



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 6  
1445 ROSS AVENUE, SUITE 1200  
DALLAS TX 75202-2733

**RECEIVED**

JUL 25 2016

**WASTE PERMITS DIVISION  
TEXAS COMMISSION ON  
ENVIRONMENTAL QUALITY**

July 20, 2016

Mr. Brent Wade  
Deputy Director  
Office of Waste  
Texas Commission on Environmental Quality  
Post Office Box 13087  
Austin, Texas 78711-3087

Dear Mr. Wade:

The Environmental Protection Agency Region 6 has completed its review of the FY2017 Quality Assurance Project Plan (QAPP) for the Environmental Monitoring and Measurement Activities Relating to the Resource Conservation and Recovery Act (RCRA) and Underground Injection Control. The document has been assigned tracking number Q-Track 16-275.

EPA has approved the FY2017 QAPP effective September 1, 2016, and expiring August 31, 2017. The executed signature page and review checklist are enclosed. If we may be of further assistance, please call me at (214) 665-7357, or call Ms. Cheryl Scott, Texas RCRA Project Officer, at (214) 665-2179.

Sincerely,

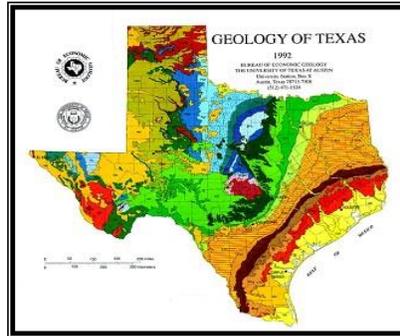
A handwritten signature in black ink, appearing to read "Melissa Smith".

Melissa Smith  
Chief  
Program Support Section (6MM-RS)  
Multimedia Division

Enclosure

cc: Ms. Brandy Brooks, Manager  
Business and Program Services Section  
Waste Permits Division

# **Texas Commission on Environmental Quality**



**Fiscal Year 2017**  
**Quality Assurance Project Plan**  
**For**  
**Environmental Monitoring and Measurement Activities**  
**Relating to the Resource Conservation and Recovery Act**  
**(RCRA)**  
**&**  
**Underground Injection Control (UIC)**

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**U.S. EPA Approved: 7/20/16**  
**QAPP QTRAK Number: 16-275**  
**Effective: September 1, 2016 - August 31, 2017**



**P.O. Box 13087**  
**Austin, Texas 78711-3087**

## ***FOREWORD***

This document provides the Quality Assurance Project Plan (QAPP) requirements for the Texas Commission on Environmental Quality (TCEQ or Commission) conducting environmental data operations on behalf of the State of Texas and the United States Environmental Protection Agency (U.S. EPA) through contracts with commercial laboratories, the TCEQ laboratory, permits, corrective action, enforcement and other regulated activities for the Resource Conservation and Recovery Act (RCRA) and Underground Injection Control (UIC) Programs.

The RCRA/UIC QAPP complies with U.S. EPA Order CIO 2105-P-01-0 to establish a mandatory Quality System. The U.S. EPA Order CIO 2105.0, *Policy and Program Requirements for the Mandatory Agency-wide Quality System*, provides requirements for the conduct of quality management practices, including quality assurance (QA) and quality control (QC) activities, for all environmental data collection and environmental technology programs performed by or for the U.S. EPA. The primary goal of Order is to ensure that environmental programs and decisions are supported by data of the type and quality needed and expected for their intended use and that decisions involving the design, construction, and operation of environmental technology are supported by appropriate quality assured engineering standards and practices.

In 2003, House Bill (HB) 2912 was codified in the Texas Water Code (TWC) requiring the TCEQ to accept only environmental testing laboratory data generated by laboratories accredited under the Texas Laboratory Accreditation Program using National Environmental Laboratory Accreditation Conference (NELAC) standards when the data are used by the TCEQ for various decisions. 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 (TNI) 2009 TNI Standards. This includes requirements related to proficiency testing.

To read more about the TCEQ Quality System, refer to the TCEQ's Quality Management Plan (QMP), Revision 20.

**A1 TITLE AND APPROVAL SHEETS**

**Enforcement Division**

Name: Bryan Sinclair

Title: Director

Signature: Bryan Sinclair Date: 6/7/2016

Name: James Gradney

Title: Waste Section Manager

Signature: James Gradney Date: 6/7/16

**Monitoring Division**

Name: Sharon R. Coleman, Laboratory and Quality Assurance Section

Title: TCEQ Quality Assurance Manager

Signature: Sharon R. Coleman Date: 6/7/2016

**Critical Infrastructure Division**

Name: Kelly Cook

Title: Director

Signature: \_\_\_\_\_



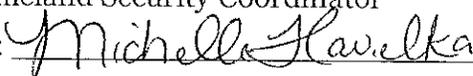
Date: \_\_\_\_\_

6/14/16

Name: Michelle Havelka

Title: Homeland Security Coordinator

Signature: \_\_\_\_\_



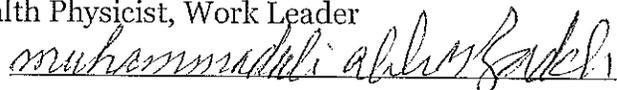
Date: \_\_\_\_\_

06/20/16

Name: Muhammadali Abbaszadeh, Homeland Security Section, Radioactive Materials Compliance Team (RMCT)

Title: Health Physicist, Work Leader

Signature: \_\_\_\_\_



Date: \_\_\_\_\_

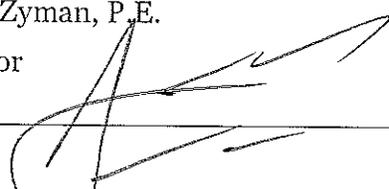
6/14/2016

**Permitting and Registration Support Division**

Name: Jaya Zyman, P.E.

Title: Director

Signature: \_\_\_\_\_



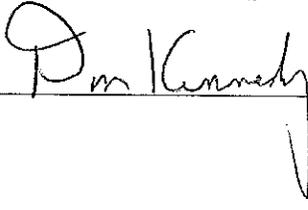
Date: \_\_\_\_\_

6/7/16

Name: Don Kennedy, Registration and Reporting Section

Title: Section Manager

Signature: \_\_\_\_\_



Date: \_\_\_\_\_

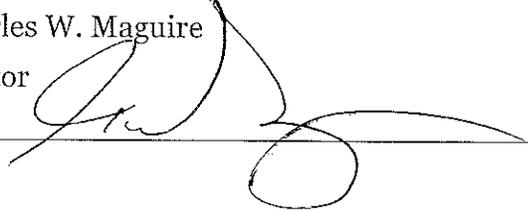
6/7/16

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**Radioactive Materials Division**

Name: Charles W. Maguire

Title: Director

Signature:  Date: 6/10/16

Name: Lorrie Council, P.G., UIC Permits Section

Title: Section Manager

Signature:  Date: 6/8/16

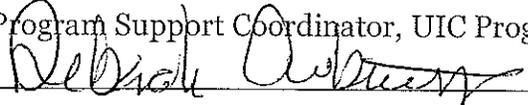
Name: Tom Robichaux, UIC Permits Section

Title: UIC Grant Manager

Signature:  Date: 6/8/16

Name: Debi Armbruster, UIC Permits Section

Title: UIC Program Support Coordinator, UIC Program Quality Assurance Specialist

Signature:  Date: 6/8/16

**Remediation Division**

Name: Beth Seaton

Title: Director

Signature: \_\_\_\_\_

*Beth Seaton*

Date: \_\_\_\_\_

*6/7/16*

Name: Merrie Smith, P.G., Voluntary Cleanup and Corrective Action (VCP-CA) Section

Title: Section Manager

Signature: \_\_\_\_\_

*Merrie Smith*

Date: \_\_\_\_\_

*6/7/16*

**Toxicology Division**

Name: Michael Honeycutt, Ph.D.

Title: Director

Signature:  Date: 6-8-16

**Waste Permits Division**

Name: Earl Lott

Title: Director

Signature: Earl Lott Date: 6/9/16

Name: Bob Patton, Industrial and Hazardous Waste Permits Section

Title: Section Manager

Signature: [Signature] Date: 6/7/2016

Name: Charly Fritz, Business & Program Services Section

Title: Section Manager, RCRA/UIC Program

Signature: Charly Fritz Date: 6/7/16

Name: Anju Chalise, Business & Program Services Section

Title: Lead Quality Assurance Specialist

Signature: Anjusharma Chalise Date: 6/6/2016

Name: Steve Hutchinson, MPA, Business & Program Services Section

Title: RCRA Grant Manager

Signature: [Signature] Date: 6/6/2016

**Water Quality Planning Division**

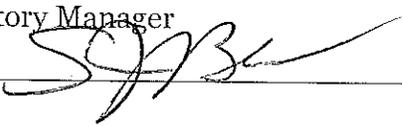
Name: Kelly Holligan

Title: Director

Signature:  Date: 6/24/2016

Name: Shirley J. Best, Sugar Land Laboratory

Title: Laboratory Manager

Signature:  Date: 6/20/16

**Office of Compliance & Enforcement Regional Areas**

Name: Susan M. Jablonski, P.E., Central Texas Area

Title: Director

Signature: *Susan Jablonski* Date: 06/16/16

Name: Beryl Thatcher, Program Support Section

Title: Section Manager

Signature: *Beryl Thatcher* Date: 06/16/16

Name: David A. Ramirez, Border and Permian Basin Area

Title: Director

Signature: *David A. Ramirez* Date: 6-16-16

Name: Kelly Keel Linden, Coastal & East Texas Area

Title: Director

Signature: *Kelly Keel Linden* Date: 6-16-16

Name: Randy J. Ammons, North Central & West Texas Area

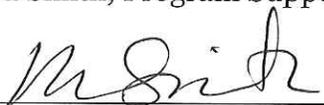
Title: Director

Signature: *Randy J. Ammons* Date: 6/16/16

**United States Environmental Protection Agency, Region 6**

Name: Melissa Smith, Program Support Section, Hazardous Waste Branch

Title: Chief

Signature:  Date: 7/13/16

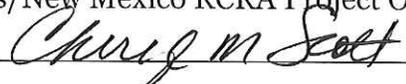
~~Name: Curry Jones, State/Tribal Oversight Section~~

~~Title: Chief~~

~~Signature: \_\_\_\_\_ Date: \_\_\_\_\_~~

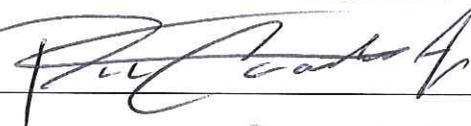
Name: Cheryl Scott, Program Support Section, Hazardous Waste Branch

Title: Texas/New Mexico RCRA Project Officer

Signature:  Date: 7/13/2016

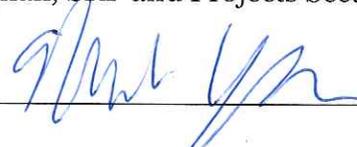
Name: Maurice Rawls, ~~State Revolving Fund (SRF) and Projects Section~~ Community Infrastructure Section

Title: Chief

Signature:  Date: 7/20/16

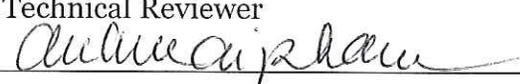
Name: Michael Vaughan, ~~SRF and Projects Section~~ Community Infrastructure Section

Title: Project Officer

Signature:  Date: 7/20/16

Name: Anhmai Pham, Program Support Section, Hazardous Waste Branch

Title: RCRA Technical Reviewer

Signature:  Date: 7/12/16

### **Contract Laboratories**

In lieu of signatures from participating contract laboratories, contracts executed by the Program Support Section (PSS) of the Central Texas Area and 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 the RCRA and UIC regulations.

Laboratories listed in the Distribution List are current as of July 1, 2016. If you have questions, please contact PSS Laboratory Contract Manager Julie Steger (512) 239-1542. The Department of State Health and Services Laboratory (DSHS) is contracted through the RMD.

**A2 TABLE OF CONTENTS**

FOREWORD ..... i

A1 TITLE AND APPROVAL SHEETS ..... ii

A2 TABLE OF CONTENTS ..... xiv

A3 DISTRIBUTION LIST ..... 1

A4 TCEQ PROJECT/TASK ORGANIZATION ..... 5

A5 PROBLEM DEFINITION/BACKGROUND ..... 8

A5.1 Purpose/Background for RCRA ..... 8

A5.2 Purpose/Background for UIC..... 9

A5.3 Testing and Monitoring Activities ..... 9

A5.4 Decision Makers ..... 11

A5.5 Principal Data Users ..... 11

A6 PROJECT/TASK DESCRIPTION..... 12

A6.1 Purpose/Background..... 12

A6.2 TCEQ RCRA/UIC Participating Divisions..... 12

A7 QUALITY OBJECTIVES AND CRITERIA ..... 16

A7.1 Purpose/Background ..... 16

A7.2 Specifying the Quality Objectives ..... 16

A7.3 Holding Times..... 18

A8 SPECIAL TRAINING/CERTIFICATION ..... 19

A8.1 Purpose/Background..... 19

A8.2 Investigator Training ..... 19

A8.3 Mechanical Integrity Tests (MIT) ..... 19

A8.4 Well Constructions, Workovers and Plugging ..... 20

A8.5 Laboratory Accreditation ..... 20

A9 DOCUMENTS AND RECORDS ..... 21

A9.1 Purpose/Background..... 21

A9.2 Information Included in the Reporting Packages..... 21

A9.2.1 Field Operations..... 21

A9.4 Official State Records..... 26

B1 SAMPLING PROCESS DESIGN ..... 27

B1.1 Purpose/Background ..... 27

B2 SAMPLING METHODS ..... 28

B2.1 Purpose/Background..... 28

B2.2 Sampling Considerations by Regional Office RCRA Investigators ..... 28

Table B2.2.1 Sample Collection Methods for Emissions from Hazardous Waste  
Facilities..... 30

Table B2.2.2 Bottles Required for Aqueous Samples ..... 31

Table B2.2.3 Bottles Required for Soil and Sediment Samples ..... 31

B2.3	Sampling Considerations by Regulated Entities Demonstrating Compliance	31
B2.4	Preservation and Holding Time Requirements	32
Table B2.4.1	Holding Times <sup>1</sup> and Preservation for Aqueous Samples	33
Table B2.4.2	Holding Times <sup>1</sup> and Preservation for Soil and Sediment Samples	34
B3	SAMPLE HANDLING AND CUSTODY	35
B3.1	Purpose/Background	35
B3.2	Sample Custody Procedure	35
B4	ANALYTICAL METHODS REQUIREMENTS	36
B4.1	Purpose/Background	36
B4.2	Preparation of the Samples	37
Table B4.2.1	Sample Preparation Procedures	37
B4.3	Analytical Methods	38
Table B4.3.1	Analytical Procedures	39
B4.4	Analytical Method Modifications	41
B5	QUALITY CONTROL AND ACCEPTANCE CRITERIA	42
B5.1	Purpose/Background	42
B5.2	QC Procedures	42
B5.2.1	Field Procedures	42
B5.2.2	Laboratory Procedures	43
Table B5.2.3.1	Matrix Spike/Matrix Spike Duplicate Acceptance Limits For Organic Gas Chromatography & Gas Chromatography Mass Spectrometry (GC & GCMS) and Inorganic Analyses	45
Table B5.2.3.2	Surrogate Spike Acceptance Limits For GC and GC/MS Organic Analyses	47
B6	INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE	52
B6.1	Purpose/Background	52
B6.2	Testing, Inspection and Maintenance	52
B7	INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY	54
B7.1	Purpose/Background	54
B7.2	Instrumentation Requiring Calibration or Standardization	54
B7.3	Calibration Methods	54
B7.4	Calibration Standards	54
B7.5	Calibration Frequency	54
B8	INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES	56
B8.1	Purpose	56
B8.2	Critical Supplies and Consumables	56
B8.3	Acceptance Criteria	56
B9	NON-DIRECT MEASUREMENTS	58
B9.1	Purpose	58
B10	DATA MANAGEMENT	60

B10.1 Purpose/Background.....	60
B10.2 Contract, Commercial and On-Site Laboratories.....	62
C1 ASSESSMENTS AND RESPONSE ACTIONS.....	63
C1.1 Purpose/Background .....	63
C1.2 Assessment Activities and Project Planning.....	63
Table C1.2.1 Documentation of Assessments .....	64
C1.3 Reporting and Resolution of Issues.....	65
C1.4 Laboratory Assessments and Corrective Action .....	66
C2 REPORTS TO MANAGEMENT .....	67
C2.1 Purpose/Background.....	67
D DATA VALIDATION AND USABILITY .....	68
D1 DATA REVIEW, VERIFICATION, AND VALIDATION.....	69
D1.1 Purpose/Background .....	69
D1.2 Delineation of Laboratory Responsibility and Checklists .....	71
D1.2.1 Reporting QA/QC Results .....	71
D2 VERIFICATION AND VALIDATION METHODS.....	73
D2.1 Purpose/Background.....	73
D2.2 Implementation of Validating and Verifying Data .....	74
Table D2.2.1 Inputs from the Analytical Laboratory for Data Verification.....	75
D3 RECONCILIATION WITH USER REQUIREMENTS .....	76
D3.1 Purpose/Background.....	76
GLOSSARY .....	77
REFERENCES .....	83
WASTE PERMITS LABORATORY DATA REPORT COVER PAGE .....	84
LABORATORY DATA QA/QC REPORT & ANNUAL GROUNDWATER DETECTION MONITORING CHECKLIST INSTRUCTIONS.....	85
I. Texas Accreditation Program.....	85
II. Analytical Methods and Method Modifications Clarifications & Procedures .....	85
III. I&HW Annual Groundwater Detection Monitoring Data.....	87
IV. How to Complete the Laboratory Data Report QA/QC Checklist & I&HW Annual Groundwater Detection Monitoring Checklist.....	87
Table D1.2 LABORATORY DATA QA/QC REPORT CHECKLIST .....	89
LABORATORY DATA REPORT QA/QC CHECKLIST .....	92
TABLE D1.3 WPD I&HW Annual Groundwater Detection Monitoring Report .....	94

### ***A3 DISTRIBUTION LIST***

#### **Office of the Executive Director**

##### **Toxicology Division**

Michael Honeycutt, Ph.D. (512) 239-1793 – MC 168

**Office of Water:** L'Oreal Stepney, P.E., Deputy Director (512) 239-1321

##### **Water Quality Planning Division**

Kelly Holligan (512) 239-2369 – MC 203 and

Shirley J. Best (281) 457-5229 - Sugar Land Laboratory

**Office of Compliance & Enforcement:** Ramiro Garcia, Jr., Deputy Director (512) 239-4481

##### **Enforcement Division**

Bryan Sinclair (512) 239-2171 and James Gradney (512) 239-6549 – MC 219

##### **Critical Infrastructure Division**

Kelly Cook (512) 239-0044, Michelle Havelka (512) 239-3134, and Muhammadali Abbaszadeh (512) 239-6078 – MC 177

##### **Monitoring Division**

Sharon R. Coleman (512) 239-6340 and Penny Sterling (512) 239-1617 - MC 165

##### **Program Support Section**

Beryl Thatcher (512) 239-2270, Peter Abel (512) 239-1189, Julie Steger (512) 239-1542–MC 174

#### **TCEQ Regional Area and Office Directors**

##### **Border and Permian Basin**

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

##### **Regional Office Directors**

Region 6 - El Paso, Lorinda Gardner (915) 834-4951

Region 7 – Midland, Lorinda Gardner (915) 834-4951

Region 15 - Harlingen, Jaime A. Garza (956) 430-6030

Region 16 - Laredo, Jaime A. Garza (956) 430-6030

##### **Central Texas Area**

Area Director Susan M. Jablonski, P.E. (512) 239-6731 MC/172

##### **Regional Office Directors**

Region 9 - Waco, David Van Soest (512) 239-0468

Region 11 - Austin, David Van Soest (512) 239-0468

Region 13 – San Antonio, Joel Anderson (210) 403-4010

**Coastal and East Texas**

Area Director Kelly Keel Linden (512) 239-3607 MC 172

**Regional Office Directors**

Region 5 - Tyler, Leroy Biggers (903) 535-5112

Region 10 - Beaumont, Kathryn B. Saucedo (409) 899-8747

Region 12 - Houston, Ashley K. Wadick (713) 767-3687

Region 14 – Corpus Christi, Susan Clewis (361) 825-3104

**North Central and West Texas**

Area Director Randy J. Ammons (806) 796-7092 MC R2

**Regional Office Directors**

Region 1 - Amarillo, Brad Jones (806) 468-0501

Region 2 - Lubbock, Gary Shipp (806) 796-7604

Region 3 - Abilene, Winona L. Henry (325) 698-6120

Region 4 – Dallas/Fort Worth, Tony Walker (817) 588-5902

Region 8 – San Angelo, Winona L. Henry (325) 698-6120

**Office of Waste:** Brent Wade, Deputy Director (512) 239-6566

**Permitting & Registration Support Division**

Jaya Zyman, P.E. (512) 239-2012 - MC 223 and Don Kennedy (512) 239-2154 – MC 129

**Waste Permits Division**

Earl Lott (512) 239-2047 and Bob Patton (512) 239-2277 – MC 130

Charly Fritz (512) 239-2331, Anju Chalise (512)239-1529, and Steve Hutchinson (512)

239-6716 – MC 126

**Radioactive Materials Division**

Charles W. Maguire (512) 239-5308, Lorrie Council, P.G. (512) 239-6461, and Debi Armbruster (512) 239-3972 - MC 233

**Remediation Division**

Beth Seaton (512) 239-2526 – MC 225, and Merrie Smith, P.G. (512) 239-5051 – MC221

**Contract Laboratories**

**A&B Environmental Services, Inc.**

10100 East Freeway, Suite 100  
Houston, Texas 77029  
(713) 453-6060

**ALS Group USA, Corp.**

10450 Stancliff Rd., Suite 210  
Houston, Texas 77099-4338  
(281) 530-5656

**Pace Analytical Services, Inc.**

400 W. Bethany, Suite 190  
Allen, Texas 75013  
(972) 727-1123

**XENCO Laboratories**

9701 Harry Hines Blvd.  
Dallas, Texas 75220  
(214) 902-0300

**Accutest Laboratories – Gulf Coast**

10165 Harwin Drive, Suite 150  
Houston, Texas 77036  
(713) 271-4700

**Lower Colorado River Authority**

3505 Montopolis Drive  
Austin, Texas 78744-1417  
(512) 356-6022

**Trace Analysis Inc.**

6701 Aberdeen Ave., Suite 9  
Lubbock, Texas 79424-1505  
(806) 794-1296

**Department of State Health Services**

1100 West 49<sup>th</sup> Street  
Austin, Texas 78756  
(512) 458-7587

**Environmental Protection Agency, Region 6**

1445 Ross Avenue

Suite No. 1200

Dallas, Texas 75202 - 2733

Cheryl M. Scott MC: 6MM-RS (214)665-2179, E-mail: [scott.cheryl-m@epa.gov](mailto:scott.cheryl-m@epa.gov)

Curry Jones MC/6PD-O (214) 665-6705, E-mail: [jones.curry@epa.gov](mailto:jones.curry@epa.gov)

Michael Vaughan MC/6WQ-AP (214) 665-7313, Email: [vaughan.michael@epa.gov](mailto:vaughan.michael@epa.gov)

Maurice Rawls MC/6WQ-AP (214) 665-8049, Email: [rawls.maurice@epa.gov](mailto:rawls.maurice@epa.gov)

Anhmai Pham MC: 6MM-RS (214) 665-8438, E-mail: [pham.anhmai@epa.gov](mailto:pham.anhmai@epa.gov)

Melissa Smith MC: 6MM-RS (214)665-7357, E-mail: [smith.melissa@epa.gov](mailto:smith.melissa@epa.gov)

An electronic copy of the QAPP will be provided 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: Industrial and Hazardous Waste (I&HW) Permits Section of the Waste Permits Division (WPD), UIC Permits Section of the Radioactive Materials Division (RMD), I&HW/MSW Registration Team of the Permitting and Registration Support Division (PRSD), and Voluntary Cleanup Program - Corrective Action (VCP-CA) Section of the Remediation Division (REM) within the Office of Waste (OOW); waste programs of the 16 Regional Offices, Program Support Section (PSS) of the Central Texas Area, and Laboratory and Quality Assurance Section within the Monitoring Division (MD), Enforcement Division (ENF), and Critical Infrastructure Division (CID) within the Office of Compliance and Enforcement (OCE); Toxicology Division (TD) within the Office of the Executive Director (ED); and Water Quality Planning Division (WQPD) and TCEQ Sugar Land Laboratory within the Office of Water (OW).

An electronic copy is also available for use, viewing and printing on the TCEQ Home page URL <http://www.tceq.texas.gov/> and then typing in "RCRA/UIC QAPP" in the **Site Search** window.

#### **A4 TCEQ PROJECT/TASK ORGANIZATION**

The RCRA/UIC QAPP organization chart is included as Attachment A.

**Earl Lott** - Director of WPD; responsible for overall implementation of RCRA permitting projects.

**Bob Patton** - Manager of I&HW Permits Section of the WPD; responsible for the review of RCRA permitting activities.

**Charly Fritz** - Section Manager of B&PS of WPD. Lead QA Specialist of WPD; responsible for the management of the WPD B&PS activities.

**Anju Chalise** – Lead Quality Assurance Specialist; responsible for development of the RCRA/UIC QAPP and assessment of the RCRA quality systems in WPD.

**Steve Hutchinson** - RCRA Grant Manager of the Business and Program Services (B&PS) Section of the WPD; responsible for monitoring the expenditures, commitments and development of the RCRA Grant.

**Charles W. Maguire**, - Director of RMD; responsible for the overall implementation of UIC permitting projects:-

**Lorrie Council, P.G.** - Section Manager of UIC Permits Section in the RMD; responsible for the review of UIC permitting activities as described in the QAPP.

**Tom Robichaux** – UIC Grant Manager of the RMD; responsible for monitoring commitments and development of the UIC grant. **Debi Armbruster** – UIC QA Specialist of RMD; Program Support Coordinator for the UIC Permits Section in the RMD; responsible for development of UIC portions of the QAPP, assessment of the UIC quality systems in RMD, and overall coordination with the QA Specialist of WPD.

**RCRA/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, closure plan and/or trial burn plan, a waste audit or as mandated in an enforcement order or corrective action order.

**Beth Seaton** - Director of REM; responsible for oversight of all remediation and corrective action activities.

**Merrie Smith, P.G.** - Manager of VCP/Corrective Action Section of REM; responsible for the oversight of RCRA cleanup and closure activities.

**REM Corrective Action Program Staff** – Responsible for overseeing compliance with the RCRA requirements for corrective actions and closures.

**Bryan Sinclair** - 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.

**Mark Oliver** - Manager of Waste Enforcement Section of the Enforcement Division; responsible for management of RCRA/UIC enforcement activities.

**Enforcement Staff** - Responsible for updating the RCRAInfo database from investigation reports sent from Regional Office staff, issuing agreed orders, technical requirements and calculating penalties for RCRA/UIC cases.

**Sharon R. Coleman** - 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.

**Michael Honeycutt, Ph.D.** – Director of the TD in the ED; responsible for implementation of the toxicology and risk assessment program in air, water, and waste; provides technical expertise on toxicological issues and RCRA projects.

**Kelly Holligan** - Director of WQPD; responsible for data quality management of the TCEQ laboratory.

**Shirley J. Best** – Manager of the Sugar Land Laboratory in the WQPD; responsible for oversight of laboratory operations and ensuring that the lab produces quality analytical data, maintains verification procedures establishing the level of quality, and adheres to TNI standards.

**Beryl Thatcher** – Section Manager of PSS in the Central Texas Area; responsible for central office and Regional administration area coordination of waste program field activities, including RCRA/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.

**Muhammadali Abbaszadeh** – Health Physicist in the Homeland Security Section in the CID, Radioactive Materials Compliance Team (RMCT); responsible for the oversight and consistency of procedures for UIC Class III well activities as defined in the QAPP.

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

**Michelle Havelka** – Homeland Security Coordinator in the CID; responsible for oversight and consistency of procedures for UIC Class III well activities as defined in this QAPP.

**Jaya Zyman, P.E.** – Director of PRSD; responsible for oversight of all I&HW registration and reporting activities.

**Don Kennedy** – Manager of Registration and Reporting staff within PRSD; responsible for management of I&HW registration and reporting activities.

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

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

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

## **A5 PROBLEM DEFINITION/BACKGROUND**

### **A5.1 Purpose/Background for RCRA**

The passage of the RCRA in 1976 and the Hazardous and Solid Waste Amendments in 1984 (HSWA) provided the nation's primary law governing disposal of solid and hazardous and industrial waste in the United States. To achieve these goals RCRA established four distinct, yet interrelated programs:

- The solid waste program, under RCRA Subtitle D, requires comprehensive management of nonhazardous industrial solid waste and municipal solid waste.
- The underground storage tank (UST) program, under RCRA Subtitle I, regulates USTs containing hazardous substances and petroleum products.
- The hazardous waste program, under RCRA Subtitle C, establishes a system for controlling hazardous waste from the time it is generated until its ultimate disposal.
- Collection and analysis of air stack samples to determine compliance with the emission standards in 40 Code of Federal Regulations (CFR) Part 63, Subpart EEE.

***This QAPP addresses requirements in RCRA Subtitle C only.*** To achieve the Subtitle C goals, Congress directed U.S. EPA to create regulations to manage hazardous waste. The first RCRA regulations, "Hazardous Waste and Consolidated Permit Regulations," published in the Federal Register on May 19, 1980 (45 FR 33066), established the basic "cradle to grave" approach to hazardous waste management that exists today. RCRA Subtitle C mandates strict controls over the treatment, storage and disposal (TSD) of hazardous and industrial waste generation and management in the U.S. and consequently in Texas. In addition to these federal requirements, states may develop more stringent requirements or requirements that are broader in scope than the federal regulations. Through the State Authorization rulemaking process, U.S. EPA delegates the primary responsibility of implementing RCRA to individual states in lieu of U.S. EPA. As the authorized agency in Texas for RCRA, the TCEQ has a continuing obligation to maintain a hazardous waste program equivalent to and consistent with the federal hazardous waste program.

In regulatory terms, a RCRA hazardous waste is a waste that appears on one of the four hazardous wastes lists (F-list, K-list, P-list or U-list) or exhibits at least one of four characteristics: (1) ignitability, (2) corrosivity, (3) reactivity, or (4) toxicity. The F-list identifies wastes from common manufacturing and industrial processes, also known as wastes from non-specific sources. The K-list includes certain wastes from specific industries, such as petroleum refining or pesticide manufacturing. The P-list and the U-list are discarded commercial chemical products. These lists include specific commercial chemical products in an unused form. All lists can be found in 40 CFR Part 261. Waste that does not meet any of the listings explained above may still be considered a hazardous waste if it exhibits one of the four characteristics, as listed above and, defined in 40 CFR Part 261, Subpart C.

## **A5.2 Purpose/Background for UIC**

The passage of the Safe Drinking Water Act in 1974 provides the foundation for the regulation of underground injection in the United States. The Texas Uranium Surface Mining and Reclamation Act, Title 4 of the Texas Natural Resources code, provides the statutory authority for the extraction of minerals by surface mining operations and proper reclamation regulations within Texas. The Injection Well Act, as amended in 1981 and Title 3 of the Texas Natural Resources Code, provides the statutory authority for regulation of all 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 RRCT has authority to regulate Class II injection wells, Class III brine solution mining wells, Class V geothermal wells, and Class VI carbon dioxide sequestration wells. The TCEQ regulates all other injection wells (Class I, III, IV and V).

The TCEQ has a continuing obligation to maintain a UIC Program. Specifically, injection wells are classified into six different types:

- Class I wells, which are used for deep injection, are regulated by the TCEQ. (The RRCT reviews and comments on these applications.);
- Class II wells, which are related to oil and gas production, are regulated by the RRCT.
- Class III wells, which are used to extract minerals other than oil and gas, are regulated by the TCEQ or the RRCT, depending on the type of well;
- Class IV wells, are generally banned, but may be authorized by the TCEQ or the U.S. EPA in certain environmental cleanup operations;
- Class V wells, which are used for many different activities, are regulated by either the TCEQ or the RRC, depending on the type of well; and
- Class VI wells, which are used for injection of carbon dioxide (CO<sub>2</sub>) below Underground Sources of Drinking Water for long term storage (geologic sequestration), are regulated by both TCEQ and the RRCT. TCEQ's jurisdiction is limited to wells associated with clean energy projects that inject into formations that are not producing oil, gas, or geothermal energy. Neither agency has applied for federal authorization to regulate this newest class of injection well. Currently there are no Class VI wells in Texas.

## **A5.3 Testing and Monitoring Activities**

RCRA and UIC program obligations translate into adhering to Title 40 CFR Chapters 260-270 for RCRA, 40 CFR Parts 144-148 for UIC, *Test Methods for Evaluating Solid Waste:-, Physical/Chemical Methods*, (SW-846), or other U.S. EPA approved methods, and the HSWA of 1984 Sections 3004 and 3005, during the following:

- Investigations of hazardous waste generators, transporters, and treatment, storage and disposal;
- Investigations of TSD facilities to ensure these entities are properly managing hazardous waste;

- Collection and analysis of soil and 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 U.S. EPA has amended a variety of testing and monitoring requirements in the RCRA hazardous waste regulations and certain Clean Air Act regulations that relate to hazardous waste combustors ([SW-846](#) Final Update IIIB). These amendments allow more flexibility when performing RCRA-related sampling and analysis by removing from the regulations a requirement to use the methods in conducting various testing and monitoring and by limiting required uses of a [SW-846](#) method.

The only required use of an [SW-846](#) method is the measurement of method-defined parameters (MDPs). 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 or TCLP. 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.

[SW-846](#) Update IIIB 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 RCRA/UIC MDP compliance. Modifications to methods used to demonstrate compliance to Maximum Achievable Control Technology (MACT) Standards must be approved by U.S. EPA Region 6 Staff.

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 generates, treats, stores, or disposes of hazardous solid waste is subject to RCRA Subtitle C sampling and analysis requirements;
- Entities subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP) final standards for hazardous waste combustors (40 CFR Part 63, Subpart EEE);
- Anyone who mines an in-situ recovery operation for uranium, sulfur, and sodium sulfate; and
- Anyone who operates Class IV and V wells.

#### **A5.4 Decision Makers**

- U.S. EPA;
- TCEQ Executive Staff (Executive and Deputy Directors);
- TCEQ Division Directors, Section Managers and staff of the WPD, PRSD, REM, Regional Offices, CID, PSS, WQPD, RMD, Homeland Security Program, ENF and TD; and
- Regulated Community.

#### **A5.5 Principal Data Users**

- U.S. EPA;
- TCEQ Executive Staff;
- TCEQ Division Directors, Section Managers and staff of the WPD, PRSD, REM, Regional Offices, PSS, CID, WQPD, RMD, Homeland Security Program, ENF, and TD; and
- Regulated Community.

## **A6 PROJECT/TASK DESCRIPTION**

### **A6.1 Purpose/Background**

The purposes of the RCRA and UIC programs are to ensure proper management of hazardous and nonhazardous waste and to prevent pollution of underground sources of drinking water in Texas, in accordance with 40 CFR Parts 144-148 (UIC) and 260-270 (RCRA). With respect to the RCRA and UIC programs, and depending on the activity being conducted, the TCEQ requires permits, authorizations or registrations and corrective action procedures 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 RCRA/UIC program activities must comply with all state and federal regulations identified or referenced in this QAPP.

Specifically, nine divisions in four offices support the RCRA/UIC programs in the agency. The participating divisions are listed below along with a description of tasks unique to that division which supports activities detailed in this QAPP.

### **A6.2 TCEQ RCRA/UIC Participating Divisions**

State implementation, management and oversight of the RCRA and UIC programs is a cooperative effort between many divisions within TCEQ that work collectively to ensure compliance applicable to the RCRA or UIC activity being performed. In some instances divisions serve multiple programs since they provide compliance support services to water, waste and air program areas. The following divisions within the ENF, OCE, and the OOW receive a portion of the RCRA/UIC grant monies and therefore have a function and responsibility as defined in this QAPP. These functions and responsibilities are briefly described below.

#### **A6.2.1 Toxicology Division (TD)**

The TD staff assesses risks to human health from exposure to environmental pollutants. This involves reviewing models, data, assessments, permits and cleanup plans for possible risks to human health, and estimating their effects on overall air and water quality. Their responsibility in implementation of the RCRA and UIC programs includes providing technical support and conducting and reviewing evaluations including risk assessments to safeguard the environment and public health in the event of releases/contamination.

#### **A6.2.2 Waste Permits Division (WPD)**

The WPD performs activities associated with the permitting and registration of facilities involved in the storing, processing or disposing of hazardous and nonhazardous industrial wastes and special wastes for RCRA. They contribute to implementation of the RCRA program through the following functions:

- Reviewing environmental data provided from external sources in permit applications;

- Verifying and validating sampling results provided by both commercial and in-house laboratories according to method/program and QAPP requirements;
- Reviewing environmental data submitted by RCRA facilities pursuant to permit requirements;
- Reviewing environmental data submitted with an application for a permit (new, renewal, amendments and modifications) by RCRA facilities;
- Reviewing waste classification data submitted by entities generating/managing hazardous waste and industrial solid wastes;
- Evaluating environmental data submitted by RCRA facilities related to Comprehensive (Confirmatory) Performance Test burns at Hazardous Waste Combustion units as required by 40 CFR Part 63, Subpart EEE;
- Evaluating the RCRA program for optimization purposes to meet the needs and requirements of the State of Texas legislature mandates;
- Performing technical analysis of submission from regulated entities; and
- Performing QA compliance audits of RCRA and UIC programs.

#### **A6.2.3 Remediation Division (REM)**

The REM oversees the investigation and cleanup associated with releases of hazardous waste and/or hazardous substances subject to the Texas Risk Reduction Program ([TRRP](#)) rules (30 TAC Chapter 350) or the 30 TAC Chapter 335 rules. These rules establish response action requirements for the correction action program areas of the TCEQ. The REM role in implementing the RCRA/UIC programs includes:

- Reviewing environmental data submitted by RCRA facilities in the form of corrective action plans/reports to verify contamination is remediated at the appropriate level;
- Ensuring sites are assessed and remediated to levels that protect human health and the environment;
- Verifying waste management units or facilities are taken out of service and closed properly; and
- Overseeing post-closure care and monitoring.

In implementing the Forum on Environmental Measurement Directive 2012-02, the VCP-CA section manager will assess and document the competency of REM staff via the established performance evaluation process.

#### **A6.2.4 Permitting and Registration Support Division (PRSD)**

The PRSD supports various agency programs including the registration of I&HW facilities. The PRSD contributes to the implementation of the RCRA and UIC programs by:

- Collecting information on hazardous waste generators, hazardous waste transporters, RCRA/UIC permitted facilities and TSD facilities including basic information on UIC units associated with hazardous and/or industrial waste.

### **A6.2.5 Program Support Section and Regional Offices**

The Program Support Section is responsible for central-office and regional coordination and supports the 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 RCRA/UIC programs:

- Investigating hazardous waste generators, transporters, TSD, and other facilities to ensure that these entities are properly managing solid and hazardous waste;
- Collecting and analyzing soil, sediment, surface water and 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;
- 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 xiii).

### **A6.2.6 Critical Infrastructure Division (CID)**

The Critical Infrastructure Division, Homeland Security Section, Radioactive Materials Compliance Team, 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; and
- Complying with and submitting Form 7520 reports for semi-annual and annual requirements to U.S. EPA Region 6.
- Coordinating with the Radioactive Materials Division, UIC Permit Section on an annual report to U.S. EPA related to the TCEQ UIC program.

### **A6.2.7 Water Quality Planning Division (WQPD)**

The WQPD oversees and operates the TCEQ Sugar Land Laboratory which performs sample analyses for RCRA/UIC regulatory compliance and classification.

### **A6.2.8 Enforcement Division (ENF)**

The ENF 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 RCRA and UIC programs includes:

- Reviewing and responding to notices and disclosures submitted pursuant to the Texas Environment, Health, and Safety Audit Privilege Act; and
- Processing compliance history appeals.

### **A6.2.9 Laboratory and Quality Assurance Section**

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

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

Task components rely on guidance provided in the 40 CFR Parts 144-148 and 260-268, [SW-846](#) and HSWA Sections 3004 and 3005 in order to maintain a consistent scientific basis for decision making. The management portion of these components uses guidance provided in the U.S. EPA Guidance for Quality Assurance Project Plans, (U.S. EPA QA/G-5), the FY 14-15 Performance Partnership Grant (PPG), and agency policy and procedures. The Government Performance and Results Act facilities associated with this QAPP are listed in the PPG or Memorandum of Agreement.

#### **A6.2.10 Radioactive Materials Division (RMD)**

The RMD is responsible for:

- Permitting of Class I and Class III injection wells;
- Authorization of production areas for *in situ* mining uranium;
- Authorization of Class IV injection wells used for environmental remediation at RCRA or Superfund Sites;
- Authorization of Class V injection wells for environmental remediation, stormwater management, aquifer storage and recovery, heating and cooling and other miscellaneous uses;
- Reviewing environmental data submitted by UIC facilities pursuant to permit requirements;
- Reviewing of environmental data submitted with an application for permit (new, renewal, amendments, and minor modifications) by UIC facilities;
- Rulemaking in response to state and federal mandates; and
- Maintaining and updating of UIC Program federal authorization.

## **A7 QUALITY OBJECTIVES AND CRITERIA**

### **A7.1 Purpose/Background**

This section defines minimum criteria for all entities meeting regulatory compliance under this QAPP. The RCRA and UIC programs use 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 QAPP.

### **A7.2 Specifying the Quality Objectives**

This section describes the quality of data needed for project decision making under the RCRA and UIC programs. 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 protect human health and the environment from mismanagement of hazardous and industrial solid wastes. The following qualitative and quantitative approaches define the RCRA and UIC program DQO processes.

#### **A7.2.1 Intended Use of Data**

Data generated for use in the RCRA/UIC programs 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 units; and
- Determining the compliance of an injection well facility with applicable state and federal regulations.

#### **A7.2.2 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 Authorization and Remediation Tracking System (ARTS), 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; and
  - Corrective action data that meet the appropriate regulatory requirements of 40 CFR Parts 260-270 and 30 TAC Chapters 335 (Subchapter S) and/or 350 (TRRP Rules) regarding applicable permits, enforcement agreements and approved plans or reports.

### **A7.2.3 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.

### **A7.2.4 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 RCRA and UIC programs, 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 [2009 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 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 RCRA/UIC programs, refer to Section B5.

### **A7.3 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 B.2.4 for more information and tables.

## **A8 SPECIAL TRAINING/CERTIFICATION**

### **A8.1 Purpose/Background**

Subsection A8.2 discusses the training which TCEQ regional environmental investigators must complete in order to conduct investigations of RCRA facilities, to collect samples, prepare the samples for analysis, and to develop investigation reports. General training requirements for TCEQ staff are discussed in Section 3 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 [2009 TNI Standards](#).

Environmental data operations conducted for the RCRA and UIC programs 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.

### **A8.2 Investigator Training**

Training of Environmental Investigators to conduct investigations of RCRA facilities, to collect samples, to prepare the samples for analysis, and to develop investigation reports must be carried out in accordance with the [Professional Development Plan Requirements for Environmental Investigators](#). The maintenance of the investigator training and certification records is the responsibility of the investigator's manager.

### **A8.3 Mechanical Integrity Tests (MIT)**

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 mechanical integrity. Regions 1 (Amarillo), and 14 (Corpus Christi) UIC Investigators review all annual MIT reports, and over a three-year period, physically observe mechanical integrity tests 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 B ) 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.

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. CID UIC staff will witness some of the pressure tests and review the cement records during investigations.

#### **A8.4 Well Constructions, Workovers and Plugging**

When permittees notify TCEQ of new well construction and well plugging, staff of the UIC Permits Section in the RMD either observe aspects of the well construction and well plugging operations or coordinate with permittee's field crews via phone and email to review and approve changes to procedures that may be warranted. Regional staff review and approve 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, and accompanying an experienced investigator on a well construction and a well plugging operation.

#### **A8.5 Laboratory Accreditation**

The Texas Laboratory Accreditation Program in the Laboratory and Quality Assurance Section of the MD has responsibility for implementation and oversight of the accreditation program. The Texas Laboratory Accreditation Program also tracks the proficiency testing (PT) performance of each accredited laboratory. The Sugar Land Laboratory is accredited by the Louisiana Department of Environmental Quality (LDEQ); the laboratory and LDEQ maintain records of PT performance.

Data generated by exempt on-site labs must meet the performance criteria of this QAPP and be documented using the analytical checklist and Case-Narrative supplied at the end of the QAPP.

## **A9 DOCUMENTS AND RECORDS**

### **A9.1 Purpose/Background**

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 include:

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

### **A9.2 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 A9.2.1 through A9.2.5.

#### **A9.2.1 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 (including field notes/field logbook pages), Chain of Custody (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 place and times for this information is determined by the Field Operations Records Retention Schedule which is part of the Agency Records Retention Schedule. SOPs located on the OCE Field Operations Documents (FOD) 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](#) (also available from the [TCEQ Home Page: http://www.tceq.texas.gov/](#) then using the search window). Alleged violations will be addressed either by Notice of Violation (NOV) or Notice of Enforcement for formal enforcement action. SOPs located on the [OCE FOD Sharenet website](#) specify how to track enforcement activity for all investigations conducted.

### **A9.2.2 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.

Contract laboratories analyze 90% of the RCRA samples collected by the TCEQ through contract with the MD. The other 10% is analyzed by the TCEQ Sugar Land Laboratory. The DSHS laboratory analyzes all of the TCEQ UIC groundwater samples that TCEQ field staff have taken at a UIC permitted *in-situ* uranium mining sites through the DSHS laboratory/RMD contract.

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. The final 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 RCRA/UIC regulations must follow requirements as designated in [30 TAC Chapter 25](#) (relating to Environmental Testing Laboratory Accreditation and Certification) and the [2009 TNI Standards](#).

### **A9.2.3 Technical Analysis Staff (TAS) of I&HW Permits Section**

Laboratory data used by the TAS group are for waste classification audits, variances or exclusions from the definition of solid waste, or from regulation as a certain classification of solid waste. These data packages include process knowledge, custody documentation for the samples analyzed in a laboratory, QA/QC data for the samples (e.g., matrix spikes, duplicates, etc.), analytical results for the samples and a description as to how these samples are representative of the waste as a whole.

There may be additional information provided (e.g., extenuating circumstances as to why a less stringent classification may be warranted). Data packages reviewed by TAS submitted for waste classification purposes will include, at a minimum, the requirements found in 30 TAC 335.509 - 335.514. Once the analysis is completed and a determination is made, the data package and decision documentation is combined and sent to the TCEQ Central Records where it is maintained for 5 years, then stored at the Texas State Library and Archives Commission for 30 years.

#### **A9.2.4 Hazardous Waste Compliance Review**

Data reviewers at the agency rely on the information in reporting packages submitted by Regional Offices and the regulated community. The report packages are evaluated for administrative completeness and technical information as required by the governing rule, regulation, permit, order/judgment or approved plan or report. Refer to Section D2 (Verification and Validation Methods - Table D2.2.1) for a list of supporting data that the data reviewer looks for in the report package or may be requested by the data reviewer. Data requirements required for the management of hazardous waste as defined in this QAPP are determined on a site or unit basis through the DQO process with the regulated entity and may be permit specific. Documentation and retention of the data reviews are performed in accordance with the SOPs in the corresponding division and will include one of the following: completed checklists kept with the data, letters to the regulated entity regarding deficiencies and/or completeness or memorandums to the file.

#### **A9.2.5 Corrective Action Review**

Corrective Action project managers review environmental data submitted by RCRA facilities in investigation and assessment reports, risk assessments, corrective action plans/reports, closure reports, and certifications. Project managers also review environmental data submitted by RCRA facilities with an application for a compliance plan (new, renewal, amendments and modifications) or pursuant to permit or compliance plan requirements. The content of these reports is specified under 40 CFR Parts 260-270, 30 TAC Chapter 335, and 30 TAC Chapter 350. The project managers review the reports to determine compliance with applicable rules and associated guidance documents.

The project managers ensure the regulated community follows applicable rules and the appropriate guidance documents when reviewing the data. The guidance documents applicable to environmental data include, but are not limited to, the TCEQ guidance document *Review and Reporting of COC Concentration Data*, [RG-366 (TRRP 13)] and the July 23, 1998 memorandum *Implementation of the Existing Risk Reduction Rule*, also known as the Consistency Memo. The project manager documents the review in a corrective action review letter sent to the regulated entity. The letter outlines deficiencies and/or compliance status based on the information provided in the report. The Corrective Action Program retains a copy of the report and the letter in the agency files.

### **A9.3 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.

#### **A9.3.1 Field Operations Records**

The PSS and the regional offices utilize a database, the Consolidated Compliance and Enforcement Data System (CCEDS), 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. The data from CCEDS is uploaded into the RCRAInfo 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. Standard reports on monthly/quarterly numbers of investigations are generated from CCEDS in the central office. The U.S. EPA Region 6 can obtain reports on the number of investigations via the RCRAInfo database. The U.S. EPA Region 6 also conducts semi-annual reviews under the RCRA grant, including a report indicating the number of investigations conducted by TCEQ.

### **A9.3.2 Laboratory Records**

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. Laboratories must also meet requirements in the [2009 TNI Standards](#) regarding laboratory records management.

Where applicable or requested by agency staff, the following records shall 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;
- 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 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.

### **A9.3.3 Technical Analysis Staff (TAS) of I&HW Permits Section**

TAS reviews data packages submitted for waste characterization purposes to ensure compliance with 30 TAC 335.509 - 511 and 335.513. The laboratory report 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.

TAS of the I&HW Permits Section consists of data validators, reviewers, and users of waste classification information. The data supplier is responsible for documenting that the waste classification DQOs are met and that the data supplied supports the specific classification assigned.

### **A9.3.4 UIC**

Regional Office and CID/Homeland Security UIC staff enters data into the investigations tracking database, CCEDS, including MIT inspections of waste disposal wells associated with *in situ* uranium mining projects and other components of the UIC program. UIC staff in the RMD review data packages submitted for waste characterization purposes to ensure compliance with 30 TAC 335.510, 335.511 and 335.513.

The laboratory report 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.

### **A9.3.5 Hazardous Waste Compliance Review**

Staff in applicable agency programs are primarily data users. The data users review and evaluate data packages submitted by the regulated community or the data supplier. The data supplier is responsible for ensuring that their compliance data package includes concise and accurate records of any activities that may impact data quality. Data are reviewed utilizing the data review check list (Table D2.2.1 – Inputs from the Analytical Laboratory for Data Verification) in conjunction with the case-narrative, the state and federal rules and regulations (40 CFR Parts 260-270 and 30 TAC Chapter 335), and various guidance documents such as, [SW-846](#), RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, RCRA Sampling Procedures Handbook, policies and procedures of the TCEQ as outlined in the Enforcement Standard Operating Procedures, RCRA Corrective Action Plan, Final U.S. EPA 520-R-94-004, May 1994, approved work plans and reports, and applicable permits, agreed orders and agreed judgments. Other U.S. EPA documents may be utilized during the review process in order to address site specific situations. Review documentation is maintained by the TCEQ Central Records section in accordance with the TCEQ Records Retention Schedule.

The compliance status of facilities is recorded in the RCRAInfo database. The data is available to U.S. EPA for pulling into various report formats as needed. The database

provides the record of compliance with the TCEQ PPG for the current U.S. EPA fiscal year.

#### **A9.3.6 Corrective Action Program Review**

The data and reports submitted to the Corrective Action Program by the regulated entity conform to the requirements of 40 CFR Parts 260-270, 30 TAC Chapter 335, and 30 TAC Chapter 350. The regulated community is responsible for verifying the data package meets those requirements and the specifications in the TCEQ guidance document *Review and Reporting of COC Concentration Data*, [RG-366 (TRRP 13)] or, when applicable, the July 23, 1998 memorandum *Implementation of the Existing Risk Reduction Rule*, also known as the consistency memo. The Corrective Action Program retains the data with the associated report in TCEQ files.

#### **A9.4 Official State Records**

TCEQ OPP 13.02 specifies record management procedures necessary to safeguard the legal and financial rights of the State of Texas and any persons directly affected by activities of the TCEQ. Records produced by TCEQ and maintained as official records of the State of Texas are documented in the TCEQ Records Retention Schedule. Reports are maintained by the TCEQ Central Records section 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.

## ***B1 SAMPLING PROCESS DESIGN***

### **B1.1 Purpose/Background**

Sampling designs are not developed by the RCRA/UIC programs or TCEQ staff. The TCEQ staff in the WPD, REM and 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 (e.g., trial/risk burn data collection, closure of permitted units, clean-up of unauthorized releases).

Periodically, TCEQ field investigators also conduct split or final sampling with aRP based upon the sampling design previously submitted by the RP and approved by TCEQ personnel. Sampling procedures are conducted in accordance with chapters 1 and 9 of [SW-846](#).

If, during an investigation of a RCRA/UIC facility, a TCEQ investigator suspects mismanagement of hazardous waste or violation of federal and/or state rules, then the TCEQ investigator follows U.S. EPA RCRA sampling handbook protocol in determining the sampling process. See Section B2.2 for further explanation of sampling process for TCEQ investigators and Section B2.3 for sampling process for TCEQ regulated entities.

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.

## **B2 SAMPLING METHODS**

### **B2.1 Purpose/Background**

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 waste, soil, water, and any other media possibly containing, or contaminated by hazardous or Class 1 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 a unit.

Sampling procedures to demonstrate compliance for the various RCRA/UIC programs in the agency by regulated entities must be documented and samples must be collected according to the waste analysis plans (WAPs), permit specifications, remediation or corrective action plans, waste disposal classification verification 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. This section outlines several procedures for sampling different types of wastes in various physical states and containers.

### **B2.2 Sampling Considerations by Regional Office RCRA Investigators**

RCRA field staff collect soil, sediment, surface water, groundwater and solid waste 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. The wastes may be in drums, barrels, sacks, bins, vacuum trucks, ponds or other containers. Sample collection procedures that support data to demonstrate compliance with RCRA/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;
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, 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 B2.2.1 lists the methods for sampling of emissions from facilities that burn hazardous constituents, as defined in [SW-846](#) as updated. Sampling of emissions from facilities burning hazardous constituents requires specialized sampling devices and procedures. Tables B2.2.2 and B.2.2.3 give general guidelines for volume requirements for aqueous and soil and sediment samples respectively. Preservation and holding times are given in Section B2.4.

During the investigation the investigator should identify the types and locations of samples that may need to be collected. The investigator will identify:

- The media or wastes to be sampled;
- The physical locations to sample;
- The steps within a treatment process to sample;
- The physical characteristics of the medium to be sampled; and
- Other relevant information that would be helpful in developing a sampling plan.

**Table B2.2.1 Sample Collection Methods for Emissions from Hazardous Waste Facilities**

Analysis	Methods
Particulate	U.S. EPA Method 5**
Moisture	U.S. EPA Method 4**
Velocity/Temperature	U.S. EPA Methods 1,2**
O <sub>2</sub> - Oxygen	U.S. EPA Method 3A**
CO <sub>2</sub> - Carbon dioxide	U.S. EPA Method 3A**
Total Organic Emissions (Unspeciated Volatile Organics)	0040*
Total Organic Emissions by total chromatographable organics (TCO) and gravimetric (GRAV) analysis procedures	0010*
Particle Size Distribution	U.S. EPA Method 201***, 201A*** or 5**
Aldehydes/Ketone	0011*
Polychlorinated Dibenzo-p-dioxins/ Polychlorinated Dibenzofurans	0023A*
Volatile Organic Compounds Semivolatile Organic Compounds	0030 or 0031* 0010*
Principal Organic Hazardous Constituents/Tedlar Bag	0040*
HCl/Cl <sub>2</sub> - Hydrogen chloride and chlorine emissions	0050/0051*
Metals	0060* or U.S. EPA Methods 29 **
Hexavalent Chromium	0061*

\* *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition*

\*\* 40 CFR, Ch. 1, Pt 60, Appendix. A

\*\*\* 40 CFR, Ch. 1, Pt. 51, Appendix. M

**Table B2.2.2 Bottles Required for Aqueous Samples**

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 <sup>2-</sup> Cyanide & Sulfide	1 liter	1 1-liter polyethylene bottle
Inorganic (non-metal)	1 liter	1 1-liter polyethylene bottle

**Table B2.2.3 Bottles Required for Soil and Sediment Samples**

Analysis	Required Volume	Container Type <sup>1</sup>
Volatile Organics	5 grams/sample	3-40 ml VOA glass vials sealed after sample added from sample coring device or 3 hermetically-sealed sample vials
Extractable Organics (BNA and pesticide/PCB)	6 ounces	1 8-ounce or 2 4-ounce wide-mouthed glass jars w/Teflon lined lid
Metals, Cyanides and Sulfides	6 ounces	1 8-ounce or 2 4-ounce wide-mouthed glass jars w/Teflon lined lid

Note: 1 – Sample containers will conform to U.S. EPA regulations for the appropriate constituents.

### **B2.3 Sampling Considerations by Regulated Entities Demonstrating Compliance**

The REM oversees the cleanup of sites with soil and groundwater contamination associated with releases of industrial and municipal hazardous and industrial non-hazardous wastes. The regulated community is required to follow requirements in [30 TAC Chapter 350](#) (relating to TRRP) for all sampling and corrective action considerations.

Chapter 350 specifies the information and procedures necessary to demonstrate compliance with the TRRP. This program provides a consistent corrective action process directed toward protection of human health and the environment balanced with the economic welfare of the citizens of this state. This program uses a tiered approach incorporating risk assessment techniques to help focus investigations and to determine appropriate protective concentration levels for human health and for ecological receptors. The program also sets reasonable response objectives that will protect human health and the environment and preserve the active and productive use of land. Once subject to the TRRP, the person must comply with all requirements of the adopted rule unless another agency rule states otherwise, or a federal standard or state statutory requirement is more stringent.

The WPD oversees entities which generate, treat, store, or dispose of hazardous or nonhazardous solid waste and are subject to RCRA Subtitle C or D sampling and analysis requirements. The WPD also oversees entities subject to the NESHAP final standards for hazardous waste combustors (40 CFR Part 63, Subpart EEE). Sampling design considerations depend upon a number of variables such as: type of facility generating treating, storing, or disposing of the hazardous waste; chemicals of concern; media type; number of samples necessary to get a representative sample; corrective action (remediation) or other actions necessary to demonstrate compliance to RCRA/UIC regulations.

The sampling equipment, preservation, and holding time requirements, recommended to the regulated community for sampling of air emissions from facilities that burn hazardous constituents, for the specific analytical method for each analyte are in [SW-846](#) and in the Handbook Quality Assurance/Quality Control (QA/QC) Procedures for Hazardous Waste Incineration.

#### **B2.4 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 may be found in Table B2.4.1 for aqueous samples and Table B2.4.2 for soil and sediment samples. Acceptable sample containers for the collection of aqueous samples and for the collection of soil and sediment samples, are listed on Table B2.2.2 and Table B2.2.3, respectively. Analyses performed on samples collected under this program will be within U.S. EPA established MHTs. Tables B2.4.1 and B2.4.2 lists the types of analyses and the applicable holding times. The holding times recommended to the regulated community for sampling of air emissions from facilities that burn hazardous constituents are in [SW-846](#) or in the [Handbook of Quality Assurance/Quality Control \(QA/QC\) Procedures for Hazardous Waste Incineration](#). Table B2.2.1 lists the methods for sampling of emissions constituents.

**Table B2.4.1 Holding Times<sup>1</sup> and Preservation for Aqueous Samples**

Analysis	Extraction/Digestion Times	Analysis Time	Preservation Method <sup>2</sup> ,
Volatile Organic Compounds (VOCs)	NA	14 days	Hydrogen Chloride (HCL), Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> ) or Sodium bisulfate (NaHSO <sub>4</sub> ), to pH<2, cool ≤ 6°C
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 <sub>3</sub> ) to pH<2
Mercury	28 days	28 days, ASAP after extraction	HNO <sub>3</sub> to pH<2
Hexavalent Chromium <sup>3</sup>	24 hours	within 24 hours after extraction <sup>4</sup>	≤ 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: <sup>1</sup>Holding times begin at the time of collection.

<sup>2</sup> 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.

<sup>3</sup>If hexavalent chromium is analyzed by the Ion Chromatography method U.S. EPA 218.6, the holding time can be extended to 28 days.

**Table B2.4.2 Holding Times<sup>1</sup> and Preservation for Soil and Sediment Samples**

Analysis	Extraction/Digestion Times	Analysis Time (maximum holding time)	Preservation Method
Volatile Organic Compounds (VOCs)	NA	2 days if unpreserved, 14 days if preserved	<p><b>For Remediation Activities:</b>            For low/med levels, extrude into empty tared hermetically sealed vials containing 5 mL H<sub>2</sub>O, cool to ≤ 6°C, if not analyzed within 48 hours, store at &lt; -7°C but &gt; -20°C. For high levels, extrude into in tared hermetically sealed vials containing 5 mL MeOH, and cool to ≤ 6°C.</p> <p><b>For Waste Permits Activities:</b> sealed zero headspace container preserved according to method specifications.</p>
Semi-volatile Organics Base/neutral/acids (BNA) Pesticides/PCBs	14 days	within 40 days after extraction	≤ 6°C
Metals	6 months	6 months or ASAP after digestion	≤ 6°C
Mercury	28 days	ASAP after extraction	≤ 6°C
Hexavalent Chromium	28 days	Within 4 days after extraction	≤ 6°C
Sulfides	NA	7 days	≤ 6°C
Cyanides	NA	14 days	≤ 6°C
<b>TCLP Parameters</b>			
VOCs	14 days	14 days	see individual methods ≤ 6°C
Semi-Volatile Organics, BNAs and Pesticides/PCBs	14 days/7 days to prep	within 40 days after extraction	≤ 6°C
Metals	6 months	within 6 months after extraction	none
Mercury	28 days	within 28 days after extraction	≤ 6°C

Notes: <sup>1</sup>Holding times begin at the time of collection.

### ***B3 SAMPLE HANDLING AND CUSTODY***

#### **B3.1 Purpose/Background**

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 RCRA/UIC programs must be described in their QAM and conform or be equivalent to the current standards applied to laboratories that are accredited.

#### **B3.2 Sample Custody Procedure**

Custody procedures requires 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 RCRA/UIC programs must be consistent with procedures outlined in [SW-846](#) and U.S. EPA protocols. The custody procedures recommended to the regulated community for sampling of air emissions from facilities that burn hazardous constituents are in the [Handbook of Quality Assurance/Quality Control \(QA/QC\) Procedures for Hazardous Waste Incineration](#).

## **B4 ANALYTICAL METHODS REQUIREMENTS**

### **B4.1 Purpose/Background**

To support the analytical needs of the RCRA program (and by extension, other waste site management programs), the U.S. EPA created and maintains SW-846, a methods compendium. Please refer to U.S. EPA [Office of Resource Conservation and Recovery \(ORCR\) for more updates to SW-846.](#)

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. The U.S. EPA regulations state that, “Several of the hazardous waste regulations under Subtitle C of RCRA require that specific testing methods in [SW-846](#) be employed for certain applications. These requirements relate to testing used to determine a specific kind of property that is termed a “method-defined parameter.” The regulation goes on to say that, “*Any reliable method may be used to meet other requirements in 40 CFR Parts 260 - 270*” [emphasis added].

Currently, testing done to meet compliance with the MACT Standards must be done in accordance with 40 CFR Part 63, Subpart EEE. Any modifications to methods required in these rules must be approved by U.S. EPA Region 6.

#### **B4.1.1 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 (e.g., TRRP rules for remediation activities), and that the method chosen to demonstrate compliance or decision making be included in the TCEQ Fields of Accreditations 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 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 or to the DSHS laboratory for UIC Class III uranium mining facility samples. 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 RCRA Subtitle C and the UIC programs 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.

#### **B4.2 Preparation of the Samples**

Table B4.2.1 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 [2009 TNI Standards](#).

**Table B4.2.1 Sample Preparation Procedures**

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

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

### **B4.3 Analytical Methods**

Table B4.3.1 lists the most common analytical procedures used to meet regulatory compliance for the RCRA and 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 Chapter Volume 1, Modules 2 to 7 of the [2009 TNI Standards](#) (*relating to Quality Systems*). Additional, more stringent criteria may be specified in this 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 [2009 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 B5. 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 B4.3.1 Analytical Procedures**

<b>Parameters</b>	<b>Method</b>
<b>Organics</b>	
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
<b>Inorganics</b>	
Alkalinity	2320
Ammonia-N	350.1
Chlorides	300.0/ 9057*
Conductivity	2510
Cyanides	9010/9012/9013*
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
<b>Metals</b>	
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*

**Table B4.3.1 Analytical Procedures**

Parameters	Method
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 *
<b>Hazardous Waste Characterization</b>	
Alkalinity	U.S. EPA 2320B, 310.1
Ignitability	1010/1020
Corrosivity	9040B/110*
pH	U.S. EPA 9040
Reactivity	SW-846, Chapter 7
Toxicity	1311 followed by appropriate procedure

\*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-3rd Edition, as updated

For a complete list of methods for which the Agency offers accreditation, see [Fields of Accreditation](#)

#### **B4.4 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 the QAPP or the Agency's Method Modification RG-380. 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.

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.

Modifications to methods and procedures that support the MACT Standards must have prior approval from U.S. EPA. A list of potentially acceptable modifications that are allowed for meeting RCRA compliance according to the U.S. EPA and TCEQ is presented in the instruction sheet of the Analytical Data Report QA/QC Checklist.

## ***B5 QUALITY CONTROL AND ACCEPTANCE CRITERIA***

### **B5.1 Purpose/Background**

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 RCRA and UIC programs.

### **B5.2 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.

#### **B5.2.1 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 and additional samples for MS and MSDs. Field instruments should be calibrated in accordance with equipment SOPs (available on the OCE FOD Sharenet website). 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 measurement. 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.

The field procedure requirements that are recommended to the regulated community for sampling are in [SW-846](#) and in the [Handbook of Quality Assurance/Quality Control \(QA/QC\) Procedures for Hazardous Waste Incineration](#) for air emissions from facilities that burn hazardous constituents. At this time, current standards applied to laboratories that are accredited do not address field sampling procedures or minimum criteria. However, TNI operates a separate field activities program called the National Environmental Field Activities Program (NEFAP) whose mission is to establish and implement an accreditation program for field sampling and measurement organizations (FSMOs).

The TNI Standard for FSMOs is modeled after ISO/IEC 17025:2005, "General Requirements for the Competence of Testing and Calibration Laboratories." TNI Standard Volume 1 is the FSMO Competency Standard which is the same international standard for fixed laboratories. TNI Standard Volume II is the FSMO Accreditation Body (AB) Requirements to Accredite FSMOs. The AB Standard is based on ISO/IEC 17011:2004 "Conformity Assessment – General Requirements for Accreditation Bodies Accrediting Conformity Assessment Bodies."

### **B5.2.2 Laboratory Procedures**

The QC procedures used by the all laboratories for the determination of compliance for the RCRA/UIC program are outlined in each laboratory's QAM and must conform to the [2009 TNI Standards](#). Permit holders with on-site laboratories exempt by 30 TAC 25.6 (relating to Conditions Under which the Agency May Accept Environmental Data) shall meet requirements specified in this 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 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 the 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.

The laboratories should generate their own control limits for all laboratory control samples as recommended in [SW-846](#) 3rd Edition.

### **B5.2.3 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 RCRA and UIC programs 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 goals for organic analyses in the RCRA/UIC programs are stated in Tables B5.2.5.1 and B5.2.5.2. These limits represent the quality of QC data necessary to support decision making by TCEQ staff for industrial and hazardous wastes and 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 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 B5.2.5.1 and B.5.2.5.2 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 RCRA/UIC programs.

The QA objectives that are recommended to the regulated community for analysis of air emissions from facilities that burn hazardous constituents are found in [SW-846](#) or the Handbook of Quality Assurance/Quality Control (QA/QC) Procedures for Hazardous Waste Incineration. The minimum QC procedures that must be followed by the laboratory for the specific sampling and analytical method for each analyte are described in [SW-846](#). QA objectives for the analysis of total organics emissions or particulate distribution are determined on a case by case basis and are facility specific (see Table B2.2.1 Sample Collection Procedures for Emissions from Hazardous Waste Facilities). While the minimum QC procedures that a laboratory needs to follow are presented in [SW-846](#), other U.S. EPA methods, and the current 2009 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 B5.2.3.1 Matrix Spike/Matrix Spike Duplicate Acceptance Limits For Organic Gas Chromatography & Gas Chromatography Mass Spectrometry (GC & GCMS) and Inorganic Analyses**

Matrix Spike Compound	Water		Soil/Sediment	
	% Recovery	RPD	% Recovery	RPD
<b>Volatile Organics Compounds</b>				
1,1-Dichloroethene	75-125	20	75-125	20
Trichloroethene	75-125	20	75-125	20
Benzene	75-125	20	75-125	20
Toluene	75-125	20	75-125	20
Chlorobenzene	75-125	20	75-125	20
<b>Semi-volatile organics</b>				
Phenol	70-130	25	70-130	25
2-Chlorophenol	70-130	25	70-130	25
1,4-Dichlorobenzene	70-130	25	70-130	25
N-Nitroso-di-n-propylamine	70-130	25	70-130	25
1,2,4-Trichlorobenzene	70-130	25	70-130	25
4-Chloro-3-methylphenol	70-130	25	70-130	25
Acenaphthene	70-130	25	70-130	25
4-Nitrophenol	70-130	25	70-130	25
2,4-Dinitrotoluene	70-130	25	70-130	25
Pentachlorophenol	70-130	25	70-130	25
Pyrene	70-130	25	70-130	25
<b>Herbicides</b>				
2,4-Dichlorophenoxyacetic acid (D)	70-130	25	70-130	25
Silvex	70-130	25	70-130	25
<b>Pesticides</b>				
Gamma-Benzene hexachloride (BHC)	70-130	25	75-125	25
Heptachlor	70-130	25	75-125	25

Matrix Spike Compound	Water		Soil/Sediment	
	% Recovery	RPD	% Recovery	RPD
Aldrin	70-130	25	75-125	25
Dieldrin	70-130	25	75-125	25
Endrin	70-130	25	75-125	25
4,4'-Dichlorodiphenyltrichloroethane (DDT)	70-130	25	75-125	25
<b>Metals</b>				
Aluminum	80-120	20	80-120	20
Antimony	80-120	20	80-120	20
Arsenic	80-120	20	80-120	20
Barium	80-120	20	80-120	20
Beryllium	80-120	20	80-120	20
Cadmium	80-120	20	80-120	20
Calcium	80-120	20	80-120	20
Chromium	80-120	20	80-120	20
Chromium (Hexavalent)	80-120	20	80-120	20
Cobalt	80-120	20	80-120	20
Copper	80-120	20	80-120	20
Iron	80-120	20	80-120	20
Lead	80-120	20	80-120	20
Magnesium	80-120	20	80-120	20
Manganese	80-120	20	80-120	20
Mercury	80-120	20	80-120	20
Nickel	80-120	20	80-120	20
Potassium	80-120	20	80-120	20
Radium-226	80-120	20	80-120	20
Selenium	80-120	20	80-120	20
Silver	80-120	20	80-120	20

Matrix Spike Compound	Water		Soil/Sediment	
	% Recovery	RPD	% Recovery	RPD
Sodium	80-120	20	80-120	20
Uranium	80-120	20	80-120	20
Vanadium	80-120	20	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 B5.2.3.2 Surrogate Spike Acceptance Limits For GC and GC/MS Organic Analyses**

Surrogate Compounds	Soil/Sediment % Recovery	Water % Recovery
<b>Volatile organics</b>		
1,2-Dichloroethane-d4	75-125	75-125
4-Bromofluorobenzene	75-125	75-125
Toluene-d8	75-125	75-125
Dibromofluoromethane	75-125	75-125
<b>Semi-volatile organics</b>		
Nitrobenzene-d5	70-130	70-130
Terphenyl-d14	70-130	70-130
2-Fluorobiphenyl	70-130	70-130
2-Fluorophenol	70-130	70-130
2,4,6-Tribromophenol	70-130	70-130
Phenol-d5	70-130	70-130
1,2-Dichlorobenzene-d4	70-130	70-130
<b>Herbicides</b>		
2,4-Dichlorophenylacetic acid	70-130	70-130
<b>Pesticides</b>		
Decachlorobiphenyl	70-130	70-130
Tetrachloro-m-xylene	70-130	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 QAPP without explanation in the data package concerning matrix effects, cleanups, etc., or other problems associated with the sample matrix.

#### **B5.2.4 Proficiency**

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

#### **B5.2.5 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. Precision can be evaluated by comparing multiple measurements of the same parameter on the same exact 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.

#### **B5.2.6 Accuracy and Laboratory Control Samples**

The accuracy of an analytical method is the extent to which test results generated by the method and the true 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.

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) 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).

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 certified reference materials, PT samples or other measures.

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

### **B5.2.7 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, and is particularly important for the RCRA program, where a wide range of different matrices are subject to regulation.

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 B5.2.3.1.

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

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

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

### **B5.2.8 Sample Representativeness and Blanks**

Samples collected must be representative (e.g., area of interest, medium being sampled etc.) that will be analyzed to determine compliance. 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 RCRA/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 the 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. A secondary purpose of these blanks is to document proper sample bottle preparation, decontamination, and handling techniques have been employed.

### **B5.2.9 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. Calibrations will be performed in accordance with U.S. EPA or manufacturer's specifications and will be verified at the frequency specified in the methods.

### **B5.2.10 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).

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

### **B5.2.11 Analytical Parameters and Quantitation Limits**

Each laboratory's determination of the Limits of Detection (LOD), also known as method detection limits, and Limits of Quantitation (LOQ), also known as practical quantitation limits, will comply with the 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 QAPP or other reference materials (e.g., [TRRP](#) Rule and guidance). 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 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.

## ***B6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE***

### **B6.1 Purpose/Background**

All equipment, instruments, and other items used in the collection of environmental data must be maintained and tested to verify that it is in proper working condition.

### **B6.2 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 must conform or be consistent with criteria in the [2009 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 and testing their equipment. The procedures used are outlined in each laboratory's QAM or applicable SOPs.

#### **B6.2.1 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 insure that an adequate reserve of spare parts and supplies is available. Inventory is replenished as needed.

#### **B6.2.2 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, commercial laboratories, and DSHS laboratory will maintain records for contract, program and method compliance. These records are reviewed by a

TCEQ Laboratory and Quality Assurance inspector within the MD during audits and as a condition of accreditation and must conform to record requirements in the [2009 TNI Standards](#).

## ***B7 INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY***

### **B7.1 Purpose/Background**

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 specifications. This section describes the procedures and frequency with which field and laboratory equipment shall be calibrated.

### **B7.2 Instrumentation Requiring Calibration or Standardization**

Field equipment such as pH meters, dissolved oxygen meters, explosimeters, OVAs and other field sampling equipment used to make environmental measurements will be calibrated prior to being taken into the field or according to established, written SOPs or manufacturer's recommendations. Only [NIST](#) traceable standards (e.g., pH buffers) or equipment (e.g., thermometers) will be used for calibration when available.

All laboratory instruments will be standardized using [NIST](#) traceable standards. Other laboratory equipment such as balances and thermometers shall be calibrated against [NIST](#) traceable weights and thermometers.

### **B7.3 Calibration Methods**

Field instruments and equipment will be calibrated according to the manufacturer's instructions, which at a minimum will include calibration prior to use. Laboratory instruments and equipment will be calibrated according to the manufacturer's instructions and standardized according to the analytical methods as described [SW-846](#) or other equivalent approved methods and each laboratory's QA Manual or SOP. Calibration methods specific for measuring air emissions are found in [Quality Assurance Handbook for Air Pollution Measurement Systems: Vol III: Stationary Source Specific Methods](#), Interim Edition.

### **B7.4 Calibration Standards**

Standards used for the calibration of field instruments will be, when available, traceable to certified standards or reference material. Laboratory equipment will be calibrated or standardized against [NIST](#) traceable reference materials and standards. Documentation of the certificate of analysis and traceability of the standards and reagents will be maintained by the field investigator or laboratory personnel.

### **B7.5 Calibration Frequency**

Calibration of field instruments and equipment will be performed at approved intervals as specified by the manufacturer or more frequently as conditions dictate. Calibrations may also be required to be performed at the start and completion of each test run. Records of calibration, repair, or replacement will be filed and maintained by the designated field office staff.

Calibration and standardization of laboratory equipment will be based on procedures described in each contract laboratory's QAM and/or SOPs. It is the responsibility of the data validators to ensure that the proper calibration protocols were used.

Records of calibration, repair, or replacement will be filed and maintained by the designated laboratory personnel performing QA activities in accordance with requirements. Calibration records will be filed and maintained at the laboratory location where the work is performed and will be subject to review by a TCEQ MD laboratory inspector during a scheduled QA audit.

In addition all instrument/equipment calibration and frequency procedures must conform to or be consistent with criteria in the [2009 TNI Standards](#).

## ***B8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES***

### **B8.1 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.

### **B8.2 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](#). Containers are also supplied by the contract laboratories and must meet the criteria described below.

### **B8.3 Acceptance Criteria**

The most important factors to consider when choosing containers for hazardous waste 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 pre-rinsed 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.).

## **B9 NON-DIRECT MEASUREMENTS**

### **B9.1 Purpose**

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.

#### **B9.1.1 Permitting and the Toxicology Division (TD)**

The permit coordinator reviews and may use data from regulatory sources (e.g., emission limits from 40 CFR Part 266).

#### **TD**

When TCEQ determines that a multi-pathway risk assessment is necessary for a hazardous waste combustion facility, the toxicologist ensures that nationally recognized databases, [e.g., the Integrated Risk Information System (IRIS)], and modeling tools are used to calculate the risk due to indirect and direct exposure to facility emissions in accordance with U.S. EPA.

#### **B9.1.2 Corrective Action Program and the TD**

Corrective Action project managers review and evaluate site assessment, remediation and closure data submitted by the regulated community or the data supplier. Corrective Action project managers use state and federal rules and regulations (40 CFR Parts 260-270, 30 TAC Chapters 335 and 350); various guidance documents such as SW-846, *RCRA Corrective Action Plan*, Final U.S. EPA 520-R-94-004, May 1994; [TRRP Guidance](#); approved work plans and reports; and applicable permits/compliance plans and agreed orders to review the data and to determine if the data supplier has documented representativeness, lack of bias, precision, identification of qualifiers, and included an adequate summary of sample data.

#### **TD**

The TD reviews and evaluates feasibility studies, remedial investigation work plans and reports, risk burn data, risk assessment work plans, baseline risk assessments, and proposed remedial action documents submitted by the regulated community or the data supplier.

These documents are reviewed utilizing state and federal rules and regulations (e.g., 30 TAC Chapters 335 and 350); various state (e.g., [TRRP Guidance](#)) and U.S. EPA guidance documents (e.g., Risk Assessment Guidance for Superfund Part A ([RAGS A](#) and [RAGS B](#))); approved conceptual models and work plans; and agreed judgments.

### **B9.1.3 Registration and Reporting**

The major TCEQ database for the storage of facility information is the Permitting and Registration Information System (PARIS). PARIS contains information on all registered generators, transporters, receivers, and permitted storage facilities of hazardous waste. This is maintained daily with new and updated information from PARIS being sent to the RCRAInfo database. The goal of the TCEQ is to have the two databases be equal for all the data elements that they share. I&HW Permits Section has access to PARIS so that they can update facility information on permitted units and update certain permit related information that only I&HW Permits has access to change. This data is available to Regional Offices, ENF, and REM.

### **B9.1.4 UIC Permit Compliance Data**

Regional Office and Homeland Security UIC staff enter information into CCEDS for compliance purposes as designated by the regulated facility's permit requirements. CCEDS also contain information that is used to generate 7520 semi-annual, quarterly and annual reports to the U.S. EPA. CCEDS tracks mechanical integrity testing, facility addresses, investigations, and well workovers. Other databases track the UIC inventory, facility background (site specific), injection volumes, and permitting. The Regional Office investigations database CCEDS is also used by RMD and CID UIC staff for reporting purposes.

## ***B10 DATA MANAGEMENT***

### **B10.1 Purpose/Background**

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 - 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.

#### **B10.1.1 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 FOD Sharenet website), 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 will include the COC record number and associated sample identification numbers and filled out in the field, with no subjective information. 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.

#### **B10.1.2 Laboratory of the Water Quality Planning Division**

Laboratory personnel validate the analytical data by comparing the various QC measurements against method specifications, SOPs or specific project plan or program requirements, and by recalculating a random selection of the results produced by each analyst submitting data.

The potential for human error is high during the transfer of data from laboratory work sheets into a LIMS, onto data entry forms, and while being entered into the system of record. It is imperative that all data entered manually be written legibly with special care to maintain the decimal in its proper location. The laboratory utilizes automated data entry as much as possible thus minimizing transcription errors. Each phase of data generation and handling should have routine independent checks made on data transfer on a 10% basis as a minimum. The appropriate section manager will assume responsibility that this task is completed. Whenever errors are noted, laboratory staff will take the appropriate corrective action and document all actions.

Whenever reported data are reduced in size, it is essential that proper rules for modifying official data be followed. Common tables of conversion factors and rules for significant figures will be used.

The TCEQ routinely stores all completed COC records and sample report at the Sugar Land Laboratory. These files are retained and archived for 5 years as specified in the TCEQ retention file schedule and in accordance with 2009 TNI Standards.

The TCEQ laboratory must maintain files on all QA verification for 5 years and contract laboratories must retain files of all QA verifications for a minimum of 5 years. These files must be readily available for inspection.

The procedures for reporting of analytical results will depend upon which laboratory conducts the analysis. For analyses performed at the TCEQ laboratory, the results are entered into a LIMS. Copies of the results are then sent directly to the sample collector. At the contract laboratories, hard copy reports are generated from the LIMS. These results are sent to TCEQ central office, Regional Offices, and a copy of the report is forwarded to the collector.

Procedures for records storage, control, and retrieval are contained in the TCEQ OPP Section 13.2 - Records Management and also noted in Section 5 of the TCEQ [QMP](#).

### **B10.1.3 Permitting and TD**

Data management activities from generation of data in the field or laboratory to the reporting of the data in a trial burn/risk burn report are the responsibility of the regulated community (data suppliers).

When TCEQ determines that a multi-pathway risk assessment is necessary for a hazardous waste combustion facility, the regulated community will use the data from the trial burn/risk burn report to conduct a comprehensive risk assessment. The potential for human error is high during the transfer of data from the trial burn/risk burn report to the risk assessment model spreadsheets. It is imperative that all data are entered correctly with special attention to maintaining the decimal in its proper location.

Each phase of data handling should have routine independent checks made on data transfer. The appropriate TD project manager will assume responsibility that this task is completed.

Whenever reported data are reduced in size, it is essential that proper rules for modifying official data be followed. Common tables of conversion factors and rules for

significant figures should be used. Reduced data should be identified as such to prevent confusion since the reduced data may inadvertently indicate a violation of analytical or physical measurement methodology.

#### **B10.1.4 Corrective Action Program and Industrial and Hazardous Waste**

The Corrective Action project manager is a data user. He or she reviews and evaluates site assessment, remediation, and closure data submitted by the regulated community or the data supplier. The cleanup status of permitted facilities or facilities that were cited for a permit violation and are conducting corrective action under an order in the Corrective Action Program is recorded in the RCRAInfo database. The I&HW Permits Section in WPD is responsible for final evaluation and closure of permitted units. The data are available to the U.S. EPA for pulling into various report formats as needed. Information in the database provides the documentation required to demonstrate TCEQ corrective action compliance with the TCEQ PPG. Data management activities are handled by Corrective Action staff except for final closure of permitted units which are handled by I&HW Permits staff in WPD.

#### **B10.1.5 Registration and Reporting**

Data regarding the generation or receipt of waste is entered into the PARIS database. If a discrepancy or deficiency is identified, the responsible party (e.g., generator or receiver) is sent a resolution notice. The discrepancy or deficiency is addressed before the data is considered complete.

#### **B10.1.6 UIC**

UIC staff from RMD, PSS, and Regional Offices enters data into databases concerning their individual areas of responsibility within the UIC program. The databases are used to track compliance activity. The CID Homeland Security UIC staff compiles UIC investigation and MIT data, including enforcement actions from CCEDS into semi-annual and annual reports to the U.S. EPA. The RMD will generate the annual reports submitted to the U.S. EPA under federal regulation of 40 CFR Part 144.8 in coordination with CID staff. The data through Central Registry ARTS is peer reviewed after entry by UIC staff (Appendix B). Errors found are corrected immediately.

#### **B10.2 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 [2009 TNI Standards](#) and in 30 TAC Chapter 25 if they are an accredited laboratory analyzing samples to demonstrate compliance to the RCRA/UIC programs. 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 [2009 TNI Standards](#) referenced in 30 TAC Chapter 25.

## **C1 ASSESSMENTS AND RESPONSE ACTIONS**

### **C1.1 Purpose/Background**

The purpose of this section of the QAPP is to ensure 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.

### **C1.2 Assessment Activities and Project Planning**

- Laboratory Audits - Performed by the Accreditation Group of MD once before accreditation is issued and once every 2 years thereafter, unless interim accreditations are issued;
- TCEQ technical peer review process - May include RCRA or 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 - Quality review of each RCRA investigation report generated by the participating TCEQ Regional Offices is conducted by that Regional office before the report is submitted to the central office. Some UIC investigation are generated and reviewed by UIC staff in the Regional Offices;
- Enforcement Action Requests (EAR) - Peer reviews for RCRA/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 ENF SOP. 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 RCRA/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, corrective action and data entry functions are conducted by the WPD QA Specialist or team leader or other management staff as designated on Table C1.2.1. – Documentation of Assessments. After each review for a division or section, the WPD QA Specialist or other assessment staff completes a report of the findings and any corrective action needed to correct all deficiencies to the RCRA or UIC grant manager, audited section manager and division director. Verification that corrective action has been taken on the negative findings is achieved during the next audit; and

- TCEQ Field Investigators - An environmental investigator (EI) II could be accompanied on investigations once a quarter by either an EI V, work leader, team leader, or section manager, and an EI III and EI IV could be accompanied on investigations twice a year by either an EI V, work leader, team leader, or section manager. Investigator’s assessment and evaluation processes are performed by work leader, team leader, or section manager during UIC permit investigation and/or radioactive material license investigation. Corrective actions needed are discussed at the time of the investigation and verification. Implementation of corrective actions occurs at the next accompanied investigation. CID inspects the on-site laboratories at uranium sites and other radioactive material sites as applicable and required every 3 years (§25.6, Subchapter A). Results are to be documented and placed in the investigator’s personnel file.

**Table C1.2.1 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 Group Staff	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.
Quality System Audit	Biennially	Agency QA Specialist	No set schedule	Audit report sent to lead QA Specialist, affected Section Manager(s) and Division Director
Peer Review of specified technical issue	As needed	Specified by Manager	No set schedule	Final document reported on Technical Peer Review Document
Quality Assurance Review	100% of RCRA investigation reports	Region Office Waste Section Manager	Within 45 days of the investigation date	Maintained by Region Office Program Manager
Quality Control Review	100% of Enforcement Action Request submitted (EAR)	Enforcement ENF Staff and Management	Within 15 days of receipt of report from Regional Office Staff	Section 7i of the EAR
Program Audit Completeness Review	One Class 1, or Class 1ED and one Class 2 modification as needed	WPD QA Specialist	Annual review	Report sent to RCRA Project Manager, Section Manager and Division Director
Program Audit Completeness Review	One major permit amendments or new permit reviewed for completeness as needed	WPD QA Specialist	Annual review	Report sent to RCRA Project Manager, Section Manager and Division Director

**Table C1.2.1 Documentation of Assessments**

<b>Type of Assessment</b>	<b>Number and/or Frequency</b>	<b>Assessment Personnel</b>	<b>Schedule</b>	<b>Reporting and Resolution</b>
Program Audit Completeness Review	5% of all nonhazardous waste determinations as needed	Technical Analysis Team (TAT) in WPD	Annual review	Report maintained by TAT and available upon request
Program Audit Completeness Review	1 Class 3 Permit modification as needed or approved by WPD Director	WPD QA Specialist	Annual review	Report sent to RCRA Project Manager, Section Manager and Division Director
Program Audit Completeness Review	1 Trial Burn/Risk Burn reviewed as needed or approved by WPD Director	WPD QA Specialist	Annual review	Report sent to RCRA Project Manager, Section Managers and Division Director
Program Audit Completeness Review	5% or 1 UIC inspection report as needed	RMD/OCE QA Specialist	Annual review	Report sent to UIC Project Manager, Section Manager and Division 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

### **C1.3 Reporting and Resolution of Issues**

Findings of procedures and practices which do not conform to the QAPP require timely corrective action. Corrective action for laboratory issues may be initiated by the PSS or Regional Offices, the WPD QA Specialist, laboratory staff and management, data reviewers and all other data users specialist using procedures outlined in [SW-846](#) and all other project specifications (e.g., references) designated in this 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 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.

Laboratory corrective action could 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 RCRA/UIC Program 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 RCRA/UIC Program 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 verified according to Section 10 of the TCEQ [QMP](#).

#### **C1.4 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 [2009 TNI Standards](#) and should be documented accordingly. Corrective action procedures should be defined, implemented and then documented as necessary.

## **C2 REPORTS TO MANAGEMENT**

### **C2.1 Purpose/Background**

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.

#### **C2.1.1 Frequency, Content, and Distribution of Reports**

- Investigation Reports – PSS creates monthly progress reports of work plan attainment and distributes the reports to Area and Regional managers and to CID Director and Homeland Security Section Manager. The numbers are derived from the CCEDS database with information on each investigation and maintained by the Regional Offices. Reports are submitted to the Area Directors, Homeland Security Section Manager, and Regional Office management each month for review of progress in investigation activity. For UIC investigations, a report is generated using the federal fiscal year (Form 7520). With 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), Form 7520 - 3 (Mechanical Integrity Testing);
- Monthly enforcement report to the Commission: the number of formal actions initiated for the month sorted by program (e.g., I&HW, 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;
- Corrective Action Program Activities - Annual report to the Department of Defense (DOD) regarding status of RCRA corrective action activities at Federal Facilities is completed by the DOD and State Memorandum of Agreement Manager;
- Quarterly report to the State of Texas Legislative Budget Board regarding the timeliness and number of permits issued, percentage of corrective action facilities closed, new system waste stream evaluations, and notice of deficiency letters sent for corrective action proposals is compiled by the budget analyst of each division; and
- Corrective action reports will be distributed according to Section 10 of the TCEQ [QMP](#).
- Semi-annual reports on UIC exceptions are sent to the U.S. EPA Region 6 quarterly.

## **D DATA VALIDATION AND USABILITY**

For the purposes of the QAPP, TCEQ defines and applies practices and procedures based on U.S. EPA QA/G-8, Guidance on Environmental Data Verification and Data

Validation (U.S. EPA240R-02/004). A primary goal of the TCEQ is to ensure that environmental programs and decisions are supported by data of the type and quality needed and expected for their intended use. This data may be used to support remediation activities, waste classification, compliance to the MACT Standards, and groundwater monitoring activities to name a few. Please refer to the Glossary for definitions of data validation and data verification.

Data validation is an integral part of quality management in the TCEQ. The data review, validation and verification procedures described in this section will ensure: (1) complete documentation is maintained in accordance with Section B10 of this document; (2) transcription and data reduction errors are minimized; (3) the data are reviewed with results documented; and (4) the reported results are qualified if necessary. Laboratory data reduction and verification procedures are required to ensure the overall objectives of analysis and reporting meet method and project specifications.

All laboratory data reduction procedures must be described in each laboratory QAM and/or SOPs and conform or be consistent with the [2009 TNI Standards](#) and be appropriate for its intended use.

## ***D1 DATA REVIEW, VERIFICATION, AND VALIDATION***

### **D1.1 Purpose/Background**

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 may be 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 QAPP and other referenced documents where applicable.

Staff of the PSS, Regional Offices, REM, CID, I&HW Permits Section of the WPD, UIC Permits Section of the RMD, and TD are data users. These data users are the program staff authorized to determine the compliance status of the data supplier, TCEQ, 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 may 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.

### **D1.1.1 I&HW/RMD Permits**

Staff of I&HW Permits Section in the WPD and UIC Permits Section in the RMD are data users. In order 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 (Table D.1.2) 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.

I&HW/UIC Permit Sections also provides a checklist (Table D1.3) to assist I&HW/UIC permitted facilities which are subject to the groundwater detection monitoring to prepare annual reports to be submitted to the TCEQ.

I&HW/UIC staff or their contractors or permittees will review environmental data submitted for QA/QC validation by use of standardized check lists and procedures developed in the section. Staff review trial burn/risk burn reports to document if DQOs outlined in the company's QAPP that was submitted in the trial burn/risk burn proposal were achieved.

The following reference documents may be utilized by the data reviewer during the data review/validation process: U.S. EPA Technical Implementation Document for U.S. EPA's Boiler and Industrial Furnace Regulations, U.S. EPA A530-R-92-011, [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).

### **D1.1.2 TAS of the I&HW Permits Section**

The explanation portion of the check sheet has guidance on how to assess the quality of the data. The analytical check sheet is used to document data quality outside of performance goals with respect to MS/MSDs, surrogate recoveries, internal standards or highly contaminated samples to name a few. Data is rejected on a case by case basis by the reviewer based on best professional judgment.

### **D1.1.3 Corrective Action Program**

As specified in 30 TAC §350.54(a), the person responding to the TRRP rule in the Corrective Action Program is responsible for the quality of the data. The TCEQ guidance *Review and Reporting of COC Concentration Data under TRRP* (RG-366/TRRP-13) provides procedures the person must follow to document the quality of the data. Corrective Action project managers review the project and laboratory data (including reportable data, laboratory review checklists, and exception reports) and the data usability summary to verify the reporting requirements are met, the quality of the

data is known and documented, and the data are usable for making compliance determinations.

#### **D1.1.4 Regional Offices**

Problems with potential limitations of the data 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 I&HW/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 B5 when DQOs have been formally established.

#### **D1.2 Delineation of Laboratory Responsibility and Checklists**

All laboratory operations subject to TNI Standards, as well as on-site laboratories qualifying for an exemption under 30 TAC Chapter 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 WPD in the OPR should contain a completed copy of the Laboratory Data Report QA/QC Checklist (Table D1.2). This checklist will be used by WPD Permits Section staff to verify minimum data quality completeness, correctness and compliance against method references and other requirements listed in this QAPP. In addition, the laboratory must also provide comments in the LCN that describe in detail any problems encountered in the processing of the samples within the analytical data set in question. 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 a LCN. Refer to the Laboratory Data Report QA/QC Checklist (Table D1.2).

All data sets submitted to this agency on behalf of a remediation action according to 30 TAC Chapter 350 must include a TRRP review checklist completed by the laboratory and reviewed by the data reviewer to ensure the quality of the data is known and acceptable for its intended purpose. Once a person has been referred to the TRRP, the person must comply with all requirements of the adopted rule unless otherwise stated in another agency rule or unless a federal standard or state statutory requirement is more stringent.

##### **D1.2.1 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.

**D1.2.2 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.

## ***D2 VERIFICATION AND VALIDATION METHODS***

### **D2.1 Purpose/Background**

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 with the matrix variability noted on appropriate documentation.

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

When compliance data is submitted under TRRP, the laboratory reviews the data for technical compliance to the method and laboratory SOPs. The laboratory then documents the outcome in the laboratory review checklist and data package. The laboratory review checklist and data package are then reviewed and, when warranted, validated by a party independent of the laboratory to determine if the data meet the project objectives and are usable for making project decisions. The outcome of the data review and, if performed, the data validation is documented in the data usability summary included in the assessment report.

Due to the variety of data uses and varying compliances to demonstrate compliance according to federal and state rules, not every laboratory analyses 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 RCRA/UIC Program/Permit specifications.

## **D2.2 Implementation of Validating and Verifying Data**

Staff of the Corrective Action Program of the REM, I&HW Permits Section of the WPD, UIC Permits Section of the RMD, Registration and Reporting Section of the PRSD, TD, CID, MD, PSS, 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 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 D2.2.1 (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 Analysis Plans, minimum QC performance criteria, regulatory standards etc.) so that the data validator knows what information the laboratory was required to provide. Table D2.2.1 (Inputs from the Analytical Laboratory for Data Verification) lists elements that can be used to validate data for its particular use.

**Table D2.2.1 Inputs from the Analytical Laboratory for Data Verification**

Essential Laboratory Data Requirements to Demonstrate Compliance to RCRA/UIC Programs

**Organic 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

**Inorganic Analytes**

- 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 TAC25.6

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

### ***D3 RECONCILIATION WITH USER REQUIREMENTS***

#### **D3.1 Purpose/Background**

The objective of this section is to describe how the results obtained from the project and/or task is 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 Corrective Action Program of the REM, I&HW Permit Section staff of the WPD, UIC Permits Section of the RMD, TD, CID, MD, 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 uncertainty 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 the loss of data rejected by the data reviewer is critical to the decision being made with the data.

Questions or comments regarding the contents of this QAPP may be directed to the TCEQ Waste Permits Division Quality Assurance Specialist: Anju Chalise (512) 239-5441.

## **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.

**Accrediting Body:** Although NELAP is a national program, state governmental agencies serve as Accrediting Bodies, the Territorial, State, or federal agency having responsibility and accountability for environmental laboratory accreditation and which grants accreditation. The TCEQ is the TNI Accrediting body for the State of Texas. A NELAP Accreditation Body will accept by recognition, the accreditation status of a laboratory issued 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. For soil sample, field blank samples can be prepared with certified clean sand or soil rather than clean water

**Instrument Blank:** A clean sample (e.g., distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination. (U.S. EPA-QAD)

**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 30TAC 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, handled, transported to the field, and then returned to the laboratory in the same manner as the other samples. Trip blanks are used to evaluate error associated with shipping and handling (i.e., diffusion of volatile organics through 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 detectable 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 Objective (DQO):** [*also called Measurement Quality Objective*]: the desired sensitivity, range, precision and bias of a measurement.

**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 (exceptions are trial or risk burns). 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. TCEQ REM does not require this QC parameter to be collected unless warranted by site-specific conditions.

**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 (*spiked sample or fortified sample*):** A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample 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 (*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:** One way to establish a LOD, defined as the 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 activities involving the 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. (QAMS)

**Quality Assurance Project Plan (QAPP):** A formal document describing the detailed QC procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved. (U.S. EPA-QAD)

**Quality Control (QC):** The overall system of technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of users. (QAMS)

**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 (aka – 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 Well 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 that analyte of interest. It is unlikely to be found in an environmental sample and is added to them for QC purposes.

## ***REFERENCES***

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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. Handbook of Quality Assurance/Quality Control (QA/QC) Procedures for Hazardous Waste Incineration, U.S. EPA 625/6-89/023, January 1990
6. U.S. EPA RCRA Sampling Procedures Handbook, Region VI, May 1998
7. 40 CFR Parts 144-148 and 260-270
8. TCEQ Guidance on Implementing [SW-846](#) Method 5035
9. RCRA Corrective Action Plan, Final U.S. EPA 520-R-94-004, May 1994
10. TCEQ PPG
11. U.S. EPA RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, November 1992
12. U.S. EPA RCRA Sampling Procedures Handbook, Revised May 1998
13. TCEQ Enforcement SOPs.
14. Field Operations Division Standard Operating Procedures, Latest Revision
15. Enforcement Initiation Criteria, Latest Revision
16. Quality [Assurance Handbook for Air Pollution Measurement Systems: Vol III: Stationary Source Specific Methods](#), Interim Edition, Office of Research and Development, U.S. EPA/600/R-94/038C, April 1994
17. U.S. Environmental Protection Agency (2002): Guidance on Environmental Data Verification and Data Validation, QA/G-8.
18. Current Perspectives in Site Remediation and Monitoring – The Relationship Between SW-846, PBMS, and Innovative Analytical Technologies U.S. EPA 542-R-01-015



## **WASTE PERMITS LABORATORY DATA REPORT COVER PAGE**

This data package consists of laboratory data that supports one of the following:

- Groundwater Monitoring
- Hazardous Waste Classification
- Hazardous Waste Combustor Maximum Achievable Control Technology Standards
- Injection Well
- Other (Explained in Case-Narrative)

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**Release Statement:** I am responsible for the release of this laboratory data package. The data submitted in this package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Data Report QA/QC Checklist (Table D1.2), and no information or data have been knowingly withheld that would compromise the quality of the data.

**Check if Applicable:**  This laboratory is an in-house laboratory controlled by the person required to demonstrate compliance according to rule. The official signing the cover page of the report is responsible for releasing this data package and is by signature affirming the above release statement is true.

*Please Note: A comparable data checklist and signature page may be used. The checklist has been provided for your convenience. Depending upon the type of data needed to demonstrate regulatory compliance, the responsible party for the completeness of the data package may be a representative of a permitted site (i.e., Comprehensive Performance Testing Entity), a generator of hazardous and industrial non-hazardous waste, or an authorized representative of a non-permitted site. Data of documented and known quality is the responsibility of each laboratory.*

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Name (Printed)

Signature

---

Official Title

Date

***LABORATORY DATA QA/QC REPORT & ANNUAL  
GROUNDWATER DETECTION MONITORING CHECKLIST  
INSTRUCTIONS***

**Waste Permits Division and Radioactive Materials Division**

The Laboratory Data Report QA/QC Checklist, (Table D1.2) 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 RCRA and UIC programs within the Waste Permits Division and Radioactive Materials Division, respectively. 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 RCRA and UIC programs will also have to meet the performance criteria as designated in this QAPP.

**II. Analytical Methods and Method Modifications Clarifications & Procedures**

**Analytical Methods**

New rulemaking initiatives update 30 TAC Chapter 305 and 30 TAC Chapter 335 to include federal rule changes (U.S. EPA's Methods Innovation Rule) that are set forth in parts of RCRA Clusters XV-XVIII. These rule changes remove the requirements to use U.S. EPA [SW-846](#) methods when conducting RCRA monitoring programs unless prohibited by law, rule, or method. 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 RCRA thereby protecting the environment and human/animal population. This is due on principle that most RCRA 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 RCRA 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)*). There are also methods and procedures that support the MACT Standards. 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 in order to demonstrate compliance. A list of potentially acceptable modifications that are allowed for meeting RCRA compliance according to the U.S. EPA and TCEQ is presented here.

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

<b>Equipment</b>	
<b>Chemicals</b>	
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
<b>Specifications</b>	
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. I&HW Annual Groundwater Detection Monitoring Data**

If you are an I&HW permitted facility subject to the groundwater detection monitoring and are required to submit an annual report to the I&HW Permits Section of the WPD by March 1<sup>st</sup> of every year the I&HW Annual Groundwater Detection Monitoring Report Checklist is provided as a tool for the facility. All data collected from each groundwater sampling event in the preceding calendar year shall be included in the report. The actual content of the report should reflect the current state of the monitoring done at the facility. Refer to the I&HW Annual Groundwater Detection Monitoring Report Checklist (Table D1.3).

### **IV. How to Complete the Laboratory Data Report QA/QC Checklist & I&HW Annual Groundwater Detection Monitoring Checklist**

Provide a completed copy of the Laboratory Data Report QA/QC Checklist (Table D1.2) for all analytical data sets submitted to the TCEQ to verify compliance to RCRA and UIC Programs within the Waste Permits Division and Radioactive Materials, respectively.

- If you are providing data for the I&HW Annual Groundwater Detection Monitoring Report, we recommend you also complete and submit an I&HW Annual Groundwater Detection Monitoring Report\_Checklist (Table D1.3).
- 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 for record.
- Sample matrix interference problems must be identified in the Case-Narrative 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 [2009 TNI Standards](#).
- The method detection limit (MDL), also known as the limit of detection (LOD – [2009 TNI Standards](#)), and the practical quantitation limit (PQL - [2009 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.

**Table D1.2 LABORATORY DATA QA/QC REPORT CHECKLIST**

<b>Facility Name:</b>	<b>Permit/ISW Reg No.:</b>	<b>For TCEQ Use Only</b>	
<b>Laboratory Name:</b>	<b>U.S. EPA I.D. No.:</b>	<b>Project Mgr:</b>	
<b>Reviewer Name:</b>	<b>TCEQ Project Manager/Data Reviewer:</b>		
<b>Date:</b>	<b>Date:</b>		
<b>Description</b>	<b>Status</b>	<b>Case Narrative (Check Box)</b>	<b>Technically Complete</b>
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 <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
2. Was a case-narrative from laboratory (QC data description summary) submitted with the data set?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
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 <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
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 <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
5. Were all samples prepared and analyzed within required holding times?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
6. Were samples properly preserved according to method and QAPP requirements?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	N <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>

<b>Facility Name:</b>	<b>Permit/ISW Reg No.:</b>	<b>For TCEQ Use Only</b>		
<b>Laboratory Name:</b>	<b>U.S. EPA I.D. No.:</b>	<b>Project Mgr:</b>		
<b>Reviewer Name:</b>	<b>TCEQ Project Manager/Data Reviewer:</b>			
<b>Date:</b>	<b>Date:</b>			
<b>Description</b>	<b>Status</b>	<b>Case Narrative (Check Box)</b>	<b>Technically Complete</b>	
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 <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	
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 <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	
9. Are the POC's included within the analytical method's target analyte list?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	
10. Were the appropriate type(s) of blanks analyzed?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>		
11. Did any blank samples contain POC concentrations >5x or 10x of MDL? If so, please explain potential bias?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	
12. Were method blanks taken through the entire preparation and analytical process?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	
13. Did the calibration curve and continuing calibration verification meet regulatory (e.g. NELAC Standards) method specifications (No. of standards, acceptance criteria, etc.)?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	
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 <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	
15. Were manual peak integrations performed? If so pre and post chromatograms and method change histories may be requested?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	
16. Were all results bracketed by a lower and upper range calibration standard?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	

<b>Facility Name:</b>	<b>Permit/ISW Reg No.:</b>	<b>For TCEQ Use Only</b>	
<b>Laboratory Name:</b>	<b>U.S. EPA I.D. No.:</b>	<b>Project Mgr:</b>	
<b>Reviewer Name:</b>	<b>TCEQ Project Manager/Data Reviewer:</b>		
<b>Date:</b>	<b>Date:</b>		
<b>Description</b>	<b>Status</b>	<b>Case Narrative (Check Box)</b>	<b>Technically Complete</b>
17. Was any result reported outside of the range of the calibration standards?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
18. Were all matrix spike (MS) and MS duplicate (MSD) recoveries within the data decision making goals of QC data in the RCRA/UIC QAPP and/or within the laboratories control charts? If not were data flagged with explanation in case-narrative?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
19. Were all of the MS and MSD relative percent differences (RPDs) within the data decision making goals of QC data in the RCRA/UIC QAPP? If not were data flagged with explanation in case-narrative?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
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 <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
21. Were all POCs (COCs) in the LCS?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
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? <i>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.</i>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
23. Were any of the samples diluted? If so were appropriate calculations made to the MDL and/or PQL of the final report?	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>	<input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>





**TABLE D1.3 WPD I&HW Annual Groundwater Detection Monitoring Report**

<b>Facility Name:</b>			<b>Permit/ISW Reg No.:</b>		
<b>Address:</b>			<b>Date:</b>		
Report Elements	Regulatory Citations, Permit Provisions* or I&HW Recommendations	To Be Completed by I&HW Permitted Facility		For TCEQ USE Only (Technically Complete)	
		N/A	Location of Information within the I&HW Annual Groundwater Detection Monitoring Report		
1.	Certification required under 40 CFR Section 270.11(d)(1).	40 CFR 270.11(d)(1)			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
2.	Sealed in accordance with Texas Geopractice Act and Rules.	22 TAC 851.156			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
3.	Discussion of any permit action (e.g., permit mod, renewal, etc.) that might change the groundwater detection monitoring system.	Recommended			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
4.	Discussion of site historical information for any significant issues related to groundwater detection monitoring including groundwater flow direction change, statistically significant increase (SSI) multiple aquifer sampling, perched aquifer, etc.	Recommended			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
5.	Discussion of any site specific conditions which affect interpretation of the data collected.	Recommended			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
6.	Dates and required frequency of sampling events.	Permit Provision II.B.1.d			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
7.	For Post Closure Care, statement of the year (e.g., 5 <sup>th</sup> ) as well as the total number of years (e.g., 30) required for groundwater detection monitoring.	Recommended			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>

<b>Facility Name:</b>			<b>Permit/ISW Reg No.:</b>		
<b>Address:</b>			<b>Date:</b>		
Report Elements	Regulatory Citations, Permit Provisions* or I&HW Recommendations	To Be Completed by I&HW Permitted Facility		For TCEQ USE Only (Technically Complete)	
		N/A	Location of Information within the I&HW Annual Groundwater Detection Monitoring Report		
8.	Identification of all groundwater detection monitoring system wells and associated aquifers required to be sampled by the permit.	Permit Table VI.B.3.b and Permit Provision VI.D.2.c			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
9.	All wells identified in checklist Item 8 sampled, or explanation of discrepancy provided.	Permit Table VI.B.3.b and Permit Provision VI.D.2.c			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
10.	Statement whether a SSI has occurred over background values in any well during the previous calendar year's monitoring events.	Permit Provision VI.G.1			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
11.	Discussion of the status of any SSI events.	Permit Provision VI.G.1			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
12.	Discussion of groundwater sampling methods.	Permit Provision VI.D.1.c			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
13.	Groundwater level measurements relative to Mean Sea Level (MSL) measured to within 0.01 ft.	Permit Provision VI.D.2.d(1)			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
14.	Determination of pH, temperature, Specific Conductivity and, if applicable, Turbidity in nephelometric turbidity units.	Permit Provision VI.D.2.d(2)			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
15.	Description of groundwater sample appearance (clarity, color, etc.).	Permit Provision VI.D.2.d(3)			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
16.	Comparison of measured total well depth to total constructed well depth and screened interval as noted on well construction logs. Recommendations for any needed corrective action (redevelopment or replacement).	Permit Provision VI.D.2.d(4)			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>

<b>Facility Name:</b>			<b>Permit/ISW Reg No.:</b>		
<b>Address:</b>			<b>Date:</b>		
Report Elements	Regulatory Citations, Permit Provisions* or I&HW Recommendations	To Be Completed by I&HW Permitted Facility		For TCEQ USE Only (Technically Complete)	
		N/A	Location of Information within the I&HW Annual Groundwater Detection Monitoring Report		
17.	Discussion of findings from inspection of all wells specified in permit, and discussion of any needed repairs or replacements.	Permit Provision VI.D.2.d(5)			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
18.	Table summarizing groundwater elevation data for each well including field measurements, surveyed elevations of measuring point and calculated groundwater elevation above MSL.	Permit Provision VI.G.2 and VI.D.2.d(1)			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
19.	Discussion of groundwater flow direction and flow rate in the uppermost aquifer or any other aquifer that is sampled, using the data collected during the preceding calendar year's sampling events. Include all calculations and data inputs used for the determination.	Permit Provision VI.G.3			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
20.	Contour map sealed by a Professional Geoscientist of the potentiometric water levels in the uppermost aquifer or any other aquifer that is sampled based at a minimum upon concurrent measurements in all monitoring wells for each monitoring event.	Permit Provision VI.G.4 and 22 TAC 851.156			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
21.	Any exclusion of data collected for generating contour map and justifications.	Recommended			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
22.	Table summarizing analytical results for all required samples and constituents.	Permit Provision VI.G.2			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>

<b>Facility Name:</b>		<b>Permit/ISW Reg No.:</b>			
<b>Address:</b>		<b>Date:</b>			
Report Elements	Regulatory Citations, Permit Provisions* or I&HW Recommendations	To Be Completed by I&HW Permitted Facility		For TCEQ USE Only (Technically Complete)	
		N/A	Location of Information within the I&HW Annual Groundwater Detection Monitoring Report		
23.	Field investigation reports including, at a minimum, sample results, sample collection records, COC records, analytical results, associated QC including trip, field and rinsate blanks as applicable, laboratory blanks, spike recovery, duplicate, and surrogate recovery data and a written discussion of the sampling event.	QAPP Section A.9.2.1			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
24.	Laboratory report including, at a minimum, the Analytical Data Report Cover Page, the COC record, the sample results and associated QC including blank, spike recovery, duplicate, and surrogate recovery data. Information provided shall be sufficient to ensure the quality and the usability of the data.	QAPP Section A.9.2.2 and Analytical Data Report Cover Page found within the QAPP			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
25.	Analytical Data Report QA/QC checklist and Laboratory Case Narrative (Table D1.2).	RCRA/UIC QAPP			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
26.	Discussion of statistical methodologies used in accordance with relevant permit provisions. Please note: an alternate statistical methodology cannot be used without an approved permit amendment or modification.	Recommended			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>

<b>Facility Name:</b>		<b>Permit/ISW Reg No.:</b>			
<b>Address:</b>		<b>Date:</b>			
Report Elements	Regulatory Citations, Permit Provisions* or I&HW Recommendations	To Be Completed by I&HW Permitted Facility			For TCEQ USE Only (Technically Complete)
		N/A	Location of Information within the I&HW Annual Groundwater Detection Monitoring Report		
27.	Table and/or description of statistical analysis results, including any SSI over background concentrations and all supporting documentation (calculations and data inputs).	Permit Provision VI.G.2			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
28.	Recommendations for any changes to the groundwater detection monitoring system.	Permit Provision VI.G.5			Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>
<b>TCEQ Project Manager:</b>		<b>Date Reviewed:</b>			

\* All Permit Provisions referenced herein refer to standard permit provisions in the latest permit modules maintained by the I&HW Permits Section. The Regulated Entity is responsible for ensuring that the provisions of their specific permit are met.



**SOUTH TEXAS OPERATIONS**

641 E FM 1118  
Kingsville, Texas 78363  
Phone: (361) 595-5731

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December 22, 2014

Muhammadali Abbaszadeh, Health Physicist  
UIC & Radioactive Materials Compliance Coordinator/Investigator  
Critical Infrastructure Division  
Homeland Security Section  
Office of Compliance and Enforcement  
Texas Commission on Environmental Quality

Re: URI uranium analysis method

Mr. Abbaszadeh,

Based upon new requirements in URI's Mine Area Permits for Vasquez, Rosita and Kingsville, URI is now required to submit its uranium analysis method to the TCEQ Executive Director for approval. URI's previously approved permits required URI to follow analytical methods set forth in the EPA document "Methods for Chemical Analysis of Water and Wastes". This document as well as all revisions did not include any method for uranium analysis. Also at the time that these permits were originally written, there were no alternative standard methods for determining uranium content in water. Based upon research in the field of uranium analysis, URI developed a method that provided acceptable results for our permitting and processing requirements. This method has been used for uranium analysis for more than 30 years. Over several years, URI has checked its analytical results with an outside laboratory and has shown that the results are within an acceptable tolerance. The attachment outlines the method that is currently utilized for our in house analysis. References for the development of the method are shown within the procedure. This process has been unchanged since operations of these three facilities has commenced.

URI, Inc. requests that the attached procedure be officially approved by the TCEQ as required by sections V.F(b) of the area permits for Vasquez (UR03050), Rosita (UR02880), and Kingsville Dome (UR02827).

Sincerely,

A handwritten signature in blue ink, appearing to read "D. McCoig", is written over a faint, larger version of the same signature.

Dain McCoig  
Vice President South Texas Operations  
URI, Inc.

 <b>URI, INC.</b>		<b>SOP30S – SPECTROPHOTOMETRIC DETERMINATION OF URANIUM WITH 4-(2-PYRIDYLAZO)RESORCINOL (PAR)</b>
<b>Radioactive Materials License No. R03653</b> <b>October 28, 2014</b>	<b>Rev: 1.1</b>	<b>RSO Review/Date:</b> <i>JH 12/22/2014</i> <b>MGT Review/Date:</b> <i>MJ 12/22/14</i>

## Principle

There are several pyridine-azo dyes that may be employed for the spectrophotometric determination of uranium. Although bromo-PADAP is the one most commonly used in the in-situ solution mining industry, its cost and periods of non-availability have caused laboratory personnel to switch to the PAR reagent. PAR possesses all spectrophotometric features (except for a lower molar absorptivity) of the bromo-PADAP reagent.

The PAR procedure is similar and as simple to use as the bromo-PADAP's; and the reagent is approximately 85% less costly. The uranyl-PAR complex is affected by the same factors (i.e., pH, temperature, and the concentrations of the complexing agents and interfering ions) which affect the uranyl-bromoPADAP reagent.<sup>12</sup>

## Scope

This method can be employed for all plant and well field samples that will contain uranyl ( $UO_2^{++}$ ) ions. These ions are present as the di- and tri- carbonates and chloride complexes in the samples from the plant and well field. Uranium, as dissolved uranyl peroxide, can not be determined with this procedure.

## Equipment and Glassware

1. Volumetric flask, 25 ml: one per sample.
2. Pipet, various volumes: one per sample depending on the uranium concentration.
3. Dispensette dispensers: 4 (one for each reagent: two-5 ml, one 10 ml, and one-2 ml bottle tops), three with a 1 liter capacity bottle (reservoir).
4. Visible spectrophotometer: A double or single beam, grating spectrophotometer with a tungsten source may be used to measure the absorbances of the samples. If a single beam spectrophotometer is used, a blank must be run (i.e., the instrument is "zeroed" or calibrated by setting the blank's absorbance at 0.000A).

<sup>1</sup> Florence, T. M., and Farrar, Y., "Spectrophotometric Determination of Uranium with 4-(2-pyridylazo)resorcinol", *Anal. Chem.*, 35(11), 1613-16 (1963)

<sup>2</sup> Johnson, D. A., and Florence, T. M., "Spectrophotometric Determination of Uranium (VI) with 2-(5-bromo-2-pyridylazo)-5-diethylaminophenol", *Anal. Chem. Acta.*, 53, 73-79 (1971)

## Chemicals and Reagents

1. Reagent alcohol - place the 10 ml Dispensette bottle top on the 1 gallon alcohol bottle.
2. Complexing reagent solution 2000 mls: Add 25 g of CyDTA, (1,2-cyclohexylenedinitrilo) tetraacetic acid, 5 g of NaF, and 65 g of sulfosalicylic acid to a 1000 ml beaker containing 800 ml of distilled water. Neutralize to pH 8.0 with 40% NaOH; dilute to 2000 ml with distilled water and transfer to the Dispensette's 1 liter reservoir and place the 5 ml bottle top on the bottle.
3. 40% NaOH solution: To 500 ml of distilled water, which is being magnetically stirred, slowly add 200 g of NaOH pellets. As soon as the solution attains room temperature, tightly stopper the container to prevent CO<sub>2</sub> absorption.
4. Buffer solution: Prepare a 1M triethanolamine buffer by adding 149 g (132.5 ml) of reagent-grade triethanolamine to a 1000 ml beaker containing 800 ml of distilled water. Neutralize to a pH 8.0 with HCl acid and allow to stand overnight. If the buffer's pH deviates, readjust to 8.0 with either HCl or NaOH and dilute to one liter; transfer to the Dispensette reservoir and place the 5 ml bottle top on the bottle.
5. PAR reagent, 0.060%: Dissolve 0.6 g of the PAR reagent (Aldrich catalog # 17,826-8) in 1000 ml of distilled water and transfer to the Dispensette's reservoir and place the 2 ml bottle top on it.
6. Uranium standard stock solution:
  - a. A 1000 ppm uranium standard was prepared by dissolving 2.1091 grams of uranyl nitrate, UO<sub>2</sub>(NO<sub>3</sub>)<sub>2</sub> · 6H<sub>2</sub>O, in 1000 ml of distilled water; or
  - b. A 1000 ppm standardized uranium reference standard was purchased from Anderson Labs., Inc., Ft. Worth, Tex. (trade name: Banco).

## Calibration Curve Procedure

Prior to analyzing unknown samples, prepare a standard calibration curve by carrying a series of 4-5 known uranium standards. Consult Note 1.

1. Designate one-25 ml volumetric flask as the blank flask. Add no uranium-containing solution, only the reagent volumes which will be used for the standard and sample analyses.
2. Pipette a 2 ml aliquot of standard stock solution into a 100 ml volumetric flask; make to volume with distilled water. This represents the 20 ppm secondary stock standard solution.

3. From the 20 ppm uranium standard solution, pipet 1, 3, 5, and 7 ml aliquots into individual 25 ml volumetric flasks. These volumes correspond to the uranium weights of 20, 60, 100, and 140  $\mu\text{g}$  in the reaction flask.
4. To the 25 ml volumetric flasks, add in the following order and volumes, shaking the sample after each addition:
  - a. 2.5 ml of complexing reagent solution
  - b. 5.0 ml of reagent alcohol
  - c. 2.0 ml of PAR reagent solution
  - d. 2.0 ml of buffer solution
5. Add distilled water to dilute the reaction solution to the 25 ml volumetric mark for each flask; stopper the flask and mix the contents thoroughly by inverting the flask several times.
6. After mixing, allow the solution to stand for at least 5 minutes to allow color (i.e., the reaction) to develop fully.
7. Measure the absorbance at 530 nm on the spectrophotometer using a 1 cm glass cuvette. The spectrophotometer is first "zeroed" using the blank and then the standard or sample readings are made. Consult Notes 2 and 3.
8. The calibration curve is prepared by plotting absorbance values versus micrograms ( $\mu\text{g}$ ) of uranium (as  $\text{U}_3\text{O}_8$ ) in the solution, determined from the uranium standards. Determine the slope of the calibration curve, as depicted in Figure 1. Consult Note 4.

### **Analysis of Unknown Samples**

The procedure is essentially the same as in the section entitled calibration curve procedure.

1. Perform as in 1 of the calibration curve procedure.
2. Pipette an aliquot of the sample solution; dilutions will have to be made if the sample's uranium content exceeds the upper limit, approximately 140  $\mu\text{g}$  U.
3. Perform as in 4, 5, 6, and 7 of the calibration curve procedure.
4. Calculate the uranium concentration by multiplying the sample's absorbance value by the slope and dividing the resultant by the volume of sample used in the 25 ml volumetric flask. If dilutions were made, multiply the y-value calculated above by the dilution factor. Consult Notes 5 and 6.

### **Notes**

1. Any time fresh stock solutions (i.e., PAR, complexing agent solution, buffer solution, and/or uranium standard solutions) are made, a new standard curve must be prepared.

2. Each cuvette should be washed with distilled water before starting and after concluding the series of analyses. Prior to filling the cuvette with blank, standard, or sample solution, rinse twice with reagent alcohol; this minimizes air bubble formation on the sides of the cuvette; lightly tap the cuvette to evolve-off any air bubbles.
3. For a 20  $\mu\text{g}$  uranium standard (23.6  $\mu\text{g}$   $\text{U}_3\text{O}_8$ ), an absorbance reading of approximately 0.27 is measured; for a 140  $\mu\text{g}$  U standard (165  $\mu\text{g}$   $\text{U}_3\text{O}_8$ ), 0.96A.
4. The slope can be determined by the following equation:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

The slope y-intercept form of a straight line is:

$$y = mx + b$$

For colorimetric determinations,  $b = 0$ .

5. Example: From the calibration curve procedure, the slope was calculated and determined to be 172.12 and  $b = 0$ . The sample's procedure revealed the following: a) a 2 ml sample aliquot was used in the 25 ml volumetric flask and was taken from a 5 to 25 ml dilution (DF= 5); and b) its absorbance was measured at 0.750.

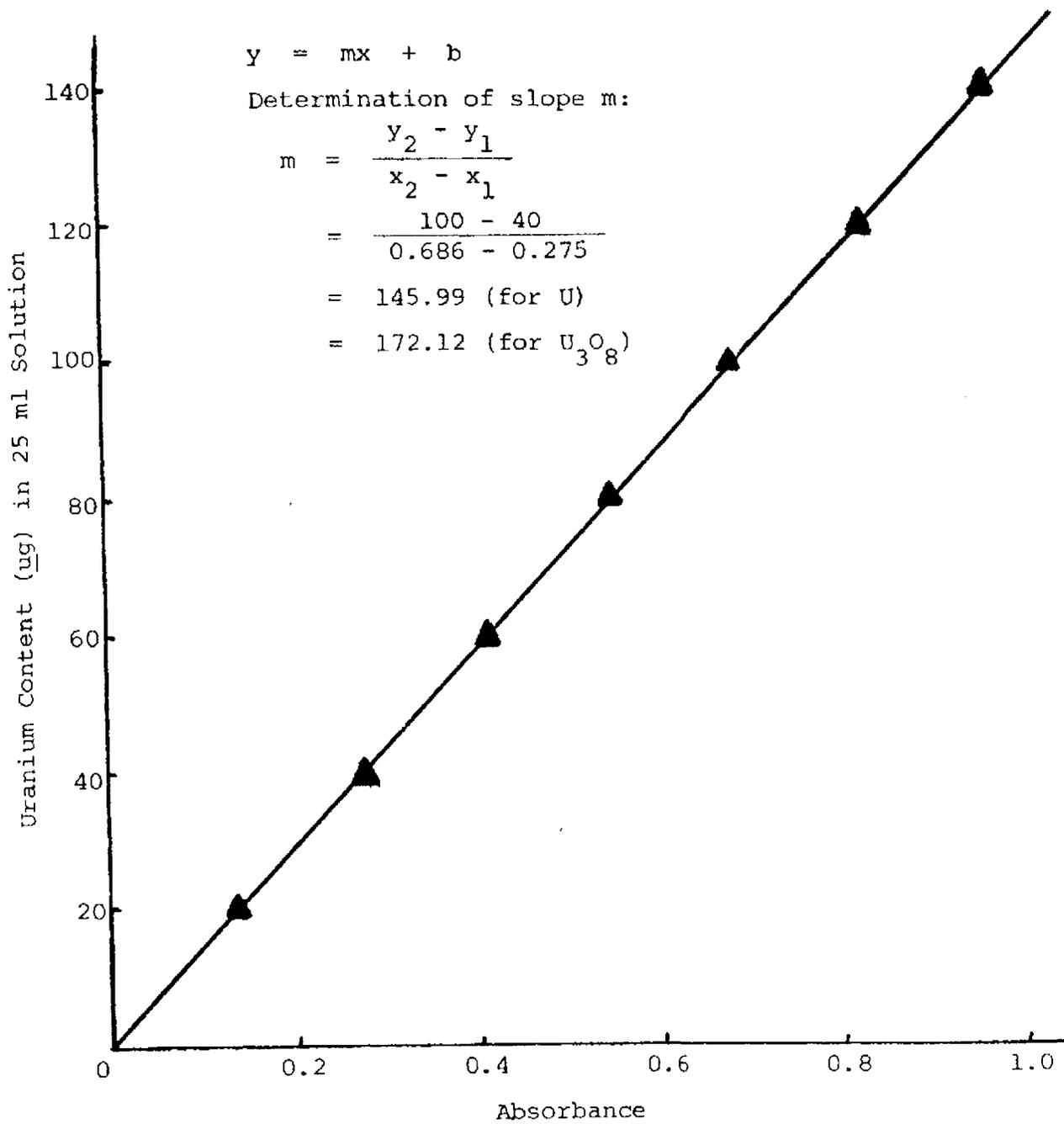
$$\begin{aligned} \text{a. } y &= mx + b \\ &= (172.12)(0.75) + 0 \\ &= 129.09 \mu\text{g } \text{U}_3\text{O}_8 \end{aligned}$$

$$\text{b. } 129.09 \mu\text{g } \text{U}_3\text{O}_8 / 2 \text{ ml sample volume} = 64.5 \mu\text{g } \text{U}_3\text{O}_8 / \text{ml}$$

$$\begin{aligned} \text{c. } \text{ppm } \text{U}_3\text{O}_8 &= (64.5 \mu\text{g } \text{U}_3\text{O}_8 / \text{ml})(\text{DF}) \\ &= (64.5 \mu\text{g } \text{U}_3\text{O}_8 / \text{ml})(5) \\ &= 322.5 \end{aligned}$$

6. The stability of the uranyl-PAR complex is excellent over a 20 hour period. Florence and Farrar report only a 3% gradual absorbance decrease in the presence of the complexing agent. For best results, a sample or standard's absorbance should be read within 4 hours (and preferably, within 2 hours). If appreciable amounts (greater than 200  $\mu\text{g}$ ) of ferric iron or oxidation agents are present, the absorbance should be measured within 15 minutes.

FIGURE 1



	<p style="text-align: center;"><b>URI, INC.</b></p>	<p style="text-align: center;"><b>SOP30S – SPECTROPHOTOMETRIC DETERMINATION OF URANIUM WITH 4-(2-PYRIDYLAZO)RESORCINOL (PAR)</b></p>
<p><b>Radioactive Materials License No. R03653</b></p>	<p><b>December 8, 2015</b></p>	<p><b>RSO Review/Date:</b></p>
<p><b>Rev: 1.3</b></p>	<p><b>MGT Review/Date:</b></p>	<p><i>[Signature]</i> 12/14/15</p>

## Principle

PAR method is a highly sensitive and selective method in determination of Uranium present in sample solutions in the form of (UO<sub>2</sub><sup>++</sup>) uranyl ions. Uranium forms a 1:1 complex with PAR, which has a molar absorptivity of 38,700 at 530 nm (Florence, 1963). The determination is carried out at a pH 8 in the presence of complexing agent, sulfosalicylic acid and fluoride (Florence, 1963). The advantage of PAR is both the free dye and uranyl complex are water soluble (Florence, 1963). The PAR procedure is simple to use and the reagent is 85% less costly.

## Scope

The scope of this method is to determine the uranium (mg/L) in the samples present as uranyl ions (UO<sub>2</sub><sup>++</sup>). For the purposes of this analysis, results will be reported as U, otherwise known as UO<sub>2</sub><sup>++</sup>.

This method can be employed for all plant and well field samples that will contain uranyl (UO<sub>2</sub><sup>++</sup>) ions. These ions are present as the di- and tri- carbonates and chloride complexes in the samples from the plant and well field. Uranium, dissolved as uranyl peroxide, cannot be determined with this procedure.

## Equipment and Glassware

1. Volumetric flask, 25 ml: one per sample.
2. Pipet, various volumes: one per sample depending on the uranium concentration.
3. Dispensette dispensers: 4 (one for each reagent: two-5 ml, one 10 ml, and one-2 ml bottle tops), three with a 1 liter capacity bottle (reservoir).
4. Visible spectrophotometer: A double or single beam, grating spectrophotometer with a tungsten source may be used to measure the absorbances of the samples. If a single beam spectrophotometer is used, a blank must be run (i.e., the instrument is "zeroed" or calibrated by setting the blank's absorbance at 0.000A).

## Quality Assurance / Quality Control (QA/QC)

1. A positive control will be performed using a known concentration of laboratory grade uranium in solution at least once each day this method is performed. Choose a positive

control concentration value that is near the range expected in the samples to be tested. The known concentration and results shall be documented and maintained with laboratory documentation.

2. A blank (negative control) containing no uranium will be performed at least once each day this method is performed. Blank results shall be documented and maintained with laboratory documentation.
3. As needed perform a matrix spike control. Spike a known laboratory standard with a known concentration sample volume. The value and % recovery is documented and maintained with laboratory documentation.
4. Perform a detectability check to confirm non-detect results . Based on the MDL a sample concentration greater than or equal to the MQL is prepared in house, analyzed and recorded. (This is done based on the requirement and during internal audits)

#### **Method detection limit (MDL)/ Estimated quantitation limit (EQL)**

1. The MDL is minimum concentration of a substance that can be reported with 99% confidence that the analyte concentration is greater than zero<sup>1</sup>. Determine the MDL using the spectrophotometer manufacturer's recommendation and/or using USEPA 40 CFR APPENDIX B TO PART 136 (Definition and Procedure for the Determination of the Method Detection Limit).
2. New MDL determinations may be needed for different sample sites and matrixes.
3. The EQL is lowest concentration that can be reliably measured within specified limits of precision and accuracy for a specific laboratory analytical method during routine laboratory operating conditions and is 10 times the MDL.<sup>2</sup> Use the EQL-by-MDL multiplier approach to determine EQL.
4. MDL/EQL reporting
  - a. Values detected between the EQL and MDL is an estimated value and should be reported with the qualifier "E" (E represents estimated).
  - b. The MDL for the current method is 0.13 ppm (As determined on March 26, 2015 by Kasi Yannamani through USEPA 40 CFR APPENDIX B TO PART 136.) The EQL is 1.3ppm (EQL is generally 5 to 10 times the MDL<sup>2</sup>).
  - c. If the material was analyzed for, but was not detected above the level of the associated value, the associated value is either the sample quantitation limit or the sample detection limit and should be reported with the qualifier "X"(X represents undetectable).

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<sup>1</sup> USEPA 40 CFR Appendix B to Part 136 - Definition and Procedure for the Determination of the Method Detection Limit-Revision 1.11

<sup>2</sup> USEPA, SW-846, Chapter one – Quality Control, 5.0 Definitions, Estimated Quantitation Limit. (p.25)

## Chemicals and Reagents

1. Reagent alcohol - place the 10 ml Dispensette bottle top on the 1 gallon alcohol bottle.
2. Complexing reagent solution 2000 mls: Add 25 g of CyDTA, (1,2-cyclohexylenedinitrilo) tetraacetic acid, 5 g of NaF, and 65 g of sulfosalicylic acid to a 1000 ml beaker containing 800 ml of distilled water. Neutralize to pH 8.0 with 40% NaOH; dilute to 2000 ml with distilled water and transfer to the Dispensette's 1 liter reservoir and place the 5 ml bottle top on the bottle.
3. 40% NaOH solution: To 500 ml of distilled water, which is being magnetically stirred, slowly add 200 g of NaOH pellets. As soon as the solution attains room temperature, tightly stopper the container to prevent CO<sub>2</sub> absorption.
4. Buffer solution: Prepare a 1M triethanolamine buffer by adding 149 g (132.5 ml) of reagent-grade triethanolamine to a 1000 ml beaker containing 800 ml of distilled water. Neutralize to a pH 8.0 with HCl acid and allow to stand overnight. If the buffer's pH deviates, readjust to 8.0 with either HCl or NaOH and dilute to one liter; transfer to the Dispensette reservoir and place the 5 ml bottle top on the bottle.
5. PAR reagent, 0.060%: Dissolve 0.6 g of the PAR reagent (Aldrich catalog # 17,826-8) in 1000 ml of distilled water and transfer to the Dispensette's reservoir and place the 2 ml bottle top on it.
6. Uranium standard stock solution:
  - a. A 1000 ppm uranium standard was prepared by dissolving 2.1091 grams of uranyl nitrate, UO<sub>2</sub>(NO<sub>3</sub>)<sub>2</sub>·6H<sub>2</sub>O, in 1000 ml of distilled water.
  - b. A 1000 ppm standardized uranium reference standard was purchased from Anderson Labs., Inc., Ft. Worth, Tex. (trade name: Banco).

## Calibration Procedure (Perform each time a new PAR reagent is prepared)

Prior to analyzing unknown samples, prepare a standard calibration graph by plotting (conc vs absorbance) using a series of 5 to 7 known uranium concentrations. Consult Note 1. The uranium concentrations chosen for a calibration depends on the anticipated concentration of uranium present in different types of samples being analyzed. For example higher expected uranium concentration such as those from production related samples will use a higher Uranium concentrations (20 to 140 µg). Likewise a PAR curve with lower Uranium standards (1 to 10 µg) is made when measuring the monitor well samples and baseline well samples.

1. Designate one-25 ml volumetric flask as the blank flask. Add no uranium-containing solution, only the reagent volumes which will be used for the standard and sample analyses.

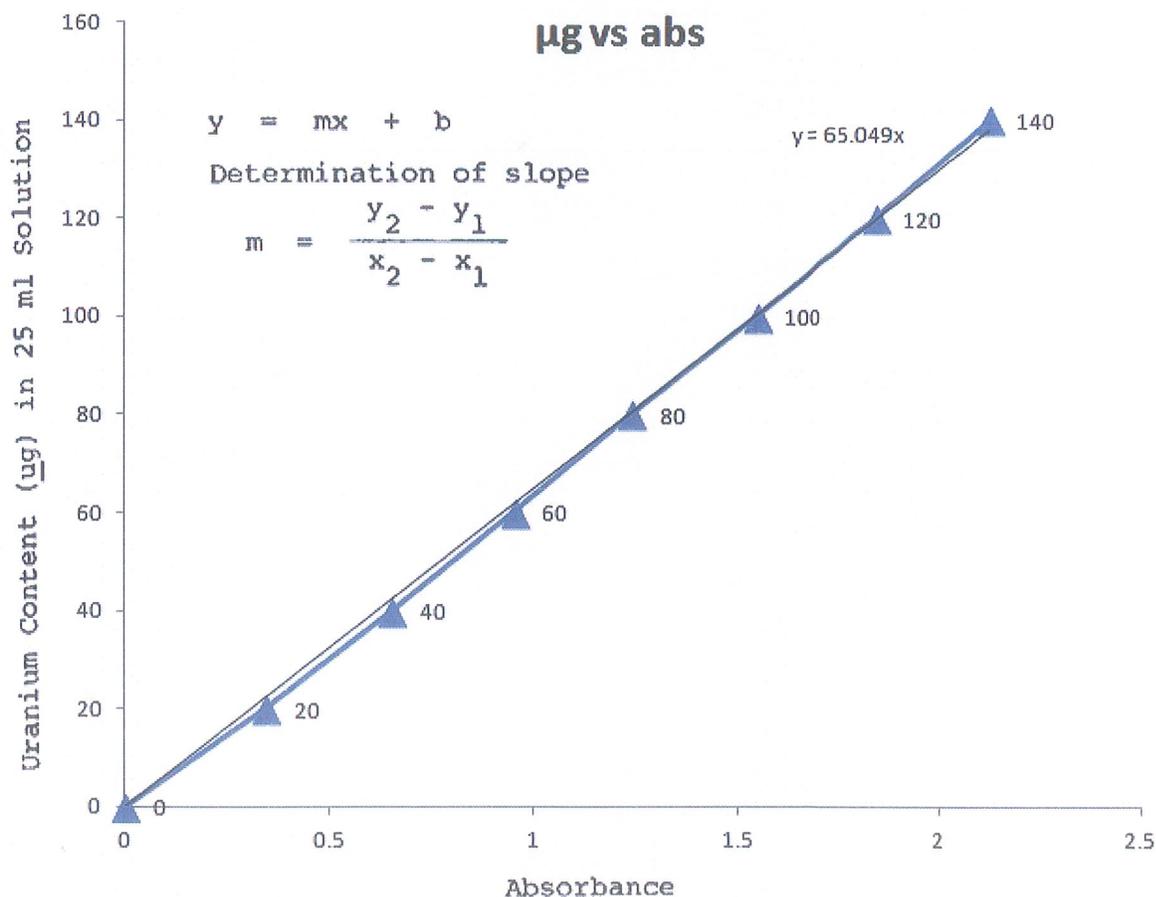
2. Pipette a 2 ml aliquot of standard stock solution into a 100 ml volumetric flask; make to volume with distilled water. This represents the 20  $\mu\text{g}$  secondary stock standard solution.
3. In the below example from the 20 ppm uranium standard solution, pipet 1,2,3,4,5,6 and 7 ml aliquots into individual 25 ml volumetric flasks. These volumes correspond to the uranium weights of 20,40, 60, 80, 100, 120 and 140  $\mu\text{g}$  in the reaction flask.
4. To the 25 ml volumetric flasks, add in the following order and volumes, shaking the sample after each addition:
  - a. 2.5 ml of complexing reagent solution
  - b. 5.0 ml of reagent alcohol
  - c. 2.0 ml of PAR reagent solution
  - d. 2.0 ml of buffer solution
5. Add distilled water to dilute the reaction solution to the 25 ml volumetric mark for each flask; stopper the flask and mix the contents thoroughly by inverting the flask several times.
6. After mixing, allow the solution to stand for at least 5 minutes to allow color (i.e., the reaction) to develop fully.
7. Measure the absorbance at 530 nm on the spectrophotometer using a 1 cm glass cuvette. The spectrophotometer is first "zeroed" using the blank and then the standard or sample readings are made. Consult Notes 2 and 3.
8. The calibration curve is prepared by plotting absorbance values versus micrograms ( $\mu\text{g}$ ) of uranium ( in the solution, determined from the uranium standards see example in table 1. Determine the slope of the calibration curve, as an example is depicted in Figure 1. Consult Note 4.

**Table 1**

Uranium Content ( $\mu\text{g}$ )	Absorbance*
0	0
20	0.342
40	0.649
60	0.950
80	1.236
100	1.541
120	1.842
140	2.12

\*Absorbance measurements will vary with each curve.

Figure 1



### Analysis of Unknown Samples

The procedure is essentially the same as in the section entitled calibration procedure. The preparation procedure for unknown samples is same as the preparation of calibration standards used for plotting the graph.

1. Designate and prepare a blank sample as described in step 1 of the calibration procedure.
2. Pipette an aliquot of unknown sample into a 25 ml volumetric flask. Note: dilutions will need to be made if the uranium content in the sample is anticipated to be greater than 140 µg.
3. Carry the blank and unknown samples through steps 4,5,6,&7 for a calibration curve as performed in the calibration procedure.

- Calculate the uranium concentration by multiplying the sample's absorbance value by the slope and dividing the resultant by the volume of sample used in the 25 ml volumetric flask. If dilutions were made, multiply the y-value calculated above by the dilution factor. Consult Notes 5 and 6.

### Notes

- Any time fresh stock solutions (i.e., PAR, complexing agent solution, buffer solution, and/or uranium standard solutions) are made, a new standard curve must be prepared.
- Each cuvette should be washed with distilled water before starting and after concluding the series of analyses. Prior to filling the cuvette with blank, standard, or sample solution, rinse twice with reagent alcohol; this minimizes air bubble formation on the sides of the cuvette; lightly tap the cuvette to evolve-off any air bubbles.
- For a 20 µg uranium standard (23.6 µg U<sub>3</sub>O<sub>8</sub>), an absorbance reading of approximately 0.342 is measured; for a 140 µg U standard (165 µg U<sub>3</sub>O<sub>8</sub>), 2.12 is measured as shown in the example in table 1.
- The slope can be determined by the following equation:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

The slope y-intercept form of a straight line is:

$$y = mx + b$$

For colorimetric determinations, b = 0.

- Example: From the calibration curve procedure, the slope was calculated and determined to be 65.049 for U and 76.692 for U<sub>3</sub>O<sub>8</sub>. Therefore, when measuring for U<sub>3</sub>O<sub>8</sub> the correction factor is 1.179. So the slope is multiplied with the correction factor. (65.049x1.179) = 76.692. and b = 0. The sample procedure revealed the following: a) a 0.5 ml of 210 mg/L aliquot was used in the 25 ml volumetric flask and was taken from a 0.5 to 1ml (DF = 2) and b) its absorbance was measured at 1.367.

- $$y = mx + b$$

$$= (76.692)(1.367) + 0$$

$$= 104.83 \text{ } \mu\text{g U}_3\text{O}_8$$

- 104.9 µg U<sub>3</sub>O<sub>8</sub>/0.5 ml sample volume = 209.8 µg U<sub>3</sub>O<sub>8</sub>/1 ml

$$\text{ppm U}_3\text{O}_8 = (104.9 \text{ } \mu\text{g U}_3\text{O}_8/\text{ml})(\text{DF})$$

$$= (104.9 \text{ } \mu\text{g U}_3\text{O}_8/\text{ml})(2)$$

$$= 209.8$$

1 ml of 5mg/L aliquot was used in the 25 ml volumetric flask (DF = 1) and b) its absorbance was measured at 0.066

$$\begin{aligned}y &= mx+b \\ &= (76.692)(0.066) + 0 \\ &= 5.06\mu\text{g U}_3\text{O}_8\end{aligned}$$

1 ml of 10mg/L aliquot was used in the 25 ml volumetric flask (DF = 1) and b) its absorbance was measured at 0.132

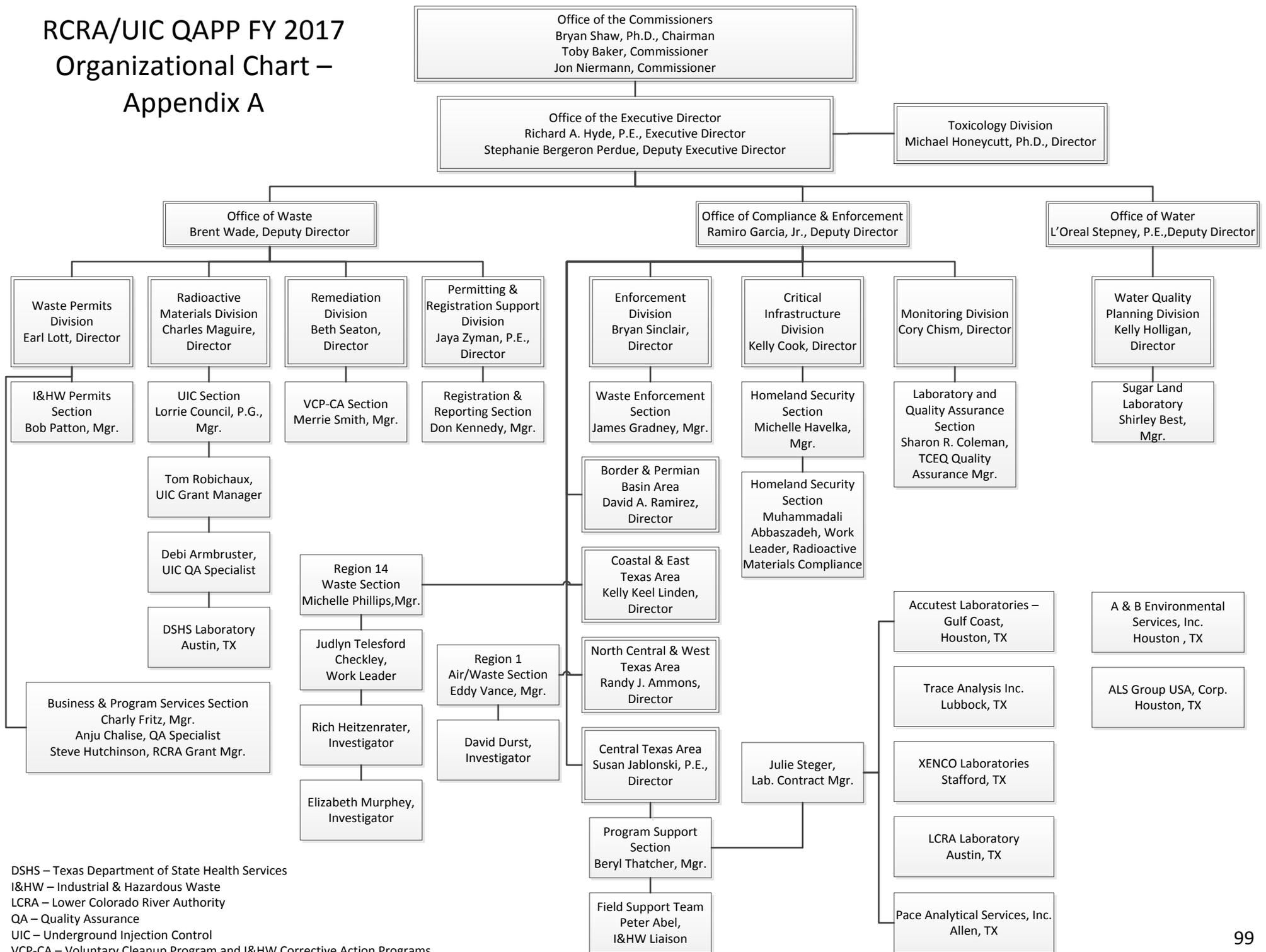
$$\begin{aligned}y &= mx+b \\ &= (76.692)(0.132) + 0 \\ &= 10.12 \mu\text{g U}_3\text{O}_8\end{aligned}$$

6. The stability of the uranyl-PAR complex is excellent over a 20 hour period. Florence and Farrar report only a 3% gradual absorbance decrease in the presence of the complexing agent. For best results, a sample or standard's absorbance should be read within 4 hours (and preferably, within 2 hours). If appreciable amounts (greater than 200  $\mu\text{g}$ ) of ferric iron or oxidation agents are present, the absorbance should be measured within 15 minutes.

#### REFERENCES

1. Florence, T. M., and Farrar, Y., "Spectrophotometric Determination of Uranium with 4-(2-pyridylazo)resorcinol", *Analytical Chemistry*, 35(11), 1613-16 (1963)
2. Johnson, D. A., and Florence, T. M., "Spectrophotometric Determination of Uranium (VI) with 2-(5-bromo-2-pyridylazo)-5-diethylaminophenol", *Analytical Chemistry. Acta.*, 53, 73-79 (1971)

# RCRA/UIC QAPP FY 2017 Organizational Chart – Appendix A



DSHS – Texas Department of State Health Services  
 I&HW – Industrial & Hazardous Waste  
 LCRA – Lower Colorado River Authority  
 QA – Quality Assurance  
 UIC – Underground Injection Control  
 VCP-CA – Voluntary Cleanup Program and I&HW Corrective Action Programs

# UIC Mechanical Integrity Testing Staff – Appendix B

