

### 1. Title and Approval

**INSTRUCTIONS: Please fill in the spaces below with appropriate information for your project and organization, leaving the approval lines blank. Once this QAPP is approved for your project, the LCBP and EPA approval signatures will be added. You will receive a copy of the QAPP with all approval signatures. Collection of samples for this project must not take place until the QAPP is approved.**

**A. Your Specific Project Under the “Lake Champlain General Quality Assurance Project Plan for Volunteer, Educational and Local Community Monitoring and Reporting Activities” :**

\_\_\_\_\_

(Your Project’s Name)

\_\_\_\_\_

(Name of Your Organization)

\_\_\_\_\_

(Date)

**EPA Grant Number (fill in):** \_\_\_\_\_

**LCBP Project Number (fill in):** \_\_\_\_\_

**Project Manager Signature/Date:** \_\_\_\_\_

**Project QA Officer Signature/Date:** \_\_\_\_\_

**Project QAPP Prepared by:** \_\_\_\_\_

**Approvals by:**

\_\_\_\_\_  
*Erik Beck, USEPA Program Manager* *Date*

\_\_\_\_\_  
*Barry Gruessner, Technical Coordinator* *Date*

\_\_\_\_\_  
*Arthur Clark, EPA QA Officer* *Date*

**B. Generic Lake Champlain Basin Program QAPP:**

Lake Champlain General Quality Assurance Project Plan for  
Volunteer, Educational and Local Community Monitoring and  
Reporting Activities

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(Project Name)

Lake Champlain Basin Program

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(Responsible Agency)

July 16, 2001

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(Date)

**Approval Signatures:**

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*Erik Beck, USEPA Program Manager* *Date*

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*Bill Howland, LCBP Manager* *Date*

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*Arthur Clark, USEPA QA Officer* *Date*

QAPP Prepared by: Lee Steppacher & Diane Switzer, EPA New England

## 2. Table of Contents

***INSTRUCTIONS: Change page numbers and appendices as needed for your project. Insert information for any pages of additional information you attach (e.g., maps, manuals, written procedures, etc.)***

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### 3. Distribution List

#### A. Names and telephone numbers of those receiving copies of this general LCBP QAPP.

- i. Arthur Clark, US EPA New England - QA Office, 11 Technology Drive, Chelmsford, MA 01863-2431; Phone: 617-918-8374; FAX 617-918-8397, EMAIL [clark.arthur@epa.gov](mailto:clark.arthur@epa.gov) .
- ii. Erik Beck, US EPA New England (CVT), 1 Congress St., Suite 1100, Boston, MA 02214; Phone: 617-918-1606; FAX 617-918-0606; EMAIL [beck.erik@epa.gov](mailto:beck.erik@epa.gov)
- iii. Michaela Stickney, VT Lake Champlain Coordinator, LCBP, PO Box 204, 54 West Shore Rd., Grand Isle, VT 05458; Phone 802-372-3213 or 800-468-5227; FAX 802-655-6540; EMAIL [michaela.stickney@anrmial.anr.state.vt.us](mailto:michaela.stickney@anrmial.anr.state.vt.us)
- ii. Jim Connolly, NY Lake Champlain Coordinator, NYSDEC, PO Box 296, Raybrook, NY 12977; Phone 518-897-1216; FAX 518-897-1394; EMAIL [jconnol@gw.dec.state.ny.us](mailto:jconnol@gw.dec.state.ny.us)
- ix. Barry Gruessner, Technical Coordinator, LCBP, PO Box 204, 54 West Shore Rd., Grand Isle, VT 05458; Phone 802-372-3213, FAX 802-655-6540; EMAIL [bgruessner@anrmail.anr.state.vt.us](mailto:bgruessner@anrmail.anr.state.vt.us)

#### B. For specific projects funded by LCBP:

***INSTRUCTIONS: please fill in the following section with the names and contact information (i.e., address, phone #, email address) of those involved with your project - other than those listed above - who will receive a copy of your QAPP. This should include the project leader, field/sampling leader and person from the lab.***

- i. \_\_\_\_\_
- ii. \_\_\_\_\_
- iii. \_\_\_\_\_
- iv. \_\_\_\_\_

#### 4. Project/Task Organization

##### A. Table 4a - Lake Champlain Basin Program - Key People and Their Responsibilities.

Project Title/Responsibility	Name
Lake Champlain Basin Program Manager	Bill Howland
EPA Lake Champlain Basin Coordinator	Erik Beck
Technical Coordinator	Barry Guessner
EPA QA Contact	Arthur Clark
Education Coordinator	Colleen Hickey
VT Lake Champlain Basin Coordinator	Michaela Stickney
NY Lake Champlain Basin Coordinator	Jim Connolly

##### B. Table 4b - Key Project People and Their Responsibilities

**INSTRUCTIONS:** Please fill in the name and affiliation (if not from your organization) of the person that best corresponds to the title and description in the left column. Note that one person may have more than one responsibility and may be listed more than once, however, the person responsible for QA should not be the project leader, if possible. If you are not using a laboratory, put an N/A (Not Applicable) in the name space. Add other key people as needed

Project Title/Responsibility	Name/Affiliation
<b>Organization Director</b> – responsible for overseeing all of the organization's activities .	
<b>Project Leader</b> – directly responsible for all aspects of this project.	
<b>Volunteer Coordinator</b> – responsible for overseeing all of the activities of volunteers, including recruiting, maintaining training and participation records, etc.	
<b>Field/Sampling Leader</b> – responsible for training and supervising volunteers in field work, filling out field forms, and performing QC checks to make sure procedures are followed or corrected, as needed.	

<p><b>QA Coordinator</b> – responsible for ensuring that procedures in field and laboratory are performed in accordance with this QAPP and keeps other leaders informed of project status in relation to QAPP. Works with other leaders in conducting QC checks on sampling and analysis techniques. Maintains log of QA and QC checks.</p>	
<p><b>Laboratory Contact</b> – makes arrangements with any laboratory that is used to perform sample analysis according to QAPP. Ensures correct procedures are used, holding times are met and laboratory provides complete documentation.</p>	
<p><b>Data Management Coordinator</b> – Maintains the data systems for the organization, performs data entry, and checks entries for accuracy against field and laboratory forms.</p>	

## 5. Background of Lake Champlain Basin Program

The Lake Champlain Special Designation Act of 1990 has brought together people with diverse interests in the Lake to create a comprehensive pollution prevention, control and restoration plan for the future of the Lake and its watershed. The Lake Champlain Basin Program (LCBP) coordinates all the activities envisioned by the Act undertaken by federal agencies, state and local governments, environmental organizations, watershed groups, businesses, academics, farmers, and other citizens of the Basin. The Act specifically requires examination of ecological, recreational, and cultural resources as well as the identification of problems requiring management action and an integrated plan for the future. This plan is presented in the document “Opportunities for Action” which is available from the Lake Champlain Basin Program Office.

A number of significant themes form the foundation upon which the Lake Champlain Basin Program operates. They include:

- Implementation of the Plan should rely on partnerships among government, private sector, and citizens.
- Planning and management must be based on an ecosystem approach that considers the basin as an interconnected complex system.
- A watershed (or subwatershed) approach should be used to help target areas for restoration and/or protection. This takes advantage of local knowledge of and allows communities to link together to solve local problems.
- Environmental and economic goals must be integrated.
- Pollution prevention efforts are favored to deter future harm to the ecosystem.
- Consensus and collaboration strengthen decision making.

- This plan must be flexible.

The three highest priorities for management efforts, among all issues identified in the Plan, are:

- Reduction of phosphorus in targeted watersheds of the Lake
- Prevention and control of persistent toxic contaminants found Lake-wide or in localized areas of the Lake
- Development and implementation of a comprehensive program for nuisance aquatic species

Individual projects of the LCBP that are covered by this Generic Lake Champlain QAPP address specific baseline data needs, identification of site-specific water quality problems or remedies to reduce/eliminate problems, implementation of specific actions to address problems, and/or monitoring for changes in water quality in specific areas.

## 6. Individual Project Purpose/Task Description

***Instructions - For parts A and B below, please check the boxes that apply to your project and add specific information as needed. Include all pertinent background information, including a brief summary of previously collected data, that help support the purpose of your project. The summary can either be in table format or a brief narrative.***

***Attach a map in Part C, to identify waterbodies being sampled and sampling sites. If you are unable to locate sampling sites until the project is initiated, please explain your circumstances below.***

### A. Objectives of Projects

The principal objectives of projects under this QAPP are to 1) provide a perspective on the range of water quality conditions across the Basin; 2) describe water quality conditions of each waterbody; 3) provide data useful in developing eutrophication models for lakes in the Basin; 4) establish a data base for each waterbody for use in documenting future changes in water quality, and 5) educate and involve local residents in waterbody protection.

General guidelines for projects under this QAPP are:

- Data will be collected during summer months at regular intervals regardless of dry or wet weather conditions, but not in severe weather, such as thunderstorms or high winds (safety always comes first).
- Some data will be collected every week, and other data will only be collected only once during the sample season or appropriate index period (e.g., low flow, high temperature, etc.) as described in Section 10B, Sample Design Logistics, in this QAPP.
- Data will be analyzed, summarized and interpreted on an annual basis. Projects will be required to report to LCBP quarterly, unless another reporting schedule is

approved by the LCBP.

- Information will be presented to the local community in a suitable format, be it a press release, public meeting or another event.
- Data that meets project quality objectives may be entered into Lake Champlain Basin Program’s data management system and EPA’s national water quality data storage system, STORET.

The type of stream/river/pond/lake information that is important to the LCBP includes the following:

- Water depth and depth of sample collection.
- Secchi disk measurements for water clarity/transparency.
- Chlorophyll-a concentrations as an estimate of algal populations.
- Total phosphorus concentrations to measure this nutrient content.
- Dissolved oxygen and temperature measurements along a depth profile, to determine the presence of a thermocline (in lakes) and the amount of oxygen available for fish.
- pH to determine if the waterbody is affected by acid deposition.
- Alkalinity to determine if pond/lake has the ability to neutralize acid deposition.
- The presence and extent of milfoil, to track the spread and removal of this nuisance plant.
- The presence of zebra mussels, an exotic nuisance species.
- Descriptions of flows, bottom sediment, shoreline habitat, etc. in order to learn about – and track changes in – habitat.
- Descriptions of the types of land cover and land use within 100 feet of the shoreline.
- The weather before, and on, the sample date.
- Locational data (latitude/longitude) of sample site(s).

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**B. Intended Uses of Data**

***Instructions: Please place a checkmark beside the uses which are applicable for your project’s data.***

The data generated by projects under this Generic QAPP will serve at least one of the following uses, as specified in project proposals and workplans.

- ‘ Track phosphorus concentrations and/or loadings
- ‘ Identify the presence, density and spread of nuisance aquatic species
- ‘ Describe water quality conditions at specific locations
- ‘ Document the presence and severity of localized problems (e.g. bacteria as pathogen indicators)

- ' Identify sources of local problems
- ' Evaluate sedimentation and erosion problems
- ' Evaluate habitat & embeddedness with regard to aquatic life use
- ' Support development and use of biological indicators for the LCBP
- ' Educate school children and local communities about the Basin, problems and improvements.
- ' Evaluate the effectiveness of restoration projects and other management activities
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**C. Map of Area and Waterbody**

For individual projects under this generic QAPP, a map is to be provided here that identifies waterbody and sample sites.

***Instructions: Insert the map for your project here.***

**D. Table 6a - Project Timetable**

**Instructions: Fill in the following table with the correct dates for your project. If your project does not include any of the listed activities, note why. If there are activities not listed, add them to the table. If you have already completed a timetable you may attach it in lieu of this one.**

<b>Activity</b>	<b>Projected Start Date</b>	<b>Anticipated Completion Date</b>
LCBP Initiates Project Contract		
Project Planning Meeting		
Writing and submission of QAPP (allow 30-90 days between initial submission & approval)		
QAPP Approved		
Training Volunteers/Samplers		
Sampling Begins		
Sampling Ends		
Analytical Results Evaluated * Check/Correct Errors Due to Math Miscalculations or Transferring Data from Field/Lab Forms * Confirm Useable Data * Separate Unuseable Data		
Data Entered into Project Database		
QC Review of Database		
Data Summarized		
Meeting to Review & Discuss Data		
Draft Data Report		
Draft Report Review & Discussion		
Submit Final Data Report to LCBP		

Presentation(s) of Information at a LCBP or Local Meeting		

## 7. Project Quality Objectives

**Instructions: Please check to ensure that you can meet the accuracy and precision requirements, and if you cannot please indicate and explain. Check the appropriate boxes on the left for parameters to be sampled in your project. If you plan to use a different field or laboratory method add your information to this table and provide the written procedures when submitting this completed project QAPP.**

### A. Data Precision, Accuracy, Measurement Range Requirements

**Table 7a – Field Analysis Protocols for Water Samples**

Parameter	Field Analysis Method	Method Reference <sup>1</sup>	Accuracy <sup>2</sup>	Precision <sup>2</sup>
" Transparency	Secchi Disk	Vermont Lay Monitoring Program Manual, 2000	--	+/- 0.1 meter
" Dissolved Oxygen	Winkler Method w/ Azide Modification	<u>Testing the Waters: Chemical &amp; Physical Signs of a River</u> , River Network, 1996	+/- 0.5 mg/l	+/- 0.5 mg/l
" Dissolved Oxygen by Meter	DO Meter	<i>Standard Methods for the Examination of Water and Wastewater</i> , 20 ed., 4500-O G. Membrane Electrode Method	+/- 0.5 mg/l	+/- 0.5
" Temperature	Alcohol Thermometer	<u>Testing the Waters: Chemical &amp; Physical Signs of a River</u> , River Network, 1997	+/- 1.0 <sup>o</sup> C	+/- 1.0 <sup>o</sup> C
" pH	pH Meter	<i>Standard Methods</i> , etc., 20th ed., 4500-H <sup>+</sup> B Electrode Method	± 0.5 S.U	± 0.5 S.U.
"				

Footnotes:

1– An example of methods that meet the precision and accuracy of LCBP projects under this QAPP are listed. Other methods which meet data quality objectives may be used upon approval of the LCBP. The full citations for each of these publications are: APHA, AWWA & WEF. Standard Methods for the Examination of Water and Wastewater, prepared and published jointly by the American Public Health Association, American Water Works Association and Water Environment Federation, 20<sup>th</sup> ed., 1998 Behar, Sharon. Testing the Waters: Chemical & Physical Vital Signs of a River, published by River Network, 1997 Vermont Agency of Natural Resources. Vermont Lay Monitoring Program Manual: 2000, by Water Quality Division, Vermont Dept. of Env. Conservation.

2– Accuracy of field protocols will generally not be measured in the field, but at training and quality control check sessions. Accuracy and Precision measures given are for LCBP projects under this QAPP. The protocols may themselves provide more

accurate and precise measures than expressed here.

**Table 7b – Laboratory Analysis Protocols for Water Samples :**

Parameter	Reporting Limit <sup>A</sup>	Accuracy <sup>B</sup> (% Recovery)	Estimated Precision <sup>C</sup> (RPD)	Lab Relative Percent Difference (RPD)	Analytical Method Reference
" Chlorophyll-a	0.5 ug/l	--	#12%	6%	<i>Std. Methods</i> (20 <sup>th</sup> ed.) 10200H.3 VT DEC 5.4
" Total phosphorus	0.003 mg/l	77-118%	#15%	5% <sup>D</sup>	EPA 365.1 VT DEC 1.6 <sup>D</sup>
" Fecal Coliform <sup>E</sup>	1 colony/100 ml	N/A	±100% <sup>F</sup>	±100% <sup>F</sup>	<i>Std. Methods</i> (20 <sup>th</sup> ed.) 9222D
" E. coli <sup>E</sup>	1 colony/100 ml	N/A	±100% <sup>F</sup>	±100% <sup>F</sup>	<i>Std. Methods</i> (20 <sup>th</sup> ed.) 9213D.3 (m-TEC) or <i>Std. Methods</i> (20 <sup>th</sup> ed.) 9223 (Colilert)
" Enterococci <sup>E</sup>	1 colony/100 ml	N/A	±100% <sup>F</sup>	±100% <sup>F</sup>	EPA1600
" Total Suspended Solids	1 mg/L	N/A	# 10%	# 10%	<i>Std. Methods</i> (20 <sup>th</sup> ed.) 2540D
" Turbidity	5 NTU	N/A	# 10%	#10%	<i>Std. Methods</i> (20 <sup>th</sup> ed.) 2130B

(A) - Reporting Limit is the minimum reported value (lowest standard in calibration curve or MDLx3)

(B) - Section 5.0, Vermont Dept. of Conservation Laboratory QA Plan, 1999

(C) - Generated by the analysis of field duplicates

(D) -Section 5.0, Vermont Dept. of Conservation Laboratory QA Plan, 1999

(E) - EPA's New England Regional Laboratory recommends that all samples resulting in Too Numerous To Count (TNTC) growth, defined as greater than 200 colonies on the membrane filter, be recorded as "TNTC" and an additional sample be collected from the site.

(F) -As a quality control check on bacteria counts, if two or more analysts are available, each should count colonies on the same membrane plate for about 10% of the samples, and agree on the # of colonies within 10%.

***Instructions: For the following sections (B,C,D), which address data representativeness, comparability and completeness, the LCBP maintains a minimum goal of 80%. On rare occasions a project requires higher goals and this may be a point of discussion during review of your QAPP. If you think your project might be unable to meet the minimum goal, please provide the information in the lines provided below each element.***

### **B. Data Representativeness**

Samples collected at locations and depths described in this QAPP will reflect conditions of individual waterbodies and tributaries of the Lake Champlain watershed. To ensure representativeness all Samples will be collected, preserved and analyzed according to the procedures in this QAPP, and within the specified holding times. Those results not meeting the project quality objectives of this program will be flagged and reviewed to determine if appropriate quality controls are in place. They will be discussed in the data report and will be excluded from entry into the Lake Champlain Program data system and STORET.

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### **C. Data Comparability**

All samples for each specific parameter will be collected and analyzed using the respective procedures described in this QAPP to ensure that comparisons between different sample sites, sample dates, depths and projects can be appropriately made.

If a project compares historical data with the data generated under this QAPP, the historical data should have used SOPs that provide the same data quality as defined here. If a project is collecting phosphorus data, methods will be comparable to those used by the LCBP's Long Term Monitoring Program and Lay Monitoring Program.

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### **D. Data Completeness**

At least 80% of the anticipated number of samples will be collected, analyzed and determined to meet data quality objectives for the project to be considered successful. Individual projects may have different completeness goals, which will be presented in the table below. The data report for each project will contain information, similar to that presented below, containing the number of samples meeting the data quality objectives and the resulting calculation of "Percent Complete".

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**NOTE: The information in Table 7c – Project Completeness (below) about field samples, and field and lab duplicate samples collected is not needed for the QAPP submission, however please review it so you will be able to submit it at the end of the project.**

**Table 7c – Project Completeness**

Parameter	Number of Samples Anticipated	Number of Valid Samples Collected & Analyzed	Percent Complete *
" Chlorophyll-a			
" Total Phosphorus			
" Fecal Coliform			
" E. coli			
" Enterococci			
" Total Suspended Solids			
" Transparency			
" Dissolved Oxygen			
" Temperature			
" Alkalinity			
" pH			
'			
'			

\* Percent Complete = # of Valid Samples Collected and Analyzed ÷ # of Samples Anticipated

## 8. Training Requirements and Certification

### A. Training Logistical Arrangements

**Instructions: Make changes as needed to the table below to reflect your project. Note however that what is contained in this table is, for the most part, considered minimal training. Attach copies of available resumes to the QAPP.**

The Project Coordinator will arrange volunteer training sessions and keep a record of each volunteer's training needs and accomplishments. A notice of achievement will be provided to each volunteer after each type of training is successfully completed.

**Table 8a - Training Process**

Type of Volunteer Training	Frequency of Training/Certification
Initial Orientation to the Project	Once
Training in Sampling and Analysis	One full training session for each new volunteer & annual refresher training before each sampling season begins
In-Lab Quality Control Session	One at beginning and One at end of sampling season
On-site Visit by Project Coordinator	Once during sampling season

### B. Description of Training and Trainer Qualifications

**INSTRUCTIONS: Please indicate any differences in your training scheme from what is described below, if applicable (No additional qualifications are required)..**

Each trainer has a degree in an appropriate subject and/or at least 3 years experience with each of the parameters and procedures they teach. Trainers participate in an annual refresher course at which protocols are discussed and demonstrated. For projects with more than one trainer, all trainers will perform side-by-side tests of each procedure they teach, in order to identify any differences in collection and/or analytical techniques.

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## 9. Documentation and Records

**Instructions: Add any additional information on documentation and records, if applicable.**

Documentation for each project will include 1) a manual, 2) sample forms 3) training forms 4) field sheets and 5) written assessments from on-site visits of Project Leader & QA Coordinator (see Section 8A). Each project will prepare or use a manual that includes procedures that are used for preparing to sample, collecting samples, filling out sample and analysis forms, and maintaining and cleaning equipment. The Project Manager will maintain a record of each volunteer’s training and participation in projects. Field data sheets will be filled out by the Sampling Volunteer and maintained by the Project Manager. Examples of field sheets are included in Appendix B. Each group will attach a copy of their field sheets to the individual project’s version of this QAPP they submit.

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## 10. Sampling Process Design

### A. Rationale for Selection of Sampling Sites

**Instructions: There are a number of acceptable sampling designs depending on the purpose of your project. Please review the descriptive information, adding project specific information as needed in the space provided. On the following table check the appropriate box(es) and insert the numbers that reflect your project sampling design. Submit an additional map or diagram which locates all sampling sites and important landmarks, if map under #6 does not show this.**

**SAMPLE SITE DESCRIPTION** – Please provide a general description of each sample site, and note the approximate location on the submitted map.

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**PHYSICAL HABITAT & SURROUNDING FEATURES** – Characteristics of the physical habitat, land use in the immediate area, or specific features like point source discharges, may help determine where sample sites are located (e.g., macroinvertebrate sampling may take place only in riffle areas). Where this is the case, please describe the rationale for site selection. The intensity of the description will depend on individual projects, and must meet the requirements necessary to use the data for the project’s purpose.

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**LOCATIONAL DATA** – The latitude/longitude of each sample site will be recorded using a Global Positioning System, with a precision within 10 meters unless the LCBP

determines that this degree of resolution is not needed. This information does not need to be submitted as part of the QAPP, but the information should be included in the project data report.

**Instruction: If your group is only able to provide locational information by indicating sites on a map, please note this below.**

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**LAKES/PONDS WATER QUALITY**– Generally, each Lake/Pond will be sampled for water quality parameters at the deepest spot as determined by the attached procedure. If the deep hole is near one end of the lake/pond, then a second site will be sampled at the opposite end. For some projects, sampling will take place at the center of the lake, regardless of whether it is the deep hole, depending on the specific purpose of the monitoring event and the parameters being assessed. If sampling for your project will vary from any of these designs, please describe it below.

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**RIVERS/STREAM WATER QUALITY** – Wadeable stream samples will generally be collected offshore, near the center of the stream. Water quality samples will be taken from just below surface to near bottom. Individual grab samples, composited grab samples or a core sample can be collected from the water column. Specific projects will designate the type of sample, which must be in accordance with quality control requirements and the purpose of each project.

Depending on the bottom substrate, water quality samples from deep rivers will be collected no closer than 6 inches from the bottom. If the substrate is very soft/silty a greater distance may be designated so as not to contaminate the water sample or the sampling device

**Instructions: Please check the types of samples that will be collected for your project. If your sampling method(s) differ from the description, please describe what you intend to do.**

For this specific project, the samples will be collected by:

- ' Individual grab samples that will be analyzed separately
- ' Time composite samples – the same volume is collected at constant time intervals (e.g., 4 hours apart) at the same site, and combined to form a composite sample for that site

- ' Core samples – a single sample collected vertically in the water column across a series of depths.

If sampling for your project will vary from this design, please describe it below.

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**BIOLOGICAL SAMPLE SITES** – Site selection for biological samples will be done according to the type of organisms and the purpose of specific projects. For example, benthic macroinvertebrates will be collected, for the most part, in riffled areas of wadeable streams. Individual projects may, however, require sampling soft sediments. Because there is a great deal of variability in identifying sites for biological sampling due to specific project purpose it can not be presented in a general way in this QAPP. Please provide a sampling site design for your biological sample collection.

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**Instructions: Please fill in and modify the following table as appropriate for your project. If you have a separate summary of this information, you can attach it in place of this table.**

**Table 10a – Overview of Types of Waterbody, Sample Site(s) & Sample Depth(s)**

TYPE OF WATERBODY	SAMPLE SITE(S) For Each Waterbody	SAMPLE DEPTH(S) At Each Site	TRANSECT(S) Across Length or Width of Each Waterbody
How many LAKES & PONDS will be sampled? _____			
Name of Lake/Pond:	' Inflow ' Outflow ' Center ' Deep Hole ' Near Shore	' Surface Water ' Mid-Depth ' Near Bottom ' Bottom Water ' Surface to ' Bottom Profile ' Bottom ' Substrate	' Transect from ' Inflow to ' Outflow ' Cross ' Transect(s) ' Transect(s) ' near to shore & ' parallel to ' shoreline

<p>Name of Lake/Pond:</p>	<p>' Inflow ' Outflow ' Center ' Deep Hole ' Near Shore</p>	<p>' Surface Water ' Mid-Depth ' Near Bottom ' Bottom Water ' Surface to Bottom Profile ' Bottom ' Substrate</p>	<p>' Transect from Inflow to Outflow ' Cross ' Transect(s) ' Short ' Transects parallel to shoreline ' Short transects extending out from shoreline</p>
<p>How many RIVERS &amp; STREAMS will be sampled? _____</p>			
<p>Name of River/Stream:</p>	<p>' Upstream of _____</p> <p>' Downstream of _____</p> <p>' Wadeable ' Deepwater</p>	<p>' Surface ' Mid-Depth ' Near Bottom ' Bottom ' Surface to Bottom Profiles ' Bottom ' Substrate</p>	<p>' Upstream to Downstream Transect ' Cross Transect</p>
<p>Name of River/Stream:</p>	<p>' Upstream of _____</p> <p>' Downstream of _____</p> <p>' Wadeable ' Deepwater</p>	<p>' Surface ' Mid-Depth ' Near Bottom ' Bottom ' Surface to Bottom Profiles ' Bottom ' Substrate</p>	<p>' Upstream to Downstream Transect ' Cross Transect</p>

**B. Summary of Sample Collection**

**Instructions: Please complete the following table for each parameter you will be sampling. Add any parameters not listed.**

Individual projects will identify the number of samples, sampling frequency and specific sampling period for each parameter in accordance with their objectives.

**Table 10b – Sample Collection**

	Type of Sample/ Parameter	Total Number of Samples (Indicate if this is for the project or per week, etc.)	Sampling Frequency (How often – once/weekly/bi- weekly?)	Sampling Period (When they will be collected)
Biological	' Macroinvertebrates			
	' Macrophytes			
	' Zebra Mussels			
	' Fecal Coliform			
	' <i>E. coli</i>			
	' <i>Enterococci</i>			
	'			
Chemical	' pH			
	' Dissolved Oxygen			
	' Alkalinity			
	' Total Phosphorous			
	' Total Nitrogen			
	' Hardness			
	'			
Physical	" Temperature			
	" Secchi Disk			
	" Total Suspended Solids			
	'			

## 11. Sampling & Analysis Methods

Field and laboratory analytical methods are provided in Section 7, and Field Sampling Methods are listed in Section 10 and in Appendix B. The table below presents containers, preservation and holding times used for LCBP projects under this QAPP.

The sampling methods that will be used for an individual project will be listed below:

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**INSTRUCTIONS: If your sampling methods are listed in Appendix B, please list the specific protocols you are using in the spaces above. If your sampling protocol is different from the descriptions in Sections 7 and 10 or the examples in Appendix B, please provide your protocol(s) to this QAPP for review. Check off the appropriate parameters in the table below. If your project is something different, check and fill in the blank row(s) in the table.**

**Table 11a –Sample Containers, Preservation & Holding Times <sup>A</sup>**

Parameter/Measure	Container	Preservation	Holding Time <sup>B</sup>
' Total Phosphorus	Glass, w/ Teflon cap	Cool to 4°C <sup>C</sup>	28 days
' Chlorophyll <i>a</i>	Filter	Freeze, Dark	21 days
' DO - Mod. Winkler	Glass	None	Immediate
' DO - Meter	<i>(in situ)</i>	None	Direct Analysis
' pH Meter	Plastic	None	Immediate
' Temperature - Thermometer <sup>D</sup>	Plastic	None	Immediate
'			

### Footnotes:

A – A copy of some field SOPs are attached as Appendix C.

B – Holding times are in accordance with the Code of Federal Regulations, title 40 (Protection of Environment), part 136, section 3 (or 40CFR136.3)

C – The VT DEC analyzes the entire sample volume in the sampling container, so no acidification is needed. Extra containers of sample will be needed to allow the VT DEC lab to analyze spiked samples. If samples are analyzed by another lab that does not use the VT DEC method, the samples should be acidified according to their sampling and analysis SOP if they are not analyzed within 48 hours.

D – **Mercury thermometers will not be used in the field.** Field thermometers can be checked with an NIST certified thermometer in the laboratory setting.

## 12. Sample Handling and Custody Procedures

**Instructions: Please attach copy of chain of custody form you will use, if applicable. If not applicable because sampling and analysis are done by the same person, please note that in the space below.**

Generally at each site it is the same person who collects and analyzes the sample, so one individual retains custody of the sample at all times. For any procedures which include transferring possession of samples from one person to another, such as delivering samples to a laboratory for analysis, a chain of custody form will be completed to document who has custody as the sample is processed. The EPA Chain-of-Custody Form or another form containing the required information will be used. A copy of EPA's Chain of Custody form is attached as Appendix D.

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## 13. Analytical Methods Requirements

Information for this section is included in Tables 7a and 7b.

## 14. Quality Control Requirements

**Instructions: For sections A, B, and C, check only those that are applicable to your project. You might not check boxes in each section, depending on the parameters you are sampling. The goal for quality control checks is 10%. Please note if your goal varies from this.**

### A. Field QC Checks

For each project funded by the LCBP, quality control checks will include at least 1 Field Duplicate for up to 10 samples collected. The additional types of field quality control samples needed will depend on the parameter and the collection method. Field quality control samples can include any of the following:

- U **Field Duplicate (required)** – a check on water quality, sampling & analysis consistency. The field duplicates can be one or both of the following types, depending upon the parameter and the purpose of the project:
  - ' Co-located Field Duplicate/Replicate – collected from side-by-side locations at the same point in time and space so as to be considered identical. These separate samples are said to represent the same population and are carried through all steps of the sampling and analytical procedures in an identical manner. They are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.
  - ' Sub-sample Field Duplicate/Replicate - Similar to a split sample, except the same laboratory analyzes both samples, The sample is thoroughly mixed before being divided into two or more portions. These samples do not assess site heterogeneity, only specific sample point heterogeneity,.

- ' **Bottle Blanks** – may be needed if sampling for phosphorous. It checks for contamination (Accuracy/Bias) – in the field, water that does not have the constituent being tested is collected into a sample container, of the same lot as the containers used for the environmental samples. This checks for contamination introduced from the sample container(s).
- ' **Equipment Blanks** – measures contamination (accuracy/bias) – a sample of water, free of measurable contaminants is poured over or through decontaminated field sampling equipment that is considered ready to collect or process an additional sample. The purpose of this is to assess the adequacy of the decontamination process and whether equipment needs special cleaning to make sure it doesn't have something that contaminates the sample or influence the results
- ' **Field Split Samples** – Two or more representative subsamples are taken from one environmental sample in the field and sent to two different labs for analysis. Prior to splitting, the environmental sample is well-mixed to correct for sample in homogeneity that would adversely impact sample data comparability. Field splits are used to assess sample handling procedures from field to laboratory and interlaboratory comparability and precision.
- ' **Equipment Calibration Checks** – A check on a meter's accuracy – the verification of the initial calibration that is required at certain times during the sampling day or while analyzing a large number of samples. Checking to see if a pH meter is maintaining its calibration would involve taking a reading of standard solutions (e.g., pH buffers of 4, 7, or 10, etc.)

For projects that include long term repetitive sampling at several sites, the site at which a field quality control sample is collected may change so there may be at least one duplicate sample at each sample location during the course of the project.

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## B. Laboratory QC Checks

Laboratory QC samples may include any of the following, depending on the parameter.

- ' **Method Blanks** – Laboratory grade water is analyzed as a sample is, in order to identify any interferences or contamination introduced by the analytical process.
- ' **Matrix Spikes** – Introducing known amount of constituent into sample and comparing result with quantity that was introduced. Provides a measure of accuracy.
- ' **Matrix Spike Duplicates** – A second matrix spike. Comparing result with matrix spike, this provides a measure of precision.

' **Laboratory Duplicates** – Taking two separate aliquots from a field sample. The second aliquot is a duplicate, and is prepared and analyzed with the same protocols as the sample. Provides a measure of analytical precision & consistency in subsampling in the laboratory.

' **Equipment Calibration Checks** – Standards

### 15. Instrument/Equipment Testing, Inspection, and Maintenance Requirements

**Instructions: Please complete the table below. Refer to manufacturer specifications.**

The Project Lead is responsible for ensuring equipment and instruments are maintained according to standard operating procedures and manufacturer requirements. In preparing for a sampling event, equipment will be inspected and tested by the sampler prior to its intended use. A maintenance log will be maintained by the Project Lead for all mechanical and electronic equipment. Any equipment that does not meet the requirements necessary for producing data in accordance with the data quality objectives of specific projects, will not be used for sample collection or analysis. Additional equipment (non-mechanical and non-electrical), including buckets, rope, thermometers etc. should be maintained according to the standard operating procedure.

**Table 15a - Equipment for Project**

Equipment Type	Manufacturer	Inspection Frequency	Type of Inspection
" DO Meter			visual, calibration test
" GPS Unit			according to SOP (attached)
"			
"			

## 16. Instrument Calibration and Frequency

**Instructions: Please complete the table below.**

The Project Lead will ensure that all field instruments are checked for good working order prior to the day of sample collection, preferably at least 24 hours prior to sampling. On the day of sample collection, equipment will be calibrated and checked for accuracy before any samples are collected in accordance with the standard operating procedures. At the end of each sample day, the calibration of meters will be verified by recording each meter's reading of a standard used (or against a calibration instrument). If the amount of drift in instrument readings is not acceptable, data will be flagged as suspect. Calibration checks and readings of standards will be recorded on field sheets or another form set up for that purpose. All documentation regarding instrument calibration will be maintained by the Project Lead or another person identified in a project-specific QAPP.

**Table 16a - Equipment Calibration**

Equipment Type	Calibration Frequency	Standard or Calibration Instrument Used

## 17. Inspection/Acceptance Requirements

The Project Lead will ensure that all equipment, instruments and supplies are clean and maintained according to the standards and conditions required to meet project objectives. Sample containers will be of the appropriate size and precleaned for the parameter for which the sample will be analyzed. All shipments of bottles will be inspected, and if there is any question of cleanliness or improper documentation of their condition, they will not be used and will be replaced with correct bottles. Other materials, such as nets, gloves, rinse bottles, sampling apparatus, buckets, line, etc., will be kept clean and stored properly so as to prevent contamination that interferes with producing samples and analytical results that meet project objectives.

Each standard operating procedure lists the required materials and the quality control checks that should be followed to ensure proper sampling and/or analysis. These will be followed, and additional procedures will be provided as necessary to meet specific project needs.

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## **18. Data Acquisition Requirements**

External data (data that is not generated by the project but is to be used as part of the project) will be used in accordance with the objectives stated in Section 6B of this QAPP, and should have sufficient documentation that it is at least equivalent to the data quality generated as part of this project (see Section 7). If complete documentation is not available, the project lead should explain why the external data is useable. The LCBP will be kept informed of any external data sources being used as part of the project.

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## **19. Data Management**

The generation of accurate data with accompanying documentation, such as field sheets and quality control sample results, is the responsibility of the individual Project Leads. On a daily basis, field data sheets are inspected and signed by the people performing the sampling before leaving a site or completing a sampling "run". Field sheets are given to the Field Leader after the sampling event for review. Within 72 hours, the Leader will contact any samplers whose field sheets contain significant errors or omissions.

The lab manager reviews analytical results, and identifies questionable data with regard to results or documentation. The lab manager signs bench sheets after all QC checks have been completed. The bench sheets and final calculations are sent to the Project Lead, so data can be entered into the data summary report. The Project Lead and the person responsible for QA review all field and lab data to determine usability in the project.

All environmental data generated by projects funded by LCBP will be submitted to the LCBP in a commonly used format (such as EXCEL or ACCESS) and will be uploaded to STORET , the national water quality data storage system.

Unless otherwise noted within projects the data generated with LCBP funding is the property of the LCBP and EPA. The LCBP has an ongoing role in data management and facilitates data maintenance and planning for upload to STORET in the future.

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## **20. Assessment and Response Actions**

For each project funded by LCBP, there will be an on-site visit by the Project Leader or Quality Assurance Coordinator to observe field sampling and field analysis procedures. Generally, this will be done near the beginning of the project. This is in addition to training procedures described in Section 8. A written checklist will be used for the assessments, maintained by the Project Leader, and copies will be provided with the data report. The Project Leader and QA Coordinator will determine if field work follows the written procedures or if there needs to be corrections by additional training or revising protocols. Please refer to Section 22 for additional evaluations and response actions regarding data

evaluations.

If a laboratory's performance is necessary, the LCBP will contact Vermont DEC and EPA's Quality Assurance Office for recommendations.

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## 21. Reports

***Instructions: Please describe the report(s) to be submitted as part of this project. This may be specified in your workplan or contract with LCBP. Please note whether data generated will be included as either part of the final report or be a separate data report.***

Written quarterly progress reports as well as draft and final project reports will be submitted to the LCBP for all funded projects. There may be additional progress reports required based upon the type and complexity of the project. The reports will vary in content according to the type of project and the expected uses of the information. LCBP encourages project leads to plan at least one presentation of their project and its results at a local community function, schools, LCBP meeting or other venue.

In addition to a written report, data and metadata (information about the data) will be provided as described in Section 19 above.

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## 22. Data Review, Validation, and Verification

All data are reviewed by the individual Project Leader, QA Coordinator and Data Management Coordinator to determine if data meet QAPP requirements. Occasionally, LCBP and EPA may also review data from the perspective of those not directly connected to a project.

Data Analysis QC Checks will include:

- Data Entry Checks by Second Person
- Review of Calculations by Second Person
- Measurement Quality Objectives (MQO's) and Laboratory QC achieved

To validate and verify project data, the project QA Coordinator will compare computer entries to field or laboratory data sheets; look for data gaps and unexpected, or nonsensical results; inspect chain of custody information; review both laboratory and field quality control checks and resulting information, and; review graphs, tables and other presentations of data.

Errors in data entry will be corrected. Data that are outside the expected range will be flagged for further review or rejected. A second field sample and/or laboratory aliquot will

be taken, if possible, to verify the condition and a determination of necessary corrections, if any, will be made. This may include equipment replacement, retraining, additional calibration check etc. The LCBP will be contacted if assistance is needed to identify sources of errors. Problems with data quality will be discussed in the draft and final reports to the LCBP. The Percent Complete table presented in Section 7 will be filled in and included with the data report.

If causes of failure to meet data quality objectives can not be determined and/or corrected, proposed revisions to the project will be submitted to the LCBP and EPA QA Office for approval.

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### **23. Validation and Verification Methods**

Information is provided under Section 22 above.

### **24. Reconciliation with Project Quality Objectives (PQOs)**

Information is provided under 22 above.

***A FINAL NOTE: If your project includes laboratory analyses, a Lab QA Plan, which addresses procedures in the lab, should be submitted in conjunction with this QAPP. The laboratory you use should be able to provide this to you.***

APPENDIX -- A

PROJECT WAIVER

FROM

QAPP REQUIREMENTS

If you think your project may qualify for a waiver from Quality Assurance Project Plan requirements, please fill out the enclosed form and submit to the Lake Champlain Basin Program for consideration.

**LAKE CHAMPLAIN BASIN PROGRAM  
PROJECT WAIVER  
FROM  
QAPP REQUIREMENTS**

A monitoring effort undertaken for the sole purpose of being a general demonstration of how environmental measurements can be taken (sometimes referred to as an “educational purpose), and will not use data for making an assessment of environmental conditions in any way whatsoever, will not require a QAPP. Specifically, if your project is designed to demonstrate sampling methods and analytical techniques and the resulting data will not be used in any problem identification or environmental assessment, a QAPP is not needed. Data from the project must meet both of the following 2 criteria:

- \* Data generated from this project will not be used as a basis for comparison of conditions over time and will not be eligible for STORET or any other long term data storage system. Nor will it be eligible for inclusion in watershed assessment reports, state 305(b) reports or other environmental assessments.
  
- \* Data generated from this project will not be used in any comparisons with data from other areas, projects or years.

If you believe this is true of your project, please check the box below. that appropriately describes the intent of your project.

**' This project is for demonstrating sample collection techniques only as part of an educational effort, and data will be used only during the limited time of project.**

**" Data from this sampling season will not be retained or used for an environmental assessment of any kind. Future years of the project will produce data generated and retained under an approved QAPP. ( For new sampling programs, this may allow a first year of education and “getting up to speed” before data is collected under a QAPP and retained .**

Please sign below and return this form with your work plan to the LCBP office for consideration. If you have questions about this waiver please call the LCBP .

Name of Project \_\_\_\_\_

Project Director  
Signature/Date \_\_\_\_\_

## APPENDIX - B

### FIELD STANDARD OPERATING PROCEDURES (SOPs)

Examples of acceptable Field SOPs are included. Other SOPs may be used if they meet project data objectives under this Generic QAPP. Additional information about procedures and contact information for obtaining referenced materials can be obtained from the Lake Champlain Basin Program.

Individual projects that use one of the example field SOPs must identify which one(s) will be used in Section 11 of this QAPP.

If an example SOP is used, but with modifications, please provide the modified SOP you use.

## Vermont Lay Monitoring Program Field Protocols

For information about the Vermont Lay Monitoring Program and their manual, contact Amy Picotte, VLMP Coordinator, VT DEC Water Quality Division, 103 S. Main St., 10-N, Waterbury, VT 05671-0408; phone 802-241-3777; email [amyp@dec.anr.state.vt.us](mailto:amyp@dec.anr.state.vt.us); Web [www.state.vt.us/anr](http://www.state.vt.us/anr)

## River Network Protocols

River Network's protocols are used by permission of River Network, and were excerpted from Testing the Waters: Chemical and Physical Vital Signs of a River (1977). For copies of the manual contact, River Network's National Office, 520 SW Sixth Avenue, Suite 1130, Portland, OR 97204-1535. [www.rivernetwork.org](http://www.rivernetwork.org)

## APPENDIX - C

### SAMPLE FIELD SHEETS

Examples of field forms are enclosed. Other forms may be used as appropriate for the specific projects funded by the LCBP.

## Vermont Lay Monitoring Program Field Sheets

For information about the Vermont Lay Monitoring Program and their manual, contact Amy Picotte, VLMP Coordinator, VT DEC Water Quality Division, 103 S. Main St., 10-N, Waterbury, VT 05671-0408; phone 802-241-3777; email [amyp@dec.anr.state.vt.us](mailto:amyp@dec.anr.state.vt.us); Web [www.state.vt.us/anr](http://www.state.vt.us/anr)

## River Network Field Sheets

The following forms were used by permission of River Network and were excerpted from Testing the Waters: Chemical and Physical Vital Signs of a River (1977). For copies of the manual contact, River Network's National Office, 520 SW Sixth Avenue, Suite 1130, Portland, OR 97204-1535. [www.rivernetwork.org](http://www.rivernetwork.org)"

## APPENDIX - D

### EPA CHAIN OF CUSTODY FORM

A copy of EPA's Chain of Custody Form is included as an example that is useful for any project. Another type of format that is appropriate for a specific project's use can be used.

EPA's form has two layers. A copy of the form with signatures must be kept by all individuals involved in sample transfers.

## APPENDIX - E

### The VOLUNTEER MONITOR'S GUIDE TO QUALITY ASSURANCE PROJECT PLANS

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### EPA NEW ENGLAND'S REGIONAL QA OFFICE ATTACHMENTS

Copies of EPA's QAPP Guide can be obtained from the Lake Champlain Basin Program Office.

EPA's regional amendments are to clarify elements discussed in the national guide.