Taylor (325) 698-6125

Region 4 – Dallas/Fort Worth, Alyssa Taylor (817) 588-5828

Region 8 – San Angelo, Mike Taylor (325) 698-6125

Program Support and Environmental Assistance

Sonya Riebock (817) 588-5913, Tom Heitman (512) 239-3257 MC 174

Office of Air

D. Jody Koehler (512) 239-1990, Penny Sterling (512) 239-1617 MC 165

Environmental Protection Agency, Region 6

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Althea Foster MC: LCRRB (214)665-2268, E-mail: foster.althea@epa.gov

An electronic copy of the UIC QAPP will be provided by Lead UIC QA Specialist to all TCEQ staff listed on the distribution list for further distribution into the program areas as well as to each contracted laboratory. These areas will include but may not be limited to the RMD within the OOW; waste programs of the 16 Regional Offices, PSEAD, and Laboratory and Quality Assurance Section within the MD, ENF, and CID within the OCE. An electronic copy is also available for use, viewing and printing on the TCEQ Home page URL https://www.tceq.texas.gov/ and then typing “UIC QAPP “in the Site Search text box.”

Contract Laboratories

A&B Environmental Services, Inc.

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ALS Group USA, Corp.

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Lower Colorado River Authority

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A8. PROJECT ORGANIZATION

The UIC QAPP organization chart is included in Section A10.

Ashley Forbes, - Deputy Director of RMD; responsible for the overall implementation of UIC permitting projects.

Bryan Smith, P.G. - Section Manager of UIC Permits Section in the RMD; responsible for the management of UIC permitting activities.

Kathryn Ploch – UIC Grant Manager of the RMD; responsible for monitoring commitments and development of the UIC grant.

Tamara Young – Lead UIC QA Specialist of RMD; Program Coordinator for the UIC Permits Section in the RMD; responsible for development of the UIC QAPP, conducting audits and assessments of the UIC quality systems including identifying, documenting, monitoring, implementing, and reporting of corrective action in RMD.

UIC Central Office Staff - Responsible for the review and acceptance/rejection of environmental data submitted by a regulated entity as part of a permit application, corrective action plan, and closure plan, a waste audit or as mandated in an enforcement order or corrective action order.

Amy Settemeyer – Deputy Director of the Enforcement Division; responsible for implementation of the TCEQ's enforcement program (air, water, waste and multi-media) and updating compliance history in the RCRA Information (RCRAInfo) database.

Madelyn Flannagan, P.G. – Section Manager of Waste Enforcement Section of the Enforcement Division; responsible for management of UIC enforcement activities.

PSEAD Staff – Responsible for updating the RCRAInfo database from investigation reports sent from Regional Office staff, issuing agreed orders, technical requirements and calculating penalties for UIC cases.

D. Jody Koehler - QA Manager for the TCEQ; responsible for overall development of the TCEQ QMP, review and approval of program QAPPs, and for monitoring the implementation of the QMP and QAPPs.

Andy Gardner – Deputy Director of PSEAD; responsible for central office and Regional administration area coordination of waste program field activities, including UIC activities in each region; supports the four areas: North Central and West Texas, Coastal and East Texas, Border and Permian Basin, and Central Texas. Responsible for oversight of all contract laboratory administrative functions performed by staff.

Kelly Cook – Deputy Director of CID; responsible for the oversight and consistency of procedures for UIC Class III well activities as defined in the QAPP.

Lana D'Souza – Section Manager, Radioactive Materials Compliance and Chemical Reporting Section in the CID; responsible for oversight and consistency of procedures for UIC Class III well activities as defined in this QAPP.

Four Area Directors - Responsible for monitoring the activities of the Regional Directors and Regional Offices under their designated areas and regions.

Regional Directors - Responsible for monitoring the investigation and sample collection activities of all field investigators and conformance to SOPs as referenced in the QAPP. Responsible for oversight of waste program field activities including UIC activities in each region.

Regional Investigators - Responsible for performing investigations of UIC facilities, conducting field sampling, preparing samples for laboratory analysis, developing investigation reports, and observing annual demonstrations of mechanical integrity testing of UIC facilities.

A9. PROJECT QAM INDEPENDENCE

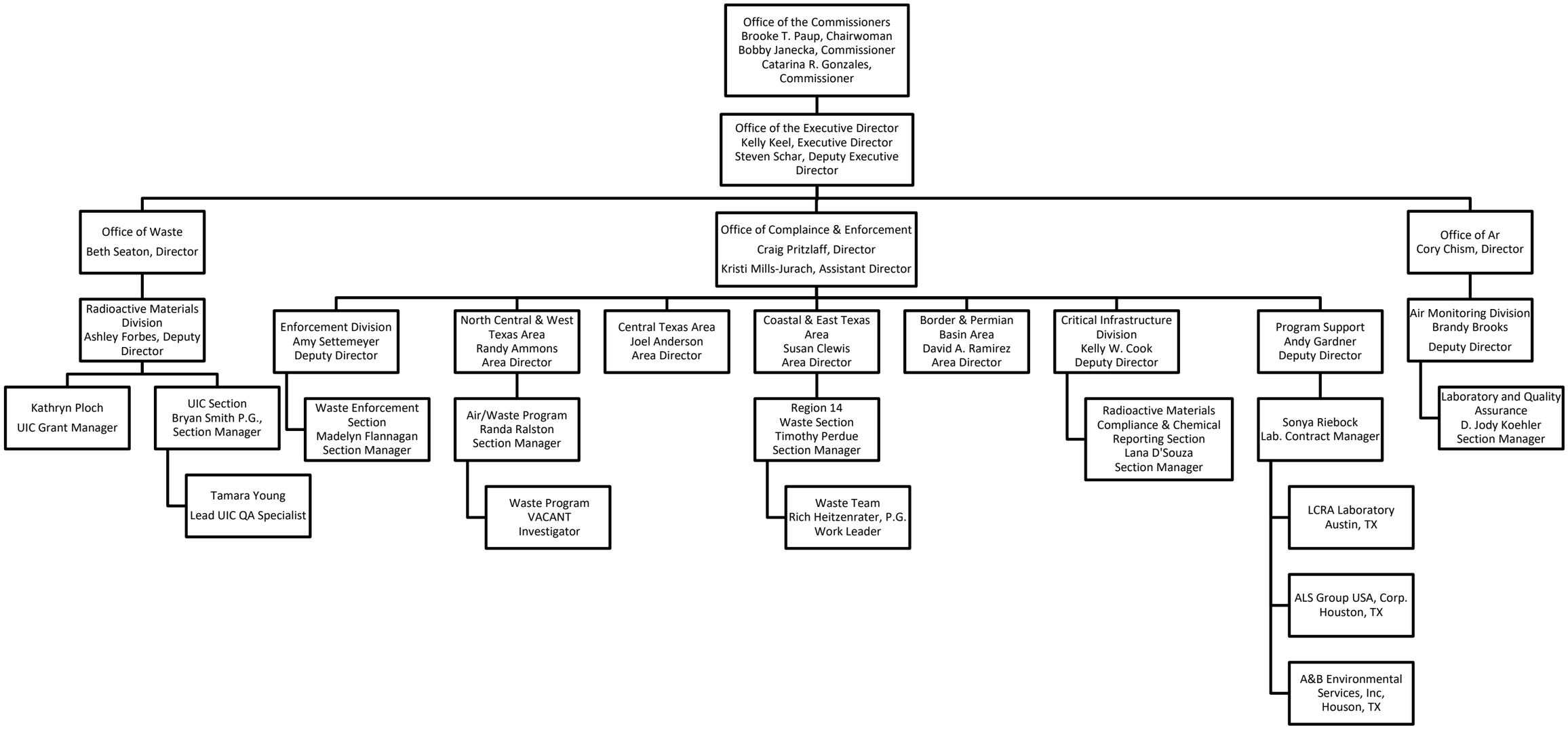
As stated in the TCEQ QMP, TCEQ uses a semi-decentralized QA program, relying on one organizational unit to coordinate development and implementation of the agency-wide program and certain program quality systems, and relying on offices, divisions, and individual programs to implement other QA programs.

TCEQ's QA program is organizationally independent of operational programs and activities within the agency and has sufficient access and authority to coordinate the development and implementation of the agency's quality system. Staff within the QA Work Group of the Air Monitoring Division have access to all work areas and sufficient authority and organizational freedom to identify, initiate, and facilitate solutions to quality problems and to verify the implementation of solutions to problems.

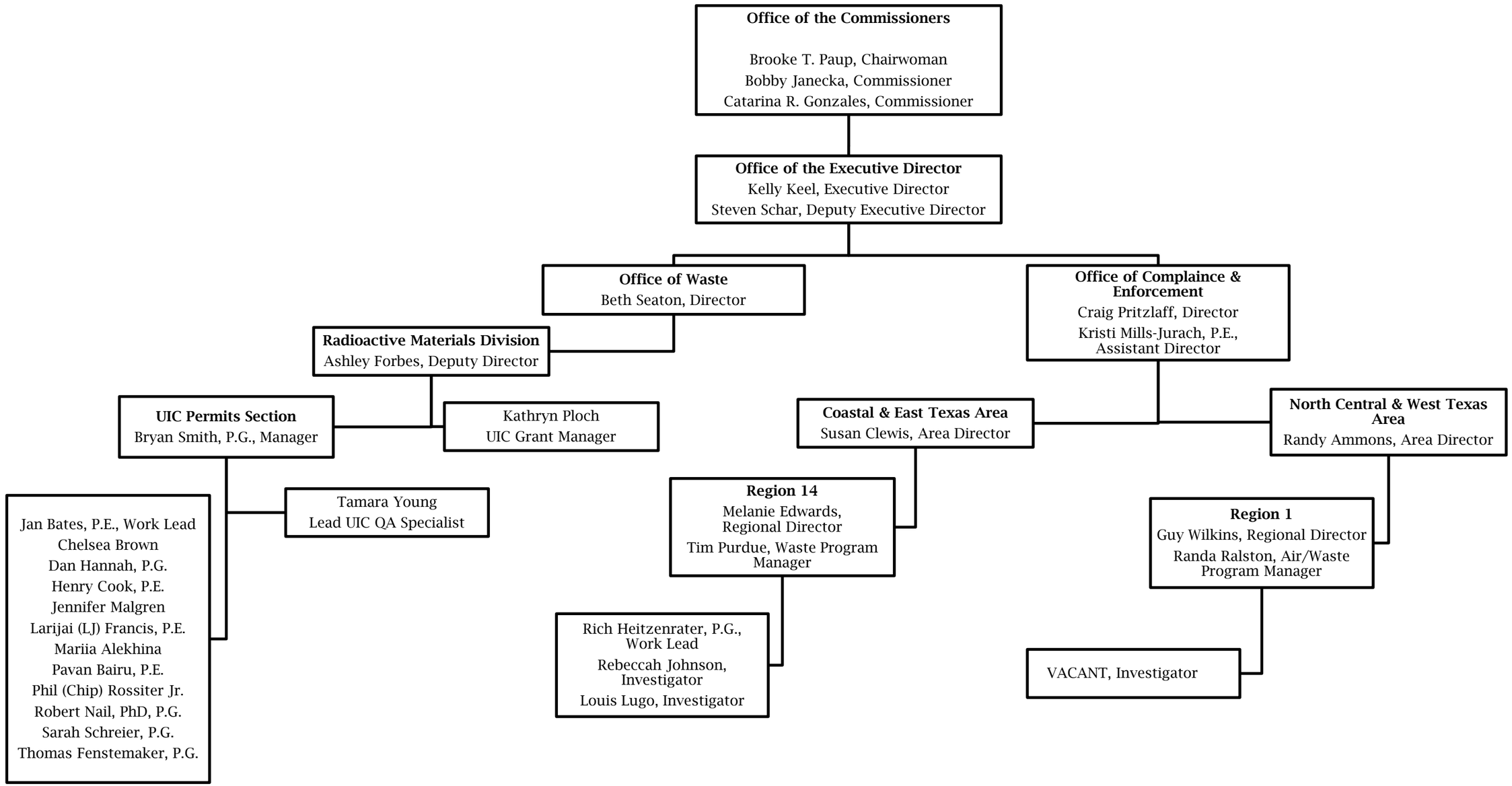
Designated lead QA staff are detailed in Appendix D of TCEQ's QMP for each under L Quality System. These staff have access to related work areas and sufficient authority and organizational freedom to identify, initiate, recommend, and provide solutions to quality problems and to verify the implementation of solutions to problems. With delegation from TCEQ's executive management, the TCEQ QA Manager has responsibility for oversight of the agency's QA program and its operations. Issues and questions regarding the agency QA program and its operations may be raised by agency QA staff, agency staff, and agency management to the TCEQ QA Manager.

A10. PROJECT ORGANIZATION CHART AND COMMUNICATIONS

UIC QAPP - FY2026 Organizational Chart



UIC - Mechanical Integrity Testing Staff



A11. PERSONNEL TRAINING/CERTIFICATION

Purpose

The UIC Program is administered and performed by qualified personnel using appropriate technologies and techniques. Qualifications of personnel are documented and both individual and program performance are regularly assessed. Personnel receive training in the responsibilities and duties and associated program elements, codes, standards, and procedures of the quality system. The training may include formal instruction, seminars, on-the-job training, participation in technical conferences, and other activities determined to be appropriate. Training needs and the achievement of training objectives are documented. General training requirements for TCEQ staff are discussed in Section 12 of the TCEQ QMP.

Training and education requirements for laboratory personnel are specified in each laboratory Quality Assurance Manual (QAM) as part of their accreditation documentation. Training and education requirements may also be found in the 2016 TNI Standards.

Environmental data operations conducted for the UIC program by TCEQ staff and contractors are covered under documented quality systems. All personnel are deemed qualified to perform their work through educational credentials, specific job/task training, required demonstrations of competency, and internal and external assessments of their respective programs. All participating laboratories are NELAP- accredited.

Records of educational credentials, training, demonstrations of competency, and assessments are retained within the respective divisions and laboratories and are available for review.

Regional Investigator Training

Environmental Investigators are trained to conduct investigations of facilities, to collect samples, to prepare the samples for analysis, and to develop investigation reports in accordance with the Professional Development Plan (PDP) Requirements for Environmental Investigators. There are separate PDPs for “Basic Investigators” and “Senior Investigators” which specify required reading, equipment proficiencies, training courses and investigations, activities, and reports. The maintenance of the investigator training and certification records is the responsibility of the investigator’s manager.

Mechanical Integrity Tests (MIT)

Demonstrations of mechanical integrity (MI) are the most common means of demonstrating that there is no movement of fluids into or between USDWs associated with injection wells. Demonstration of MI is required by 30 TAC §331.43(a) for all Class I waste disposal wells, and all Class III wells used for mineral extraction. In addition, certain Class V injection wells are required by their authorizations to undergo a demonstration of MI. Duties for reviewing the results of MI testing are shared by UIC permits staff and regional investigators. Managers are responsible for assigning and maintaining training records of their staff.

All Class I waste injection wells in Texas are required by 30 TAC §331.43(a) and 40 CFR §146.68(d) to undergo a demonstration of MI. Regions 1 (Amarillo), and 14 (Corpus Christi) UIC Investigators review all annual MIT reports, and over a three-year period, physically observe MITs at active wells (i.e., about one-third of the annual MITs are observed by region staff each year). The dates for annual MITs are well-specific, based on the date of the last MIT performed. When possible, UIC Permits Section staff (Appendix A) and/or region office staff observe MITs conducted in association with new well construction and well closures, as schedules permit. Training of staff members for observing this testing includes familiarization with the above cited state and federal regulations. Training also includes studying the TCEQ’s Basic Guidelines for MITs and Related Cased Hole Wireline Logging and becoming familiar with the MIT Report Form. Accompanying an experienced investigator on a MIT completes the staff members’ initial training.

All Class III injection wells and related extraction and monitoring wells in the state of Texas are required to undergo a demonstration of MI by 30 TAC §331.43(a), 30 TAC §331.82 and 40 CFR §146.34(b). MITs on Class III wells are accomplished in part with a casing pressure test. This test confirms the integrity of the casing. The second part of the MIT consists of a review of cementing records which documents the integrity of the casing - borehole annulus. In coordination with the permittees, CID UIC staff may witness some of the pressure tests conducted on newly constructed Class III wells and/or Class III wells that are replaced. In addition, CID UIC staff may review the pressure tests and will review the cement records during investigations. UIC Permits staff may review the testing procedures, cement records and casing pressure test results which the permittee submits prior to putting each well into production. Training includes familiarization with the above cited state and federal regulations, studying NUREG 1910 Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities, the Wyoming DEQ Land Quality Division Guideline No. 4 In Situ Mining Noncoal, and example Class III MIT procedures.

Certain Class V injection wells are required by their authorizations to undergo a demonstration of MI. This demonstration is accomplished in part by performance of a pressure fall-off test, temperature log and radioactive tracer survey. UIC Permits staff in RMD review the MIT report and physically observe the MITs. Training of staff members for observing this testing includes studying the TCEQ’s Basic Guidelines for MITs and Related Cased Hole Wireline Logging and becoming familiar with the MIT Report Form and accompanying experienced UIC staff on an MIT.

Well Constructions, Workovers and Plugging

When permittees notify TCEQ of new Class I injection well construction and well plugging, UIC Permits Section staff either observe aspects of the well construction and well plugging operations or coordinates with the permittee’s field crews by phone and email to review and approve changes to procedures that may be warranted. The UIC staff coordinates with the Regional staff regarding new well construction and well plugging operations. Regional staff review and approve Class I well work-over plans and coordinate with permittees for actions related to well workovers and associated MITs. Initial training for these duties includes familiarization with state and federal rules, attending classes in well construction and well log interpretation when available, and accompanying an experienced UIC engineer, geologist, or investigator on a well construction and a well plugging operation. UIC Permits staff reviews the documentation for the installation and plugging of Class III wells and Class V injection wells.

Laboratory Accreditation

The TLAP in the Laboratory and Quality Assurance Section of the MD has responsibility for implementation and oversight of the accreditation program. The TLAP also tracks the proficiency testing (PT) performance of each accredited laboratory. Data generated by exempt on-site labs must meet the performance criteria of this UIC QAPP and be documented using the analytical checklist and Case-Narrative supplied at the end of the QAPP.

A12. DOCUMENTS AND RECORDS

Purpose

This section defines the records critical to the project (records needed to complete the project), information to be included in the reports, data reporting format, and document control procedures. These records:

- Itemize the information and records included in the data report package and specify the reporting format for hard copy and electronic forms, when used;
- Identify any other records and documents applicable to the project such as audit reports, interim progress reports, and final reports; and
- Specify or reference all applicable requirements for the final disposition of records and documents.

Information Included in the Reporting Packages

Data used for the demonstration of compliance (e.g., data collection in support of litigation or compliance with a permit) must be of known and documented quality. Records required for the data or reporting packages are specified in sections A12.2.1 and A.12.2.3.

Field Operations

Data contained in a reporting package varies depending on the type of investigation conducted and the purpose of the sampling activity. Field investigation reports with sample results include, at a minimum, sample collection records, COC records, analytical results, associated results from QC items (including blank, spike recovery, duplicate, and surrogate recovery data) and a written discussion of the sampling event. The retention places and times for this information are documented in the Field Operations Records Retention Schedule, which is part of the Agency Records Retention Schedule. The OCE *Field Operations Standard Operating Procedures* (FOSOP) *Investigation Guidance Documents* on the Sharenet website specify what information must be included in investigation reports. Investigator training and certification records are maintained by the Regional Offices as described in Sections 1.0 and 3.0 of the *Professional Development Plan* (PDP) document.

OCE has written procedures in place for initiating enforcement as well as for tracking enforcement activity for all investigations conducted. The appropriate level of enforcement must be determined in accordance with the Enforcement Initiation Criteria (EIC) guidance (Revision 18 - also available from the TCEQ Home Page: http://www.tceq.texas.gov/ then using the search window). The EIC is updated every two years. Alleged violations will be addressed either by Notice of Violation (NOV) or Notice of Enforcement (NOE) for formal enforcement action. SOPs located on the internal *OCE Field Operations website* (FODWEB) specify how to conduct investigations and take enforcement action when appropriate.

Laboratories

Accreditation and audits of the TCEQ contract laboratories are performed and documented by a laboratory auditor in the MD. The Sugar Land Laboratory is accredited through the Louisiana Department of Environmental Quality (LDEQ). The TCEQ has granted the Sugar Land laboratory secondary accreditation based on the LDEQ primary accreditation. Laboratory accreditation and audit documents are retained by the MD and LDEQ for a minimum of 10 years.

The contract laboratories maintain QAMs which are submitted to the TCEQ as part of receiving the contract. The manuals are also maintained by staff within the Accreditation Group of the MD. Each contract requires record retention. The contracted laboratories shall maintain all records associated with the analysis of the samples, including documentation of sample receipt, standard and reagent preparation logs, instrument run logs, sample preparation logs, instrument maintenance logs, and facility maintenance logs (e.g., temperature logs, balance calibration logs, etc.) for at least 5 years. Each final laboratory data report submitted to TCEQ will include the COC record, the sample results and associated QC including blank, spike recovery, duplicate, and surrogate recovery data so that the quality of the data is known, and a determination of its usability can be made. The TCEQ Sugar Land Laboratory maintains similar records. These records are stored at the Sugar Land Laboratory for 5 years.

The TCEQ and contract laboratories reduce data according to the specific methods and to standard practices for rounding. All data is verified by the laboratories after input into a Laboratory Information Management System (LIMS). The specific procedures and responsibilities are discussed in each laboratory's QAM or SOPs.

Laboratories (contract, commercial, and on-site) performing analyses to demonstrate compliance with federal and state UIC regulations must follow requirements as designated in 30 TAC Chapter 25 (relating to Environmental Testing Laboratory Accreditation and Certification) and the 2016 TNI Standards.

UIC

Data submitted to the UIC Permits Section is received as part of permitting applications or routine reports. Permit applications must contain data as described in the application form. Reports submitted to the UIC Permits Section must include all elements described in the rule which they are submitted to address, and any additional information specified in the facility's operating permit.

The UIC Permits Section maintains the application forms on a publicly accessible website and updates them as needed to incorporate any new or revised rule requirements. Class I permits, Class III Area permits, and certain Class V permits are renewed and updated on a 10-year cycle and amended as needed in the interim to reflect changes to facility operations.

Data Reporting Package Format and Documentation Control

This section discusses the various components assembled to document a concise and accurate record of all activities affecting data quality. The format of data reporting packages is consistent with the procedures used for data validation and data assessment.

Field Operations Records

The PSEAD and the regional offices utilize a database, the Consolidated Compliance and Enforcement Data System (CCEDS), a database in which investigators document all investigations they conduct. Each regional office has access to CCEDS where investigation information is entered. After the field investigator completes the investigation report, it is approved by his or her manager and noted as "Approved" in the database.

A management report generated from CCEDS is used to verify that all investigation reports have been submitted promptly. Individual reports are reviewed by Regional supervisory personnel. Investigation information that is sent

electronically to U.S. EPA from TCEQ's CCEDS database is verified at least annually. The U.S. EPA Region 6 can obtain reports on the number of investigations by direct request to PSEAD or regional staff.

Laboratory Records

Laboratories will maintain all records associated with the analysis of the samples including documentation of sample receipt, standard and reagent preparation logs, instrument run logs, sample preparation logs, instrument maintenance logs and facility maintenance logs (e.g., temperature logs, balance calibration logs, etc.) for at least 5 years. Laboratories must also meet requirements in the 2016 TNI Standards regarding laboratory records management.

Where applicable or requested by agency staff, the following records will be included:

- Instrument detection and quantitation limits and relationship between the two; COC records;
- Sample identification cross-reference table that includes the laboratory and field IDs;
- Sample results with corresponding units;
- Laboratory blank results (method, instrument, etc.);
- Laboratory control sample (LCS) results;
- Matrix spike (MS) and matrix spike duplicate (MSD) results (when the sample used for the MS/MSD is from the site or project being evaluated);
- Surrogate results; and
- Verification/documentation that samples were extracted/digested and/or analyzed within appropriate holding times.

Laboratory data packages should also include discussions regarding any problems or anomalies. A laboratory review checklist or case-narrative should clearly document whether the laboratory has been accredited by TCEQ or other TCEQ-recognized accrediting body for the matrices, analytical methods, and parameters relating to data included in the data package. The checklist or case-narrative should also document the QC parameters reviewed (e.g., calibration, continuing calibration, and other method required parameters) against laboratory procedures, method specifications, and criteria specified in this UIC QAPP to allow TCEQ data users to make a full determination as to the usability of the data. Please refer to Section D - Data Validation and Usability for complete instructions and additional information necessary for submitting laboratory data.

UIC

UIC Permits staff review data packages that are submitted as required in the UIC Class I Permit Application for waste characterization purposes to ensure compliance with 30 TAC §335.510, §335.511 and §335.513. The reviews are documented in a checklist which is kept with the permit application as long as the permit is in force.

CID Investigators enter data related to the investigations of Class III wells associated with *in situ* uranium mining projects, into the investigations tracking database CCEDS UIC staff in Region 1 and Region 14 enters data into the investigations tracking database, CCEDS, including MIT inspections of Class I non-hazardous waste disposal wells associated with *in situ* uranium mining projects and other components of the UIC program.

UIC Permits staff review data packages that are submitted as required in the UIC Application for Class V Underground Injection Control (UIC) Wells for an Aquifer Storage and Recovery (ASR) and Aquifer Recharge (AR) Project to evaluate water quality requirements for the injectate; the effect injection of will have on native groundwater with respect to the considerations in 30 TAC §331.186(a)(4) and 30 TAC §331.267(a)(4); and whether the injected water will comply with the standards set forth under the federal Safe Drinking Water Act (42 United States Code, §§300f, et seq). These reviews are documented through a notice of deficiency process if needed, and issuance of the authorization letter once all requirements have been met

Submitted laboratory reports must also include the COC record, the sample results and associated QC including blank, spike recovery, duplicate, internal standards, results of interference check sample and surrogate recovery data, as applicable.

Geologists and engineers are data validators, reviewers, and users of analytical information. The data supplier is responsible for documenting that the analytical DQOs are met and that the data supports the specific assigned purpose. Data reviewers rely on the information in reporting packages submitted by the regulated community as required by the governing rule, regulation, permit, order/judgment or approved plan or report.

Official State Records

TCEQ OPP 13.02 Records Management: Policy Introduction establishes policy for the proper handling of agency records. TCEQ maintains agency records and furnishes information to protect the legal and financial rights of the state and any person directly affected by the activities of TCEQ. Reports are maintained by the TCEQ Records Management Program in Austin, Texas. Some retention schedules are mandated by rule while others are based on historical need for the document type. An annual review of the schedule is conducted in January with modifications made as necessary. Project managers or designees shall maintain QA records relating to their respective projects and ensure these records are identified in the Records Retention Schedule.

B. IMPLEMENTING ENVIRONMENTAL INFORMATION OPERATIONS

B1. IDENTIFICATION OF PROJECT ENVIRONMENTAL INFORMATION OPERATIONS

Purpose

The following describes in detail the environmental information operations to be conducted for the project, and how they will satisfy the project purpose, the data quality objectives, and the performance and acceptance criteria in the Group A4 and A6 elements.

To ensure that sampling conducted by the responsible party will satisfy the project purpose, the TCEQ staff in the regional offices are responsible for reviewing and approving the sampling design submitted by the responsible party (RP) or their representative. During the review process, the TCEQ staff follow the protocol established in 40 CFR, Parts 144-148 and 260-270 and in SW-846 to assess the sampling designs for the appropriate type of sampling plan. Sampling procedures are conducted in accordance with chapters 1 and 9 of SW-846.

If, during an investigation of a UIC facility, a TCEQ investigator suspects mismanagement of hazardous waste or violation of federal and/or state rules, then the TCEQ investigator follows the sampling process described in Section B2. Sampling designs for permittees are unique and vary depending on the type of facility, type of solid waste or process, site geology, monitoring activities, or remediation.

To ensure information/data quality objectives, performance, and acceptance criteria are met, all analytical data submitted to the TCEQ must be generated by a lab that the TLAP has accredited under the National Environmental Laboratory Accreditation Conference (NELAC) standard for matrices, methods, and parameters of analysis, unless:

1. the lab is an in-house lab and either the lab performs work for its owner, for another company with a unit located on the same site, or without compensation for a governmental agency or charitable organization, or the lab is in another state and is accredited or inspected by that state;
2. the lab is accredited under federal law;
3. the data are needed for emergency-response activities and no TLAP-accredited lab is available; or
4. the lab supplies data for which the TCEQ does not offer accreditation.

Detailed descriptions of each individual waste stream to be disposed of in the injection is required including the description of the processing generating each waste stream, the source of each waste stream, the generator name, and the exact point of generation. A description and a laboratory analysis report of the chemical and physical characteristics of each waste stream are required. The description must include the chemical, physical, thermal, organic, bacterial, or radiological properties or characteristics, in enough detail to allow the evaluation of water and environmental quality considerations. A required description for each waste stream is the ranges of pH, density and viscosity, and the percentage of total waste volume [30 TAC §305.45(a)(8)(B)(ii) and §331.121(a)(2)(G)(iv)]. Range of pH, the maximum specific gravity, and any other waste characteristic limits requested under proposed permit for the injected waste streams must be maintained for the protection of the injection well, associated facilities, and injection zone, and to ensure proper operation of the facility including waste compatibility with well materials, injection zone minerals and formation fluids. [30 TAC §331.63(h) & §331.66(c)(1)]

All sampling procedures, sample transport, sample storage and waste analyses utilized for waste identification or verification and other analyses for environmental monitoring must be performed in accordance with methods specified in the current editions of EPA SW-846, ASTM or other methods accepted by the TCEQ.

B2. METHODS FOR ENVIRONMENTAL INFORMATION ACQUISITION

Purpose

The primary purpose of the sampling program, whether it be initiated by agency staff, permittees, or other regulated entities, is to obtain representative samples of water possibly containing or contaminated by hazardous or nonhazardous wastes or Class III *in situ* uranium operations. Representative samples aid in evaluating the nature and extent of waste deposits present at each site or in determining a release from an injection well.

Sampling procedures to demonstrate compliance for the various UIC programs in the agency by regulated entities must be documented and samples must be collected according to the permit specifications or enforcement orders. In general, sampling requires the collection of adequately sized representative samples of the wastes or contaminated media. Sampling situations vary widely, and therefore no universal sampling procedure can be recommended.

Field Activities Environmental Measurements

UIC field staff collect groundwater samples suspected of containing hazardous waste. Samples are also collected to determine the practices used by generators, receivers, and transporters for waste classification and waste management, including waste disposal and recycling of waste. These samples may be taken any time an investigator needs to make these determinations, or the generator is required to report this information. These media and waste can often be complex, multi-phase mixtures of liquids, semi-solids, sludges, or solids. The liquid and semi-solid mixtures vary greatly in viscosity, corrosivity, volatility, explosivity, and flammability. The solid wastes can range from powders to granules to big lumps. Sample collection procedures that support data to demonstrate compliance with UIC programs must be consistent with procedures outlined in SW-846 and U.S. EPA protocols.

Sampling these diverse types of media and wastes requires different types of samplers. Specific sample collection devices and the procedures for preparing, using, and decontaminating the sample collection devices are described in SW-846 and U.S. EPA protocols. In the event of a sampling or measurement system failure, the investigator is required to try and resample and resubmit the samples whenever possible. Sufficient volume of sample, representative of the main body of waste or environmental media, must be collected. The sample must also be adequate in size for all analytical needs. The concentration of the contaminant, the type of analysis, and the sample medium determines the volume requirements. The SW-846 and U.S. EPA protocols give general guidelines for volume requirements.

The following equipment should be on hand when sampling wells:

1. Cooler for sample shipping and cooling, sample container, chemical preservatives, and appropriate packing cartons and filler;

2. Thermometer, pH paper and meter, digital camera, labels, appropriate keys (for locked wells), tape measure, water level indicators, and specific-conductivity meter. Sample preservation, analysis, and analytical quality control shall be as defined in the most recent issue of Methods for Chemical Analysis of Water and Wastes (EPA - Technology Transfer). Total dissolved solids shall be determined by evaporation at 180 ˚C;

3. Pumps will normally be used to obtain samples, although samples may be obtained directly from the pump discharge line for high yielding monitoring wells and wells with dedicated pumps. Samples intended to determine volatile organic compounds (VOCs) should not be obtained directly from the pump discharge line unless collecting from a very low flow discharge as a high flow will bias the intended VOC data low. If unable to collect by low flow, the data needs to be qualified as biased low;

4. Bailers and monofilament line with tripod-pulley assembly (if necessary); and

5. Decontamination solutions – tap water, distilled water, Alconox, isopropanol, CLP – specified grade water.

Ideally, sample withdrawal equipment should be completely inert, economical, easily cleaned and reused, able to operate at remote sites in the absence of power resources, and capable of delivering variable rates for well flushing and sample collection.

Table B2.1 gives general guidelines for volume requirements for aqueous samples.

TABLE B2.1 BOTTLES REQUIRED FOR AQUEOUS SOLUTION

Analysis	Required Volume	Container Type
Volatile Organics	80 mL	2 40-mL volatile organic analysis (VOA) glass vials
Extractable Organics (base/neutral/acid) and pesticide/ (BNA) polychlorinated biphenyl (PCB)	4 liters	2 80-ounce or 4 1-liter amber glass bottles w/Teflon lined lid
Metals	1 liter	1 1-liter polyethylene bottle
CN- & S^{2-} Cyanide & Sulfide	1 liter	1 1-liter polyethylene bottle
Inorganic (non-metal)	1 liter	1 1-liter polyethylene bottle

Sampling Considerations by Regulated Entities Demonstrating Compliance

The RMD, UIC Permits Section, oversees entities responsible for the disposal of hazardous or nonhazardous industrial waste or municipal solid waste or certain radioactive wastes via injection wells, and entities subject to 30 TAC §335.47(c)(3). Sample design depends on the facility design, the waste being injected, the timing of samples necessary to get representative samples, the injection well design, or other actions necessary to demonstrate compliance with UIC regulations.

Preservation and Holding Time Requirements

Maximum holding times (MHTs) have been established by the U.S. EPA and are presented in the CFRs and SW-846. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization,

oxidation, sorption, precipitation, and other physical and chemical processes. The U.S. EPA-established preservation and holding times that may be found in Table B2.2 for aqueous samples.

TABLE B2.2 HOLDING TIMES AND PRESERVATION FOR AQUEOUS SAMPLES

Analysis	Extraction/Digestion Times	Analysis Time	Preservation Method[2]
Volatile Organic Compounds (VOCs)	NA	14 days	Hydrogen Chloride (HCL), Sulfuric Acid (H2SO4) or Sodium bisulfate (NaHSO4), to pH<2, cool ≤ 6C
Semi-volatile Organics Base/neutral/acids (BNA) Pesticides/PCBs	7 days	within 40 days after extraction	≤ 6°C
Metals	6 months	6 months, ASAP after digestion	Nitric acid (HNO_3 to pH<2
Mercury	28 days	28 days, ASAP after extraction	HNO_3 to pH<2
Hexavalent Chromium[4]	24 hours	within 24 hours after extraction4	≤ 6°C
Alkalinity	NA	14 days	≤ 6°C
Chlorides	NA	28 days	≤ 6°C
Conductivity	NA	28 days	≤ 6°C
Nitrate-N	NA	48 hours	≤ 6°C
Sulfates and Fluorides	NA	28 days	≤ 6°C
Total Dissolved Solids (TDS)	NA	7 days	≤ 6°C
Perchlorate	NA	28 days	≤ 6°C
Cyanides	NA	14 days	Sodium Hydroxide (NaOH) to pH>12, cool ≤ 6°C
Sulfides	NA	7 days	NaOH to pH>12, 2ml of 2N Zinc Acetate per liter, cool ≤ 6°C

Notes: [1]Holding times begin at the time of collection.

[2] Some waters may effervesce. If this occurs, perform no pH adjustment, cool, and have analyzed immediately. Refer to Chapter 4 of SW-846 Revision 4 for more detailed guidance regarding preservation of aqueous samples.

[4]If hexavalent chromium is analyzed by the Ion Chromatography method U.S. EPA 218.6, the holding time can be extended to 28 days.

Laboratory Analyses

Purpose

To support the analytical needs of the UIC Program, the U.S. EPA created and maintains SW-846, a methods compendium.

The SW-846 is a guidance document meant to assist the analytical chemist and other users by suggesting sampling and analytical procedures that have undergone thorough evaluation to identify the strengths and weaknesses of the methods and the expected analytical performance for the range of sample types evaluated. The U.S. EPA position for the majority of the methods in SW-846 (which are not method-defined parameters) is: (1) SW-846 is not the only source of methods that can be used, (2) Methods in SW-846 do not need to be implemented exactly as written in SW-846; and (3) Performance data presented in SW-846 methods should not be used as regulatory default or absolute “QC requirement.”

However, not all SW-846 methods are guidance. There are certain specific regulatory requirements to use SW-846 methods exactly as written.

Method Selection

The analytical methods chosen by agency staff, permittees, or other regulated entities to determine or verify compliance are varied and may be dependent upon the following: the chemicals of concern, type of sample media, detection requirements, permit requirements, criteria designated in program rules and that the method chosen to demonstrate compliance or decision-making must be included in the TCEQ Fields of Accreditation for which accreditation is offered and required. The methods that will be commonly used by Regional Office investigators are identified in the TCEQ Laboratory Contracts. A list of laboratories currently accredited along with the methods, media, and analytes they are accredited for can be found on the List of Accredited Laboratories and Their Fields of Accreditation.

Cases with no information available about the waste present a challenge for the regional office investigators when deciding the parameters to request for analysis. The final decision is left to the investigator.

For Regional Office staff, samples are sent to a laboratory contracted by the TCEQ. These laboratories and any subcontractors are accredited by TCEQ according to 30 TAC Chapter 25 (relating to Environmental Testing Laboratory Accreditation and Certification) Subchapters A and B as amended, for the matrices, methods, and parameters of

analysis, if available, unless the TCEQ agrees in writing to allow one of the regulatory exceptions specified in 30 TAC §25.6.

A laboratory that provides analytical data for the UIC program to a permittee must be accredited according to 30 TAC Chapter 25 (relating to Environmental Testing Laboratory Accreditation and Certification) Subchapters A and B as amended, for the matrices, methods, and parameters of analysis, if available, unless the laboratory meets one of the regulatory exceptions specified in 30 TAC §25.6.

Preparation of the Samples

Table B2.3 lists the most common sample preparation procedures requested. The appropriate method is determined by the matrix (water, soil, sludge, emission samples, etc.) and the analytical method selected. Unless otherwise prohibited in SW-846, other agency or U.S. EPA-approved test methods may be used in order to prepare the samples for analysis. The preparation of samples must be described in each laboratory's QAM and conform or be consistent to the 2016 TNI Standards.

TABLE B2.3 SAMPLE PREPARATION PROCEDURES

Parameters	Method[1]
Organics	
Volatile organics (VOA)	5021A/5030B/5031/5035/5041A
Semivolatile organics (BNA)	3510C/3520C/3540C/3541/3550C/3542
Pesticides/PCBs	3510C/3520C/3540C/3541/3550C
Inorganics	
Metals	3005A/3010A/3015A/3020A/3050B/3051A

Note: [1]Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-3rd Edition, as updated

Analytical Methods

Table B2.4 lists the most common analytical procedures used to meet regulatory compliance for the UIC programs. For permittees or other entities using the services of a commercial laboratory, a complete list of methods/media/analytes for which the agency offers accreditation (also known as the Fields of Accreditation may be found on the Laboratory Accreditation website. The methods can be used for the analyses of water, soils, sludges, emission samples, and other matrices. The minimum QC procedures that must be followed by accredited laboratories are detailed in Volume 1, Modules 2 to 7 of the 2016 TNI Standards (*relating to Quality Systems*). Additional, more stringent criteria may be specified in this UIC QAPP, WAP, other program requirements, or conditions of the site (e.g., Remediation and TRRP Rules) based on facility type and type of action being taken for which samples are being collected.

On-site facility laboratories choosing not to be a 2016 TNI Standards accredited (Exempt by 30 TAC §25.6) facility must meet the minimum criteria described in this QAPP and in SW-846 method 8000 for organic analyses and method 7000 for metals. In addition, all laboratories are required to maintain an up-to-date QAM which describes the QA practices of the laboratory. The QC requirements are also discussed further in Section B4. Where specific acceptance criteria are not given, such as for surrogate recoveries, the laboratories are to develop their own criteria and update the limits on at least an annual basis. The limits are reported to the data user in the report QC package and their suitability will be evaluated by the data user.

TABLE B2.4 ANALYTICAL PROCEDURES

Parameters	Method
Organics	
Volatile organics (VOA)	8260*
Semivolatile organics (BNA)	8270*
Pesticides/PCBs	8081/8082*
PCBs (emission samples only)	U.S. EPA 1668
Aldehydes/Ketones	8315*
Polychlorinated Dibenzo-p-dioxins/ Polychlorinated Dibenzofurans	8290*
Polycyclic aromatic hydrocarbons (PAHs)	California Air Resources Board (CARB) Method 429
Inorganics	
Alkalinity	2320
Ammonia-N	350.1
Chlorides	300.0/ 9057*
Conductivity	2510
Cyanides	9010/9012/9013*

TABLE B2.4 ANALYTICAL PROCEDURES

Parameters	Method
Nitrate-N	351.1/353.2
Sulfates and Fluorides	300.0/6500/9056* 375.4
Sulfides	9030B/9031/9215*
Total Dissolved Solids (TDS)	160.1
Metals	
Aluminum	7020/6010/6020*
Antimony	7040/7041/6010/6020*
Arsenic	7060/7061/6010/6020*
Barium	7080/7081/6010 6020*
Beryllium	7090/7091/6010/6020*
Cadmium	7130/7131/6010/6020*
Calcium	3500-Ca/7140/6010/6020*
Chromium	7190/7191/6010/6020*
Chromium (Hexavalent)	7195/7196/7197/7198/7199*
Cobalt	7200/7201/6010/6020*
Copper	7210/7211/6010/6020*
IRON	7380/7381/6010/6020*
Lead	7420/7421/6010/6020*
Magnesium	3500-Mg/7450/6010/6020*
Manganese	7460/7461/6010/6020*
Mercury	7470/7471/6010/6020*
Nickel	7520/7521/6010/6020*
Potassium	3500-K/7610/6010 / 6020*
Radium-226	U.S. EPA 903.1A/SM7500-RaC
Selenium	7740/7741/7742 / 6010 / 6020 *
Silver	7760A/7761/6010/6020 *
Sodium	3500-Na/7770/6010/6020 *
Uranium	U.S. EPA 200.8/SM7500-UC for drinking water Spectrophotometric Determination of Uranium with 4-(2-Pyridylazo) Resorcinol (PAR)
Vanadium	7910/7911/6010/6020 *
Zinc	7950/7951/6010/6020 *
Hazardous Waste Characterization	
Alkalinity	U.S. EPA 2320B, 310.1
Ignitability	1010B/1020/1030
Corrosivity	9040B/1110*
pH	U.S. EPA 9040
Reactivity	SW-846, Chapter 7
Toxicity	1311 followed by appropriate test method procedures

Analytical Method Modifications

Any modifications to methods can be done in accordance with SW-846 as allowed. A list of all modifications that are acceptable in SW-846 unless otherwise excluded can be found in the analytical checklist instructions found at the back of this UIC QAPP. It is important for the laboratory and regulated community as well as TCEQ staff to understand what can be modified, cannot be modified, and can be modified with U.S. EPA's approval. Basic information concerning the TCEQ method modification application process can be found in the TCEQ regulatory guidance document RG-380, "The Analytical Method Modification Program – How to Apply."

The U.S. EPA expects that some methods in SW-846 will have to be modified to improve method performance for certain target analytes in certain matrices. Such modifications allow acquisition of the most appropriate and scientifically valid data possible for use in determining compliance or non-compliance on the part of a regulated entity. This is the reason why the majority of SW-846 methods were written as guidance rather than mandate. However, other methods are not guidance and are written into the CFR and must be used **without any modification** if results are to be legally and

defensibly used to demonstrate compliance for their intended purposes in the RCRA programs. These methods can be found at 40 CFR §260.11.

Existing Information

In the permitting process, UIC staff rely on information submitted by the responsible parties in the permit application. This information may include site specific information, data from published literature and/or data from other nearby facilities. UIC Permitting staff review the information using professional judgement, and referencing relevant rules, guidance documents from TCEQ, EPA, and the U.S. Nuclear Regulatory Commission, and published literature as needed to ensure it is technically correct and meets rule requirements.

Confidential Business Information and Personal Identifiable Information

As described in TCEQ's Records Manual Revision 2024, TCEQ requires all agency employees to protect confidential information from unauthorized disclosure, consistent with current statutes. This means preventing the unauthorized access, use, modification, disclosure, and unnecessary retention of confidential information, consistent with the requirements of the Texas Public Information Act (PIA). The PIA has criminal penalties for the distribution or misuse of confidential information (Texas Government Code §552.352). Although agency records are open and available for public disclosure under the protection of the PIA, exceptions to protect confidential information are defined in Texas Government Code §552.101-§552.160. The PIA protects most confidential information managed by the agency, including Personal Identifying Information (PII) and Sensitive Personal Information (SPI). The Identity Theft Enforcement and Protection Act (Business Commerce Code Sec. 521.001) outlines standards set by the State of Texas on the management of personal identifying information. OPP 19.10 Sensitive Personal Information Protection is the TCEQ policy on protecting personal and sensitive data.

The UIC Program must identify what confidential information may be within in its records series and appropriately classify them. It may be necessary to seek a ruling from the Office of Attorney General (OAG) if the agency receives a Public Information Request (PIR) for the information. Securities classifications of confidential information: Agency Confidential is information that has been deemed confidential by statute. Information must be redacted prior to release and/or must be sent to OAG for a ruling for release. Examples include social security number, heightened security, attorney-client communications. Confidential physical, hard copy, records must be kept in a locked, secure area with limited access when not in use. Only required copies of confidential information should be created and these should be managed with the same caution as the official record. Copies must be immediately shredded when no longer needed.

Environmental Technology

The objective of this section is to identify types of data needed for project implementation and/or decision making that is obtained from non-measurement sources such as computer databases, spreadsheets, programs, and literature files. Prior to evaluation of the data, the acceptance criteria for the use of the data in the project should be defined, and any limitations on the use of the data resulting from uncertainty in its quality should be discussed.

UIC Permit Compliance Data

Regional Office and CID UIC staff enter information into CCEDS for compliance purposes as designated by the regulated facility's permit requirements. CCEDS also contains information that is used to generate the narrative annual report and 7520 semi-annual and annual reports to the U.S. EPA. CCEDS tracks mechanical integrity testing procedures, observations, reports review, facility addresses, compliance and complaint investigations, and well workover reports review. CCEDS is used by the regional offices and CID UIC staff for reporting purposes. UIC Permits Section staff maintain the UIC injection well inventory, facility background (site specific), injection volumes, and permitting data in IDA.

B3. INTEGRITY OF ENVIRONMENTAL INFORMATION

Purpose

Sample custody is an integral part of any sample collection and analysis plan and applies to both field and laboratory activities associated with sample collection and analysis. The first step to ensure sample integrity is to utilize the appropriate procedures in the field for collection, identification, preservation, and shipment of samples. When samples reach the laboratory, they are then monitored for proper preservation, assigned a laboratory number, and maintained at 6˚C or less, if required by the method of analysis, until sample preparation and analyses can be performed within required sample holding times. Sample handling procedures for all laboratories demonstrating compliance to UIC programs must be described in their QAM and conform or be equivalent to the current standards applied to laboratories that are accredited.

Sample Custody Procedure

Custody procedures require permanent records of all sample handling and shipment. Custody procedures must be used to ensure sample integrity and legally and technically defensible data. The custody procedures for data used to demonstrate compliance with UIC programs must be consistent with procedures outlined in SW-846 and U.S. EPA protocols.

B4. QUALITY CONTROL

Purpose

A program to generate data of acceptable quality will include both a QA component, which encompasses the management procedures and controls, as well as an operational day-to-day QC component. The guidelines for sampling define fundamental elements of such a data collection program.

These guidelines identify the minimum QC components that should be used in the performance of sampling and analyses, including the QC information that should be documented. Data collection should involve:

• The design and planning of a project to achieve the DQOs;

• Implementation of the project plan; and

• Assessment of the data to determine if the DQOs are met.

Guidance is provided to construct QA programs for field work conducted in support of the UIC programs.

QC Procedures

QA is an integrated system of activities involving planning, QC, quality assessment, reporting, and quality improvement to ensure that a product or service meets defined standards of quality with a stated level of confidence. QC is the overall system of technical activities whose purpose is to measure and control the quality of a product or service so that the product meets the needs of users.

A data set cannot be properly evaluated for accuracy and precision unless it is accompanied by QA data. QA data result from the implementation of QC procedures during sampling and analysis or during the data entry process. QC procedures that are employed to document the accuracy and precision of sampling and analysis are defined in the following section.

Field Procedures

The number and type of QC samples collected in the field are dependent upon the types of analyses being performed, on the media being collected, and the intended use of the data. QC samples may include all or some of the following: trip blanks, field spikes, field blanks, equipment blanks, field duplicates, laboratory control samples, surrogates, and additional samples for MS and MSDs. Field instruments should be calibrated in accordance with equipment SOPs (available on the OCE FODWEB). The objective for precision of field data collection methods is to achieve and maintain the factory specifications for the field equipment. Field instruments will normally be used for environmental sampling. For pH meters, precision will be evaluated using multiple field measurements. Consecutive field measurements of the same sample should agree within 0.1 pH standard units after the instrument has been field-calibrated with standard National Institute of Standards and Technology (NIST) traceable buffers. Water level indicator readings will be precise within 0.01 foot for duplicate measurements. The organic vapor analyzer (OVA) will be calibrated each day prior to field use. If calibration readings deviate 15% or more from the concentration of the calibration gas, the instrument will be recalibrated.

Laboratory Procedures

The QC procedures used by all laboratories for the determination of compliance for the UIC program are outlined in each laboratory's QAM and must conform to the 2016 TNI Standards. Permit holders with on-site laboratories exempt from 30 TAC §25.6 (relating to Conditions Under which the Agency May Accept Environmental Data) shall meet requirements specified in this UIC QAPP, WAPs, or other relevant documents or procedures as specified in their permits. All on-site data collection procedures are subject to review by Regional Office investigators as required for the TNI Standards accreditation exemption.

All laboratories must have quality control procedures for monitoring the validity of test and calibrations undertaken. The resulting data shall be recorded in such a way that trends are detectable, and where practicable, statistical techniques shall be applied to the reviewing of the results. All laboratories must also meet all QC procedures outlined in the analytical method used to meet compliance if more stringent than TNI Standards.

Corrective action procedures used by laboratories are discussed in each laboratory's QAM. If corrective action does not result in samples being analyzed under in-control conditions, then all affected data must be flagged by the laboratory. For example, if one surrogate is not within acceptance criteria, then the associated data must be flagged. If a matrix spike recovery is not within acceptance criteria, then all samples associated with the same sample matrix type in the batch must be flagged. The description of the failure may be included in a case narrative on the final report of analysis.

Specifying Measurement Performance Criteria

The primary goal of this QA program is to ensure the accuracy and completeness of the data that ultimately will be used to determine the status of the sites that are investigated. In order to achieve this accuracy and completeness, it is necessary that all sampling, analysis, and data management activities be conducted in accordance with pre-set standards, and that these activities be reviewed regularly to maintain full compliance with the standards. This program has been designed so that corrective action can be implemented quickly, if necessary, without causing undue expense or delay. The standards and review procedures that TCEQ will use to evaluate accuracy and completeness of data are outlined in this plan. All contractors, subcontractors, and permittees will be required to follow these standards and procedures, at a minimum. All data submitted to the agency or that are required to demonstrate compliance with the UIC program shall be of known quality.

The QA objectives for all measurement data include considerations of precision, bias, accuracy, completeness, representativeness, and comparability. Compliance with the QA objectives will be judged individually for each site. QC acceptance limits for organic analyses in the UIC program are stated in Tables B4.1 and B4.2. These limits represent the quality of QC data necessary to support decision making by TCEQ staff for UIC sample determinations. Data not meeting these QC acceptance criteria should be flagged in the data package with an explanation of problems encountered by the laboratory and a statement of the limitations, if any, on the data due to the problems.

All corrective actions performed in the laboratory or at the direction of TCEQ as a result of data exceeding minimum data quality criteria of the current standard applied to laboratories that are accredited and acceptance criteria designated in this UIC QAPP shall be documented. All records shall be maintained by the laboratory. . Data qualifiers are applied when acceptance criteria are not met and corrective action was not successful or corrective action was not performed. Failure to meet QC acceptance criteria in Tables B4.1 and B4.2 does not necessarily mean the data are

unusable. Particular care will be taken to review all QC data within the data package for compliance with the UIC program.

While the minimum QC procedures that a laboratory needs to follow are presented in SW-846, other U.S. EPA methods, and the 2016 TNI Standards, "*The performance data included in these methods are for guidance purposes only, and are not intended to be and must not be used as absolute QC acceptance criteria….*" (See Chapter 2, Paragraph 2 of SW-846). Therefore additional performance standard criteria have been specified in this QAPP.

TABLE B4.1 MATRIX SPIKE/MATRIX SPIKE DUPLICATE ACCEPTANCE LIMITS FOR ORGANIC GAS CHROMATOGRAPHY & GAS CHROMATOGRAPHY MASS SPECTROMETRY (GC & GCMS) AND INORGANIC ANALYSES

Matrix Spike Compound	Water	
	% Recovery	Relative Percent Difference (RPD)
Volatile Organic Compounds		
1,1-Dicholorothene	75-125	20
Trichloroethene	75-125	20
Benzene	75-125	20
Toluene	75-125	20
Chlorobenzene	75-125	20
Semi-volatile organics		
Phenol	70-130	25
2-Chlorophenol	70-130	25
1,4-Dichlorobenzene	70-130	25
N-Nitroso-di-n-propylamine	70-130	25
1,2,4-Trichlorobenzene	70-130	25
4-Chloro-3-methylphenol	70-130	25
Acenaphthene	70-130	25
4-Nitrophenol	70-130	25
2,4-Dinitrotoluene	70-130	25
Pentachlorophenol	70-130	25
Pyrene	70-130	25
Herbicides		
2,4-Diclorophenoxyacetic acid (D)	70-130	25
Silvex	70-130	25
Pesticides		
Gamma-Benzene hexachloride (BHC)	70-130	25
Heptachlor	70-130	25
Aldrin	70-130	25
Dieldrin	70-130	25
Endrin	70-130	25
4,4'-Dichlorodiphenyltrichloroethane (DDT)	70-130	25
Metals		
Aluminum	80-120	20
Antimony	80-120	20
Arsenic	80-120	20
Barium	80-120	20
Beryllium	80-120	20
Cadmium	80-120	20
Calcium	80-120	20
Chromium	80-120	20
Chromium (Hexavalent)	80-120	20
Cobalt	80-120	20
Copper	80-120	20

Matrix Spike Compound	Water	
	% Recovery	Relative Percent Difference (RPD)
Iron	80-120	20
Lead	80-120	20
Magnesium	80-120	20
Manganese	80-120	20
Mercury	80-120	20
Nickel	80-120	20
Potassium	80-120	20
Radium-226	80-120	20
Selenium	80-120	20
Silver	80-120	20
Sodium	80-120	20
Uranium	80-120	20
Vanadium	80-120	20

*Each laboratory must establish their own limits but should not exceed the prescribed limits in this QAPP without flagging the data in the data package with explanation in the case-narrative concerning matrix effects, cleanups failed attempts to obtain quality objectives using a different method more suited for the matrix.

TABLE B4.2 SURROGATE SPIKE ACCEPTANCE LIMITS FOR GC AND GC/MS ORGANIC ANALYSES

Surrogate Compounds	Water % Recovery
Volatile organics	
1,2-Dichloroethane-d4	75-125
4-Bromofluorobenzene	75-125
Toluene-d8	75-125
Dibromofluoromethane	75-125
Semi-volatile organics	
Nitrobenzene-d5	70-130
Terphenyl-d14	70-130
2-Fluorobiphenyl	70-130
2-Fluorophenol	70-130
2,4,6-Tribromophenol	70-130
Phenol-d5	70-130
1,2-Dichlorobenzene-d4	70-130
Herbicides	
2,4-Dichlorophenylacetic acid	70-130
Pesticides	
Decachlorobiphenyl	70-130
Tetrachloro-m-xylene	70-130

These limits are for advisory purposes only. . Each laboratory must establish their own limits but should not exceed the prescribed limits in this UIC QAPP without explanation in the data package concerning matrix effects, cleanups, etc., or other problems associated with the sample matrix.

Proficiency

All laboratories, except those qualifying for exemption under 30 TAC §25.6, must successfully participate in Proficiency Testing (PT) for each field of accreditation as required by 30 TAC Chapter 25.

Precision and Replicate (Duplicate) Analysis

The precision of a measurement is an expression of the agreement between multiple measurements of same property conducted under prescribed similar conditions. The results from duplicate analyses are used to evaluate analytical or measurement precision and include variability associated with sub-sampling and the matrix, but not the precision of field sampling, preservation, or storage internal to the laboratory. The frequency of laboratory duplicate analysis typically depends on project requirements. Precision can be evaluated by comparing multiple measurements of the same parameter on the same sample under the same conditions. This can be accomplished by analyzing duplicates of an MS and MSD. Precision between duplicates is usually expressed in terms of the relative percent difference (RPD). The RPD can be evaluated both internally (laboratory duplicates) and externally (field duplicates) to the laboratory. For inorganic analytes and metals, the acceptance criteria for precision is an RPD no greater than 20%. The RPD between two results can be calculated using the formula:

$$RPD = |A-B| / [(A + B)/2] \times 100\%$$

where A and B are the results from the duplicate analyses.

Accuracy and Laboratory Control Samples

The accuracy of an analytical method is the extent to which test results generated by the method and the reference value agree. Accuracy can also be described as the closeness of agreement between the value that is adopted, either as a conventional, true or accepted reference value, and the value found. QC analyses used to measure accuracy include standard recoveries, laboratory control samples (LCS), spiked samples, and surrogates.

The true value for accuracy assessment can be obtained in several ways. One alternative is to compare the results of the method with results from an established reference method. This approach assumes that the uncertainty of the reference method is known. Secondly, accuracy can be assessed by analyzing a sample with known concentrations (e.g., a control sample or certified reference material (CRM)) and comparing the measured value with the true value as supplied with the material. If certified reference materials or control samples are not available, a blank sample matrix of interest can be spiked with a known concentration by weight or volume**.** After extraction of the analyte from the matrix and injection into the analytical instrument, its recovery can be determined by comparing the response of the extract with the response of the reference material dissolved in a pure solvent. Because this accuracy assessment measures the effectiveness of sample preparation, care should be taken to mimic the actual sample preparation as closely as possible.

The primary purpose of the LCS is to demonstrate that the laboratory can perform the overall analytical approach in a matrix free of interferences (e.g., in reagent water, clean sand, or another suitable reference matrix). Although the frequency of LCS analysis should be determined by the needs of a project, typically one LCS is prepared and analyzed for every analytical batch, as the recovery of the target analytes in the LCS analysis demonstrates whether the methodology is in control and the laboratory is capable of making unbiased measurements.

Therefore, the LCS results should be used in conjunction with MS/MSD results to separate issues of laboratory performance and "matrix effects."

Measures to assure accuracy of the test method also include calibration and/or continuing calibrations, use of CRMs, PT samples, or other measures.

The objective for accuracy of field measurements is to achieve and maintain factory specifications for the field equipment.

Matrix Spikes and Method Performance

The MS/MSD results are an important measure of the performance of the method relative to the specific sample matrix of interest. The U.S. EPA believes that such a demonstration is an important aspect of an overall QA program.

The primary purpose of these MS/MSD analyses is to establish the applicability of the overall analytical approach (e.g., preparative, cleanup, and determinative methods) to the specific sample matrix from the site of interest.

Unfortunately, some may believe that the MS/MSD results can and should *routinely* be used to evaluate performance of an individual laboratory. This was *not* the U.S. EPA's intent in specifying that MS/MSD analyses be performed at a 5% frequency.

The U.S. EPA believes that consistent *trends* in MS/MSD results can be of some use in evaluating laboratory performance, as are trends in surrogate recoveries, LCS recoveries, and other QC data. However, the appropriate use of a *single* set of MS/MSD results is to evaluate *method* performance in the matrix of interest, not to evaluate *laboratory* performance.

Recoveries give valuable information as to the effectiveness of the analytical method for the quantitation of analytes in a particular matrix. Low recoveries may indicate a poor analytical performance or the potential need to select a more appropriate analytical method.

The degree of accuracy and the recovery of analytes to be expected for the analyses of QC samples and spiked samples are dependent on the matrix, method of analysis, and the compound or element being determined.

The acceptance limits for matrix spike/matrix spike duplicate results (for organic and inorganic analyses) can be found in Table B4.2.

The percent recovery of an analyte can be calculated using the following formula:

$$\% \text{ Recovery}=SSR-SR/SA \times 100$$

where SSR is the spiked sample result, SR is the sample result, and SA is the amount of spike added.

Sample Representativeness and Blanks

Samples collected that will be analyzed to determine compliance must be representative (e.g., area of interest, medium being sampled, etc.). The U.S. EPA describes a representative sample as a portion of material or water that is as nearly identical in content and consistency as possible to that in the larger body of material or water being sampled. Assessing sample representativeness is a critical component of any environmental investigation and should be performed before any conclusions are reached. If the samples are not representative, any conclusions or decisions will be incorrect.

Sample collection procedures that support data to demonstrate compliance with UIC programs must be consistent with procedures outlined in SW-846 and U.S. EPA protocols.

The type and frequency of blanks are described in this UIC QAPP Glossary and are dependent upon the permit specifications, site, sample matrix, and analytes of interest. The primary purpose of blanks is to allow evaluation of contamination. Comparison of different blank sample results can be used to identify and isolate the source of contamination introduced in the field or the laboratory. Acceptance criteria are defined by the various methods, QAPPs, and data users to support the intended use of the data. A secondary purpose of these blanks is to document proper sample bottle preparation, decontamination, and handling techniques have been employed.

A blank is included with the analysis of every analytical batch of 20 samples or less, or as stated in the method, whichever is more frequent.

Comparability

Consistency in the acquisition, handling, and analysis of samples is necessary so the results may be compared with regulatory requirements. Concentrations will be reported in a manner consistent with general practices. Standard U.S. EPA analytical methods and QC will be used to support the comparability of analytical results with those obtained in

other testing.

Completeness

For the U.S. EPA and TCEQ project planning purposes (U.S. EPA R-5) a DQO for completeness is measured as the difference between the planned or proposed amount of samples and/or data and the actual amount collected. A DQO for completeness may state that "90% of the proposed samples must be collected to meet project objectives."

Completeness of the data is measured as the amount of valid data obtained from the measurement system (field and laboratory) versus the amount of data expected from the system. The data validation will determine the amount of valid data obtained from each site investigation. The specific objective for the completeness of each project will be greater than or equal to 90% for field and laboratory data for each site unless otherwise specified.

Completeness is calculated as a % value. In the equation below, ST is the total number of samples (or data points) collected and SV is the number of samples with a valid analytical report (or total number of possible data points).

$$\% \text{ Completeness} = SV/ST \times 100$$

Analytical Parameters and Quantitation Limits

Each laboratory's determination of the Limits of Detection (LOD), also known as method detection limits (MDLs), and Limits of Quantitation (LOQ), also known as practical quantitation limits, will comply with the 2016 TNI Standards. For permitted facilities, the LOQ must take into account site-specific samples when determining background data for groundwater monitoring. The LOQ will be the lowest concentration of a target analyte that can be reported with the confidence established by the precision and accuracy limits in this QAPP. For site specific or program specific compliance, analytical parameter quantitation limits will be determined on a per-site or program- specific basis as designated in this UIC QAPP or other reference materials (e.g., guidance documents). Some determination will be made by the responsible party submitting a sampling design plan with concurrence by TCEQ staff conducting the review of the plan. The quantitation limits may vary since they are matrix and analyte dependent, laboratories should be able to demonstrate how each MDL/LOQ is determined

Laboratories that analyze samples to be used by TCEQ staff or the regulated community for compliance purposes must maintain documentation demonstrating that the analytical methodology used has adequate sensitivity. Unless otherwise specified in regulations or TCEQ guidance, each pollutant of concern must be reported at quantitation levels as low as applicable during normal operating conditions and at levels lower than the appropriate regulatory action levels. The sensitivity of the method may be determined as follows:

- From a method detection limit study performed as defined in 40 CFR Part 136, Appendix B, including Step No. 7 to test for reasonableness of the estimated detection limit;
- From the method quantitation limit, as described in Section 7 of SW-846 Method 8000B, at or below the critical Pollutant Concentration Limits (PCL); or
- By analysis of spiked samples at least 3 to 5 times lower than the regulatory action level that demonstrates compliance by the successful analysis of a sample that contains the analyte of interest at a level below the action level.

It is the responsibility of the sample submitter or regulated entity to provide the laboratory with regulatory action levels so that the reported quantitation limits do not prevent evaluation of regulatory compliance.

B5. INSTRUMENTS/EQUIPMENT CALIBRATION, TESTING, INSPECTION, AND MAINTENANCE

Purpose

All equipment, instruments, and other items used in the collection of environmental data are maintained, calibrated, and tested for proper functionality.

Testing, Inspection and Maintenance

New equipment, instruments, tools, gauges, and other items are tested with known standards to determine the acceptability of the equipment. If the new equipment, instruments, tools, gauges, and other items are not acceptable, they are returned for properly working equipment in accordance with agency procedures documented in the Administrative Services Coordinator Manual. Testing, inspection, and maintenance procedures for laboratory equipment must conform or be consistent with criteria in the 2016 TNI Standards.

Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendations and written SOPs developed by the operators.

The contract laboratories are responsible for maintaining, testing, and calibrating their equipment. The procedures used are outlined in each laboratory’s QAM or applicable SOPs.

Schedules

Manufacturer's procedures identify the schedule for servicing critical items in order to minimize the downtime of the measurement system. It will be the responsibility of the operator to adhere to this maintenance schedule and to arrange any necessary and prompt service as required. Service to the equipment, instruments, tools and gauges shall be performed by qualified personnel and be documented. Program managers or designees determine whether acceptance criteria have been met and whether the equipment is adequate and appropriate for use in the field.

In the absence of any manufacturer's recommended maintenance criteria, a maintenance process and schedule will be developed, written, and maintained by the operator based on experience and previous use of the equipment.

A schedule of preventive maintenance is established by each contract laboratory and documented for review by outside investigators. An inventory check is conducted each month to ensure that an adequate reserve of spare parts and supplies is available. Inventory is replenished as needed.

Records

Logs will be established and maintained to record maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. When equipment, instrument, tools, and gauges are used at the sites and stored at the field offices, records produced will be reviewed, maintained, and filed by the investigator.

The contract laboratories and commercial laboratories maintain records for contract, program, and method compliance. These records are reviewed by a TCEQ Laboratory and Quality Assurance assessor within the MD during audits as a condition of accreditation and must conform to record requirements in the 2016 TNI Standards.

Instrument/Equipment Calibration and Frequency

The accuracy of environmental measurements depends on the proper calibration or standardization of the equipment prior to acquiring data. Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with applicable specification requirements and complies with the relevant standard specifications. Records shall be maintained of each item of equipment and its software significant to the tests and/or calibrations performed.

B6. INSPECTION/ACCEPTANCE OF SUPPLIES AND SERVICES

Purpose

This section describes the supplies and consumables that are critical to the quality of the project and the criteria used for accepting/rejecting the supplies. This section applies largely to TCEQ personnel.

The inspection/acceptance of supplies and consumables by regulated laboratories and contract laboratories must be described in each laboratory's QAM.

Critical Supplies and Consumables

The consumables that directly affect the quality of the data are the collection devices, reagents, reagent dispensers, and containers used to store the samples for analysis. Collection devices, reagents, reagent dispensers, and containers are obtained from vendors through the normal procurement procedures referenced in Section 4 of the TCEQ QMP, most current revision. Containers are also supplied by the contract laboratories and must meet the criteria described below.

Acceptance Criteria

The most important factors to consider when choosing containers for samples are compatibility, resistance to breakage, and volume. Containers must not melt, rupture, or leak as a result of handling or chemical reactions with the samples. Containers with wide mouths are preferable. Also, the containers must be large enough to contain the required volume of sample.

The plastic containers recommended for use by TCEQ personnel are constructed of linear polyethylene with a polypropylene cap. These containers should be purchased in 1 liter and 5 liter sizes. They should be used to collect and store aqueous samples which do not contain oily residues, pesticides, or halogenated hydrocarbons.

Glass containers are inert to most chemicals and can be used to collect and store all hazardous waste samples except those that contain hydrofluoric acid or strong alkali. Wide mouth 1 liter jars and 40 mL volatile organics analysis (VOA) vials are recommended. These are provided with a rigid plastic or metal cap and a Teflon liner. The VOA vials are used to collect samples for analysis of volatile organics or very concentrated hydrocarbon samples which are to be analyzed by GC or GC/MS. The 1 liter glass jars are used to collect samples containing semi-volatile organic compounds or halogenated organic compounds to be analyzed by GC and GC/MS.

The containers must be cleaned and unused. In some cases, the containers are prerinsed with a solvent or acid. Field blanks, prepared in the laboratory with laboratory pure water (containers opened to air), are collected to determine whether contamination from the sampling site has occurred. Equipment blanks are collected to evaluate contamination from the sampling equipment.

Reagents and their dispensers will be tested for contaminants on a periodic basis and records of the testing will be maintained on-site for inspection purposes. If the reagents do not meet the laboratory standards for purity, they must be returned to the seller, disposed of, or where available purified (e.g., by filtering, distillation, etc.).

B7. ENVIRONMENTAL INFORMATION MANAGEMENT

Purpose

The objective of this section is to describe the project data management scheme, tracing the path of the data from generation in the field or laboratory to final use or storage (refer also to A9 - Documents and Records and C2 – Oversight and Reports to Management). The areas within the agency that may be evaluated for compliance with program SOPs or data needs depending on specific program needs are as follows:

- The standard record-keeping procedures, document control system, and the approach used for data storage and retrieval on electronic media;
- The control mechanism for detecting and correcting errors and for preventing loss of data during data reduction (e.g., calculations), data reporting, and data entry to forms, reports, and databases;
- All data handling equipment and procedures used to process, compile, and analyze the data, including the procedures for addressing data generated as part of the project as well as data from other sources; and
- Any required computer hardware and software, specific performance requirements for the hardware/software configuration addressed, and procedures that will be followed to demonstrate acceptability of the hardware/software configuration.

Regional Offices

Even when accepted protocols are followed in collecting and analyzing environmental samples, a potential for loss of data quality arises in the manipulation and reporting of the data. However, certain procedures are designed to minimize the chance of errors related to number handling.

The COC that accompanies each set of samples to the laboratory has a space dedicated to recording observations. The field investigator has primary responsibility to ensure that all pertinent information is recorded correctly, and in the proper units. There are also sample information forms and request for analysis (RFA) forms (Waste RFA Forms A- D 3/15/99, available on OCE FODWEB), which may be attached to the COC. The information forms have room to record field data and other observations. The field investigator will take field notes at the time of sampling to aid in describing the COC information regarding samples collected in the field. The field notes are completed in the field and include the COC record number and associated sample identification numbers. Information recorded in the field is entered onto the final report with the sampling results attached to the report and then reviewed by a team leader or section manager prior to final approval noted in CCEDS.

UIC

UIC staff from CID, RMD, PSEAD, and Regional Offices enters data into databases for their individual areas of responsibility within the UIC program. The databases are used to track compliance activity, information on permitted facilities, and waste disposal information. The CID UIC staff compiles UIC investigations information and MIT data, including enforcement actions from CCEDS into 7520 semi-annual and federal fiscal year annual reports to the U.S. EPA in coordination with RMD, UIC Permits Section. The RMD, UIC Permits Section generates the federal fiscal year annual narrative reports submitted to the U.S. EPA under 40 CFR Part 144.8 (b) in coordination with CID UIC staff. The data in Central Registry (CR) is peer reviewed after entry by UIC staff (Appendix A). Errors found are corrected immediately. UIC Permits staff enters site-specific, permit, application, injectate and waste disposal information into IDA, CR, Access, and PARIS databases for permitted facilities.

Contract, Commercial and On-Site Laboratories

Data management procedures must be described in each laboratory's QAM (or other SOPs or documents however named) according to the 2016 TNI Standards if they are an accredited laboratory analyzing samples to demonstrate compliance to the UIC program. Permittees with their own on-site laboratory must meet data management procedures described in their permits. Data management procedures must be made available to Regional Office investigators upon request and should be consistent with the 2016 TNI Standards referenced in 30 TAC Chapter 25.

C. ASSESSMENT, RESPONSE ACTIONS AND OVERSIGHT

C1. ASSESSMENTS AND RESPONSE ACTIONS

Purpose

The purpose of an assessment is to ensure that the QAPP is implemented as approved. This includes ensuring that all elements of sampling, analysis, and data reduction and collection are completed as planned. This will be accomplished through a system of internal and external checks such that:

- All elements of the QAPP are implemented as described;
- The quality of the data generated by implementation of the QAPP is adequate; and
- A corrective action plan is in place if unforeseen circumstances force a deviation from the plan.

Assessment and response action records will be maintained and made available for review by the program area that performed the assessment in accordance with applicable SOPs, guidelines, or processes; or for a period of five years after the expiration of the QAPP under which they were performed.

Assessments and Project Planning

The following list describes assessments used to ensure that the QAPP is implemented as approved.

- Laboratory Audits - Performed by the Accreditation Work Group of MD and LDEQ once before accreditation is issued and once every 2 years thereafter, unless interim accreditations are issued;
- TCEQ technical peer review process - May include UIC issues as they relate to new technology, high profile issues, rules, policy, guidance, processes with major revisions or as the need arises as determined by the manager;
- QA reviews of investigation reports - Some UIC investigation reports are generated and reviewed by UIC staff in the Regional Offices; quality review of the UIC investigation reports related to the Uranium Recovery sites is conducted by CID management before the report is sent to the TCEQ Central Records.
- Enforcement Action Referrals (EAR) - Peer reviews for UIC cases are completed to determine if violations are properly documented, which type of enforcement action to pursue, which type of violator and which priority of enforcement action is appropriate in accordance with the TCEQ ENFORCEMENT SOPs. Modified date and version number for all the Enforcement SOPs can be found in the link provided. The SOP includes the EIC, the penalty policy and standard documents used for formal enforcement action;
- QC review of enforcement documents - Quality review of each enforcement document including orders, technical requirements, and penalty calculation worksheets for UIC cases is conducted by ENF staff. All documents are completed and checked in accordance with the TCEQ ENF SOPs;
- Program Audits - Annual reviews of the permitting, and data entry functions are conducted by the Lead UIC QA Specialist or work lead or other management staff as designated on Table C1.1. After each review, the Lead UIC QA Specialist or other assessment staff completes a report of the findings and any corrective action needed to correct all deficiencies and submits the report to the audited section manager, and deputy director. Verification that corrective action has been taken on the negative findings is achieved during the next audit;
- QA review of data entry – UIC Permits Section Lead QA Specialist performs monthly quality review of data entry for each issued UIC permit and UIC authorization, as designated on Table C1.1. After each review, the UIC Permits Section Lead QA Specialist analyzes the findings, identifies needed corrective actions, notifies appropriate staff to initiate corrective actions, verifies corrective actions, and informs section manager and work lead; and
- TCEQ Field Investigators -An environmental investigator (EI) II will be accompanied by a senior investigator or manager for on the job training as needed. EI II, EI III and EI IV will be accompanied on an investigation at least once a year by either an EI V, work leader, team leader, or section manager as part of their ongoing work evaluation. CID investigators are accompanied on investigations once a year by the work leader, section manager, or other qualified staff. Investigators' assessment and evaluation processes are performed by work leader, team leader, or section manager during UIC permit investigations and/or Radioactive Material License investigations. Corrective actions needed are discussed at the time of the investigation. Implementation of the corrective actions by the permittee may occur at the time of investigation and verified by the investigator. Otherwise, verification of the Permittee's corrective actions occurs at the next investigation. CID inspects the on-site laboratories at uranium recovery sites and other radioactive material sites as applicable and required every 3 years (30 TAC §25.6, Subchapter A). Results of the investigation accompaniments are to be documented and placed in the investigator's personnel file.

TABLE C1.1 DOCUMENTATION OF ASSESSMENTS

Type of Assessment	Number and/or Frequency	Assessment Personnel	Schedule	Reporting and Resolution
Laboratory Audits	Eight contract laboratories, agency lab and unknown number of commercial laboratories applying for accreditation	MD Accreditation Work Group Staff; LDEQ (for Sugar Land Laboratory)	Once before accreditation is issued and once every 2 years thereafter, unless interim accreditation is issued	Technical Report of audit produced and letter sent to laboratory notifying of findings. Follow-up conducted to confirm resolution of issues.
Peer Review of specified technical issue	As needed	Specified by Manager	No set schedule	Final document reported on Technical Peer Review Document
Quality Control Review	100% of Enforcement Action Referrals Submitted (EAR)	Enforcement Staff and Management	Within 15 days of receipt of report from Regional Office Staff	Section 7i of the EAR

Type of Assessment	Number and/or Frequency	Assessment Personnel	Schedule	Reporting and Resolution
Program Audit	Once Yearly	Specified by UIC Section Manager	Annual	Results and final resolution sent to section manager and deputy director.
QA Review of Data Entry	Once Monthly	UIC Permits Section Lead QA Specialist	Monthly review	Results and final resolutions sent to section manager and work lead
Program Audit Completeness Review	5% or 1 UIC inspection report as needed	OCE QA Specialist	Annual review	Report sent to OCE Project Manager, Section Manager and Deputy Director
Investigator Inspection Assessment	EI I & II - 4/year EI III & IV - 2/year	Regional Office Investigator Staff EI V and Team Leaders	Set by reviewing staff	Comments drafted with plan of action (if necessary), and filed in personnel files in Regional Offices
Investigator Training Assessment	All Investigators	Team Leaders in Regional Offices	Annually	Staff deficient in training will be sent to needed training as the budget allows

Response Actions

Findings of procedures and practices which do not conform to this UIC QAPP require timely corrective action. Corrective action for laboratory issues may be initiated by the PSEAD or Regional Offices, the UIC QA Specialist, laboratory staff and management, data reviewers and all other data users using procedures outlined in SW-846 and all other project specifications (e.g., references) designated in this UIC QAPP. If and when variances from proper protocol are noted. Project managers, team leaders, and laboratory managers are responsible for ensuring that required corrective actions are completed. It is the responsibility of the regulated entity (e.g., permittee) to accurately convey their data needs to the laboratory for the analysis of samples to demonstrate regulatory compliance or waste classification.

Examples of variances which require corrective action may include but are not limited to:

- Equipment failure;
- Excursions from precision and accuracy control;
- Samples arriving at the laboratory with incomplete COC or with sample integrity in doubt;
- Samples arriving with insufficient preservation (e.g., at room temperature);
- Samples lost in transit or in laboratory accidents;
- Failure to meet acceptance limits when analyzing U.S. EPA QA study samples;
- Reporting data in wrong units;
- Calculating data by wrong formula; and
- Incomplete documentation.

For the regulated community, field corrective procedures are described in individual facility QAPPs. Laboratory corrective actions defined in the facility QAPPs include: repair or replacement of faulty equipment; reanalysis of samples and standards; checking reagents for proper strength; request for resampling; or contacting the TCEQ project manager or UIC Program Lead QA Specialist for advice. Unique problems which cannot be corrected by the procedures listed above will require corrective actions to be defined when the need arises.

Corrective action for work conducted in the office could include: notifying the appropriate supervisory personnel, sending personnel to training, modifying and/or developing SOPs or checklists, reevaluating decisions or contacting TCEQ project/program managers or UIC Program Lead QA Specialist for advice. Unique problems which cannot be corrected by the procedures listed above will require corrective actions to be defined when the need arises. Corrective action reports will be developed according to Section 10 of the most current version of the TCEQ QMP, and the effectiveness of corrective actions will be verified.

Laboratory Assessments and Corrective Action

Requirements for laboratory assessments and corrective action procedures must be included in each laboratory's QAM. Assessments should be at a type and frequency as required by the 2016 TNI Standards and should be documented accordingly. Corrective action procedures should be defined, implemented, and documented.

C2. OVERSIGHT AND REPORTS TO MANAGEMENT

Purpose

TCEQ reports to management provide a structure for apprising management of the status of projects, deviations from approved QA and established standards and uncertainties in decisions based on the data.

Frequency, Content, and Distribution of Reports

- Investigation Reports – PSEAD creates weekly progress reports of work plan attainment and distributes the reports to Area Directors. The reports are based on investigation information from the CCEDS database. Summary reports are distributed to the Area Directors, and Regional Office management each month for review of progress in investigation activity. For UIC investigations and enforcement, semiannual and federal fiscal year 7520 reports are generated by CID in coordination with RMD, UIC Permits Section. For semi-annual report Forms 7520 - 2A (Compliance Evaluation) and 7520 - 2B for (Significant Non-Compliance) and Part 4 (Quarterly Exceptions List) are included. The federal fiscal year report consists of a complete Form 7520, which in addition to the sections above, includes Form 7520-1 (Permit and Area of Review) and Form 7520 - 3 (Mechanical Integrity Testing). The semi-annual and the federal fiscal year reports are reported to the U.S. EPA Region 6 and EPA headquarters using EPA's web-based application for UIC Data Collection;
- Monthly enforcement report to the Commission: The number of formal actions initiated for the month sorted by program (e.g., IHW, UIC, air, municipal solid waste etc.), number of agreed orders adopted by the Commission, amount of penalties assessed, deferred, or SEP value, number of cases resolved, number of cases being developed, cases being tracked for compliance, NOVs issued by region and central office, number of pending actions for administrative order by the TCEQ, number of cases pending at the Attorney General's Office, number of judgments, number of cases referred for formal enforcement action;
- Quarterly report to the State of Texas Legislative Budget Board regarding the timeliness and number of permits issued is compiled by the budget analyst of each applicable division; and Corrective action reports will be distributed according to Section 15 of the TCEQ QMP, (current revision).

D. ENVIRONMENTAL INFORMATION REVIEW AND USABILITY DETERMINATION

D1. ENVIRONMENTAL INFORMATION REVIEW

Purpose

Data review, verification, and validation are key steps in the transition from sampling and analysis to the assessment of the data. This section describes some data verification and validation practices that are used to promote common understanding and effective communication among environmental laboratories, data validators, and users.

Data verification is primarily an evaluation of performance against pre-determined requirements given in a document such as an analytical method procedure or a contract (e.g., permit). Data validation, on the other hand, centers on particular data needs for the program, as stated in this UIC QAPP and other referenced documents where applicable.

Staff of the PSEAD, Regional Offices, CID UIC staff, and UIC Permits Section of the RMD, are data users. These data users are the program staff authorized to determine the compliance status of the data supplier, and the regulated community. Program staff review and evaluate assessments, remediation activities, and closure activities submitted by the data supplier. In the review process, program staff will evaluate the data to ensure that:

- Representative samples were collected from the appropriate environmental media during investigation and/or remediation activities;
- Sample collection procedures followed during investigation and/or remedial activities are compliant with all approved work plans, permit provisions, enforcement order provisions, and the applicable federal and/or state guidance documents;
- Sample handling procedures (e.g., COC records) were properly completed and document the condition of samples during the preparation, packing, transportation and analysis process. The data supplier shall be responsible for reporting and correcting all sample handling procedures that deviate from the approved DQOs and/or other project-specific requirements;
- Analytical methods used to evaluate samples collected during investigation and/or remediation activities provide the appropriate level of accuracy required to meet all formal and/or informal DQOs. All deviations from the acceptable criteria and potential impacts affecting the usability of the data shall be reported by the data supplier;
- QC checks are performed and necessary corrective actions have been taken. Program staff will review the data supplied to ensure compliance with the formal and/or informal DQOs stated in all approved work plans, permit provisions, enforcement order provisions, and the applicable federal and/or state guidance documents;
- Proper calibration of instrumentation and equipment are performed. All calibration problems, corrections, and associated impacts on the quality of environmental data shall be clearly and accurately reported by the data supplier for evaluation; and
- Data reduction and processing is performed by the data supplier prior to submittal for review by staff.

UIC Permits

Staff of UIC Permits Section in the RMD are data users. To effectively evaluate an analytical data set, the data user must at least have a general overview of the sample results or data set that is in question. An analytical checklist (Appendix E) will be used by the permittee/laboratory to certify the type and quality of the data. TCEQ staff will then use the checklist to verify what has been submitted and validate the intended use of the data. A laboratory case-narrative (LCN) must be used to describe the information needed for a general overview of the QA/QC by the data user. This information can be derived from an in-depth review of the data. At a minimum, problems in QA/QC such as sample matrix, dilutions of the matrix, inadequate sample volume for analysis or re-analysis, sample container condition, sample temperature, sample preservation, and unusual events should be discussed within the LCN. The LCN is required for all analytical data submitted to this group for laboratories demonstrating compliance to permit requirements.

The following reference documents may be utilized by the data reviewer during the data review/validation process: SW-846, *U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (OSWER 9240.1-45, U.S. EPA, 540/R-04-004, October 2004), and the *U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (U.S. EPA 540/R-99-008, October 1999).

Regional Offices

Issues concerning potential data limitations are handled at two different levels: (1) at the time of audit or calibration of field samplers by the field investigators, who have prime responsibility for routine field audits and calibrations; and (2) by users of data, such as the UIC Permits staff who may question or want to verify the DQOs with QA staff at a later date after data is processed. Issues are reconciled at the lowest level and earliest time possible.

The appropriate Regional Office manager and/or field investigator are empowered to review and question any part of the measurement process and may initiate data reviews and corrective actions to bring the process back into compliance. To assess the quality of the data, the precision, accuracy, and completeness will be assessed in comparison to the DQOs as discussed in Section B4 when DQOs have been formally established.

Laboratory Responsibility and Checklists

All laboratory operations subject to 2016 TNI Standards, as well as on-site laboratories qualifying for an exemption under 30 TAC §25.6, are expected to generate data of known and documented quality and maintain the quality systems required to generate quality data.

All data sets submitted to the TCEQ UIC Permits Section in the RMD should contain a completed copy of:

- The Laboratory Data Report QA/QC Checklist (Appendix E).
  This checklist will be used by UIC Permits Section staff to verify minimum data quality completeness, correctness and compliance against method references and other requirements listed in this UIC QAPP.
- The Laboratory Case Narrative (LCN)
  The LCN must describe in detail any problems encountered in the processing of the samples within the analytical data set in question. The LCN should provide a clear explanation of each failed precision and accuracy measurement determined to be outside of the method control limits of the QA/QC criteria. Precision and accuracy determinations should be clearly presented with all results calculated. How the consequences and limitations of the QA/QC failure affect the results should also be included within the LCN. The LCN review should include comments that clearly

identify the problems associated with the sample results and state their limitations, when compared to the analytical methodology listed within the U.S. EPA Test Methods for Evaluating Solid Waste, SW-846, or other TCEQ approved analytical methods.

Comparable laboratory checklists will also be accepted as long as they meet all required elements, a certified statement attesting to the known quality of the data and an LCN. Refer to the Laboratory Data Report QA/QC Checklist (Appendix E).

All data sets submitted to the TCEQ regarding compliance with 30 TAC Chapters 335 or 350 must meet with requirements of the TCEQ RCRA QAPP.

Reporting QA/QC Results

The LCN should provide a clear explanation of each failed precision and accuracy measurement determined to be outside of the method control limits of the QA/QC criteria. Precision and accuracy determinations should be clearly presented with all results calculated. How the consequences and limitations of the QA/QC failure affect the results should also be included within the LCN.

Summary Paragraph

The LCN review should include comments that clearly identify the problems associated with the sample results and state their limitations, when compared to the analytical methodology listed within the U.S. EPA Test Methods for Evaluating Solid Waste, SW-846, or other TCEQ approved analytical methods.

Verification and Validation Methods

In general, verification is confirmation, through provision of objective evidence, that specified requirements have been fulfilled; and validation is confirmation, through provision of objective evidence that the requirements for a specific intended use or application have been fulfilled.

- Data Verification is the process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements.
- Data Validation is an analyte- and sample-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance (i.e., data verification) to determine the analytical quality of a specific data set.
- Data Quality Assessment is the scientific and statistical evaluation of data to determine if the data obtained from environmental information operations are of the right type, quality, and quantity to support their intended use.

Reconciliation with User Requirements

To further clarify the respective roles of data verification and data quality assessment or data suitability, the following example from U.S. EPA QA/G-8 Guidance on Environmental Data Verification and Data Validation (U.S. EPA240R-02/004) has been taken:

> "As part of a site characterization soil sampling program for evaluating a potential remediation project, silver is a metal of interest. After samples have been collected, analyzed, and the results reported, the data is submitted for data verification. The data verification process documents that silver recoveries for spiked samples fell below control limits. The data validation process traces the cause for the non- conformance to an elevated pre-spike sample concentration. The data validator notes that the laboratory control samples all have recoveries within criteria, and other spiked samples have recoveries within criteria, and the field duplicate results have significant variability. The data validation process determines that the low silver recovery is a result not of analytical bias, but of the heterogeneity of the matrix. The data quality assessment process considers the fact that all soil samples have silver concentrations below the action limit for the site by a factor of two or more, and therefore the data quality is adequate for the purpose of site characterization. The matrix variability is noted and should be taken into account in planning future sample collection."

Data validation can be performed in a laboratory by staff independent of the data generation or by an independent third party submitting compliance data under this UIC QAPP. This validation ensures that all users can verify that decisions made using this data are supported by the type of data and quality needed and expected for their intended use. This validation is documented on the checklist provided at the end of this UIC QAPP.

Due to the variety of data uses and varying compliances to demonstrate compliance according to federal and state rules, not every laboratory analysis will involve the same degree of data validation and verification. For example, for permitted sites, with on-site laboratories, data verification may be predominantly an internal function of the field or laboratory staff to assure they are producing appropriate outputs according to their permits.

While field or laboratory staff verifies data in "real time" or near real time, TCEQ staff will perform external data verification after receipt of a completed data package (checklist and case-narrative) where all appropriate steps producing verification documentation are reviewed for completeness, factual content and against UIC Program/Permit specifications.

Implementation of Validating and Verifying Data

Staff of the UIC Permits Section of the RMD, CID UIC staff, MD, PSEAD, and Regional Offices, Corrective Action Program of the REM, IHW Permits Section of the WPD, and Registration and Reporting Section of the OLRD are data users. These data users are the program staff authorized to determine the compliance status of the data supplier, or the regulated community. Program staff review and evaluate assessments, remediation activities, and closure activities submitted by the data supplier. In the review process, program staff may evaluate the documentation provided by the data suppliers to ensure that all validation and verification of data are performed and that all necessary corrective actions have been taken. Table D1.2 (Inputs from the Analytical Laboratory for Data Verification) presents information on a number of operations in the process of environmental data generation, commonly-used records, and the likely source of the specifications for such records that may be reviewed by TCEQ staff, regulated entity, permittee, or contractor depending upon their particular reporting requirements.

The data verification documentation should support the verified data that are reported. The data validator (e.g., contractor, permittee, TCEQ staff) should be aware of the requirements from any planning documents (e.g., Sampling and Analysis Plans, minimum QC performance criteria, regulatory standards etc.) so that the data validator knows what information the laboratory was required to provide. Table D1.2 (Inputs from the Analytical Laboratory for Data Verification) lists elements that can be used to validate data for its particular use.

TABLE D1.2 INPUTS FROM THE ANALYTICAL LABORATORY FOR DATA VERIFICATION

ESSENTIAL LABORATORY DATA REQUIREMENTS TO DEMONSTRATE COMPLIANCE TO UIC PROGRAM

Organic Analytes	Inorganic Analytes
Field/Laboratory sample ID Confirmation of results when positive results are detected from location not previously tested by laboratory Method reference number(s) (extraction/analysis where applicable) Detection & quantitation limits defined COC Date of analysis Sample receipt and login information System monitoring compound Positive controls • Matrix spike/matrix spike duplicate • Laboratory control sample • Surrogates Negative controls • Method Blanks GC/MS tuning - proof of acceptance Internal standard area and retention time summary Sample preparation details • Pre/post sample amounts • Extractions • Sample cleanups • Dilutions • Sample prep/extraction log Sample data • Case-Narrative • Quantitation reports • Chromatographs * • Spectra * • Instrument run log * • Initial calibration acceptance criteria met* • Continuing calibration acceptance criteria met* • Manual integrations with pre and post integration chromatograms* • Audit trail report * • Accreditation certification if not meeting exception defined in 30 TAC §25.6	Field/Laboratory sample ID Method reference number(s) (digestion/analysis where applicable) Detection & quantitation limits defined COC Date of analysis Sample receipt and login information Positive controls • Matrix spike/matrix spike duplicate • Laboratory control sample (LCS) Negative controls • Method Blanks Inductively Coupled Plasma (ICP) interference check sample criteria met* Post digestion spike sample information Method of standard addition (MSA) if applicable Sample preparation details • Pre/post sample amounts • Digestions • Dilutions • Sample prep log* Sample data • Case-Narrative • Raw sample data, instrument output* • Instrument run log* Initial calibration acceptance criteria* • Continuing calibration acceptance criteria* • Accreditation certification if not meeting exception as defined in 30 TAC §25.6

*Data not required in data package but may be requested by data reviewer as needed

D2. USEABILITY DETERMINATION

Purpose

The objective of this section is to describe how the results obtained from the project and/or task are reconciled with the requirements defined by the data user or decision maker. The proposed methods to analyze the data and determine possible anomalies or departures from assumptions established in the planning phase of data collection should be outlined. The process of how issues will be resolved and how limitations on the use of the data will be reported to decision makers should be described.

The UIC Permits Section of the RMD, CID UIC staff, and Regional Office staff are data users. These data users are the program staff authorized to determine the compliance status of the data supplier, or the regulated community. Program staff review and evaluate assessments, remediation activities, and closure activities submitted by the data supplier. In the review process, program staff may evaluate if limitations on the use of the data were reported to data users and/or decision makers. If no limitations were reported and limitations are found, the data is returned as deficient.

The data users evaluate the effects of the uncertainly associated with the qualified data, such as the potential bias and imprecision of data. The data users consider the deviations made from the approved QAPP and also determine if data rejected by the data reviewer are critical to the decision being made with the data.

Questions or comments regarding the contents of this QAPP may be directed to the TCEQ Lead UIC Quality Assurance Specialist: Tamara Young (512) 239-6582.

Appendix A

Acronyms & Abbreviations

CCEDS – Consolidated Compliance and Enforcement Data Systems
CFR – Code of Federal Regulation
CID – Critical Infrastructure Division
COC- Chain-of-Custody
DQO – Data Quality Objective
EAR – Enforcement Action Referral
EI – Environmental Investigator
EIC – Enforcement Initiation Criteria
ENF – Enforcement Division
EPA or U.S. EPA – The United States Environmental Protection Agency
FODweb – Field Operations Documents Website
GC – Gas Chromatography
GCMS or GC/MS – Gas Chromatography Mass Spectrometry
HSWA – Hazardous and Solid Waste Amendments
IDA – Internal Data Applications
IHW – Industrial and Hazardous Waste
LCN – Laboratory Case Narrative
LCS – Laboratory Control Sample
LDEQ – Louisiana Department of Environmental Quality
LOD – Limits of Detection
LOQ – Limits of Quantitation
MD – Monitoring Division
MDL – Method Detection Limit
MDP – Method–Defined Parameter
MI – Mechanical Integrity
MIT – Mechanical Integrity Test
MS – Matrix Spike
MSD – Matrix Spike Duplicate
NELAC – National Environmental Laboratory Accreditation Conference
NIST – National Institute of Standards and Technology
OA – Office of Air
OAG – Office of Attorney General
OCE – Office of Compliance and Enforcement
OLRD – Occupational Licensing and Registration Division
OOW – Office of Waste
PARIS – Permitting and Registration Information Systems
PCB - polychlorinated biphenyl
PCL – Pollutants Concentration Limits
PDP – Professional Development Plan
PIA – Public Information Act
POC – Parameter of Concern
PQL – Practical Quantitation Limit
PSEAD – Program Support and Environmental Assistance Division
PT – Proficiency Testing
QA – Quality Assurance
QAM – Quality Assurance Manual
QAPP – Quality Assurance Project Plan
QAS - Quality Assurance Specialist
QC – Quality Control
QMP – Quality Management Plan
RCRA – Resource Conservation and Recovery Act
RFA – Request for Analysis
RMD – Radioactive Materials Division
RPD – Relative Percent Difference
RRCT – Railroad Commission of Texas
SOP – Standard Operating Procedures
TAC – Texas Administrative Code

TCEQ – Texas Commission on Environmental Quality
TCLP – Toxicity Characteristic Leaching Procedure
TNI – The NELAC Institute
TRRP - Texas Risk Reduction Program
TSD – Treatment, Storage and Disposal
TWC – Texas Water Code
UIC – Underground Injection Control
USDW – Underground Source of Drinking Water
VOA – Volatile Organics Analysis
VOC – Volatile Organic Compound
WAP – Waste Analysis Plan

Appendix B

Glossary

Acceptance Criteria: Specified limits placed on characteristics of an item, process, or service defined in requirement documents. (ASQC)

Accreditation: The process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications or standards, thereby accrediting the laboratory. In the context of the National Environmental Laboratory Accreditation Program (NELAP), this process is a voluntary one.

Accreditation Body: Authoritative body that performs accreditation. (TNI) Although NELAP is a national program, state, territorial, or federal governmental agencies serve as Accreditation Bodies having responsibility and accountability for environmental laboratory accreditation and for granting accreditation. The TCEQ is the TNI Accreditation Body for the State of Texas. A NELAP Accreditation Body will also accept, by recognition, the accreditation status of a laboratory as determined by another NELAP Accreditation Body (this is called secondary accreditation). Each Accreditation Body must adopt and adhere to this principle as a condition of membership in NELAP. In accepting the accreditation status of a laboratory through recognition, the Accreditation Body assumes accreditation responsibilities as a secondary accreditation body.

A laboratory seeking accreditation must apply to its home state Accreditation Body for accreditation. However, if the Accreditation Body does not offer accreditation for testing in conformance with a particular field of accreditation (matrix-method/technology- analyte/analyte group), laboratories may obtain primary accreditation for that particular field of accreditation from any other NELAP Accreditation Body.

Accuracy: The degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components which are due to sampling and analytical operations; a data quality indicator.

Batch: Environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lots(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same TNI-defined matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last samples (extract, digestates or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples.

Blank: A sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results. Each batch of samples, up to 20, should include the appropriate type of blanks depending upon the sample type, location and any other contributing factors that could compromise data integrity. Blanks include:

> **Equipment** *(rinsate)* **Blank:** A sample of analyte-free media which has been used to rinse common sampling equipment to check effectiveness of decontamination procedures.
>
> **Field Blank:** Blank prepared in the field by filling a clean container with pure de- ionized water and appropriate preservative, if any, for specific sampling activity being undertaken.
>
> **Instrument Blank:** A clean sample (e.g., distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination.
>
> **Method Blank:** A sample of a matrix similar to the batch of associated samples that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes (e.g., Chemicals of Concern 30 TAC Chapter 335) or interferences are present at concentration that impact the analytical results for sample analyses.
>
> **Trip** *(travel)* **Blanks:** Trip blanks are used for volatile organic compounds (VOCs) analysis only. In addition, trip blanks are prepared prior to going into the field by filling containers (VOC vials) with clean water (HPLC-grade) or sand. The sample containers are kept closed and maintained with the sample containers associated with site-specific VOC analysis until returned to the laboratory. Trip blanks are used to evaluate error associated with shipping and handling (i.e., diffusion of volatile organics though the septum during shipment and storage) and analytical procedures. They are used in conjunction with field blanks to isolate sources of sample contamination already noted in previous field blanks. If the trip blank has detectible quantities of the Chemicals of Concern (i.e., analytes of interest) it is possible that any positive results in the sample may be due to contamination; either by accident or by design. (Fundamentals of Environmental Sampling and Analysis)

Chain of Custody (COC) Form: Record that documents the possession of the samples from the time of the collection to receipt in the laboratory. This record generally includes: the number and types of containers; the mode of collection; collector; time of collection; preservation; and requested analysis.

Confirmation: Verification of the identity of a component through the use of an approach with a different scientific principle from the original method. These may include, but are not limited to:

> Second column confirmation;
> Alternate wavelength;
> Derivatization;
> Mass spectral interpretation;
> Alternate detectors; or/and
> Additional cleanup procedures.

Data Quality Objectives (DQOs): Qualitative and quantitative statements derived from a process used to develop performance and acceptance criteria that clarify study, technical, and quality objectives; define the appropriate type of data; and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions. The document Guidance on Systematic Planning Using the Data Quality Objectives Process (EPA QA/G-4) provides a standard working tool for project managers and planners to develop DQOs for determining the type, quantity, and quality of data needed to reach defensible decisions or make credible estimates.

Data Validation: An analyte and sample specific process that extends the evaluation of the data beyond method, procedural, or contractual compliance (i.e., data verification) to determine the analytical quality of a specific data set. (U.S. EPA QA/G-8)

Data Verification: Process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements. (U.S. EPA QA/G-8)

Data Reduction: The process of transforming the number of data items by arithmetic or statistical calculation,

standard curves, and concentration factors and collating them into more a more useful form.

Detection Limit *(also see Method Detection Limit)***:** The lowest concentration or amount of the target analyte (also called Chemical of Concern 30 TAC Chapter 335) that can be identified, measured, and reported with confidence that the analyte concentration is not a false positive value.

Environmental Sample *(also referred to as field sample)***:** An environmental sample is a representative sample of any material (aqueous, non-aqueous, or mixed matrix) collected from any source for which determination of composition or contamination is requested or required.

Field of Accreditation: TNI's approach to accrediting laboratories by matrix, technology/method and analyte/analyte group.

Field Duplicates *(also referred to as field replicates and split samples)***:** These are field samples obtained from one sampling point, homogenized, divided into separate containers, and treated as separate samples throughout the remaining sampling handling and analytical processes. These field replicate samples are used to assess error associated with sample heterogeneity, sample methodology, and analytical procedures. Unlike field replicates, collocated samples are not composited and used as discrete samples in order to assess site variation in the immediate vicinity of the sampling area. (Fundamentals of Environmental Sampling and Analysis)

Field Measurement: The determination of physical, biological, or radiological properties, or chemical constituents that are measured on-site, close in time and space to the matrices being sampled/measured, following accepted test methods. This testing is performed in the field outside of a fixed-laboratory or outside of an enclosed structure that meets the requirement of a mobile laboratory.

Field Spikes: Field spikes are usually collected once every sampling event. These samples are used by the laboratory to demonstrate the stability of the sampling matrix. The field spike is usually made by spiking some of the sampling matrix with known amount of surrogate spike in the field.

Holding Times: (*Maximum Allowable Holding Times***):** The maximum times that samples may be held prior to analysis and still be considered to be valid or compromised. (40 CFR Part 136)

Internal Standard: A known amount of standard added to a test portion of a sample as a reference for evaluation and controlling the precision and bias of the applied analytical method.

Laboratory Control Sample (LCS): *(however named, such as laboratory fortified blank, spiked blank or QC check sample)***:** A sample matrix, free from the analytes of interest (aka – Chemicals of Concern) spiked with verified known amounts of analytes or a material containing known and verified amounts of analyte generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.

Laboratory Duplicate: Aliquots of sample taken from the sample container under laboratory conditions and processed and analyzed independently.

Limit of Detection (LOD): *(also called method detection limit in the 30 TAC Chapter 335):* An estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte and matrix specific and may be laboratory dependent.

Matrix: The substrate of a test sample.

> **Field of Accreditation Matrix**: These matrix definitions (applicable to this QAPP) will be used by the Texas Accreditation Program.
>
> **Air and Emissions:** Whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbent tube, impinger solution, filter, or other device.
>
> **Aqueous:** Any aqueous sample excluded from the definition of Drinking Water matrix or Saline/Estuarine source including surface water, groundwater, effluents and TCLP or other extracts.
>
> **Chemical Waste:** A product or by-product of an industrial process that results in a matrix not previously defined.
>
> **Drinking Water:** Any aqueous sample that has been designated a potable or potential potable source.
>
> **Non-Aqueous Liquid:** Any liquid with <15% settleable solids.
>
> **Non-Potable Water:** Any aqueous sample excluded from the definition of Drinking Water matrix including surface water, groundwater, effluents, water treatment chemicals and TCLP or other extracts.
>
> **Solid and Chemical Materials:** Includes soils, sediments, sludges, products and by products or an industrial process that results in a matrix not previously defined.
>
> **Solids:** Includes soils, sediments, sludges and other matrices with >15% settleable solids.

Matrix Spike (MS) *(spiked sample or fortified sample)***:** A sample prepared by adding a known mass of target analyte to a specified amount of matrix ample for which an independent estimate of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recover efficiency. (QAMS)

Matrix Spike Duplicate (MSD) *(spiked sample or fortified sample duplicate):* A second replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte. (QAMS)

May: Denotes permitted action, but not required action.

Method Detection Limit: (**MDL**) One way to establish a LOD, defined as a minimum concentration of a substance (an analyte) that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

Must: Denotes a requirement that must be met. (Random House College Dictionary)

National Accreditation Database: The publicly accessible database listing the accreditation status of all laboratories participating in NELAP.

National Institute of Standards and Technology (NIST): An agency of the U.S. Department of Commerce's Technology Administration that is working with U.S. EPA, States, TNI and other public and commercial entities to

establish a system under which private sector companies and interested States can be accredited by NIST to provide traceable PT to those laboratories testing drinking water and wastewater. (NIST).

Precision: The degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms.

Preservation: Refrigeration and/or reagents added at the time of sample collection (or later) to maintain the chemical and/or biological integrity of the sample.

Proficiency Test Sample: A sample, the composition of which is unknown to the analyst and provided to test whether the analyst/laboratory can produce analytical results within specified acceptance criteria.

Proficiency Testing (PT): A means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source.

Quality Assurance (QA): An integrated system of management activities involving planning, implementation, documentation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the customer.

Quality Assurance Project Plan (QAPP): A document describing in comprehensive detail the necessary QA, QC, and other technical activities that should be implemented to ensure that the results of the work performed will satisfy the stated performance criteria.

Quality Control (QC): The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated needs established by the customer; operational techniques and activities that are used to fulfill requirements for quality.

Quality Control Sample: A sample used to assess the performance of all or a portion of the measurement system. QC sample may be Certified Reference Materials, a quality system matrix fortified by spiking, or actual samples fortified by spiking.

Replicate Analysis (duplicate analysis): The measurements of the target analyte performed identically on two or more sub-samples of the same sample within a short time interval.

Resource Conservation and Recovery Act (RCRA): The enabling legislation under 42 USC 321 et seq. (1976), that gives U.S. EPA the authority to control hazardous waste from the "cradle-to-grave" including its generation, transportation, treatment, storage, and disposal.

Safe Drinking Water Act (SDWA): The enabling legislation, 42 USC 300f et seq. (1974), (Public Law 93-523), that requires the U.S. EPA to protect the quality of drinking water in the U.S. by setting maximum allowable contaminant levels, monitoring and enforcing violations. The Underground Injection Control Program falls under this act.

Shall: Denotes a requirement that is mandatory whenever the criterion for conformance with the specifications requires that there be no deviation. This does not prohibit the use of alternative approaches or methods for implementing the specifications so long as the requirement is fulfilled. (ANSI).

Should: Denotes a guideline or recommendation whenever non-compliance with the specification is permissible. (ANSI)

Spike: A known mass of target analyte added to a blank sample or sub-sample; used to determine recovery efficiency or for other QC purposes.

Surrogate: A substance with properties that mimic an analyte of interest. It is unlikely to be found in an environmental sample and is added to it for QC purposes

Appendix C

References

1. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846 3rd Edition, as updated
2. U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, U.S. EPA 540/R-94/013, February 1994
3. U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, U.S. EPA 540/R-94/012, February 1994
4. U.S. EPA Risk Assessment Guidance for Superfund, U.S. EPA 540/R-92/001-004, December 1991
5. U.S. EPA RCRA Sampling Procedures Handbook, Region VI, May 1998
6. 2016 TNI Standard, NELAC Institute
7. 40 CFR Parts 144-148 and 260-270
8. TCEQ Guidance on Implementing SW-846 Method 5035
9. U.S. EPA RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, November 1992
10. U.S. EPA RCRA Sampling Procedures Handbook, Revised May 1998
11. TCEQ Enforcement SOPs.
12. Field Operations Division Standard Operating Procedures, Latest Revision
13. Enforcement Initiation Criteria, Latest Revision
14. U.S. Environmental Protection Agency (2002): Guidance on Environmental Data Verification and Data Validation, QA/G-8.
15. Current Perspectives in Site Remediation and Monitoring – The Relationship Between SW-846, PBMS, and Innovative Analytical Technologies U.S. EPA 542-R- 01-015.

Appendix D

Laboratory Data QA/QC Report Instructions

UIC Program Laboratory Data QA/QC Report Instructions

The Laboratory Data Report QA/QC Checklist, (Appendix E) checklist is a tool designed to be completed by all permittees/laboratories, waste generators/laboratories, and any other regulated activities that require an analytical demonstration to verify compliance for the UIC program within the Radioactive Materials Division. The purpose of this checklist is to ensure that the records associated with all analytical data reflect all of the processes and procedures used to generate them, and to evaluate completeness, correctness, and compliance of the data against the applicable TCEQ and federal requirements.

I. Texas Accreditation Program

Laboratories providing data to the TCEQ must be NELAP-accredited unless an exception can be made under 30 TAC §25.6. In addition, all data used to meet compliance with the UIC program will also have to meet the performance criteria as designated in this QAPP.

II. Analytical Methods and Method Modifications Clarifications & Procedures

Analytical Methods

TCEQ rules allow flexibility in method selection consistent with U.S. EPA's 2005 Methods Innovation Rule. Unless prohibited by law, rule, or method, permittees/laboratories are not required to use U.S. EPA SW-846 methods when conducting RCRA monitoring programs. This allows for all versions of a method or different U.S. EPA method if the laboratory can demonstrate compliance through acceptable QA of the performance standards. All methods used by the laboratory must be provided on data report sheets and/or the checklist.

Method Modification Procedures

Due to the variation of waste, it is the responsibility of the permittee/laboratory to find the appropriate method suitable to demonstrate compliance along with data of known quality unless a particular method is required by permit or rule. The U.S. EPA and TCEQ recognize this flexibility through the CFR and TAC and require the permittee, or entity required to demonstrate compliance, to have a laboratory modify a method (as allowed) to ensure compliance to the UIC thereby protecting the environment and human/animal population. This is due on principle that most UIC methods are considered performance-based and guidance, therefore modifications to methods in SW-846 may be necessary to meet or enhance performance that could not otherwise be attained to demonstrate compliance. In other words, most of the methods are not one- size-fits-all and should be tailored to fit the sample type and associated interferences while maintaining clear and controlled QC performance standards. Other methods are not guidance and are written into the CFR and must be used without any modification if they are legally and defensibly used to demonstrate compliance for their intended purposes in the UIC programs. These are referred to as Method Defined Parameters (MDPs) and can be found at 40 CFR §260.11 (e.g., *Toxicity Characteristic Leaching Procedure (TCLP; flashpoint procedure, and corrosivity to identify hazardous waste*). Any modifications to these methods must have prior approval from the U.S. EPA.

All modifications to methods must be listed on the Case-Narrative Sheet and be written in the laboratory's SOP if this is a routine procedure or whether a modification was necessary at the time of sample preparation and analysis to demonstrate compliance. A list of potentially acceptable modifications that are allowed for meeting UIC compliance according to the U.S. EPA and TCEQ is presented here.

Equipment	
AA or AE lamp type Absorption cell size Amperometer equipment Atomizer type Auto-analyzer equipment Mixing technology Measurement technology Reaction procedure Automatic concentration equipment (e.g., TurboVap) Beaker and/or flask size Centrifuge tube size Chromatographic cleanup/isolation column type/size Chromatography column and dimensions Colorimetric apparatus Condenser glassware Connective tubing type Dilution glassware type/size Dissolved oxygen analyzer Distillation apparatus Evaporating dish type/size Filter type/size Filtration apparatus Flame AA burner type Fume traps Furnace AA platform and tube type Glassware stopper type	Gooch crucible/platinum dish size Graduated cylinder size Heating equipment Hydride generator Kuderna-Danish size Photometer type Pipet size Pressure reduction apparatus Proportionating or peristaltic pump Purge gas Reduction column composition/size Reflux apparatus Sample cooling and/or stirring devices Sample container type/size Sample digestion apparatus Chemical oxidation Microwave digestion Sample purge cell type/size Sample trap material/size Scrubber apparatus size Separatory funnel size Synder column Solvent delivery System Syringe size Titration vessel size Vacuum apparatus Vial size
Chemicals	

Atomic absorption/emission fuels and oxidant Buffer solution Catalyst Cleanup column elution solvent Color developing reagent Dechlorination reagents for residual chlorine Desiccant/drying chemical Dilution water composition Extraction solvent Fuel/oxidant ratio Class cleaning chemical HPLC system/pump Indicator solution	Inhibitor solution Internal standards Materials for reference matrix (e.g., air/gas, effluent water, oil, sand, soil Nitrification inhibitor Oxidizing and reducing agents Partitioning solvent Sample preservation chemical Sample digestion chemical Scrubber solution and concentration Stock solution concentration Surrogates Titrant
Specifications	
Aeration time Calibration range Conductance measurements Dehydration techniques Desorption technique and time Glassware cleaning techniques and sequences Heating time Hydride elimination techniques Interference elimination techniques	Metal-and-organic-free water preparation. reflux time Sample aliquot size Sample cleanup techniques Sample cooling techniques and times Sample digestion/extraction techniques Sample mixing techniques Solution Standardization techniques

III. How to Complete the Laboratory Data Report QA/QC

Provide a completed copy of the Laboratory Data Report QA/QC Checklist (Appendix E) for all analytical data sets submitted to the TCEQ to verify compliance to UIC Program with the Radioactive Materials Division.

- If entries are lengthy or in Table form: (1) refer in the checklist to a specific section of the reference or modified method or (2) use a separate sheet to document the information, indicate “See Attachment No.,” and attach the sheet to the checklist. Assign a number or other unique identifier to each attachment and indicate the identifier in the space on the checklist.
- All performance standards (QA/QC samples) that did not meet compliance to the goals and/or requirements to this QAPP must be described in the Case-Narrative for further evaluation by TCEQ staff to determine whether the data can be used to demonstrate regulatory compliance to the program requirements.
- All modifications to methods by the laboratory must be identified in the Case- Narrative (Appendix F) for record.
- Sample matrix interference problems must be identified in the Case-Narrative (Appendix F) and any corrective action the laboratory took including calling the TCEQ or modifying the method.
- The laboratory report sheet must comply with the minimum reporting requirements of the 2016 TNI Standards.
- The method detection limit (MDL), also known as the limit of detection (LOD–2016 TNI Standards), and the practical quantitation limit (PQL-2016 TNI Standards), also known as the limit of quantitation (LOQ), must be clearly defined.
- Each laboratory must define all flagged data.
- Any results reported outside the lower and upper calibration standards will be considered an estimate and must be flagged.
- A statement or sampling and run dates or proof by COC forms must be provided to verify that samples were run within required holding times.

Appendix E

Laboratory Data QA/QC Report Checklist

Laboratory Data QA/QC Report Checklist

Facility Name:	**Permit No.:**	**For TCEQ Use Only**
Laboratory Name:	**U.S. EPA I.D. No.:**	
Reviewer Name:	**TCEQ Project Manager/Data Reviewer:**	
Date:	**Date:**	

Description	Status	Case Narrative (Check Box)	Technically Complete
1. Were laboratory analyses performed by a laboratory accredited by TCEQ, whose accreditation included the matrix (ces), methods, and parameters associated with the data? If not was an explanation given in the case-narrative (e.g., laboratory exemption, accreditation for method /parameter not available from TCEQ)?	Yes☐ No☐ NA☐ Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
2. Was a case-narrative from laboratory (QC data description summary) submitted with the data set?	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
3. Are the sample collection, preparation and analyses methods listed in the permit, preparation and analysis methods listed in the permit or other documents specifying criteria the ones used on the final report?	Yes ☐ No ☐NA ☐	☐	Yes☐ No☐ NA☐
4. Were there any modifications to the sample collection, preparation and/or analytical methodology (ies)? If so was the description included on the Case-Narrative?	Yes☐ No☐ NA☐ Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
5. Were all samples prepared and analyzed within required holding times?	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
6. Were samples properly preserved according to method and QAPP requirements?	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
7. Have the method detection limits (MDL) and/or practical quantitation limit (PQL) been defined in the final report? Note: NELAC uses terms limit of detection (LOD) and limit of quantitation respectively.	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
8. Do parameters listed on final report match regulatory parameters of concern (POC) specified in permit and/or Waste Analysis Plan or other required document? Note: POC may also be referred to chemicals of concern (COCs)	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
9. Are the POC's included within the analytical method's target analyte list?	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
10. Were the appropriate type(s) of blanks analyzed?	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
11. Did any blank samples contain POC concentrations >5x or 10x of MDL? If so, please explain potential bias.	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
12. Were method blanks taken through the entire preparation and analytical process?	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
13. Did the calibration curve and continuing calibration verification meet regulatory (e.g. NELAC Standards) method specifications (No. of standards, acceptance criteria, etc.)?	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
14. Do the initial calibration standards include a concentration below the regulatory limit/decision level? If not please explain. If an MDL and PQL are each used on a report then the relationship between the two must be defined for each method.	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
15. Were manual peak integrations performed? If so pre and post chromatograms and method change histories may be requested.	Yes☐ No☐ NA☐ Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
16. Were all results bracketed by a lower and upper range calibration standard?	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
17. Was any result reported outside of the range of the calibration standards?	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
18. Were all matrix spike (MS) and MS duplicate (MSD) recoveries within the data decision making goals of QC data in the UIC QAPP and/or within the laboratories control charts?	Yes☐ No☐ NA☐ Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐

Facility Name:	Permit No.:	For TCEQ Use Only
Laboratory Name:	U.S. EPA I.D. No.:	
Reviewer Name:	TCEQ Project Manager/Data Reviewer:	
Date:	Date:	

Description	Status	Case Narrative (Check Box)	Technically Complete
If not were data flagged with explanation in case-narrative?			
19. Were all of the MS and MSD relative percent differences (RPDs) within the data decision making goals of QC data in the UIC QAPP? If not were data flagged with explanation in case-narrative?	Yes☐ No☐ NA☐ Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
20. Were all laboratory control sample (LCS) recoveries at least within the MS and MSD ranges of recoveries and within laboratories control charts? If not were data flagged with explanation in the case-narrative?	Yes☐ No☐ NA☐ Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
21. Were all POCs (COCs) in the LCS?	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
22. Were the MS and MSD from samples collected for this work order or other samples in the analytical batch as defined by the Accreditation Standards? *This information is used to identify factors contributing to matrix interferences. It should not be assumed, unless it is understood by the laboratory, that samples relating to this report were the ones selected to be fortified with the POCs.*	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐
23. Were any of the samples diluted? If so were appropriate calculations made to the MDL and/or PQL of the final report?	Yes☐ No☐ NA☐	☐	Yes☐ No☐ NA☐

Appendix F

Laboratory Data Report QA/QC

Laboratory Case Narrative

LABORATORY DATA REPORT QA/QC CHECKLIST

Laboratory Case Narrative

(To accompany laboratory checklist)

Facility Name:	Permit No.:
Laboratory Name:	U.S. EPA I.D. No.:

Method No.	Non-conformance Description	Method Modification Description