



TASK 2: QUALITY ASSURANCE

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TASK 2: QUALITY ASSURANCE

Introduction

Quality assurance (QA) is an integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure a process is of the type and quality needed and expected by the customer. The focus on this definition provides this task's rationale as it relates to project planning, oversight, and corrective action.

Systematic project planning is central to an integrated quality assurance approach and is fundamental to the success of water quality monitoring projects conducted under the Clean Rivers Program (CRP). It is a process that considers;

- project objectives,
- measurement performance specifications,
- appropriate methods,
- field and laboratory quality control,
- data management,
- verification and validation of data,
- oversight, and
- corrective action.

The CRP uses QAPPs to plan, organize, and define quality assurance process so data is collected with the level of reliability needed for decision-making. QAPPs for the CRP do not require Environmental Protection Agency (EPA) approval. The TCEQ requires CRP data collection to be comparable to other data collected by the TCEQ, and to be consistent with EPA requirements

CRP QAPPs do not apply to, and should not be used for data collection for federally funded programs or projects. A standalone QAPP must be developed and approved by the appropriate TCEQ staff for federally funded projects.

Contract Provisions

QA components are essential to collect valid data, and ensure its usability. Certain key components related to quality assurance are essential to the collection of valid data and ensure, to the greatest extent possible, that data produced by the CRP will be of the type and quality necessary for its intended use. These critical components represent the three key aspects of quality assurance; planning, implementation, and oversight. CRP contracts incorporate the following provisions:

All work funded by this Agreement that involves the acquisition of environmental data generated from direct measurement activities, collected from other sources, or compiled from computerized data bases and information systems shall be planned in consultation with the TCEQ and be documented in a fully approved TCEQ Quality Assurance Project Plan (QAPP) before data collection can be implemented. If this Agreement contains Federal Conditions, the QAPP must be approved by the U.S. Environmental Protection Agency (EPA) Project Officer in compliance with the Federal Conditions of this Agreement.



The GRANTEE shall ensure laboratory data is produced by laboratories (and subcontract laboratories) that are National Environmental Laboratory Accreditation Conference (NELAC)-accredited according to Texas Water Code Chapter 5, Subchapter R (TWC §5.801 et seq) and Title 30 Texas Administrative Code Chapter 25, Subchapters A and B.

If this Agreement is funded pursuant to the Texas Clean Rivers Program, the Planning Agency must perform on-site assessments of field monitoring activities for all sub-participants and/or subcontractors at least once during the Contract Term for on-going projects, or once during the project's lifetime, for short-lived projects.

Approval to Conduct Work

Implement all work funded by the contract in accordance with an approved QAPP, including; acquisition of environmental data generated from direct measurement activities, data collected from other sources, data compiled from computerized data bases and information systems, or the analysis and manipulation of any of this data. Limited exceptions may be granted under the conditions described below.

QAPP Extensions

Time constraints may cause lapses in Basin-wide QAPP coverage at the beginning of a new two-year contract cycle. If no significant changes are planned in the next QAPP, and the new monitoring schedule is approved, the Planning Agency may request a temporary authorization to conditionally proceed with the monitoring plan under the existing QAPP.

The Planning Agency Project Manager must submit an e-mail request for conditional approval to the TCEQ CRP Project Manager before the existing QAPP expires. The TCEQ CRP Project Manager, with the concurrence of the TCEQ CRP Program Manager and the Lead Quality Assurance Specialist (QAS) may grant approval for a maximum of 90 days beyond the expiration date of the existing QAPP.

Quality Assurance Project Plans

The development and implementation of a QAPP helps to ensure:

- projects use a planned approach;
- objectives, roles, and responsibilities of participants are defined;
- measurement systems are defined and appropriate;
- adequate project oversight;
- data verification and validation procedures are specified, thus enabling reconciliation with data quality objectives.

Biennial Submittal of Basin-Wide QAPPs

Shells for [all CRP QAPP documents](https://www.tceq.texas.gov/waterquality/clean-rivers/qa/index.html) can be accessed electronically at

<https://www.tceq.texas.gov/waterquality/clean-rivers/qa/index.html>. The use of shell documents streamlines QAPP preparation, review, and approval.



Much of the shell language represents CRP and/or TCEQ requirements. Language in standard text format is provided as an example. If actual activities differ from the shell language, discuss these differences with the TCEQ CRP Project Manager and edit the QAPP draft(s) as necessary. Information to be provided by the Planning Agency is highlighted. Italicized instructions and instructions in the comment review layer are provided for the various sections and should be followed and deleted from the document before the QAPP draft is submitted to the TCEQ.

Data Collection Procedures

The TCEQ *Surface Water Quality Monitoring Procedures* ([Volume I, RG-415](#) and [Volume II, RG-416](#)) describes field procedures used for surface water sampling and biological collection for the purpose of submitting data to TCEQ. The QAPP states that the most recent version of the *Surface Water Quality Monitoring Procedures* must be used, including any updates made between revisions. If other SOPs apply, they should be referenced in the QAPP, as appropriate. Do not submit SOP with the QAPP for TCEQ review unless specifically requested. Make SOPs available to sampling staff for use and to TCEQ staff during an audit.

QAPP Maps

Include maps in the QAPP and any amendments that involving changes to sampling sites. QAPP maps need to include and label sampling sites covered under the QAPP, streams, reservoirs, major roads, and cities, as appropriate. The maps are for illustrative purposes only and should include the recommended disclaimer, found in the QAPP shell.

Draft QAPPs

Send draft basin-wide QAPPs to the TCEQ CRP Project Manager electronically by June 15 of odd-numbered years. The TCEQ CRP Project manager compiles TCEQ reviewer comments and returns the comments to the Planning Agency Project Manager within 30 days of QAPP receipt. Respond to all TCEQ comments, note how the comment was addressed, or explain why the comment was not addressed. Resubmit a revised amended draft QAPP with all comments addressed within 30 days. QAPP drafts that do not address all reviewer comments may not be accepted by the TCEQ CRP Project manager. Call the TCEQ CRP Project manager if there are any issues addressing comments to QAPP drafts. The final basin-wide QAPP is due by August 15 of odd-numbered years. More than one exchange of comments and responses may be necessary to achieve approval to proceed from all parties at the Planning Agency and the TCEQ. **Do not collect signatures or letters of adherence until the TCEQ CRP Project manager indicates the QAPP is complete and ready for final approval.**

Approval, Signature, and Distribution of Basin-Wide QAPPs

After the TCEQ has given approval of the QAPP, submit a .pdf, .doc or .docx version of the QAPP, an .xls or .xlsx version of Appendix A7, and any other additional documents to the TCEQ CRP Project Manager. Email .pdf copies, or mail hard copies of Planning Agency, Laboratory, and sub-participant signature pages. After Planning Agency, Laboratory, and sub-participant signature pages are received by the TCEQ CRP Project Manager, the TCEQ staff will route a copy for TCEQ signatures. The TCEQ retains two signed copies of the QAPP. The Planning Agency may send additional signature pages for signature by the TCEQ, if original signatures are required by their program. The TCEQ Data Management and Assessment staff uploads a final copy of the QAPP to SWQMIS (the Surface Water



Quality Monitoring Information System database maintained by the TCEQ), where it is available to users in addition to the electronic data.

Required signatures are designated on the Basin-wide QAPP shell document. Additional signatures can be added as needed (e.g. sub-participants). Laboratory sign off on all QAPPs is to ensure laboratories are involved in the development of QAPPs. Distribute the final, signed QAPP to all appropriate Planning Agency staff, Laboratory staff, and sub-participants. The TCEQ Lead QA Specialist distributes copies to the TCEQ personnel indicated on the distribution list. Secure an acknowledgement of receipt and an adherence letter from sub-participants of the QAPP stating the sub-participants' receipt of the document and commitment to requirements contained in the QAPP. **Adherence letters are not required for entities who sign the QAPP.** An example adherence letter is provided in the QAPP shell document. Maintain copies of all acknowledgements of receipt and all adherence letters as part of the project's quality assurance records. **Copies of all adherence letters must be forwarded to the TCEQ no later than 60 days after TCEQ approval of the QAPP, and prior to any monitoring event.**

QAPP Amendments

Project changes requiring QAPP amendments include changes to:

- analytical procedures,
- Table A.7,
- LOQs,
- NELAC Accreditation,
- sampling sites,
- sampling schedule,
- anything that would affect the data generated by the project, or
- project organization, etc.

QAPP amendments are contract deliverables. Submit amendments to the TCEQ on an "as needed" basis but before the changes are implemented. Provide a justification and summary of the changes as specified in the QAPP amendment shell. Also provide the amended QAPP Sections. **Do not implement changes until the amendment is fully executed.** In some cases, a data correction request may also be necessary to correct previously submitted data.

Many QAPP amendments involve changes to address existing activities which have been consistent with program requirements all along and therefore correct information that was not included or was incorrect in the original QAPP. **Do not "backdate" these amendments.** The QAPP amendment serves as a portion of the corrective action process, and should be documented as a part of the corrective action plan (CAP).

Note: If the changes made are funded by Federal programs, you may be required to create a stand-alone QAPP document. Please contact your TCEQ CRP Project Manager about these changes.

Required signatures are designated on the QAPP shell document. Add signatures as needed (e.g., sub-participants).

Signatures may be provided by hand, either by mailed or scanned .pdf files sent from participants to the TCEQ CRP Project Manager, or by electronic review. To streamline the amendment process, there



is a procedure for electronic review and approval of QAPP amendments. The steps for the process are as follows:

1. The Planning Agency e-mails the TCEQ CRP Project Manager an amendment.
2. TCEQ CRP Project Manager, Project QA Specialist, and Lead CRP QA Specialist review the amendment.
3. TCEQ CRP Project Manager provides comments to the Planning Agency Project Manager, or indicates that the amendment can be approved. Steps 1 and 2 may be repeated multiple times before an amendment is approved.
4. If an amendment is ready to be approved, the TCEQ Lead CRP QA Specialist initiates an e-mail "signature page" and sends the e-mail to all signatories.
5. Each signatory "replies to all" for the most recent email indicating approval, providing an email "trail" to show all approvals on a single email thread.

When the TCEQ Lead CRP QA Specialist receives the final approvals, he adds a TCEQ approval cover letter with the approval date of the final amendment and mails the completed signature page and amendment to the Planning Agency Project Manager or QAO, and TCEQ CRP Project Manager.

The Planning Agency secures adherence letters from affected sub-participants of its QAPP stating the sub-participants' commitment to requirements contained in the QAPP amendment. An example letter is provided in the QAPP shell document. QAPP adherence documentation should be maintained as part of the project's quality assurance records. **Forward copies of all adherence letters to the TCEQ no later than 60 days after TCEQ approval of the QAPP amendment, but prior to any monitoring event.** Adherence letters are not required for entities who sign the QAPP amendment.

The Planning Agency distributes QAPP amendments to all personnel on the distribution list. The TCEQ Lead CRP Quality Assurance Specialist distributes copies to TCEQ project participants, including but not limited to the TCEQ CRP Project Manager, and the Houston Laboratory as appropriate. The TCEQ CRP Project Manager emails a text-recognized copy of the amendment to TCEQ DM&A for upload to SWQMIS.

Appendix B: Monitoring Schedule Update

Because the basin-wide QAPP is effective for two years, the monitoring schedule in Appendix B of the basin-wide QAPP needs to be updated for the second year of the biennium after the annual coordinated monitoring meeting. Include a summary of changes to the monitoring schedule and revised maps. Send updates to Appendix B via e-mail to the TCEQ CRP Project Manager by June 15, in the even numbered years. Review comments will be sent to the Planning Agency Project Manager within 30 days of QAPP receipt. The Planning Agency must modify and resubmit the document within 30 days. The final revision is due by August 15 of even numbered years.

Project Oversight

A process of oversight and evaluation is necessary to ensure data collection is conducted as planned, and that environmental monitoring projects are successful. Adequate oversight and evaluation of projects ensure:

- work is accomplished in accordance with planning documents;
- data quality is adequate;



- necessary corrective actions are implemented effectively.

Document project oversight requirements in the QAPP, Section C1, Assessment and Response Actions.

Planning Agency Oversight Requirements

Basin Planning Agencies are also tasked with conducting status monitoring which involves the continual evaluation of programs or projects to ensure they are being conducted as planned and documented. Oversight activities are described in the following sections.

Document oversight activities in quarterly progress reports.

Status Monitoring

Status monitoring involves the continual evaluation of programs or projects to ensure they are conducted as planned in the QAPP. This type of oversight is specified in the QAPP to ensure that TCEQ CRP Project Managers perform a continual review of quality assurance activities over the course of the biennium. This type of monitoring may be a formal management review or a less formal review of QA activities. At a minimum, the Planning Agency Project Manager should request a written status of QA activities from staff on a quarterly basis. This includes, but is not limited to Laboratory NELAC Accreditation Status, Deficiencies, and Corrective Actions.

Laboratory Oversight

Ensure any laboratory generating data for the CRP is audited by its laboratory quality assurance staff for conformance to laboratory SOPs, applicable methods, and other specific requirements defined in the applicable QAPP and in its quality system standard. At a minimum, conduct a limited review of laboratory operations associated with verifying that the laboratory is following the QAPP specifications and is providing the needed information for verifying and validating data on a regular basis. Perform this limited-scope review/audit so laboratory-client communications remain open, and the laboratory understands client requirements under the CRP.

Sub-Participant Oversight Requirements

Basin Planning Agencies are required to oversee the activities addressed in their QAPPs and must conduct formal audits of all sub-participants who conduct field monitoring. If all work is performed by the Planning Agency (i.e. there are no sub-participants participating in the Basin's CRP program), these audits are not required. Negotiate the timing and scope of oversight activities, and document in the QAPP.

There are two acceptable types of sub-participant field monitoring audits: 1) readiness reviews, and 2) monitoring systems audits. Perform at least one audit at the sub-participant's office, field station, or other appropriate location at least once during each contract cycle (biennium), in the case of on-going projects; or once during a project's lifetime, in the case of short-lived special studies.

Readiness Review

A readiness review is an evaluation to determine if all components of the project are in place before work begins. Readiness reviews are the preferred assessment activity to evaluate a sub-participant's ability to adhere to QAPP requirements and implement any necessary corrective actions before data collection commences. The process is designed to evaluate performance and effectiveness of sampling processes from collection through final result reporting, including (as applicable);

- minimum documentation,
- adequacy of facilities and equipment,
- instrument calibration procedures and logs,
- field measurement procedures,
- sample collection procedures,
- biological sampling procedures,
- sample handling and analysis procedures,
- data verification and validation procedures,
- records handling and retention, and
- data management procedures.

The [Monitoring Systems Audit Checklist](https://www.tceq.texas.gov/waterquality/clean-rivers/qa/index.html) is available electronically on the CRP web page at <https://www.tceq.texas.gov/waterquality/clean-rivers/qa/index.html>. Modify the checklist to accommodate readiness reviews. The Planning Agency reviewer must be familiar with the QAPP, field standard operating procedures, and data management protocols. The individual responsible for ensuring readiness reviews are completed is identified in the QAPP, Section A4 Description of Responsibilities.

Monitoring Systems Audit

Monitoring systems audits can be performed at any time during the lifetime of a monitoring program or project, and are required at least once per biennium. A monitoring systems audit is a thorough and systematic technical systems audit involving an on-site qualitative review of monitoring activities. The auditor examines facilities, equipment, personnel, training procedures, data management, and record keeping for conformance with the QAPP. The goal of a monitoring systems audit is to verify that applicable elements of the quality system are developed, appropriate, documented, and implemented in accordance with project and program specifications. Audits add value to a quality system by promoting and supporting continuous improvement. The audit process is designed to evaluate the sampling process from collection through final result reporting, including the activities and processes evaluated during a readiness review. The Monitoring Systems Audit Checklists can be found on the CRP web page at www.texascleanrivers.org in the *Program Resources --> Quality Assurance* section. Adapt the checklist as necessary based on the audit scope.

Data traceability exercises effectively document the sampling process from collection through final reporting. The [data traceability/file review form](https://www.tceq.texas.gov/waterquality/clean-rivers/qa/index.html) is on the CRP web page at <https://www.tceq.texas.gov/waterquality/clean-rivers/qa/index.html>.

Report and Response

Provide the audited organization with a report within 30 days of a readiness review or monitoring systems audit. The report should state if no negative findings were identified. If negative findings are identified, they must be reported. Reference specific requirement(s) in a primary reference source

(the QAPP, SOPs, SWQM Procedures Manual, the CRP Guidance, the CRP Contract and Workplan, etc.), and document the evidence that led to the negative finding. Include additional information regarding the negative findings along with observations. The audited organization must respond to the report in writing within 30 days. Minimum responses require:

- the root cause of the deficiency,
- the effect, if any, on any previously completed or current work,
- proposed corrective action(s) to correct the deficiency,
- action(s) planned to prevent recurrence of the deficiency, and
- date that each action will be, or was completed.

Audit reports and responses are deliverables to the TCEQ CRP Project Manager with the quarterly progress report no later than the quarter following the one in which the audit was conducted.

Corrective Action Process for Deficiencies

Address issues that may affect data quality. Procedures are in place to help Planning Agencies track, address, and report deficiencies effectively without imposing unnecessary requirements.

Any deviation from the QAPP, SWQM Procedures, SOPs, or Data Management Reference Guide is a deficiency. Deficiencies may invalidate resulting data and may require corrective action. Corrective action may involve discarding samples and collecting replacement samples. Deficiencies are documented in logbooks, field data sheets, etc. by field or laboratory staff. It is the responsibility of the Planning Agency Project Manager, in consultation with the Planning Agency QAO, to ensure that the actions and resolutions to the problems are documented and that records are maintained in accordance with the QAPP. In addition, these actions and resolutions will be conveyed to the TCEQ CRP Project Manager both verbally and in writing in the quarterly project progress reports and by completion of a corrective action plan (CAP). In instances where data quality is affected by the deficiency, notify the TCEQ CRP Project Manager within 72 hours.

Planning Agencies must address deficiencies associated with:

- sampling method or design (e.g. samples not preserved in the field);
- sample tracking procedures (e.g. hold times for bacteria samples expired, bacteria samples not collected in sterile bottles);
- analytical method requirements (e.g. post calibrations not performed); and/or
- quality control requirements (e.g. blank contamination).

Corrective Action Plans should:

- Identify the problem, nonconformity, or undesirable situation;
- Document any immediate remedial actions taken;
- Identify the underlying cause(s) of the deficiency;
- Identify whether the problem is systematic; likely to recur, or occur in other areas ;
- Identify personnel responsible for completing corrective actions;
- Establish timelines and provide a schedule for implementation of corrective actions;
- Identify any effected data and determine appropriate data correction procedures; and
- Document the corrective actions completed.

The flow chart in Exhibit 2A: Corrective Action Process for Deficiencies illustrates the CAP process. A basic CAP form is available electronically at www.texascleanrivers.org select *Program Resources* -->



Quality Assurance, and in Exhibit 2C of this document. Planning Agencies may choose to use the forms provided or devise their own system and set of forms.

Periodic status monitoring ensures CAPs effectively address previous deficiencies, and prevent their recurrence.

CAP status is a part of the quarterly progress report deliverable (see Exhibit 2B: Status of Corrective Actions Table). Document deficiencies leading to data loss on Data Summaries when submitting data sets.

Data Review, Verification, and Validation

A well-defined and documented system of data review ensures the validity of data submitted to the TCEQ. The CRP defines and recognizes the two terms **verification** and **validation** as they are part of NELAC terminology. Verification is confirmation by examination and provision of evidence that specified requirements have been met. It refers to the data review processes used to determine data completeness, correctness, and compliance with technical specifications contained in applicable documents (e.g. QAPPs, SOPs, QAMs, analytical methods, NELAC Accreditation). Validation is the confirmation by examination and provision of objective evidence that the particular requirement for a specific intended use is fulfilled. It refers to a specific review process that extends the evaluation of a data set beyond method and procedural compliance (i.e., data verification) to determine the quality of a data set specific to its intended use.

Review all data obtained from field and laboratory measurements, verify for conformance to technical criteria, and validate against performance specifications. Only data supported by appropriate QC data and which meet applicable project specifications are considered acceptable for reporting to the TCEQ and entry into SWQMIS.

Describe the specifics of data review in Section D1 of the QAPP and specify responsible parties in Section A4. Generally speaking, there are levels of review to be performed by field staff and by laboratory staff. Field staff usually review field data, and laboratory staff review laboratory data. Sub-participant Data Managers or QAOs, and Planning Agency Data Managers or QAOs review data after field and laboratory data are combined into a data set.

Develop and use checklists that facilitate data review, and address the various levels of review (see Table 1: Verification and Validation Tasks). Develop checklists for field data review that incorporate the various requirements defined in the *Surface Water Quality Monitoring Procedures (RG-415)* and in the QAPP so that the data review tasks associated with field data can be accomplished. Develop a lab data review checklist to facilitate data review, analogous to the checklists used for field data review. Similarly, the Planning Agency should prepare a checklist for use in reviewing the data after the data set is assembled that speaks to data usability.

Document QAPP nonconformances and submit the information to the TCEQ CRP Project manager with any affected data. The Data Summary is the appropriate communication tool between the Planning Agency and the TCEQ CRP Project Manager.

Task 4 discusses data formatting, report generation, and data validation topics.



Table 1: Verification and Validation Tasks

Task	Field Task	Laboratory Task	Submitting Entity Data Manager Task
Sample documentation complete; samples labeled, sites identified	Y	Y	
Field QC samples collected for all analytes as prescribed in the TCEQ <i>SWQM Procedures Manual</i>	Y		
Standards and reagents traceable	Y	Y	
Chain of custody complete/acceptable	Y	Y	
NELAC Accreditation is current		Y	Y
Sample preservation and handling acceptable	Y	Y	
Holding times not exceeded	Y	Y	
Collection, preparation, and analysis consistent with SOPs and QAPP	Y	Y	Y
Field documentation (e.g., biological, stream habitat) complete	Y		
Instrument calibration data complete	Y	Y	
Bacteriological records complete	Y	Y	
QC samples analyzed at required frequency	Y	Y	Y
QC results meet performance and program specifications	Y	Y	Y
Analytical sensitivity (Limits of Quantitation/Ambient Water Reporting Limits) consistent with QAPP		Y	Y
Results, calculations, transcriptions checked	Y	Y	
Laboratory bench-level review performed		Y	
All laboratory samples analyzed for all parameters		Y	
Corollary data agree	Y	Y	Y
Nonconforming activities documented	Y	Y	Y
Outliers confirmed and documented; reasonableness check performed			Y
Dates formatted correctly			Y
Depth reported correctly			Y
TAG IDs correct			Y
TCEQ ID number assigned			Y
Valid parameter codes			Y
Codes for submitting entity(ies), collecting entity(ies), and monitoring type(s) used correctly			Y
Time based on 24-hour clock			Y
Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the coordinated monitoring schedule)	Y	Y	Y
Field QC results attached to data review checklist			Y
Verified data log submitted			Y
10% of data manually reviewed			Y



TCEQ Oversight Requirements

TCEQ Laboratory and Monitoring Systems Audits

The TCEQ performs audits of Planning Agencies as determined by a risk-based assessment.

Participant and CRP-Associated laboratories are assessed once every two years by their laboratory accrediting body. The audits assess compliance with NELAC standards, and include reviews of facilities, equipment, record-keeping, chain-of-custody records, adherence to approved QA planning documents, and SOPs. The TCEQ CRP Project Manager, Project QA Specialist, and/or Lead QA Specialist may provide input into this process if deemed appropriate by the Laboratory Inspector. Checklists are used to guide the conduct of the audits. Audit findings are reported to TCEQ upper management (Section Manager and above) if significant corrective action is needed. Otherwise, audit reports are maintained by the TCEQ Quality Assurance Team.

Monitoring Systems Audits conducted by the TCEQ will be determined after a risk assessment has been conducted and results ranked. Audits by the TCEQ will be conducted systematically so that all Planning Agencies and laboratories performing work for CRP will be assessed within a three-to-five year period, or more frequently, depending upon several factors (e.g., number of requests for audits, risk factors, findings from previous audits).

Specific CRP Laboratory Requirements

Ambient Water Reporting Limits (AWRLs)

For surface water to be evaluated for compliance with Texas Surface Water Quality Standards (TSWQS) (30 TAC §307.1 - 307.10) and screening levels, data must be reported at or **below** specified levels. To ensure data are collected at or below these levels, required reporting specifications (AWRLs) were established by the CRP. [The parameters for which AWRLs have been established](https://www.tceq.texas.gov/waterquality/clean-rivers/qa/index.html) are available electronically (see <https://www.tceq.texas.gov/waterquality/clean-rivers/qa/index.html>).

While the AWRL is the program-defined reporting specification for each analyte, most laboratories report data based on the concept of a limit of quantitation (LOQ). A limit of quantitation (is the minimum level, concentration, or quantity of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The following requirements must be met in order to report results to the CRP:

- **The laboratory's LOQ for each analyte must be at or below the AWRL as a matter of routine practice, unless an exception has been granted;**
- **The laboratory must demonstrate its ability to quantitate at its LOQ for each analyte by running an LOQ check sample; and**
- **The requirements for lab control check samples are described in Section B5 of the QAPP shell.**

For certain parameters that are routinely reported close to the LOQ, Laboratory Control Samples (LCS) should be run at the LOQ. These parameters include nutrients and metals in water.

Authorized Laboratory Methods

Analytical methodologies under the CRP are specified in the TSWQS. The TSWQS mandate that procedures for laboratory analysis will be in accordance with:



- The latest version of the *Surface Water Quality Monitoring Procedures (RG 415 and RG 416)*,
- 40 Code of Federal Regulations (CFR) Part 136, or
- other reliable procedures acceptable to the TCEQ.

Changes to 40 CFR §136 became effective March 12, 2007. These changes allow the use of 189 updated methods from the 19th and 20th editions of *Standard Methods* in addition to the methods approved earlier for use. Requirements for analytical methodologies are specified in the QAPP shell document.

Statistical Control of Precision and Bias

Analytical laboratories must have a statistical process in place to review results as applicable to control on-going performance. To generate data for the CRP, the laboratories' control limits must be set and controlled within the bounds set by the measurement performance specifications for laboratory control samples (LCS) and LCS/LCS duplicates as defined in Table A7 of the QAPP. The most common method of statistical process control involves the use of control charts as described in *Standard Methods for the Examination of Water and Wastewater* or the *EPA Handbook for Analytical Quality Control in Water and Wastewater Laboratories*. (Computer-generated lists or databases with values, limits, and trends may be used as an alternative to control charts.)

Laboratory Test Reports

Laboratory test reports (if applicable for routine water quality data analysis) should be clear, unambiguous and, at a minimum, contain the information specified in the NELAC Standards. The information required by NELAC with test reports is required even if the data are transmitted from the laboratories in event/result format unless the laboratory has valid reasons for not doing so. In addition to the specified information, test reports for the CRP should include project-specific quality control results such as equipment, trip, and field blank results, and bacteria holding time, as applicable. It is important for laboratories to provide narrative information about why results were not compliant with specifications as stated in the "Laboratory Data Review" section of this guidance document. Without this information, Planning Agency data management staff cannot verify and validate data and provide required information on the Data Summary when data are submitted to the TCEQ. Copies of test reports are reviewed during monitoring systems audits. Information regarding standard test report format is contained in the QAPP shell document. Additional information may be requested.

Laboratory Data Review

The laboratory's role in the review of CRP data is very important. At a minimum, all laboratory data must be reviewed (as described under "**Data Review, Verification and Validation**" in this Task). Laboratories should have SOPs in place to ensure data are free from transcription and calculation errors, all quality control measures are reviewed and evaluated, and project specifications are met. Laboratory data review records must be signed and dated by the analyst reviewer(s) and/or the Laboratory QA Officer.

The use of data review checklists by the laboratory is encouraged. If any requirements or specifications are not met, based on the data review, the laboratory should document the deficiencies and submit the information in the report narrative to the Planning Agency with the data.

In turn, this information must be communicated to the TCEQ by the Planning Agency in the Data Summary.

Web Site Deliverable

Post certain sections of QAPPs on the Planning Agency's CRP Web page to enable the public to know and understand the water quality monitoring being conducted in their basin. Include:

- monitoring programs,
- project objectives,
- measurement performance specifications (i.e., Table A7),
- a link to the coordinated monitoring schedule (CMS) website with disclaimer that states that the CMS includes stations monitored by other entities,
- QAPP amendments, and
- special study appendices.

Quality Assurance Training

The CRP encourages all applicable Planning Agency personnel and in-kind contributors to obtain training on topics associated with this task. This is especially critical to ensuring data are collected using TCEQ-approved policies and procedures. Special accommodations may need to be made to ensure in-kind contributors get appropriate training. All non-CRP training events require prior approval to be considered for reimbursement for both training fees and any associated travel expenses. Itemize all training on quarterly progress reports, and include on reimbursement requests accordingly.

Special Project Planning

All applicable parties, including TCEQ staff, should thoroughly discuss special study and permit support monitoring projects before workplans are finalized. If Basin Planning Agencies intend to conduct multiple special projects under subcontract, they should carefully consider staggering projects over the biennium, with consideration of variable funding. Allocate sufficient time to properly plan and execute the QAPP before data collection and reporting. Adequate data collection, report writing, or other project components may necessitate project components being carried into the next biennium. Determine this before executing the work plan. Considerations for designing monitoring plans are in Task 3 – Monitoring.

The formal project planning process has many benefits. It:

- Promotes communication and input from all involved parties to optimize data collection efforts.
- Ensures data collected are of the type and quality appropriate to their intended use and may support decision making.
- Maximizes existing data use.
- Defines data management conditions, such as data coding, verification and validation, manipulation, and transfer.
- Determines information to be documented in the QAPP appendix to expedite review and approval so projects can begin in a timely manner.



Contact TCEQ CRP Project Managers to indicate intent and desire to conduct a planning meeting. Conduct the planning meeting at least 90 days before the planned sampling date. The TCEQ CRP Project Manager will include appropriate TCEQ staff in planning activities if additional specialized knowledge will aid in the planning process.

The project planning meeting objective is to implement a systematic planning process based on standard QAPP sections. The decisions made during the planning meeting will be incorporated into a Special Study QAPP Appendix.

The Planning Agency Project Manager will play the lead role in respect to planning projects and is responsible for:

- establishing the planning team in consultation with the TCEQ,
- scheduling meetings,
- distributing meeting materials before meetings,
- facilitating meetings, and
- preparation and distribution of meeting minutes.

Include a proposed scope of work with maps of the study area in meeting preparation materials. **Do not begin drafting the QAPP before the meeting.** You may conduct meetings in Austin, at the Planning Agency, or via conference call. The outcome of the planning meeting should be a set of project goals and objectives, and appropriate SWQMIS data codes. Develop a QAPP within 30 days of the meeting. Detailed meeting minutes are a Task 2 deliverable.

QAPP Appendices

Appendices are prepared to itemize additional work or projects not initially described in the original QAPP. Planning Agency Project Managers develop appendices in coordination with TCEQ CRP Project Managers, the Project QA Specialist, the Lead QA Specialist and other technical specialists (laboratories, consultants, other agency water programs, etc.), as appropriate. **The CRP QAPP shell does not apply to and should not be used for data collection for federally funded programs or projects. Develop a standalone QAPP and obtain approval from appropriate TCEQ staff for federally funded projects.**

Special Study or Permit Support Monitoring

These QAPP appendices are designed to incorporate special study or permit support monitoring projects into the QAPP as they are planned. Although QAPP appendices are designed to be attachments to the basin-wide QAPP and reference applicable parts, they do need to have specific information addressed that is unique to a project such as: problem definition, task description, project objective, measurement performance specifications, sample design rationale, sampling methods requirements, data management, etc. Include enough information in the QAPP appendix that it functions as a stand-alone document. This information will be addressed during the project planning meeting.

The TCEQ CRP Project Manager tracks the deliverables and forwards QAPP appendices to the Lead QA Specialist for review. After the document has been reviewed by the TCEQ, the TCEQ CRP Project Manager compiles and sends comments to the Planning Agency. The TCEQ is committed to an expeditious review and approval of these documents, retains the right to review all submissions for



up to 30 days. Draft QA documents are not considered approved or completed until all parties have signed the final QAPP appendix.

Use of Acquired Data

Data which are not newly generated as part of a project are called “existing,” “historical,” “secondary,” “non-measurement,” “non-direct,” or “acquired” data. For the purpose of routine data, Section B9 of the basin-wide QAPP shell document addresses non-direct measurement data sources and specifies, “This QAPP does not include the use of routine monitoring data obtained from non-direct measurement sources.” Do not request that historical routine data be submitted through the CRP.

However, in some cases, acquired data will be co-mingled with new data collected under a QAPP. Acquiring data can allow data needs to be met despite time and resource constraints. The use of acquired data may also provide more detailed and exhaustive information than the project could produce otherwise, allowing for a better understanding of the situation. Sources of data include: other projects, databases, reports, etc. The sources and characteristics of acquired data must be specified in Section B9 of the QAPP.

To include acquired data, the Planning Agency should consider and describe the following of the data collection:

- Quality Objectives and Criteria - The original purpose of the data and what QAPP the data were collected under (if applicable) and measurement performance specifications.
- Sampling and Process Design - Sampling locations, dates and times; limitations associated with the data and how these may impact their intended use relative to the project objectives.
- Sampling Methods, Handling and Custody - Chain-of-custody procedures, sample preservation, holding times.
- Analytical Methods - Type of analytical equipment, maintenance, and calibration procedures; laboratory analyst training and capability; sample preparation and methods of analysis.

For the purpose of CRP projects, it is important to verify that data are consistent with TCEQ requirements, and therefore, comparable to other data, allowing for comparisons. The EPA Guidance document *EPA QA/G-5* provides additional information regarding the use of acquired data.



EXHIBIT 2A

CORRECTIVE ACTION PROCESS FLOW CHART

Corrective Action Process for Deficiencies

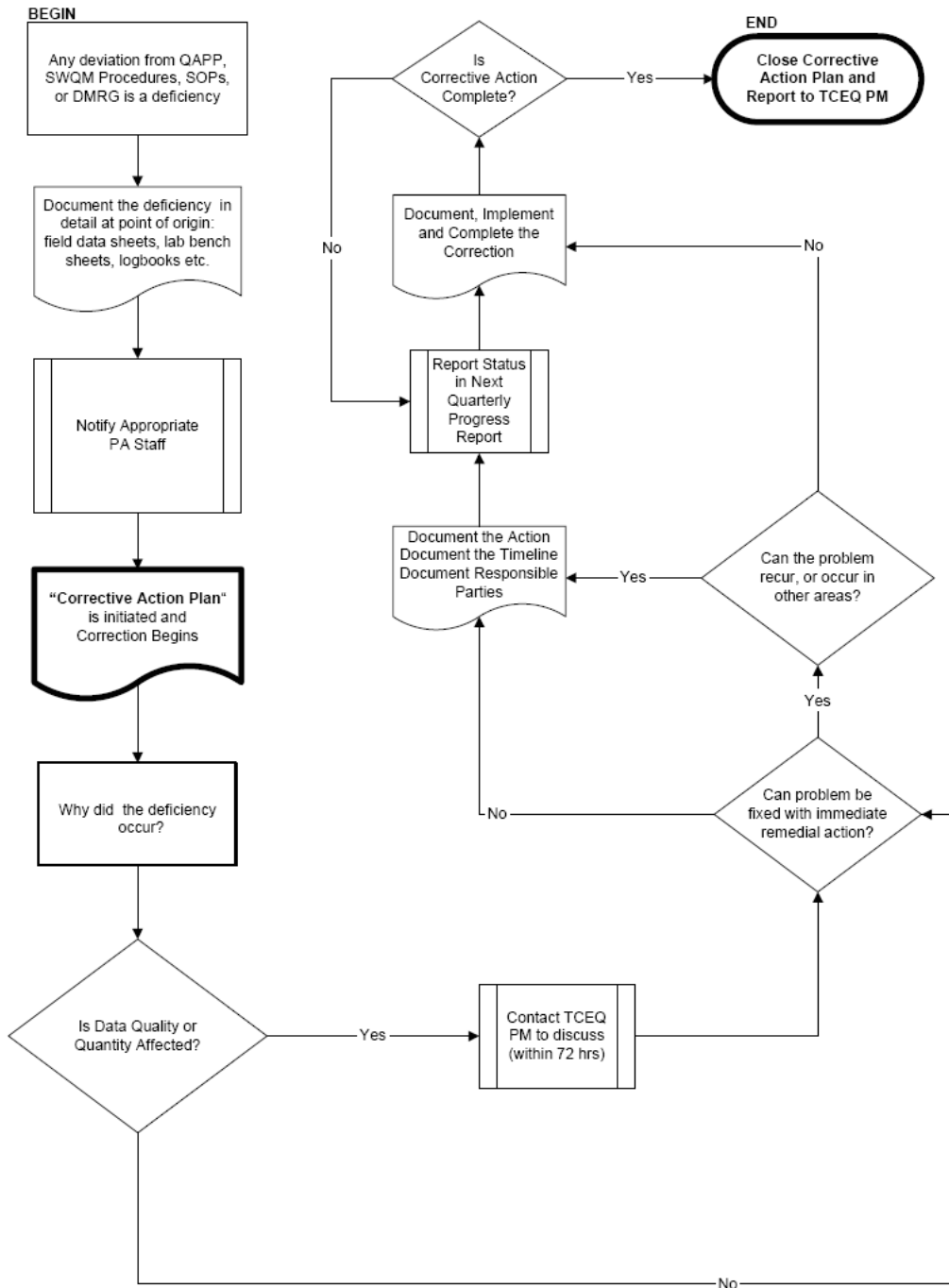




EXHIBIT 2B

CORRECTIVE ACTION STATUS TABLE



EXHIBIT 2B - Corrective Action Status Table

Corrective Action #	Date Issued	Description of Deficiency	Action Taken	Date Closed



EXHIBIT 2C

CORRECTIVE ACTION PLAN FORM



EXHIBIT 2C - Corrective Action Plan Form

Corrective Action Plan
Issued by: _____ Date Issued _____ Report No. _____
Description of deficiency
Root Cause of deficiency
Programmatic Impact of deficiency
Does the seriousness of the deficiency require immediate reporting to the TCEQ? If so, when was it?
Corrective Action to address the deficiency and prevent its recurrence
Proposed Completion Date for Each Action
Individual(s) Responsible for Each Action
Method of Verification
Date Corrective Action Plan Closed?