The NSF Drinking Water Systems Center Quality Management Plan

October 2003

Developed by:

NSF International
789 N. Dixboro Road
Ann Arbor, MI 48105

Authors and Contributors:

C. Bruce Bartley
Angela M. Beach
Carol A. Becker
Gordon Bellen
Mike Blumenstein
Bruce DeMaine
Kristie Wilhelm

FOREWORD

Throughout NSF's over 50-year history as an independent third-party standard's setting, testing and certification organization, NSF has consistently provided services in a quality manner. NSF has an accreditation as a third-party certifier from many national and international organizations such as the American National Standards Institute and the Standards Council of Canada.

The U.S. EPA requires a quality management plan (QMP) for all of the Environmental Technology Verification (ETV) Centers as part of the EPA's ETV Quality Management Plan. The *NSF Drinking Water Systems (DWS) Center Quality Management Plan* provides the framework based on lessons learned during the pilot-phase and demonstrates NSF's conformance with the EPA's ETV requirements.

1. INTRODUCTION

1.1 Purpose

NSF has received an accreditation as a third-party certifier from national and international organizations such as The American National Standards Institute and The Standards Council of Canada, conforming to ISO Guide 65. These two independent organizations assessed NSF's quality management system and found that it conforms to the quality management systems of the above standards.

The U.S. EPA requires a quality management plan (QMP) for all of the Environmental Technology Verification (ETV) Centers as part of the EPA's ETV Quality Management Plan and agreement with NSF. The *NSF Drinking Water Systems (DWS) Center Quality Management Plan* (referred hereafter as the Center QMP) provides the framework by which the Center develops work products and assures their quality in conformance with the EPA's ETV requirements.

The purpose of Center QMP is to assure the quality of services including test data acquisition provided by the EPA's ETV DWS Center. To accomplish this goal, NSF, through its existing quality management system, relies upon its process and procedures to assure the effective management of the ETV DWS Center. This document essentially provides the location of pertinent and existing NSF documents and a "road-map" for how to obtain the information from them.

1.2 Overview of the NSF Quality Management System

NSF developed and implemented the *NSF International Corporate Quality Assurance Manual* for all of it operations. NSF's core operations are the development and maintenance of national and international consensus Standards and the assessment of conformance of products and services (a.k.a. Certification) to the consensus Standards. Although some operations including protocol development, research, and special testing may not appear to be part of NSF's core operations, they too must follow the applicable quality systems found in the *NSF International Corporate Quality Assurance Manual* to assure conformance to quality objectives.

The NSF quality management system, as defined in the *NSF International Corporate Quality Assurance Manual*, has as its key components, the items in the first column of Table 1. The second column of Table 1 contains the NSF controlled document name and number corresponding to the quality management system item in the first column. Controlled documents are organized and sorted by department by the middle three-integer code in the 9-character string. It is best to first look for the controlled documents by the middle string of numbers throughout the list. A complete list of the documents referenced and included in this QMP is included after Attachment B for convenient reference.

Table 1. NSF Quality Management System Summary and References to Controlled Documents

Key NSF International Quality Management System Components:	**Controlled Document Reference:**
Established quality policy and objectives focused on meeting customer and stakeholder needs applicable to all of NSF's operations	AF-700-0002: SECTION 2.0 AND 2.1 IN NSF INTERNATIONAL CORPORATE QUALITY ASSURANCE MANUAL AA-700-0188: CONTINUOUS IMPROVEMENT REPORT
Training of NSF personnel	AF-700-0003: CORPORATE TRAINING MANUAL AF-700-0001: PERSONNEL MANUAL AA-700-0001: PERFORMANCE APPRAISALS
Documentation of procedures, policies and processes used in NSF's operations	ALL PROCEDURES, POLICIES AND PROCESSES USED BY NSF ARE CONTROLLED AND AVAIABLE UPON REQUEST. REFERENCE NUMBERS BEGINNING WITH THE LETTERS "AA" SIGNIFIES THAT THE DOCUMENT IS A PROCEDURE. OTHER LETTER DESIGNATIONS INCLUDE FORMS (AC), ETC.
A process to control the distribution and dissemination of documents such as processes, procedures and contracts for all operations	AA-759-0006: SUBMITTAL AND ISSUANCE OF CONTROLLED DOCUMENTS AA-700-0008: PROCEDURAL MODIFICATION DOCUMENTATION
Addressing customer feed back and comments	AA-700-0191: CLIENT FEED BACK MANAGEMENT SYSTEM AF-700-0002: SECTION 13 IN NSF INTERNATIONAL CORPORATE QUALITY ASSURANCE MANUAL
Internal and external audits and inspections of operations	AA-700-0187: SECTION 14 IN NSF INTERNATIONAL CORPORATE QUALITY ASSURANCE AUDITS
Record retention	AF-700-0002: SECTION 15 IN NSF INTERNATIONAL CORPORATE QUALITY ASSURANCE MANUAL

1.3 Management of the ETV DWS Center within the NSF Quality Management System

1.3.1 Federal Programs Processes

The Federal Programs group specifically responds to and manages government-sponsored and research foundation projects that are not within the scope of NSF's core processes of Standards development and certification. The procedures and controlled documents listed in Table 2 are some of the procedures that pertain to the Federal Programs group and its operations. The first column in Table 2 lists the key operations of Federal Programs and the second column lists the

controlled document corresponding to the key operation in the first column. (Note: the SOPs in Table 2 refer to the Environmental & Research Services (ERS) department, the overall department that Federal Programs is a part of.)

Table 2. Federal Programs Operations and References to Controlled Documents

Key FEDERAL PROGRAMS Operations:	**Controlled Document Reference:**
Handling customer inquiries for services not within the scope of certification or standards development e.g., one-time testing and protocol development	AA-772-0001: HANDLING CUSTOMER REFERRALS
Project coordination and management	AA-772-0005: PROJECT COORDINATION
Record retention	AA-772-0007: SPECIAL STUDIES RECORD RETENTION

1.3.2 ETV DWS Center Management

Mr. Bruce Bartley, a Technical Manager in the Federal Programs group, manages the ETV DWS Center. As stated in the *NSF International Corporate Quality Assurance Manual,* the Federal Programs group reports to Mr. Gordon Bellen, the Vice President of Federal Programs. The Federal Programs group reports to Mr. Mark Jost, Senior Vice President, Water Systems.

Mr. Gordon Bellen, the Vice President of Federal Programs, will assist in the development of marketing communication and outreach activities. He will especially help with the outreach efforts to international stakeholders. He will help in the development of program income and the sustainability of the ETV Center.

Mr. Bruce Bartley manages the DWS Center, as a Technical Manager in the Federal Programs Department. He is directly responsible for all aspects of the ETV tests and also for the DWS Center. His responsibilities include:

- Overseeing that verification testing is properly conducted;
- Assuring stakeholder input into all aspects of the ETV Protocols and operations;
- Ensuring project objectives are met;
- Assigning the review of the qualifications of an FTO to conduct verification testing to NSF staff;
- Assigning the management and coordination of verification testing to the NSF Project staff that may include the auditing and inspection of verification testing, engineering set up and design;
- Market assessment and development for verification testing;
- Project budgeting; and
- Business plan development for private sector funding.

There are two project engineers (PEs) that report to Mr. Bartley: Ms. Carol Becker and Ms.

Kristie Wilhelm. Also reporting directly to Mr. Bartley are Angela Beach and Mike Blumenstein, the project coordinators for the DWS Center. The role and responsibility of each of these persons are described as they relate to specific ETV DWS Center functions:

- Qualification of FTOs,
- Protocol development and technology specific test plan (TSTP) development,
- Verification testing,
- Verification report and statement (VS) preparation, and
- Outreach and communication.

The Project Engineers, Ms. Becker and Ms. Wilhelm, and the Project Coordinators, Ms. Beach, and Mr. Blumenstein are responsible for reviewing the qualifications of an FTO to conduct on-site and field measurements and the subsequent data reduction, water sample collection, management of field operations including local communications and logistics, data compilation and reporting.

The PEs' specific responsibilities for protocol development and TSTP development include at a minimum the following tasks:

- Technical review – For existing protocols and TSTPs, PEs are responsible for assessing comments received from consultants and stakeholders after protocols and TSTPs have been applied for testing. They shall also provide recommendations to resolve technical issues and if necessary identify technical issues requiring a specialist or broader discussion by stakeholders. PE's shall conduct a preliminary engineering and scientific review of the initial generic protocol or TSTP, assure that outside reviewer's comments are addressed, assure states and stakeholders comments are addressed, and assure the Steering Committee's comments are addressed.
- Outside Peer Review – Coordinate review with a contractor, typically an outside expert in the field.

The PEs' specific responsibilities for verification testing include, at a minimum, technical review of the product specific test plan (PSTP). This includes an engineering and scientific review of the initial PSTP to assure that the PSTP conforms to the generic protocol and test plan.

The PEs' specific responsibilities for verification report VS preparation include, at a minimum, technical review, which consists of a preliminary engineering and scientific review of the initial report or VS to assure quality in the assessment of data.

The PEs' specific responsibilities for outreach and communication include, at a minimum, preparing and participating in the preparation of papers and presentations for conferences and symposia, and attendance at conferences and symposia to represent the DWS Center.

The PCs'specific responsibilities for protocol development and TSTP development include at a minimum the following tasks:

- Technical review – assist the PE with their responsibilities (as defined above), including coordination of reviews with the EPA, outside peer reviewers, etc.
- Administrative review – Review of ETV Protocol and TSTP for format and editorial content,

usually concurrent with technical review.
- Outside Peer Review – Coordinate review with a contractor, typically an outside expert in the field.

The PCs' specific responsibilities for verification testing include at a minimum:
- Technical review of the field testing organization (FTO) qualifications - review the initial and subsequent application to assure that the organization conforms to the minimum requirements specified by the EPA and stakeholders.
- Coordination of a technical review of the PSTP – an engineering and scientific review of the initial PSTP.
- QA review – Inspect testing to assure that it is being conducted according to the approved PSTP and Quality Assurance Project Plan (QAPP).
- Administrative review – Review of PSTPs for format and editorial content and assure that the PSTP conforms to the generic protocol and test plan.

The PCs' specific responsibilities for verification report and VS preparation include at a minimum:
- Technical review – Coordinate a preliminary engineering and scientific review of the initial report or verification statement, to assure quality in the assessment of data.
- QA review or the check of 10% or more of the data (as specified in the ETV QMP) from its origin (lab reports and field logbooks) for transcription, transposition or other such types of errors.
- Administrative review – Review the report and VS for format and editorial content, usually concurrent with technical review by the PEs.
- Outside Peer Review – Coordinate review with a contractor, typically an outside expert in the field.

The PCs' specific responsibilities for outreach and communication include at a minimum:
- Representing the Center at conferences and other meetings,
- Preparing and participating in the preparation of papers and presentations for conferences and symposia,
- Responding to technical inquiries related to the Center,
- Stakeholder service especially responding to non-technical Center-related inquiries,
- Updating the web site with current information, and
- Coordinating proper archival and retrieval of information for the Center such as protocols, PSTPs, and reports.

The first column in Table 3 lists the key operations of the ETV Center and the second column lists the controlled document corresponding to the key operation in the first column. Additional procedures, forms, and contracts specific to the ETV DWS Center operations not included in this document are available upon request.

Table 3. ETV Center Operations and References to Quality Documents

Key ETV Center Operations:	**Document Reference:**
Stakeholder interest and inquiries for testing	AA-395-0001: ETV DRINKING WATER SYSTEMS CENTER VERIFICATION TEST PROCEDURES
Protocol Development with involvement of key stakeholders	AA-395-0002: STUDY PROTOCOL AND TECHNOLOGY-SPECIFIC TEST PLAN DEVELOPMENT PROCEDURES
Qualification of Field Testing Organizations	ETV PROGRAM INFORMATION AND GUIDANCE FOR FIELD TESTING ORGANIZATIONS
Verification Testing: inspections and QA/QC oversight	AA-395-0001: ETV DRINKING WATER SYSTEMS CENTER VERIFICATION TEST PROCEDURES AA-395-0003: ETV DRINKING WATER SYSTEMS CENTER TESTING INSPECTION PROCEDURES AD-395-0004: *EPA/NSF ETV PROTOCOL FOR EQUIPMENT VERIFICATION TESTING FOR PHYSICAL REMOVAL OF MICROBIOLOGICAL AND PARTICULATE CONTAMINANTS* (NOTE: ALL PROTOCOLS UNDER THE CENTER INCLUDE A QUALITY ASSURANCE PROJECT PLAN AND THE SAME QUALITY CONTROLS DESCRIBED IN CHAPTER ONE IN THE ABOVE REFERENCED PROTOCOL. SEE SECTION 2.2 FOR THE COMPLETE LIST OF DWS ETV PROTOCOLS)
Report and verification statement preparation	AA-395-0001: ETV DRINKING WATER SYSTEMS CENTER VERIFICATION TEST PROCEDURES

1.3.3 NSF Personnel (Non-ETV DWS Center) Responsibilities:

The following NSF persons are also involved in the ETV DWS Center and have responsibilities for assuring and controlling the quality (QA/QC) of the activities related to the EPA's ETV Drinking Water Center.

Mr. Bruce P. DeMaine**,** Director of Quality Assurance, is responsible for evaluation of the implementation of the NSF Quality Management System. Because the ETV Drinking Water Center is part of NSF operations, he is indirectly responsible for assuring that ETV Drinking Water Center activities conform to the NSF QMP.

Mr. DeMaine is responsible for system audits of NSF operations. His duties and responsibilities include the inspection and audit of the ETV Center, as managed by Federal Programs within NSF. He is responsible for assessing whether the Federal Programs personnel are following the internal procedures for the management of the Center. Mr. DeMaine reports to Mr. Jim Kendzel,

Vice President of Administration.

Additionally, Mr. DeMaine oversees the review of all analytical quality control data produced by NSF Laboratories and uses procedures that NSF developed to assure the quality of data when NSF uses subcontract laboratories for NSF activities such as the ETV testing and NSF Certification Programs. NSF procedures for assuring the quality in the use of subcontract laboratories requires that quality control data be reviewed by either Mr. DeMaine, the QA and Safety Specialist, Ms. Theresa Uscinowicz, or Senior QA Specialist, Joseph Terrell. A description of the staff that Mr. DeMaine may call upon to conduct quality reviews follows.

Mr. Joseph Terrell is a QA Specialist with NSF with more than 20 years experience with organic chemistry. Mr. Terrell, upon request, will review the quality control data for organic chemistry results. Mr. Terrell has worked with organic chemical analytical instrumentation since 1977. Mr. Terrell is also a USEPA Laboratory Certification Officer for Chemistry and Microbiology.

Upon request, Mr. Darrell Williams, the Senior Chemist in the Metals Laboratories, will review the quality control data for all inorganic chemistry results. He will also review proposed revisions to procedures and protocols related to his specialty. He has been in a leadership position with NSF since 1997.

Upon request, Mr. Robert Donofrio, the Microbiological Technical Manager, will review the quality control data for all microbiological results. He will also review proposed revisions to procedures and protocols related to his specialty. He supervises routine analyses, develops new procedures such as for *Cryptosporidium* analysis, and assists in the development of NSF Standards. Mr. Donofrio will review the proposed quality controls proposed by the FTO in the PSTP and the quality control data for all microbiological results. He will also review proposed revisions to procedures and protocols related to his specialty.

Mr. Robert Herman is a technical manager in the NSF laboratory responsible for the proper conduct of the testing of POU devices under the Drinking Water Treatment Units Certification Program. Mr. Herman will assist Center staff with any special testing, be available at technical panel meetings and to the EPA as necessary regarding standardized testing of POU devices.

Mr. Terrell may review the laboratories and other specialists for readiness to perform analyses under the ETV DWS Center before the laboratory is permitted to conduct analyses for the Center. He will also conduct technical system audits of microbiological seeding studies for ETV related work. He may also review proposed revisions to procedures and protocols related to her specialty.

Ms. Theresa Uscinowicz is the NSF QA and Safety Specialist who assists Mr. DeMaine. In addition to her present role at NSF, she previously conducted inorganic analysis for the EPA at their laboratory on Grosse Ile, Michigan.

The states that certify laboratories for drinking water analysis also serve in the quality assurance and quality control of the off-site chemical and bacteria analyses, as agreed by the stakeholders

during the organizational phase of the ETV Drinking Water Pilot. The state certification process involves periodic performance evaluation tests and data calculations from the instrument readings to the reported values.

In summary, the following persons or organizations are responsible for these QA/QC assessments in the ETV Drinking Water Systems Center:

- Technical systems audits that assess quality of technical verification tests are performed by Mr. DeMaine and his staff if the testing is done by the NSF Laboratory. If testing is done by a an FTO or non-NSF laboratory, technical system audits are conducted by Ms. Becker, Ms. Wilhelm, Mr. Blumenstein or Ms. Beach with oversight by Mr. DeMaine and his staff such as Mr. Joseph Terrell.
- Performance evaluation audits that assess performance measurements are performed by the NSF Laboratories when NSF analyzes samples. When non-NSF labs are used, the performance evaluation audits are done by the states that have certified the non-NSF laboratory as a drinking water laboratory. The PEs or PCs with the help of NSF QA specialists (Mr. Terrell) will conduct audits of any on-site performance evaluations as specified in the pertinent protocols. Audits of data quality that assess data calculations and reporting are performed by the NSF Laboratories when NSF analyzes samples. When non-NSF labs are used, the data quality audits are done by the states that have certified the non-NSF laboratory as a drinking water laboratory or by an NSF Specialist (Mr. Williams, Mr. Terrell, Mr. Donofrio) for any on-site performance evaluations as specified in the pertinent protocols.

2. THE CENTER QUALITY MANAGEMENT PLAN (QMP)

2.1 Organization of the Center QMP

The *NSF DWS Center Quality Management Plan* is organized similarly to the organization of the ANSI/ASQC Standard E4 - 1994 *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*. Attachment A addresses NSF's quality management system (Part A of E4), the Center's processes for collecting and evaluating data (Part B of E4), and processes for operation and maintenance of drinking water treatment technologies (Part C of E4). These sections further direct the reader to the "roadmap" or the location of specific E4 requirements in the referenced NSF documents. Attachment B includes a new "roadmap" of new requirements within the EPA's ETV QMP and the corresponding NSF documents that fulfill those requirements.

2.2 Referenced Documents

In addition to the documents referenced in Tables 1, 2, and 3 above, the following documents are also used and referenced within this document:

1. AF-840-0001: Laboratory Quality Assurance Manual
2. AD-395-0001: *EPA/NSF ETV Protocol for Equipment Verification Testing for Arsenic*

Removal

3. AD-395-0002: *EPA/NSF ETV Protocol for Equipment Verification Testing for Removal of Precursors to Disinfection By-Products*
4. AD-395-0003: *EPA/NSF ETV Protocol for Equipment Verification Testing for Removal of Inorganic Constituents*
5. AD-395-0005: *EPA/NSF ETV Protocol for Equipment Verification Testing for Inactivation of Microbiological Contaminants*
6. AD-395-0006: *EPA/NSF ETV Protocol for Equipment Verification Testing for Physical Chemical and Biological Removal of Nitrate*
7. AD-395-0007: *EPA/NSF ETV Protocol for Equipment Verification Testing for Removal of Radioactive Chemical Contaminants*
8. AD-395-0008: *EPA/NSF ETV Protocol for Equipment Verification Testing for the Removal of Synthetic Organic Chemical (SOC) Contaminants*
9. AD-395-0009: *EPA/NSF ETV Protocol for Equipment Verification Testing of Volatile Organic Chemical (VOC) Removal*

3. QUALITY MANAGEMENT SYSTEM (Part A of E4)

The requirements in Part A of the ANSI/ASQC E4 - 1994 for a quality management system are met by two NSF documents:

- AF-700-0002: NSF International Corporate Quality Assurance Manual
- AF-840-0001: Laboratory Quality Assurance Manual

The locations of the specific E4 requirements in these NSF documents are shown in Attachment A. The two referenced documents are attached to this QMP.

4. COLLECTION AND EVALUATION OF DATA (Part B of E4)

The requirements in Part B of the ANSI/ASQC E4 - 1994 for the collection and evaluation of test data are met by the following NSF documents:

- AA-395-0001: ETV Drinking Water Systems Center Verification Test Procedures
- AA-395-0002: Study Protocol and Technology-Specific Test Plan Development Procedures
- Terms and Conditions for Qualifying Field Testing Organizations Performing Verification Services
- AD-395-0004: *EPA/NSF ETV Protocol for Equipment Verification Testing for Physical Removal of Microbiological and Particulate Contaminants* -

The locations of the specific E4 requirements in these NSF documents is shown in Attachment A. The referenced documents are attached to this QMP. The referenced protocol, *EPA/NSF ETV Protocol for Equipment Verification Testing for Physical Removal of Microbiological and Particulate Contaminants*, is used as the basis for the E4 road map; however, all of the Center's protocols follow the same outline as this one and thus all testing conforms to these standardized

protocols.

5. OPERATION OF DRINKING WATER TREATMENT TECHNOLOGIES (Part C of E4)

Only the operation requirements in Part C of the ANSI/ASQC E4 - 1994 for operating a drinking water treatment system are met by the following NSF documents:

- AA-395-0001: ETV Drinking Water Systems Center Verification Test Procedures
- AA-395-0002: Study Protocol and Technology-Specific Test Plan Development Procedures
- Terms and Conditions for Qualifying Field Testing organizations Performing Verification Services
- AD-395-0004: *EPA/NSF ETV Protocol for Equipment Verification Testing for Physical Removal of Microbiological and Particulate Contaminants* -

The location of the specific E4 requirements in these NSF documents is shown in Attachment A. The referenced documents are attached to this QMP.

ATTACHMENT A: LOCATION OF ANSI/ASQC E4-1994 REQUIREMENTS IN NSF REFERENCE DOCUMENTS

ANSI/ASQC PART A

ITEM	E4 REFERENCE NO.	E4 SECTION	SPECIFICATION	NSF REFERENCE DOCUMENT AND SECTION
001	2.01.1.001	mgt	quality policy	2.0-2.1 in CQAM
002	2.01.1.002	mgt	quality system resp. authority, mgt appr	4.0-4.3 in CQAM
003	2.01.1.003	mgt	ID of customers and suppliers	2.0-2.1 in CQAM, Protocol Preface
004	2.01.1.004	mgt	ID their needs/expectations, est. work objectives	3.0-3.4 in CQAM, Protocol Preface
005	2.01.1.005	mgt	negotiation for quality when problems/constraints	3.0-3.4 in CQAM, AA 700-0191
006	2.01.1.006	mgt	ensure E4 understood and implemented	5.1.1 in CQAM
007	2.01.1.007	mgt	provide adequate resources	1.2 in CQAM
008	2.01.1.008	mgt	stop unsafe work or delegate authority	Info and Guid for FTOs
009	2.01.1.009	mgt	assess and document adequacy of Q system	3.0-3.4 and 14.0-14.4 in CQAM
010	2.01.1.010	mgt	define assessment objectives, determine Q system impl. meas.	3.0-3.4 and 14.0-14.4 in CQAM
011	2.01.1.011	mgt	determ. response actions, implement in a timely manner	3.0-3.4 and 14.0-14.4 in CQAM
012	2.02.1.001	Qsyst	Qsys plan, est, doc, imple, and assessed	3.0-3.5 in CQAM
013	2.02.1.002	Qsys	include as org,policy,requi., guidance necessary	3.0-3.5 and 4 in CQAM
014	2.02.1.003	Qsys	shall ensure product/results of type needed	3.0-3.5 in CQAM
015	2.02.1.004	Qsys	no initiation of work until Qsys approved	3.0-3.5 and 5.1.1 in CQAM
016	2.02.1.005	Qsys	Qsys in QMP approved by mgt for implementation	3.5 and 14.4 in CQAM
017	2.02.1.006	Qsys	controls for projects and how projects are plan/impl/assess	3.0-3.5 in CQAM
018	2.02.1.007	Qsys	address all applicable part of E4	3.0-3.5 and 5.11 in CQAM
019	2.02.1.008	Qsys	general descr. items/prog/activities Qsys applies to	3.0-3.5 in CQAM
020	2.02.1.009.00	Qsys	ID/document activities affecting Q	3.0-3.5 in CQAM
021	2.02.1.009.01	Qsys	.....mgt. resp.	4.0-4.3 in CQAM
022	2.02.1.009.02	Qsys	..... technic. act. resp.	4.0-4.3 in CQAM
023	2.02.1.009.03	Qsys	..... required interfaces	3.2 and 4.0-4.3 in CQAM
024	2.02.1.010	Qsys	Qsys update, at least annual	3.5 and 14.0 in CQAM
025	2.03.1.001	Per/Tr	trained for project before starting the work	8.0-8.3 in CQAM, AF-700-0003, AA-759-0006
026	2.03.1.002	Per/Tr	need for training evaluated and impl.	8.0-8.3 in CQAM, AF-700-0003

027	2.03.1.003	Per/Tr	documentation of training	8.0-8.3 in CQAM, AF-700-0003, AA-700-0001
028	2.03.1.004	Per/Tr	ensure training when job reqs change	8.0-8.3 in CQAM, AA-759-0006
029	2.03.1.005	Per/Tr	doc/maintain evidence of job proficiency	8.0-8.3 in CQAM, AA-700-0001
030	2.03.1.006	Per/Tr	training resources	8.0-8.3 in CQAM, AF-700-0003
031	2.04.1.001	Procur	planned/controlled/documented to meet client needs	CQAM 9.0-9.3, LQAM 5.11-5.13
032	2.04.1.002	Procur	docs descr. item/service needed&assoc. tech reqs/crit.	CQAM 9.0-9.3, LQAM 5.11-5.13
033	2.04.1.003	Procur	specify parts of E4 supplier resp. for	NA
034	2.04.1.004	Procur	docs reviewed for accuracy before release	CQAM 9.0-9.3, LQAM 5.11-5.13
035	2.04.1.005	Procur	changes to docs subject to same review	CQAM 9.0-9.3, LQAM 5.11-5.13
036	2.04.1.006	Procur	procedures to ensure procured items meet requirements	CQAM 9.0-9.3, LQAM 5.11-5.13
037	2.04.1.007	Procur	if stated, demonstrated capability needed from suppliers	CQAM 9.0-9.3, LQAM 5.11-5.13
038	2.05.1.001	Doc/Rec	records mgt. procedures required	10.0-10.5 in CQAM, AF-700-0002
039	2.05.1.002	Doc/Rec	must be applicable to all, including electronic media	NA
040	2.05.1.003	Doc/Rec	ID need for control of any specified documents	10.0-10.5 in CQAM, AF-700-0002, AA-759-0006
041	2.05.1.004	Doc/Rec	must be reviewed for conformance before release by authoriz.	10.0-10.5 in CQAM, AF-700-0002, AA-759-0006
042	2.05.1.005	Doc/Rec	if used for work, must be kept current	10.0-10.5 in CQAM, AF-700-0002, AA-759-0006
043	2.05.1.006	Doc/Rec	ensure all users understand docs	10.0-10.5 in CQAM, AF-700-0002, AA-759-0006
044	2.05.1.007	Doc/Rec	ID obsolete/superseded docs/ remove from workplace	10.0-10.5 in CQAM, AF-700-0002, AA-759-0006
045	2.05.1.008	Doc/Rec	maintain docs to show quality of work or conf. to regs.	10.0-10.5 in CQAM, AF-700-0002, AA-759-0006
046	2.05.1.009	Doc/Rec	maintenance to include retention/prot/pres/trac/retr	10.0-10.5 in CQAM, AF-700-0002, AA-759-0006
047	2.05.1.010	Doc/Rec	if evid. records, COC for records and confidentiality proc.	10.0-10.5 in CQAM, AF-700-0002, AA-759-0006
048	2.05.1.011	Doc/Rec	retention times based on contract/stat requirements	10.0-10.5 in CQAM, AF-700-0002, AA-759-0006
049	2.05.1.012	Doc/Rec	storage, protection from damage, loss, deterioration	10.0-10.5 in CQAM
050	2.06.1.001	Comput	all aspects to meets user reqs& conform to appl. conc. stds.	CQAM 7.0-7.3, LQAM 5.8
051	2.06.1.002	Comput	test hard/software before use	CQAM 7.0-7.3, LQAM 5.8
052	2.06.1.003.00	Comput	further testing of configs not req. unless:	NA
053	2.06.1.003.01	Comput	.....software usage scope changes	NA
054	2.06.1.003.02	Comput	.....mods to hard/software configs.	NA
056	2.06.1.004	Comput	assesss changes to configs re: impact on technical & Q obj.	NA
057	2.06.1.005	Comput	change components(& config), must retest	NA
058	2.06.1.006	Comput	program changes, check (&test) config as needed	NA

059	2.06.1.007.00	Comput	configs covered include:	NA
060	2.06.1.007.01	Comput	.....experimental design	NA
061	2.06.1.007.02	Comput	.....design analysis	NA
062	2.06.1.007.03	Comput	.....environmental modeling	NA
063	2.06.1.007.04	Comput	.....process control systems (LIMS, auto data aquis. etc.)	NA
064	2.06.1.007.05	Comput	.....environmental data bases	NA
065	2.07.1.001.00	Planning	establ./imple/control/ and docu planning process to:	5.0-5.6 in CQAM
066	2.07.1.001.01	Planning	.....ID customers, needs, work results expected	5.0-5.6 in CQAM, Protocol Preface
067	2.07.1.001.02	Planning	.....ID tech and Q goals to meet needs	5.0-5.6 in CQAM, Protocol 3.1 and 4.0
068	2.07.1.001.03	Planning	.....translate goals to tech. specs.	5.0-5.6 in CQAM, Test Plans
069	2.07.1.001.04	Planning	.....address cost/schedule constraints	5.0-5.6 in CQAM, Protocol 4.6, and Test Plans
070	2.07.1.001.05	Planning	.....ID acceptance criteria for results	5.0-5.6 in CQAM, Protocol 6.3
071	2.07.1.002	Planning	plan. docs approved by authorized person. Before work starts	5.0-5.6 in CQAM, all Protocols and Test Plans
072	2.07.1.003	Planning	plan doc include work plans, schedules, and QAPPs	5.0-5.6 in CQAM, Protocol 4.0 and 6.0
073	2.08.1.001	Implement	work accord. to plans and other docs, in the correct order	3.0-3.4 in CQAM, Protocol 5.0
074	2.08.1.002	Implement	mgt oversight commensurate to work importance	3.0-3.4 in CQAM, Protocol 6.7
075	2.08.1.003	Implement	SOPs for standard, critical operations	3.0-3.4 in CQAM, AA-395-002
078	2.08.1.004	Implement	SOPS in good format, sufficient detail	3.0-3.4 in CQAM, AA-759-0006
079	2.08.1.005.00	Implement	following addressed at minimum:	3.4 in CQAM
080	2.08.1.005.01	Implement	.....ID of operations needing SOPs	3.4 in CQAM
081	2.08.1.005.02	Implement	.....prep process for SOPs- form, content, applicability	3.4 in CQAM
082	2.08.1.005.03	Implement	..... review/approval for SOPs	3.4 in CQAM
083	2.08.1.006	Implement	tech SOPs reviewed/approved by qualified personnel	3.4 in CQAM
084	2.08.1.007	Implement	impl to include measurement of perf. to tech. Q specs.	3.0-3.4 in CQAM
085	2.08.1.008	Implement	monitor work proc.	3.0-3.4 in CQAM
086	2.08.1.009	Implement	independence of monitor. personnel commensure with work	3.0-3.4 in CQAM
087	2.09.1.001	Ass/Resp	assess. to be plan/sche/periodically cond.	14.0-14.4 in CQAM
088	2.09.1.002.00	Ass/Resp	four types of assessment:	14.0-14.4 in CQAM
089	2.09.1.002.01	Ass/Resp	.....mgt. self-assessment	14.0-14.4 in CQAM, AA-700-0187
090	2.09.1.002.02	Ass/Resp	.....manag. ind. –assessment	14.0-14.4 in CQAM
091	2.09.1.002.03	Ass/Resp	.....tech. self-assessment	14.0-14.4 in CQAM, AA-395-0001

092	2.09.1.002.04	Ass/Resp	.....tech. ind.-assessment	14.0-14.4 in CQAM, AA-395-0001
093	2.09.1.003	Ass/Resp	ass. type selected in planning stage of project	14.0-14.4 in CQAM, AA-395-0001
094	2.09.1.004	Ass/Resp	must address tech requirement (not just procedural)	14.0-14.4 in CQAM, Protocol 6.8
095	2.09.1.005	Ass/Resp	ass. performed according to a described process	5.0 and 14.0-14.4 in CQAM
096	2.09.1.006	Ass/Resp	ass. documented, reported to mgt, reviewed by mgt.	14.0-14.4 in CQAM
097	2.09.1.007	Ass/Resp	assessors must be qualified	14.0-14.4 in CQAM, AA-395-0001
098	2.09.1.008	Ass/Resp	respo. and authority for ass. must be documented/stop work	14.0-14.4 in CQAM and 4. in AA-395-0001
099	2.09.1.009.00	Ass/Resp	authority must include:	14.0-14.4 in CQAM, AA-395-0001
100	2.09.1.009.00	Ass/Resp	.....ID and document problems	14.0-14.4 in CQAM, AA-395-0001
101	2.09.1.009.00	Ass/Resp	.....ID lessons learned and share them	14.0-14.4 in CQAM, AA-395-0001
102	2.09.1.009.00	Ass/Resp	.....propose recommendations	14.0-14.4 in CQAM, AA-395-0001
103	2.09.1.009.00	Ass/Resp	.....independently confirm corrective action	14.0-14.4 in CQAM, AA-395-0001
104	2.09.1.009.00	Ass/Resp	..... document to mgt., monitoring of work where problems	14.0-14.4 in CQAM, AA-395-0001
105	2.09.1.010	Ass/Resp	resp. to adverse conclusions must be timely	14.0-14.4 in CQAM, AA-395-0001
106	2.09.1.011	Ass/Resp	cond. needing corrective action ID and responded timely	14.0-14.4 in CQAM, AA-395-0001
107	2.09.1.012	Ass/Resp	follow-up required to confirm response	14.0-14.4 in CQAM, AA-395-0001
108	2.10.1.001	Improv.	process to be est. / implemented	14.0-14.4 in CQAM, AA-395-0001, AA715-0005 and AA715-0005
109	2.10.1.002	Improv.	proc. to detect and correct problems in all phases	14.0-14.4 in CQAM, AA-395-0001, AA-700-0188
110	2.10.1.003	Improv.	if big problems, ID cause & effect and root causes	14.0-14.4 in CQAM, AA-395-0001, AA-700-0188
111	2.10.1.004	Improv.	ID root causes before permanent prev. measures	14.0-14.4 in CQAM, AA-395-0001, AA-700-0188
112	2.10.1.005	Improv.	plan/doc/imple. appro responses, timely	14.0-14.4 in CQAM, AA-395-0001, AA-700-0188

REFERENCED NSF DOCUMENTS:

"**CQAM**" is the NSF Corporate Quality Assurance Manual (AF-700-0002)

"**LQAM**" is the NSF Laboratory Quality Assurance Manual (AF-840-0001)

"**Info and Guid for FTOs**" is the ETV Program Information and Guidance for Field Testing Organizations

---

AA-700-0188: Continuous Improvement Report

AF-700-0003: Corporate Training Manual

AF-700-0001: Personnel Manual

AA-700-0001: Performance Appraisals

AA-759-0006: Submittal and Issuance of Controlled Documents

AA-700-0008: Procedural modification Documentation

AA-700-0191: Client Feedback Management Systems

AA-700-0187: Corporate Quality Assurance Audits

AA-395-0001: ETV Drinking Water Systems Center Verification Test Procedures

---

E4 PART B

113	3.01.1.001	Plan/Scope	all work (involving generation, acquisition, & use of environ. data) planned and documented	FTO Terms pG-7 Testing, Protocol 4.0, 5.0, 6.3-6.6, 7.0
114	3.01.1.002	Plan/Scope	type & qual. of environ. data, ID and documented using a systematic planning process	Protocol 4.3, 6.0
115	3.01.1.003	Plan/Scope	proj. spec. planning involves key users, customers of data,& tech. staff	AA-395-0002, Protocol 2.5
11 6	3.01.1.004	Plan/Scope	results of planning activities subject to review for conformance to tech. and qual. expectations	AA-395-0002
117	3.01.1.005.00	Plan/Scope	proj. planning coordinated among participating orgs. & include:	Protocol 2.0
118	3.01.1.005.01	Plan/Scope	.....definition of proj./task scope & objs. & desired action or result from the work	Protocol 4.0, 2.5
119	3.01.1.005.02	Plan/Scope	.....ID of orgs. (e.g., sampling groups & anal. labs) that need to participate in proj. & their role in planning/imp/ass. Activities	Protocol 2.1
120	3.01.1.005.03	Plan/Scope	.....ID of environ. data required to achieve desired action or result	Protocol 4.0-4.1
121	3.01.1.005.04.00	Plan/Scope	ID of QA/QC requirements to establish qual. of data collected or produced including:	Protocol 6.0
122	3.01.1.005.04.01	Plan/Scope	.....data qual. indicator (e.g., precision, bias) goals	Protocol 6.3
123	3.01.1.005.04.02	Plan/Scope	.....acceptable level of confidence (or statistical uncertainty)	Protocol 6.0 & 4.0
124	3.01.1.005.04.03	Plan/Scope	.....level of data valid. & verif. needed	Protocol 6.5
125	3.01.1.005.05	Plan/Scope	ID of documentation to describe qual. of results	Protocol 6.7 & 6.9
126	3.01.1.005.06	Plan/Scope	ID of personnel, their skills & required equipment.	Info and Guid for FTOs pG-4-G-6 Qualifications
127	3.01.1.005.07	Plan/Scope	ID of applicable regulatory requirements & other constraints (e.g., time & budget)	Protocol 1.0, 4.6
128	3.01.1.005.08	Plan/Scope	ID of conditions under which suspension of work is necessary	Info and Guid for FTOs pG-9-G-11Investigations and Withdrawal
129	3.01.1.005.09	Plan/Scope	determination of assessment tools (e.g., prog. tech. reviews, peer reviews, surveillances, readiness reviews, & tech. audits)	AA-395-0001
130	3.01.1.005.10	Plan/Scope	ID of methods/procedures for storing, retrieving, analyzing, & reporting data produced	Protocol 7.0, 6.5
131	3.01.1.005.11	Plan/Scope	ID of possible methods/procedures (including waste minimization objs) for char. & disp. of cont. sample material accumulated during the proj	Protocol 2.4, 8.0
132	3.02.1.001	Design Ops	Define, control, verify, & document the design of data collection operations	Info and Guid for FTOs pG-7 Testing & pG-8 Records, Protocol 4.0 & 6.0
133	3.02.1.002	Design Ops	ID all relevant activities pertaining to environ. data operations, establish performance specs, ID appropriate ctrls	Info and Guid for FTOs pG-1 Definitions & pG-4 Responsibility of a FTO, Protocol 2.0
134	3.02.1.003.00	Design Ops	design process includes detailed specs for:	
135	3.02.1.003.01	Design Ops	assessments during proj. (e.g., surveillance, audits, performance evaluations).	AA-395-0001, AA-395-0003, Protocol 6.0
136	3.02.1.003.02	Design Ops	data reporting requirements.	Protocol 7.0, Info and Guid for FTOs pG-8 Testing & pG-8 Records
137	3.02.1.003.03	Design Ops	data validation & verification methods	Protocol 6.5 1
138	3.02.1.003.04	Design Ops	integrating cost or schedule constraints into design	AA-395-0002, Protocol 4.2
139	3.02.1.003.05	Design Ops	protection of health & safety of workers & the public	Protocol 8.0
140	3.02.1.003.06	Design Ops	readiness reviews prior to data collection	AA-395-0001; Info and Guid for FTOs

141	3.02.1.003.07	Design Ops	reqs. for calibration & perf. eval. samples for anal. methods	Protocol 6.4.2 & 6.4.1
142	3.02.1.003.08	Design Ops	requirements for data (and data base) security, archival, & retention	Protocol 6.5
143	3.02.1.003.09	Design Ops	requirements for field & lab QA/QC activities	Protocol 6.0
144	3.02.1.003.10	Design Ops	requirements & qualifications for sampling & analysis personnel	Protocol 2.4
145	3.02.1.003.11	Design Ops	sample handling, packaging, shipping & custody requirements	TSTPs' QA/QC sections
146	3.02.1.003.12	Design Ops	selection of analytical methods & their quality performance expectations	Protocol 6.0, TSTPs
147	3.02.1.003.13	Design Ops	selection of analytical facility or lab	Info and Guid for FTOs pG-3 Definitions
148	3.02.1.003.14	Design Ops	selection of field sampling or testing methodology (specific sampling or field analytical instrumentation & other analytical testing requirements)	Protocols & TSTPs. 5.0
149	3.02.1.003.15	Design Ops	techniques for assessing limitations on data use	Protocol 4.5, 6.3, 7.0
150	3.02.1.003.16	Design Ops	disp. or min. proc. for wastes prod. during sampling & analy. operations	Protocol 2.4
151	3.02.1.004	Design Ops	ID & control (accord. specs determined during design) key variables that det. or directly affect qual. of results	Protocol 6.4
152	3.02.1.005	Design Ops	ensure that data are traceable to the proc. (incl. revisions) used to produce data & to the persons generating or coll. data	AA-395-0001, Info and Guid for FTOs pG-7 Testing & G-8 Records
153	3.02.1.006	Design Ops	deter. & document data transfer, red., verif. , and valid. reqs	AA-395-0001, Info and Guid for FTOs pG-8 Records
154	3.02.1.007	Design Ops	deter. & spec. in the design data interpretation and analysis needs, such as the use of specific statist. methods	Protocol 4.5
155	3.02.1.008	Design Ops	ID & doc. reports to manag. re: work status, interim work results , & ass. results	Info and Guid for FTOs
156	3.02.1.009	Design Ops	ID & state restrictions on using interim results (and data) - defines restriction & the specific data to which it applies	Info and Guid for FTOs
157	3.02.1.010	Design Ops	(if the data are stored in magnetic media) Encode restrictions with the data and report in accompanying documentation	Info and Guid for FTOs
158	3.02.1.011	Design Ops	document results of the environ. data collection design process in QAPP & other plan docs according to reqs. Of QA system & line mgmt	Protocol 6.0
159	3.02.1.012	Design Ops	review/approve QAPP &/or other plan documents by designated persons - tech. capable of eval. the proj.	AA-395-0001, AA-395-0002
160	3.02.1.013	Design Ops	organizations qual. system ID who must review & approve proj.-specific QAPP & explain process for conducting the review	AA-395-0001
161	3.02.1.014	Design Ops	changes to data collection designs or procedures (including field changes) subject to same review/approval protocols as the original document	AA-395-0002
162	3.03.1.001	Implement	environ. data operations implemented according to approved planning docs - by qual. persons Doc. and report deviations to mgmt.	Info and Guid for FTOs: pG-4 Responsibility of a FTO, pG4-G-5 Qualification, pG-6 Inspections
163	3.03.1.002	Implement	determine impact & significance of the deviation on planned operations & make adjustments to such operations	Info and Guid for FTOs pG-6 Inspections.
164	3.03.1.003	Implement	make approved changes to planning documents, operating guides & manuals and distribute to proj. personnel	AA-395-0002
165	3.03.1.004	Implement	data collected during impl. shall be traceable to plans used & persons collecting data	AA-395-0001
166	3.03.1.005	Implement	use qual. and accepted services/items in environ. data operations. Accept. shall be ID on the items &/or in docs traceable to the items.	Info and Guid for FTOs pG-5 Qualifications
167	3.03.1.006	Implement	perform inspections/accept. test. of samp. Meas., anal. instr. (or other meas. systems) and their components to confirm intended use of items	Protocols 6.0
168	3.03.1.007	Implement	when accept. criteria are not met, defic. Resolved & re-inspection performed	Protocols 6.0

169	3.03.1.008	Implement	ctrl tools, gauges, instruments, & other sampling, measuring, & testing equipment for activities affecting qual. as required & at specified intervals, calibrated to maintain accuracy within specified limits. ID unsuitable equipment	Protocols 6.0
170	3.03.1.009	Implement	eval. the valid. of measure./ tests performed with out-of-calibr. equipment - measurements and tests will be repeated	Protocols 6.0
171	3.03.1.010	Implement	document basis for the calib. Maintain docs of calibr. - shall be traceable to the equipment	Protocols 6.0
172	3.03.1.011	Implement	perform periodic preventive and corrective maint. of meas./test equipment - ensure avail. and satisfactory perf. of the systems	Protocols 6.0, Info and Guid for FTOs pG-6 Inspections
173	3.03.1.012	Implement	re-calibrate all equipment subj. to maintenance or repair, before the equipment is used	Test Plans-QA/QC Section (ch. 2 sec 13.0, ch. 3 sec 14.0, ch. 4 sec 14.0, ch 5 sec 14.0, ch. 6 sec 14.0)
174	3.03.1.013	Implement	perform hand., stor., cleaning, pack., ship., and pres. of field and lab samples accord. to req. specs, protocols, or proc. to prevent damage, loss, deter., artifacts, or interfer. Track and document sample chain of custody	Test Plans (ch. 2 sec 9.4.2, 13.11.3) (ch. 3 sec 10.3.1, 14.8) (ch. 4 sec 10.3.1, 14.8) (ch. 5 sec 10.3.1, 14.8) (ch. 6 sec 10.3.1, 14.8)
175	3.03.1.014	Implement	perform data or info. mgmt., incl. trans., storage, valid., assess., process., & retrieval, accord. to approved instr., methods, procs.	Protocol 7.0 & TSTPs' Data Handling Protocol section
176	3.04.1.001	Ass/Resp	assess activities perf. during environ. data ops. that affect the qual. of the data & the find. reported to mgmt. to ensure that the reqs stated in planni docss (e.g., QAPPs, work & sampling plans) are being implemented	Info and Guid for FTOs - pG-6 Inspection, AA-395-0001
177	3.04.1.002	Ass/Resp	take appropriate corr. actions and verify/document the ass. findings	Info and Guid for FTOs - pG-6 Inspections, AA-395-0001
178	3.04.1.003	Ass/Resp	eval. data obtained prev. from a method or instrument found to be nonconforming to specs to determine impact of a nonconform. on qual. of data. Doc. impact and the approp. action taken	Not Applicable as not allowed in (NA)
179	3.05.1.001	Ass/Verif	assess, verify, and qualify data obtained from environ. data operations according to their intended use	Protocol 6.0 and TSTPs
180	3.05.1.002	Ass/Verif	express limitations on this intended data use (quantitatively) and doc. reporting of the data in print or electronically	AA-395-0001; Protocol 6.0
181	3.05.1.003	Ass/Verif	assess data obtained from sources that did not use a qual. system equiv. to this Standard according to approved/documented proc.	Info and Guid for FTOs – pC-1 Existing Data
182	3.05.1.004	Ass/Verif	independ. review of proj. reports w/ data, OR report results of environ. data ops to confirm that data/r results are presented correctly.	AA-395-0001
183	3.05.1.005	Ass/Verif	reports shall be approved by mgmt. prior to release, publ., or dist.	AA-395-0001

REFERENCED NSF DOCUMENTS:

AA-395-0001: ETV Drinking Water Systems Center Verification Test Procedures

---

AA-395-0002: Study Protocol and Technology-Specific Test Plan Development Procedures

---

AA-395-0003: ETV Drinking Water Systems Center Testing Inspection Procedures

---

"**Info and Guid for FTOs**" is the ETV Program Information and Guidance for Field Testing Organizations

---

"**Protocol**" is the Protocol for Equipment Verification Testing for Physical Removal of Microbiological and Particulate Contaminants – April 2002 (equivalent sections appear in each Protocol)

"**TSTPs**" refers to the Technology Specific Test Plans that make up each Protocol after Chapter 1

E4 PART C

184	4.01.1.001	Planning	plan and doc. activities and projects re: design, constr., and operation of ET	Protocol 5.0, AA-395-0001
185	4.01.1.002	Planning	proj.-specific planning for ET must involve the key users/customers of systems and persons resp. for activities affecting qual. Planning outputs to be reviewed for conform. to tech. and qual. Requirements	Protocol 5.2, Info and Guid for FTOs
186	4.01.1.003.00	Planning	coordinate proj. planning among participating orgs.and include the ID of the following elements:	Protocol 2.1, 5.0
187	4.01.1.003.01	Planning	acceptance criteria for completed systems	Not Applicable (NA)
188	4.01.1.003.02	Planning	delivery, handling , storage, ID, inspect., test., and install. reqs	Protocol 5.0
189	4.01.1.003.03	Planning	notification of participating orgs. & their role in planning , design, constr./fabric., operation, and ass. Activities	Protocol 2.0, 5.0
190	4.01.1.003.04	Planning	personnel, equip., and other resources required	NA
191	4.01.1.003.05	Planning	program/task scope and obj. & a list of primary activities involved	Protocol 5.0
192	4.01.1.003.06	Planning	program tech. reviews, peer reviews, surveillances (overnight), tech. and QA audits, readiness reviews, and other assessment processes	AA-395-0001
193	4.01.1.003.07	Planning	project and QA records required	Protocol 6.0
194	4.01.1.003.08	Planning	specific ET components to be designed, fabricated, constructed, and operated	NA
195	4.01.1.003.09	Planning	tech., perf., regulatory and qual. stds., criteria, and obj.	NA
196	4.01.1.004	Planning	proj. and activity planning docs should include appropriate use of work plans/QAPPs/design criteria/schedules/organization charts/conceptual design drawings	Protocol - all
197	4.02.1.001	Design	establ. and imp. processes and proc. to ensure that ETs are designed using sound engineering/scientific principles and stds.	May 1997 SC meeting formed tech subcommittee to address this issue
198	4.02.1.002.00	Design	impl. procedures to ensure control of design inputs/ processes/ outputs/configuration changes/interfaces(coordination), and records to provide for:	
199	4.02.1.002.01	Design	.....ability of components/systems to perform under expected conditions	Protocol 4.0
200	4.02.1.002.02	Design	.....ability of components/systems to safely respond to unexpected conditions, including consid. of redundant systems/other safeguards	Protocol 8.0
201	4.02.1.002.03	Design	.....acceptance/rejection crit. for components and systems	NA
202	4.02.1.002.04	Design	.....agreement of customer needs expressed during planning w/ tech. specs for materials/items/services---include delivery doc. reqs.	NA
203	4.02.1.002.05	Design	.....cost/schedule constraints	NA
204	4.02.1.002.06	Design	.....compliance with regulatory reqs., national stds and codes, and organizational engineering practices	Protocol - all
205	4.02.1.002.07	Design	.....considerations of unintended uses and misuses	NA
206	4.02.1.002.08	Design	.....effective coordination and interfacing of participating orgs	Protocol 2.1, 2.5
207	4.02.1.002.09	Design	.....prod. of verif., reviewed, and approved design outputs in a timely manner	NA
208	4.02.1.002.010	Design	.....safety, reliability, serviceability, and maintainability requirements	Protocol 3.0, Test Plans O&M section
209	4.02.1.003	Design	document results of the final design in specs and/or drawings that define the design baseline	NA
210	4.02.1.004	Design	specify necessary tech. and qual. accept. Criteria..detail req. inspections/ tests to verify acceptable constr./operation for design docs.	NA

211	4.02.1.005	Design	control design changes, (incl. field changes where appropriate)	NA
212	4.02.1.006	Design	perform formal verif. of final design	NA
213	4.02.1.007	Design	independent verif. of design adequacy...verif. of adequacy of design early in the project....prior to dependence upon design to perform intended function. Document design verif.	NA
214	4.02.1.008	Design	perform readiness reviews/other assessments prior to the impl. of final system design	NA
215	4.03.1.001	Construct	perform construction (or fabrication/manufacture/erection) of systems and components under controlled cond. accord. to drawings, specs, and reqs. of the approved design.	NA
216	4.03.1.002	Construct	qualified and accepted services or items used in those places indicated in the design	NA
217	4.03.1.003	Construct	maintain ID of item's acceptability on items/docs traceable to items (or any other way ensuring ID)	NA
218	4.03.1.004	Construct	perform inspect./tests at various points during constr./fab. process to verify conformity to design specs.	NA
219	4.03.1.005	Construct	control handling/storage/clean./pack./ship./pres. equip., components, and parts during constr./fab. to prevent damage, loss, and deterior.	NA
220	4.03.1.006	Construct	perform periodic prevent. and correct. main of systems and equip. used during constr. and fabr. according to oper. guidance and/or design specs. to ensure satisfactory perf.	NA
221	4.03.1.007	Construct	meas./test equip. used during constr./fab. is proper type, range, and accuracy & properly calib., main., and used according to design specs (and other planning documents)	NA
222	4.03.1.008	Construct	recalibrate equip. found unsatisfactory for their prescribed use and certify within toler. before being used	NA
223	4.03.1.009	Construct	eval. validity of measur./ tests perf. with out-of-calib. equip... and repeat measur./ tests as required	NA
224	4.03.1.010	Construct	calibr. all measur./test equipment used in constr./fab. which affects quality	NA
225	4.03.1.011	Construct	doc. basis for the calib/maintain calib. docs./ensure traceable to equipment	NA
226	4.03.1.012	Construct	install components/systems according to current/approved designs	NA
227	4.03.1.013	Construct	maintain documented test/inspect. Procedures w/ test obj./ test pers. reqs/ test equip./accept. crit./dispos/ of unacceptable items	NA
228	4.04.1.001	Operations	operate ET according to approved design docs and operating instructions and guides	Protocol 3.0, 6.6
229	4.04.1.002.00	Operations	technology operating guides include:	
230	4.04.1.002.01	Operations	.....appropriate ctrls for materials (including consumables), and meas./ test equip.	Protocol 6.4.1
231	4.04.1.002.02	Operations	.....configuration management	NA
232	4.04.1.002.03	Operations	.....operating procedures and parameters for specific components and systems configs. incl. specified safety limits	Protocol 8.0
233	4.04.1.002.04	Operations	.....process equipment ctrl and maintenance, including reqs. during abnormal conditions for inspect./test situations, fault/emergency conditions	Protocol and Test Plans (Operations and Maintenance Manual Review)
234	4.04.1.002.05	Operations	.....special environments, time/ temp./other factors affecting the qual. of operation	Protocol and Test Plans (Operations and Maintenance Manual Review)
235	4.04.1.002.06	Operations	.....skill/capability/and knowledge of operators to meet operational and qual. reqs	Protocol and Test Plans (Operations and Maintenance Manual Review)
236	4.04.1.003	Operations	when the qual. of systems operation is directly affected, control & verify periodically auxiliary materials/ utilities/consumables (to ensure uniformity of their effect on the systems involved) according to established procedures.....use only qualified and accepted services or items and consumables during the operation of systems	NA

237	4.04.1.004	Operations	provide status indicators with tolerance limits to indicate operating status of systems/components of systems indicated in design/operating instructions and guides	NA
238	4.04.1.005	Operations	maintain ID of acceptability on items, documents traceable to items (or in a manner ensuring ID)	NA
239	4.04.1.006	Operations	perform inspect./tests at various points during operation to verify conformity to operating specs/ parameters...inspections/ tests shall clearly indicate accept. crit. applied and reflect importance of the item or service to quality	Protocol 6.6–
240	4.04.1.007	Operations	control handling/storing,/cleaning/packaging/shipping/preserving equip., components, and parts during operation to prevent damage/ loss/deterioration	NA
241	4.04.1.008	Operations	perform periodic prevent./correct. main. of ET according to operating guidance/design specs to ensure systems performance	Protocol 5.1
242	4.04.1.009	Operations	establish/maintain availability of critical spare parts according to operating exp./ manufacturer's guidance/design specs.	NA
243	4.04.1.010	Operations	measur/test equipment are of proper type/ range/accuracy/properly calibrated/maintained/used according to design specs (and other planning documents)	Protocol & Test Plans O&M section
244	4.04.1.011	Operations	recalib./certify equip. found unsatisfactory for accept. testing within tolerances before being used for accept. testing	Protocol & Test Plans QA/QC section
245	4.04.1.012	Operations	evaluate validity of measur./tests performed w/ out-of-calib. equip. and repeat measurements and tests as required with properly calib. equip.	Protocol & Test Plans QA/QC section
246	4.04.1.013	Operations	calibrate meas./test equip/ used in work affect/ quality...document the basis for calib.....document of calib. maintained and traceable to the equip.	Protocol & Test Plans QA/QC section
247	4.05.1.001	Ass/Resp	regularly assess activities performed during the design/constr./operation of ET that affect quality to ensure approved planning reqs./design specs./operating guides are implemented	NA
248	4.05.1.002	Ass/Resp	take corrective actions/verify & document adequacy in response to ass. finding	NA
249	4.06.1.001	Verif/Acc	verify perf. of ET (and system components) according to ET's intended use (as specified in approved design specs or other planning docs)	Protocol 1.2, AA-395-0001
250	4.06.1.002	Verif/Acc	perform/document "start-up testing" prior to the routine use of and reliance on the ET to perform intended function.	Protocol 5.3
251	4.06.1.003	Verif/Acc	when these procedures involve environ. data operations, do Part B of this Standard.	AA-395-0001
252	4.06.1.004	Verif/Acc	the level of independ. of ass. persons is commensurate with the design specs. and operating reqs	Info and Guid for FTOs– pG-4 & G-5 Qualifications
253	4.06.1.005	Verif/Acc	....when accept. criteria not met, deficiencies are resolved and reassessments conducted.	NA

REFERENCED NSF DOCUMENTS:

AA-395-0001: ETV Drinking Water Systems Center Verification Test Procedures

---

AA-395-0002: Study Protocol and Technology-Specific Test Plan Development Procedures

---

"**Info and Guid for FTOs**" is the ETV Program Information and Guidance for Field Testing Organizations

---

"**Protocol**" is the Protocol for Equipment Verification Testing for Physical Removal of Microbiological and Particulate Contaminants – April 2002 (equivalent sections appear in each Protocol)

ATTACHMENT B: ADDITIONAL LOCATIONS OF ETV QMP REQUIREMENTS IN NSF REFERENCE DOCUMENTS

ITEM	EPA QMP REFERENCE NO.	ETV QMP SECTION	SPECIFICATION	NSF Reference Document and Section
001	A1	Proj Mgt	Title & Approval Sheet	Protocol 1.2, AA-395-0001
002	A2	Proj Mgt	TOC and Document Control Format	Protocol 1.2
003	A3	Proj Mgt	Dist. List	Protocol 1.2
004	A4	Proj Mgt	Proj/Task Org and Schedule	Protocol 1.2, 4.0, 4.6
005	A5	Proj Mgt	Prob Def'n/Background	Protocol 1.1, 3.0
006	A6	Proj Mgt	Proj/Task Description	Protocol 4.0, 5.0 and TSTPs' Tasks sections
007	A7	Proj Mgt	Quality Objectives and Criteria for Measurement Data	Protocol 6.0, TSTPs' QA/QC Sections, and Info and Guid for FTOs
008	A8	Proj Mgt	Special Training Req's/Cert	Protocol 3.0 and Info and Guid for FTOs
009	A9	Proj Mgt	Documentation and Records	Protocol 4.4, 5.2 and 7.1, and TSTPs' Data Handling Protocol section
010	B1	Measurement/ Data Acqs.	Sampling Process Design (Exp Design)	Protocol 4.0 and TSTPs' Tasks sections
011	B2	Measurement/ Data Acqs.	Sampling Methods Req's	Protocol 5.4 and TSTPs' Sampling and Water Quality Sample Collection sections
012	B3	Measurement/ Data Acqs.	Sample Handling and Custody Req's	Protocol 5.2, TSTPs' Water Quality Sample Collection and Data Handling Protocol sections
013	B4	Measurement/ Data Acqs.	Analytical Methods Req's	TSTPs Tasks sections
014	B5	Measurement/ Data Acqs.	QC Req's	Protocol 6.0 and TSTPs' QA/QC sections
015	B6	Measurement/ Data Acqs.	Inst/Equip Testing, Insp and Maint Req's	TSTPs' QA/QC sections
016	B7	Measurement/ Data Acqs.	Inst Calibration and Freq	TSTPs' QA/QC sections
017	B8	Measurement/ Data Acqs.	Insp/Acceptance Req's for Supplies & Consumables	N/A for on-site testing. Laboratory inspections fulfilled by Standard Methods (see B4)
018	B9	Measurement/ Data Acqs.	Data Acquisition (Non-Direct Meas)	Protocol 5.2, TSTPs' Data Handling Protocol sections
019	B10	Measurement/ Data Acqs.	Data Management	Protocol 5.2, 6.5 and 7.0, and TSTPs' Data Handling Protocol sections
020	C1	Assessment/ Oversight	Assessments & Response Actions	Protocol 6.5 and 6.6, AA-395-0001, AA-395-0003, Info and Guid for FTOs
021	C2	Assessment/ Oversight	Reports to Mgt	Protocol 6.7
022	D1	Data Val. and Usability	Data Review, Validation and Verif Req's	Protocol 6.5, 7.0, AA-395-0001
023	D2	Data Val. and Usability	Validation and Verification Methods	Protocol 7.0, AA-395-0001
024	D3	Data Val. and Usability	Reconciliation with DQOs	Protocol 6.5, 7.0

REFERENCED NSF DOCUMENTS:

AA-395-0001 is the ETV Drinking Water Systems Center Verification Test Procedures

---

AA-395-0003 is the ETV Drinking Water Systems Center Testing Inspection Procedures

---

"**Info and Guid for FTOs**" is the ETV Program Information and Guidance for Field Testing Organizations

---

"**Protocol**" is the Protocol for Equipment Verification Testing for Physical Removal of Microbiological and Particulate Contaminants – April 2002 (equivalent sections appear in each Protocol)

List of Referenced NSF Controlled Documents:

NSF considers all of its Controlled Documents such as Standard Operating Procedures, forms, or laboratory manuals as proprietary business information. Therefore, NSF will provide the EPA any additional Controlled Documents referenced in the ETV DWS Center Quality Management Plan, upon request. NSF requests that the EPA refrain from sharing these documents with any other party. Documents listed in **bold** are included and attached to the QMP:

AA-395-0001: ETV Drinking Water Systems Center Verification Test Procedures
AA-395-0002: Study Protocol and Technology-Specific Test Plan Development Procedures
AA-395-0003: ETV Drinking Water Systems Center Testing Inspection Procedures
AD-395-0001: *EPA/NSF ETV Protocol for Equipment Verification Testing for Arsenic Removal*
AD-395-0002: *EPA/NSF ETV Protocol for Equipment Verification Testing for Removal of Precursors to Disinfection By-Products*
AD-395-0003: *EPA/NSF ETV Protocol for Equipment Verification Testing for Removal of Inorganic Constituents*
AD-395-0004: *EPA/NSF ETV Protocol for Equipment Verification Testing for Physical Removal of Microbiological and Particulate Contaminants*
AD-395-0005: *EPA/NSF ETV Protocol for Equipment Verification Testing for Inactivation of Microbiological Contaminants*
AD-395-0006: *EPA/NSF ETV Protocol for Equipment Verification Testing for Physical Chemical and Biological Removal of Nitrate*
AD-395-0007: *EPA/NSF ETV Protocol for Equipment Verification Testing for Removal of Radioactive Chemical Contaminants*
AD-395-0008: *EPA/NSF ETV Protocol for Equipment Verification Testing for the Removal of Synthetic Organic Chemical (SOC) Contaminants*
AD-395-0009: *EPA/NSF ETV Protocol for Equipment Verification Testing of Volatile Organic Chemical (VOC) Removal*
ETV Program Information and Guidance for Field Testing Organizations
AA-700-0001: Performance Appraisals
AA-700-0008: Procedural Modification Documentation
AA-700-0187: Corporate Quality Assurance Audits
AA-700-0188: Continuous Improvement Report
AA-700-0191: Client Feed Back Management System
AA-759-0006: Submittal and Issuance of Controlled Documents
AA-772-0001: Handling Customer Referrals
AA-772-0005: Project Coordination
AA-772-0007: Special Studies Record Retention
AF-700-0001: Personnel Manual
AF-700-0002: NSF International Corporate Quality Assurance Manual
AF-700-0003: Corporate Training Manual
AF-840-0001: Laboratory Quality Assurance Manual