

Quality Assurance: What, Who, When, Where, Why...And How?

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Texas Commission on Environmental Quality
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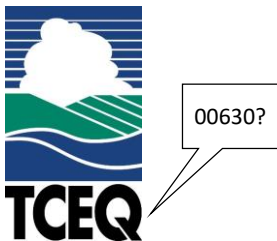
Why do QA?



Science is not finished until it is communicated.

Marc Walport

Same collection methods +
analyte + method + accreditation = comparable
results





006307



CHAPTER 5
COLLECTING WATER SAMPLES

General Principles

Water quality samples are collected for both monitoring and research studies. Sampling techniques for water and sediment samples are covered. Field procedures including flow measurement and "grab" and "composite" sampling are discussed. Sampling procedures for sediment samples are also covered. Sampling procedures for water samples are discussed. Sampling procedures for sediment samples are also covered. Sampling procedures for water samples are discussed. Sampling procedures for sediment samples are also covered.

Required Equipment

See Chapter 10 for details on CTD equipment.

Depth of Sample Collection

Collect water samples at the required depth of the water column. If the water depth is less than 10 m, collect samples at a depth of 1 m below the surface. If the water depth is greater than 10 m, collect samples at a depth of 1 m below the surface.

Where to Collect Samples

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Collecting Water Samples from a Bridge

There is a potential for water samples from a bridge to be contaminated by the bridge structure. If possible, sample water from a location that is not near the bridge structure. If possible, sample water from a location that is not near the bridge structure.

Table 82-1g Sample Storage, Preservation and Handling Requirements for CDR Samples Analyzed at Future Environmental Laboratories

Parameter	Sample Type	Preservation	Storage/Handling	Testing Time
Nitrate	Water	Ascorbic acid	4°C	24 hours
	Sediment	Ascorbic acid	4°C	24 hours
Nitrite	Water	Ascorbic acid	4°C	24 hours
	Sediment	Ascorbic acid	4°C	24 hours

Chemical Structures:

NITRATE

[O-][N+](=O)[O-]

NITRITE

[O-][N+](=O)[O-]

Conventional Parameters in Water

Parameter	Units	Method	Parameter Code	TESTS AVAILABLE	LOQ	LOQ Check	Prevalence	Min. Value of	Lab
NITRATE NITROGEN, TOTAL (NO ₃ -N, AS-N)	mg/L, water	EPA 190.0 Rev. 2.1 (1995)	00620	0.05	0.02	70-130	20	80-120	Holcombe



How do we ensure we're comparing apples to apples?

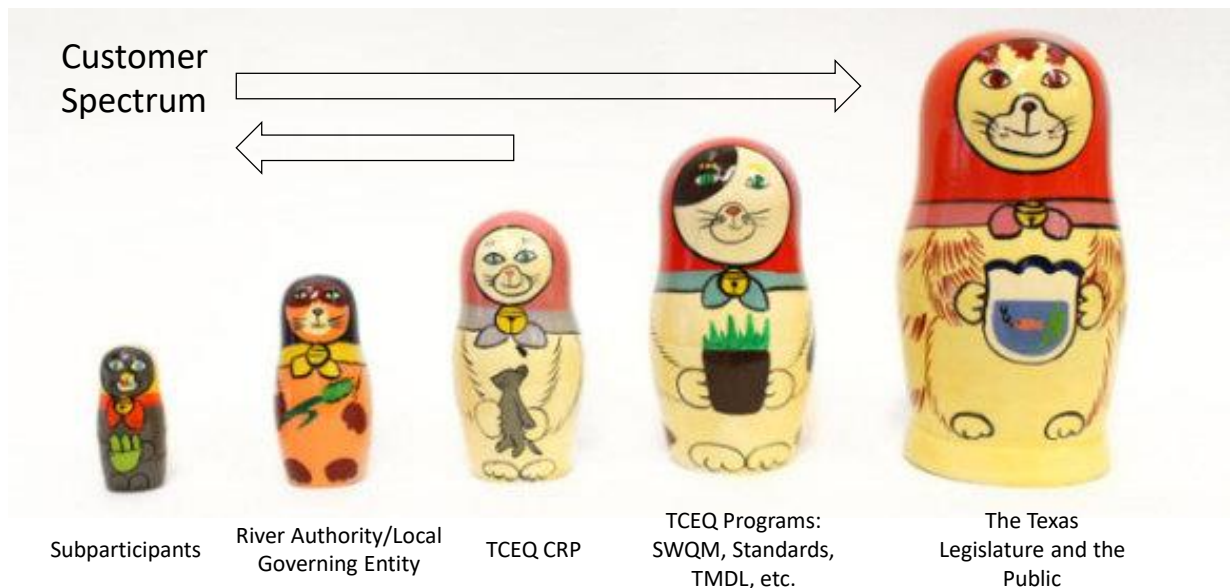
- Quality assurance (QA) is an integrated system of management activities involving

- Planning
- Implementation
- Assessment
- Reporting
- Quality improvement

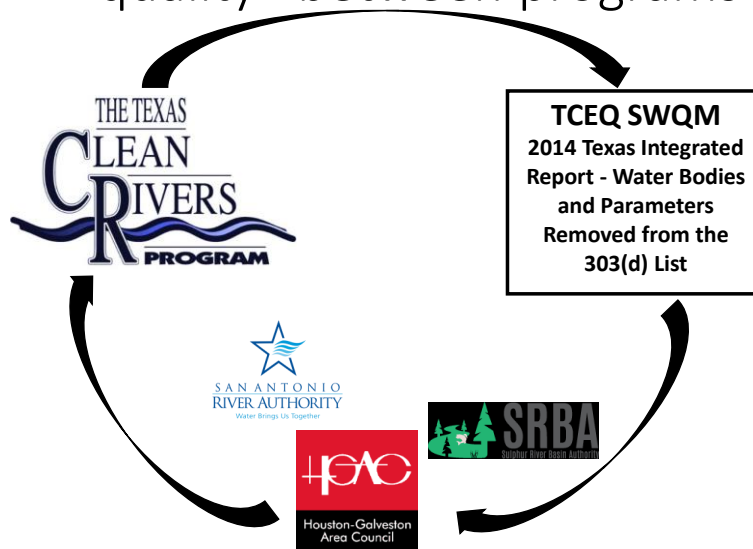
All these management activities are intended to ensure a process is of **the type and quality needed and expected by the customer.**

Per the Clean Rivers Program Guidance and Reference Guide
FY 2016 -2017, taken directly from the EPA Quality Manual
for Environmental Programs, CIO 2105-P-01-0, May 2000

Who is the customer? (CRP example)



QA allows for the sharing of data of “known quality” between programs



Uses for water quality data

- May be used in
 - Water quality assessments
 - Total maximum daily load (TMDL) development
 - Establishing water quality standards
 - Making permit decisions
 - Used by other programs deemed appropriate by the TCEQ
 - To support the achievement of program objectives
 - Other exciting and, as yet, unknown possibilities!!
- If your data is publicly available, you have no control over how that data may be used in future... and that's ok if you are producing quality data!

Per the CRP QAPP Shell FY 2016 -2017

QA for Water Quality Monitoring Programs

- Addresses the following questions:
 - How are the water samples collected?
 - How are the samples analyzed?
 - How is the data obtained from those samples assessed and maintained?
- Where can answers to these burning questions be found?
 - Hint... the answer starts with “Q” and ends with “APP”

QA for Water Quality Monitoring Programs

- Why are these important?
 - Sample collection methodology
 - Analytical methods
 - Data analysis
 - Data storage
- Bottom line
 - Data comparability
 - Data legitimacy

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QA per the EPA – QA Resources

- Quality assurance (QA) is an integrated system of management activities involving
 - **Planning**
 - How the water samples are collected
 - How the samples are analyzed
 - How the data obtained from those samples is assessed and maintained
 - Implementation
 - Assessment
 - Reporting
 - Quality improvement

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 - Planning
 - Implementation
 - Assessment
 - Reporting
 - **Quality improvement**
 - How to improve/better perform the guidelines established for the collection, analysis, assessment, and maintenance of project data

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What is Defensible Data?

Per TCEQ Quality Management Plan (QMP), **Revision 21, January 2016**:

At a minimum, staff is responsible for ensuring that work products are **scientifically valid, legally defensible, and of known and acceptable quality**. Ultimately, we will be judged by how well these products and our programs meet the expectations and needs of our customers. (p. 4)

Environmental data used in agency decisions will be **scientifically valid**; of known precision and bias, acceptable completeness, representativeness, and comparability; and **legally defensible**. (p. 5)

Quality Management Plan on Data Quality

Per TCEQ Quality Management Plan (QMP), **Revision 25, January 2020**:

At a minimum, staff is responsible for ensuring that work products are of **known and documented quality, deemed acceptable for their intended use**. Ultimately, we will be judged by how well these products and our programs meet the expectations and needs of our customers. (p. iv)

Formal, documented QA programs are a prerequisite for federal funding of environmental data activities. State law also requires formal QA programs for certain environmental activities. In other cases, the importance and complexity of environmental operations warrant implementation of formal QA programs. (p. v)

Environmental data used in agency decisions will be of **known and documented quality and will meet specific program- and project-level requirements**. (p. 5)

Data of “known and documented quality”

- Per TCEQ QMP, Revision 25, January 2020 (con’t)
- In 2013, EPA issued “Guidelines for Field Activities” to
 - Establish national consistency in field activities
 - Further promote the collection of reliable and legally-defensible environmental data
 - *Not in the QMP: CRP and other TCEQ and state-agency programs often reference TCEQ Surface Water Quality Monitoring Procedures Vol. 1 and 2*
- Guidelines based on EPA quality-related requirements and provisions in ISO/IEC 17025, “General Requirements for the Competence of Testing and Calibration Laboratories.”

Data of “known and documented quality”

- Per TCEQ QMP, Revision 25, January 2020 (p. 6)
- The guidelines are designed to ensure EPA field staff, grantees, and grantee contractors and subcontractors have quality systems that include documentation of the following components:
 - Data Management - **How the data is maintained**
 - Document Control
 - Records Management
 - Sampling and Environmental Data Management
 - Implementation - **How the water samples are collected**
 - Field Documentation
 - Field Equipment
 - Field Inspection and Investigations
 - Reports - **How the data obtained from those samples is assessed**
 - Quality Improvement - **How to improve/better perform the guidelines established for the collection, analysis, assessment, and maintenance of project data**
 - Personnel Training
 - Internal Audits
 - Corrective Actions

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Per TCEQ QMP, Revision 25, January 2020

“Although the FOG [EPA Field Operations Group] guidelines serve as guidance and not requirements for TCEQ, elements of the guidelines are already represented in TCEQ QAPPs and other agency QA documents. The TCEQ QA Manager will reference the guidelines in future reviews of program and project-specific QA documentation.” (p. 6)

Defensible Data

- Per Quality Assurance Associates (<http://www.qaallc.com/goooddata.html>):
 - Legally defensible - “The data quality is suitable for the stated purpose of the analysis and that sufficient documentation is available to verify the suitability.”
 - Technically/scientifically valid: “A technically valid analysis procedure is one that can adequately identify and/or measure the chemical compounds of interest with the necessary accuracy and precision.”

Defensible Data

- Per Quality Assurance Associates (<http://www.qaallc.com/goooddata.html>)
- The principle ingredients of suitable data quality:
 - Clearly stated measurement purposes
 - Data management
 - Sampling
 - Analysis method
 - Quality control samples
 - Quality control limits
 - Documentation

Water Quality Monitoring QA Guidance

- Exists to standardize processes both within and between surface water quality monitoring projects
- Answers the questions:
 - How are the water samples collected?
 - How are the samples analyzed?
 - How is the data obtained from those samples assessed and maintained?
- Results in data that is of known and documented quality and will meet specific program- and project-level requirements

The Purpose of QA...

In the EPA, the suppliers are those who provide environmental data, and the intermediate goods are the data themselves. The intermediate customers are the compliance officials of EPA and others, such as researchers within EPA and outside and people drafting proposed regulations and laws for environmental management, whether in EPA, in Congress, or in the private world. The data (intermediate products) are used by the intermediate customer to produce the ultimate product of environmental protection and enhancement to the ultimate consumer, the taxpayer. Environmental protection is achieved by deciding what the data mean and taking actions appropriate to that meaning.

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The purpose of the QA program, crassly put, is to prevent any embarrassing situation in which the data fail to serve their intended function because their quality turns out to be too far from what was expected. Stated more generously, QA for data in EPA is the certification, independent of the data supplier, that those data are adequate for their intended purposes.

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QC in EPA must thus be equated with the means the suppliers of data use to check and control the quality of those data, through control over all the technical aspects of their work, beginning with decisions about what, where, when, and how to sample, going through analyses of samples, to maintenance of the integrity of lines of custody and data storage, and, finally, to documentation of the data. A QA program constitutes the activities of oversight and monitoring that ensure that the quality of the data does indeed meet the expectations of its intermediate customers. The purpose of the QA program, crassly put, is to prevent any embarrassing situation in which the data fail to serve their intended function because their quality turns out to be too far from what was expected. Stated more generously, QA for data in EPA is the certification, independent of the data supplier, that those data are adequate for their intended purposes.

From the "Final Report on Quality Assurance to the Environmental Protection Agency", 1988 found at <https://books.google.com/books?id=XVWpRAAAYAAJ&pg=PA42&lpg=PA42&dq=quality+assurance+failures+EPA&source=bl&ots=P-RDvfxRhZ&sig=QA0vGmJEsfCvmkgHQPkED76LLA&hl=en&sa=X&ved=0ahUKEwJ957ym0-70AHUTSGMKHtmfCDQOQ6AEIRzAIBw=onepage&q=quality%20assurance%20failures%20EPA&f=false>

Clean Rivers Program QA Resources

Texas Administrative Code

- [30 TAC 220](#)

Texas Water Code

- [TWC 26.0135](#)

TCEQ Clean Rivers Program Guidance

- Contract
- [Guidance](#)
- [QAPP Shell](#)
- [AWRL Fact Sheet](#)

TCEQ Surface Water Quality Monitoring Sampling Guidelines

- [SWQM Procedures](#)

TCEQ Quality Management Plan

- [TCEQ QMP](#)

Other QA Resources

Laboratory/Analytical QA Resources

- [ISO 17025](#)
- [National Environmental Methods Index](#)

EPA QA Resources

- [EPA Quality Systems](#)
- [EPA QA R-5](#)
- [EPA Agency-Wide Quality Assurance documents](#)

Other explanations of Data Quality

- [What Is “Good” Data?](#) by Donald A. Flory, Quality Assurance Associates
- [The Data User’s Guide to Producing Legally Defensible Environmental Data](#), by C. Hiegel, National Environmental Monitoring Conference

Questions?

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