COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER QUALITY PROGRAMS
ELLEN GILINSKY, Ph.D., DIRECTOR

P.O. Box 10009 **Richmond, VA 23240-0009**

Subject: Guidance Memo No. 06-2010
Guidelines for DEQ Review and Approval of Biological Monitoring QAPPs Submitted by Non-DEQ Sources

To: Regional Directors

From: Ellen Gilinsky, Ph.D, Director 

Date: August 28, 2006

Copies: James Golden, Rick Weeks, Regional Water Compliance Managers, Regional Office Biologists, Regional Office Planners, Alan Pollock, Jean Gregory, Darryl Glover, Charles Martin, Warren Smigo, Alex Barron, James Beckley, Harry Augustine

Summary:

This document provides DEQ guidelines for review and approval of biological monitoring Quality Assurance Project Plans (QAPPs) submitted by non-DEQ entities, such as federal, other state agencies, and citizen volunteer monitoring groups, for DEQ use of the data in assessments of wadeable streams and rivers. This guidance does not apply to data from DEQ contractors, which is considered DEQ data and approved for use through other procedures.

A tiered approach is outlined to determine how non-agency biological data will be used in the assessment program based on information quantity, quality and representativeness. The three levels of use of non-agency biological data are: Level III where data from non-DEQ sources meet the highest standards and can be accepted for use determinations, 305(b) assessment, or 303(d) listing and delisting of impaired waters; Level II for identification of waters of concern as discussed Department Guidance Memo No.GM04-2005, Section VII , 4.1; and Level I for community education and awareness, watershed characterization and red flag or early warning. In reviewing data submitted by non-DEQ sources, the DEQ will use these guidelines to determine the appropriate level of use of the data generated by such a project.

Electronic Copy:

An electronic copy of this guidance in PDF format is available for staff internally on DEQNET, and for the general public on DEQ's website at: http://www.deq.virginia.gov.

Contact information:

Name: Warren H. Smigo
Phone Number: 804-698-4046
E-mail: whsmigo@deq.virginia.gov

Disclaimer:

This document is provided as guidance and, as such, sets forth standard operating procedures for the agency. However, it does not mandate any particular method nor does it prohibit any particular method for the analysis of data, establishment of a waste load allocation, or establishment of a permit limit. If alternative proposals are made, such proposals should be reviewed and accepted or denied based on their technical adequacy and compliance with appropriate laws and regulations.

1.0 BACKGROUND

Although many citizen volunteer monitoring groups and other organizations want their biological monitoring data to be used by DEQ for assessment purposes, differences in methods from DEQ established protocols make it more difficult for DEQ to use the data in this way. Therefore, this guidance has been developed to provide internal procedures for reviewing and approving biological monitoring Quality Assurance Project Plans (QAPPs) from non-DEQ sources and defining a tiered approach to agency use of the data in assessments of wadeable streams and rivers.

Historically, DEQ has used citizen volunteer biological data and other non-DEQ biological data as supplemental or supporting data for use determinations, but not for use determinations based solely on volunteer data. If non-DEQ monitoring data are to be used as the sole source in use attainment, a greater emphasis on the development of QAPPs, training, and QA review of sampling events will be required.

During development of these internal protocols for approval of QAPPs for a specific level of data use, staff reviewed guidance from several states (Pennsylvania, Idaho, Kentucky, California, Washington, Minnesota, and Connecticut) on how they use non-agency biological monitoring data in agency programs. This process also parallels a similar process being used for non-agency chemical data.

2.0 REVIEW AND APPROVAL OF BIOMONITORING QAPPS

Appendix 1 provides a QAPP review checklist for use by DEQ in reviewing biological monitoring QAPPs submitted by citizen and other non-DEQ sources. Written approval, conditional approval, or disapproval of the QAPP will be based on this checklist evaluation, which includes the 24 requirements outlined in Requirements for Quality Assurance Project Plans (USEPA 2001). (QAPP instructions and templates can be found at www.deq.virginia.gov/cmonitor/grant.html)

3.0 DETERMINATION OF USES OF NON-DEQ BIOLOGICAL MONITORING DATA IN ASSESSMENT

Appendix 2 provides a form to be submitted by the non-DEQ source for use by DEQ to evaluate the scientific rigor and data relevance of non-DEQ data and to assign the appropriate tier of agency use of the biological data from non-DEQ sources. The 3 levels of data use are presented according to use level and criteria such as quality

assurance/quality control protocols, monitoring methods, and the education and training of the monitors.

3.1 Description of Data Uses and QA/QC Requirements for Each Ranking Tier

The three levels of DEQ use of non-DEQ biological monitoring data are driven by the scientific rigor of the data because all data decisions must be scientifically defensible.

3.1.2. Level III

Use of the data:

Level III non-DEQ biological data may be used to assess support of designated aquatic life uses – 305(b) assessment; 303(d) determination of impairment. Level III data may be used to indicate either Fully Supporting or Impaired status only. DEQ will require the most strict data standards for these Level III uses.

QA/QC Protocols:

There are two options by which non-DEQ sources may obtain Level III status.

Option A: DEQ will hold non-DEQ sources to the same standards required of DEQ staff in collecting and processing biological data. The intent of these requirements is that, for use in 305(b) assessments, any data collected by non-DEQ programs is equivalent to DEQ procedures and therefore can be used to reach equivalent classification decisions. The non-DEQ source must use the methodology for macroinvertebrate monitoring currently followed by DEQ.
Option B: When non-DEQ sources have different bioassessment protocols from DEQ, validation studies will have been conducted that determine that the non-DEQ protocols consistently reach equivalent classification decisions. Upon request, DEQ will provide a list of the non-DEQ bioassessment protocols that have been validated for Level III use in assessing data.

For both options, non-DEQ sources must also:

- Have a Quality Assurance Project Plan (QAPP) that has been reviewed and approved by DEQ and meets the 24 requirements outlined in Requirements for Quality Assurance Project Plans (USEPA 2001) and is consistent with DEQ standard operating procedures and methods.

- Have a documented training program for the collection and identification of macroinvertebrates.

- Have personnel responsible for training water quality monitors obtain a certification in macroinvertebrate taxonomic identification proficiency from DEQ or have documentation indicating such proficiency.

- Have DEQ conduct review of taxonomic identifications for confirmation of accuracy for each non-DEQ source every other year.

3.1.3. Level II

Use of the data:

DEQ will accept data collected as baseline information and as a screening tool to indicate where "Waters of Concern" needing additional monitoring are located, but will not use citizen data independently for listing or delisting purposes. As resources allow, additional monitoring may be done by DEQ on those streams that had the highest potential for water quality problems as identified by the submitter of the data.

QA/QC Protocols:

The non-DEQ source must have a Quality Assurance Project Plan (QAPP) that has been reviewed and approved by DEQ and meets the 24 requirements outlined in Requirements for Quality Assurance Project Plans (USEPA 2001). Non-DEQ sources must have a monitoring program with required participation of all sample collectors in a training program and they must be able to identify benthic macroinvertebrates to at least the order level. The data collectors will have followed documented field, laboratory, and data-handling protocols.

3.1.4 Level I

Use of the data:

DEQ will accept data collected for the purpose of community education and awareness, watershed characterization and red flag or early warning. This type of information may be considered as general background information, but is not of sufficient rigor for listing decisions.

QA/QC protocols:

Non- DEQ sources must have a basic written plan – purpose, parameters, methods, sites, schedule – which may be qualitative in nature. Macroinvertebrates are used as the biological indicator and are identified to at least the community level.

Virginia Department of Environmental Quality
Appendix 1: Non-DEQ Biological Monitoring QAPP Review Checklist

Element	Element Name and Review Aspect	A Acceptable	U Unacceptable	NI Not Included	NA Not Applicable	Page # (Section #)	Comments (and notes)
	PROJECT MANAGEMENT						
1	**Title and Approval Page(s)**						Items A1.1 through A1.8 can be presented on one or two sheets
1	Contains project title						
1	Indicates name of responsible agency or organization						
1	Dated signature of organization's project manager present						
1	Signature block for organization's Project Manager						
1	Signature block for organization's QA Officer						
1	Signature block for DEQ QA Officer or Biomonitoring Coordinator						
2	**Table of Contents**						
2	Lists sections with page numbers						
2	Lists references						
2	Provides lists of tables and figures						
2	Provides contents of each Appendix						
2	Lists all attached SOPs (with names, not just numbers)						
3	**Distribution List**						
3	Includes names and telephone numbers of all individuals who are to receive a copy of the QA Project Plan and identifies their organization or agency						
4	**Project/Task Organization**						
4	Identifies key individuals involved in all major aspects of the project, including contractors						
4	Lists their corresponding responsibilities						
5	**Problem Definition/Background**						
5	Contains a problem statement						
5	States intended use of the data						
6	**Project/Task Description**						

Element	Element Name and Review Aspect	A Acceptable	U Unacceptable	NI Not Included	NA Not Applicable	Page # (Section #)	Comments (and notes)
6	Summarizes general overview of the project						
6	Provides project tasks indicating critical project points, e.g., start and completion dates for activities such as sampling, analysis, data or file reviews, and assessments						
6	Details geographical locations to be studied, including maps where possible						
7	**Quality Objectives for Measurement Data**						
7	Provides parameter lists with data quality objectives for all field measurements and lab analyses						
7	Identifies acceptance criteria for analysis of benthic macroinvertebrates						
7	Discusses precision						
7	Addresses bias						
7	Discuss representativeness and how it will be assessed and controlled						
7	Identifies the need for completeness						
8	**Training Requirements/Certifications**						
8	Identifies any project personnel specialized training or certifications						
8	States that the Contractor's QA Officer is responsible for overseeing training						
8	Discusses how this training will be provided						
8	Indicates personnel responsible for assuring these are satisfied						
8	Identifies where this information is documented						
9	**Documentation and Records**						
9	Identifies report format and summarizes all data report package information						
9	Lists all other project documents, record, and electronic files that will be produced						
9	Identifies where project information should be kept and for how long						
9	Discusses back up plans for records stored electronically						

Element	Element Name and Review Aspect	A Acceptable	U Unacceptable	NI Not Included	NA Not Applicable	Page # (Section #)	Comments (and notes)
9	States how individuals identified in A3 will receive the most current copy of the approved QA Project Plan, identifying the individuals responsible for this						
	MEASUREMENTS/DATA ACQUISITION						
10	**Sampling Process Design (Sampling Design and Logistics)**						
10	Provides the design information, or a reference to a specific document that contains it, at the required level of detail to enable the reader to tell whether the data will achive the objective						
10	Describes and justifies design strategy, indicating size of the area, or time period to be represented by a sample						
10	Details the type and total number of sample types or test runs/trials expected and needed						
10	Indicates where samples should be collected, how sites will be identified located						
10	Discusses what to do if sampling sites become inaccessible [logistics]						
10	Identifies project activity schedules such as each sampling event, times samples should be sent to the laboratory, etc. [logistics]						
10	Specifies what information is critical and what is for informational purposes only						
10	Identifies sources of natural variability and how this variability should be reconciled with project information						
10	Identifies potential sources of bias or misrepresentation and how their contribution can be minimized						
11	**Sampling (sample collection) Methods/Requirements**						Field measurements are discussed in element 13
11	Identifies all sampling SOPs by number, date, and regulatory citation, indicating sampling options or modifications to be taken. SOPs for sample collection should be attached.						
11	Indicates how each kind of sample type should be collected						
11	Indicates how samples are to be homogenized, composited, split, or filtered, if needed						
11	Indicates what sample containers and sample volumes should be used						
11	Identifies whether samples should be preserved and indicates methods that should be followed						

Element	Element Name and Review Aspect	A Acceptable	U Unacceptable	NI Not Included	NA Not Applicable	Page # (Section #)	Comments (and notes)
11	Indicates whether sampling equipment and samplers should be cleaned and/or decontaminated, identifying how this should be done and by-products disposed of						
11	Identifies any equipment and support facilities needed						
11	Addresses actions to be taken when problems occur, identifying individual(s) responsible for corrective action and how this should be documented						
12	**Sample Handling**						
12	States maximum holding times allowed from sample collection to and analysis for each sample type						
12	Identifies how samples or information should be physically handled, transported, and then received and held in the laboratory or office (including						
12	Indicates how sample or information handling information should be documented, such as in field notebooks and forms, identifying individual responsible						
13	**Analytical Methods and Field Measurements**						
13	Identifies all SOPs (field and/or office) that should be followed by number, date, and regulatory citation, indicating options or modifications; SOPs should be attached						
13	Lists all the instruments and kits that will be used in the field and describes the measurement principle and the major attributes						
13	Identifies all laboratory SOPs that should be followed by number, date, and regulatory citation, indicating options or modifications to be taken, such as sub-sampling procedures						
13	Identifies equipment or instrumentation needed for laboratory analyses						
13	Specifies any specific method performance criteria						
13	Identifies procedures to follow when failures occur, identifying individual responsible for corrective action and appropriate documentation						
13	Specifies laboratory turnaround times needed						
13	Provides method validation						
13	Indicates where method development records are stored and how they can be accessed						
14	**Quality Control Requirements**						

Element	Element Name and Review Aspect	A Acceptable	U Unacceptable	NI Not Included	NA Not Applicable	Page # (Section #)	Comments (and notes)
14	For each type of sampling, analysis, or measurement technique, identifies QC activities which should be used, e.g. duplicates						
14	Details what should be done when control limits are exceeded, and how effectiveness of control actions will be determined and documented						
14	Identifies procedures and formulas for calculating Data Quality Indicators or applicable QC statistics, for example, for precision, bias, outliers and missing data						
15	**Instrument/Equipment Testing, Inspection and Maintenance**						
15	Identifies field and laboratory equipment needing periodic maintenance, and the schedule for this						
15	Indicates procedures in place for inspecting equipment before usage						
15	Identifies individual(s) responsible for testing, inspection and maintenance						
16	**Instrument/Equipment Calibration and Frequency**						
16	NA						
17	**Inspection/Acceptance for supplies and Consumables**						
17	Identifies critical supplies and consumables for field and laboratory, noting supply source, acceptance criteria, and procedures for tracking, storing and retrieving these materials						
17	Identifies the individual(s) responsible for this						
18	**Data Acquisition Requirements**						
18	Identifies data sources, for example, computer databases or literature files, or models that should be accessed and used						
18	Describes the intended use of this information and the rationale for their selection, i.e., its relevance to project						
18	Indicates the acceptance criteria for these data sources and/or models [re-iterated or referred to Element A7)						
18	Identifies key resources/support facilities needed						
18	Describes how limits to validity and operating conditions should be determined, for example, internal checks of the program						
19	**Data Management**						

Element	Element Name and Review Aspect	A Acceptable	U Unacceptable	NI Not Included	NA Not Applicable	Page # (Section #)	Comments (and notes)
19	Describes data management scheme from field to final use and storage, for field measurements, and lab analyses						
19	Discusses standard record-keeping and tracking practices, and the document control system or cites other written documentation such as SOPs						
19	Identifies data handling equipment/procedures that should be used to process, compile, analyze, and transmit data reliably and accurately						
19	Describes how field measurement, and laboratory analyses data will be formatted and entered - or prepared for upload - into a database						
19	Identifies individual(s) responsible for each step and task						
19	Describes procedures to demonstrate acceptability of hardware and software configurations						
19	Attaches checklists and forms that should be used [or refers the reader to other QAPP elements where the forms are shown, or refers to SOPs]						
	ASSESSMENT AND OVERSIGHT						
20	**Assessments and Response Actions**						
20	Lists the number, frequency, and type of assessment activities that should be conducted, with the approximate dates						
20	Identifies individual(s) responsible for conducting assessments						
20	Describes how and to whom assessment information should be reported						
21	**Reports to Management**						
21	Identifies what project QA status reports are needed and how frequently						
21	Identifies who should write these reports and who should receive this information						
	DATA VALIDATION AND USABILITY						
22	**Data Review, Verification and Validation Requirements**						
22	Describes criteria that should be used for accepting, rejecting, or qualifying project data; re-iterates or refers to element 7						
23	**Verification and Validation Methods**						

Element	Element Name and Review Aspect	A Acceptable	U Unacceptable	NI Not Included	NA Not Applicable	Page # (Section #)	Comments (and notes)
23	Describes process for data verification and validation, providing SOPs and indicating what data validation software should be used, if any						
23	Identifies who is responsible for verifying and validating different components of the project data/information, for example, receipt logs, calibration information, etc.						
23	Identifies issue resolution process, and method and individual responsible for conveying these results to data users						
23	Attaches checklists, forms, and calculations including electronic formula if using spreadsheets						
24	**Reconciliation with Data Quality Objectives**						
24	Describes procedures to evaluate the uncertainty of the validated data [or refer them to previous elements]						
24	Describes how limitations on data use should be reported to the data users						
	Project Name:						
	Reviewer Name:						
	Review Date:						

Appendix 2

Documentation of Non-Agency Biological Monitoring Data from Wadeable Streams and Rivers to be Incorporated into VA DEQ Water Body Assessments

Part I. Information to be provided by citizen volunteer monitoring group or other non-DEQ organization:

Date of Submittal: _____

Contact Information:

Please provide your contact information so DEQ may contact you if a question arises regarding your data.

Name: _____ **Phone:** _____
Address: _____ **Email:** _____
City: _____ **State:** _____ **Zip:** _____

Relevance

1) Were the data collected within the last six years? ☐ YES / ☐ NO

2) Are the water bodies where the data were collected referenced by name and GIS coordinates or map location? * ☐ YES / ☐ NO

3) Are data provided in an electronic format on readable media? ☐ YES / ☐ NO

OR are the data provided in a publication, agency report, or Ph.D. or masters thesis? ☐ YES / ☐ NO
Citation/reference for publication/report/thesis: _____

Scientific Rigor

1) Are the data quantitative in nature? * ☐ YES / ☐ NO
(quantitative data describes size, magnitude, or degree)

2) Were data collected following the methods in the USEPA Rapid Bioassessment Protocol II (RBP II) for Streams and Rivers (Plafkin et. al 1989)? ☐ YES / ☐ NO
If no, what methods or protocols were used? _____

3) Were data collected under a DEQ reviewed and approved Quality Assurance Project Plan as outlined in Requirements for Quality Assurance Project Plans (USEPA 2001)? * ☐ YES / ☐ NO

4) Were data collected by water quality monitoring personnel that have been trained according to a documented training program described in the QAPP? * ☐ YES / ☐ NO

5) Was a reference site used for an RBP II assessment? ☐ YES / ☐ NO

If yes, was the reference site chosen based on DEQ's reference site screening criteria? ☐ YES / ☐ NO

6) Were the samples processed by water quality monitoring personnel that have been trained according to a documented training program described in the QAPP? * ☐ YES / ☐ NO

7) Were the organisms identified by water quality monitoring personnel that have been trained by a certified taxonomist? * [a] ☐ YES / ☐ NO

8) Were the samples identified to family level? ☐ YES / ☐ NO
If not, to what level of identification (community, genus, etc.)? _____

9) Were there two or more sampling events during the most recent two years of the 305 (b) assessment window made at each biological monitoring station? * ☐ YES / ☐ NO

10) Were five percent or more of all samples identified checked for proper taxonomic characterization by an independent taxonomist? * ☐ YES / ☐ NO

***** These questions must be answered "YES" for level III consideration

[a] Please see qualifications for level III data use for certified taxonomist qualifications

Please mail or fax this form to:
Warren H. Smigo, VA DEQ, PO Box 10009, Richmond VA 23240-0009 1-800-592-5482; Fax: (804) 698-4522.

Part II: VA DEQ Evaluation and Assignment of Appropriate Level of Use of the Data

(to be completed by VA DEQ; contact Warren Smigo whsmigo@deq.virginia.gov for information)

Data Rating

All data submitted has value and use in the water body assessment process. DEQ evaluates the scientific rigor and relevance of non-DEQ data to determine where and how it will be incorporated into the assessment process.

Based on your responses to the questions and submittal of supporting documentation, your data has been rated for use at the following level:

Rating: ☐ Level III / ☐ Level II / ☐ Level I

Level III

Use of the data:

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QA/QC Protocols:

There are two options by which non-DEQ sources may obtain Level III status.

Option A: DEQ will hold non-DEQ sources to the same standards required of DEQ staff in collecting and processing biological data. The intent of these requirements is that, for use in 305(b) assessments, any data collected by non-DEQ programs is equivalent to DEQ procedures and therefore can be used to reach equivalent classification decisions. The non-DEQ source must use the methodology for macroinvertebrate monitoring currently followed by DEQ.
Option B: When non-DEQ sources have different bioassessment protocols from DEQ, validation studies will have been conducted that determine that the non-DEQ protocols consistently reach equivalent classification decisions. Upon request, DEQ will provide a list of the non-DEQ bioassessment protocols that have been validated for Level III use in assessing data.

For both options, non-DEQ sources must also:

- **Have a Quality Assurance Project Plan (QAPP) that has been reviewed and approved by DEQ and meets the 24 requirements outlined in Requirements for Quality Assurance Project Plans (USEPA 2001) and is consistent with DEQ standard operating procedures and methods.**

- **Have a documented training program for the collection and identification of macroinvertebrates.**

- **Have personnel responsible for training water quality monitors obtained a certification in macroinvertebrate taxonomic identification proficiency from DEQ or have documentation indicating such proficiency.**

- **Have DEQ conduct review of taxonomic identifications for conformation of accuracy every other year.**

Level II

Use of the data:

DEQ will accept data collected as baseline information and as a screening tool to indicate where "Waters of Concern" needing additional monitoring are located, but will not use citizen data independently for listing and assessment purposes. As resources allow, additional monitoring may be done by DEQ on those streams that had the highest potential for water quality problems as identified by the submitter of the data.

QA/QC Protocols:

The non-DEQ source must have a Quality Assurance Project Plan (QAPP) that has been reviewed and approved by DEQ and meets the 24 requirements outlined in Requirements for Quality Assurance Project Plans (USEPA 2001). Non-DEQ sources must have a monitoring program with required participation of all sample collectors in a training program and they must be able to identify benthic macroinvertebrates to at least the order level. The data collectors will have followed documented field, laboratory, and data-handling protocols.

Level I

Use of the data:

DEQ will accept data collected for the purpose of community education and awareness, watershed characterization and red flag or early warning. This type of information may be considered as general background information, but is not of sufficient rigor for listing decisions.

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Non- DEQ sources must have a basic written plan – purpose, parameters, methods, sites, schedule – which may be qualitative in nature. Macroinvertebrates are used as the biological indicator and are identified to at least the community level.