UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
EPA New England
Office of Environmental Measurement & Evaluation
11 Technology Drive, North Chelmsford, MA 01863

MEMORANDUM

DATE: April 30, 2003 RFA No. CT03066

SUBJ: Approval of Rapid Bioassessment QAPP

FROM: Arthur E. Clark, Chemist,
Quality Assurance Office (EQA)

TO: Larry MacMillan, EPA Connecticut
State Team, OEP (CCT)

On January 9, 2003, I reviewed the following quality assurance project plan:

> *Rapid Bioassessment in Wadeable Streams and Rivers by Volunteer Monitors*, by M. Beauchene, Connecticut Dept. of Environmental Protection Bureau of Water Management, January 2, 2003.

On April 25, 2003, I received satisfactory responses to my comments. Our biologist who reviewed the QAPP, Peter Nolan, has recommended approval of the QAPP with the modifications I received. We find that the QAPP includes the necessary elements provided in our Agency guidance document, *EPA Requirements for Quality Assurance Project Plans* (EPA QA/R-5, March, 2001). Please note that the QAPP's author, has agreed with my suggestion to treat the QAPP as one for an on-going project.

I have reviewed the QAPP and signed the cover page; I will forward it to you by pouch mail. After you have signed it, please send me a photocopy of it for our files. Also, I do not have a copy of the revised version of the QAPP itself, i.e., pages 1 - 12, and would like to have one for our files.

This approval covers the 2003 through 2007 sampling seasons.

- If minor changes occur, our office should be informed by email or letter, but approvals of such changes are not required.
- If major changes occur, a revised QAPP should be submitted for review and approval.
- If the project continues beyond 2007, a new QAPP should be submitted for review and approval before monitoring in 2008 begins even if the changes are minor.

If you have any comments or questions, please contact me at any time. I may be reached by phone at (617)918-8374 and by fax at (617)918-8274.

QUALITY ASSURANCE PROJECT PLAN
1. Title and Approval Page

Rapid Bioassessment In Wadeable Streams and Rivers By Volunteer Monitors

(Project name)

Connecticut Department of Environmental Protection Bureau of Water Management Planning and Standards Division

(Responsible Agency)

January 2, 2003

(Date)

Bureau QA/QC Officer Signature _____

Signature/Date

Mr. Fred Banach
Assistant Director
CT DEP Planning and Standards Division
Connecticut Department of Environmental Protection
Bureau of Water Management
Planning and Standards Division

Project Manager Signature _____

Signature/Date

Mr. Ernest Pizzuto
Project Manager Monitoring & Assessment
Connecticut Department of Environmental Protection
Bureau of Water Management
Planning and Standards Division

USEPA Project Officer Signature _____

Signature/Date

Mr. Larry MacMillan
EPA Project Officer
Connecticut State Team
United States Environmental Protection Agency

USEPA QA Officer Signature _____

Signature/date

Mr. Arthur Clark
Quality Assurance Officer
United States Environmental Protection Agency

Prepared by

Michael Beauchene
CT DEP Bureau of Water Management
Planning and Standards Division
79 Elm Street
Hartford, CT 06106

2. Table of Contents

3. Distribution List

Mr. Arthur Clark
Quality Assurance Officer
United States Environmental Protection Agency

Mr. Larry MacMillan
EPA Project Officer, Connecticut State Team
United States Environmental Protection Agency

Mr. Fred Banach
Assistant Director, CT DEP Planning and Standards Division
Quality Management Lead
Connecticut Department of Environmental Protection, Bureau of Water Management, Planning and Standards Division

Mr. Ernest Pizzuto
Project Manager Monitoring & Assessment
Connecticut Department of Environmental Protection, Bureau of Water Management, Planning and Standards Division

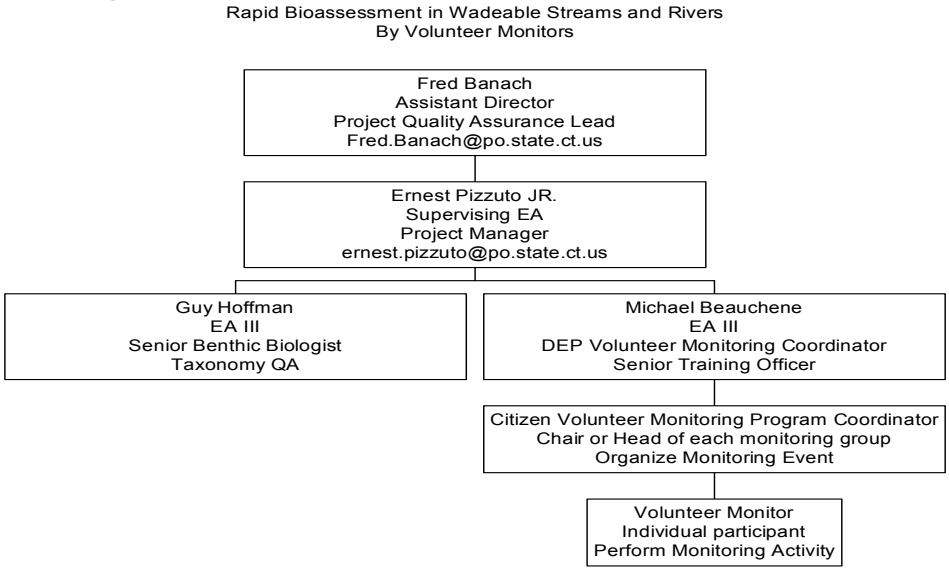
Mr. Michael Beauchene
Monitoring & Assessment
Connecticut Department of Environmental Protection, Bureau of Water Management, Planning and Standards Division

Mr. Guy Hoffman
Monitoring & Assessment
Connecticut Department of Environmental Protection, Bureau of Water Management, Planning and Standards Division

Chairperson/Lead Contact
Each Volunteer Monitoring Group
Participating in this Program

4. Project Organization

4.1 Organizational Chart



4.2 Communication Pathways

The CT DEP maintains a web page with materials relating to background, data collection methodology, field data sheets, and annual summary reports (http://dep.state.ct.us/wtr/volunmon/volopp.htm). The DEP volunteer monitoring coordinator maintains a list of electronic and physical addresses for all citizen volunteer monitoring program coordinators. The citizen volunteer monitoring coordinator maintains contact information for each volunteer monitor under his/her supervision. All communications are handled electronically via e-mail whenever possible. The heart of the above communication pathway is between the DEP volunteer monitoring coordinator and the Citizen Volunteer Monitoring Program Coordinator. These 2 people are responsible for facilitating, organizing, and reporting all information regarding, the training day, methodology, data use and assessment, and data reporting. Communication flows up through the DEP via the DEP coordinator and down to individual volunteer monitors via the citizen volunteer monitoring program coordinator.

4.2.1 Modifications to the Approved QAPP

Any real-time changes to sampling effort or location will be made by the citizen volunteer monitoring program coordinator with consultation from the DEP volunteer monitoring coordinator. If such changes are necessary they are to be made in such a manner as to not jeopardize the validity and comparability of the macroinvertebrate community data. If a change is made, the change will be documented and distributed via the above pathway.

4.3 Personnel Responsibilities and Qualifications

Name	Project Related Role	Qualifications
Fred Banach	Project QA/QC Lead	10 years as Assistant Director of Planning and Standards Division. Over 25 years involved with water quality management.
Ernest Pizzuto Jr.	Project Manger (Monitoring) Data review and assessment	Over 25 years involved with surface water quality and biological monitoring. Supervising EA for monitoring section 7 years.

Michael Beauchene	Workshop Facilitator/Field Survey Crew Leader/Data Management/QA-QC officer	Over 10 years involved with river/stream sampling. Developed RBV protocol of which this QAPP is written for. Developed Access database to store water quality and biological data.
Guy Hoffman	Benthic Expert and Taxonomy QA	Over 20 years involved with surface water quality and biological monitoring. Lead Biologist for the DEP Ambient Benthic Monitoring Program.
Citizen Volunteer Monitoring Program Coordinator	Organize training day, identify site locations, liasion with DEP volunteer monitoring coordinator/Sample Collection QA	Active interest in water quality monitoring or watershed management, restoration, or preservation. Current serving as the chair of an organized volunteer monitoring group. Have previously attended and participated in the RBV training.
Volunteer Monitor	Field Data Collection	Active interest in water quality monitoring or watershed management, restoration, or preservation.

4.4 Special Training Requirements/Certification

A. Training Logistical Arrangements

The DEP BWM volunteer monitoring coordinator conducts all training sessions. Presentations are standardized and presented in Microsoft Power Point format (Appendix A and B). Volunteer monitoring program coordinators schedule a one-day training session with the DEP BWM volunteer monitoring coordinator. The session consists of morning presentations followed by afternoon field sample collection.

B. Description of Training and Trainer Qualifications

DEP BWM volunteer monitoring coordinator, Michael Beauchene, directs training. Mike Beauchene developed all program materials and methodology with peer review from Ernest Pizzuto and Guy Hoffman.

Project Function	Course or Description	Trained by	Training Date	Trainees	Certs/Records
Data collection	Rapid Bioassessment in Wadeable Streams and Rivers by Volunteer Monitors	Michael Beauchene	Every Fall immediately prior to sampling	All Volunteer Monitors in Attendance	DEP Volunteer Monitoring Coordinator

5. Project Planning/Problem Definition

5.1 Project Planning Meetings

Project planning meetings are held when a citizen volunteer monitoring coordinator contacts the DEP volunteer monitoring coordinator requesting to set up a training day for their specific group. At the meeting the logistics for training and sample collection locations are discussed. Follow up meetings are held until are of the issues regarding the training are resolved and both parties are satisfied with the logistics.

5.2 Problem Definition/Site History and Background

During the early to mid 1990's volunteer monitoring using macroinvertebrates was very popular. Most groups implemented the family-level bioassessment method. Unfortunately the extensive time commitment required to complete the process at a single site caused many groups to abandon or reduce their monitoring activity. The DEP volunteer monitoring coordinator, developed this protocol to reduce volunteer attrition while concurrently maintaining useful data for both DEP and the volunteer.

Beginning in 1999, the DEP volunteer monitoring coordinator developed Rapid Bioassessment in Wadeable Streams and Rivers (RBV). This method uses a select group of macroinvertebrates collected from riffle segments of wadeable streams and rivers to screen for either very high or very low water quality. As part of the programs' materials, a document describing the rationale and history of the RBV method was developed. This document is found on the web page at (http://dep.state.ct.us/wtr/volunmon/rbvpt1.pdf) and is presented as Appendix C. This method was developed to reverse the trend discussed above. The DEP values volunteer monitoring data when collected with and according to established methods. However, the amount of data and number of groups willing to commit to the task were steadily decreasing. The program has been ongoing since each fall since 1999 and seems to have stabilized the volunteer monitoring effort in Connecticut.

6. Project Description and Schedule

6.1 Project Overview

The RBV program has been implemented each fall since 1999. At each RBV day, participants are trained prior to sample collection by the DEP volunteer monitoring coordinator. The participants collect riffle-dwelling benthic macroinvertebrates from approximately 1 square meter of substrate. The entire contents of the sample are sorted by type. A representative specimen from each type is placed in a labeled glass vial with alcohol and submitted to the DEP volunteer monitoring coordinator.

A complete description of the program is attached as Appendix C.

6.2 Project Schedule

The following table provides a schedule of the project activities for a typical fall collection season. The schedule is based on a calendar year. Initial planning activities occur during the summer prior to sampling (year A) and data assessment occurs following data entry and validation but prior to initial planning activities for the next low flow sampling (year B).

Task	**Date**
Scoping Meeting/Selection of Waterbodies	Summer of year A
Definition of segments	Summer/Fall of year A
Training and benthic community sampling	September-November of year A
Data entry/validation	November-December of year A
Data Evaluation/Assessment	January-March of year B
Data Reporting	April of year B

7. Project Quality Objectives

7.1 Project Quality Objectives

Groups who participate in RBV will be provided with a list of macroinvertebrates. Each organism on the list has distinct shape, structure, color, or behavior and provides key ecological information about the stream environment (Appendix D). Following the standard procedures, volunteers collect benthic macroinvertebrates in the fall and determine the relative abundance (none, few, some or many) of each macroinvertebrate on the list. The final product will be a completed data sheet and a representative voucher collection. The datasheet can then be submitted to DEP via phone, mail, fax, or email and the voucher collection at a later date. The entire process occurs at the stream site and can be completed by 2-3 monitors within 2 hours.

The most meaningful information for the DEP will come from those groups who are able to complete the RBV process at multiple sites (**during a single day in the fall**) along a reach of river not routinely monitored by DEP. By evaluating the relative abundance of the benthic community at each site and establishing baseline information, subtle changes can be detected, provided the process is performed correctly.

7.2 Measurement Performance Criteria

A. Precision & Accuracy/Bias

This method of collecting macroinvertebrates does not support measurable precision nor accuracy/bias calculations. Volunteers are required to place a representative organism of each type collected at the station in to a vial with alcohol. All organism identifications are verified by the DEP volunteer monitoring coordinator and mis-identifications reconciled when the voucher sample is submitted to DEP.

B. Data Representativeness

Sampling segments are limited to riffle habitats within wadeable sections of streams and rivers. Volunteers are required to perform a traveling kick at six different locations at the sampling station. The organisms from each of the 6 kick stops are composited into a single sample for the station. Data collected in this fashion provide documentation of organisms present at a station at the date and time of collection.

C. Comparability

Macroinvertebrates community data are collected per the protocol methodology in wadeable riffle sections of a stream. Each sample will consist of 6 kick stops composited into a single sample. The DEP volunteer monitoring coordinator rotates through each group of collectors at least once during the collection process on each of the RBV days to insure the participants follow the protocol correctly.

D. Completeness

It is expected that a vial of voucher organisms will be assembled and preserved in alcohol from each of the stations selected for monitoring.

8. Sampling Process Design

8.1 Sampling Design Rationale

This method covered by this QAPP allows citizens to collect and submit meaningful aquatic macroinvertebrate information to the DEP, Bureau of Water Management, Ambient Monitoring Program. Data collected using this method will be used to help identify streams with pollution sensitive benthic communities. Rapid Bioassessment for volunteers is not a definitive assessment procedure, but rather a screening tool intended to broadly characterize sites within 3 categories of environmental quality; very good, marginal, or very poor. Established DEP assessment methods may be needed to determine actual community structure.

A. Sample Design Logistics

Category	Type of sample	Number of samples	Sampling Frequency	Sampling Period
Macroinvertebrate community	Traveling Kick	20-30	Annually	September to December

9. Sampling Procedures and Requirements

9.1 Sampling Procedure

Follows methodology detailed in Appendix E. (http://dep.state.ct.us/wtr/volunmon/rbvpt2.pdf).

9.2 Sampling SOP Modifications

None

9.3 Cleaning and Decontamination of Equipment

All equipment is rinsed with stream water following sampling. Additional cleaning occurs with a scrub brush and hose at the field headquarters after sampling is complete and prior to storing the gear.

Field Equipment Calibration

No equipment requiring calibration is used in this project.

9.4 Field Equipment Maintenance, Testing and Inspection Requirements

Equipment type	Inspection Frequency	Type of Inspection
Kick Net	Pre and post sampling	Net and handle condition
Sorting trays	Pre and post sampling	Cleanliness
Identification support materials	Pre and post sampling	Condition and Presence
Voucher Collection materials (Vials, alcohol, labels, pencils)	Pre sampling	Present and usable

9.5 Inspection and Acceptance Requirements for Supplies/Sample Containers

All equipment must be in condition to be able to collect and retain macroinvertebrates without loss through holes, rips, tears, etc. Adequate preservation materials must be on site.

10. Sample Handling, Tracking and Chain of Custody Procedures

The volunteer participant transfers the original field data sheet and the voucher collection at end of sampling day to the Citizen volunteer monitoring coordinator and then to the DEP volunteer monitoring coordinator. The field data sheet and label in the vial are review for completeness and accuracy while the collector is present.

At least one of each organism that is identified as one of the "targeted" types on the data sheet and at least one of each type of organism either not on the datasheet or that was not able to be definitively identified in the field are placed in the voucher collection vial and submitted to the DEP volunteer monitoring coordinator as soon as sampling is completed. Since the sampling method is intended not to be lethal to most of the organisms, they are released to the stream immediately following identification.

The DEP volunteer monitoring coordinator logs each sample into a Microsoft Access database upon return to DEP lab.

10. 1 Documentation and Records

10.1.1 Field Notes

Field Data sheets (http://dep.state.ct.us/wtr/volunmon/rbvdatasht.pdf) track field collection information. Field data sheets are printed on waterproof paper. Location data is collected using hand-held GPS and/or ArcView Map interpolation by the DEP volunteer monitoring coordinator. A copy of the field data sheet is attached as Appendix D.

10.1.2 Field Documentation Management System

Field documentation is described in section 10 above.

10.2 Sample Handling and Tracking System

Sample handling and tracking is described in section 10 above.

10.3 Sample Custody
Sample custody is described in section 10 above.

11. Field Analytical Requirements
There are no field analytical methods involved with this project

12. Fixed Laboratory Analytical Method Requirements
There are no laboratory analytical methods involved with this project.

13. Quality Control Requirements

13.1 Sampling Quality Control
Volunteer monitors are supervised by either the DEP volunteer monitoring coordinator or an experienced participant (greater than 2 sampling seasons). The DEP volunteer monitoring coordinator on site confirms all macroinvertebrate voucher sample identification.

13.2 Analytical Quality Control
There are no analytical quality controls.

14. Data Acquisition Requirements
Completed field sheets and the voucher collection are submitted to the DEP volunteer coordinator at the conclusion of the sampling. The DEP volunteer monitoring coordinator enters all specimens into a Microsoft Access Database.

15. Documentation, Records, and Data Management
15.1 Project Documentation and Records

Sample collection records	Field Analysis Records	Fixed Laboratory Records	Data Assessment Records
Field Notes	**Field Data Sheet**	**Voucher Collection**	**Volunteer Monitoring Database**

15.2 Field Analysis Data Package Deliverables
A photocopy of the completed field datasheet and the voucher collection from each sample collection location.

15.3 Fixed Laboratory Data Package Deliverables
Curated Voucher Collection.

15.4 Data Reporting Formats
Data are recorded on waterproof paper. A standard data sheet is used to estimate relative abundance of each type of organism identified at the station. The data recorder places few, some, or many for each organism identified. Any errors are reconciled by a single line through the error and initialed by the data recorder. The DEP volunteer monitoring coordinator reviews each data sheet immediately following completion of the protocol.

15.5 Data Handling and Management

Data Recording
Data are recorded are described in section 15.4.

Data Transformation/Data Reduction
The data is neither transformed nor reduced.

Data analysis and Data Assessment
Rapid Bioassessment for volunteers is not a definitive assessment procedure, but rather a screening tool intended to identify high quality streams. Established DEP assessment methods may be needed to determine actual community structure.

Macroinvertebrate community lists are used via best professional judgement that is equivalent to RBP I (Plafkin 1989). Assessments are used to define level of support for Aquatic Life Water Quality Standard (CT DEP 1997). The most useful data are those samples containing several representatives in the pollution sensitive groups (Most Wanted). When these organisms are present in a voucher sample, it can be inferred with some degree of confidence that the water quality standards for aquatic life use are fully supporting. Currently, there is no calibrated multi-metric approach appropriate for this data set. Sites with data suggesting impairment are scheduled for follow-up monitoring by DEP staff.

15.6 Data Tracking and Control
The volunteer monitoring database was developed and is maintained by BWM staff. The database resides on a Novell Computer Network. The CT DEP Information and Technology Department maintain this network. The network is backed up nightly, weekly, monthly, and annually on computer tapes. With this back up system the database can be restored following catastrophic loss or the corruption. Ultimately these data will be uploaded to STORET.

The database is password protected and maintained by Mike Beauchene. Only he and the monitoring supervisor know the password. The monitoring supervisor keeps a hard copy of the password.

16. Assessment and Response Actions
16.1 Planned Assessments
The macroinvertebrate data is compiled in to an annual summary report. This report serves to document the types of organisms collected at each sampling location for the corresponding field season. As the number of samples from a particular station increase with time, longer-term evaluation can occur.

16.2 Assessment Findings and Corrective Action Responses
Any deficiencies identified during field sampling visits are documented on the field data sheet and forward to the DEP volunteer monitoring coordinator and the citizen volunteer monitoring coordinator as described in section 4.2 Communication pathways. Segments with data indicating low macroinvertebrate diversity and that are located on previously unassessed DEP segments will be recommended for a more though investigation. These recommendations will come from the DEP volunteer monitoring coordinator to the DEP project manager.

16.3 Additional QAPP non-conformances
The monitoring staff and the field crew supervisor discuss and reach consensus regarding any field sampling deviations. Corrective actions are decided and based upon the intended use of the data. If it is determined that conditions will jeopardize the usability of the data sampling is

suspended until the issue can be resolved according the communication pathways described in section 4.2. Most deviations involve stream flow, habitat, or accessibility issues.

17. QA Management Reports

Photocopies of the field data sheets are provided to the DEP volunteer monitoring coordinator from the volunteer monitoring group. These datasheets are kept on file at the DEP. Because the DEP volunteer monitoring coordinator is present during sampling, any QA issues are handled in a timely manner so not to jeopardize the sample results. The DEP volunteer coordinator provides a verbal report of the days sampling to the volunteer participants during and at the completion of the sampling. Any potential water quality issues discovered during the RBV sampling are documented through interdepartmental memos as soon as it is practical.

18.Verification and Validation Requirements

Data will be verified and validated primarily by evaluating the contents of the voucher collection against the hard copy data sheet.

19. Verification and Validation Procedures

At least one of each organism that is identified as one of the "targeted" types on the data sheet and at least one of each type of organism either not on the datasheet or that was not able to be definitively identified in the field are placed in the voucher collection vial at the time of collection. At a later date at the DEP laboratory each organism in the voucher collection is identified and confirmed against the datasheet. Because this methodology is not intended to be a comprehensive list of riffle-dwelling benthic macroinvertebrates, it is expected that organisms not listed as part of the protocol will be in the voucher vial. All organisms in the vial are verified and recorded in the database.

20. Data Usability/Reconciliation with DQO's

Data are reviewed according to *Diagram 6 Preliminary Data Review Decision Tree* in the QAPP guidance (EPA 1999). Assessments are used to define level of support for Aquatic Life Water Quality Standard (CT DEP 1997).

References Cited

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of water; Washington, D.C].

CT DEP. 2002. A Volunteer Opportunity for Citizen to Monitor Wadeable Streams and Rivers. DEP Web Page. http://dep.state.ct.us/wtr/volunmon/volopp.htm. Hartford, CT

CT DEP. 1997. Water Quality Standards. CT Department of Environmental Protection, Bureau of Water Management, Planning and Standards Division, Hartford, CT

CT DEP. 1999a. 1998 Water Quality Report to Congress. CT Department of Environmental Protection, Bureau of Water Management, Planning and Standards Division, Hartford, CT

CT DEP. 1999b. Ambient Monitoring Strategy for Rivers and Streams: Rotating Basin Approach. CT Department of Environmental Protection, Bureau of Water Management, Planning and Standards Division, Hartford, CT

EPA 1999. Region I, New England Compendium of Quality Assurance Project Plan Requirements and Guidance. US EPA-New England Region 1 Quality Assurance Unit Staff, Office of Environmental Measurement and Evaluation.

Plafkin, J.L. et al. 1989. Rapid bioassessment protocols for use in streams and rivers. U.S. Environmental Protection Agency, Washington D.C.