# Quality Assurance Project Plan
# Nueces River Authority

## *602 N. Staples Street, Suite 280*
## *Corpus Christi, Texas 78401*

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**Clean Rivers Program**

**Water Quality Planning Division**

**Texas Commission on Environmental Quality**

**P.O. Box 13087, MC 234**

**Austin, Texas 78711-3087**

**Effective Period: FY 2022 to FY 2023**

**Questions concerning this QAPP should be directed to:**

**Sam Sugarek**
**Director of Water Quality Programs**
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**Corpus Christi, Texas 78401**
**(361) 653-2110**
**ssugarek@nueces-ra.org**

# A1 Approval Page

## Texas Commission on Environmental Quality

### *Water Quality Planning Division*

9/9/2021

Kyle Girten, Manager Date
Water Quality Monitoring and Assessment Section

Rebecca DuPont 09/09/2021

Rebecca DuPont, Work Leader Date
Clean Rivers Program

Rebecca DuPont 09/09/2021

Rebecca DuPont, Date
Acting Project Quality Assurance Specialist

Clean Rivers Program

Rebecca DuPont 09/09/2021

Rebecca Dupont, Project Manager Date
Clean Rivers Program

Cathy S. Anderson 09/09/2021

Cathy Anderson, Team Leader Date
Data Management and Analysis

### *Monitoring Division*

09/13/2021

Sharon Coleman Date
TCEQ Quality Assurance Manager

Dana D. Squires 09/10/2021

Dana Squires Date
Lead CRP Quality Assurance Specialist

## Nueces River Authority

Sam Sugarek 9/1/2021
Sam Sugarek Date
Nueces River Authority Project Manager

Sam Sugarek 9/1/2021
Sam Sugarek Date
Nueces River Authority Quality Assurance Officer

## City of Corpus Christi Water Utilities Laboratory (WUL)

8/31/21

Marisa Juarez — Date
WUL Laboratory Manager

8/31/21

Laura Lira — Date
WUL Laboratory Quality Assurance Officer

## Texas A&M University – Corpus Christi Center for Coastal Studies Laboratory (CCSL)


Aaron Cristan Date
CCSL Laboratory Manager

Brien Nicolau 09.09.2021
Brien Nicolau Date
CCSL Laboratory Quality Assurance Officer

## San Antonio River Authority Regional Environmental Laboratory (SARA REL)

8/31/21

Zachary Jendrusch — Date
SARA REL Laboratory Supervisor

8/31/21

Patty Carvajal — Date
SARA REL Laboratory Quality Assurance Officer

## Lower Colorado River Authority Environmental Laboratory Services (LCRA ELS)

Dale Jurecka 9/2/21
Dale Jurecka Date
LCRA ELS Lab Manager

08/31/21
Angel Mata Date
LCRA ELS Lab Quality Assurance Officer

## *Bandera County River Authority and Groundwater District (BCRAGD)*

| | |
|---|---|
| David Mauk | Date |
| BCRAGD General Manager | |

| | |
|---|---|
| Clint Carter | Date |
| BCRAGD Quality Assurance Officer | |

# A2 Table of Contents

# List of Acronyms

| | |
|---|---|
| AWRL | Ambient Water Reporting Limit |
| BCRAGD | Bandera County River Authority and Groundwater District |
| BMP | Best Management Practices |
| CAP | Corrective Action Plan |
| CCSL | Center for Coastal Studies Laboratory |
| CE | Collecting Entity |
| COC | Chain of Custody |
| CRP | Clean Rivers Program |
| DMRG | Surface Water Quality Monitoring Data Management Reference Guide, July 2019, or most recent version |
| DM&A | Data Management and Analysis |
| EPA | United States Environmental Protection Agency |
| FY | Fiscal Year |
| GIS | Geographical Information System |
| GPS | Global Positioning System |
| LCRA-ELS | Lower Colorado River Authority – Environmental Laboratory Services |
| LCS | Laboratory Control Sample |
| LCSD | Laboratory Control Sample Duplicate |
| LIMS | Laboratory Information Management System |
| LOD | Limit of Detection |
| LOQ | Limit of Quantitation |
| MT | Monitoring Type |
| NELAP | National Environmental Laboratory Accreditation Program |
| QA | Quality Assurance |
| QM | Quality Manual |
| QAO | Quality Assurance Officer |
| QAPP | Quality Assurance Project Plan |
| QAS | Quality Assurance Specialist |
| QC | Quality Control |
| QMP | Quality Management Plan |
| RT | Routine Monitoring |
| SARA REL | San Antonio River Authority Regional Environmental Laboratory |
| SE | Submitting Entity |
| SLOC | Station Location |
| SOP | Standard Operating Procedure |
| SWQM | Surface Water Quality Monitoring |
| SWQMIS | Surface Water Quality Monitoring Information System |
| TAMU-CC | Texas A&M University – Corpus Christi |
| TMDL | Total Maximum Daily Load |
| TCEQ | Texas Commission on Environmental Quality |
| TNI | The NELAC Institute |
| TSWQS | Texas Surface Water Quality Standards |
| WUL | City of Corpus Christi Water Utilities Laboratory |

# A3 Distribution List

**Texas Commission on Environmental Quality**
P.O. Box 13087
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**San Antonio River Authority Regional Environmental Laboratory (SARA REL)**
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**Lower Colorado River Authority Environmental Laboratory Services (LCRA ELS)**
P.O. Box 220
Austin, Texas 78767

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(512) 730-6337

Angel Mata, Quality Assurance Officer
(512) 365-6022

**Bandera County River Authority and Groundwater District (BCRAGD)**
P.O. Box 177
Bandera, Texas 78003-0177

David Mauk, General Manager
(830) 796-7260 / dmauk@bcragd.org

Clint Carter, Quality Assurance Officer
(830) 796-7260 / ccarter@bcragd.org

The NRA will provide copies of this project plan and any amendments or appendices of this plan to each person on this list and to each sub-tier project participant, e.g., subcontractors, subparticipants, or other units of government. The NRA will document distribution of the plan and any amendments and appendices, maintain this documentation as part of the project's quality assurance records, and ensure the documentation is available for review.

# A4 Project/Task Organization

## Description of Responsibilities

## *TCEQ*

### *Rebecca DuPont*
### *CRP Work Leader*
Responsible for Texas Commission on Environmental Quality (TCEQ) activities supporting the development and implementation of the Texas Clean Rivers Program (CRP). Responsible for verifying that the TCEQ Quality Management Plan (QMP) is followed by CRP staff. Supervises TCEQ CRP staff. Reviews and responds to any deficiencies, corrective actions, or findings related to the area of responsibility. Oversees the development of Quality Assurance (QA) guidance for the CRP. Reviews and approves all QA audits, corrective actions, , reports, work plans, contracts, QAPPs, and TCEQ Quality Management Plan. Enforces corrective action, as required, where QA protocols are not met. Ensures CRP personnel are fully trained.

### *Dana Squires*
### *CRP Lead Quality Assurance Specialist*
Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Assists program and project manager in developing and implementing quality system. Serves on planning team for CRP special projects.. Prepares and distributes annual audit plans. Conducts monitoring systems audits of Planning Agencies. Concurs with and monitors implementation of corrective actions. Conveys QA problems to appropriate management. Recommends that work be stopped in order to safeguard programmatic objectives, worker safety, public health, or environmental protection. Ensures maintenance of audit records for the CRP.

### *Sam Sugarek*
### *CRP Project Manager*
Responsible for the development, implementation, and maintenance of CRP contracts. Tracks, reviews, and approves deliverables. Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Coordinates the review and approval of CRP QAPPs Ensures maintenance of QAPPs Assists CRP Lead QA Specialist in conducting Basin Planning Agency audits. Verifies QAPPs are being followed by contractors and that projects are producing data of known quality. Coordinates project planning with the Basin Planning Agency Project Manager. Reviews and approves data and reports produced by contractors. Notifies QA Specialists of circumstances which may adversely affect the quality of data derived from the collection and analysis of samples. Develops, enforces, and monitors corrective action measures to ensure contractors meet deadlines and scheduled commitments.

### *Cathy Anderson*
### *Team Leader, Data Management and Analysis (DM&A) Team*
Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Ensures DM&A staff perform data management-related tasks.

### *Sarah Kirkland*
### *CRP Data Manager, DM&A Team*
Responsible for coordination and tracking of CRP data sets from initial submittal through CRP Project Manager review and approval. Ensures that data are reported following instructions in the Data Management Reference Guide, July 2019 or most current version (DMRG). Runs automated data validation checks in the Surface Water Quality Management Information System (SWQMIS) and coordinates data verification and error correction with CRP Project Managers. Generates SWQMIS summary reports to assist CRP Project Managers' data review. Identifies data anomalies and inconsistencies. Provides training and guidance to CRP and Planning Agencies on technical data issues to ensure that data are submitted according to documented procedures. Reviews QAPPs for valid stream monitoring stations. Checks validity of parameter codes, submitting entity code(s), collecting entity code(s), and monitoring type code(s). Develops and maintains data management-related SOPs for CRP data management. Coordinates and processes data correction requests. Participates in the development, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP).

### *Rebecca DuPont*
### *Acting CRP Project Quality Assurance Specialist*
Serves as liaison between CRP management and TCEQ QA management. Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Serves on planning team for CRP special projects and reviews QAPPs in coordination with other CRP staff. Coordinates documentation and implementation of corrective action for the CRP.

## *NUECES RIVER AUTHORITY*

### *Sam Sugarek*
### *Nueces River Authority Project Manager*
Responsible for implementing and monitoring CRP requirements in contracts, QAPPs, and QAPP amendments and appendices. Coordinates basin planning activities and work of basin partners. Ensures monitoring systems audits are conducted to ensure QAPPs are followed by basin planning agency participants and that projects are producing data of known quality. Ensures that subparticipants are qualified to perform contracted work. Ensures CRP project managers and/or QA Specialists are notified of deficiencies and corrective actions, and that issues are resolved. Responsible for validating that data collected are acceptable for reporting to the TCEQ.

### *Sam Sugarek*
### *Nueces River Authority Quality Assurance Officer*
Responsible for coordinating the implementation of the QA program. Responsible for writing and maintaining the QAPP and monitoring its implementation. Responsible for maintaining records of QAPP distribution, including appendices and amendments. Responsible for maintaining written records of sub-tier commitment to requirements specified in this QAPP. Responsible for identifying, receiving, and maintaining project QA records. Responsible for coordinating with the TCEQ QAS to resolve QA-related issues. Notifies the Nueces River Authority Project Manager of particular circumstances which may adversely affect the quality of data. Coordinates and monitors deficiencies and corrective action. Coordinates and maintains records of data verification and validation. Coordinates the research and review of technical QA material and data related to water quality monitoring system design and analytical techniques. Conducts monitoring systems audits on project participants to determine compliance with project and program specifications, issues written reports, and follows through on findings. Ensures that field staff is properly trained and that training records are maintained.

### *Sam Sugarek*
### *Nueces River Authority Data Manager*
Responsible for ensuring that field data are properly reviewed and verified. Responsible for the transfer of basin quality-assured water quality data to the TCEQ in a format compatible with SWQMIS. Maintains quality-assured data on Nueces River Authority internet sites.

### *Sam Sugarek*
### *Nueces River Authority Field Supervisor*
Coordinates field sampling and data collection activities and supervises the field personnel in conducting sampling events. Ensures that all field personnel are properly trained and equipped to conduct the necessary monitoring and that all sampling procedures are followed according to the QAPP. Ensures that personnel, supplies, and equipment are available at all appropriate times. Responsible for overseeing the Aquatic Resource Specialist in completing sample documentation including labeling samples and ensuring the correct sites are identified. Supervises field and laboratory data entry to the NRA database. Reviews data entered into NRA database and informs NRA Project Manager of any needed corrections.

***Shellie McCumber***
***Nueces River Authority* Aquatic Resource Specialist**
Conducts field sampling and data collection activities following procedures outlined in the QAPP. Responsible for completing sample documentation including labeling samples and ensuring the correct sites are identified. Responsible for ensuring all instrument calibration data is complete. Enters data into NRA database and informs NRA Project Manager of any needed corrections.

## *City of Corpus Christi-Water Utilities Laboratory (WUL)*

### *Marisa Juarez*
### *WUL, Laboratory Manager*
Responsible for the overall performance, administration, and reporting of analyses performed by the WUL. Responsible for supervision of laboratory personnel involved in generating analytical data for the project. Ensures that laboratory personnel have adequate training and a thorough knowledge of the QAPP and related SOPs. Responsible for oversight of all laboratory operations ensuring that all QA/QC requirements are met, documentation is complete and adequately maintained, and results are reported accurately. Enforces corrective action, as required.

### *Laura Lira*
### *WUL, Laboratory QAO*
Responsible for the overall quality control and quality assurance of analyses performed by the WUL. Monitors the implementation of the QM/QAPP within the laboratory to ensure complete compliance with QA data quality objectives, as defined by the contract and in the QAPP. Conducts in-house audits to ensure compliance with written SOPs and to identify potential problems. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory.

## *Center for Coastal Studies Laboratory at Texas A&M University – Corpus Christi (CCSL)*

### *Aaron Cristan*
### *CCSL, Laboratory Manager*
Responsible for the overall performance, administration, and reporting of analyses performed by CCSL. Responsible for supervision of laboratory and field personnel involved in generating analytical data for the project. Ensures that laboratory and field personnel have adequate training and a thorough knowledge of the QAPP and related SOPs. Responsible for oversight of all laboratory operations ensuring that all QA/QC requirements are met, documentation is complete and adequately maintained, and results are reported accurately. Enforces corrective action, as required.

### *Brien Nicolau*
### *CCSL, Laboratory QAO*
Responsible for the overall quality control and quality assurance of analyses performed by CCSL. Monitors the implementation of the QM/QAPP within the laboratory to ensure complete compliance with QA data quality objectives, as defined by the contract and in the QAPP. Conducts in-house audits to ensure compliance with written SOPs and to identify potential problems. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory.

## *San Antonio River Authority Regional Environmental Laboratory (SARA REL)*

### *Zachary Jendrusch*
### *SARA REL, Laboratory Supervisor*
Responsible for overall performance, administration, and reporting of analyses performed by SARA's Regional Environmental Laboratory Services. Responsible for supervision of laboratory personnel involved in generating analytical data for the project. Ensures that laboratory personnel have adequate training and a thorough knowledge of the QAPP and related SOPs. Responsible for oversight of all laboratory operations ensuring that all QA/QC requirements are met, documentation is complete and adequately maintained, and results are reported accurately. Additionally, the lab director will review and verify all field and laboratory data for integrity and continuity, reasonableness and conformance to project requirements, and then validated against the data quality objectives listed in Appendix A.

### *Patty Carvajal*
### *SARA REL, Laboratory QAO*
Maintains operating procedures that are in compliance with the QAPP, amendments and appendices. Responsible for the overall quality control and quality assurance of analyses performed by SARA's Regional Environmental Laboratory. Assists with monitoring systems audits for CRP projects. Conducts in-house audits to ensure compliance with written SOPs and to identify potential problems. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory.

## *Lower Colorado River Authority Environmental Laboratory Services (LCRA ELS)*

### *Dale Jurecka*
### *LCRA ELS, Laboratory Manager*
Responsible for the overall performance, administration, and reporting of analyses performed by LCRA's ELS. Responsible for supervision of laboratory and field personnel involved in generating analytical data for the project. Ensures that laboratory and field personnel have adequate training and a thorough knowledge of the QAPP and related SOPs. Responsible for oversight of all laboratory operations ensuring that all QA/QC requirements are met, documentation is complete and adequately maintained, and results are reported accurately. Enforces corrective action, as required.

### *Angel Mata*
### *LCRA ELS, Laboratory QAO*
Responsible for the overall quality control and quality assurance of analyses performed by LCRA's ELS. Monitors the implementation of the QM/QAPP within the laboratory to ensure complete compliance with QA data quality objectives, as defined by the contract and in the QAPP. Conducts in-house audits to ensure compliance with written SOPs and to identify potential problems. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory.

## *Bandera County River Authority and Groundwater District (BCRAGD)*

### *David Mauk*
### *General Manager*
Responsible for overall performance, administration, and reporting of analyses performed by BCRAGD field staff. Responsible for supervision of field personnel involved in generating analytical data for the project. Ensures that field personnel have adequate training and a thorough knowledge of the QAPP and related SOPs. Responsible for oversight of all field operations ensuring that all QA/QC requirements are met, documentation is complete and adequately maintained, and results are reported accurately. Additionally, the general manager will review and verify all field work and laboratory calibrations for integrity and continuity, reasonableness and conformance to project requirements.

### *Clint Carter*
### *BCRAGD Operations Manager/QAO*
Maintains operating procedures that are in compliance with the QAPP, amendments and appendices. Responsible for the overall quality control and quality assurance of analyses performed by BCRAGD's field staff. Assists with monitoring systems audits for CRP projects. Additionally, the QAO will review and verify all field and laboratory data for integrity and continuity, reasonableness and conformance to project requirements, and then validated against the data quality objectives.

Responsible for coordinating the implementation of the QA program. Responsible for identifying, receiving, and maintaining project quality assurance records. Notifies the NRA QAO of particular circumstances which may adversely affect the quality of data. Coordinates and monitors deficiencies, nonconformance and corrective action. Coordinates and maintains records of data verification and validation. Coordinates their search and review of technical QA material and data related to water quality monitoring system design and analytical

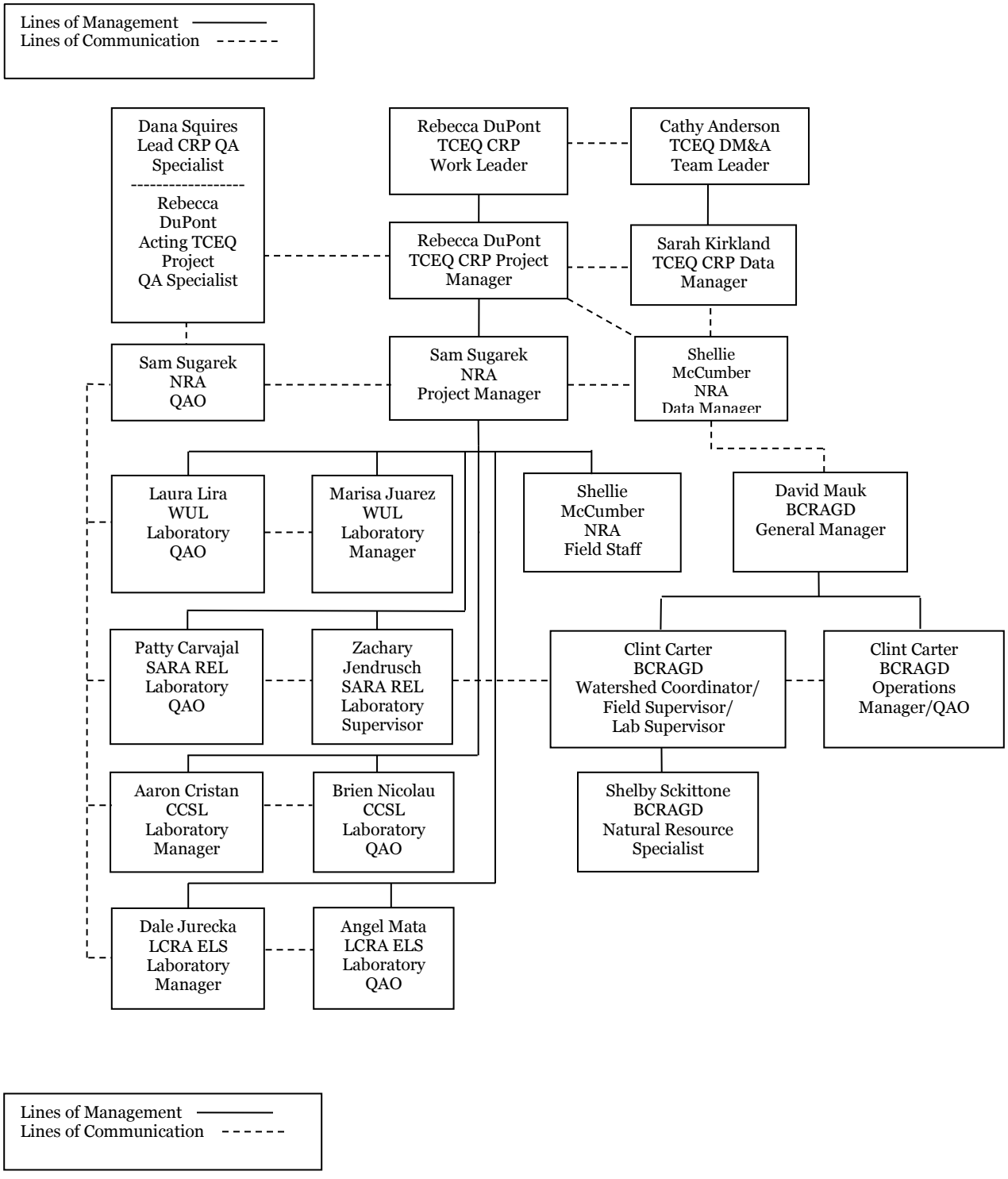
techniques.

### *Clint Carter*
### *BCRAGD Watershed Protection Coordinator / Field Supervisor / Lab Supervisor*
Coordinates field sampling and data collection activities and supervises the field personnel in conducting sampling events. Ensures that all field personnel are properly trained and equipped to conduct the necessary monitoring and that all sampling procedures are followed according to the QAPP. Ensures that personnel, supplies, and equipment are available at all appropriate times. Responsible for overseeing the Natural Resource Specialist in completing sample documentation including labeling samples and ensuring the correct sites are identified. Ensures that samples are sent properly to lab for analysis. Responsible for recording all reagents into the reagent log and labeling all reagent bottles in accordance with the Nueces River Authority QAPP and the BCRAGD SOP for CRP. Conducts all pre- and post-calibrations and maintains all sampling equipment.

### *Shelby Sckittone*
### *BCRAGD Natural Resource Specialist*
Conducts field sampling and data collection activities following procedures outlined in the QAPP. Responsible for completing sample documentation including labeling samples and ensuring the correct sites are identified. Ensures that samples are sent properly to lab for analysis.

## Project Organization Chart

### *Figure A4.1. Organization Chart – Lines of Communication*



# A5 Problem Definition/Background

In 1991, the Texas Legislature passed the Texas Clean River Act (Senate Bill 818) in response to growing concerns that water resource issues were not being pursued in an integrated, systematic manner. The act requires that ongoing water quality assessments be conducted for each river basin in Texas, an approach that integrates water quality issues within the watershed. The CRP legislation mandates that each river authority (or local governing entity) shall submit quality-assured data collected in the river basin to the commission. Quality-assured data in the context of the legislation means data that comply with TCEQ rules for surface water quality monitoring (SWQM) programs, including rules governing the methods under which water samples are collected and analyzed and data from those samples are assessed and maintained. This QAPP addresses the program developed between the Nueces River Authority and the TCEQ to carry out the activities mandated by the legislation. The QAPP was developed and will be implemented in accordance with provisions of the TCEQ Quality Management Plan, January 8 2019 or most recent version (QMP).

The purpose of this QAPP is to clearly delineate Nueces River Authority QA policy, management structure, and procedures which will be used to implement the QA requirements necessary to verify and validate the surface water quality data collected. The QAPP is reviewed by the TCEQ to help ensure that data generated for the purposes described above are of known and documented quality, deemed acceptable for their intended use. This process will ensure that data collected under this QAPP and submitted to SWQMIS have been collected and managed in a way that guarantees its reliability and therefore can be used in water quality assessments, total maximum daily load (TMDL) and water quality standards development, permit decisions, and other program activities deemed appropriate by the TCEQ. Project results will be used to support the achievement of CRP objectives, as contained in the *Clean Rivers Program Guidance and Reference Guide FY 2022-2023*.

This QAPP provides for the continuation of the San Antonio-Nueces Coastal Basin, Nueces River Basin, and Nueces-Rio Grande Coastal Basin baseline monitoring. See Appendix C for station location maps for each basin. The Nueces River Clean Rivers Program monitoring is based on water quality concerns and impairments identified in the Texas Integrated Report, input from steering committee members, and input from agencies collecting water quality data in the basin.

Steering Committee input provides valuable information and helps establish San Antonio-Nueces Coastal Basin, Nueces River Basin, and Nueces-Rio Grande Coastal Basin community priorities with respect to water quality. Three basin monitoring objectives were established to address the prioritized water quality concerns. The basin monitoring objectives are to provide data for water quality control programs, generate historical water quality trends, and identifying potential water quality problems. The monitoring objectives also consider the assessment of the Texas Surface Water Quality Standards (TSWQS) attainment. The remaining sections of this QAPP describe how the objectives will be met.

Historical data evaluations have shown that water quality is generally good throughout the San Antonio-Nueces Coastal Basin, Nueces River Basin, and Nueces-Rio Grande Coastal Basin, but more data is needed to obtain better coverage throughout the basins. The Clean Rivers Program allows for the continuation of monitoring at most existing water quality stations in order to maintain a continuous record. The 2020 Texas Integrated Report lists the following segments as having one or more impairments:
https://www.tceq.texas.gov/assets/public/waterquality/swqm/assess/14txir/2014_imp_index.pdf

## San Antonio – Nueces Coastal Basin

See Appendix B for station descriptions and information.
2020 Texas Integrated Report Impairments:

- Segment 2001 – Mission River Tidal: bacteria
- Segment 2003 – Aransas River Tidal: bacteria
- Segment 2004 – Aransas River Above Tidal: bacteria
- Segment 2004A – Aransas Creek: bacteria
- Segment 2004B – Poesta Creek: bacteria

## Nueces River Basin

See Appendix B for station descriptions and information.
2020 Texas Integrated Report Impairments:

- Segment 2102 – Nueces River below Lake Corpus Christi: TDS
- Segment 2103 – Lake Corpus Christi: TDS
- Segment 2105 – Nueces River Above Holland Dam: depressed dissolved oxygen
- Segment 2106 – Nueces/Lower Frio River: TDS, bacteria
- Segment 2107 – Atascosa River: bacteria, depressed dissolved oxygen, impaired fish community, impaired macrobenthic community
- Segment 2108 – San Miguel Creek: bacteria
- Segment 2109 – Leona River: bacteria
- Segment 2113 – Upper Frio River: impaired macrobenthic community, impaired fish community
- Segment 2114 – Hondo Creek: chloride
- Segment 2117 – Frio River Above Choke Canyon Reservoir: bacteria, chloride, TDS

## Nueces – Rio Grande Coastal Basin

See Appendix B for station descriptions and information.
2020 Texas Integrated Report Impairments:

- Segment 2201 – Arroyo Colorado Tidal: depressed dissolved oxygen, bacteria, mercury in longnose gar, and Polychlorinated biphenyls (PCBs) in edible tissue.
- Segment 2201B – Unnamed Drainage Tributary (B) in Cameron County Drainage District #3: bacteria
- Segment 2202 – Arroyo Colorado Above Tidal: bacteria, mercury in longnose gar, and PCBs in edible tissue
- Segment 2202A – Donna Reservoir: PCBs in fish tissue
- Segment 2203 – Petronila Creek Tidal: bacteria
- Segment 2204 – Petronila Creek Above Tidal: bacteria, chloride, sulfate, TDS

## Adjoining Bays and Estuaries

See Appendix B for station descriptions and information.
2020 Texas Integrated Report Impairments:

- Segment 2462OW – San Antonio/Hynes/Guadalupe Bay: bacteria (oyster waters)
- Segment 2472OW – Copano Bay: bacteria (oyster waters)
- Segment 2481CB – Corpus Christi Bay (Cole, Ropes and Poenisch Park beaches only): bacteria
- Segment 2482 – Nueces Bay: copper in water
- Segment 2482OW – Nueces Bay: zinc in oyster tissue
- Segment 2484 – Corpus Christi Inner Harbor: copper in water
- Segment 2485 – Oso Bay: bacteria, depressed dissolved oxygen
- Segment 2485OW – Oso Bay: bacteria (oyster water)
- Segment 2485A – Oso Creek: bacteria
- Segment 2491 – Laguna Madre: depressed dissolved oxygen, bacteria
- Segment 2491OW – Laguna Madre: bacteria (oyster waters)
- Segment 2492A – San Fernando Creek: bacteria
- Segment 2494 – Brownsville Ship Channel: bacteria
- Segment 2494A – Port Isabel Fishing Harbor: bacteria

# A6 Project/Task Description

NRA will monitor a minimum of 10 bay and tidal sites quarterly for conventional, bacteria, and field parameters. NRA will also monitor 2 bay and tidal locations on a semi-annual basis for conventional, bacteria, and field parameters. NRA will monitor a minimum of 33 river and lake sites quarterly for conventional, bacteria, flow (where applicable), and field parameters. NRA will also monitor 2 river locations on a quarterly basis for Chlorophyll-*a*, TDS, bacteria, and field parameters. NRA will also monitor one river site for bacteria and field parameters only and one river site for field parameters only. NRA will also conduct 24-hour dissolved oxygen monitoring at 3 sites given sufficient water. NRA will monitor for metals in water at 3 locations on a twice per year frequency.

Bandera County River Authority and Groundwater District (BCRAGD) will conduct routine quarterly monitoring, collecting field, conventional, bacteria and, where applicable, flow data at 5 river stations in basin 20.

See Appendix B for the project-related work plan tasks and schedule of deliverables for a description of work defined in this QAPP.

See Appendix B for sampling design and monitoring pertaining to this QAPP.

See Appendix B for the project-related work plan tasks and schedule of deliverables for a description of work defined in this QAPP.

See Appendix B for sampling design and monitoring pertaining to this QAPP.

## Amendments to the QAPP

Revisions to the QAPP may be necessary to address incorrectly documented information or to reflect changes in project organization, tasks, schedules, objectives, and methods. Requests for amendments will be directed from the NRA Project Manager to the CRP Project Manager electronically. The Basin Planning Agency will submit a completed QAPP Amendment document, including a justification of the amendment, a table of changes, and all pages, sections, and attachments affected by the amendment. Amendments are effective immediately upon approval by the NRA Project Manager, the NRA QAO, the CRP Project Manager, the CRP Lead QA Specialist, , the CRP Project QA Specialist, and additional parties affected by the amendment. Amendments are not retroactive. No work shall be implemented without an approved QAPP or amendment prior to the start of work. Any activities under this contract that commence prior to the approval of the governing QA document constitute a deficiency and are subject to corrective action as described in section C1 of this QAPP. Any deviation or deficiency from this QAPP which occurs after the execution of this QAPP will be addressed through a Corrective Action Plan (CAP). An amendment may be a component of a CAP to prevent future recurrence of a deviation.

Amendments will be incorporated into the QAPP by way of attachment and distributed to personnel on the distribution list by the NRA Project Manager. If adherence letters are required, the NRA will secure an adherence letter from each sub-tier project participant (e.g., subcontractors, sub-participant, or other units of government) affected by the amendment stating the organization's awareness of and commitment to requirements contained in each amendment to the QAPP. The Basin Planning Agency will maintain this documentation as part of the project's QA records, and ensure that the documentation is available for review.

## Special Project Appendices

Projects requiring QAPP appendices will be planned in consultation with the NRA and the TCEQ Project Manager and TCEQ technical staff. Appendices will be written in an abbreviated format and will reference the Basin QAPP where appropriate. Appendices will be approved by the NRA Project Manager, the NRA QAO, the Laboratory (as applicable), and the CRP Project Manager, the CRP Project QA Specialist, the CRP Lead QA Specialist and additional parties affected by the Appendix, as appropriate. Copies of approved QAPP appendices will be distributed by the NRA to project participants before data collection activities commence. The Basin Planning Agency will secure written documentation from each sub-tier project participant (e.g., subcontractors, subparticipants, other units of government) stating the organization's awareness of and commitment to requirements contained in each special project appendix to the QAPP. The NRA will maintain this

documentation as part of the project's QA records, and ensure that the documentation is available for review.A7 Quality Objectives and Criteria

The purpose of routine water quality monitoring is to collect surface water quality data that can be used to characterize water quality conditions, identify significant long-term water quality trends, support water quality standards development, support the permitting process, and conduct water quality assessments in accordance with TCEQ's Guidance for Assessing and Reporting Surface Water Quality in Texas, June 2015 or most recent version (https://www.tceq.texas.gov/assets/public/waterquality/swqm/assess/14txir/2014_guidance.pdf). These water quality data, and data collected by other organizations (e.g., United States Geological Survey (USGS), TCEQ, etc.), will be subsequently reconciled for use and assessed by the TCEQ.

The measurement performance specifications to support the project purpose for a minimum data set are specified in Appendix A.

## Ambient Water Reporting Limits (AWRLs)

For surface water to be evaluated for compliance with Texas Surface Water Quality Standards ("TSWQS") and screening levels, data must be reported at or below specified reporting limits. To ensure data are collected at or below these reporting limits, required ambient water reporting limits ("AWRL") have been established. A full listing of AWRLs can be found at https://www.tceq.texas.gov/assets/public/waterquality/crp/QA/awrlmaster.pdf .

The limit of quantitation (LOQ) is the minimum reporting limit, concentration, or quantity of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence by the laboratory analyzing the sample. Analytical results shall be reported down to the laboratory's LOQ (i.e., the laboratory's LOQ for a given parameter is its reporting limit) as specified in Appendix A.

The following requirements must be met in order to report results to the CRP:

- The laboratory's LOQ for each analyte must be set at or below the AWRL.
- Once the LOQ is established in the QAPP, that is the reporting limit for that parameter until such time as the laboratory amends the QAPP and lists an updated LOQ.
- The laboratory must demonstrate its ability to quantitate at its LOQ for each analyte by running an LOQ check sample for each analytical batch of CRP samples analyzed.
- When reporting data, no results may be reported below the LOQ stated in this QAPP.
- Measurement performance specifications for LOQ check samples are found in Appendix A.

Laboratory Measurement Quality Control Requirements and Acceptability Criteria are provided in Section B5.

## Precision

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

Laboratory precision is assessed by comparing replicate analyses of Laboratory Control Samples (LCS) in the sample matrix (e.g. deionized water, sand, commercially available tissue), Matrix Spike/Matrix Spike Duplicate (MS/MSD), or sample/duplicate (DUP) pairs, as applicable. Precision results are compared against measurement performance specifications and used during evaluation of analytical performance. Program-defined measurement performance specifications for precision are defined in Appendix A.

## Bias

Bias is the systematic or persistent distortion of a measurement process, which causes errors in one direction (i.e., the expected sample measurement is different from the sample's true value). Bias is a statistical measurement of correctness and includes multiple components of systematic error. Bias is determined through the analysis of LCS and LOQ check samples prepared with verified and known amounts of all target analytes in the sample matrix (e.g. deionized water, sand, commercially available tissue) and by calculating percent recovery. Results are compared against measurement performance specifications and used during evaluation of analytical performance. Program-defined measurement performance specifications for bias are specified in

Appendix A.

## Representativeness

Site selection, the appropriate sampling regime, comparable monitoring and collection methods, and use of only approved analytical methods will assure that the measurement data represents the conditions at the site. Routine data collected under CRP are considered to be spatially and temporally representative of ambient water quality conditions. Water quality data are collected on a routine frequency and are separated by approximately even time intervals. At a minimum, samples are collected over at least two seasons (to include inter-seasonal variation) and over two years (to include inter-year variation) and include some data collected during an index period (March 15- October 15). Although data may be collected during varying regimes of weather and flow, the data sets will not be biased toward unusual conditions of flow, runoff, or season. The goal for meeting maximum representation of the water body will be tempered by funding availability.

## Comparability

Confidence in the comparability of routine data sets for this project and for water quality assessments is based on the commitment of project staff to use only approved sampling and analysis methods and QA/QC protocols in accordance with quality system requirements as described in this QAPP and in TCEQ guidance. Comparability is also guaranteed by reporting data in standard units, by using accepted rules for rounding figures, and by reporting data in a standard format as specified in the Data Management Plan in Section B10.

## Completeness

The completeness of the data describes how much of the data are available for use compared to the total potential data. Ideally, 100% of the data should be available. However, the possibility of unavailable data due to accidents, insufficient sample volume, broken or lost samples, etc. is to be expected. Therefore, it will be a general goal of the project(s) that 90% data completion is achieved.

# A8 Special Training/Certification

Before new field personnel independently conduct field work, NRA's Field Supervisor trains him/her in proper instrument calibration, field sampling techniques, and field analysis procedures. The QA officer (or designee) will document the successful field demonstration. The QA Officer (or designee) will retain documentation of training and the successful field demonstration in the employee's personnel file (*or other designated location*) and ensure that the documentation will be available during monitoring systems audits. BCRAGD's Field Supervisor must ensure that new field personnel are trained in accordance with NRA's Special Training/Certification procedures.

Contractors and subcontractors must ensure that laboratories analyzing samples under this QAPP meet the requirements contained in The NELAC Institute Standard(TNI) (2016) Volume 1, Module 2, Section 4.5.5 (concerning Subcontracting of Environmental Tests).

# A9 Documents and Records

The documents and records that describe, specify, report, or certify activities are listed. The list below is limited to documents and records that may be requested for review during a monitoring systems audit.

## Table A9.1 Project Documents and Records

| Document/Record | Location | Retention (yrs) | Format |
|---|---|---|---|
| QAPPs, amendments and appendices | NRA, BCRAGD | 7* | Paper, electronic |
| Field SOPs | NRA, BCRAGD | 7* | Paper, electronic |
| Laboratory Quality Manuals | WUL, SARA REL, CCSL, LCRA ELS | 5 | Paper, electronic |
| Laboratory SOPs | WUL, SARA REL, CCSL, LCRA ELS | 5 | Paper, electronic |
| QAPP distribution documentation | NRA, BCRAGD | 7* | Paper, electronic |
| Field staff training records | NRA, BCRAGD | 7* | Paper, electronic |
| Field equipment calibration/maintenance logs | NRA, BCRAGD | 7* | Paper |
| Field instrument printouts | NRA, BCRAGD | 7* | Electronic |
| Field notebooks or data sheets | NRA, BCRAGD | 7* | Paper |
| Laboratory Data Results | NRA, BCRAGD | 7* | Paper |
| Chain of custody records | NRA, BCRAGD, WUL,CCSL, SARA REL, LCRA ELS | 7* | Paper |
| Laboratory calibration records | WUL, SARA REL, CCSL, LCRA ELS | 5 | Paper, electronic |
| Laboratory instrument printouts | WUL, SARA REL, CCSL, LCRA ELS | 5 | Paper, electronic |
| Laboratory data reports/results | WUL/SARA REL, CCSL, LCRA ELS | 5 | Paper, electronic |
| | NRA, BCRAGD | 7* | Paper, electronic |
| Laboratory equipment maintenance logs | WUL, SARA REL, CCSL, LCRA ELS | 5 | Paper, electronic |
| Corrective Action Documentation | WUL, SARA REL, CCSL, LCRA ELS | 5 | Paper, electronic |
| | NRA, BCRAGD | 7* | Paper, electronic |

*NRA stores all documentation including electronic and paper documents at least 7 years.

## Laboratory Test Reports

Test/data reports from the laboratory must document the test results clearly and accurately. Routine data reports should be consistent with the TNI Standard (2016), Volume 1, Module 2, Section 5.10 and include the information necessary for the interpretation and validation of data. The requirements for reporting data and the procedures are provided.

- Title of report and unique identifiers on each page
- Name and address of the laboratory
- Name and address of the client
- A clear identification of the sample(s) analyzed
- Date and time of sample receipt
- Identification of method used
- Identification of samples that did not meet QA requirements and why (e.g., holding times exceeded)
- Clearly identified subcontract laboratory results (as applicable)
- A name and title of person accepting responsibility for the report
- Narrative information on QC failures or deviations from requirements that may affect the quality of results or is necessary for verification and validation of data.
- Sample results
- Units of measurement
- Station information
- Date and time of collection
- LOQ and Limit of Detection (LOD) (formerly referred to as the reporting limit and the method detection limit, respectively), and qualification of results outside the working range (if applicable)

- Certification of NELAP compliance for each parameter reported
- Holding time for *E. coli*.

### Electronic Data

Data will be submitted electronically to the TCEQ in the Event/Result file format described in the most current version of the DMRG, which can be found at https://www.tceq.texas.gov/waterquality/data-management/dmrg_index.html. A completed Data Review Checklist and Data Summary (see Appendix F) will be submitted with each data submittal.

NRA receives data from all laboratories and sub-tier participants in electronic form. Upon receiving electronic laboratory results, NRA makes a physical copy and stores the data with the field data sheets. Data is submitted 3 times a year electronically to the TCEQ in the Event/Result file format described in the most current version of the DMRG, which can be found at:
https://www.tceq.texas.gov/waterquality/data-management/dmrg_index.html

## B1 Sampling Process Design

Sampling under this QAPP is conducted by NRA and BCRAGD. NRA uses the CC-WUL for conventional parameters including bacteria and CCSL for chlorophyll-*a* and pheophytin analysis. NRA has the option to use the CC-WUL to run chlorophyll-*a* and pheophytin analysis as needed. BCRAGD uses the SARA-REL for all routine chemical analysis including bacteria.

See Appendix B for sampling process design information and monitoring tables associated with data collected under this QAPP.

## B2 Sampling Methods

### Field Sampling Procedures

Field sampling will be conducted in accordance with the latest versions of the TCEQ Surface Water Quality Monitoring Procedures Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2012 (RG-415) and Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416), collectively referred to as "SWQM Procedures." Updates to SWQM Procedures are posted to the Surface Water Quality Monitoring Procedures website (https://www.tceq.texas.gov/waterquality/monitoring/swqm_guides.html ), and shall be incorporated into the Nueces River Authority's procedures, QAPP, SOPs, etc., within 60 days of any final published update. Additional aspects outlined in Section B below reflect specific requirements for sampling under CRP and/or provide additional clarification.

## *Table B2.1 Sample Storage, Preservation and Handling Requirements*

| Parameter | Matrix | Container | Preservation | Sample Vol. (mL) | Holding Time |
|---|---|---|---|---|---|
| **Routine Chemical** | | | | | |
| Alkalinity | Water | 1 or 8[¤] | cool to <6° C but >0° C * | 500 | 14 days |
| Chloride | Water | 1 or 8[¤] | cool to <6° C but >0° C * | 100 | 28 days |
| Sulfate | Water | 1 or 8[¤] | cool to <6° C but >0° C * | 100 | 28 days |
| TDS | Water | 1 or 8[¤] | cool to <6° C but >0° C * | 250 | 7 days |
| Turbidity | Water | 8[¤] | cool to <6° C but >0° C * | 250 | 48 hours |
| TKN | Water | 2 or 9[¤] | cool to <6° C but >0° C 1-2 ml conc. $H_2SO_4$ pH<2* | 250 | 28 days |
| Ammonia-N | Water | 2 or 9[¤] | cool to <6° C but >0° C 1-2 ml conc. $H_2SO_4$ pH<2* | 250 | 28 days |
| Total Phosphorus | Water | 2 or 9[¤] | cool to <6° C but >0° C 1-2 ml conc. $H_2SO_4$ pH<2* | 250 | 28 days |
| TOC | Water | 4 or 9[¤] | cool to <6° C but >0° C 1-2 ml conc. $H_2SO_4$ pH<2* | 250 | 28 days |
| Nitrate | Water | 1 and 2 or 8[¤] | cool to <6° C but >0° C 1-2 ml | 250 | 48 hours |
| Nitrite | Water | 1 and 2 or 8[¤] | cool to <6° C but >0° C 1-2 ml | 250 | 48 hours |
| TSS | Water | 1 or 8[¤] | cool to <6° C but >0° C * | 1000 | 7 days |
| Chlorophyll-a | Water | 3 or 10[¤] | cool to <6° C but >0° C * | 250 | Filter ≤ 48 hours, Samples must be filtered as soon as possible and filters stored frozen up to 24 days |
| Pheophytin | Water | 3 or 10[¤] | cool to <6° C but >0° C * | 250 | Filter ≤ 48 hours, Samples must be filtered as soon as possible and filters stored frozen up to 24 days |
| **Microbiological** | | | | | |
| *E. coli* IDEXX Colilert | Water | 5 or 11[¤] | cool to <6° C but >0° C, Sodium Thiosulfate* | 100 | 8 hours[ᶜ] |
| Enterococcus | Water | 5 or 11[¤] | cool to <6° C but >0° C, Sodium Thiosulfate* | 100 | 8 hours |
| **Metals in Water** | | | | | |
| Dissolved Metals | Water | 6[£] | Filter at site with 0.45 µm filter, add $HNO_3$ (in the lab) to pH < 2 | 250 | 6 months |
| Total Metals | Water | 6[£] | Add $HNO_3$ (in the lab) to pH < 2 | 250 | 6 months |
| Total Mercury | Water | 7[£] | Add $HNO_3$ (in the lab) to pH < 2 | 250 | 28 Days |

Containers 1 through 5 correspond to WUL, containers 8 through 10 correspond to SARA ELS, and containers 6 and 7 correspond to LCRA ELS.

* Samples are acid-preserved (if required) and stored on ice immediately upon collection (within 15 minutes)

(ᶜ) *E. coli* samples should always be processed as soon as possible and incubated no later than 8 hours from time of collection. When transport conditions necessitate sample incubation after 8 hours from time of collection, the holding time may be extended and samples must be processed as soon as possible and within 30 hours.

(¤) For the SARA REL Lab only.

(£) For the LCRA ELS Lab only.

## Sample Containers

Sample containers are new, supplied by the laboratories conducting the analyses and are shipped to NRA or BCRAGD directly. Sample containers with preservative arrive pre-acidified with sulfuric acid (containers 2 and 4) or preloaded with sodium thiosulfate (containers 5 and 11). BCRAGD preserves samples in the field (Container 9). Containers 6 and 7 are supplied by LCRA ELS; the samples are field filtered by NRA staff. Acidification of metals in water samples will be performed by LCRA ELS in the lab. Certificates from sample container manufacturers are maintained in a notebook by the laboratory.

## Table B2.2 Sampling Containers

| NRA Sampling Containers | | |
|---|---|---|
| **Container #** | **Bottle Description** | **Lab** |
| *1* | 1000mL Polyethylene bottle | WUL |
| 2 | 500mL Polyethylene bottle, preserved in the lab | WUL |
| 3 | 500mL Brown polyethylene bottle | CCSL* |
| 4 | 500mL Glass bottle, preserved in the lab | WUL |
| 5 | 290mL IDEXX bottle | WUL |
| 6 | 250mL Polyethylene bottle | LCRA ELS |
| 7 | 250mL Glass or Teflon bottle | LCRA ELS |
| **BCRAGD Sampling Containers** | | |
| 8 | 4000mL Cubitainer | SARA REL |
| 9 | 1000mL Cubitainer, preserved in the field | SARA REL |
| 10 | 2000mL Brown polyethylene bottle | SARA REL |
| 11 | 300mL Whirlpack | SARA REL |

*NRA purchases new containers (container 3) to be used for parameter analysis by CCSL.

## Processes to Prevent Contamination

SWQM Procedures outline the necessary steps to prevent contamination of samples, including: direct collection into sample containers, when possible; use of certified containers for organics; and clean sampling techniques for metals. Field QC samples (identified in Section B5) are collected to verify that contamination has not occurred.

## Documentation of Field Sampling Activities

Field sampling activities are documented on field data sheets as presented in Appendix D. Flow worksheets, aquatic life use monitoring checklists, habitat assessment forms, field biological assessment forms, and records of bacteriological analyses (if applicable) are part of the field data record. The following will be recorded for all visits:

Station ID
Sampling Date
Location
Sampling Depth
Sampling Time
Sample Collector's name
Values for all field parameters collected

Notes containing detailed observational data not captured by field parameters, including;
Water appearance
Weather
Biological activity
Recreational activity
Unusual odors
Pertinent observations related to water quality or stream uses
Watershed or instream activities
Specific sample information
Missing parameters

### *Recording Data*

For the purposes of this section and subsequent sections, all field and laboratory personnel follow the basic rules for recording information as documented below:

- Write legibly, in indelible ink
- Make changes by crossing out original entries with a single line strike-out, entering the changes, and initialing and dating the corrections.
- Close-out incomplete pages with an initialed and dated diagonal line.

## Sampling Method Requirements or Sampling Process Design Deficiencies, and Corrective Action

Examples of sampling method requirements or sample design deficiencies include but are not limited to such things as inadequate sample volume due to spillage or container leaks, failure to preserve samples appropriately, contamination of a sample bottle during collection, storage temperature and holding time exceedance, sampling at the wrong site, etc. Any deviations from the QAPP, SWQM Procedures, or appropriate sampling procedures may invalidate data, and require documented corrective action. Corrective action may include for samples to be discarded and re-collected. It is the responsibility of the Nueces River Authority Project Manager, in consultation with the Nueces River Authority QAO, to ensure that the actions and resolutions to the problems are documented and that records are maintained in accordance with this QAPP. In addition, these actions and resolutions will be conveyed to the CRP Project Manager both verbally and in writing in the project progress reports and by completion of a CAP.

The definition of and process for handling deficiencies and corrective action are defined in Section C1.

# B3 Sample Handling and Custody

## Sample Tracking

Proper sample handling and custody procedures ensure the custody and integrity of samples beginning at the time of sampling and continuing through transport, sample receipt, preparation, and analysis.

A sample is in custody if it is in actual physical possession or in a secured area that is restricted to authorized personnel. The Chain of Custody (COC) form is a record that documents the possession of the samples from the time of collection to receipt in the laboratory. The following information concerning the sample is recorded on the COC form (See Appendix E). The following list of items matches the COC form in Appendix E. *All COC forms to be used in the project should be included in Appendix E for the TCEQ's review.*

Date and time of collection
Site identification
Sample matrix
Number of containers
Preservative used
Was the sample filtered
Analyses required
Name of collector
Custody transfer signatures and dates and time of transfer
Bill of lading, if applicable

## Sample Labeling

Samples from the field are labeled on the container, or on a label, with an indelible marker. Label information includes:

Site identification
Date and time of collection

Preservative added, if applicable
Indication of field-filtration for metals, as applicable
Sample type (i.e., analyses) to be performed

## Sample Handling

At each site visited, sample containers are placed in a re-sealable plastic bag and are immediately placed on ice in an ice chest. Chain of custody (COC) forms are filled out noting the station ID, date, and time and corresponding analysis to be completed by laboratory personnel. Samples to WUL and CCSL are delivered immediately to the respective lab after sampling. Upon delivery, lab personnel receive the samples and note the temperature of the samples, time, date, and provide a signature on the COC form. Copies of the signed COC forms are made and stored with field data sheets and lab data results at Nueces River Authority.

For metals in water sampling, NRA will collect a dissolved metals in water and a total metals in water sample at each metals monitoring station. Dissolved metals in water samples are field filtered and placed in a re-sealable plastic bag along with the unfiltered total metals in water sample. Samples are then placed in an ice chest (no ice is required) with the COC sealed in a waterproof storage bag inside the cooler. The cooler is then sealed with duct tape and a signed and dated chain of custody seal for shipment to LCRA ELS. Samples are then shipped to LCRA ELS for analysis. Upon delivery, lab personnel receive the samples and note the temperature of the samples, time, date, and provide a signature on the COC form.

Samples obtained by BCRAGD are immediately placed on ice in an ice chest for transport back to BCRAGD offices. Chain of custody (COC) forms provided by the SARA Lab are filled out noting the station ID, date, and time and corresponding analysis to be completed by laboratory personnel. The ice chest with the COC forms are then sealed for transport to SARA by courier. Upon delivery, lab personnel receive the samples and note the temperature of the samples, time, date, and provide a signature on the COC form.

## Sample Tracking Procedure Deficiencies and Corrective Action

All deficiencies associated with COC procedures, as described in this QAPP, are immediately reported to the Basin Planning Agency Project Manager. These include such items as delays in transfer resulting in holding time violations; violations of sample preservation requirements; incomplete documentation, including signatures; possible tampering of samples; broken or spilled samples, etc. The Nueces River Authority Project Manager in consultation with the Nueces River Authority QAO will determine if the procedural violation may have compromised the validity of the resulting data. Any failures that have reasonable potential to compromise data validity will invalidate data and the sampling event should be repeated. The resolution of the situation will be reported to the TCEQ CRP Project Manager in the project progress report. CAPs will be prepared by the Lead Organization QAO and submitted to TCEQ CRP Project Manager along with project progress report.

The definition of and process for handling deficiencies and corrective action are defined in Section C1.

# B4 Analytical Methods

The analytical methods, associated matrices, and performing laboratories are listed in Appendix A. The authority for analysis methodologies under CRP is derived from the 30 Tex. Admin. Code Ch. 307, in that data generally are generated for comparison to those standards and/or criteria. The Texas Surface Water Quality Standards state “Procedures for laboratory analysis must be in accordance with the most recently published edition of the book entitled Standard Methods for the Examination of Water and Wastewater, the TCEQ Surface Water Quality Monitoring Procedures as amended, 40 CFR 136, or other reliable procedures acceptable to the TCEQ, and in accordance with chapter 25 of this title.”

Laboratories collecting data under this QAPP must be NELAP accredited in accordance with 30 TAC Chapter 25. Copies of laboratory QMs and SOPs shall be made available for review by the TCEQ. Exceptions to this rule include laboratories that only analyze parameters that do not require laboratory accreditation (eg. Chlorophyll-*a* and pheophytin samples run by CCSL using EPA 447.0 which doesn’t require TCEQ accreditation).

## Standards Traceability

All standards used in the field and laboratory are traceable to certified reference materials. Standards preparation is fully documented and maintained. Each documentation includes information concerning the standard identification, starting materials, including concentration, amount used and lot number; date prepared, expiration date and preparer's initials/signature. The reagent bottle is labeled in a way that will trace the reagent back to preparation.

## Analytical Method Deficiencies and Corrective Actions

Deficiencies in field and laboratory measurement systems involve, but are not limited to such things as instrument malfunctions, failures in calibration, blank contamination, quality control samples outside QAPP-defined limits, etc. In many cases, the field technician or lab analyst will be able to correct the problem. If the problem is resolvable by the field technician or lab analyst, then they will document the problem on the field data sheet or laboratory record and complete the analysis. If the problem is not resolvable, then it is conveyed to the applicable Laboratory Supervisor, who will make the determination and notify the Nueces River Authority QAO if the problem compromises sample results. If the analytical system failure may compromise the sample results, the resulting data will not be reported to the TCEQ. The nature and disposition of the problem is reported on the data report which is sent to the Nueces River Authority Project Manager. The Nueces River Authority Project Manager will include this information in a CAP and submit with the Progress Report which is sent to the TCEQ CRP Project Manager.

The definition of and process for handling deficiencies and corrective action are defined in Section C1.

The TCEQ has determined that analyses associated with qualifier codes (e.g., "holding time exceedance," "sample received unpreserved," "estimated value") may have unacceptable measurement uncertainty associated with them. This will immediately disqualify analyses from submittal to SWQMIS. Therefore, data with these types of problems should not be reported to the TCEQ. Additionally, any data collected or analyzed by means other than those stated in the QAPP, or data suspect for any reason should not be submitted for loading and storage in SWQMIS. However, when data is lost, its absence will be described in the data summary report submitted with the corresponding data set, and a CAP (as described in section C1) may be necessary.

# B5 Quality Control

## Sampling Quality Control Requirements and Acceptability Criteria

The minimum field QC requirements, and program-specific laboratory QC requirements, are outlined in SWQM Procedures. Specific requirements are outlined below. Field QC sample results are submitted with the laboratory data report (see Section A9).

### Field blank

Field blanks are required for total metals-in-water samples when collected without sample equipment (i.e., as grab samples). For other types of samples, they are optional. A field blank is prepared in the field by filling a clean container with pure deionized water and appropriate preservative, if any, for the specific sampling activity being undertaken. Field blanks are used to assess contamination from field sources, such as airborne materials, containers, or preservatives. Field blanks for total metals-in-water samples will be collected at a frequency of one per day of sampling. Only those samples collected on dates with associated field blanks collected on the same day will be submitted to TCEQ.

The analysis of field blanks should yield values lower than the LOQ. When target analyte concentrations are high, blank values should be lower than 5% of the lowest value of the batch, or corrective action will be implemented.

Field blanks are associated with batches of field samples. In the event of a field blank failure for one or more target analytes, all applicable data associated with the field batch may need to be qualified as not meeting project QC requirements, and these qualified data will not be reported to the TCEQ. These data include all samples collected on that day during that sample run and should not be confused with the laboratory analytical batch.

### Field equipment blank
Field equipment blanks are required for metals-in-water samples when collected using sampling equipment. The field equipment blank is a sample of analyte-free media which has been used to rinse common sampling equipment to check the effectiveness of decontamination procedures. It is collected in the same type of container as the environmental sample, preserved in the same manner, and analyzed for the same parameter. Field equipment blanks for dissolved metals-in-water samples will be collected at a frequency of one per day of sampling. Only those samples collected on dates with associated field equipment blanks collected on the same day will be submitted to TCEQ.

The analysis of field equipment blanks should yield values lower than the LOQ, or, when target analyte concentrations are very high, blank values must be less than 5% of the lowest value of the batch, or corrective action will be implemented.

Field equipment blanks are associated with batches of field samples. In the event of a field equipment blank failure for one or more target analytes, all applicable data associated with the field batch may need to be qualified as not meeting project QC requirements, and these qualified data will not be reported to the TCEQ. These data include all samples collected on that day during that sample run and should not be confused with the laboratory analytical batch.

## Laboratory Measurement Quality Control Requirements and Acceptability Criteria

### Batch
A batch is defined as environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same NELAP-defined matrix, meeting the above-mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared environmental 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.

### Method Specific QC requirements
QC samples, other than those specified later this section (e.g., sample duplicates, surrogates, internal standards, continuing calibration samples, interference check samples, positive control, negative control, and media blank), are run as specified in the methods and in SWQM Procedures. The requirements for these samples, their acceptance criteria or instructions for establishing criteria, and corrective actions are method-specific.

Detailed laboratory QC requirements and corrective action procedures are contained within the individual laboratory quality manuals (QMs). The minimum requirements that all participants abide by are stated below.

### Comparison Counting
For routine bacteriological samples, repeat counts on one or more positive samples are required, at least monthly. If possible, the analyst will compare counts with another analyst who also performs the analysis. Replicate counts by the same analyst should agree within 5 percent, and those between analysts should agree within 10 percent. The analyst(s) will record the results.

### Limit of Quantitation (LOQ)
The laboratory will analyze a calibration standard (if applicable) at the LOQ published in Appendix A of this QAPP on each day calibrations are performed. In addition, an LOQ check sample will be analyzed with each analytical batch. Calibrations including the standard at the LOQ listed in Appendix A will meet the calibration requirements of the analytical method, or corrective action will be implemented.

### LOQ Check Sample
An LOQ check sample consists of a sample matrix (e.g., deionized water, sand, commercially available tissue) free from the analytes of interest spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. It is used to establish intra-laboratory bias to assess the performance of

the measurement system at the lower limits of analysis. The LOQ check sample is spiked into the sample matrix at a level less than or equal to the LOQ published in Appendix A of this QAPP, for each analyte for each analytical batch of CRP samples run. If it is determined that samples have exceeded the high range of the calibration curve, samples should be diluted or run on another curve. For diluted or high concentration samples run on batches with calibration curves that do not include the LOQ published in Appendix A of this QAPP, a check sample will be run at the low end of the calibration curve.

The LOQ check sample is carried through the complete preparation and analytical process and is performed at a rate of one per analytical batch.

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

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

Measurement performance specifications are used to determine the acceptability of LOQ Check Sample analyses as specified in Appendix A of this QAPP.

## Laboratory Control Sample (LCS)

An LCS consists of a sample matrix (e.g., deionized water, sand, commercially available tissue) free from the analytes of interest spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. It is used to establish intra-laboratory bias to assess the performance of the measurement system. The LCS is spiked into the sample matrix at a level less than or near the midpoint of the calibration for each analyte. In cases of test methods with very long lists of analytes, LCSs are prepared with all the target analytes and not just a representative number, except in cases of organic analytes with multipeak responses.

The LCS is carried through the complete preparation and analytical process and is performed at a rate of one per preparation batch.

Results of LCSs are calculated by percent recovery (%R), which is defined as 100 times the measured concentration, divided by the true concentration of the spiked sample.

The following formula is used to calculate percent recovery, where %R is percent recovery; $S_R$ is the measured result; and $S_A$ is the true result:

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

Measurement performance specifications are used to determine the acceptability of LCS analyses as specified in Appendix A.

## Laboratory Duplicates

A laboratory duplicate is an aliquot taken from the same container as an original sample under laboratory conditions and processed and analyzed independently. A laboratory duplicate is achieved by preparing 2 separate aliquots of a sample, LCS, or matrix spike. Both samples are carried through the entire preparation and analytical process. Laboratory duplicates are used to assess precision and are performed at a rate of one per preparation batch.

For most parameters except bacteria, precision is evaluated using the relative percent difference (RPD) between duplicate results as defined by 100 times the difference (range) of each duplicate set, divided by the average value (mean) of the set. For duplicate results, $X_1$ and $X_2$, the RPD is calculated from the following equation:

$$RPD = \frac{|X_1 - X_2|}{\left(\frac{X_1 + X_2}{2}\right)} \times 100$$

If the precision criterion is exceeded, the data are not acceptable for use under this project and are not reported to TCEQ. Results from all samples associated with that failed duplicate (usually a maximum of 10 samples) are

considered to have excessive analytical variability and are qualified as not meeting project QC requirements.

For bacteriological parameters, precision is evaluated using the results from laboratory duplicates. Bacteriological duplicates are analyzed at a 10% frequency (or once per preparation batch, whichever is more frequent). Sufficient volume should be collected to analyze laboratory duplicates from the same sample container.

The base-10 logarithms of the results from the original sample and its duplicate are calculated. The absolute value of the difference between the two base-10 logarithms is calculated and compared to the precision criterion in Appendix A.

The precision criterion in Appendix A for bacteriological duplicates applies only to samples with concentrations > 10 MPN.

## Laboratory equipment blank

Laboratory equipment blanks are prepared at the laboratory where collection materials for metals sampling equipment are cleaned between uses. These blanks document that the materials provided by the laboratory are free of contamination. The QC check is performed before the metals sampling equipment is sent to the field. The analysis of laboratory equipment blanks should yield values less than the LOQ. If the result is not less than the LOQ, the equipment should not be used.

**Matrix spike (MS)** – Matrix spikes are prepared by adding a known quantity of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

Matrix spikes indicate the effect of the sample on the precision and accuracy of the results generated using the selected method. Matrix-specific QC samples indicate the effect of the sample matrix on the precision and accuracy of the results generated using the selected method. The information from these controls is sample/matrix specific and would not normally be used to determine the validity of the entire batch. The frequency of matrix spikes is specified by the analytical method, or a minimum of one per preparation batch, whichever is greater. To the extent possible, matrix spikes prepared and analyzed over the course of the project should be performed on samples from different sites.

The components to be spiked shall be as specified by the mandated analytical method. The results from matrix spikes are primarily designed to assess the validity of analytical results in a given matrix and are expressed as percent recovery (%R).

The percent recovery of the matrix spike is calculated using the following equation, where %R is percent recovery, $S_{SR}$ is the concentration measured in the matrix spike, $S_R$ is the concentration in the parent sample, and $S_A$ is the concentration of analyte that was added:

$$\%R = \frac{S_{SR} - S_R}{S_A} \times 100$$

Matrix spike recoveries are compared to the acceptance criteria published in the mandated test method. If the matrix spike results are outside established criteria, the data for the analyte that failed in the parent sample is not acceptable for use under this project and will not be reported to TCEQ. The result from the parent sample associated with that failed matrix spike will be considered to have excessive analytical variability and will be qualified by the laboratory as not meeting project QC requirements. Depending on the similarities in composition of the samples in the batch, the Nueces River Authority may consider excluding all of the results in the batch related to the analyte that failed recovery.

## Method blank

A method blank is a sample of matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as the samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses. The method blank is used to document contamination from the analytical process. The analysis of method blanks should yield values less than the LOQ.

For very high-level analyses, the blank value should be less than 5% of the lowest value of the batch, or corrective action will be implemented. Samples associated with a contaminated blank shall be evaluated as to the best corrective action for the samples (e.g. reprocessing, data qualifying codes). In all cases the corrective action must be documented.

The method blank shall be analyzed at a minimum of one per preparation batch. In those instances for which no separate preparation method is used (e.g., VOA) the batch shall be defined as environmental samples that are analyzed together with the same method and personnel, using the same lots of reagents, not to exceed the analysis of 20 environmental samples.

### Quality Control or Acceptability Requirements Deficiencies and Corrective Actions

Sampling QC excursions are evaluated by the Nueces River Authority Project Manager, in consultation with the Nueces River Authority QAO. In that differences in sample results are used to assess the entire sampling process, including environmental variability, the arbitrary rejection of results based on pre-determined limits is not practical. Therefore, the professional judgment of the Nueces River Authority Project Manager and QAO will be relied upon in evaluating results. Field blanks for trace elements and trace organics are scrutinized very closely. Field blank values exceeding the acceptability criteria will automatically invalidate the sample. Notations of blank contamination are noted in the data summaries that accompany data deliverables. Equipment blanks for metals analysis are also scrutinized very closely.

Laboratory measurement quality control failures are evaluated by the laboratory staff. The disposition of such failures and the nature and disposition of the failure is reported to the Laboratory QAO. The Laboratory QAO will discuss the failure with the Nueces River Authority Project Manager. If applicable, the Nueces River Authority Project Manager will include this information in a CAP and submit with the Progress Report which is sent to the TCEQ CRP Project Manager.

The definition of and process for handling deficiencies and corrective action are defined in Section C1.

Additionally, in accordance with CRP requirements and the TNI Standard (Volume 1, Module 2, Section 4.5, Subcontracting of Environmental Tests) when a laboratory that is a signatory of this QAPP finds it necessary and/or advantageous to subcontract analyses, the laboratory that is the signatory on this QAPP must ensure that the subcontracting laboratory is NELAP-accredited (when required) and understands and follows the QA/QC requirements included in this QAPP. This includes that the subcontracting laboratory utilize the same reporting limits as the signatory laboratory and performs all required quality control analysis outlined in this QAPP. The signatory laboratory is also responsible for quality assurance of the data prior to delivering it to the Nueces River Authority, including review of all applicable QC samples related to CRP data. As stated in section 4.5.5 of the 2016 TNI Standard, the laboratory performing the subcontracted work shall be indicated in the final report and the signatory laboratory shall make a copy of the subcontractor's report available to the client (Nueces River Authority) when requested.

## B6 Instrument/Equipment Testing, Inspection, and Maintenance

All sampling equipment testing and maintenance requirements are detailed in the SWQM Procedures. Sampling equipment is inspected and tested upon receipt and is assured appropriate for use. Equipment records are kept on all field equipment and a supply of critical spare parts is maintained.

All laboratory tools, gauges, instrument, and equipment testing and maintenance requirements are contained within laboratory QM(s).

## B7 Instrument Calibration and Frequency

Field equipment calibration requirements are contained in the SWQM Procedures. Post-calibration check error limits and the disposition resulting from errors are adhered to. Data collected from field instruments that do not

meet the post-calibration check error limits specified in the SWQM Procedures will not be submitted for inclusion into SWQMIS.

Detailed laboratory calibrations are contained within the QM(s).

# B8 Inspection/Acceptance of Supplies and Consumables

No special requirements for acceptance are specified for field sampling supplies and consumables. Reference to the laboratory QM may be appropriate for laboratory-related supplies and consumables.

# B9 Acquired Data

Non-directly measured data, secondary data, or acquired data involves the use of data collected under another project and collected with a different intended use than this project. The acquired data still meets the quality requirements of this project and is defined below. The following data source(s) will be used for this project:

USGS gage station data will be used throughout this project to aid in determining gage height and flow. Rigorous QA checks are completed on gage data by the USGS and the data are approved by the USGS and permanently stored at the USGS. This data will be submitted to the TCEQ under parameter code 00061 Flow, Instantaneous or parameter code 74069 Flow Estimate depending on the proximity of the monitoring station to the USGS gage station.

Reservoir stage data are collected every day from the USGS, International Boundary and Water Commission (IBWC), and the United States Army Corps of Engineers (USACE) websites. These data are preliminary and subject to revision. The Texas Water Development Board (TWDB) derives reservoir storage (in acre-feet) from these stage data (elevation in feet above mean sea level), by using the latest rating curve datasets available. These data are published at the TWDB website at http://waterdatafortexas.org/reservoirs/statewide. Information about measurement methodology can be found on the TWDB website. These data will be submitted to the TCEQ under parameter code 00052 Reservoir Stage and parameter code 00053 Reservoir Percent Full.

# B10 Data Management

## Data Management Process

NRA's field data sheets are used to record field and acquired data (streamflow and precipitation information) from each monitoring station for each sampling event. Laboratory data results from WUL , LCRA ELS, and CCSL are received electronically by NRA via email following each sampling event.

BCRAGD submits field data and lab results to NRA electronically via email.

NRA staff transcribes data and uploads photographs from each sampling event (NRA and BCRAGD) to NRA's online data entry forms called DataIn Scripts. Data is input into the database based on the source or type of data. There is an online form for 24-hour dissolved oxygen data, routine CRP data analyzed by CC WUL, LCRA ELS, and CCSL, routine CRP data analyzed by SARA, and one for profile measurements. Each input form includes the field parameters. There is an additional input form for adding pictures. The data is stored in NRA's temporary database. The data are extracted from this database and formatted for submittal to TCEQ.

The forms are designed to limit the amount of information that has to be typed in order to reduce typographical errors. The forms contain: a drop-down list of stations associated with each input type; input fields associated with the event record include the tag number, date, time, depth, source codes, program code, comment, and quarter. The quarter field is only used in NRA's temporary database. The forms also include the results records information via input fields for all field parameters and lab parameters. Where applicable, outliers are flagged via an associated input field. The information entered into the database is printed and double-checked against the field data sheets and lab results pages by the NRA Field Supervisor. Data entry errors are noted and corrected.

The data will be supplied to the TCEQ Project Manager as ASCII pipe-delimited text files in the Event/Result file formats as described in the most current version of the DMRG. The data files are then forwarded to the TCEQ Data Manager.

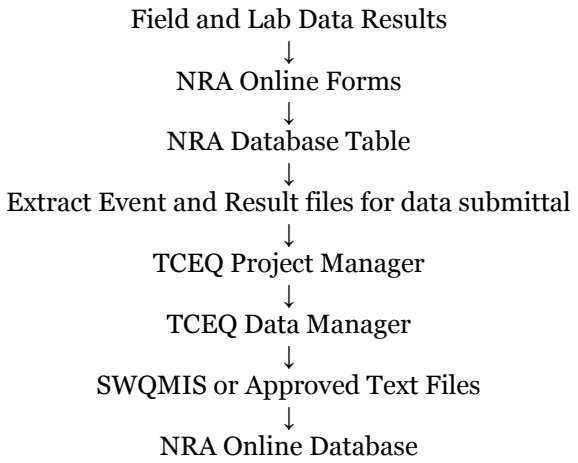
After approval by TCEQ and inclusion in SWQMIS, the data are entered into NRA's CRP database table that is available online. There are two loading procedures:

- Procedure 1: Once a month, non-NRA data are downloaded from SWQMIS via the "CRP Data Tool" (https://www80.tceq.texas.gov/SwqmisWeb/public/crpweb.faces) website for all segments within NRA's area of responsibility. The event and result files are formatted for upload into NRA's database. A script is run that loads these data into NRA's database. This allows not only new data to be inserted, but data that has been modified in the SWQMIS database to be updated in the NRA's database. This provides users access to all approved data in NRA's area of responsibility via NRA's website (https://www.nueces-ra.org/CP/CRP/SWQM/index.php), regardless of the collecting and submitting entities.

- Procedure 2: NRA data are loaded using the event and result files that were used for the data submittal after they have been approved. NRA's data are loaded separately to preserve NRA's tag assignment to the profile data.

Errors discovered in these records after inclusion in SWQMIS are determined by comparing lab and field data to data inputted and are manually corrected in NRA databases by the NRA QAO.

The following flow chart summarizes the data path.




### Data Dictionary

Terminology and field descriptions are included in the 2019 DMRG, or most recent version.

| Name of Entity | Tag Prefix | Submitting Entity | Collecting Entity |
|---|---|---|---|
| Nueces River Authority | O | NR | NR |
| Bandera County River Authority and Groundwater District | O | NR | BA |

## Data Errors and Loss

Time of lab analysis is compared to holding times for all parameters by WUL, CCSL, BCRAGD, SARA REL, LCRA ELS, and NRA. In the event that a holding time is not met, the accompanying narrative is reviewed for an explanation and/or validity of the reported data. This information is entered into the comment field of the event table and the data exceeding the holding times is excluded from the reported data set, if applicable.

To detect and correct errors prior to submission to TCEQ, the scripts that convert the data entered in the online forms check the entered value against the parameter codes minimum and maximum accepted values. In the event that the data are outside the range, the script returns an error message instructing the user to either re-

enter the data or to verify the value and place a "1" in an associated box that is equivalent to the "Remark" field of the results table. Date and time entries must also be in valid formats for the scripts to process the data. A report of the records that were added to the table is displayed which can be used to review the data against the field and laboratory data sheets.

## Record Keeping and Data Storage

All hardcopy field and lab data sheets are stored in files associated with the quarter in which the sampling occurred. The database is located on a Windows NT server housed in San Antonio, Texas. The CRP database consists of three tables: *parameters*, which contains storet information; *swqm*, which contains information on all sampling stations within NRA's area of responsibility; and *results*, which contains all the sampling event and result information and data.

The NRA Database Manager backs up the CRP database, web pages, and scripts monthly, on or about the first of each month. The database tables are exported to sql and csv files. Listings of the current month's updated records for the individual segments, the web pages and scripts are also copied. These files are copied to a network drive, a lcd drive, and to a DVD. The DVD's are stored in a fireproof safe on-site.

## Data Handling, Hardware, and Software Requirements

| | |
|---|---|
| **SERVER HARDWARE #1:** | Dell Server |
| **SERVER DATABASE SOFTWARE #1:** | Microsoft-IIS/6.0 - MySQL build 5.0.51a |
| **SERVER SOFTWARE #1:** | Windows NT SDFMAXVCUS0303 5.2 build 3790 |
| **SERVER_PROTOCOL #1:** | HTTP/1.1 |
| **SERVER HARDWARE #2:** | Altec Custom Build |
| **SERVER BACKUPSOFTWARE SOFTWARE #2:** | Manual / Norton Ghost 10 |
| **SERVER SOFTWARE #2:** | Windows XP Professional |
| **SERVER_PROTOCOL #2:** | HTTP/1.1 |
| **PROGRAMMING LANGUAGE SUPPORT:** | PERL, JAVASCRIPT, HTML, XHTML, PHP, SQL, BASH SHELL SCRIPTNG, JAVA, ACTIVE PERL, FLASH and ACTIVEX |
| **DATABASE SUPPLEMENTAL SOFTWARE APPLICATIONS:** | SECURE SHELL, SECURE FTP, WS_FTP(LE), Notepad, MS WORD, OUTLOOK Express, WINZIP9.0, Roxio Easy CD Creater 5 and MS OUTLOOK. |
| **DATABASE SUPPLEMENTAL GRAPICS SOFTWARE APPLICATIONS:** | FLASH MX, JASC Paint Shop Pro XI and JASC Animation Shop. |
| **MIDDLEWARE** | DBI,/DBD, CGI/FastCGI, Active X Controls, Mozilla, MSIE, Netscape, and Opera. |
| **DATABASE PRINTER SUPPLEMENTAL HARDWARE/SOFTWARE:** | HP Color Laser Jet 4500DN, HP , Office Jet 7410 All-In-One and Xerox Workcentre 7232. |

## Information Resource Management Requirements

Data will be managed in accordance with the TCEQ DMRG (most recent revision), and applicable Nueces River Authority information resource management policies.

GPS equipment may be used as a component of the information required by the Station Location (SLOC) request process for creating the certified positional data that will ultimately be entered into SWQMIS database. Positional data obtained by CRP grantees using a GPS will follow the TCEQ's OPP 8.11 policy regarding the collection and management of positional data. Positional data may be acquired with a GPS and verified with photo interpolation using a certified source, such as Google Earth or Google Maps. The verified coordinates and map interface can then be used to develop a new SLOC.

# C1 Assessments and Response Actions

The following table presents the types of assessments and response actions for data collection activities applicable to the QAPP.

## Table C1.1 Assessments and Response Requirements

| Assessment Activity | Approximate Schedule | Responsible Party | Scope | Response Requirements |
|---|---|---|---|---|
| Status Monitoring Oversight, etc. | Continuous | Nueces River Authority | Monitoring of the project status and records to ensure requirements are being fulfilled | Report to TCEQ in Quarterly Report |
| Monitoring Systems Audit of Basin Planning Agency | Dates to be determined by TCEQ CRP | TCEQ | Field sampling, handling and measurement; facility review; and data management as they relate to CRP | 30 days to provide corrective actions response to the TCEQ |
| Monitoring Systems Audit of Program Subparticipants | Once per biennium | Nueces River Authority | Field sampling, handling and measurement; facility review; and data management as they relate to CRP | 30 days to respond in writing to the Basin Nueces River Authority. PA will report problems to TCEQ in Progress Report. |
| Laboratory Assessment | Dates to be determined by TCEQ | TCEQ Laboratory Assessor | Analytical and quality control procedures employed at the laboratory and the contract laboratory | 30 days to provide corrective actions response to the TCEQ |

## Corrective Action Process for Deficiencies

Deficiencies are any deviation from the QAPP, SWQM Procedures, or other applicable guidance. Deficiencies may invalidate resulting data and require corrective action. Repeated deficiencies should initiate a CAP. Corrective action for deficiencies may include for samples to be discarded and re-collected. Deficiencies are documented in logbooks, field data sheets, etc. by field or laboratory staff, are communicated to the Nueces River Authority Project Manager (or other appropriate staff) and should be subject to periodic review so their responses can be uniform, and their frequency tracked. It is the responsibility of the Nueces River Authority Project Manager, in consultation with the Nueces River Authority QAO, to ensure that the actions and resolutions to the problems are documented and that records are maintained in accordance with this QAPP. In addition, these actions and resolutions will be conveyed to the CRP Project Manager both verbally and in writing in quarterly progress reports and by completion of a CAP.

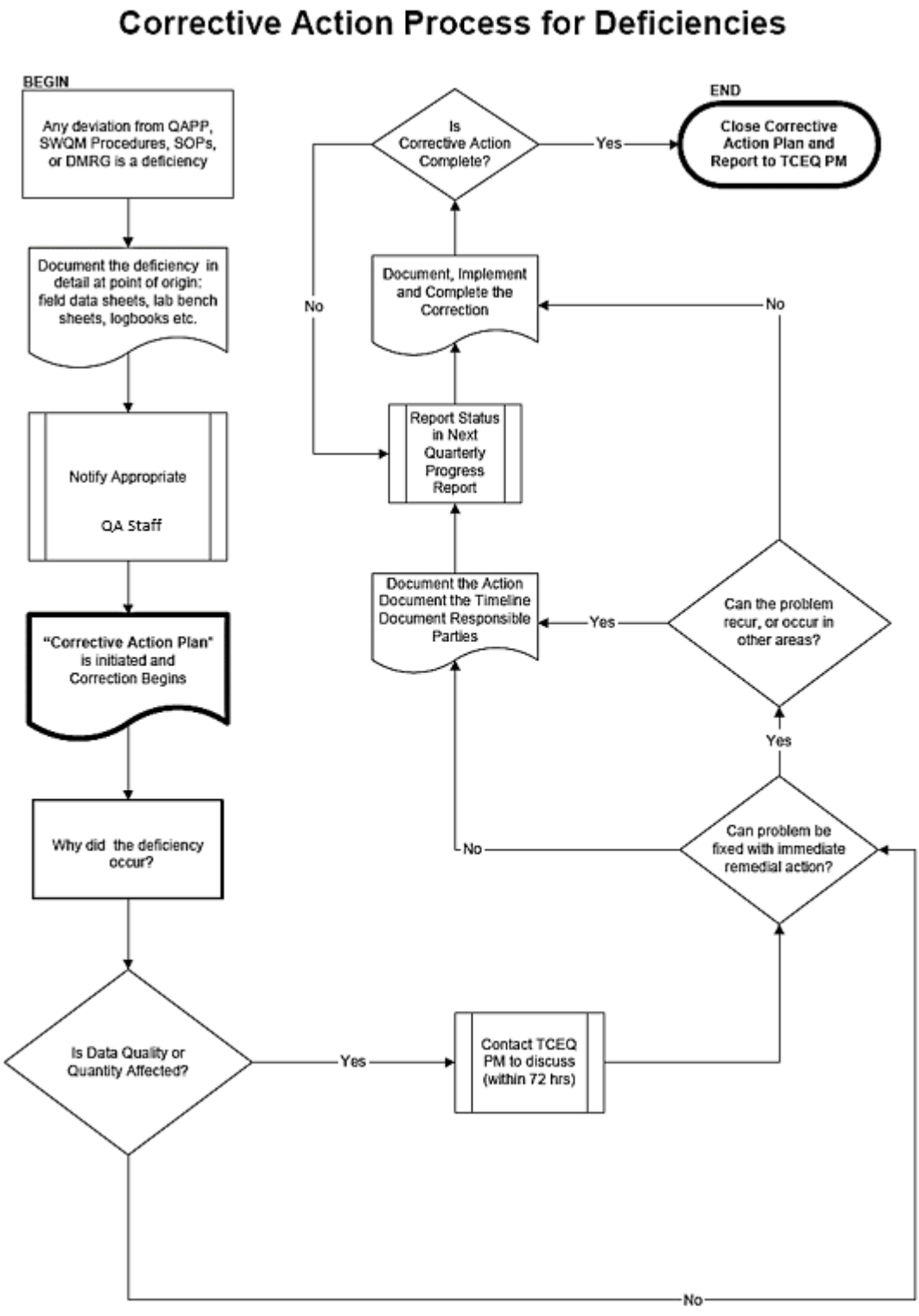
## Corrective Action

CAPs should:

- Identify the problem, nonconformity, or undesirable situation
- Identify immediate remedial actions if possible
- Identify the underlying cause(s) of the problem
- Identify whether the problem is likely to recur, or occur in other areas
- Assist in determining the need for corrective action
- Employ problem-solving techniques to verify causes, determine solution, and develop an action plan
- Identify personnel responsible for action
- Establish timelines and provide a schedule
- Document the corrective action

A flow chart has been developed to facilitate the process (see figure C1.1: Corrective Action Process for Deficiencies).

## Figure C1.1 Corrective Action Process for Deficiencies



The status of CAPs will be included with quarterly progress reports. In addition, significant conditions which, if uncorrected, could have a serious effect on safety or on the validity or integrity of data will be reported to the TCEQ immediately.

The Nueces River Authority Project Manager is responsible for ensuring that corrective actions have been implemented and tracks deficiencies and corrective actions. Records of audit findings and corrective actions are maintained by the Nueces River Authority Project Manager. Audit reports and associated corrective action documentation will be submitted to the TCEQ with the quarterly progress reports.

If audit findings and corrective actions cannot be resolved, then the authority and responsibility for terminating work are specified in the TCEQ QMP and in agreements in contracts between participating organizations.

# C2 Reports to Management

## Table C2.1 QA Management Reports

| Type of Report | Frequency (daily, weekly, monthly, quarterly, etc.) | Projected Delivery Date(s) | Person(s) Responsible for Report Preparation | Report Recipients |
|---|---|---|---|---|
| Non-Conformance Report | As Needed | As Needed | Field Staff<br>Laboratory Staff | Nueces River Authority QA Staff or<br>Laboratory Management as appropriate |
| CRP Progress Reports | Quarterly | December 15, 2019<br>March 15, 2020<br>June 15, 2020<br>September 15, 2020<br>December 15, 2020<br>March 15, 2021<br>June 15, 2021<br>August 31, 2021 | Nueces River Authority Project Manager | TCEQ CRP Project Management |
| Monitoring Systems Audit Report and Response | As Needed | As Needed | Nueces River Authority QAO | TCEQ CRP Project Management |
| Data Summary | As Needed | As Needed | Nueces River Authority Data Manager | TCEQ CRP Project Management |

## Reports to Nueces River Authority Project Management

QA issues will be reported in writing (e-mail) to the NRA Project Manager as issues arise.

The NRA Project Manager is charged with the responsibility to report the status of implementation and application of the quality assurance procedures described in this QAPP and thereby the status of data quality. It is imperative that the Project Manager is properly informed of any quality assurance problems encountered and responsible for the development and implementation of corrective actions. This information will be provided to the Project Manager by the NRA Data Manager and/or Field Personnel. These reports will include laboratory analysis quality assurance summaries and field QC results. These reports will be provided to the NRA Project Manager/QAO as needed prior to the transfer of the data to the TCEQ. Other reports as needed include, but are not limited to corrective action forms, correspondence, case narratives, etc., describing corrective actions or implementation of new processes to ensure that quality data are produced.

## Reports to TCEQ Project Management

All reports detailed in this section are contract deliverables and are transferred to the TCEQ in accordance with contract requirements.

### Progress Report

Summarizes the Nueces River Authority's activities for each task; reports monitoring status, problems, delays, deficiencies, status of open CAPs, and documentation for completed CAPs; and outlines the status of each task's deliverables.

### Monitoring Systems Audit Report and Response

Following any audit performed by the Nueces River Authority, a report of findings, recommendations and response is sent to the TCEQ in the quarterly progress report.

### Data Summary

Contains basic identifying information about the data set and comments regarding inconsistencies and errors identified during data verification and validation steps or problems with data collection efforts (e.g. deficiencies).

## Reports by TCEQ Project Management

### Contractor Evaluation

The Nueces River Authority participates in a Contractor Evaluation by the TCEQ annually for compliance with administrative and programmatic standards. Results of the evaluation are submitted to the TCEQ Financial Administration Division, Procurement and Contracts Section.

# D1 Data Review, Verification, and Validation

All field and laboratory data will be reviewed and verified for integrity and continuity, reasonableness, and conformance to project requirements, and then validated against the project objectives and measurement performance specifications which are listed in Section A7 of this QAPP. Only those data which are supported by appropriate quality control data and meet the measurement performance specifications defined for this project will be considered acceptable and will be reported to the TCEQ for entry into SWQMIS.

# D2 Verification and Validation Methods

All field and laboratory data will be reviewed, verified and validated to ensure they conform to project specifications.

Data review, verification, and validation will be performed using self-assessments as well as peer and management review as appropriate to the project task. The data review tasks to be performed by field and laboratory staff are listed in the first two columns of Table D2.1, respectively. Potential errors are identified by examination of documentation and by manual examination of corollary or unreasonable data; this analysis may be computer-assisted. If a question arises or an error is identified, the manager of the task responsible for generating the data is contacted to resolve the issue. Issues which can be corrected are corrected and documented. If an issue cannot be corrected, the task manager consults with the higher-level project management to establish the appropriate course of action, or the data associated with the issue are rejected and not reported to the TCEQ for storage in SWQMIS. Field and laboratory reviews, verifications, and validations are documented.

After the field and laboratory data are reviewed, another level of review is performed once the data are combined into a data set. This review step as specified in Table D2.1 is performed by the Nueces River Authority Data Manager and QAO. Data review, verification, and validation tasks to be performed on the data set include, but are not limited to, the confirmation of laboratory and field data review, evaluation of field QC results, additional evaluation of anomalies and outliers, analysis of sampling and analytical gaps, and confirmation that all parameters and sampling sites are included in the QAPP.

The Data Review Checklist (see Appendix F) covers three main types of review: data format and structure, data quality review, and documentation review. The Data Review Checklist is transferred with the water quality data submitted to the TCEQ to ensure that the review process is being performed.

Another element of the data validation process is consideration of any findings identified during the monitoring systems audit conducted by the TCEQ CRP Lead Quality Assurance Specialist. Any issues requiring corrective action must be addressed, and the potential impact of these issues on previously collected data will be assessed. After the data are reviewed and documented, the Nueces River Authority Project Manager validates that the data meet the data quality objectives of the project and are suitable for reporting to TCEQ.

If any requirements or specifications of the CRP are not met, based on any part of the data review, the responsible party should document the nonconforming activities and submit the information to the Nueces River Authority Data Manager with the data in the Data Summary (See Appendix F). All failed QC checks, missing samples, missing analytes, missing parameters, and suspect results should be discussed in the Data Summary.

## Table D2.1: Data Review Tasks

| Data to be Verified | Field Task | Laboratory Task | Quality Assurance Task | NRA Data Manager Task |
|---|---|---|---|---|
| Sample documentation complete; samples labeled, sites identified | NRA/BCRAGD Field Supervisor | | NRA QAO<br>BCRAGD QAO | |
| Field QC samples collected for all analytes as prescribed in the TCEQ SWQM Procedures Manual | NRA/BCRAGD Field Supervisor | | NRA, BCRAGD QAO | |
| Standards and reagents traceable | NRA/BCRAGD Field Supervisor | WUL, CCSL, SARA REL and LCRA ELS QAO | NRA, CCSL, BCRAGD, SARA REL, WUL and LCRA ELS QAO | |
| Chain of custody complete/acceptable | NRA/BCRAGD Field Supervisor | WUL, CCSL, SARA REL and LCRA ELS QAO | NRA, BCRAGD, SARA REL, WUL and LCRA ELS QAO | |
| NELAP Accreditation is current | | WUL, CCSL, SARA REL and LCRA ELS QAO | NRA, BCRAGD, SARA REL, WUL, CCSL and LCRA ELS QAO | |
| Sample preservation and handling acceptable | NRA/BCRAGD Field Supervisor | WUL, SARA REL, CCSL and LCRA ELS QAO | NRA, BCRAGD, SARA REL, WUL, CCSL and LCRA ELS QAO | |
| Holding times not exceeded | | WUL, SARA REL, CCSL and LCRA ELS QAO | NRA, BCRAGD, SARA REL, WUL, CCSL and LCRA ELS QAO | NRA DM |
| Collection, preparation, and analysis consistent with SOPs and QAPP | NRA/BCRAGD Field Supervisor | WUL, SARA REL, CCSL and LCRA ELS QAO | NRA, BCRAGD, SARA REL, WUL, CCSL and LCRA ELS QAO | |
| Field documentation (e.g., biological, stream habitat) complete | NRA/BCRAGD Field Supervisor | | NRA QAO<br>BCRAGD QAO | |
| Instrument calibration data complete | NRA/BCRAGD Field Supervisor | WUL, SARA REL, CCSL and LCRA ELS QAO | NRA, BCRAGD, SARA REL, WUL, CCSL and LCRA ELS QAO | |
| QC samples analyzed at required frequency | NRA/BCRAGD Field Supervisor | WUL, CCSL, SARA REL and LCRA ELS QAO | NRA, BCRAGD, SARA REL, WUL, CCSL and LCRA ELS QAO | |
| QC results meet performance and program specifications | | WUL, SARA REL, CCSL and LCRA ELS QAO | NRA, BCRAGD, SARA REL, WUL, CCSL and LCRA ELS QAO | |
| Analytical sensitivity (LOQ/AWRL) consistent with QAPP | | WUL, CCSL, SARA REL and LCRA ELS QAO | NRA, BCRAGD, SARA REL, WUL, CCSL and LCRA ELS QAO | |
| Results, calculations, transcriptions checked | | WUL, CCSL, SARA REL and LCRA ELS QAO | | |
| Laboratory bench-level review performed | | WUL, CCSL, SARA REL and LCRA ELS QAO | | |
| All laboratory samples analyzed for all scheduled parameters | | WUL, CCSL, SARA REL and LCRA ELS QAO | NRA QAO | |
| Corollary data agree | | | | NRA QAO |
| Nonconforming activities documented | NRA/BCRAGD Field Supervisor | NRA and BCRAGD PM & | NRA, BCRAGD, SARA REL, WUL, CCSL and | |

| | | | | |
|---|---|---|---|---|
| | | QAO, WUL, SARA REL LS, CCSL LM & QAO and LCRA ELS LM | LCRA ELS QAO | |
| Outliers confirmed and documented; reasonableness check performed | NRA Field Supervisor | | | NRA DM |
| Dates formatted correctly | | | | NRA DM |
| Depth reported correctly and in correct units | | | NRA QAO BCRAGD QAO | |
| TAG IDs correct | | | | NRA DM |
| TCEQ Station ID number assigned | | | | NRA DM |
| Valid parameter codes | | | NRA QAO | NRA DM |
| Codes for submitting entity(ies), collecting entity(ies), and monitoring type(s) used correctly | | | NRA QAO | NRA DM |
| Time based on 24-hour clock | | | NRA QAO | NRA DM |
| Check for transcription errors | NRA Field Supervisor | | NRA QAO | |
| Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the coordinated monitoring schedule) | | | | NRA DM |
| Field instrument pre- and post-calibration results within limits | NRA. BCRAGD Field Supervisor | | NRA QAO BCRAGD QAO | |
| 10% of data manually reviewed | | WUL LM, CCSL LM, LCRA ELS and SARA REL LS | NRA QAO | |

## D3 Reconciliation with User Requirements

Data produced in this project, and data collected by other organizations (e.g., USGS, TCEQ, etc.), will be analyzed and reconciled with project data quality requirements. Data which do not meet requirements will not be submitted to SWQMIS nor will be considered appropriate for any of the uses noted in Section A5.

# Appendix A:

# Measurement Performance Specifications (Tables A7.1-7.8)

Measurement performance specifications define the data quality needed to satisfy project objectives. To this end, measurement performance specifications are qualitative and quantitative statements that:

- clarify the intended use of the data
- define the type of data needed to support the end use
- identify the conditions under which the data should be collected

Appendix A of the QAPP addresses measurement performance specifications, including:

- analytical methodologies
- AWRLs
- limits of quantitation
- bias limits for LCSs
- precision limits for LCSDs
- completeness goals
- qualitative statements regarding representativeness and comparability

The items identified above should be considered for each type of monitoring activity. The CRP encourages that data be collected to address multiple objectives to optimize resources; however, caution should be applied when attempting to collect data for multiple purposes because measurement performance specifications may vary according to the purpose. For example, limits of quantitation may differ for data used to assess standards attainment and for trend analysis. When planning projects, first priority will be given to the main use of the project data and the data quality needed to support that use, then secondary goals will be considered.

Tables A7.1-7.8 reflects actual parameters, methods, etc. employed by the Nueces River Authority and BCRAGD. Procedures for laboratory analysis must be in accordance with the most recently published edition of Standard Methods for the Examination of Water and Wastewater, 40 CFR 136, or otherwise approved independently. Only data collected that have a valid TCEQ parameter code assigned in Tables A7 are stored in SWQMIS. Any parameters listed in Tables A7 that do not have a valid TCEQ parameter code assigned will not be stored in SWQMIS.

Table A7.1 – 7.8Measurement Performance Specifications

| TABLE A7.1 Measurement Performance Specifications for the Nueces River Authority | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conventional Parameters in Water | | | | | | | | | | |
| Parameter | Units | Matrix | Method | Parameter Code | AWRL | LOQ | LOQ Check Sample %Rec | Precision (RPD) of LCS/LCSD) | Bias %Rec. of LCS | Lab |
| ALKALINITY, TOTAL (MG/L AS CACO3) | mg/L | water | SM2320B | 00410 | 20 | 20 | NA | 20 | NA | WUL |
| RESIDUE, TOTAL NONFILTRABLE (MG/L) | mg/L | water | SM2540D | 00530 | 5 | NA | NA | NA | NA | WUL |
| NITROGEN, AMMONIA, TOTAL (MG/L AS N) | mg/L | water | EPA350.1 Rev. 2.0 (1993) | 00610 | 0.1 | 0.1 | 70-130 | 20 | 80-120 | WUL |
| NITRITE NITROGEN, TOTAL (MG/L AS N) | mg/L | water | EPA 300.0 Rev. 2.1 (1993) | 00615 | 0.05 | 0.02 | 70-130 | 20 | 80-120 | WUL |
| NITRATE NITROGEN, TOTAL (MG/L AS N) | mg/L | water | EPA 300.0 Rev. 2.1 (1993) | 00620 | 0.05 | 0.025 | 70-130 | 20 | 80-120 | WUL |
| NITRITE NITROGEN, TOTAL (MG/L AS N) | mg/L | water | EPA 353.2 | 00615 | 0.05 | 0.02 | 70-130 | 20 | 80-120 | WUL |
| NITRATE NITROGEN, TOTAL (MG/L AS N) | mg/L | water | EPA 353.2 | 00620 | 0.05 | 0.02 | 70-130 | 20 | 80-120 | WUL |
| NITROGEN, KJELDAHL, TOTAL (MG/L AS N) | mg/L | water | EPA 351.4 | 00625 | 0.2 | 0.2 | 70-130 | 20 | 80-120 | WUL |
| PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P) | mg/L | water | EPA365.1 | 00665 | 0.06 | 0.06 | 70-130 | 20 | 80-120 | WUL |
| CARBON, TOTAL ORGANIC, NPOC (TOC), MG/L | mg/L | water | SM5310 C | 00680 | 2 | 0.3 | NA | NA | NA | WUL |
| CHLORIDE (MG/L AS CL) | mg/L | water | EPA 300.0 Rev. 2.1 (1993) | 00940 | 5 | 0.3 | 70-130 | 20 | 80-120 | WUL |
| SULFATE (MG/L AS SO4) | mg/L | water | EPA 300.0 Rev. 2.1 (1993) | 00945 | 5 | 0.1 | 70-130 | 20 | 80-120 | WUL |
| RESIDUE, TOTAL FILTRABLE (DRIED AT 180C) (MG/L) | mg/L | water | SM2540C | 70300 | 10 | 2.5 | NA | 20 | 80-120 | WUL |
| CHLOROPHYLL-A, FLUOROMETRIC METHOD, UG/L | µg/L | water | EPA 445.0 | 70953 | 3 | 2 | NA | NA | NA | WUL |
| PHEOPHYTIN-A UG/L FLUOROMETRIC METHOD | µg/L | water | EPA 445.0 | 32213 | 3 | 2 | NA | NA | NA | WUL |
| CHLOROPHYLL-A, HPLC VISIBLE WAVELENGTH METHOD DETENTION, UG/L | µg/L | water | EPA 447.0 | 32211 | 3 | 2 | NA | NA | NA | CCSL |
| PHEOPHYTIN-A UG/L HPLC VISIBLE WAVELENGTH DETENTION METHOD | µg/L | water | EPA 447.0 | 32218 | 3 | 2 | NA | NA | NA | CCSL |
| United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020 | | | | | | | | | | |
| American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.) | | | | | | | | | | |
| TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415). | | | | | | | | | | |
| TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416) | | | | | | | | | | |

| TABLE A7.2 Measurement Performance Specifications for the BCRAGD | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Conventional Parameters in Water** | | | | | | | | | | |
| **Parameter** | **Units** | **Matrix** | **Method** | **Parameter Code** | **AWRL** | **LOQ** | **LOQ Check Sample %Rec** | **Precision (RPD) of LCS/LCSD)** | **Bias %Rec. of LCS** | **Lab** |
| ALKALINITY, TOTAL (MG/L AS CACO3) | mg/L | water | SM2320B | 00410 | 20 | 10 | NA | 20 | NA | SARA REL |
| RESIDUE, TOTAL NONFILTRABLE (MG/L) | mg/L | water | SM2540D | 00530 | 5 | 1 | NA | NA | NA | SARA REL |
| NITROGEN, AMMONIA, TOTAL (MG/L AS N) | mg/L | water | SM4500-NH3 D | 00610 | 0.1 | 0.1 | 70-130 | 20 | 80-120 | SARA REL |
| NITRITE NITROGEN, TOTAL (MG/L AS N) | mg/L | water | EPA 300.0 Rev. 2.1 (1993) | 00615 | 0.05 | 0.05 | 70-130 | 20 | 80-120 | SARA REL |
| NITRATE NITROGEN, TOTAL (MG/L AS N) | mg/L | water | EPA 300.0 Rev. 2.1 (1993) | 00620 | 0.05 | 0.05 | 70-130 | 20 | 80-120 | SARA REL |
| NITROGEN, KJELDAHL, TOTAL (MG/L AS N) | mg/L | water | EPA 351.2 | 00625 | 0.2 | 0.2 | 70-130 | 20 | 80-120 | SARA REL |
| PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P) | mg/L | water | EPA365.3 | 00665 | 0.06 | 0.02 | 70-130 | 20 | 80-120 | SARA REL |
| CARBON, TOTAL ORGANIC, NPOC (TOC), MG/L | mg/L | water | SM5310 C | 00680 | 2 | 1.0 | NA | NA | NA | SARA REL |
| CHLORIDE (MG/L AS CL) | mg/L | water | EPA 300.0 Rev. 2.1 (1993) | 00940 | 5 | 5 | 70-130 | 20 | 80-120 | SARA REL |
| SULFATE (MG/L AS SO4) | mg/L | water | EPA 300.0 Rev. 2.1 (1993) | 00945 | 5 | 5 | 70-130 | 20 | 80-120 | SARA REL |
| CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH | µg/L | water | SM10200-H | 32211 | 3 | 1 | NA | 20 | 80-120 | SARA REL |
| PHEOPHYTIN-A UG/L SPECTROPHOTOMETRIC ACID METH | µg/L | water | SM10200-H | 32218 | 3 | 1 | NA | NA | NA | SARA REL |
| RESIDUE, TOTAL FILTRABLE (DRIED AT 180C) (MG/L) | mg/L | water | SM2540C | 70300 | 10 | 10 | NA | NA | NA | SARA REL |
| TURBIDITY, LAB NEPHELOMETRIC TURBIDITY UNITS, NTU | NTU | water | EPA 180.1 | 82079 | 0.5 | 0.5 | NA | NA | NA | SARA REL |
| United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020 | | | | | | | | | | |
| American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.) | | | | | | | | | | |
| TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415). | | | | | | | | | | |

**TABLE A7.3 Measurement Performance Specifications for the Nueces River Authority and BCRAGD**

**Field Parameters**

| Parameter | Units | Matrix | Method | Parameter Code | AWRL | LOQ | LOQ Check Sample %Rec | Precision (RPD) of LCS/LCSD) | Bias %Rec. of LCS | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| TEMPERATURE, WATER (DEGREES CENTIGRADE) | DEG C | water | SM 2550 B and TCEQ SOP V1 | 00010 | NA | NA | NA | NA | NA | Field |
| AIR TEMPERATURE | DEG C | air | TCEQ SOP | 00020 | NA | NA | NA | NA | NA | Field |
| TRANSPARENCY, SECCHI DISC (METERS) | meters | water | TCEQ SOP V1 | 00078 | NA | NA | NA | NA | NA | Field |
| SPECIFIC CONDUCTANCE, FIELD (US/CM @ 25C) | µs/cm | water | EPA 120.1 and TCEQ SOP, V1 | 00094 | NA | NA | NA | NA | NA | Field |
| OXYGEN, DISSOLVED (MG/L) | mg/L | water | SM 4500-O G and TCEQ SOP V1 | 00300 | NA | NA | NA | NA | NA | Field |
| PH (STANDARD UNITS) | s.u. | water | EPA 150.1 and TCEQ SOP V1 | 00400 | NA | NA | NA | NA | NA | Field |
| SALINITY - PARTS PER THOUSAND | ppt | water | SM 2520 and TCEQ SOP V1 | 00480 | NA | NA | NA | NA | NA | Field |
| DAYS SINCE PRECIPITATION EVENT (DAYS) | days | other | TCEQ SOP V1 | 72053 | NA | NA | NA | NA | NA | Field |
| DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE | meters | water | TCEQ SOP V2 | 82903 | NA | NA | NA | NA | NA | Field |
| RESERVOIR STAGE (FEET ABOVE MEAN SEA LEVEL) † | FT ABOVE MSL | water | TWDB | 00052 | NA | NA | NA | NA | NA | Field |
| RESERVOIR PERCENT FULL† | % RESERVOIR CAPACITY | water | TWDB | 00053 | NA | NA | NA | NA | NA | Field |
| RESERVOIR ACCESS NOT POSSIBLE LEVEL TOO LOW ENTER 1 IF REPORTING | NS | other | TCEQ Drought Guidance | 00051 | NA | NA | NA | NA | NA | Field |
| MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)* | meters | other | TCEQ SOP V2 | 89864 | NA | NA | NA | NA | NA | Field |
| MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)* | meters | other | TCEQ SOP V2 | 89865 | NA | NA | NA | NA | NA | Field |
| POOL LENGTH, METERS* | meters | other | TCEQ SOP V2 | 89869 | NA | NA | NA | NA | NA | Field |
| % POOL COVERAGE IN 500 METER REACH* | % | other | TCEQ SOP V2 | 89870 | NA | NA | NA | NA | NA | Field |
| WIND INTENSITY (1=CALM,2=SLIGHT, 3=MOD.,4=STRONG) | NU | other | NA | 89965 | NA | NA | NA | NA | NA | Field |

**TABLE A7.3 (continued) Measurement Performance Specifications for the Nueces River Authority and BCRAGD**

**Field Parameters**

| Parameter | Units | Matrix | Method | Parameter Code | AWRL | LOQ | LOQ Check Sample %Rec | Precision (RPD) of LCS/LCSD) | Bias %Rec. of LCS | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| PRESENT WEATHER (1=CLEAR,2=PTCLDY, 3=CLDY,4=RAIN,5=OTHER) | NU | other | NA | 89966 | NA | NA | NA | NA | NA | Field |
| WATER SURFACE (1=CALM,2=RIPPLE, 3=WAVE,4=WHITECAP) | NU | water | NA | 89968 | NA | NA | NA | NA | NA | Field |
| WATER COLOR (1=BROWN,2=REDDISH, 3=GREEN, 4=BLACK, 5=CLEAR,6=OTHER) | NU | water | TCEQ SOP | 89969 | NA | NA | NA | NA | NA | Field |
| WATER ODOR (1=SEWAGE, 2=OILY/CHEMICAL, 3=ROTTEN EGGS, 4=MUSKY,5=FISHY, 6=NONE, 7=OTHER) | NU | water | TCEQ SOP | 98871 | NA | NA | NA | NA | NA | Field |
| TIDE STAGE (1=LOW,2=FALLING, 3=SLACK,4=RISING,5=HIGH) | NU | water | NA | 89972 | NA | NA | NA | NA | NA | Field |
| RAINFALL IN 1 DAY INCLUSIVE PRIOR TO SAMPLE (IN) | inches | other | TCEQ SOP | 82553 | NA | NA | NA | NA | NA | Field |
| RAINFALL IN 7 DAY INCLUSIVE PRIOR TO SAMPLE (IN) | inches | other | TCEQ SOP | 82554 | NA | NA | NA | NA | NA | Field |
| TURBIDITY (1=LOW,2=MEDIUM, 3=HIGH) | NU | water | TCEQ SOP | 88842 | NA | NA | NA | NA | NA | Field |
| WIND DIRECTION (1=NORTH,2=SOUTH, 3=EAST, 4=WEST, 5=NORTHEAST, 6=SOUTHEAST, 7=NORTHWEST, 8=SOUTHWEST) | NU | other | NA | 89010 | NA | NA | NA | NA | NA | Field |

* To be routinely reported when collecting data from perennial pools.

† As published by the Texas Water Development Board on their website http://wiid.twdb.state.tx.us/ims/resinfo/BushButton/lakestatus.asp?selcat=3&slbasin=2

References:


United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020

American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)

TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).

TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416)

| TABLE A7.4 Measurement Performance Specifications for the Nueces River Authority | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 24 Hour Parameters in Water | | | | | | | | | | |
| Parameter | Units | Matrix | Method | Parameter Code | AWRL | LOQ | LOQ Check Sample %Rec | Precision (RPD) of LCS/LCSD) | Bias %Rec. of LCS | Lab |
| TEMPERATURE, WATER (DEGREES CENTIGRADE), 24HR AVG | DEG C | water | TCEQ SOP V1 | 00209 | NA | NA | NA | NA | NA | Field |
| WATER TEMPERATURE, (DEGREES CENTIGRADE), 24HR MAX | DEG C | water | TCEQ SOP V1 | 00210 | NA | NA | NA | NA | NA | Field |
| TEMPERATURE, WATER (DEGREES CENTIGRADE) 24HR MIN | DEG C | water | TCEQ SOP V1 | 00211 | NA | NA | NA | NA | NA | Field |
| SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR AVG | µS/cm | water | TCEQ SOP V1 | 00212 | NA | NA | NA | NA | NA | Field |
| SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR MAX | µS/cm | water | TCEQ SOP V1 | 00213 | NA | NA | NA | NA | NA | Field |
| SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR MIN | µS/cm | water | TCEQ SOP V1 | 00214 | NA | NA | NA | NA | NA | Field |
| PH, S.U., 24HR MAXIMUM VALUE | s.u. | water | TCEQ SOP V1 | 00215 | NA | NA | NA | NA | NA | Field |
| PH, S.U., 24HR, MINIMUM VALUE | s.u. | water | TCEQ SOP V1 | 00216 | NA | NA | NA | NA | NA | Field |
| SALINITY, 24-HR, MAXIMUM, PPT | ppt | water | TCEQ SOP V1 | 00217 | NA | NA | NA | NA | NA | Field |
| SALINITY, 24-HR, AVERAGE, PPT | ppt | water | TCEQ SOP V1 | 00218 | NA | NA | NA | NA | NA | Field |
| SALINITY, 24-HR, MINIMUM, PPT | ppt | water | TCEQ SOP V1 | 00219 | NA | NA | NA | NA | NA | Field |
| SALINITY, # OF MEASUREMENTS IN 24-HRS | NU | water | TCEQ SOP V1 | 00220 | NA | NA | NA | NA | NA | Field |
| WATER TEMPERATURE, # OF MEASUREMENTS IN 24-HRS | NU | water | TCEQ SOP V1 | 00221 | NA | NA | NA | NA | NA | Field |
| SPECIFIC CONDUCTANCE, # OF MEASUREMENTS IN 24-HRS | NU | water | TCEQ SOP V1 | 00222 | NA | NA | NA | NA | NA | Field |
| pH, # OF MEASUREMENTS IN 24-HRS | NU | water | TCEQ SOP V1 | 00223 | NA | NA | NA | NA | NA | Field |
| DISSOLVED OXYGEN, 24-HOUR MIN. (MG/L) MIN. 4 MEA | mg/l | water | TCEQ SOP V1 | 89855 | NA | NA | NA | NA | NA | Field |
| DISSOLVED OXYGEN, 24-HOUR MAX. (MG/L) MIN. 4 MEA | mg/l | water | TCEQ SOP V1 | 89856 | NA | NA | NA | NA | NA | Field |

| TABLE A7.4 (continued) Measurement Performance Specifications for the Nueces River Authority | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **24 Hour Parameters in Water** | | | | | | | | | | |
| **Parameter** | **Units** | **Matrix** | **Method** | **Parameter Code** | **AWRL** | **LOQ** | **LOQ Check Sample %Rec** | **Precision (RPD) of LCS/LCSD)** | **Bias %Rec. of LCS** | **Lab** |
| DISSOLVED OXYGEN, 24-HOUR AVG. (MG/L) MIN. 4 MEA | mg/l | water | TCEQ SOP V1 | 89857 | NA | NA | NA | NA | NA | Field |
| DISSOLVED OXYGEN, # OF MEASUREMENTS IN 24-HRS | NU | water | TCEQ SOP V1 | 89858 | NA | NA | NA | NA | NA | Field |
| References: | | | | | | | | | | |
| United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020 | | | | | | | | | | |
| American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.) | | | | | | | | | | |
| TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415). | | | | | | | | | | |
| TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416) | | | | | | | | | | |

| TABLE A7.5 Measurement Performance Specifications for the Nueces River Authority | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Bacteriological Parameters in Water** | | | | | | | | | | |
| **Parameter** | **Units** | **Matrix** | **Method** | **Parameter Code** | **AWRL** | **LOQ** | **LOQ Check Sample %Rec** | **Precision (RPD) of LCS/LCSD)** | **Bias %Rec. of LCS** | **Lab** |
| E. COLI, COLILERT, IDEXX METHOD, MPN/100ML | MPN/ 100 mL | water | SM 9223-B* | 31699 | 1 | 1 | NA | 0.50 | NA | WUL |
| ENTEROCOCCI, ENTEROLERT, IDEXX, (MPN/100 ML) | MPN/ 100 mL | water | Enterolert ** | 31701 | 1 | 1 | NA | 0.50 | NA | WUL |
| E.COLI, COLILERT, IDEXX, HOLDING TIME | hours | water | NA | 31704 | NA | NA | NA | NA | NA | WUL |
| * E.coli samples analyzed by SM 9223-B should be processed within 8 hours when possible. When transport conditions necessitate delays in delivery longer than 6 hours, the holding time may be extended and samples must be processed as soon as possible and within 30 hours. | | | | | | | | | | |
| **Enterococcus Samples should be diluted 1:10 for all waters. | | | | | | | | | | |
| References: | | | | | | | | | | |
| United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020 | | | | | | | | | | |
| American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.) | | | | | | | | | | |
| TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415). | | | | | | | | | | |
| TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416) monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416) | | | | | | | | | | |

| TABLE A7.6 Measurement Performance Specifications for BCRAGD | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Bacteriological Parameters in Water** | | | | | | | | | | |
| **Parameter** | **Units** | **Matrix** | **Method** | **Parameter Code** | **AWRL** | **LOQ** | **LOQ Check Sample %Rec** | **Precision (RPD) of LCS/LCSD)** | **Bias %Rec. of LCS** | **Lab** |
| E. COLI, COLILERT, IDEXX METHOD, MPN/100ML | MPN/ 100 mL | water | SM 9223-B* | 31699 | 1 | 1 | NA | 0.50 | NA | SARA REL |
| E.COLI, COLILERT, IDEXX, HOLDING TIME | hours | water | NA | 31704 | NA | NA | NA | NA | NA | SARA REL |
| * E.coli samples analyzed by SM 9223-B should be processed within 8 hours when possible. When transport conditions necessitate delays in delivery longer than 6 hours, the holding time may be extended and samples must be processed as soon as possible and within 30 hours. | | | | | | | | | | |
| References: | | | | | | | | | | |
| United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020 | | | | | | | | | | |
| American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.) | | | | | | | | | | |
| TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415). | | | | | | | | | | |
| TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416) monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416) | | | | | | | | | | |

| TABLE A7.7 Measurement Performance Specifications for the Nueces River Authority and BCRAGD | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Flow Parameters** | | | | | | | | | | |
| **Parameter** | **Units** | **Matrix** | **Method** | **Parameter Code** | **AWRL** | **LOQ** | **LOQ Check Sample %Rec** | **Precision (RPD) of LCS/LCSD)** | **Bias %Rec. of LCS** | **Lab** |
| STREAM FLOW, INSTANTANEOUS (CUBIC FEET PER SEC) | cfs | water | TCEQ SOP V1 | 00061 | NA | NA | NA | NA | NA | Field |
| FLOW SEVERITY (1=No Flow,2=Low, 3=Normal,4=Flood,5=High,6=Dry | NU | water | TCEQ SOP V1 | 01351 | NA | NA | NA | NA | NA | Field |
| STREAM FLOW ESTIMATE (CFS) | cfs | water | TCEQ SOP V1 | 74069 | NA | NA | NA | NA | NA | Field |
| FLOW METHOD (1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER | NU | water | TCEQ SOP V1 | 89835 | NA | NA | NA | NA | NA | Field |
| References: | | | | | | | | | | |
| United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020 | | | | | | | | | | |
| American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.) | | | | | | | | | | |
| TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415). | | | | | | | | | | |
| TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416) | | | | | | | | | | |

| TABLE A7.8 Measurement Performance Specifications for the Nueces River Authority | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Metals in Water (Dissolved) | | | | | | | | | | |
| Parameter | Units | Matrix | Method | Parameter Code | TCEQ AWRL | LOQ | LOQ Check Sample %Rec | Precision (RPD) of LCS/LCSD) | Bias %Rec. of LCS | Lab |
| ALUMINUM, DISSOLVED (UG/L AS AL) | µg/L | water | EPA 200.7 Rev 4.4 (1994) | 01106 | 200 | 50 | 70-130 | 20 | 80-120 | LCRA ELS |
| ARSENIC, DISSOLVED (UG/L AS AS) | µg/L | water | EPA 200.8 | 01000 | 5 | 2 | 70-130 | 20 | 80-120 | LCRA ELS |
| BARIUM, DISSOLVED (UG/L AS BA) | µg/L | water | EPA 200.8 | 01005 | 1000 | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| BERYLLIUM, DISSOLVED (UG/L AS BE) | µg/L | water | EPA 200.8 | 01010 | 2 | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| CALCIUM, DISSOLVED (MG/L AS CA) | mg/L | water | EPA 200.7 | 00915 | NA | 0.2 | 70-130 | 20 | 80-120 | LCRA ELS |
| CADMIUM, DISSOLVED (UG AS CD) | µg/L | water | EPA 200.7_8 Rev 5.4 (1998) | 01025 | 0.1 for waters <50mg/L hardness ------- 0.3 for waters >50mg/L hardness | 0.1 | 70-130 | 20 | 80-120 | Energy Lab |
| CHROMIUM, DISSOLVED (UG/L AS CR) | µg/L | water | EPA 200.8 Rev 5.4 (1998) | 01030 | 10 | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| COBALT, DISSOLVED (UG/L AS CO) | µg/L | water | EPA 200.8 | 01035 | NA | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| COPPER, DISSOLVED (UG/L AS CU) | µg/L | water | EPA 200.8 Rev 5.4 (1998) | 01040 | 1 for waters <50mg/L hardness ------- 3 for waters >50mg/L hardness | 1.0 | 70-130 | 20 | 80-120 | LCRA ELS |
| IRON, DISSOLVED (UG/L) | µg/L | water | EPA 200.7 | 01046 | NA | 50 | 70-130 | 20 | 80-120 | LCRA ELS |
| MERCURY DISSOLVED, IN WATER (UG/L) | µg/L | water | EPA 245.1 | 71890 | NA | 0.2 | 70-130 | 20 | 80-120 | LCRA ELS |
| MOLYBDENUM, DISSOLVED (UG/L AS MO) | µg/L | water | EPA 200.8 | 01060 | NA | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| NICKEL, DISSOLVED (UG/L AS NI) | µg/L | water | EPA 200.8 Rev 5.4 (1998) | 01065 | 10 | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| POTASSIUM, DISSOLVED (MG/L AS K) | mg/L | water | EPA 200.7 | 00935 | NA | 0.2 | 70-130 | 20 | 80-120 | LCRA ELS |

| Metals in Water (Dissolved) continued | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Units** | **Matrix** | **Method** | **Parameter Code** | **TCEQ AWRL** | **LOQ** | **LOQ Check Sample %Rec** | **Precision (RPD) of LCS/LCSD)** | **Bias %Rec. of LCS** | **Lab** |
| SELENIUM, DISSOLVED (UG/L AS SE) | µg/L | water | EPA 200.8 | 01145 | NA | 2 | 70-130 | 20 | 80-120 | LCRA ELS |
| SILVER, DISSOLVED (UG/L AS AG) | µg/L | water | EPA 200.8 Rev 5.4 (1998) | 01075 | 0.5 | 0.5 | 70-130 | 20 | 80-120 | LCRA ELS |
| SODIUM, DISSOLVED (MG/L AS NA) | mg/L | water | EPA 200.7 | 00930 | NA | 0.2 | 70-130 | 20 | 80-120 | LCRA ELS |
| STRONTIUM, DISSOLVED, (UG/L AS SR) | µg/L | water | EPA 200.7 | 01080 | NA | 10 | 70-130 | 20 | 80-120 | LCRA ELS |
| THALLIUM, DISSOLVED (UG/L AS TL) | µg/L | water | EPA 200.8 | 01057 | 1 | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| TITANIUM, DISSOLVED, (UG/L AS TI) | µg/L | water | EPA 200.8 | 01150 | NA | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| VANADIUM, DISSOLVED (UG/L AS V) | µg/L | water | EPA 200.8 | 01085 | NA | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| ZINC, DISSOLVED (UG/L AS ZN) | µg/L | water | EPA 200.8 Rev 5.4 (1998) | 01090 | 5 | 5 | 70-130 | 20 | 80-120 | LCRA ELS |
| **Metals in Water (Total)** | | | | | | | | | | |
| HARDNESS, TOTAL (MG/L AS $CACO_3$) * | mg/L | water | SM 2340 B | 00900 | 5 | 1.32 | NA | 20 | 80-120 | LCRA ELS |
| ANTIMONY, TOTAL (UG/L AS SB) | µg/L | water | EPA 200.8 | 01097 | NA | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| BARIUM, TOTAL (UG/L AS BA) | µg/L | water | EPA 200.8 | 01007 | NA | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| BERYLLIUM, TOTAL (UG/L AS BE) | µg/L | water | EPA 200.8 | 01012 | NA | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| CALCIUM, TOTAL (MG/L AS CA) | mg/L | water | EPA 200.7 | 00916 | 0.5 | 0.2 | 70-130 | 20 | 80-120 | LCRA ELS |
| CHROMIUM, TOTAL (UG/L AS CR) | µg/L | water | EPA 200.8 | 01034 | NA | 2 | 70-130 | 20 | 80-120 | LCRA ELS |
| COBALT, TOTAL (UG/L AS CO) | µg/L | water | EPA 200.8 | 01037 | NA | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| COPPER, TOTAL (UG/L AS CU) | µg/L | water | EPA 200.8 | 01042 | NA | 2 | 70-130 | 20 | 80-120 | LCRA ELS |
| IRON, TOTAL (UG/L AS FE) | µg/L | water | EPA 200.7 | 01045 | 300 | 50 | 70-130 | 20 | 80-120 | LCRA ELS |
| MAGNESIUM, TOTAL (MG/L AS MG) | mg/L | water | EPA 200.7 | 00927 | 0.5 | 0.2 | 70-130 | 20 | 80-120 | LCRA ELS |
| MANGANESE, TOTAL (UG/L AS MN) | µg/L | water | EPA 200.8 | 01055 | 50 | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| MERCURY, TOTAL, WATER | µg/L | water | EPA 245.1 | 71900 | 0.006 | 0.2 | 70-130 | 20 | 80-120 | Energy Lab |
| MOLYBDENUM, TOTAL (UG/L AS MO) | µg/L | water | EPA 200.8 | 01062 | NA | 50 | 70-130 | 20 | 80-120 | LCRA ELS |

| Metals in Water (Total) continued | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Units** | **Matrix** | **Method** | **Parameter Code** | **TCEQ AWRL** | **LOQ** | **LOQ Check Sample %Rec** | **Precision (RPD) of LCS/LCSD)** | **Bias %Rec. of LCS** | **Lab** |
| NICKEL, TOTAL (UG/L AS NI) | µg/L | water | EPA 200.8 | 01067 | NA | 2 | 70-130 | 20 | 80-120 | LCRA ELS |
| POTASSIUM, TOTAL (MG/L AS K) | mg/L | water | EPA 200.7 | 00937 | NA | 2 | 70-130 | 20 | 80-120 | LCRA ELS |
| SELENIUM, TOTAL (UG/L AS SE) | µg/L | water | EPA 200.8 Rev 5.4 (1998) | 01147 | 2 | 2 | 70-130 | 20 | 80-120 | LCRA ELS |
| SILVER, TOTAL (UG/L AS AG) | µg/L | water | EPA 200.8 | 01077 | NA | 0.5 | 70-130 | 20 | 80-120 | LCRA ELS |
| SODIUM, TOTAL (MG/L AS NA) | mg/L | water | EPA 200.7 | 00929 | NA | 0.2 | 70-130 | 20 | 80-120 | LCRA ELS |
| THALLIUM, TOTAL (UG/L AT TL) | µg/L | water | EPA 200.8 | 01059 | NA | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| TIN, TOTAL, (UG/L AS SN) | µg/L | water | EPA 200.7 | 01102 | NA | 50 | 70-130 | 20 | 80-120 | LCRA ELS |
| TITANIUM, TOTAL, (UG/L AS TI) | µg/L | water | EPA 200.8 | 01152 | NA | 1 | 70-130 | 20 | 80-120 | LCRA ELS |
| ZINC, TOTAL (UG/L AS ZN) | µg/L | water | EPA 200.8 | 01092 | NA | 10 | 70-130 | 20 | 80-120 | LCRA ELS |

*Hardness is not used for regulatory purposes but is used to assess metals in water at inland sites (estuarine sites do not require hardness analysis).
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

# Appendix B: Task 3

# Work Plan & Sampling Process Design and Monitoring Schedule (Plan)

# TASK 3: WATER QUALITY MONITORING

**Objectives:** Water quality monitoring will focus on the characterization of a variety of locations and conditions. This will include a combination of the following:

- planning and coordinating basin-wide monitoring;
- routine, regularly scheduled monitoring to collect long-term information and support statewide assessment of water quality; and
- systematic, regularly scheduled short-term monitoring to screen water bodies for issues.

**Task Description:** The Performing Party, working closely with TCEQ, conducts watershed monitoring to identify and evaluate surface water quality issues and to establish priorities for corrective action. Under this program, the Performing Party is responsible for the San Antonio – Nueces Coastal Basin, the Nueces River Basin, the Nueces – Rio Grande Coastal Basin, and the adjacent bays and estuaries.

The Performing Party will complete the following subtasks:

***Monitoring Description*** – In FY 2022, the Performing Party will monitor a minimum of 9 bay and tidal sites quarterly for conventional, bacteria, and field parameters. The performing party will also monitor 2 bay and tidal locations on a semi-annual basis for conventional, bacteria, and field parameters. One quarterly bay and tidal station will have semi-annual metals monitoring. The performing party will monitor a minimum of 33 river and lake sites quarterly for conventional, bacteria, flow (where applicable), and field parameters. The performing party will also monitor 2 river locations on a quarterly basis for chlorophyll-*a*, TDS, bacteria, and field parameters. Metals in water monitoring will be performed at 2 river sites on a semi-annual basis. The performing party will also monitor one river site for bacteria and field parameters only and one river site for field parameters only. The Performing Party will also conduct 24- hour dissolved oxygen monitoring at three sites given sufficient water.

In FY 2023, the Performing Party will monitor at a similar level of effort as in FY 2022. The actual number of sites, location, frequency, and parameters collected for FY 2023 will be based on priorities identified at the Basin Steering Committee and Coordinated Monitoring meetings and included in the amended Appendix B schedule of the QAPP.

All monitoring will be completed in accordance with the Performing Party QAPP, the TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods (RG-415) and the TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data (RG-416).

**Coordinated Monitoring Meeting -** The Performing Party will hold an annual coordinated monitoring meeting as described in the FY2022-2023 CRP Guidance. Qualified monitoring organizations will be invited to attend the working meeting in which monitoring needs and purposes will be discussed segment by segment and station by station. Information from participants and stakeholders will be used to select stations and parameters that will enhance overall water quality monitoring coverage, eliminate duplication of effort, and address basin priorities. A summary of the changes to the monitoring schedule will be provided to the participants within two weeks of the meeting. Changes to the monitoring schedule will be entered into the statewide Coordinated Monitoring Schedule (http://cms.lcra.org) and communicated to meeting attendees. Changes to monitoring schedules that occur during the year will be entered into the Coordinated Monitoring Schedule and communicated to meeting attendees. All requirements related to meetings will be followed and required meetings will be conducted in-person or via TCEQ approved virtual format.

**Monitoring Activities Report -** Each Progress Report will include all types of monitoring and indicate the number of sampling events and the types of monitoring conducted in the month.

## Deliverables and Dues Dates:

### *September 1, 2021 through August 31, 2022*

A. Conduct water quality monitoring, summarize activities, and submit with Progress Report -– October 15, 2021; November 15, 2021; December 15, 2021; January 15, 2022; February 15, 2022; March 15, 2022; June 15,2022; July 15,2022
B. Coordinated Monitoring Meeting - between March 15 and April 30,2022
C. Coordinated Monitoring Meeting Summary of Changes - within 2 weeks of the meeting
D. Email notification that Coordinated Monitoring Schedule updates are complete - May 31, 2022

### *September 1, 2022 through August 31, 2023*

A. Progress Reports - September 15, 2022; October 15, 2022, November 15,2022; December 15, 2022; January 15, 2023; February 15, 2023; March 15, 2023; April 15, 2023; May 15 2023; June 15, 2023; July 15, 2023 and August 31, 2023
B. Coordinated Monitoring Meeting - between March 15 and April 30,2023
C. Coordinated Monitoring Meeting Summary of Changes – within 2 weeks of the meeting
D. Email notification that Coordinated Monitoring Schedule updates are complete - May 31, 2023

## Appendix B Sampling Process Design and Monitoring Schedule (plan)

### *Sample Design Rationale FY 2022*

The sample design is based on the legislative intent of CRP. Under the legislation, the Basin Planning Agencies have been tasked with providing data to characterize water quality conditions in support of the Texas Water Quality Integrated Report, and to identify significant long-term water quality trends. Based on Steering Committee input, achievable water quality objectives and priorities and the identification of water quality issues are used to develop work plans which are in accord with available resources. As part of the Steering Committee process, the Nueces River Authority coordinates closely with the TCEQ and other participants to ensure a comprehensive water monitoring strategy within the watershed.

Segment 2104 – One quarterly monitoring station located on the Nueces River at FM 1042 (Station Id 12972) will have metals in water monitoring removed due to funding constraints.

Segment 2107/2118 - One quarterly monitoring station located on the Atascosa River at FM 99 (Station Id 12980) will have metals in water monitoring reduced from a quarterly basis to a twice per year basis.

Segment 2108 - One quarterly monitoring station located on the San Miguel Creek at SH 16 (Station Id 12983) will have metals in water monitoring reduced from a quarterly basis to a twice per year basis.

Segment 2111 – A new quarterly monitoring station (Station Id 22306) located on the Upper Sabinal River at FM 187 downstream of Lost Maples was added and will be monitored by BCRAGD.

Segment 2116 - One quarterly monitoring station located on the Choke Canyon Reservoir at FM 99 (Station Id 17389) will have metals in water monitoring removed due to budget constraints.

Segment 2117 - One quarterly monitoring station located on the Frio River at SH 16 (Station Id 13023) will have metals in water monitoring removed due to budget constraints.

Segment 2472 - One quarterly monitoring station located on Port Bay at SH 188 (Station Id 13405) will have metals in water monitoring removed due to budget constraints.

Segment 2483 - One quarterly monitoring station located on Conn Brown Harbor (Station Id 18848) will have metals in water monitoring removed due to budget constraints.

## *Site Selection Criteria*

This data collection effort involves monitoring routine water quality using procedures that are consistent with the TCEQ SWQM program. Some general guidelines are followed when selecting sampling sites, as outlined below, and discussed thoroughly in SWQM Procedures, Volumes I and II. Overall consideration is given to accessibility and safety. All monitoring activities have been developed in coordination with the CRP Steering Committee and with the TCEQ. The site selection criteria specified are those the TCEQ would like considered to produce data which is complementary to that collected by the state and which may be used in assessments, etc.

1. Locate stream sites so that samples can be safely collected from the centroid of flow. Centroid is defined as the midpoint of that portion of stream width which contains 50 percent of the total flow. If multiple potential sites on a stream segment are appropriate for monitoring, choose one that would best represent the water body, and not a site that displays unusual conditions or contaminant source(s). Avoid backwater areas or eddies when selecting a stream site.
2. At a minimum for reservoirs, locate sites near the dam (reservoirs) and in the major arms. Larger reservoirs might also include stations in the middle and upper (riverine) areas. Select sites that best represent the water body by avoiding coves and back water areas. A single monitoring site is considered representative of 25 percent of the total reservoir acres, but not more than 5,120 acres.
3. Monitoring sites are selected to maximize stream coverage or basin coverage. Very long segments may require more stations. As a rule of thumb, stream segments between 25 and 50 miles long require two stations, and longer than 50 miles require three or more depending on the existence of areas with significantly different sources of contamination or potential water quality concerns. Major hydrological features, such as the confluence of a major tributary or an instream dam, may also limit the spatial extent of an assessment based on one station.
4. Because historical water quality data can be very useful in assessing use attainment or impairment, it may be best to use sites that are on current or past monitoring schedules.
5. All classified segments (including reservoirs) should have at least one Monitoring site that adequately characterizes the water body, and monitoring should be coordinated with the TCEQ or other qualified monitoring entities reporting routine data to TCEQ.
6. Monitoring sites may be selected to bracket sources of pollution, influence of tributaries, changes in land uses, and hydrological modifications.
7. Sites should be accessible. When possible, stream sites should have a USGS or IBWC stream flow gauge. If not, it should be possible to conduct flow measurement during routine visits.

## *Monitoring Sites for FY 2022*

## *Table B1.1 Sample Design and Schedule, FY 2022*

| Basin 20 | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Site Description* | *Staion ID* | *Waterbody ID* | *Reg* | *SE* | *CE* | *MT* | *24 hr DO* | *AqHab* | *Benthics* | *Nekton* | *Metal Water* | *Organic Water* | *Metal Sed* | *Organic Sed* | *Conv* | *Amb Tox Water* | *Amb Tox Sed* | *Bacteria* | *Flow* | *Fish Tissue* | *Field* | *Comments* |
| MISSION RIVER TIDAL NEAR SOUTH BANK IMMEDIATELY DOWNSTREAM OF THE FM 2678 BRIDGE BETWEEN REFUGIO AND BAYSIDE | 12943 | 2001 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |
| MISSION RIVER IMMEDIATELY UPSTREAM OF US 77 BRIDGE AT REFUGIO | 12944 | 2002 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| CHILTIPIN CREEK MID CHANNEL AT UNNAMED BRIDGE POSSIBLY AKA PLYMOUTH ROAD 2.11 KM DOWNSTREAM OF N END FM 631 NE OF SINTON | 12930 | 2003A | 14 | NR | NR | RT | | | | | 2 | | | | 4 | | | 4 | | | 4 | |
| ARANSAS RIVER TIDAL AT BOAT RAMP ON FM 629 TERMINUS SOUTH OF BONNIE VIEW | 12947 | 2003 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |
| ARANSAS RIVER AT COUNTY ROAD EAST OF SKIDMORE | 12952 | 2004 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |

| Basin 20 - Continued | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Site Description* | *Staion ID* | *Waterbody ID* | *Reg* | *SE* | *CE* | *MT* | *24 hr DO* | *AqHab* | *Benthics* | *Nekton* | *Metal Water* | *Organic Water* | *Metal Sed* | *Organic Sed* | *Conv* | *Amb Tox Water* | *Amb Tox Sed* | *Bacteria* | *Flow* | *Fish Tissue* | *Field* | *Comments* |
| ARANSAS CREEK AT US 181 NORTH OF SKIDMORE IN BEE COUNTY | 12941 | 2004A | 14 | NR | NR | RT | | | | | | | | | | | | 4 | 4 | | 4 | |
| POESTA CREEK, 77 M DOWNSTREAM OF SH 202 | 12937 | 2004B | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| Basin 21 | | | | | | | | | | | | | | | | | | | | | | |
| NUECES RIVER AT BLUNTZER BRIDGE ON FM 666 | 12964 | 2102 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| NUECES RIVER AT LA FRUTA BRIDGE ON SH 359 | 12965 | 2102 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | TDS, Chlorophyll-*a*/Pheophytin only |
| NUECES RIVER BELOW LAKE CORPUS CHRISTI AT HAZEL BAZEMORE PARK BOAT RAMP 4.5 KM UPSTREAM OF I-37 | 20936 | 2102 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |

| Basin 21 - Continued | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Site Description* | *Staion ID* | *Waterbody ID* | *Reg* | *SE* | *CE* | *MT* | *24 hr DO* | *AqHab* | *Benthics* | *Nekton* | *Metal Water* | *Organic Water* | *Metal Sed* | *Organic Sed* | *Conv* | *Amb Tox Water* | *Amb Tox Sed* | *Bacteria* | *Flow* | *Fish Tissue* | *Field* | *Comments* |
| NUECES RIVER IMMEDIATELY UPSTREAM OF THE SALTWATER BARRIER DAM AT LABONTE PARK | 21815 | 2102 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | TDS, Chlorophyll-*a*/Pheophytin only |
| LAKE CORPUS CHRISTI MID-LAKE AT THE DAM 380 M NNW OF NORTHERN TIP OF DAM USGS SITE | 12967 | 2103 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |
| LAKE CORPUS CHRISTI APPROX. 0.2 MI OFF WESTERN SHORE DIRECTLY WEST OF HIDEAWAY HILL | 17384 | 2103 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |
| NUECES RIVER AT LIVE OAK CR 151 NEAR RIVER CREEK ACRES UPSTREAM OF LAKE CORPUS CHRISTI | 17648 | 2103 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| NUECES RIVER AT FM 1042 BRIDGE 1.2 MILES NORTH OF SIMMONS | 12972 | 2104 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| NUECES RIVER AT SH 16 SOUTH OF TILDEN | 12973 | 2104 | 16 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |

| Basin 21 - Continued | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Description | Staion ID | Waterbody ID | Reg | SE | CE | MT | 24 hr DO | AqHab | Benthics | Nekton | Metal Water | Organic Water | Metal Sed | Organic Sed | Conv | Amb Tox Water | Amb Tox Sed | Bacteria | Flow | Fish Tissue | Field | Comments |
| NUECES RIVER AT FM 624 | 12974 | 2104 | 16 | NR | NR | RT | | | | | | | | | | | | | 4 | | 4 | |
| NUECES RIVER BRIDGE ON FM 190 NORTH OF ASHERTON | 12976 | 2105 | 16 | NR | NR | BS | 4 | | | | | | | | | | | | 4 | | 4 | |
| FRIO RIVER AT SH 72 IN THREE RIVERS TX | 12977 | 2106 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| NUECES RIVER BRIDGE ON US 281 SOUTH OF THREE RIVERS | 12979 | 2106 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| ATASCOSA RIVER AT FM 99 BRIDGE WEST OF WHITSETT | 12980 | 2107 | 14 | NR | NR | RT | | | | | 2 | | | | 4 | | | 4 | 4 | | 4 | |
| ATASCOSA RIVER AT FM 541 4.75 KM UPSTREAM OF THE CONFLUENCE WITH LIVEOAK CREEK IN ATASCOSA COUNTY | 20764 | 2107 | 13 | NR | NR | BS | 4 | | | | | | | | | | | | 4 | | 4 | |
| ATASCOSA RIVER AT FM 541 4.75 KM UPSTREAM OF THE CONFLUENCE WITH LIVEOAK CREEK IN ATASCOSA COUNTY | 20764 | 2107 | 13 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |

| Basin 21 - Continued | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Site Description* | *Staion ID* | *Waterbody ID* | *Reg* | *SE* | *CE* | *MT* | *24 hr DO* | *AqHab* | *Benthics* | *Nekton* | *Metal Water* | *Organic Water* | *Metal Sed* | *Organic Sed* | *Conv* | *Amb Tox Water* | *Amb Tox Sed* | *Bacteria* | *Flow* | *Fish Tissue* | *Field* | *Comments* |
| SAN MIGUEL CREEK AT SH 16 NORTH OF TILDEN | 12983 | 2108 | 16 | NR | NR | RT | | | | | 2 | | | | 4 | | | 4 | 4 | | 4 | |
| LEONA RIVER 370 M UPSTREAM OF FM 140 | 18418 | 2109 | 13 | NR | NR | RT | 4 | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| UPPER SABINAL RIVER IMMEDIATELY UPSTREAM OF FM 187 APPROXIMATELY 140 M NORTHEAST OF ENTRANCE OF LOST MAPLES STATE NATURAL AREA | 22306 | 2110 | 13 | NR | BA | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| SABINAL RIVER BRIDGE AT US 90 WEST OF SABINAL | 12993 | 2110 | 13 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| SABINAL RIVER AT FM 187 5.6 MI SOUTH OF VANDERPOOL | 14939 | 2111 | 13 | NR | BA | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| SABINAL RIVER AT RANCH ROAD 187 APPROX 10 KILOMETERS SOUTH OF UTOPIA AND 400 METERS UPSTREAM OF THE CONFLUENCE WITH ONION CREEK | 21948 | 2111 | 13 | NR | BA | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |

| Basin 21 - Continued | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Site Description* | *Staion ID* | *Waterbody ID* | *Reg* | *SE* | *CE* | *MT* | *24 hr DO* | *AqHab* | *Benthics* | *Nekton* | *Metal Water* | *Organic Water* | *Metal Sed* | *Organic Sed* | *Conv* | *Amb Tox Water* | *Amb Tox Sed* | *Bacteria* | *Flow* | *Fish Tissue* | *Field* | *Comments* |
| NUECES RIVER IMMEDIATELY DOWNSTREAM OF SH 55 SOUTHBOUND BRIDGE APPROXIMATELY 2.5 KM SOUTH OF LAGUNA | 16704 | 2112 | 13 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| HONDO CREEK MID CHANNEL IMMEDIATELY DOWNSTREAM OF SH 173 SOUTHEAST OF HONDO | 18408 | 2114 | 13 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |
| COMMISSIONERS CREEK 760 METERS DOWNSTREAM OF THE IMPOUNDMENT AT CAMP OF THE OZARKS APPROXIMATELY 355 METERS SOUTH OF FM 470 NEAR THE CITY OF TARPLEY | 22227 | 2114A | 13 | NR | BA | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| SECO CREEK AT SH 470 APPROXIMATELY 10 MI WEST OF TARPLEY | 13017 | 2115 | 13 | NR | BA | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |

| Basin 21 - Continued | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Site Description* | *Staion ID* | *Waterbody ID* | *Reg* | *SE* | *CE* | *MT* | *24 hr DO* | *AqHab* | *Benthics* | *Nekton* | *Metal Water* | *Organic Water* | *Metal Sed* | *Organic Sed* | *Conv* | *Amb Tox Water* | *Amb Tox Sed* | *Bacteria* | *Flow* | *Fish Tissue* | *Field* | *Comments* |
| CHOKE CANYON RESERVOIR NEAR THE DAM 422 M SOUTH AND 129 M EAST OF SPILLWAY CHANNEL USGS SITE AC | 13019 | 2116 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |
| CHOKE CANYON RESERVOIR MID LAKE 15 M E OF LIVE OAK/MCMULLEN COUNTY LINE NEAR OLD HWY 99 1.25 KM NORTH OF CC STATE PARK POINT | 13020 | 2116 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |
| CHOKE CANYON RESERVOIR APPROX 0.45 KM SOUTHEAST OF FM 99 SOUTHERN MOST BRIDGE CROSSING THE FRIO RIVER ARM | 17389 | 2116 | 16 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |
| FRIO RIVER AT SH 16 IN TILDEN | 13023 | 2117 | 16 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| FRIO RIVER IMMEDIATELY UPSTREAM OF SH 97 NORTH OF FOWLERTON | 18373 | 2117 | 16 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |

| Basin 22 | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Site Description* | *Staion ID* | *Waterbody ID* | *Reg* | *SE* | *CE* | *MT* | *24 hr DO* | *AqHab* | *Benthics* | *Nekton* | *Metal Water* | *Organic Water* | *Metal Sed* | *Organic Sed* | *Conv* | *Amb Tox Water* | *Amb Tox Sed* | *Bacteria* | *Flow* | *Fish Tissue* | *Field* | *Comments* |
| ARROYO COLORADO AT US 77 IN SW HARLINGEN | 13079 | 2202 | 15 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| PETRONILA CREEK AT FM 892 SE OF DRISCOLL | 13094 | 2204 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| PETRONILA CREEK AT FM 665 EAST OF DRISCOLL | 13096 | 2204 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| PETRONILA CREEK 181 METERS WEST AND 6 METERS SOUTH FROM THE INTERSECTION OF ALICE ROAD AND LOST CREEK ROAD | 20806 | 2204 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |

| Basin 24 | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Site Description* | *Staion ID* | *Waterbody ID* | *Reg* | *SE* | *CE* | *MT* | *24 hr DO* | *AqHab* | *Benthics* | *Nekton* | *Metal Water* | *Organic Water* | *Metal Sed* | *Organic Sed* | *Conv* | *Amb Tox Water* | *Amb Tox Sed* | *Bacteria* | *Flow* | *Fish Tissue* | *Field* | *Comments* |
| PORT BAY AT MIDDLE OF SH 188 WEST OF ROCKPORT | 13405 | 2472 | 14 | NR | NR | RT | | | | | | | | | 2 | | | 2 | | | 2 | |
| REDFISH BAY AT SH 361 AT 3RD BRIDGE BETWEEN ARANSAS PASS AND PORT ARANSAS | 13426 | 2483 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |
| CONN BROWN HARBOR MID HARBOR 50 M NORTHEAST OF THE INTERSECTION OF HUFF ST AND EAST MADDOX AVE IN ARANSAS PASS | 18848 | 2483A | 14 | NR | NR | RT | | | | | | | | | 2 | | | 2 | | | 2 | |
| OSO BAY IMMEDIATELY OFFSHHORE AT TIP OF PENINSULA AT PADRE ISLAND DRIVE/SOUTHBOUND AT SH 358 | 13440 | 2485 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |
| OSO BAY 40 M UPSTREAM OF OCEAN DRIVE AND APPROXIMATELY 50 M WEST OF EASTERN LANDFALL OF BRIDG | 13442 | 2485 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |

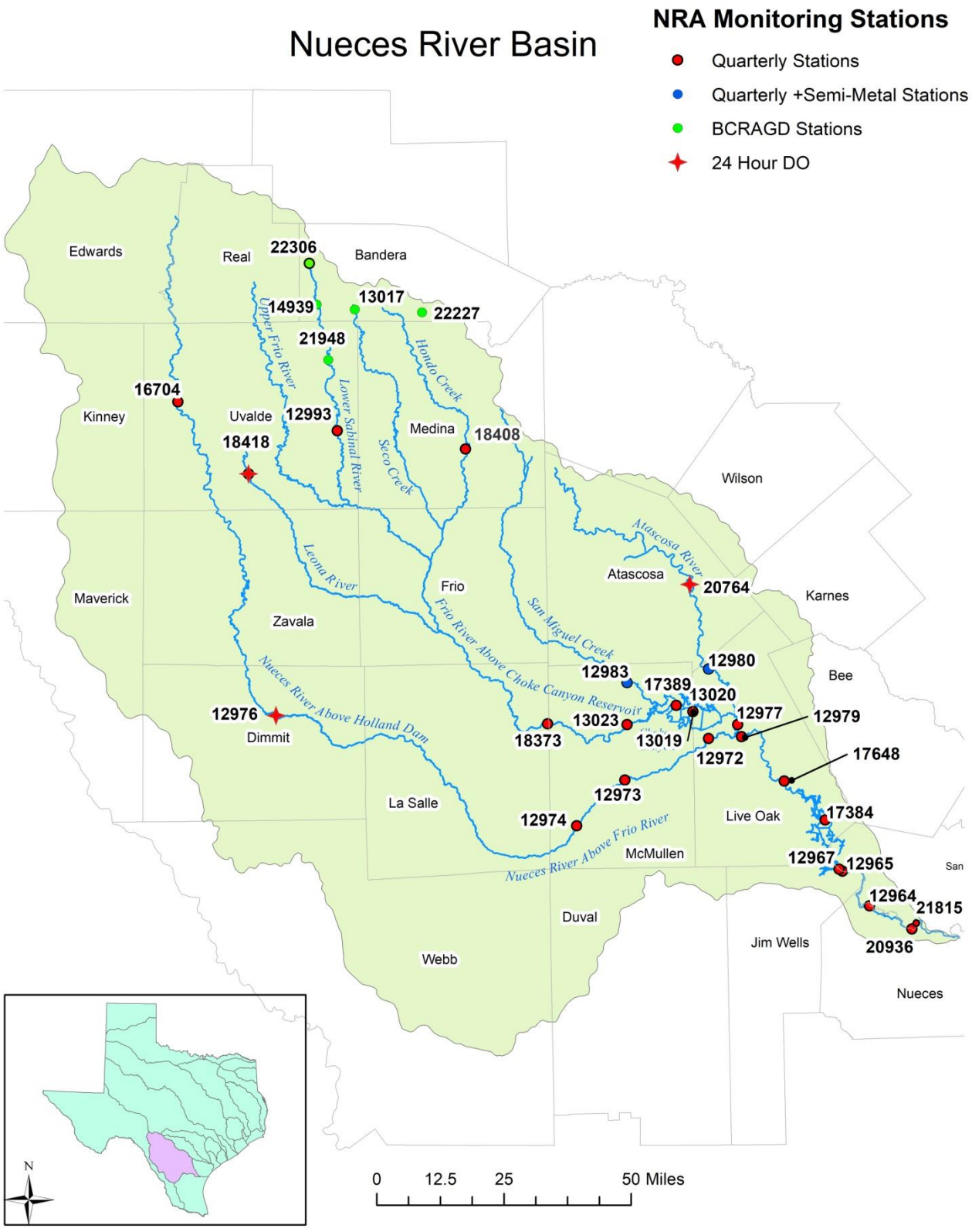
| Basin 24 - Continued | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Site Description* | *Staion ID* | *Waterbody ID* | *Reg* | *SE* | *CE* | *MT* | *24 hr DO* | *AqHab* | *Benthics* | *Nekton* | *Metal Water* | *Organic Water* | *Metal Sed* | *Organic Sed* | *Conv* | *Amb Tox Water* | *Amb Tox Sed* | *Bacteria* | *Flow* | *Fish Tissue* | *Field* | *Comments* |
| OSO CREEK IMMEDIATELY DOWNSTREAM OF SH 286 SOUTH OF CORPUS CHRISTI | 13028 | 2485A | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |
| OSO CREEK IMMEDIATELY DOWNSTREAM OF FM 763 SOUTHWEST OF CORPUS CHRISTI | 13029 | 2485A | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |
| HIDALGO MAIN FLOODWATER CHANNEL AT FM 1420 1.65 KM SOUTH OF INTERSECTION WITH FM 490 EAST OF RAYMONDVILLE | 22003 | 2491C | 15 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| RAYMONDVILLE DRAIN AT WILLACY COUNTY ROAD 445 800 METERS NORTH OF INTERSECTION WITH FM 3142 EAST OF RAYMONDVILLE | 22004 | 2491C | 15 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| LOS OLMOS CREEK IMMEDIATELY UPSTREAM OF US 77 SOUTH OF RIVIERA | 13034 | 2492 | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |

| Basin 24 - Continued | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Site Description* | *Staion ID* | *Waterbody ID* | *Reg* | *SE* | *CE* | *MT* | *24 hr DO* | *AqHab* | *Benthics* | *Nekton* | *Metal Water* | *Organic Water* | *Metal Sed* | *Organic Sed* | *Conv* | *Amb Tox Water* | *Amb Tox Sed* | *Bacteria* | *Flow* | *Fish Tissue* | *Field* | *Comments* |
| SAN FERNANDO CREEK AT US 77 AT KINGSVILLE | 13033 | 2492A | 14 | NR | NR | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 | |
| SAN MARTIN LAKE MID ESTUARY 2.04 KM EAST AND 0.80 KM NORTH OF THE HWY 48 BRIDGE NORTHEAST OF BROWNSVILLE | 22170 | 2494C | 15 | NR | NR | RT | | | | | | | | | 4 | | | 4 | | | 4 | |

# Appendix C: Station Location Maps

## Station Location Maps

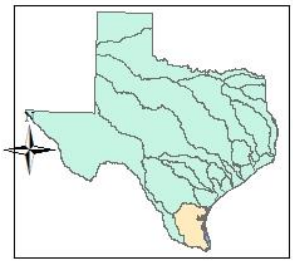
Maps of stations monitored by the Nueces River Authority are provided below. The maps were generated by the Nueces River Authority. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact the Nueces River Authority CRP Project Manager, Sam Sugarek, at 1 (361) 653-2110.


Nueces River Basin
NRA Monitoring Stations
Quarterly Stations
Quarterly +Semi-Metal Stations
BCRAGD Stations
24 Hour DO
Edwards
Real
Bandera
Kinney
Uvalde
Medina
Wilson
Maverick
Zavala
Frio
Atascosa
Karnes
Bee
Dimmit
La Salle
Live Oak
McMullen
Duval
Webb
Jim Wells
Nueces
San
22306
14939
13017
22227
21948
16704
12993
18418
18408
20764
12980
12983
17389
13020
12977
12979
12976
13023
18373
13019
12972
17648
12973
12974
17384
12967
12965
12964
21815
20936
Upper Frio River
Lower Sabinal River
Seco Creek
Hondo Creek
Leona River
Atascosa River
San Miguel Creek
Frio River Above Choke Canyon Reservoir
Nueces River Above Holland Dam
Nueces River Above Frio River
N
0
12.5
25
50 Miles

## Nueces-Rio Grande Coastal Basin

**Monitoring Stations**

- NRA Routine Stations



# Appendix D: Field Data Sheets

# Nueces River Authority
# Field Data Sheet

Date: _____ Sonde S/N #: _____

Sampling Location: _____ Station ID: _____

_____ Time In: _____

Time Collected: _____ Time Out: _____

Sample Collectors: _____

| Storet Code | Value | Parameter |
|---|---|---|
| 00020 | | Air Temp (°C) |
| 00078 | | Secchi Disk (meters) |
| 89969 | | Water Color |
| | | 1=Brown 4=Black<br>2=Reddish 5=Clear<br>3=Green 6=Other |
| 89971 | | Water Odor<br>1=Sewage 5=Fishy<br>2=Oily/Chemical 6=None<br>3=Rotten Eggs 7=Other<br>4=Musky |
| 89968 | | Water Surface<br>1=Calm 3=Waves<br>2=Ripples 4=White Caps |
| 89864 | | Maximum Pool Width (m) |
| 89865 | | Maximum Pool Depth (m) |
| 89869 | | Maximum Pool Length (m) |
| 89870 | | % Pool Coverage in 500m |
| 82903 | | Total Depth (m) |

| Storet Code | Value | Parameter |
|---|---|---|
| 00061 | | Flow (cfs) |
| 74069 | | Flow Estimate (cfs) |
| 01351 | | Flow Severity<br>1=No flow 3=Normal 5=High<br>2=Low 4=Flood 6=Dry |
| 89835 | | Flow Measurement Method<br>1-Gage 2-Electric<br>3-Mechanical 4-Weir/Flume<br>5-Doppler |
| 89966 | | Present Weather<br>1=Clear 3=Overcast<br>2=Cloudy 4=Rain |
| 89965 | | Wind Intensity _____ mph<br>1=Calm (0) 3=Moderate (8-18)<br>2=Slight (1-7) 4=Strong (19+) |
| 89972 | | Tide Stage<br>1=Low 3=Slack 5=High<br>2=Falling 4=Rising |
| 89010 | | Wind Direction<br>1=North 5=Northeast<br>2=South 6=Southeast<br>3=East 7=Northwest<br>4=West 8=Southwest |
| 88842 | | Turbidity<br>1=Low 3=High<br>2=Medium |
| 72053 | | Days since Last Precipitation |
| 82553 | | Rainfall (Inches past 1 day) |
| 82554 | | Rainfall (Inches past 7 day) |

| Storet | Parameter | Value | Value | Value | Value | Value | Value | Value |
|---|---|---|---|---|---|---|---|---|
| | Depth | | | | | | | |
| 00010 | Water Temp (°C) | | | | | | | |
| 00400 | pH | | | | | | | |
| 00300 | DO (mg/L) | | | | | | | |
| | DO (% Saturation) | | | | | | | |
| 00094 | SpC (µmhos/cm) | | | | | | | |
| 00480 | Salinity | | | | | | | |

Comments: _____

# Nueces River Authority
# Field Data Sheet
# Lake Profile

Date: _____ Sonde S/N #: _____

Sampling Location: _____ Station ID: _____

_____ Time In: _____

Time Collected: _____ Time Out: _____

Sample Collectors: _____

| Storet Code | Value | Parameter |
|---|---|---|
| 00020 | | Air Temp (°C) |
| 00078 | | Secchi Disk (meters) |
| 89969 | | Water Color<br>1=Brown 4=Black<br>2=Reddish 5=Clear<br>3=Green 6=Other |
| 89971 | | Water Odor<br>1=Sewage 5=Fishy<br>2=Oily/Chemical 6=None<br>3=Rotten Eggs 7=Other<br>4=Musky |
| 89968 | | Water Surface<br>1=Calm 3=Waves<br>2=Ripples 4=White Caps |
| 00051 | | Reservoir Stage<br>(Feet above mean sea level) |
| 00052 | | Reservoir Percent Full<br>(% Reservoir Capacity) |

| Storet Code | Value | Parameter |
|---|---|---|
| 72053 | | Days since Last Precipitation |
| 82553 | | Rainfall (Inches past 1 day) |
| 82554 | | Rainfall (Inches past 7 day) |
| 89966 | | Present Weather<br>1=Clear 3=Overcast<br>2=Cloudy 4=Rain |
| 89965 | | Wind Intensity _____mph<br>1=Calm (0) 3=Moderate (8-18)<br>2=Slight (1-7) 4=Strong (19+) |
| 89010 | | Wind Direction<br>1=North 5=Northeast<br>2=South 6=Southeast<br>3=East 7=Northwest<br>4=West 8=Southwest |
| 88842 | | Turbidity<br>1=Low 3=High<br>2=Medium |
| 82903 | | Total Depth (m) |
| | | Picture |

| Storet | Parameter | Value | Value | Value | Value | Value | Value | Value |
|---|---|---|---|---|---|---|---|---|
| | Depth | | | | | | | |
| 00010 | Water Temp (°C) | | | | | | | |
| 00400 | pH | | | | | | | |
| 00300 | DO (mg/L) | | | | | | | |
| | DO (% Saturation) | | | | | | | |
| 00094 | SpC (Φmhos/cm) | | | | | | | |

| Storet | Parameter | Value | Value | Value | Value | Value | Value | Value |
|---|---|---|---|---|---|---|---|---|
| | Depth | | | | | | | |
| 00010 | Water Temp (°C) | | | | | | | |
| 00400 | pH | | | | | | | |
| 00300 | DO (mg/L) | | | | | | | |
| | DO (% Saturation) | | | | | | | |
| 00094 | SpC (Φmhos/cm) | | | | | | | |

Comments: _____

# Appendix E: Chain of Custody Forms

## CUSTOMER RECORD and ANALYSIS

Send Results to: Sam Sugarek
Address: Nueces River Authority
602 N. Staples. St. #280
Corpus Christi, TX 78401

# NUECES RIVER AUTHORITY

Lab Analysis Request

| Phone: | Fax: | Project Name: | Project No.: |
|---|---|---|---|
| 361-653-2110 | 361-653-2115 | Clean Rivers Program Monitoring | CRP NRA/WUL |

Sampling by:
Sam Sugarek
Shellie McCumber

| Site Identification: | Lab Only | No. Containers | Matrix: Liquid | Matrix: Conductivity of water at site | Preserved (w/Ice): $H_2SO_4$ | Preserved (w/Ice): Ice/ Ref | Sampling: Date | Sampling: Time | Alkalinity SM 2320 B | Chloride EPA 300 | Sulfate EPA 300 | TDS SM 2540 C | Nitrate-Nitrite EPA 300 or 353.2 | Nitrite EPA 300.0 or 353.2 | | TKN EPA 351.4 | Ammonia-N EPA 350.1 | Phosphorus EPA365.1 | | TOC SM 5310 C | | TSS SM 2540 D | | | | | *E. coli* SM 9223-B | *Enterococcus* - Enterolert |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| Relinquished by: | Date | Time | Received By: | Date | Time | Remarks: X = laboratory measurement |
|---|---|---|---|---|---|---|
| | | | | | | **Run Lab Duplicates Separate** Receiving Temp (°C) |

## CUSTOMER RECORD and ANALYSIS

Send Results to: Sam Sugarek
Nueces River Authority
Address: 602 N. Staples. St. #280
Corpus Christi, TX 78401

## NUECES RIVER AUTHORITY

Lab Analysis Request

| Phone: | Fax: | Project Name: | Project No.: |
|---|---|---|---|
| 361-653-2110 | 361-653-2115 | Clean Rivers Program Monitoring | NRA/CRP LCRA ELS |

| Sampling by: | | No. Containers | Matrix | | Preservation | | Sampling | | Metals in Water (Dissolved) | Metals in Water (Total) | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sam Sugarek | | | Liquid – | Conductivity of water at site | acid | Field filtered | Date | Time | | | | | | | | | | | | | | | | | | | | | | | |
| Shellie McCumber | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Site Identification: | Lab Only | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Relinquished by: | Date | Time | Received By: | Date | Time | Remarks: X = laboratory measurement |
|---|---|---|---|---|---|---|
| | | | | | | Receiving Temp (°C) |

# Appendix F: Data Review Checklist and Summary Shells

## Data Review Checklist

This checklist is to be used by the Planning Agency and other entities handling the monitoring data in order to review data before submitting to the TCEQ. This table may not contain all of the data review tasks being conducted.

| **Data Format and Structure** | Y, N, or N/A |
|---|---|
| Are there any duplicate Tag Id numbers in the Events file? | |
| Do the Tag prefixes correctly represent the entity providing the data? | |
| Have any Tag Id numbers been used in previous data submissions? | |
| Are Tag IDs associated with a valid SLOC? | |
| Are sampling Dates in the correct format, MM/DD/YYYY with leading zeros? | |
| Are sampling Times based on the 24 hr clock (e.g. 09:04) with leading zeros? | |
| Is the Comments field filled in where appropriate (e.g. unusual occurrence, sampling problems, unrepresentative of ambient water quality)? | |
| Are Submitting Entity, Collecting Entity, and Monitoring Type codes used correctly? | |
| Do sampling dates in the Results file match those in the Events file for each Tag Id? | |
| Are values represented by a valid parameter code with the correct units? | |
| Are there any duplicate parameter codes for the same Tag Id? | |
| Are there any invalid symbols in the Greater Than/Less Than (GT/LT) field? | |
| Are there any Tag Ids in the Results file that are not in the Events file or vice versa? | |
| **Data Quality Review** | Y, N, or N/A |
| Are “less-than” values reported at the LOQ? If no, explain in Data Summary. | |
| Have the outliers been verified and a "1" placed in the Verify_flg field? | |
| Have checks on correctness of analysis or data reasonableness been performed?<br>e.g., Is ortho-phosphorus less than total phosphorus?<br>Are dissolved metal concentrations less than or equal to total metals?<br>Is the minimum 24 hour DO less than the maximum 24 hour DO?<br>Do the values appear to be consistent with what is expected for site? | |
| Have at least 10% of the data in the data set been reviewed against the field and laboratory data sheets? | |
| Are all parameter codes in the data set listed in the QAPP? | |
| Are all stations in the data set listed in the QAPP? | |
| **Documentation Review** | Y, N, or N/A |
| Are blank results acceptable as specified in the QAPP? | |
| Were control charts used to determine the acceptability of lab duplicates (if applicable)? | |
| Was documentation of any unusual occurrences that may affect water quality included in the Event file’s Comments field? | |
| Were there any failures in sampling methods and/or deviations from sample design requirements that resulted in unreportable data? If yes, explain in Data Summary. | |
| Were there any failures in field and/or laboratory measurement systems that were not resolvable and resulted in unreportable data? If yes, explain in Data Summary. | |
| Was the laboratory’s NELAP Accreditation current for analysis conducted? | |
| Did participants follow the requirements of this QAPP in the collection, analysis, and reporting of data? | |

## *Data Summary*

### *Data Set Information*

Data Source: _____

Date Submitted: _____

Tag_id Range:

_____

Date Range:

_____

□ I certify that all data in this data set meets the requirements specified in Texas Water Code Chapter 5, Subchapter R (TWC §5.801 et seq) and Title 30 Texas Administrative Code Chapter 25, Subchapters A & B.
□ This data set has been reviewed using the criteria in the Data Review Checklist.

Planning Agency Data Manager: _____ Date: _____

Please explain in the table below any data discrepancies discovered during data review including:

- Inconsistencies with LOQs
- Failures in sampling methods and/or laboratory procedures that resulted in data that could not be reported to the TCEQ (indicate items for which the Corrective Action Process has been initiated and send *Corrective Action Status Report* with the applicable Progress Report).

Dataset ____ contains data from FY__ QAPP Submitting Entity code __ and collecting entity __. This is field and lab data that was collected by the (collecting entity). Analyses were performed by the (lab name). The following tables explain discrepancies or missing data as well as calculated data loss.

**Discrepancies or missing data for the listed tag ID:**

| Tag ID | Station ID | Date | Parameters | Type of Problem | Comment/PreCAPs/CAPs |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |

**Data Loss**

| Parameter | Missing Data points out of Total | Percent Data Loss for this Dataset | Parameter | Missing Data points out of Total | Percent Data Loss for this Dataset |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |

# ATTACHMENT 1 Example Letter to Document Adherence to the QAPP

TO: Rebecca DuPont
TCEQ CRP

FROM: Sam Sugarek
Nueces River Authority

RE: Nueces River Authority Fiscal Year 2022-23 CRP QAPP

Please sign and return this form by (date) to:

(address)

I acknowledge receipt of the "Nueces River Authority Fiscal Year 2022-23 CRP QAPP, 6/08/2021". I understand the document(s) describe quality assurance, quality control, data management and reporting, and other technical activities that must be implemented to ensure the results of work performed will satisfy stated performance criteria. My signature on this document signifies that I have read and approved the document contents pertaining to my program. Furthermore, I will ensure that all staff members participating in CRP activities will be required to familiarize themselves with the document contents and adhere to them as well.

_____

Sam Sugarek Date

Copies of the signed forms should be sent by the Nueces River Authority to the TCEQ CRP Project Manager within 60 days of TCEQ approval of the QAPP.