

QUALITY ASSURANCE PROJECT PLAN

RIDEM's 2000 303(d) List of Impaired Waters Supplemental Monitoring Program (Groups 3 and 4)

Rhode Island Department of Environmental Management

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- Attachment A EPA Worksheets
- Attachment B Field Sampling SOPs
- Attachment C Laboratory Analytical SOPs
- Attachment D YSI Model 85 Operations Manual
- Attachment E Blank Field Sheet
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2.0 Document Format

A copy of the completed EPA Worksheet No. 2 is provided in Attachment A. The worksheets and/or required information that are not applicable or are in a format other than an EPA worksheet are summarized in Table 1 with a brief explanation.

Table 1 Required QAPP elements checklist.

EPA Worksheet	Section	Location	Comments
1	1.0	Cover Page	
2	2.0	Attachment A	
3	3.0	Section 3.0	Table 2
4	3.0	Section 3.0	Narrative
5a	4.0	Section 4.1	Narrative
5b	4.0	Section 4.2	Narrative
6	4.0	Section 4.3	Narrative
7	4.0	Section 4.2	Narrative
8a	5.0	Attachment A	
8b	5.0	Section 5.2	Narrative
9a	6.0	Section 5.0	Narrative
9b	6.0	Attachment A	
9c	6.0	Section 8.1	Narrative, Table 6 and Table 7
9d	6.0	Attachment A	
10	6.0	Section 6.2	Table 3
11a	7.0	Sections 7.1 & 7.2	Narrative
11b	7.0	Attachment A	
12a	8.0	Section 8.1	Narrative and Table 4 and 5
12b	8.0	Attachment A	
13	9.0	Section 9.1	Table 6
14	9.0	Section 9.3	Table 7
15	9.0	Section 9.3	Table 8
16	10.0	Section 10.2	Table 9
17	11.0	Section 11.0	Table 11
18	11.0	Not Attached	Refer to Section 9.3 and Table 9
19	11.0	Not Attached	Refer to Section 9.3 and Table 9
20	12.0	Section 12.1	Table 10
21	12.0	Not Attached	See lab SOPs Table 10
22a	13.0	Attachment A	
22b	13.0	Not Attached	Refer to EPA Worksheet 22a
23a	13.0	Not Attached	Refer to Appendix D
23b	13.0	Not Attached	Refer to Appendix D
24a	13.0	Attachment A	
24b	13.0	Section 13	Narrative
25	14.0	Section 14.0	Table 11
26	15.0	Section 15.0	Table 12
27a	16.0	Section 16.0	Narrative
27b	16.0	Section 16.0	Table 13
27c	16.0	NA	Project Assessment Plan
28	17.0	Section 17.0	Table 14
29a	19.0	Section 19.0	Table 15
29b	19.0	Attachment A	EPA Worksheets 11b, 22a, and 24a
29c	19.0	NA	Data validation Modifications
30	20.0	Attachment A	EPA Worksheets 11b, 22a, and 24a

3.0 Distribution List and Project Personnel Sign-Off Sheet

The distribution list documents to whom copies of the approved QAPP and any subsequent revisions will be sent. The distribution list is provided in Table 2.

Table 2 Distribution List

QAPP Recipient	Title	Organization	Telephone Number
Steve DiMattei	Quality Assurance Chemist	USEPA, NE Region I	(617) 918-8369
Connie Carey	Principal Environmental Scientist	RIDEM	(401) 222-4700 x 7239
Wayne Jenkins	Principal Sanitary Engineer	RIDEM	(401) 222-4700 x 7272
Robert Richardson	Senior Environmental Scientist	RIDEM	(401) 222-4700 x 7240
Doug Cullen	Laboratory Manager	Microinorganics, Inc.	(401) 782-8166
Karen Gavitt	Laboratory Supervisor	MITKEM, Inc.	(401) 732-3400
Kathleen Feldman	Laboratory Manager	BAL Laboratory, Inc.	(401) 785-0241
Linda Green	Director	URI Watershed Watch Program	(401) 874-2905
Kevin Braga	Laboratory Manager	ESS Laboratory	(401) 461-7181

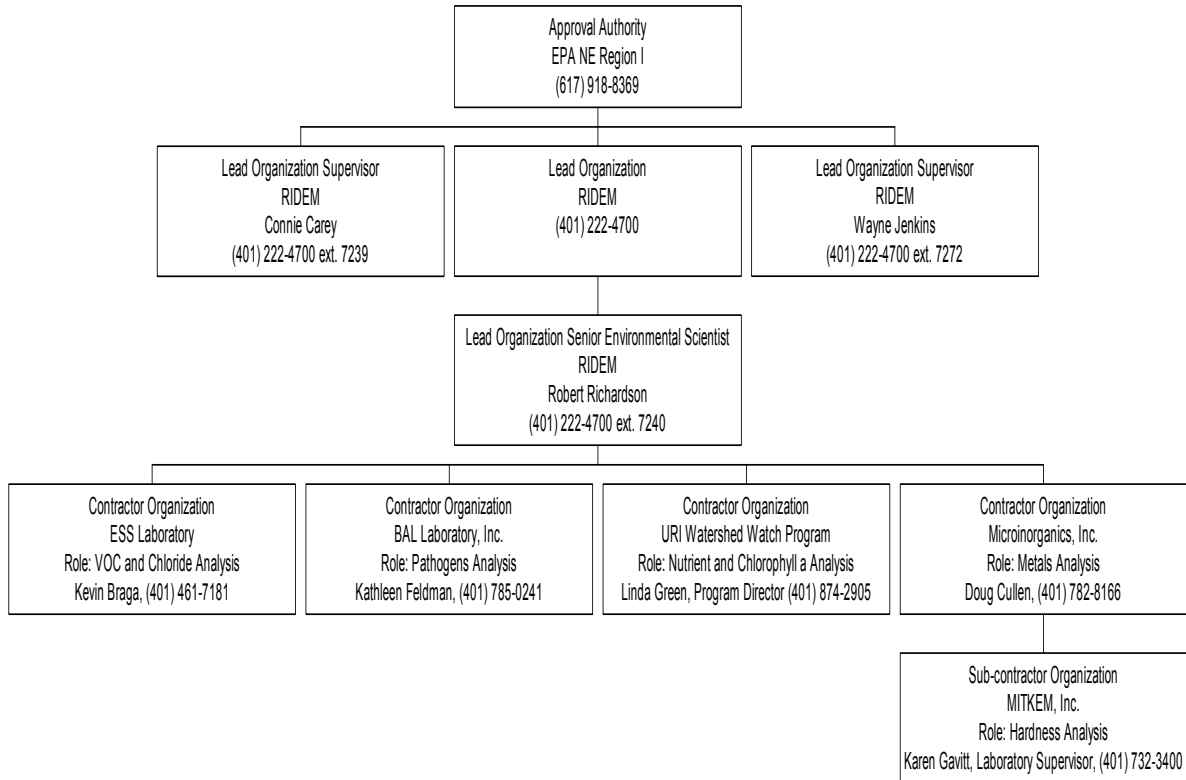
In addition to the distribution list, all personnel in the organization chart will receive a copy of the QAPP. A separate Project Personnel Sign-Off Sheet was not developed for this project.

4.0 Project Organization

The project organization chart is provided below. This chart identifies reporting relationships between the Lead Organization and other organizations, including contractors and sub-contractors and their contact information.

4.1 Project Organizational Chart

Figure 1 Organizational Chart



4.2 Communication Pathways

It is anticipated that RIDEM personnel will conduct all sampling activities for this project. The Project Manager will contact all potential sampling personnel via email at least one week before the anticipated sampling date. The Project Manager will be responsible for contacting all laboratories to order all necessary sampling containers and to alert the laboratory to incoming samples. It will be the responsibility of the laboratories to contact any sub-contractors.

Sampling personnel will be alerted via email or telephone of the time and date of sampling and a “tailgate meeting” will be conducted at a predetermined location before sampling commences. Decisions to alter the sampling plan will be made jointly by the Project Manager/QA Officer and Supervisor and all changes made in the field will be documented in the field notes. All changes to the QAPP will be reported in each Status Report and the Final Report.

4.3 *Personnel Responsibilities and Qualifications*

RIDEM personnel with surface water quality and biological sampling experience will conduct all sampling. Resumes of RIDEM personnel are on file at the RIDEM office in Providence, Rhode Island. Doug Cullen, Laboratory Manager for Microinorganics, Inc., will be responsible for the laboratory analysis of the surface water samples for metals and hardness. His resume is on file at the Microinorganics, Inc. laboratory in Narragansett, Rhode Island. The actual laboratory analysis for hardness will be conducted by MITKEM, a sub-contractor to Microinorganics, Inc. The resume for Karen Gavitt, Supervisor at MITKEM, is on file at MITKEM, in Warwick, Rhode Island. Kathleen Feldman, Laboratory Manager at BAL Laboratories, Inc. will be responsible for the laboratory analysis of the surface water samples for bacteria/pathogens. Her resume is on file at BAL Laboratories, Inc. in Cranston, Rhode Island. Linda Green of the URI Watershed Watch Program will be responsible for the laboratory analysis of the surface water samples for nutrients. Her resume is on file at the URI Watershed Watch Program in Kingston, Rhode Island. Kevin Braga, Laboratory Manager for ESS Laboratory (ESS) will be responsible for the analysis of VOCs and chloride and his resume is on file at ESS in Cranston, Rhode Island.

5.0 *Project Planning/Problem Definition*

5.1 *Project Planning Meetings*

Project scoping meetings were held to define the purpose and expected results of the project, the environmental decisions that need to be made and the sampling, analytical, and data assessment activities that will be performed. Each of the project scoping meetings are documented in EPA Worksheet No. 8a in Attachment A.

5.2 *Problem Definition/Site History and Background*

Section 303(d) of the federal Clean Water Act (CWA) requires all states to monitor water quality conditions of the state's waters, identify and list impaired waters and set priority rankings for all impaired waters included on the 303(d) list. RIDEM utilizes water quality information available from a variety of sources including data collected by state, federal and local agencies; universities; and volunteer monitoring organizations. The monitoring proposed in this QAPP would provide water quality information where data gaps occur.

The 2000 303(d) List of Impaired Waters categorizes impaired water bodies into five groups. Waterbodies in Group 3 of RIDEM's 303(d) list were assessed with total metals data, however, amendments to the Rhode Island Water Quality Regulations promulgated in 1997 express metals criteria as dissolved metals. Waterbodies in Group 4 consists of waterbodies that were based on insufficient data and/or data that is old. Additional

sampling of these Group 3 and 4 waterbodies is required to make a more accurate assessment. The waterbodies listed in Group 3 and 4 to be sampled under this QAPP are provided in Tables 3 and 4 and are depicted in Figures 2 and 3.

Table 3 Group 3 Waterbodies: Waterbodies represented by outdated total metals data.

Waterbody ID	Waterbody Name	Impairment
RI0006014R-04	Pawtuxet River (North and South Branches)	Cd
RI0006017R-02	Meshanicut Brook	Cu, Pb
RI007020E-01A	Providence River	metals

Table 4 Group 4 Waterbodies: Waterbodies represented by old data.

Waterbody ID	Waterbody Name	Impairment
RI0001002L-09	Slatersville Reservoir	pathogens, phosphorus
RI0006017L-02	Three Ponds	pathogens
RI0006018R-04	Simmons Brook	pathogens
RI0006018L-05	Print Works Pond	pathogens, TSS, chlorides
RI0007035L-03	North Easton Pond (Green End Pond)	biodiversity impacts, excess algal growth
RI0008040R-16C	Wood River-Alton Dam to confluence with the Pawcatuck River	biodiversity impacts, unknown toxicity

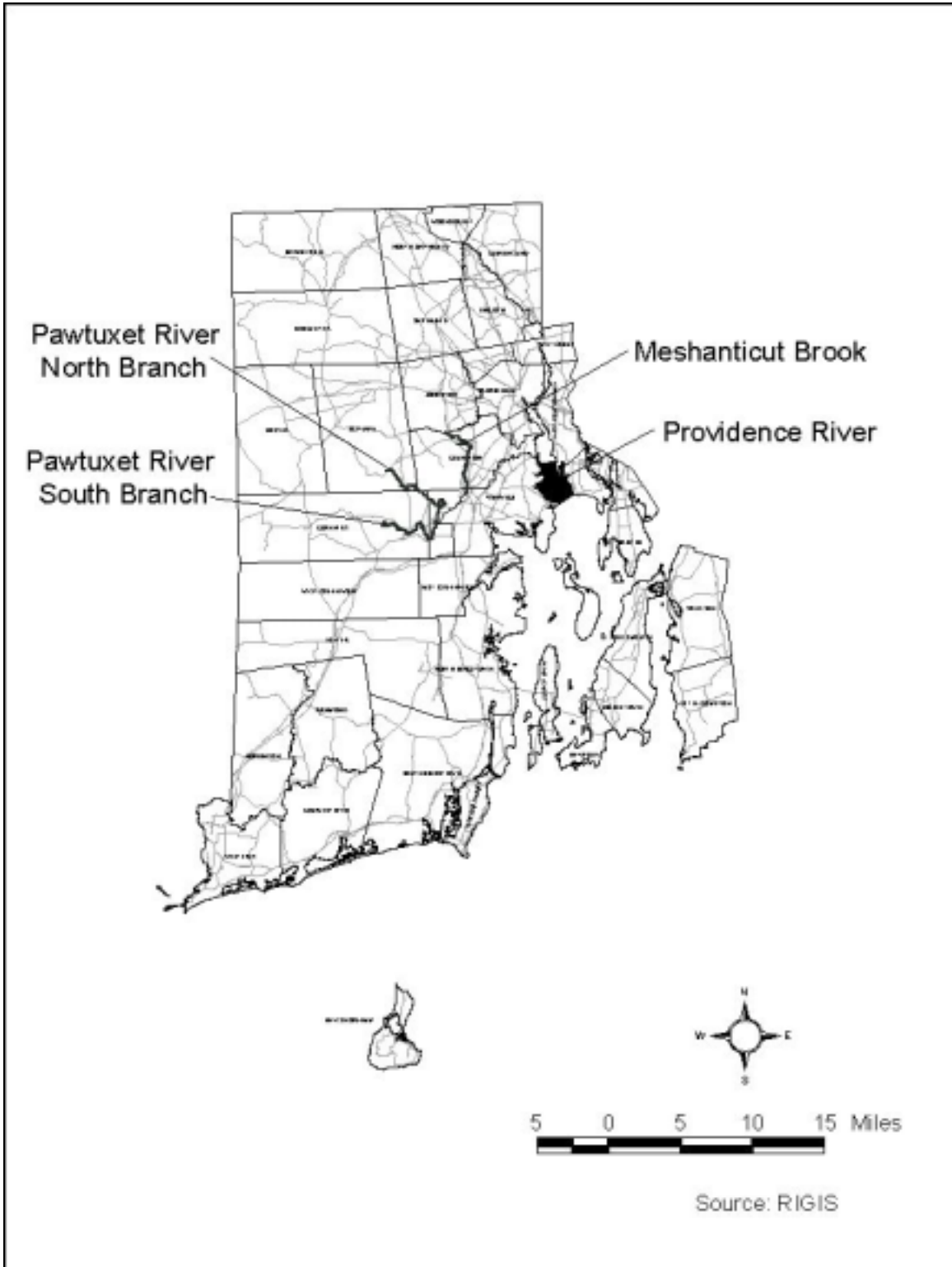


Figure 2 2000 303(d) List of Impaired Waters, Group 3 waterbodies.

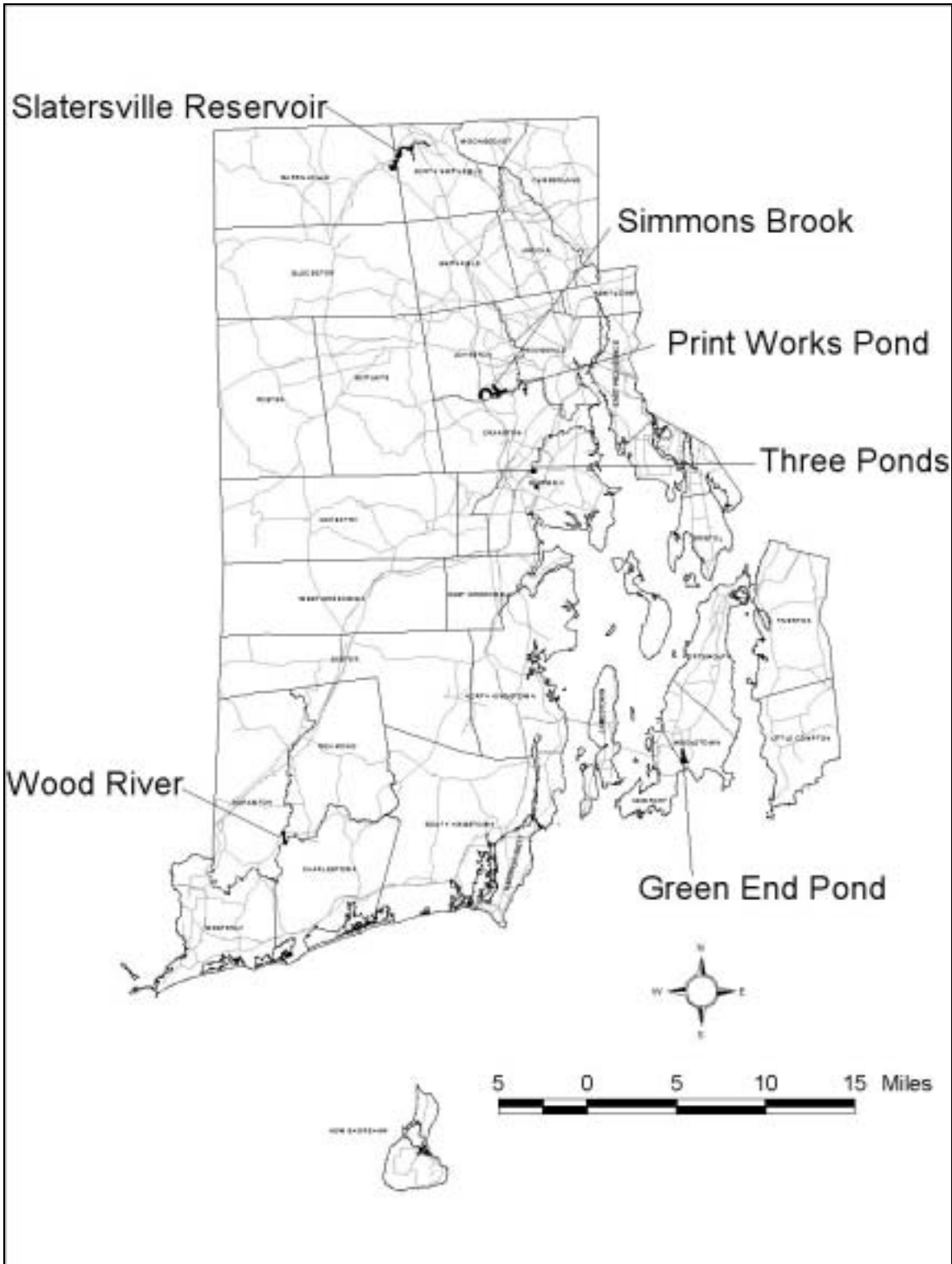


Figure 3 2000 303(d) List of Impaired Waters, Group 4 waterbodies.

6.0 Project Description and Schedule

The Clean Water Act (CWA) requires that states assess their water quality for attainment of the fishable and swimmable goals of the CWA. The requirements of the 303(d) process help determine the scope of the Group 3 and 4 supplemental monitoring.

6.1 Project Overview

Based on a review of existing studies conducted within Groups 3 and 4 of RIDEM's 303(d) List of Impaired Waters, water quality data gaps were identified and the need for additional monitoring was established. The objective of this project is to provide additional monitoring data to characterize water quality conditions within these waterbodies. The Department will utilize the results of this sampling program during the water quality assessments for the 2004 cycle.

Prior to the initiation of the 2004 assessments, the Department will develop and finalize a Consolidated Assessment and Listing Methodology (CALM), which will include public participation and EPA approval. This assessment and listing methodology will define the criteria and protocol which must be followed to determine the attainment of the individual designated uses for each waterbody/segment. This information will then be used to place each waterbody/segment into one of the 5 new Listing Categories identified in EPA's Integrated Report Guidance (EPA, 2001). As EPA has noted the new listing categories are intended to present the water quality standard attainment status for every waterbody and to develop a 303(d) List of waters truly in need of a TMDL. The change over to a new assessment methodology and the use of five new listing categories may result in moving some of the Group 3 and 4 waterbodies/segments from our current 303(d) List (Category 5 under the Integrated Report guidelines) to one of the other Categories. The contaminants of concern and other target analytes are listed in EPA Worksheet No. 9b, provided in Attachment A. Field and quality control samples are summarized in Section 8.1 and Tables 6 and 7 and the laboratory analytical services information are summarized in EPA Worksheet 9d, provided in Attachment A.

6.2 Project Schedule

Table 5 Proposed project schedule.

Task	Deliverable	2001				2002											
		C	N	D	J	F	M	A	M	J	J	A	S	C	N	D	
QAPP Preparation	QAPP Document																
Sample Collection	NA																
Laboratory Analysis	Laboratory Report																
Final Data Report	Final Data Report																

7.0 Project Quality Objectives and Measurement Performance Criteria

7.1 Project Quality Objectives

The data generated from this project will be used by RIDEM to assess the current water quality conditions of the State's 2000 303(d) Group 3 and Group 4 waterbodies for the parameters of concern. All the data quality objectives will be met if the data collected is sufficient to complete the assessments.

RIDEM water quality criteria for metals have been adopted as dissolved metals criteria to more closely approximate the bioavailable fraction of metal in the water column. The freshwater acute and chronic criteria for dissolved metals are presented as Freshwater Criteria Equations and Base e Exponential Values in Appendix B, Table 2 of the Water Quality Regulations (RIDEM,1997). Hardness is a component of the equation and must be determined. It should be noted that the minimum hardness value allowed for use in those equations is 25 mg/L, as calcium carbonate, even if the actual ambient hardness is less than 25 mg/L as calcium carbonate. For these reasons, all samples collected for this study will be analyzed for dissolved metals and hardness.

7.2 Measurement Performance Criteria

Collecting high quality data is one of the most important goals of this project. Specific data quality objectives include precision, accuracy, representativeness, comparability, and completeness. Measurement performance criteria are briefly presented below and are also found on EPA Worksheet No. 11b in Attachment A.

Precision

Precision is the degree of agreement among repeated measurements of the same characteristic under the same or similar conditions. The QC sample used to measure overall precision will consist of field duplicates and/or on-going precision and recovery (OPR) samples.

Accuracy/Bias

Accuracy is the extent of agreement between an observed value (sample result) and the true value of the parameter being measured. Bias describes the systematic or persistent error associated with a measurement process. These terms are used interchangeably in this document. The QC samples used to measure accuracy/bias will consist matrix spike/matrix spike duplicate, standard reference material (SRM), method blanks, and/or reagent blanks.

Representativeness

The selected stations and sampling frequency were chosen for their representativeness of conditions in the targeted waterbodies. The extent to which the measurements represent actual environmental conditions will be somewhat restricted by the time of year the samples are.

Comparability

To maximize the quality of the data collected, and to collect data that is comparable with other studies, accepted sampling procedures will be used during this study. All samples collected will be sent to laboratories that use standard methods. Sample collection locations will be documented in the field book using narratives, direct measurements using a calibrated tape, and/or global positioning satellites (GPS) to ensure data comparability for repeated sampling events.

Completeness

If the data collected is sufficient to complete the water quality assessments, then the data is considered to be complete. Measurement performance criteria help determine the completeness of a data set. RIDEM anticipates that 100 percent of the data will be useable for the project goals to be met.

8.0 Sampling Process Design

This section describes the sampling system in terms of what media/matrices will be sampled, where the samples will be taken, the number of samples to be taken and the sampling frequency.

8.1 Sampling Design Rationale

The media to be sampled will consist of surface water from selected waterbodies that are listed in Group 3 and 4 of the Rhode Island 2000 303(d) List of Impaired Waters. The objectives of the study are to:

1. To assess compliance with RIDEM water quality criteria for water bodies and associated parameters listed in Group 4 and to investigate the trophic status of these waterbodies;
2. To document baseline dissolved metal concentrations in Group 3 waters and assess these results for compliance with RIDEM dissolved metals criteria; and
3. To assist the RIDEM Water Quality Assessments Programs with the total maximum daily load (TMDL) prioritization process by providing them with current monitoring data to either verify the need for TMDL development and provide baseline data or help make the case for de-listing those waters determined to be in compliance with RIDEM ambient water quality criteria.

Sampling of the Group 3 waterbodies will occur quarterly for one year, will begin in the Winter of 2001, and will be conducted during steady state conditions. Sample station locations, number of samples collected, and number of QA/QC samples collected for metals analysis are summarized in Table 6.

Table 6 Group 3 chemical and biological sampling locations and parameters.

Waterbody	Station	City/Town	Analyte (dissolved)						No. of Samples X No. of Surveys	Number of Duplicate Samples*	Number of Field Blanks*	Total Number of Samples for the Study
			Cu	Pb	Cd	Ni	Ag	Zn				
Pawtuxet River North Branch	Rt. 115 [Ptx.N.[Bio.A]]****	Warwick		X					4			
	Rt. 116 [Ptx.N.[Bio.B]]****	Hope		X					4			
Pawtuxet River South Branch	Sandy Bottom Road [Ptx.S.[Bio.A]]****	West Warwick		X					4			
	Rt. 33 [Ptx.S.[Bio.B]]****	West Warwick		X					4			
Meshanicut Brook	West Natick Road [Mes.Bio.]****	Warwick	X	X					4	4	60	
Providence River***	Between Sabin Point and north end of breakwall, in ~20-25 ft. of water	East Providence/ Cranston										
	Southwest of Can Number 31 in ~6 ft. of water	Cranston										
	Between Gaspee point and Bullock Point, in ~25-27 ft. of water	Warwick/ East Providence	X	X	X	X	X	X	28			
Wood River**	Between Red Gong No. 23 and Green can No. 24, in approximately 23-26 ft. of water	Warwick/ Barrington										
	Charbart Property [Wd.Bio]****	Richmond	X	X	X	X	X	X	4	4		
Total									52	4	4	

** Wood River is actually listed in Group 4 for "Unknown Toxicity", but the metals portion of the sampling was included with Group 3 for this section of the QAPP.
 ***For the Providence River, samples will be collected from 2 depths (approximately 0.5-1.0 foot below water surface and above sediments) for stations located at depths>6 ft.

****Biological station locations suitable for rapid biological assessment [RBP]
 Station [Ptx. N. [Bio. A], Riffle upstream and downstream of RT. 115 Bdg.. Access on both sides.
 Station [Ptx. N. [Bio. B], Riffle below state of R.I. access, "Pawtuxet River Fishing Area"/ Hope Dam.
 Station [Ptx. S. [Bio. A], No riffle @ Sandy Btm..Rd./good riffle 1/4 mile upstream at Washington [USGS Gage].
 Station [Ptx. S. [Bio. B.], Small riffle below Bradford Soap Works Dam [access by Bike path on old R.R. Bdg. East of Hay St.]
 Station [Mes. Bio.] Riffle under bridge @ parking lot for Bed Bath and Beyond] on South bank.
 Station [Wd. Bio] Proximate to the Chabert facility.

Approximately 52 samples will be collected over the 4 surveys, a duplicate sample will be collected from one of the stations during each of the surveys (4 duplicate samples over the 4 surveys), and a field blank will be used during each of the surveys (4 field blanks over the 4 surveys). Including the QA/QC samples, approximately 60 samples will be brought to the laboratory for metals analysis during this study. In addition, each of the samples will be analyzed for hardness.

For those waterbodies listed in Group 4 for pathogens, sampling will be conducted monthly from June to October, inclusive. Sampling for the remaining parameters of the Group 4 waterbodies will be conducted during the Spring and Fall of 2002 to capture turnover events, and during the Summer of 2002 to capture potential stratification events, all during steady state conditions. Sample station locations, number of samples collected, and number of QA/QC samples collected for the Group 4 waterbodies are summarized in Table 7.

Table 7 Group 4 sampling locations and parameters.

Waterbody	Station	City/Town	*Total Phosphorus and Total Nitrogen	Chlorophyll a	Pathogens	Chlorides	Volatile Organic Compounds (VOCs)
Slatersville Reservoir	Center of Impoundment	Burrville and North Smithfield	X	X	X		
Three Ponds	Center of each pond	Warwick			X		
Simmons Brook	Atwood Avenue	Johnston			X		
Print Works Pond	12-foot deep hole at south end of pond	Cranston			X	X	
North Easton Pond (Green End Pond)	Center of Pond	Newport	X	X			
Wood River- Alton Dam to confluence with Pawcatuck River	Sample from Charbart Property, Church Street	Richmond					X
Number of Samples x Number of Surveys			12	6	30	4	4
Number of Duplicate Samples			3	3	5	4	4
Number of Field Blanks			3	3	5	4	4
Total Number of Samples for the Study			18	12	40	12	12

* Total phosphorus and total nitrogen samples will be collected from approximately 0.5-1 foot below the surface and 0.5-1.0 foot above the bottom at each sample station.

Approximately 12 samples will be collected for nutrient analysis. The two stations will be sampled at the surface of the waterbody and just above the bottom sediments. A duplicate sample will be collected and a field blank will be used during each of the 3 surveys. Two stations will be sampled for chlorophyll a analysis over 3 surveys with a duplicate collected for each of the surveys. Four stations will be sampled for pathogens analysis and a duplicate sample will be collected for each of the 5 surveys. It should be noted that a sample will be collected from each of the ponds making up the Three Ponds complex during each survey.

A sample for the analysis of chloride will be collected from the Print Works Pond on a quarterly basis. A duplicate sample will be collected and a field blank used for each of the surveys. Quarterly samples will be collected from the Wood River segment for the analysis of volatile organic compounds (VOCs) and a duplicate sample will be collected and a field blank used for each of the surveys. A brief description of sampling activities is presented below. In addition, the waterbodies listed in Group 4 will be monitored for temperature and dissolved oxygen profiling and secchi depth measurements.

A more detailed sampling standard operating procedure (SOP) for the collection of metals is presented in Attachment B and is entitled, "Manual (Grab) Sampling of Ambient Water for Dissolved and/or Total Recoverable Trace Metals at EPA Water Quality Criteria Levels (SOP-FS02)." The SOPs for the collection of the Group 4 waterbody samples are presented in Appendix B and are entitled, "FSOP-1 Nutrient and chloride sampling SOP", "FSOP-2 Fecal coliform sample collection –SOP" and "FSOP 3 Hand-Dip Sampling for the Collection of Surface Water for the Analysis of Volatile Organic Compounds".

The laboratories will provide all sample containers. The sample parameters and characteristics are summarized in Table 8.

Table 8 Sample parameters and characteristics.

Parameter	Matrix	Sample Volume (container)	Preservation	Maximum Holding Time	Method
Dissolved Metals	Surface Water	250 ml LDPE* (cleaned per SOP-C01; refer to Attachment C)	**Stored on ice (4°C)	24 hours prior to filtration	EPA Method 1637
Hardness	Surface Water	250 ml LDPE (cleaned per SOP-C01; refer to Attachment C)	HNO ₃ , pH<2	6 months	EPA Method 200.7
Fecal Coliform	Surface Water	250 ml LDPE	Stored on ice (4°C)	6 hours	mTEC
Nutrients	Surface Water	125-250 ml brown glass bottles	***Stored on ice (4°C)	48 hours prior to filtration	URIWW SOP SP-1
Chlorophyll a	Surface Water	2-500 ml polyethylene	***Stored on ice (4°C)	~6 hours	URIWW SOP SP-2
VOCs	Surface Water	40 ml glass vial	HCl	14 days	EPA Method 8260B
Chloride	Surface Water	125-250 ml polyethylene	Stored on ice (4°C)	28 days	EPA Method 325.2/9251
Biological Sampling	Surface Water	unspecified	90 % ethylalcohol	unlimited	RBP

*LDPE = Low Density polyethylene

**Dissolved metals will be preserved with nitric acid after the samples are filtered in the laboratory.

***Nutrient and chlorophyll a samples will be filtered in the laboratory.

9.0 Sampling Procedures and Requirements

9.1 Sampling Procedures

Standard operating procedures for field sampling are located in Attachment B. Project field sampling SOPs are summarized in Table 9.

Table 9 Project sampling SOP references.

Reference Number/Title	Originating Organization	Equipment Identification	Modified for Work Project
Field Sampling SOP 1 (FS-02) Metals Sampling	Microinorganics	Sample bottles	No
FSOP-1 Nutrient and Chloride Sampling SOP	RIDEM	Sample bottles	No
FSOP-2 Fecal Coliform Sampling SOP	RIDEM	Sample bottles	No
FSOP-3 Hand-Dip Sampling for the Collection of Surface Water for the Analysis of Volatile Organic Compounds	RIDEM	Sample bottles	No
FSOP-4 Rapid Bioassessment Protocol	USEPA	Sample Containers	No

9.2 *Equipment Cleaning*

Samples will be collected using the pre-cleaned bottles provided by the analytical laboratory, and as such, sampling equipment cleaning is not anticipated.

9.3 *Field Equipment Calibration and Maintenance*

The Project Manager will ensure that all field equipment is operating properly.

Table 10 Field equipment maintenance, testing, and inspection.

Equipment	Procedure	Frequency	Acceptance Criteria	Corrective Action	SOP Reference
YSI Model 85	See Operations Manual	Before sampling season	See Operations Manual	Re-calibrate	E-1
Secchi disk and calibrated weighted line	Check accuracy	Prior to first sampling run and throughout monitoring	±1.0 inches	Repair or replace	FASOP-2

Excerpts from the YSI Model 85 Operations Manual are provided in Attachment D.

10.0 Sample Handling, Tracking, and Custody Requirements

10.1 Sample Collection Documentation

This section describes field documentation procedures that will be followed for the project.

10.1.1 Field Notes

Sample teams will utilize either field notebooks or field log sheets to record relevant information prior to and during sampling events to include the following minimum information: Time of arrival at site, related site sketches, and general observations/comments. A copy of a blank field sheet is presented in Attachment E. Field notebooks will contain the same information as the field log sheets.

10.2 Sample Handling and Tracking System

Immediately prior to collecting each sample, the sample label will be filled out completely using a permanent marker. All samples will be placed in a cooler with ice immediately after the sample is collected. For the metals samples, ice will be packed twice into large ziplock bags sealed further with duct tape. Due to the very low detection limits (sub-ppb) for the metals analysis and the possibility of cross contamination, Microinorganics, Inc. recommends not using labels. Sample identification will be written on the sample bottle and a zip-lock bag using permanent marker. The sample bottle will be placed in the zip-lock bag and sealed, immediately after sampling.

Samples will be placed in a cooler with ice immediately after sampling and delivered to the laboratory the same day or within 24-hours of being collected. All bacteria samples will be placed in a cooler with ice immediately after sampling and will be delivered within six hours. If, for unseen circumstances, the samples can not be delivered to the laboratory within six hours, it will be noted on the chain-of-custody. All samples will be transported to the laboratory under proper chain-of-custody protocol. A copy of a blank Microinorganics, Inc., BAL Laboratory, Inc, URI Watershed Watch Program and ESS Laboratory chains-of-custody are presented in Appendix F.

The flow of samples from the time of collection, to laboratory delivery, to final sample disposal is summarized in Table 11.

Table 11 Sample handling system

Action	Responsible Party
Sample Collection	RIDEM
Sample Delivery	RIDEM
Sample Analysis	Laboratory
Sample Archival	Not Applicable
Sample Disposal	Laboratory

11.0 Field Analytical Method Requirements

During sampling of the Group 4 waterbodies, dissolved oxygen, temperature, and secchi depths will be analyzed in the field. The Project Manager shall record in the field notebook the sample location and all the results of field measurements. All field analytical SOPs were originated by RIDEM and will be performed by RIDEM personnel. Biological sampling of the macroinvertebrate communities will be conducted by RIDEM personnel following FASOP-3. Field analytical SOPs are summarized in Table 11 and are provided in Appendix G.

Table 12 Field analytical SOPs.

SOP Reference Number	SOP Title	Definitive or Screening Data	Analytical Parameter	Instrument	Modified for Project Work Plan
FASOP-1	Dissolved Oxygen and Temperature Profiling SOP	Definitive	Dissolved Oxygen and Temperature	YSI Model 85	No
FASOP-2	Secchi Depth SOP	Definitive	Water Clarity	Secchi Disk	No
FASOP-3	Rapid Bioassessment Protocol	Definitive	Biodiversity	Kick Net or Artificial Substrate	No

12.0 Fixed Laboratory Analytical Method Requirements

12.1 Fixed Laboratory Analytical

All samples will be taken to the appropriate laboratory for analysis. These samples will be analyzed according to the attached SOPs from each of the laboratories. The laboratory SOPs are summarized in Table 13.

Table 13 Laboratory SOPs

Reference Number	Title	Definitive or Screening Data	Analytical Parameter	Instrument	Modified for Project
C01	Bottle Cleaning Procedures for use in Collection of Trace Metals at AWQC* Levels	Not Applicable	Dissolved Metals	Not Applicable	No
P01	Preconcentration of Dissolved Metals from Aqueous Samples using APDC-cobalt chloride coprecipitation Technique	Not Applicable	Dissolved Metals (excluding Zn)	Not Applicable	No
A01	Graphite Furnace Analysis of Preconcentrated Water Samples	Definitive	Dissolved Metals (excluding Zn)	GFAAS**	No
A02	Direct Injection of Dissolved and Total Recoverable Trace Elements in Ambient Waters by Stabilized Temperature Graphite Furnace Absorption	Definitive	Zn	GFAAS**	No
111	Determination of Metals in Water and Wastes by Inductively Coupled Argon Plasma Atomic Emission Spectrometry	Definitive	Hardness (Ca and Mg)	ICP***	No
URIWW SOP SP-1	Total Phosphorus and Total Nitrogen	Definitive	Total Phosphorus and Total Nitrogen	Alpkem Corp. Model 300 Autoanalyzer	No
URIWW SOP SP-2	URI Watershed Watch Chlorophyll-a Analysis Procedure	Definitive	Chlorophyll-a	Turner Designs Digital Fluorometer Model TD-700	No
SOP-5	mTEC Method for Detection of Fecal Coliforms and Escherichia Coli	Definitive	Fecal Coliform	NA	No
SOP 20_8260B	Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS): Capillary Column Technique (SW-846 Method 8260)	Definitive	VOCs	GC/MS	No
SOP 40_007L	Chloride Automated Ferricyanide (EPA Method 325.2/9251)	Definitive	Chloride	Flow Injection Analysis Equipment	No

*AWQC = Ambient Water Quality Criteria

** GFAAS = Graphite Furnace Atomic Absorption Spectrometry

***ICP = Inductively Coupled Plasma

13.0 Quality Control Requirements

Quality control (QC) is the system of technical activities that measures the performance of a process. Field sampling and laboratory QC protocols are presented in this section.

13.1 Field Quality Control Samples

The types and quantities of field QC samples are summarized in EPA Worksheet No. 22a provided in Attachment A.

13.2 Fixed Laboratory Analytical Quality Control Samples

The types and quantities of fixed laboratory QC samples are summarized in EPA Worksheet No. 24a provided in Attachment A.

14.0 Data Acquisition Requirements

The listing of the Group 3 and 4 waterbodies on the RIDEM 2000 303(d) List of Impaired waters was based on data that was either old or insufficient. The water quality monitoring data sources that resulted in the listing of the waterbodies into Group 3 or Group 4 of the RIDEM 2000 303(d) List of Impaired Waters are summarized in Table 14.

Table 14 The informational sources that caused the listing of the waterbodies into Group 3 or Group 4 of the RIDEM 2000 303(d) List of Impaired Waters.

Waterbody	Data Source	Data Generator	Limitations on Data
Pawtuxet River (North and South Branches)	<i>Water Quality in Rhode Island's Urban Rivers: Blackstone, Moshasuck, Pawtuxet, Ten Mile, Woonasquatucket</i>	River Rescue 1990-1995	Data is expressed as total metals.
Meshanicut Brook	<i>Field Measurements of Water Quality in the Pawtuxet River, Summer 1990</i>	Applied Science Associates, Narragansett, Rhode Island	Data is extrapolated from Pawtuxet River study.
Slatersville Reservoir	1989 USGS sampling of pond	USGS	Insufficient and old data for assessment.
Three Ponds	<i>Field Measurements of Water Quality in the Pawtuxet River, Summer 1990</i>	Applied Science Associates, Narragansett, Rhode Island	Nutrient and dissolved oxygen data is extrapolated from Pawtuxet River study. Pathogen data source is unknown.
Simmons Brook	Data source unknown	Data source unknown	Simmons Brook was listed in the 1996 and 1998 303(d) lists.
Print Works Pond	<i>Field Measurements of Water Quality in the Pawtuxet River, Summer 1990</i>	Applied Science Associates, Narragansett, Rhode Island	Data extrapolated from Pocasset River site
North Easton Pond (Green End Pond)	1998 Chemical Baseline Data	URI Department of Civil and Environmental Engineering Department	Data extrapolated from Bailey's Brook
Providence River	<i>Monitoring of the Providence and Seekonk Rivers for Trace Metals and Associated Parameters 1988</i>	Narragansett Bay Project	Data is expressed as total metals
Wood River-Alton Dam to confluence with Wood River	Visual inspection by RIDEM for macroinvertebrates in response to proximity to hazardous waste site	RIDEM	No instream water quality data

15.0 Documentation, Records, and Data Management

All samplers will be given either a field notebook or log sheets. The monitoring plan will be given out when each sampler collects their equipment and includes specific information on what needs to be recorded on these sheets. All log sheets will be given to the field leaders at the conclusion of sampling. Initials on these sheets will identify the sampler. The Project Manager will review the sheets within three days to identify any possible errors or omissions. The Project manager will try to contact all samplers to identify any problems or additional feedback that would make any future sampling easier.

The Project Manager or designee will transport the samples to the appropriate laboratory(ies). The samples and chain of custody forms will be checked at the laboratory during sample check in. A copy of the chain of custody form will be retained by RIDEM when the samples are dropped off at the laboratory. After analysis is complete, the analytical results will be forwarded to RIDEM.

After each sampling event, a brief Status Report will be written to document any changes to the Monitoring Plan. All information collected throughout the project will be summarized in the Final Data Report. Information included in the Final Data Report is described in Section 17.0. Table 15 summarizes the records that will be generated and maintained throughout this project.

Table 15 Project documentation and records.

Sample Collection Records	Field Analysis Records	Fixed Laboratory Records	Data Assessment Records
Field Notes/Log Sheets	Field Notes/Log Sheets	Chain of Custody Records	Status Reports
Chain of Custody Records	Not Applicable	Tabulated Data Summary Forms: draft and final	Final Data Report
Monitoring Plan	Not Applicable	Not Applicable	Not Applicable

16.0 Assessments and Response Actions

The Project Manager or designee will be responsible for each of the project tasks and their associated quality assurance and quality control procedures. The Project Manager will provide consistency between sampling events and sampling teams. Continual reports to the lead agency supervisors concerning the status of sampling, quality assurance, and quality control will highlight any problems that are encountered during sampling. If needed, the Project Manager and lead agency supervisor will halt sampling until problems are remedied.

Table 16 Project assessment table.

Assessment Type	Frequency	Internal or External	Person Responsible for Performing Assessment and Implementing Corrective Actions	Person Responsible for Monitoring the Effectiveness of the Corrective Action
Field Sampling Technical Systems Audit	Start of Sampling	I	Wayne Jenkins RIDEM	Wayne Jenkins RIDEM
Laboratory Technical Systems Audit	Prior to Sample Receipt	E	Doug Cullen Microinorganics, Inc., Kathleen Feldman, Bal Laboratory, Linda Green, URI Watershed Watch Program, Kevin Braga, ESS Laboratory	Wayne Jenkins RIDEM

17.0 QA Management Reports

Table 17 lists the QA Management Reports that will be generated throughout this study.

As needed during this project, the Project Manager/QA Officer will meet with the lead organization supervisor to discuss any issues related to sampling. These meetings will be verbal status reports. Problems encountered in the field will be discussed and any appropriate actions determined and implemented. Any changes and/or problems will be included in the final report.

After each sampling event, the Project Manager will generate a Status Report. This Status Report will be the written record of any changes to the QA Plan. If a station was not sampled, it will be documented here. Issues discussed during the Verbal Status Report can also be included.

At the completion of all the sampling surveys, the Project Manager will write a final report summarizing the sampling events. Information in this final report will include the following information:

- Brief description of each sampling event;
- Data tables of all data collected during the sampling event; and
- Attachments
 - Status Reports
 - Sampling Logs
 - Chain of Custody forms
 - Laboratory data sheets provided by the labs

Table 17 QA management reports.

Type of Report	Frequency	Person(s) Responsible for Report Preparation	Report Recipient
Verbal Status Report	As needed	Wayne Jenkins RIDEM	Connie Carey RIDEM
Written Status Report	After two surveys	Wayne Jenkins RIDEM	Connie Carey RIDEM
Final Report	Completion of sampling	Wayne Jenkins RIDEM	Connie Carey RIDEM

18.0 Verification and Validation Requirements

The Project Manager/QA Officer and lead organization supervisors will review all data collected during this study to determine if the data meets QAPP objectives. Decisions to qualify or reject data will be made by the Project Manager and QA Officer. All data collected will be included in the Final Report. To ensure correct interpretation of the data, all problems encountered in the field will be included in an Appendix to the report and discussed in the general text of the report. Problems will also be documented in each survey's written Status Report. To assist in data interpretation, statistical information on sampling events, including sampling size, sample mean, and sample variance, will be reported, where applicable. A discussion on duplicate precision and accuracy criteria and results will also be discussed in the Final Report.

19.0 Verification and Validation Procedures

All data collected during the study will be included in an appendix of the report. Once the data has been collected, it will be entered into Microsoft Excel files. The Project Manager will proofread the data entry for errors and any discrepancies will be corrected. Outliers and inconsistencies will be flagged for further review. The decision to discard data will be made by the Project Manager/QA Officer and supervisors. Problems will be discussed in the Final Report. Table 18 discusses the data verification process.

Table 18 Data verification process.

Verification Task	Description	I/E	Responsible for Verification
Field Notes	Field notes will be collected at the end of each survey and reviewed. Any required corrective actions will be addressed with the field samplers prior to further sampling. After the field notes will be entered into Excel, the data will be proofread for any data entry errors. Copies of the field notes will be maintained in the project file.	I	Wayne Jenkins/RIDEM
Chain of Custody Forms	Chain of custody forms will be reviewed when samples are collected for delivery to the laboratory in the field and at the laboratory. The forms will be maintained in the project file.	I/E	Wayne Jenkins /RIDEM and Laboratory Managers
Laboratory Data	All laboratory data packages will be verified internally by the laboratory performing the work for completeness prior to submittal. The data packages will be also reviewed by the sampling organization.	I/E	Wayne Jenkins /RIDEM and Laboratory Managers

I=Internal, E=External

Data validation will utilize the measurement performance criteria documented in EPA Worksheets 11b, 22a, and 24a of this report.

20.0 Data Usability/Reconciliation with Project Quality Objectives

As soon as possible after each sampling event, calculations and determinations for precision, completeness, and accuracy will be made and corrective action implemented if needed. If data quality indicators meet those measurement performance criteria documented throughout this QA Plan, the project will be considered a success. If there are data that do not meet the measurement performance criteria established in this QA Plan, the data may be discarded and sampled again or the data may be used with stipulations written about its accuracy in the Final Report. The cause of the error will be evaluated. If the cause is equipment failure, calibration/maintenance techniques will be reassessed and improved. If the problem is sampling team error, retraining will occur. Any limitations with the data will be documented in the Status Reports and the Final Report.

References

Applied Science Associates, 1991. *Field Measurements of Water Quality in the Pawtuxet River, Summer 1990*.

Coastal Resources Center, 1996. *Water Quality in Rhode Island's Urban Rivers: Blackstone, Moshassuck, Pawtuxet, Ten Mile, Woonasquatucket, River Rescue Results 1990-1995*. University of Rhode Island.

EPA, 1999. *Region I, EPA- New England Compendium of Quality Assurance Project Plan Requirements and Guidance*. Quality Assurance Unit Staff. Office of Environmental Measurement and Evaluation.

EPA, 2001. EPA Memorandum from Robert H. Wayland III, November 19, 2001.

RIDEM. Office of Water Resources. August 6, 1997. *Water Quality Regulations*.

Shelton, 1997. *Field Guide for Collecting Samples for Analysis of Volatile Organic Compounds in Stream Water for the National Water-Quality Assessment Program*. USGS Open-File Report 97-401.

Taglioli, Brandon L., Delzer, G.C., Zogorski, J. S., 2000. *Study Design and Analytical Results Used to Evaluate Carry-Over Contamination by Volatile Organic Compounds in Surface- and Ground-Water Sampling Procedures*. USGS Open-File Report 00-384.

Attachment A – EPA Worksheets

EPA-NE QAPP Worksheet #2 - Rev. 10/99

Site Name/Project Name: RIDEM's 2000 303(d) Supplemental Monitoring Program
(Groups 3 and 4)

Site Location: Rhode Island

Site Number/Code: various

Operable Unit:

Contractor Name:

Contractor Number:

Contract Title:

Work Assignment Number:

Anticipated date of QAPP Implementation: November 2001

Title: RIDEM's 2000 303(d)
Supplemental Monitoring Program
(Groups 3 and 4)

Revision Number: 1

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1. Identify Guidance used to prepare QAPP:

Region I, New England

**Compendium of Quality Assurance Project Plan Requirements and Guidance
October 1999 and Attachment A, EPA-NE QAPP Manual, Draft September 1998**

2. Identify EPA Program: **EPA Region I, Quality Assurance Unit Staff, Office of Environmental Measurement and Evaluation**

3. Identify approval entity: EPA-NE or State: **EPA-NE**
or other entity:

4. Indicate whether the QAPP is a generic program QAPP or a **project specific QAPP**. (underline one)

List dates of scoping meetings that were held: **9/11/01, 9/17/01, 10/18/01, 10/30/01**

6. List title of QAPP documents and approval dates written for previous site work, if applicable:

7. List organizational partners (stakeholders) and connection with EPA and/or State:

RIDEM – Office of Water Resources

RIDEM- Office of Waste Management

RIDEM – Office of Compliance and Inspection

8. List data users: **RIDEM, Office of Water Resources**

9. If any required QAPP Elements (1-20), Worksheets and/or Required Information are not applicable the project, then circle the omitted QAPP Elements, Worksheets and Required Information on the attached Table. Provide an explanation for their exclusion below:

Refer to Table 6 Required QAPP elements checklist.

EPA-NE QAPP Worksheet #2 - Rev. 10/99

Site Name/Project Name: RIDEM's 2000 303(d) Supplemental Monitoring Program
(Groups 3 and 4)

Site Location: Rhode Island

Site Number/Code: various

Operable Unit:

Contractor Name:

Contractor Number:

Contract Title:

Work Assignment Number:

Anticipated date of QAPP Implementation: November 2001

Title: RIDEM's 2000 303(d)
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EPA-NE QAPP Worksheet #8a - Rev. 10/99

Complete this worksheet for each project scoping meeting held and include in final QAPP document. Attach meeting agenda and notes. (Refer to QAPP Manual Section 5.1 for guidance.)

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Project Scoping Meeting Attendance Sheet

EPA Regulation Program: RCRA FIFRA TSCA CERCLA DW CWA CAA (<u>underline one</u>)		Site Name: various	
Program (Brownfields, NPDES, etc.): TMDL		Site Location: Rhode Island	
Project Date(s) of Sampling: November 2001-November 2002		CERCLA Site/Spill Identifier No.:	
Project Manager: Wayne Jenkins		Operable Unit:	
		Other Site Number/Code:	
		Phase: ERA SA/SI Pre-RI RI (phase I, etc.) FS RD RA post-RA (<u>underline one</u>)	
		Other phase:	
Date of Meeting: 9/11/01			
Meeting Location: RIDEM			
Name	Project Role	Affiliation	Phone # e-Mail Address
Meeting Purpose:			
Comments and Action Items:			

EPA-NE QAPP Worksheet #8a - Rev. 10/99

Complete this worksheet for each project scoping meeting held and include in final QAPP document. Attach meeting agenda and notes. (Refer to QAPP Manual Section 5.1 for guidance.)

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Project Scoping Meeting Attendance Sheet

EPA Regulation Program: RCRA FIFRA TSCA CERCLA DW CWA CAA (<u>underline one</u>)		Site Name: various	
Program (Brownfields, NPDES, etc.): TMDL		Site Location: Rhode Island	
Project Date(s) of Sampling: November 2001-November 2002		CERCLA Site/Spill Identifier No.:	
Project Manager: Wayne Jenkins		Operable Unit:	
		Other Site Number/Code:	
		Phase: ERA SA/SI Pre-RI RI (phase I, etc.) FS RD RA post-RA (<u>underline one</u>)	
		Other phase:	
Date of Meeting: 9/17/01			
Meeting Location: RIDEM			
Name	Project Role	Affiliation	Phone # e-Mail Address
Meeting Purpose:			
Comments and Action Items:			

EPA-NE QAPP Worksheet #8a - Rev. 10/99

Complete this worksheet for each project scoping meeting held and include in final QAPP document. Attach meeting agenda and notes. (Refer to QAPP Manual Section 5.1 for guidance.)

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Project Scoping Meeting Attendance Sheet

EPA Regulation Program: RCRA FIFRA TSCA CERCLA DW CWA CAA (<u>underline one</u>)		Site Name: various	
Program (Brownfields, NPDES, etc.): TMDL		Site Location: Rhode Island	
Project Date(s) of Sampling: November 2001-November 2002		CERCLA Site/Spill Identifier No.:	
Project Manager: Wayne Jenkins		Operable Unit:	
		Other Site Number/Code:	
		Phase: ERA SA/SI Pre-RI RI (phase I, etc.) FS RD RA post-RA (<u>underline one</u>)	
		Other phase:	
Date of Meeting: 9/17/01			
Meeting Location: RIDEM			
Name	Project Role	Affiliation	Phone # e-Mail Address
Meeting Purpose:			
Comments and Action Items:			

EPA-NE QAPP Worksheet #9b - Rev. 10/99

Complete separate tables for each medium/matrix, analytical parameter and concentration level. List the analyte name and CAS numbers of all Contaminants of Concern (COCs) and other target analytes that will be measured for the project. Identify the COCs with an “**”. Identify the Project Quantitation Limits required to meet project objectives, i.e., known regulatory or technical Project Action Limits for each analyte. List the MDLs and QLS of the published method and the MDLs and QLS achievable by the laboratory. Ensure that the achievable laboratory quantitation limits are less than or equal to the Project Quantitation Limits and that Project Quantitation Limits are at least three to ten times less than the Project Action Limits. (Refer to *QAPP Manual* Section 6.1 for guidance.)

Medium/Matrix: Surface Water

Region I Matrix Code (from EPA-NE DQO Summary Form):

Analytical Parameter: Dissolved Metals

Concentration Level: sub ppb - ppb

Field Analytical or Fixed Laboratory Method/SOP¹: FS01, A01, A02

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Contaminants of Concern and Other Target Analytes Table (Reference Limit and Evaluation Table)

Analyte	CAS Number	Project Action Limit (Units) [*]	Project Quantitation Limit (Units) ^{**}	Analytical Method		Achievable Laboratory Limits	
				MDLs ²	Method QLS ²	MDLs ³	QLS ³
Dissolved Lead (Pb)	7439-92-1	0.54 µg/L	0.10 µg/L	0.036 µg/L	0.1 µg/L	0.033 µg/L	0.10 µg/L
Dissolved Copper (Cu)	7440-50-8	3.47 µg/L	0.17 µg/L	0.087 µg/L	0.2 µg/L	0.058 µg/L	0.17 µg/L
Dissolved Cadmium (Cd)	7440-43-9	0.37 µg/L	0.036 µg/L	0.0075 µg/L	0.02 µg/L	0.012 µg/L	0.036 µg/L
Dissolved Nickel	7440-02-0	8.2 µg/L	1.0 µg/L	0.33 µg/L	1.0 µg/L	0.33 µg/L	1.0 µg/L
Dissolved Silver	7440-22-4	0.32 µg/L	0.012 µg/L	0.029 µg/L	0.1 µg/L	0.004 µg/L	0.012 µg/L
Dissolved Zinc	7440-66-6	32.29 µg/L	3.8 µg/L	0.14 µg/L	0.5 µg/L	1.26 µg/L	3.8 µg/L
Total Hardness	-	-	-	1 mg/L	-	1 mg/L	-
* Lowest EPA AWQC							
** PQL = 3 x MDL							

¹Specify appropriate reference number/letter from the Field and Fixed Laboratory Analytical Method/SOP Reference Tables (EPA-NE QAPP Worksheets #17 and #20).
²Analytical method MDLs and QLS documented in validated methods. QLS are usually 3-10 times higher than the MDLs
³Achievable MDLs and QLS are limits that an individual laboratory can achieve when performing a specific analytical method.

EPA-NE QAPP Worksheet #9b - Rev. 10/99

Complete separate tables for each medium/matrix, analytical parameter and concentration level. List the analyte name and CAS numbers of all Contaminants of Concern (COCs) and other target analytes that will be measured for the project. Identify the COCs with an “**”. Identify the Project Quantitation Limits required to meet project objectives, i.e., known regulatory or technical Project Action Limits for each analyte. List the MDLs and QLs of the published method and the MDLs and QLs achievable by the laboratory. Ensure that the achievable laboratory quantitation limits are less than or equal to the Project Quantitation Limits and that Project Quantitation Limits are at least three to ten times less than the Project Action Limits. (Refer to *QAPP Manual* Section 6.1 for guidance.)

Medium/Matrix: Surface Water

Region I Matrix Code (from EPA-NE DQO Summary Form):

Analytical Parameter: Nutrients, chlorophylla, and fecal coliform
Concentration Level: ppb

Field Analytical or Fixed Laboratory Method/SOP¹: FSOP-1, FSOP-2, URIWW SOPs SP-1 + SP-2, SOP-5

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Contaminants of Concern and Other Target Analytes Table (Reference Limit and Evaluation Table)

Analyte	CAS Number	Project Action Limit (Units) [*]	Project Quantitation Limit (Units) ^{**}	Analytical Method		Achievable Laboratory Limits	
				MDLs ²	Method QLs ²	MDLs ³	QLs ³
Total Phosphorus	7723-14-0	25 µg/L	4 µg/L	2 µg/L	4 µg/L	2 µg/L	4 µg/L
Total Nitrogen	7727-37-9	--	25 µg/L	20 µg/L	25 µg/L	20 µg/L	25 µg/L
Chlorophyll a	--	<10 µg/L	2 µg/L	1 µg/L	2 µg/L	1 µg/L	2 µg/L
Fecal Coliform	--	Geometric mean 20-200 MPN/100 mL	1 MPN/100 mL	1 MPN/100mL	1 MPN/100 mL	1 MPN/100mL	1 MPN/100 mL
Dissolved Oxygen	--	5.0 mg/L	0 mg/L	--	--	--	--
Temperature	--	Profile Stratification	± 2°C	--	--	--	--

¹Specify appropriate reference number/letter from the Field and Fixed Laboratory Analytical Method/SOP Reference Tables (EPA-NE QAPP Worksheets #17 and #20).

²Analytical method MDLs and QLs documented in validated methods. QLs are usually 3-10 times higher than the MDLs.

³Achievable MDLs and QLs are limits that an individual laboratory can achieve when performing a specific analytical method.

EPA-NE QAPP Worksheet #9c - Rev. 10/99

Summarize by matrix the number of field and QC samples that will be collected for each analytical parameter and concentration level. (Refer to *QAPP Manual* Section 6.1 for guidance.)

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Field and Quality Control Sample Summary Table

Medium/ Matrix	Analytical Parameter	Conc. Level	Analytical Method/ SOP Reference ¹	No. of Sampling Locations ²	No. of Field Duplicate Pairs	Organic		Inorganic		No. of Trip Blanks*	No. of Bottle Blanks	No. of Equip. Blanks	No. of PE Samples	Total No. of Samples to Lab
						No. of MS	No. of MSD	No. of Duplicates	No. of MS					
SW	Dissolved Cd, Cu, Pb, Ni, Ag, Zn and Total Hardness	Sub ppb - ppb	EPA Method 1637/SOP P01 & A01 and SW846 Method 6010	13 samples x 4 surveys= 52	4					4				60

*For this project, all QA/QC samples for all analytical methods used to determine that absence/presence of contamination in the field will be referred to as Trip Blanks

¹Complete the Field Analytical Method/SOP Reference Table (EPA-NE QAPP Worksheet #17), and the Fixed Laboratory Method/SOP Reference Table (EPA-NE QAPP Worksheet #20) and specify the appropriate letter/number reference in the above table.

²If samples will be collected at different depths at the same location, count each discrete sampling depth as a separate sampling location/station.

EPA-NE QAPP Worksheet #9c - Rev. 10/99

Summarize by matrix the number of field and QC samples that will be collected for each analytical parameter and concentration level. (Refer to *QAPP Manual* Section 6.1 for guidance.)

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Field and Quality Control Sample Summary Table

Medium/ Matrix	Analytical Parameter	Conc. Level	Analytical Method/ SOP Reference ¹	No. of Sampling Locations ²	No. of Field Duplicate Pairs	Organic		Inorganic		No. of Trip Blanks*	No. of Bottle Blanks	No. of Equip. Blanks	No. of PE Samples	Total No. of Samples to Lab
						No. of MS	No. of MSD	No. of Duplicates	No. of MS					
SW	Total Phosphorus And Total Nitrogen	ppb	URIWW SOP SP-1	4x3 surveys= 12	3					3				18
SW	Chlorophyll a	ppb	URIWW SOP SP-2	2x3 surveys= 6	3					1				10
SW	Fecal Coliform	1 MPN/100m L	SOP-5	6x5 surveys= 30	5					5				40
SW	VOCs	ppb	SOP No. 40- _8260B	1x4 surveys= 4	4					1				9
SW	chloride	ppm	SOP No. 40_007L	1x4 surveys= 4	4					1				9

*For this project, all QA/QC samples for all analytical methods used to determine that absence/presence of contamination in the field will be referred to as Trip Blanks

¹Complete the Field Analytical Method/SOP Reference Table (EPA-NE QAPP Worksheet #17), and the Fixed Laboratory Method/SOP Reference Table (EPA-NE QAPP Worksheet #20) and specify the appropriate letter/number reference in the above table.

²If samples will be collected at different depths at the same location, count each discrete sampling depth as a separate sampling location/station.

EPA-NE QAPP Worksheet #9d - Rev. 10/99

Complete this worksheet for each medium/matrix, analytical parameter, and concentration level. Identify all laboratories/organizations that will provide analytical services for the project, including field screening, field analytical, and fixed laboratory analytical work. If applicable, identify the backup laboratory/organization that will be used if the primary laboratory/organization cannot be used. (Refer to *QAPP Manual* Sections 6.1, 11.0 and 12.0 for guidance.)

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Analytical Services Table

Medium/Matrix	Analytical Parameter	Concentration Level	Analytical Method/SOP ¹	Data Package Turnaround Time	Laboratory/Organization (Name and Address: Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address: Contact Person and Telephone Number)
SW	Dissolved Pb, Cd, Cu, Ni, Ag, Zn	Sub ppb-ppb	EPA Method 1637 / 1638 SOP P01 & A01	15 days	MicroInorganics, Inc., Doug Cullen, 16 Reactor Road, Narragansett, RI 02882	Not Applicable
SW	Total Hardness	ppm	SW846 Method 6010	15 days	MITKEM Karen Gavitt, 175 Metro Center Blvd, Warwick, RI 02886	Not Applicable
SW	Total Phosphorus	ppb	URIWW SOP SP-1	10 days	URI Watershed Watch Program Natural Resources Science Department Kingston, RI	Not Applicable
SW	Total Nitrogen	ppb	URIWW SOP SP-1	10 days	URI Watershed Watch Program Natural Resources Science Department Kingston, RI	Not Applicable
SW	Chlorophyll a	ppb	URIWW SOP SP-2	10 days	URI Watershed Watch Program Natural Resources Science Department Kingston, RI 02881	Not Applicable
SW	Fecal Coliform	<1 FC/100mL	SOP-5	7 days	BAL Laboratory, Inc., 185 Francis Ave., Cranston, RI 02910	Not Applicable
SW	Volatile Organic Compounds	ppb	SOP No. 20_8260B	7 days	ESS Laboratory 185 Francis Street Cranston, RI 02910	Not Applicable

EPA-NE QAPP Worksheet #9d - Rev. 10/99

Complete this worksheet for each medium/matrix, analytical parameter, and concentration level. Identify all laboratories/organizations that will provide analytical services for the project, including field screening, field analytical, and fixed laboratory analytical work. If applicable, identify the backup laboratory/organization that will be used if the primary laboratory/organization cannot be used. (Refer to *QAPP Manual* Sections 6.1, 11.0 and 12.0 for guidance.)

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Analytical Services Table

Medium/Matrix	Analytical Parameter	Concentration Level	Analytical Method/SOP ¹	Data Package Turnaround Time	Laboratory/Organization (Name and Address; Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address; Contact Person and Telephone Number)
SW	Chloride	ppm	SOP No. 40_007L	7 days	ESS Laboratory 185 Francis Street Cranston, RI 02910	Not Applicable

¹Specify appropriate reference number/letter from the Field Analytical Method/SOP Reference Table (EPA-NE QAPP Worksheet #17) and from the Fixed Laboratory Method/SOP Reference Table (EPA-NE QAPP Worksheet #20).

EPA-NE QAPP Worksheet #11b - Rev. 10/99

Complete this worksheet for each medium/matrix, analytical parameter and concentration level. Identify the DQI, measurement performance criteria (MPC), and QC sample and/or activity used to assess the measurement performance for the sampling and/or analytical procedure. Use additional worksheets if necessary.

If MPC for a specific DQI vary within an analytical parameter, i.e., MPC are analyte-specific, then provide analyte-specific MPC on an additional worksheet. (Refer to *QAPP Manual* Sections 7.1 and 7.2 for guidance.)

Measurement Performance Criteria Table

Medium/Matrix	Surface Water					
Analytical Parameter	Pb and Cd	Analytical Method/SOP ²	Data Quality Indicators (DQIs) ³	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Concentration Level	Sub ppb - ppb					
FS02		SOP A01	Precision - overall	<20 % RPD	Field Duplicates	S & A
FS02		SOP A01	Precision - Lab	<20 % RPD	MS/MSD	A
FS02		SOP A01	Accuracy/Bias	Recovery 60-120 %	MS/MSD	A
FS02		SOP A01	Accuracy/Bias	Recovery 60-120 %	SRM or CRM	A
FS02		SOP A01	Sensitivity	Recovery 60-120 %	LFB	S & A
FS02		SOP A01	Contamination	MDL – 1/3 AWQC	Field & Method Blanks	A
FS02		SOP A01	Data Completeness	-	Anticipate 100 %	S & A

¹Reference SOP Number from EPA-NE QAPP Worksheet #13.

²Reference analytical method/SOP Number from EPA-NE QAPP Worksheets #17 and #20.

³Data Quality Indicators (a.k.a. PARCC parameters, i.e., precision, accuracy/bias, sensitivity, data completeness, comparability)

EPA-NE QAPP Worksheet #11b - Rev. 10/99

Complete this worksheet for each medium/matrix, analytical parameter and concentration level. Identify the DQI, measurement performance criteria (MPC), and QC sample and/or activity used to assess the measurement performance for the sampling and/or analytical procedure. Use additional worksheets if necessary.

If MPC for a specific DQI vary within an analytical parameter, i.e., MPC are analyte-specific, then provide analyte-specific MPC on an additional worksheet. (Refer to *QAPP Manual* Sections 7.1 and 7.2 for guidance.)

Measurement Performance Criteria Table

Medium/Matrix	Surface Water						
Analytical Parameter	Cu	Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs) ³	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Concentration Level	Sub ppb - ppb						
FS02		SOP A01		Precision - overall	<20 % RPD	Field Duplicates	S & A
FS02		SOP A01		Precision - Lab	<20 % RPD	MS/MSD	A
FS02		SOP A01		Accuracy/Bias	Recovery 51-145 %	MS/MSD	A
FS02		SOP A01		Accuracy/Bias	Recovery 51-145 %	SRM or CRM	A
FS02		SOP A01		Sensitivity	Recovery 51-145 %	LFB	S & A
FS02		SOP A01		Contamination	MDL – 1/3 AWQC	Field & Method Blanks	A
FS02		SOP A01		Data Completeness	-	Anticipate 100 %	S & A

¹Reference SOP Number from EPA-NE QAPP Worksheet #13.

²Reference analytical method/SOP Number from EPA-NE QAPP Worksheets #17 and #20.

³Data Quality Indicators (a.k.a. PARCC parameters, i.e., precision, accuracy/bias, sensitivity, data completeness, comparability)

EPA-NE QAPP Worksheet #11b - Rev. 10/99

Complete this worksheet for each medium/matrix, analytical parameter and concentration level. Identify the DQI, measurement performance criteria (MPC), and QC sample and/or activity used to assess the measurement performance for the sampling and/or analytical procedure. Use additional worksheets if necessary.

If MPC for a specific DQI vary within an analytical parameter, i.e., MPC are analyte-specific, then provide analyte-specific MPC on an additional worksheet. (Refer to *QAPP Manual* Sections 7.1 and 7.2 for guidance.)

Measurement Performance Criteria Table

Medium/Matrix	Surface Water				
Analytical Parameter	Total Hardness				
Concentration Level	ppm				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs) ³	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
FS02	SOP A03	Precision - overall	<20 % RPD	Field Duplicates	S & A
FS02	SOP A03	Precision - Lab	<20 % RPD	MS/MSD	A
FS02	SOP A03	Accuracy/Bias	Recovery 75-125 %	MS/MSD	A
FS02	SOP A03	Sensitivity	Recovery 80-120 %	LFB	S & A
FS02	SOP A03	Contamination	MDL – 1/3 AWQC	Field & Method Blanks	A
FS02	SOP A03	Data Completeness	-	Anticipate 100 %	S & A

¹Reference SOP Number from EPA-NE QAPP Worksheet #13.

²Reference analytical method/SOP Number from EPA-NE QAPP Worksheets #17 and #20.

³Data Quality Indicators (a.k.a. PARCC parameters, i.e., precision, accuracy/bias, sensitivity, data completeness, comparability)

EPA-NE QAPP Worksheet #11b - Rev. 10/99

Complete this worksheet for each medium/matrix, analytical parameter and concentration level. Identify the DQI, measurement performance criteria (MPC), and QC sample and/or activity used to assess the measurement performance for the sampling and/or analytical procedure. Use additional worksheets if necessary.

If MPC for a specific DQI vary within an analytical parameter, i.e., MPC are analyte-specific, then provide analyte-specific MPC on an additional worksheet. (Refer to *QAPP Manual* Sections 7.1 and 7.2 for guidance.)

Measurement Performance Criteria Table

Medium/Matrix	Surface Water						
Analytical Parameter	Nutrients (Total Phosphorus and Total Nitrogen)	Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs) ³	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Concentration Level	ppb						
FS0P-1			URIWW SOP SP-1	Precision	<20 % RPD	Field Duplicates	S & A
FS0P-1			URIWW SOP SP-1	Accuracy/Bias	< 2 ppb (µg/L)	Method Blank	A
FS0P-1			URIWW SOP SP-1	Accuracy/Bias	+/- 10 % of PES true value	Performance Evaluation Standards (PES)	A
FS0P-1			URIWW SOP SP-1	Data Completeness	-	Anticipate 100 %	S & A

¹Reference SOP Number from EPA-NE QAPP Worksheet #13.

²Reference analytical method/SOP Number from EPA-NE QAPP Worksheets #17 and #20.

³Data Quality Indicators (a.k.a. PARCC parameters, i.e., precision, accuracy/bias, sensitivity, data completeness, comparability)

EPA-NE QAPP Worksheet #11b - Rev. 10/99

Complete this worksheet for each medium/matrix, analytical parameter and concentration level. Identify the DQI, measurement performance criteria (MPC), and QC sample and/or activity used to assess the measurement performance for the sampling and/or analytical procedure. Use additional worksheets if necessary.

If MPC for a specific DQI vary within an analytical parameter, i.e., MPC are analyte-specific, then provide analyte-specific MPC on an additional worksheet. (Refer to *QAPP Manual* Sections 7.1 and 7.2 for guidance.)

Measurement Performance Criteria Table

Medium/Matrix	Surface Water						
Analytical Parameter	Chlorophyll a	Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs) ³	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Concentration Level	ppb						
FS0P-1			URIWW SOP SP-2	Precision	<20 % RPD	Field Duplicates	S & A
FS0P-1			URIWW SOP SP-2	Accuracy/Bias	< MDL	Method Blank	A
FS0P-1			URIWW SOP SP-2	Accuracy/Bias	<20% RPD	Pure Chl-a standards Turner Design	A
FS0P-1			URIWW SOP SP-2	Data Completeness	-	Anticipate 100 %	S & A

¹Reference SOP Number from EPA-NE QAPP Worksheet #13.

²Reference analytical method/SOP Number from EPA-NE QAPP Worksheets #17 and #20 .

³Data Quality Indicators (a.k.a. PARCC parameters, i.e., precision, accuracy/bias, sensitivity, data completeness, comparability)

EPA-NE QAPP Worksheet #11b - Rev. 10/99

Complete this worksheet for each medium/matrix, analytical parameter and concentration level. Identify the DQI, measurement performance criteria (MPC), and QC sample and/or activity used to assess the measurement performance for the sampling and/or analytical procedure. Use additional worksheets if necessary.

If MPC for a specific DQI vary within an analytical parameter, i.e., MPC are analyte-specific, then provide analyte-specific MPC on an additional worksheet. (Refer to *QAPP Manual* Sections 7.1 and 7.2 for guidance.)

Measurement Performance Criteria Table

Medium/Matrix	Surface Water					
Analytical Parameter	Fecal Coliform	Analytical Method/SOP ²	Data Quality Indicators (DQIs) ³	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Concentration Level	<1 MPN/100 mL					
FSOP-2		mTEC/SOP-5	Precision	Within 95% Confidence Interval	Field Duplicates	S & A
FSOP-2		mTEC/SOP-5	Accuracy/Bias	No Growth	Method Blank	A
FSOP-2		mTEC/SOP-5	Accuracy/Bias	No Growth	Reagent Blank	A
FSOP-2		mTEC/SOP-5	Data Completeness	-	Anticipate 100 %	S & A

¹Reference SOP Number from EPA-NE QAPP Worksheet #13.

²Reference analytical method/SOP Number from EPA-NE QAPP Worksheets #17 and #20.

³Data Quality Indicators (a.k.a. PARCC parameters, i.e., precision, accuracy/bias, sensitivity, data completeness, comparability)

EPA-NE QAPP Worksheet #12b - Rev. 10/99

List all site locations that will be sampled and include sample location ID number, if applicable. Specify medium/matrix and, if applicable depth at which samples will be taken. Complete all required information, using additional worksheets if necessary. (Refer to *QAPP Manual* Section 8.1 for guidance.)

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Sampling Locations, Sampling and Analysis Method/SOP Requirements Table

Sampling Location ^{1,2}	Location ID Number	Medium/Matrix	Depth (Units)	Analytical Parameter	Conc. Level	No. of Samples (Identify field duplicates and replicates)	Sampling SOP ³	Analytical Method/SOP ³	Sample Volume	Containers (Number, size and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
	various	SW	6 inches below surface	Dissolved Metals	Sub ppb - ppb	36 samples 4 dups.	SOP FS02	EPA Method 1637, 1638, 1639/SOP A01 & A02	250 ml	LDPE Cleaned via SOP C01	4°C	24 hours prior to filtration
	various	SW	6 inches below surface	Total Hardness	ppm	36 samples 4 dups.	SOP FS02	SW846 Method 6010	250 ml	LDPE Cleaned via SOP C01	HNO ₃ , pH<2	6 months
	various	SW	6 inches below surface	VOCs	ppb	4 samples 4 dups.	FSOP-3	EPA Method 8260B/SOP 40_8260B	40 ml	Glass w/ pierceable Teflon Screw Cap	100 µL HCL	14 days
	various	SW	6 inches below surface	Chloride	ppm	4 samples 4 dups	FSOP-1	EPA Method 325.2/9251 SOP No. 40_007L	125-250 ml	polyethylene	4°C	28 days

¹Indicate critical field sampling locations with "1".

²Indicate background sampling locations with "2".

³Complete the Project Sampling SOP Reference Table (EPA-NE QAPP Worksheet #13), Field Analytical Method/SOP Reference Table (EPA-NE QAPP Worksheet #17), and Fixed Laboratory Method/SOP Reference Table (EPA-NE QAPP Worksheet #20) and specify the appropriate letter/number reference in the above table.

EPA-NE QAPP Worksheet #12b - Rev. 10/99

List all site locations that will be sampled and include sample location ID number, if applicable. Specify medium/matrix and, if applicable depth at which samples will be taken. Complete all required information, using additional worksheets if necessary. (Refer to *QAPP Manual* Section 8.1 for guidance.)

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Sampling Locations, Sampling and Analysis Method/SOP Requirements Table

Sampling Location ^{1,2}	Location ID Number	Medium/Matrix	Depth (Units)	Analytical Parameter	Conc. Level	No. of Samples (Identify field duplicates and replicates)	Sampling SOP ³	Analytical Method/SOP ³	Sample Volume	Containers (Number, size and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
	various	SW	0.5-1 foot below surface	Nutrients (total Phosphorus and Total Nitrogen)	ppb	6 samples	FSOP-1	URIWW SOP SP-1	125 or 250 ml	Brown Glass	4°C	48 hours prior to filtration
	various	SW	0.5-1 foot above the bottom	Nutrients (total Phosphorus and Total Nitrogen)	ppb	6 samples	FSOP-1	URIWW SOP SP-1	125 or 250 ml	Brown Glass	4°C	48 hours prior to filtration
	various	SW	0.5-1 foot below surface	Fecal Coliform	<1	25 samples	FSOP-2	SOP-5	250 ml	LDPE	4°C	6 hours
	various	SW	0.5-1 foot below surface	Chlorophyll a	ppb	6 samples	FSOP-1	URIWW SOP SP-2	250 ml	polyethylene	4°C	8 hours prior to filtration

¹Indicate critical field sampling locations with "1".

²Indicate background sampling locations with "2".

³Complete the Project Sampling SOP Reference Table (EPA-NE QAPP Worksheet #13), Field Analytical Method/SOP Reference Table (EPA-NE QAPP Worksheet #17), and Fixed Laboratory Method/SOP Reference Table (EPA-NE QAPP Worksheet #20) and specify the appropriate letter/number reference in the above table.

EPA-NE QAPP Worksheet #22a - Rev. 10/99

Complete a separate worksheet for each sampling technique, medium/matrix, analytical parameter and concentration level. If an analytical parameter¹ has multiple analytes, then complete EPA-NE QAPP Worksheet #22b. Worksheet #22b lists the overall field and analytical precision and accuracy/bias expected for each analyte when using the specified sampling and analytical technique. If method/SOP QC acceptance limits² exceed the measurement performance criteria³, then data may not meet user needs. (Refer to *QAPP Manual* Sections 13.0 and 13.1, and Table 4 for guidance.)

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Field Sampling QC Table

Sampling SOP*	S-1									
Medium/Matrix	Surface Water									
Analytical Parameter ¹	Metals									
Concentration Level	Sub ppb - ppb									
Analytical Method/SOP Reference	EPA Methods 1637 (Pb+Cd), and 1638 (Cu)									
Sampler's Name	Staff									
Field Sampling Organization	RIDEM									
No. of Sample Locations	13									
Field QC:	Frequency/Number	Method/SOP QC Acceptance Limits ²	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria ³				
Equipment Blanks/ Rinsate Blanks										
Bottle Blanks	1	No metal ion > 1/3 AWQC	Reclean, retest, resample and/or qualify data	Laboratory Manager/QC Officer	Accuracy/Bias contamination	No metal ion > 1/3 AWQC				
Trip Blanks	1 per survey	No metal ion > 1/3 AWQC	Reclean, retest, resample and/or qualify data	Laboratory Manager/QC Officer	Accuracy/Bias contamination	No metal ion > 1/3 AWQC				
Cooler Temperature Blanks	1 per cooler	4°C	Resample and/or qualify data	Laboratory Manager/QC Officer	Preservation	4°C				
Field Duplicate Pairs (Duplicate Subsamples)	1 per survey	<20% RPD	Resample and/or qualify data	Project Manager/QC Officer	Preservation	<20% RPD				
Other: _____										

*Specify appropriate reference number/letter from the Project Sampling SOP Reference Table (EPA-NE QAPP Worksheet #13), Field Analytical Method/SOP Reference Table (EPA-NE QAPP Worksheet #17), and Fixed Laboratory Method/SOP Reference Table (EPA-NE QAPP Worksheet #20).

EPA-NE QAPP Worksheet #22a - Rev. 10/99

Complete a separate worksheet for each sampling technique, medium/matrix, analytical parameter and concentration level. If an analytical parameter¹ has multiple analytes, then complete EPA-NE QAPP Worksheet #22b. Worksheet #22b lists the overall field and analytical precision and accuracy/bias expected for each analyte when using the specified sampling and analytical technique. If method/SOP QC acceptance limits² exceed the measurement performance criteria³, then data may not meet user needs. (Refer to *QAPP Manual* Sections 13.0 and 13.1, and Table 4 for guidance.)

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Field Sampling QC Table

Sampling SOP*	S-1						
Medium/Matrix	Surface Water						
Analytical Parameter ¹	Fecal Coliform						
Concentration Level	1 FC/100 mL						
Analytical Method/SOP Reference	MTEC/SOP 5						
Sampler's Name	Staff						
Field Sampling Organization	RIDEM						
No. of Sample Locations	5						
Field QC:	Frequency/Number	Method/SOP QC Acceptance Limits²	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria³	
Equipment Blanks/ Rinsate Blanks							
Bottle Blanks							
Trip Blanks	1 per survey	< 1 FC/100ml	Resample and/or qualify data	Laboratory Manager/QC Officer	Contamination	< 1 FC/100ml	
Cooler Temperature Blanks	1 per cooler	4°C	Resample and/or qualify data	Laboratory Manager/QC Officer	Preservation	4°C	
Field Duplicate Pairs (Duplicate Subsamples)	1 per survey	Within 95 percent confidence interval	Reanalyze and/or qualify data	Project Manager/QC Officer	Preservation	Within 95 percent confidence interval	
Other: _____							

***Specify appropriate reference number/letter from the Project Sampling SOP Reference Table (EPA-NE QAPP Worksheet #13), Field Analytical Method/SOP Reference Table (EPA-NE QAPP Worksheet #17), and Fixed Laboratory Method/SOP Reference Table (EPA-NE QAPP Worksheet #20).**

EPA-NE QAPP Worksheet #22a - Rev. 10/99

Complete a separate worksheet for each sampling technique, medium/matrix, analytical parameter and concentration level. If an analytical parameter¹ has multiple analytes, then complete EPA-NE QAPP Worksheet #22b. Worksheet #22b lists the overall field and analytical precision and accuracy/bias expected for each analyte when using the specified sampling and analytical technique. If method/SOP QC acceptance limits² exceed the measurement performance criteria³, then data may not meet user needs. (Refer to *QAPP Manual* Sections 13.0 and 13.1, and Table 4 for guidance.)

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Field Sampling QC Table

Sampling SOP*	S-1						
Medium/Matrix	Surface Water						
Analytical Parameter ¹	Chlorophyll a						
Concentration Level	ppb						
Analytical Method/SOP Reference	URIWW SOP SP-2						
Sampler's Name	Staff						
Field Sampling Organization	RIDEM						
No. of Sample Locations	2						
Field QC:	Frequency/Number	Method/SOP QC Acceptance Limits²	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria³	
Equipment Blanks/ Rinsate Blanks							
Bottle Blanks							
Trip Blanks	1 per survey	<QL	Resample and/or qualify data	Laboratory Manager/QC Officer	contamination	<QL	
Cooler Temperature Blanks	1 per cooler	4°C	Resample and/or qualify data	Laboratory Manager/QC Officer	Preservation	4°C	
Field Duplicate Pairs (Duplicate Subsamples)	1 per survey	<20% RPD	Reanalyze and/or qualify data	Project Manager/QC Officer	Preservation	<20% RPD	
Other: _____							

***Specify appropriate reference number/letter from the Project Sampling SOP Reference Table (EPA-NE QAPP Worksheet #13), Field Analytical Method/SOP Reference Table (EPA-NE QAPP Worksheet #17), and Fixed Laboratory Method/SOP Reference Table (EPA-NE QAPP Worksheet #20).**

EPA-NE QAPP Worksheet #22a - Rev. 10/99

Complete a separate worksheet for each sampling technique, medium/matrix, analytical parameter and concentration level. If an analytical parameter¹ has multiple analytes, then complete EPA-NE QAPP Worksheet #22b. Worksheet #22b lists the overall field and analytical precision and accuracy/bias expected for each analyte when using the specified sampling and analytical technique. If method/SOP QC acceptance limits² exceed the measurement performance criteria³, then data may not meet user needs. (Refer to *QAPP Manual* Sections 13.0 and 13.1, and Table 4 for guidance.)

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Field Sampling QC Table

Sampling SOP*	S-1	Field QC:	Frequency/Number	Method/SOP QC Acceptance Limits ²	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria ³
Medium/Matrix	Surface Water	Equipment Blanks/ Rinsate Blanks						
Analytical Parameter ¹	Hardness	Bottle Blanks	1	No metal ion > 1/3 AWQC	Reclean, retest, resample and/or qualify data	Laboratory Manager/QC Officer	Accuracy/Bias contamination	No metal ion > 1/3 AWQC
Concentration Level	ppm	Trip Blanks	1 per survey	No metal ion > 1/3 AWQC	Reclean, retest, resample and/or qualify data	Laboratory Manager/QC Officer	Contamination	No metal ion > 1/3 AWQC
Analytical Method/SOP Reference	SW 846 Method 6010	Cooler Temperature Blanks	1 per cooler	4°C	Resample and/or qualify data	Laboratory Manager/QC Officer	Preservation	4°C
Sampler's Name	Staff	Field Duplicate Pairs (Duplicate Subsamples)	1 per analyte	<20% RPD	Resample and/or qualify data	Project Manager/QC Officer	Preservation	<20% RPD
Field Sampling Organization	RIDEM	Other: _____						
No. of Sample Locations	13							

*Specify appropriate reference number/letter from the Project Sampling SOP Reference Table (EPA-NE QAPP Worksheet #13), Field Analytical Method/SOP Reference Table (EPA-NE QAPP Worksheet #17), and Fixed Laboratory Method/SOP Reference Table (EPA-NE QAPP Worksheet #20).

EPA-NE QAPP Worksheet #24a - Rev. 10/99

Complete a separate worksheet for each medium/matrix, analytical parameter and concentration level. If an analytical parameter¹ has multiple analytes, then complete EPA-NE QAPP Worksheet #24b. Worksheet #24b lists the precision and accuracy/bias expected for each analyte when using the specified analytical method or SOP. If method/SOP QC acceptance limits² exceed the measurement performance criteria³, then data may not meet user needs. (Refer to *QAPP Manual* Sections 13.0 and 13.2, and Tables 3 and 4 for guidance.)

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Fixed Laboratory Analytical QC Sample Table

Medium/Matrix	Surface Water									
Sampling SOP	FS02									
Analytical Parameter ¹	Hardness (CaCO ₃)									
Concentration Level	ppm									
Analytical Method/ SOP Reference*	SW 846 Method 6010									
Laboratory Name	MITKEM									
No. of Sample Locations	13									
Laboratory QC:	Frequency/ Number	Method/SOP QC Acceptance Limits²	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria³				
Method Blank	1 per 10 Samples	No element > QL	Reclean & Reanalyze	Laboratory Manager	Accuracy/Bias Contamination	Per Method 6010				
Instrument Blank	1 per Batch	No element > QL	Reclean & Reanalyze	Laboratory Manager	Contamination	Per Method 6010				
Laboratory Duplicate	1 per 10 Samples	<20% RPD	Qualify data	Laboratory Manager	Precision	Per Method 6010				
Laboratory Matrix Spike	1 per 10 Samples	Recovery 75-125%	Qualify data	Laboratory Manager	Accuracy	Per Method 6010				
Matrix Spike Duplicates	1 per 10 Samples	<20% RPD	Qualify data	Laboratory Manager	Precision	Per Method 6010				
LFB	1 per 10 Samples	Recovery 80-120%	Do not proceed with analysis until acceptable LFB obtained	Laboratory Manager	Accuracy/Bias Sensitivity	Per Method 6010				
Surrogates										
Other: Field Blank	1 per 10 Samples	No element > QL	Qualify data	Laboratory Manager/Project Manager	Contamination	Per Method 6010				

*Specify appropriate reference number/letter from the Project Sampling SOP Reference Table (EPA-NE QAPP Worksheet #13) and the Fixed Laboratory Method/SOP Reference Table (EPA-NE QAPP Worksheet #20).

EPA-NE QAPP Worksheet #24a - Rev. 10/99

Complete a separate worksheet for each medium/matrix, analytical parameter and concentration level. If an analytical parameter¹ has multiple analytes, then complete EPA-NE QAPP Worksheet #24b. Worksheet #24b lists the precision and accuracy/bias expected for each analyte when using the specified analytical method or SOP. If method/SOP QC acceptance limits² exceed the measurement performance criteria³, then data may not meet user needs. (Refer to *QAPP Manual* Sections 13.0 and 13.2, and Tables 3 and 4 for guidance.)

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Fixed Laboratory Analytical QC Sample Table

Medium/Matrix	Surface Water	Frequency/ Number	Method/SOP QC Acceptance Limits ²	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria ³
Sampling SOP	FS02	1 per 10 Samples	MDL 1/3 AWQC	Re-prep Batch	Laboratory Manager	Contamination	Per Method 1637
Analytical Parameter ¹	Pb + Cd	1 per Batch		Reanalyze	Laboratory Manager	Contamination	Per Method 1637
Concentration Level	Sub ppb	1 per Batch		Reanalyze	Laboratory Manager	Contamination	Per Method 1637
Analytical Method/ SOP Reference*	EPA Method 1637 SOP A.01	1 per 10 Samples	<20% RPD	Re-prep Batch	Laboratory Manager	Precision	Per Method 1637
Laboratory Name	MicroInorganics, Inc.	1 per 10 Samples	Recovery 60-120%	Re-prep Batch	Laboratory Manager	Precision	Per Method 1637
No. of Sample Locations	13	1 per 10 Samples	Recovery 60-120%	Re-prep Batch	Laboratory Manager	Precision	Per Method 1637
Laboratory QC:		1 per 10 Samples	Recovery 60-120%	Re-prep Batch	Laboratory Manager	Precision	Per Method 1637
Method Blank		1 per 10 Samples	Recovery 60-120%	Re-prep Batch	Laboratory Manager	Precision	Per Method 1637
Reagent Blank		1 per 10 Samples	Recovery 60-120%	Re-prep Batch	Laboratory Manager	Accuracy/Bias	Per Method 1637
Instrument Blank		1 per 10 Samples	Recovery 60-120%	Re-prep Batch	Laboratory Manager	Sensitivity	Per Method 1637
Laboratory Duplicate		1 per 10 Samples	< QL	Qualify data	Laboratory Manager/Project Manager	Contamination	Per Method 1637
Laboratory Matrix Spike		1 per 10 Samples					
Matrix Spike Duplicates		1 per 10 Samples					
LCS		1 per 10 Samples					
LFB		1 per 10 Samples					
Other: Field Blank		1 per 10 Samples					

*Specify appropriate reference number/letter from the Project Sampling SOP Reference Table (EPA-NE QAPP Worksheet #13) and the Fixed Laboratory Method/SOP Reference Table (EPA-NE QAPP Worksheet #20).

EPA-NE QAPP Worksheet #24a - Rev. 10/99

Complete a separate worksheet for each medium/matrix, analytical parameter and concentration level. If an analytical parameter¹ has multiple analytes, then complete EPA-NE QAPP Worksheet #24b. Worksheet #24b lists the precision and accuracy/bias expected for each analyte when using the specified analytical method or SOP. If method/SOP QC acceptance limits² exceed the measurement performance criteria³, then data may not meet user needs. (Refer to *QAPP Manual* Sections 13.0 and 13.2, and Tables 3 and 4 for guidance.)

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Fixed Laboratory Analytical QC Sample Table

Medium/Matrix	Surface Water											
Sampling SOP	FS02											
Analytical Parameter ¹	Cu											
Concentration Level	Sub ppb											
Analytical Method/ SOP Reference*	EPA Method 1637 SOP A.01											
Laboratory Name	MicroInorganics, Inc.											
No. of Sample Locations	9											
Laboratory QC:	Frequency/ Number	Method/SOP QC Acceptance Limits²	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria³						
Method Blank	1 per 10 Samples	MDL 1/3 AWQC	Re-prep Batch	Laboratory Manager	Contamination	Per Method 1638						
Reagent Blank	1 per Batch		Reanalyze	Laboratory Manager	Contamination	Per Method 1638						
Instrument Blank	1 per Batch		Reanalyze	Laboratory Manager	Contamination	Per Method 1638						
Laboratory Duplicate	1 per 10 Samples	<20% RPD	Re-prep Batch	Laboratory Manager	Precision	Per Method 1638						
Laboratory Matrix Spike	1 per 10 Samples	Recovery 51-145%	Re-prep Batch	Laboratory Manager	Precision	Per Method 1638						
Matrix Spike Duplicates	1 per 10 Samples	Recovery 51-145%	Re-prep Batch	Laboratory Manager	Precision	Per Method 1638						
LCS	1 per 10 Samples	Recovery 51-145%	Re-prep Batch	Laboratory Manager	Accuracy/Bias	Per Method 1638						
LFB	1 per 10 Samples	Recovery 51-145%	Re-prep Batch	Laboratory Manager	Sensitivity	Per Method 1638						
Other: Field Blank	1 per 10 Samples	<QL	Qualify data	Laboratory Manager/Project Manager	Contamination	Per Method 1638						

Note: Method 1637 does not include Cu as an analyte, thus QA/QC criteria from Method 1638 (ICP-MS) were used as a guideline

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EPA-NE QAPP Worksheet #24a - Rev. 10/99

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Fixed Laboratory Analytical QC Sample Table

Medium/Matrix	Surface Water											
Sampling SOP	FSOP-1											
Analytical Parameter ¹	Nutrients (Total Nitrogen and Total Phosphorus)											
Concentration Level	Sub ppb											
Analytical Method/ SOP Reference*	URIWW SOP SP-1											
Laboratory Name	URI Watershed Watch Program											
No. of Sample Locations	4											
Laboratory QC:	Frequency/ Number	Method/SOP QC Acceptance Limits²	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria³						
Method Blank	2 per set of 90 samples	<QL	Re-run	Laboratory Manager	Accuracy/Contamination	<QL						
Reagent Blank	2 per set of 90 samples	<QL	Re-run	Laboratory Manager	Accuracy/Contamination	<QL						
Laboratory Duplicate	All samples are run in duplicate	<20% RPD	Re-run	Laboratory Manager	Precision	<20% RPD						
Laboratory Matrix Spike												
Matrix Spike Duplicates												
LCS	Purchase external standard 2 per set of 90 samples	15% cv	Re-run	Laboratory Manager	Accuracy/Precision	15% cv						
LFB												
Other: Field Blank												

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EPA-NE QAPP Worksheet #24a - Rev. 10/99

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Fixed Laboratory Analytical QC Sample Table

Medium/Matrix	Surface Water	Frequency/ Number	Method/SOP QC Acceptance Limits ²	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria ³
Sampling SOP	FSOP-1	1 per set of 40 samples	<QL	Re-clean, Re-run	Laboratory Manager	Accuracy/Contamination	<QL
Analytical Parameter ¹	Chlorophyll a	1 per set of 40 samples	<QL	Re-clean, Re-run	Laboratory Manager	Accuracy/Contamination	<QL
Concentration Level	ppb	All samples are run in duplicate	<20% RPD	Qualify	Laboratory Manager	Precision	<20% RPD
Analytical Method/ SOP Reference*	URIWW SOP SP-2						
Laboratory Name	URI Watershed Watch Program						
No. of Sample Locations	2						
Laboratory QC:							
Method Blank							
Reagent Blank							
Laboratory Duplicate							
Laboratory Matrix Spike							
Matrix Spike Duplicates							
LCS							
Surrogates		2 per set of 40	<20% RPD	Qualify	Laboratory Manager	Precision	<20% RPD
Other: external Standards		2 per set of 40	<20% RPD	Qualify	Laboratory Manager	Precision	<20% RPD

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EPA-NE QAPP Worksheet #24a - Rev. 10/99

Complete a separate worksheet for each medium/matrix, analytical parameter and concentration level. If an analytical parameter¹ has multiple analytes, then complete EPA-NE QAPP Worksheet #24b. Worksheet #24b lists the precision and accuracy/bias expected for each analyte when using the specified analytical method or SOP. If method/SOP QC acceptance limits² exceed the measurement performance criteria³, then data may not meet user needs. (Refer to *QAPP Manual* Sections 13.0 and 13.2, and Tables 3 and 4 for guidance.)

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Fixed Laboratory Analytical QC Sample Table

Medium/Matrix	Surface Water	Method/SOP QC Acceptance Limits ²	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria ³
Sampling SOP	F SOP-2					
Analytical Parameter ¹	Fecal Coliform					
Concentration Level	<1 MPN/100 mL					
Analytical Method/ SOP Reference*	SM 9213D/SOP-5	SOP-5	Re-prepare batch	Laboratory Manager	Bias/Contamination	No Growth
Laboratory Name	BAL Laboratory, Inc.	SOP-5	Re-prepare batch	Laboratory Manager	Bias/Contamination	No Growth
No. of Sample Locations	5	SOP-5	Re-analyze	Laboratory Manager	Precision	Within 95% confidence interval
Laboratory QC:	Frequency/ Number					
Method Blank	1 per batch					
Reagent Blank	1 per batch					
Laboratory Duplicate	1 per 10 samples					
Laboratory Matrix Spike						
Matrix Spike Duplicates						
LCS						
Surrogates						
Other:						

*Specify appropriate reference number/letter from the Project Sampling SOP Reference Table (EPA-NE QAPP Worksheet #13) and the Fixed Laboratory Method/SOP Reference Table (EPA-NE QAPP Worksheet #20).

Attachment B – Field Sampling SOPs

Attachment C – Laboratory Analytical SOPs

Attachment D – YSI Model 85 Operations Manuel

Attachment E – Blank Field Data Sheet

Attachment F – Chain of Custody Forms

Attachment G – Field Analytical SOPs