Citizen Science QAPP Requirement Summary		
Section 1	Title and Approval Page	Template #1
Section 2	Organization Chart, Project Distribution List	Template #2A Template #2B
Section 3	Project/Task Organization	Template #3
Section 4	Problem Definition and Project Objectives	Template #4
Section 5	Background and History	Template #5
Section 6	Project Location	Template #6
Section 7	Project Schedule	Template #7
Section 8	Existing Data	Template #8
Section 9	Quality Objectives	Template #9
Section 10	Data Collection Methods, Equipment List/Calibration	Template #10A Template #10B
Section 11	Analytical Methods	Template #11
Section 12	Field Data Sheet	Template #12
Section 13	Training and Specialized Experience	Template #13
Section 14	Assessments and Oversight	Template #14
Section 15	Data Management	Template #15
Section 16	Data Review and Usability Determination	Template #16
Section 17	Reporting	Template #17

A quality assurance project plan (QAPP) states the objectives and procedures to be followed for a project that uses or collects environmental information. It keeps all of the information for the project in one location for easy access by all individuals involved with the project. You should be able to give a QAPP to anyone involved with the project and when they are done reading it they will know why the work is being done and what will be done to achieve the established objectives.

On the templates, instructions are highlighted in blue while examples are provided in *italics.* Replace all italicized examples with the corresponding information from your project. Please complete all relevant tables.

Citizen Science QAPP Template #1
Title and Approval Page

New York Harbor SEALs

Citizen Science Water Quality Monitoring Program (Upper New York Bay)
New York Harbor Foundation
Effective Date of Plan: April 30, 2013

Project Manager:

4/17/13
Signature/Date
Mauricio Gonzalez/Director Marine Biology Research

Project QA Manager:

Signature/Date
Matthew Haiken /Director of Operations

Project Advisor:

5/22/13
Signature/Date
Sam Janis /Restoration Manager

Project Advisor:

5/30/13
Signature/Date
Michael Judge/Research Scientist, Manhattan College

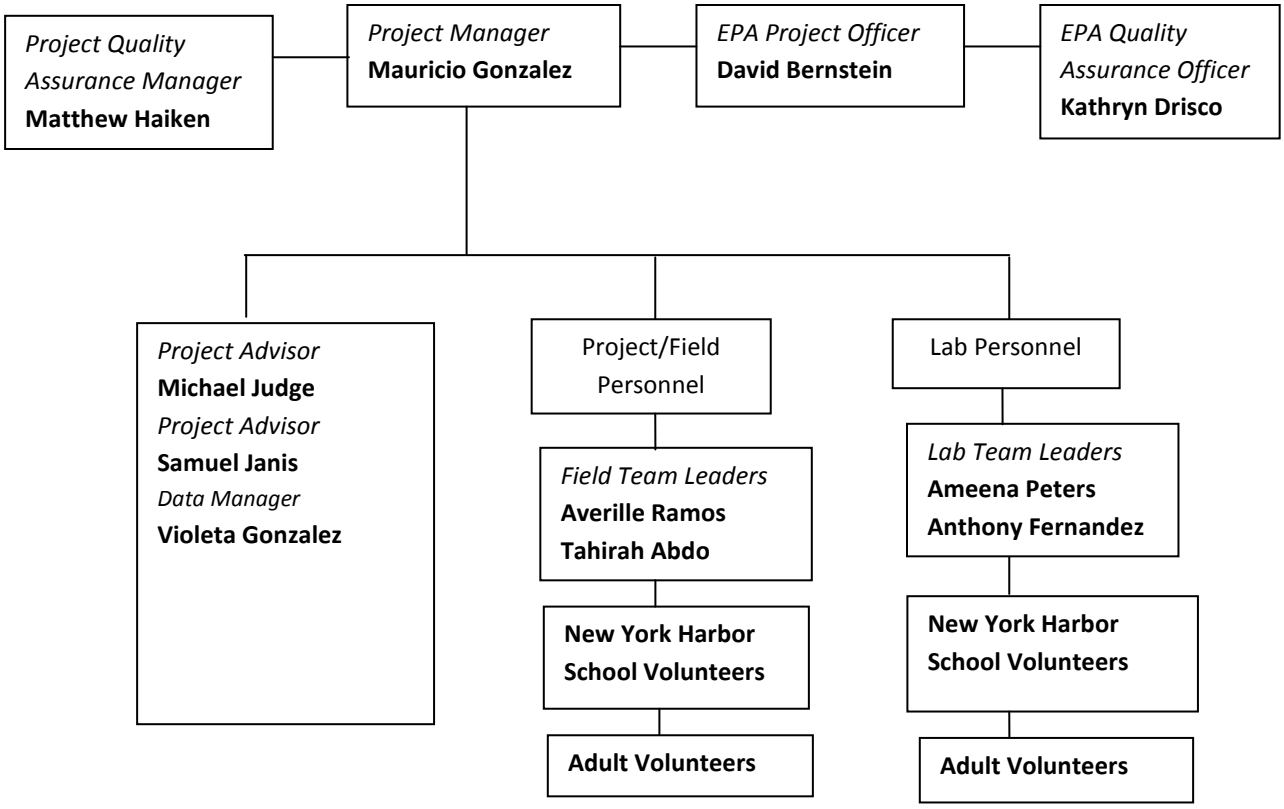
EPA Project Officer:

5/9/13
Signature/Date
David Bernstein/ Scientist
Monitoring & Assessment Branch

EPA QA Officer:

5/9/13
Signature/Date
Kathryn Drisco/QA Officer

Citizen Science QAPP Template #2A
Project Organization Chart



Citizen Science QAPP Template #2B
Project Distribution List

Name/Title	Contact Information
Mauricio Gonzalez *Project Manager*	*Email:* mgonzalez@nyharborschool.org *Phone:* 646.752.2071
Matthew Haiken *Project Quality Assurance Manager*	*Email:* mhaiken@nyharbor.org *Phone:* 917-664-1166
Sam Janis *Project Administrative Advisor*	*Email:* sjanis@nyharbor.org *Phone:* 917-284-2754
Michael Judge *Project Scientist Advisor*	*Email:* michael.judge@manhattan.edu *Phone:* 845-536-0645
David Bernstein *EPA Project Officer*	*Email:* bernstein.david@epamail.epa.gov *Phone:* 732-321-4462
Kathryn Drisco *EPA Quality Assurance Officer*	*Email:* drisco.kathryn@epa.gov *Phone:*
Violeta Gonzalez *Volunteer Data Manager/Researcher*	*Email:* violetagonzalez17@yahoo.com *Phone:* 347-454-4730
N.Y. Harbor School Team Leader 01: **Averille Ramos** *Field*	*Email:* averilleramos@aol.com
N.Y. Harbor School Team Leader 02: **Tahirah Abdo** *Field*	*Email:* tahirahabdo@gmail.com
N.Y. Harbor School Team Leader 03: **Ameena Peters** *Lab*	*Email:* ameena_peters@yahoo.com
N.Y. Harbor School Team Leader 04: **Anthony Fernandez** *Lab*	*Email:* anthonyfdez2009@hotmail.com

Citizen Science QAPP Template #3
Project/Task Organization

Name	Title	Organizational Affiliation	Responsibilities (specific to this project)
Mauricio Gonzalez	Project Manager	NY Harbor Foundation NY Harbor School	Oversees all aspects of project including, data collection, team organization and training, etc.
Matthew Haiken	Project Quality Assurance Manager	NY Harbor Foundation	Quality assurance, oversight and assessments, data verification, evaluation and usability, ensuring corrective actions are completed, etc.
Sam Janis	Project Administrative Advisor	NY Harbor Foundation	Field sampling and data analysis
Michael Judge	Project Scientist Advisor	Manhattan College	Give scientific support to the project
David Bernstein	EPA Project Officer	EPA	
Kathryn Drisco	EPA Quality Assurance Officer	EPA	
Violeta Gonzalez	Volunteer Data Manager/Researcher	NY Harbor School	Transfer collected data to online data system
Team Leaders (4 people)	Field/Lab Personnel	NY Harbor School	Gear preparation + maintenance Team Guidance
Student Volunteers (20 people)	Field/Lab Personnel	NY Harbor School	Field sampling and data analysis
Adult Volunteers (4 people)	Field/Lab Personnel	Various	Field sampling and data analysis

Citizen Science QAPP Template #4
Problem Definition and Project Objectives

Problem Definition

Since the Clean Water Act was passed in 1973 the quality of water of the Hudson River has improved. This has led to the reporting of an increase in counts of various estuarine organisms (New York-New Jersey Harbor & Estuary Program. 2012). However, keystone species such as the Atlantic oyster (*Crassostrea viriginica*) and eel grass (*Zostera marina*) have not returned in significant abundance to take the ecosystem to a higher steady state. Due to the complexity of requirements of these keystone species (Twilley *et. al.*, 1985), it is difficult to plan for the best geographical localities in which to invest restoration efforts. In order to further improve these efforts and ecosystem services around the estuary, site specific water quality monitoring is now required (USACE, 2010). The project will address the following questions:

01. What is the water quality (*i.e.* pH, dissolved oxygen, temperature, salinity, nutrients, enterococcus bacteria, and currents) of four stations off of Governors Island and Lower Manhattan?

02. Is the water quality in the sites being sampled sufficient to sustain keystone species such as the Atlantic Oyster and Eel grass?

03. What are the tidal dynamics of the area between Lower Manhattan and Governors Island?

04. Can community stakeholders, particularly high school students, successfully participate in a rigorous citizen science monitoring program and use their experiences to help bridge the gap between high school and college?

Project Objectives (linking data results with possible actions)

We plan on investigating the conditions of water quality at four stations in the New York Upper Bay to determine their suitability for oyster reefs and eel grass beds.

01. Collect water quality parameters at four stations off of Governors Island and Lower Manhattan

02. Determine the suitability of the water quality at the four sampling stations to sustain Atlantic oyster reefs and eel grass beds.

03. Determine how tidal dynamics affect water quality parameters at the four sites.

04. Educate community stakeholders and students about the water resources of the Hudson River Estuary and empower them to directly contribute to its study.

We will sample water quality (*i.e.* pH, dissolved oxygen, temperature, salinity, nutrients, enterococcus bacteria, and currents) of four stations off of Governors Island and Lower Manhattan. On year one (01) pH will be determined using a calibrated Hanna Combo Sensor and verfied using Aquacheck colorimetric test strips; dissolved oxygen will be determined using the Lamotte Azide modified Winkler Method; temperature will be determined using a calibrated thermometer and verified with the Hanna Combo sensor; salinity will be measured using a calibrated refractometer by Vital Sine; nutrients will be determined using Aquacheck colorimetric test strips; and enterococcus levels will be determined using IDEXX Enterolert. On year two (02) all the above will apply except for the following: dissolved oxygen, temperature, salinity, and nutrients will be determined using Yellow Spring Instruments (YSI) meters (YSI ProPlus and YSI 9500 Photometer). For the purpose of the educating the students, the data will be compared using Primer/Permanova to determine similarities and differences between stations. The data will also be compared to known tolerance levels of the Atlantic oyster and eel grass to determine the viability of restoration efforts.

Data Users

State who will use the data and what decisions or conclusions will be made based on the data. Include any action levels or standards to which the data will be compared.

The data collected from this project may be used by various stakeholders (*i.e.* New York Harbor SEALs, Army Corps of Engineers, NY Harbor Foundation, Hudson River Foundation) as screening level data. These stakeholders may determine if a more extensive project needs to be completed to more definitively determine if the proposed sites will be suitable for oyster and eel grass restoration. The data will also be used to inform and educate the public of the state of the water quality at the selected sampling stations and to provide high school students with opportunities to understand their natural heritage while gaining valuable research experience. The data will be compared to results found in the NY-NJ Baykeeper's Oyster Restoration Feasibility Study (2010).

Citizen Science QAPP Template #5
Background and History

Background

In this section, state why this work needs to be done, identifying the reasons for conducting the work and/or the lack of information relating to the project.

Although New York Harbor water quality has improved notably since the implementation of the Clean Water Act nearly 40 years ago. Harbor waters continue to be of insufficient quality to support many resources and activities. As a result of pollutants from combined sewer overflows, storm water runoff, industrial activities, and other current and historic uses, Harbor waters are unsuitable for significant habitat restoration (*e.g.* oyster reefs and eel grass beds), closed to shell fishing, and most are classified as appropriate only for secondary---contact recreation and fishing (NYNJHEP, 1996). These conditions have numerous negative impacts on New Yorkers, who have very few opportunities to fish, swim, surf and observe and interact with marine plants and animals. Arguably, this absence of opportunities to interact with a healthy marine environment disproportionately impacts New Yorkers from lower---income communities who cannot afford to escape to beaches and waterfront parks outside the city. This lack of access to clean marine waters likely exacerbates a cultural disconnect: many New York youth and adults do not embrace the Harbor and its natural resources, and are not aware of the variety of tools and strategies that may be used to protect and restore Harbor waters.

History

In this section provide any relevant historical information that would help the reader understand the problem that is being addressed. Discuss any previous work or data that has been collected as they relate to this project.

Oysters were once a very abundant resource of the Upper New York Bay and surrounding areas. An account published in 1887 says “Oysters once grew naturally all along the Brooklyn shore, and in the East River; all around Manhattan Island; up the Hudson as far as Sing Sing; out to the Jersey shore from that point to Keyport, N. J., and in Keyport, Raritan, Newark, and Hackensack Rivers; all around Staten Island, and on many reefs and wide areas of bottom between Robyn’s Reef and Jersey City.” However, by the early 20th century, sediment, water pollution, and over-harvesting contributed to the demise of oyster reefs and to another crucial keystone species- eel grass beds. Despite ongoing efforts by various organizations around New York and New Jersey, it is still unclear whether these ecosystem components can actually be revived and restored.

Since the Clean Water Act was passed in 1973 the quality of water of the Hudson River has improved. This has led to the reporting of an increase in counts of various estuarine organisms (New York-New

Jersey Harbor & Estuary Program. 2012). More detailed and site specific studies are being conducted in order to best assess where to concentrate restoration efforts.

Citizen Science QAPP Template #6
Project Location

Project Location

Provide a description of the site and sampling locations and how they were chosen. Provide the rationale for selecting sample locations and what is going to be sampled. Provide a map showing the location and any other relevant information for the project. Tie this information back to the goals and objectives of the project.

Two sites were chosen at Governors Island and two on the southern tip of Manhattan. Station M1 on Lower Manhattan is located by Battery Park. This site is characterized by having a cement seawall which causes fast currents. Station M2, also on Lower Manhattan, is located on the East River off of Pier 15. This station is characterized by having busy ferry docks with boats that maintain full engine throttle while parked as opposed to tying up. Station G1 is located on the northwest side of Governors Island and is characterized with sea wall, rip rap and having high water dynamics. Station G2 is located on the east of Governors Island off of Pier 101. It is characterized by sea wall and docks with less boats docking and rip rap but vulnerable to large wakes from commercial and private vessels that pass along Buttermilk Channel. This station is also close to the proposed Governors Island Oyster Reef.

The following physical-chemical and biological water quality parameters will be sampled on a monthly basis: pH, dissolved oxygen, temperature, salinity, nutrients, Enterococcus bacteria, and currents.

These were chosen because they are proposed sites for restoration efforts (*e.g.* oyster bed and sea grass restoration) and in order to determine the dynamics and influence of the Hudson and East Rivers on the surrounding waters of Governors Island.

Citizen Science QAPP Template #7
Project Schedule

In the table below, list all major project activities that will be performed during the course of the project. Provide estimates of the timeframe expected for the activities to be conducted and/or completed.

Activities	Organization/Group responsible for activity completion	Timeframe work will be done
Preparation of QAPP	**Mauricio Gonzalez** Project Manager	January 2013 – April 2013
Review and Preparation of QAPP	**Matt Haiken + Sam Janis** NY Harbor Foundation	January 2013 – April 2015
Grant Oversight	**David Bernstein** EPA Project Officer	April 2013 – April 2015
Approval of QAPP	**Kathryn Drisco** EPA Quality Assurance Officer	February/March 2013
Training 01	**Mauricio Gonzalez + Sam Janis** **Student Volunteers**	February + October 2013
Training 02 (YSI gear)	**Mauricio Gonzalez + Sam Janis** **Student Volunteers**	February + October 2014
Procurement of Equipment	**Matthew Haiken** NY Harbor Foundation	March 2013
Sample Collection	**Mauricio Gonzalez + Sam Janis** **Student Volunteers** **Adult Volunteers**	April 2013-April 2015
Sample Analysis	**Student Volunteers** **Adult Volunteers**	April 2013-April 2015
Data Evaluation	**Mauricio Gonzalez** **Michael Judge** **Student Volunteers**	April 2013-April 2015
Preparation of Final Report	**Mauricio Gonzalez**	May 2015

Citizen Science QAPP Template #8
Existing Data

For many projects it may be necessary to use data that someone else has already collected, (i.e. existing data). Just because data was collected by a reliable source, such as a peer reviewed journal article, doesn't mean it was collected in a way that your project could use. It is important to perform a check on the data to see how the data was collected and if it is acceptable for the objectives of your project. You must complete this template if your project will be using existing data.

Identify all existing data that will be used for the project, and their originating sources. Specify how the existing data will be used, and the limitations on their use.

- In the **Existing Data** section state what existing data you will use.
- In the **Data Source** section state where that data will come from.
- In the **How Data Will Be Used** section state the need for this data and/or what purpose it will be used for.
- In the **Acceptance Criteria** section state what the requirements are for the data in order for them to be used in the project. For example, if you are looking for temperature data for a water body collected in July, then temperature data collected in June would not be acceptable for the project. Data collected with a certain instrument or by a certain method are also instances where the collected data may not be acceptable for the project.

Existing Data	Data Source	How Data Will Be Used	Acceptance Criteria
Regional Precipitation (Rain)	National Weather Service - Central Park Station	To determine if there's a relationship between Enterococcus levels and precipitation	1. Precipitation data has to be collected from a properly calibrated rain gauge 2. Precipitation data was collected from within 2 km of stations 3. Sensitivity of the preci[itation data is at least 0.01 inches

Air Ambient Temperature	National Weather Service - Central Park Station	To determine if there's a relationship between air and water temperature at the sites	1. Air temperature data has to be collected from a properly calibrated thermometer 2. Temperature data was collected from within 2 km of stations 3. Sensitivity of the temperature data is at least 1.0 °F
Wind Direction	National Weather Service - Central Park Station	To determine if there's a relationship between wind direction and current direction	1. Wind direction data has to be collected from a properly calibrated wind vane 2. Wind data was collected from within 2 km of the stations 3. Sensitivity of the wind direction data is at least 8 coordinate directions (N, S, E, W, NW, NE, SE, SW)

Citizen Science QAPP Template #9
Quality Objectives

Use this template to develop the data quality objectives (DQOs) that define the type, quantity and quality of data needed to answer specific environmental questions, and support proper environmental decisions. The examples provided below are neither inclusive nor appropriate for all projects. Fill in all information appropriate for the project. Complete this template for field, existing data and laboratory activities, if your project includes these components.

Precision is defined as the ability of a measurement to consistently be reproduced. Repeated measurements are usually used to determine precision. In the case of repeated measurements, one would see how close those measurements agree. If repeat measurements will be taken state how close those measurements need to agree by.

Precision:

Field + Lab - Duplicate samples of all physical and chemical samples will be taken in the field at all four sampling stations during each sampling event. A subset of parameters will be measured *in situ* and another subset that we can't measure *in situ* will be taken to the lab for processing. Biological samples (*i.e.* enterococcus) will not be duplicated due to the less than favorable trade off between reproducibility and cost effectiveness of this method.

The readings must agree within:

PARAMETER	PRECISION	PARAMETER	PRECISION
Salinity (YSI Pro Plus + 600 OMS)	± 0.1 ppt	Salinity (Refractometer)	± 1.0 ppt
Temperature (YSI Pro Plus + 600 OMS)	± 0.1 °C	Temperature (Thermometer)	± 1.0 °C
Dissolved Oxygen (YSI Pro Plus + 600 OMS)	± 0.5 ppm	Dissolved Oxygen (Mod. Winkler)	± 1.0 ppm
pH (YSI Pro Plus)	± 0.1 units	pH (Test strips)	± 0.6 units
Ammonia (YSI 9500)	± 0.25 ppm	Ammonia (Test strips)	± 0.5 ppm
Phosphate (YSI 9500)	± 0.25 ppm	Phosphate (Test strips)	± 1.0 ppm
Nitrate (YSI 9500)	± 0.25 ppm	Nitrate (Test strips)	± 1.0 ppm

Bias is defined as any influence in the project that might sway or skew the data in a particular direction. Taking samples from one location where a problem is known to exist, instead of taking samples evenly distributed over a wide area, is one example of how data can be biased. State any biases that could potentially exist and how they will be addressed in the project.

Bias:

Field – Although the stations being sampled are located in high energy localities which mix water well, we are sampling by the edge of the seawalls at 1 m from the surface. Therefore, our data may be biased towards those waters close to the seawall edge and no deeper than 10 – 20 feet. Given that oyster reefs and eel grass beds are typically located within these characteristics due to light penetration and sedimentation, this type of sampling design is probably sufficient.

Lab – Blanks for the IDEXX method will be used to ensure that enterococcus samples are not contaminated. Positive MPN readings in the blanks will consider the other samples void. pH standards of 7.01 and 11.01 will be used to calibrate and verify pH meter readings. Discrepancies of more than 0.2 units will void the results.

Existing Data – Weather data may be biased because weather conditions vary between protected terrestrial areas and the coast or between open spaces and spaces suffering from the city canyon effect. Due to budget constraints we will be unable to install weather stations closer to the sampling stations. However, ambient air temperature and wind direction will be verified *in situ* and compared with the National Weather Service data. Temperature will be verified using the same calibrated thermometers that will be used for water temperature and wind direction will be verified with local observations of waving flags or wind cones.

Representativeness is how well the collected data depicts the true system. Describe how the collected data will accurately represent the population, place, time and/or situation of interest.

Representativeness:

There are no combined sewage outflows (CSOs) on Governors Island. Therefore, the samples taken from around GI will be representative of HRE water all around the littoral of the Island.

Samples taken from the Battery Park and Pier 15 will be representative of the littoral of Manhattan that are subject to the influence of CSOs. Although efforts will be taken to minimize sampling next to CSOs, it will be difficult to avoid higher concentrations of pollutants from the Manhattan stations.

Because the HRE waters in the sampling stations are high energy waters with a lot of boat traffic, we assume that the samples taken at a depth of 1m and by the seawall are representative of waters to a depth of 10 – 20 ft.

Comparability is defined as the extent to which data from one data set can be compared directly to another data set. The data sets should have enough common ground, equivalence or similarity to permit a meaningful analysis. State if the data is intended to be compared to other data sets and how this will be achieved.

Comparability:

Field/Lab – As far as we can tell, the only data we are collecting that will be comparable to other studies will be our dissolved oxygen data (*i.e.* both from the modified Winkler Method and the YSI Pro Plus), Enterococcus levels, salinity (*i.e.* both from the refractometer and YSI) as these are approved standard methods for the examination of water and waste water and by the EPA. On year two (02) our collection of pH and temperature with the YSI Pro PPLus will be comparable with other studies.

Existing Data – National Weather Service data is comparable nation-wide.

Completeness is the amount of data that must be collected in order to achieve the goals and objectives stated for the project. State how much data will need to be collected in order for the project to be considered successful. This can be stated as a total number of samples or a percentage of data collected.

Completeness:

Parameter	No. Valid Samples Anticipated
Salinity (YSI Pro Plus + 600 OMS)	**12**
Temperature (YSI Pro Plus + 600 OMS)	**12**
Dissolved Oxygen (YSI Pro Plus + 600 OMS)	**12**
pH (YSI Pro Plus)	**12**
Ammonia (YSI 9500)	**12**
Phosphate (YSI 9500)	**12**

Nitrate (YSI 9500)	**12**
Enterococcus MPN	**24**
Temperature (Thermometer)	**24**
Dissolved Oxygen (Mod. Winkler)	**12**
Salinity (Refractometer)	**12**
pH (Test strips)	**12**
Ammonia (Test strips)	**12**
Phosphate (Test strips)	**12**
Nitrate (Test strips)	**12**
Tidal Information (Orange)	**24**

In total, we will collect 24 samples, one every month for two years. All samples will be duplicated throughout the duration of the sampling phase. A collection and processing of a minimum of 80% of samples will be considered a successful project. If weather or other issues impede a sampling event, the event will be rescheduled.

Sensitivity is essentially the lowest detection limit of a method, instrument or process for each of the measurement parameters of interest. State the sensitivity needed for the instruments, methods or processes used for the project in order to obtain meaningful data.

Sensitivity:

PARAMETER	MEASUREMENT RANGE	INSTRUMENT SENSITIVITY
Salinity (YSI Pro Plus)	0 – 70 ppt	0.01 ppt
Temperature (YSI Pro Plus)	-5 – 70 C	0.1°C
Dissolved Oxygen (YSI Pro Plus)	0 – 50 mg/L	0.1 or 0.01 mg/L (user selectable); 0.1% air saturation
pH (YSI Pro Plus)	0 – 14 units	0.01 units
Ammonia	0 – 1.0 (N)	0.001 AU

(YSI 9500)		
Phosphate (YSI 9500)	LR 0 – 4.0 HR 0 – 100	0.001 AU
Nitrate (YSI 9500)	0 – 20 (N)	0.001 AU
Enterococcus MPN	< 1.0 – >200.5	N/A
Temperature (Thermometer)	-40 – 70 C	N/A
Dissolved Oxygen (Mod. Winkler)	0 – 10 ppm	0.2 ppm
Salinity (Refractometer)	0 – 100 ppt	1.0 ppt
pH (Test strips)	0 – 14 units	N/A
Ammonia (Test strips)	0 – 6 ppm	N/A
Phosphate (Test strips)	0 – 50 ppm	N/A
Nitrate (Test strips)	0 – 200 ppm	N/A
Tidal Information (Orange)	Ebb, flood, slack	N/A

Existing data- The precipitation data has a sensitivity of 0.01in. Air data has a sensitivity of 1.0°F. The sensitivity of the wind direction is not available.

Citizen Science QAPP Template #10A
Data Collection Methods

Sampling Design

For this section, describe and justify the data collection activities. Include location specific information, such as GPS coordinates or landmarks, for the data collection locations. Provide information about the frequency of sampling and the collection of quality control samples. Include information about your plans for sample identification and transportation.

We plan on sampling the Upper New York Bay at four localities between April, 2013 and April, 2015. Two sites were chosen at Governors Island and two on the southern end of Manhattan. Station M1 (40°42'17.04"N, 74° 1'8.29"W) on Lower Manhattan is located by Battery Park. This site is characterized by having a cement seawall which causes fast currents. Station M2 (40°42'17.07"N, 74° 0'12.96"W), also on Lower Manhattan, is located on the East River off of Pier 15. This station is characterized by having busy ferry docks with boats that maintain full engine throttle while parked as opposed to tying up. Station G1 (40°41'28.46"N, 74° 1'16.24"W) is located on the northwest side of Governors Island and is characterized with sea wall, rip rap and having high water dynamics. Station G2 (40°41'27.70"N, 74° 0'43.95"W) is located on the east of Governors Island off of Pier 101. It is characterized by sea wall and docks with less boats docking and rip rap but vulnerable to large wakes from commercial and private vessels that pass along Buttermilk Channel. This station is also close to the proposed Governors Island Oyster Reef.

Samples of all physical, chemical, and biological samples will be taken in the field at all four sampling stations during each sampling event. A subset of parameters will be measured *in situ* and another subset that we can't measure *in situ* will be taken to the lab for processing.

In total, we will collect 24 samples, one every month for two years. All samples will be duplicated throughout the duration of the sampling phase.

Blanks for the IDEXX method will be used to ensure that Enterococcus samples are not contaminated. Positive MPN readings in the blanks will consider the other samples void. pH standards of 7.01 and 11.01 will be used to calibrate and verify pH meter readings. Discrepancies of more than 0.2 units will void the results.

A Beta bottle will be used in the field to collect the water sample at a depth of 1m below the water's surface. The first sample will be discarded to wash out the vessel. The second sample will then be emptied into three graduated (50ml) polypropylene (PP) vials. These vials will have been previously marked with a unique 6 digit number and a batch letter (e.g. 130211a). Immediately after sample retrieval, the vials will be placed in a 28 Qt. Igloo cooler with four Rubbermaid ice packs measuring

7"x6"x2". A sample of water will be taken directly from the beta bottle for the Winkler Method by allowing the sample to overflow for at least 2 seconds over the glass sampling container. During year two (02), when the YSI instruments are in service, the probe will be lowered into the water at 1m below the surface for the physical-chemical readings mentioned in the previous sections.

The samples will travel by the team leaders and the Project Manager to Governors Island where they will be processed for enterococcus bacteria within one (01) hour of being collected. The rest of the duplicated samples not used for bacteria will be frozen at -40 C for, at most, four weeks before they are processed for nutrients. Used vials will be disposed of. Used enterococcus cultivated trays will be placed into a bucket with 20% Clorox and each cell will be punched out to disinfect the cultured media. The disinfected trays will then be placed in doubled biohazard bags.

Four teams of at least five volunteers each will be at each sampling station. Volunteers will consist of NY Harbor School students, NYHS teachers, NY Harbor Foundation Staff, and other adult volunteers.

Fresh fruit oranges will be used to measure tidal information (*i.e.* ebb, flood, and slack) by being thrown towards the center of the channel, perpendicular to the sea wall where present or off a dock in the case of Station M2 located on Pier 15. It will then be observed for a minimum of 10 seconds to determine which direction it is headed. Oranges were chosen because they float, are highly visible, are biodegradable, and have a small footprint which minimizes wind effects and maximizes surface current effects. By experience measuring the tide with this method had proven more reliable than using tide charts. Having detailed information of this sort will also allow us to assess the flow of water in this complex and highly dynamic marine zone where the East River, Hudson River, and Buttermilk channel meet in between Manhattan and Governors Island.

A YSI 600 OMS will be installed off of Pier 101 on Governors Island by Station G2 and will be programmed to take continuous readings every 15 minutes. The purpose is to have a second source of information with which to compare with the manual sampling and for more detailed results now that station G2 is close to the Governors Island oyster reef. The sonde will be enclosed in a 20’ long 4” PVC pipe and tagged. The data will be retrieved on a monthly basis by connecting the vendor supplied cable to an RS232 port on a lap top and using YSI Ecowatch software. A copper mesh will be applied arounf the probe section to avoid bio-fouling. Any fouling that does occur will be removed on a semester basis.

Complete all required information in the table below, using additional rows/columns, if necessary. Only a short reference back to the project objective is necessary in the table.

- In the **Matrix** section, state what kind of matrix (air, water, soil, animal/organism) is being sampled during the project.
- In the **# of Sampling Location(s)** section, provide the number of sampling locations.

- In the **# of Samples per Location** section, state if multiple efforts will be made at one location, such as sampling at different depths or taking repeated measurements over a given amount of time (i.e. once/quarter).
- In the **Parameter** section, state what substance will be measured/sampled.
- In the **Field QC Samples** section, state how many and what type of quality control samples will be collected.
- In the **Total Number of Samples** section, state the total number of samples that will be collected for each sampling event or total project including field QC samples.
- In the **Sampling SOP Reference** section, state what specific methods will be used for the sample/monitoring data collection. Attach any SOPs as necessary.
- In the **Project Objective for Sampling and Analysis or Monitoring** section, state why the data will be collected at the particular location, frequency and time.

Matrix	# of Sampling Locations	# of Samples per Location	Parameter	Field QC Samples	Total Number of Samples/ Measurements	Sampling SOP Reference	Project Objective for Sampling and Analysis or Monitoring
Water	4	2	Salinity (YSI Pro Plus)	1	8 per sampling event	See attached SOP	Collect water quality parameters at four stations off of Governors Island and Lower Manhattan to determine their suitability to sustain Atlantic oyster reefs and eel grass beds.
Water	4	2	Temperature (YSI Pro Plus)	1	8 per sampling event	See attached SOP	Collect water quality parameters at four stations off of Governors Island and Lower Manhattan to determine their suitability to sustain Atlantic oyster reefs and eel grass beds.

Matrix	# of Sampling Locations	# of Samples per Location	Parameter	Field QC Samples	Total Number of Samples/ Measurements	Sampling SOP Reference	Project Objective for Sampling and Analysis or Monitoring
Water	4	2	Dissolved Oxygen (YSI Pro Plus)	1	8 per sampling event	See attached SOP	Collect water quality parameters at four stations off of Governors Island and Lower Manhattan to determine their suitability to sustain Atlantic oyster reefs and eel grass beds.
Water	4	2	pH (YSI Pro Plus)	1	8 per sampling event	See attached SOP	Collect water quality parameters at four stations off of Governors Island and Lower Manhattan to determine their suitability to sustain Atlantic oyster reefs and eel grass beds.
Water	4	2	Ammonia (YSI 9500)	1	8 per sampling event	See attached SOP	Collect water quality parameters at four stations off of Governors Island and Lower Manhattan to determine their suitability to sustain Atlantic oyster reefs and eel grass beds.
Water	4	2	Phosphate (YSI 9500)	1	8 per sampling event	See attached SOP	Collect water quality parameters at four stations off of Governors Island and Lower Manhattan to determine their suitability to sustain Atlantic oyster reefs and eel grass beds.
Water	4	2	Nitrate (YSI 9500)	1	8 per sampling event	See attached SOP	Collect water quality parameters at four stations off of Governors Island and Lower Manhattan to determine their suitability to sustain Atlantic oyster reefs and eel grass beds.

Matrix	# of Sampling Locations	# of Samples per Location	Parameter	Field QC Samples	Total Number of Samples/ Measurements	Sampling SOP Reference	Project Objective for Sampling and Analysis or Monitoring
Water	4	2	Enterococcus IDEXX	1	9 per sampling event	See attached SOP	Collect water quality parameters at four stations off of Governors Island and Lower Manhattan to determine their suitability to sustain Atlantic oyster reefs and eel grass beds.
Water	4	1	Tidal information (Orange)	0	4 per sampling event	See attached SOP	Determine how tidal dynamics affect water quality parameters at the four sites off of Governors Island and Lower Manhattan.

Attach all SOPs as an appendix to this document.

Citizen Science QAPP Template #10B
Equipment List and Instrument Calibration

Equipment List

Generate a list of all field equipment that will be used for the project.

Item	*Catalog Co.*	*Cat. #/ISBN*	*Qty.*
Consumables			
Dissolved oxygen test kit	http://www.aquaticeco.com/subcategories/523/LaMotte-Test-Kits-Dissolved-Oxygen	LM7414	6
Nitrile gloves (small) – dozen reuseable.	http://www.aquaticeco.com/subcategories/2953/Gloves-Thick-Nitrile	Crg1	2
Nitrile gloves (medium) – dozen reuseable.	http://www.aquaticeco.com/subcategories/2953/Gloves-Thick-Nitrile	Crg2	2
Nitrile gloves (large) – dozen reuseable.	http://www.aquaticeco.com/subcategories/2953/Gloves-Thick-Nitrile	Crg3	2
Nitrile Gloves – Large disposeable	http://www.aquaticeco.com/subcategories/4764/Gloves-Nitrile	GL702	4
Nitrile Gloves – medium disposeable	http://www.aquaticeco.com/subcategories/4764/Gloves-Nitrile	Gl701	4
Nitrile Gloves – X-Large disposeable	http://www.aquaticeco.com/subcategories/4764/Gloves-Nitrile	GL703	4
Rubber gloves	http://www.aquaticeco.com/subcategories/2451/Gloves-Rubber	GL502	5
Multi-test strips for pH, Alkalinity, nitrites, and nitrates	http://www.aquaticeco.com/subcategories/502/AquaChek-Pond-Test-Strips	11252	10
Ammonia Test strips	http://www.aquaticeco.com/subcategories/502/AquaChek-Pond-Test-Strips	11253	10
Phosphate test strips	http://www.aquaticeco.com/subcategories/1822/Hach-Water-Quality-Test-Strips	H27571	10
Lab Wipes	http://www.aquaticeco.com/subcategories/4233/Lab-Wipes	KW242	5
Pipette tips 2 – 10 mL	http://www.coleparmer.com/catalog/product_view.asp?sku=2501062&pfx=LM	LM – 25010 - 62	2
pH calibration solution pellets: PH4, PH7, PH10	http://www.aquaticeco.com/subcategories/544/pH-Calibration-Capsules	PH4, PH7, PH10	3

Probe cleaning solution	http://www.aquaticeco.com/subcategories/1863/Electrode-Care-Accessories	CS	1
Probe storage solution	http://www.aquaticeco.com/subcategories/4807/Electrode-Care-Accessories	SS	1
Membrane kit Y5561	http://www.aquaticeco.com/subcategories/2677/YSI-556-Multiprobe-System	Y5909	2
Waterproof datasheets	www.staples.com		50
Sharpie Markers	www.staples.com		5
Polypropelene 50mL vial w/ grad 500/pk	http://www.coleparmer.com/catalog/product_view.asp?sku=0612068&pfx=EW	EW-06120-68	120
Ammonia reagent (0-1ppm)	http://www.aquaticeco.com/subcategories/4236/YSI-Reagent-Starter-Kits/YPM152/0	YPM152	1
Nitrate reagent (0-20ppm)	http://www.aquaticeco.com/subcategories/4236/YSI-Reagent-Starter-Kits/YPM152/0	YPM163	1
Phosphate reagent LR (0-4ppm)	http://www.aquaticeco.com/subcategories/4236/YSI-Reagent-Starter-Kits/YPM152/0	YPM177	1
Phosphate reagent HR (0-100ppm)	http://www.aquaticeco.com/subcategories/4236/YSI-Reagent-Starter-Kits/YPM152/0	YPM114	1
Disposable transfer pipettes	https://www.fishersci.com/ecomm/servlet/itemdetail?catalogId=29104&productId=2701152&distype=0&highlightProductsItemsFlag=Y&fromSearch=1&storeId=10652&langId=-1	13-711-9D	6
Batteries (C, AA, AAA, 1.5V)			
Oranges			100
Copper mesh 12 x 12”			1
Non-consumables			
Chemical Aprons	http://www.aquaticeco.com/subcategories/3301/Lab-Apron-Green-PVC	05-157GR	20
Pocket thermometer (aluminum)	http://www.aquaticeco.com/subcategories/572/Pocket-Thermometer	TH26	10
Jars, Clear glass (125mL, case of 24)	http://www.aquaticeco.com/subcategories/2370/Clear-Glass-Jars	13004C	1
Igloo Roller Cooler 28Qt	http://www.amazon.com/Igloo-Island-Breeze-Roller-Cooler/dp/B002SU97BI/ref=sr_1_11?ie=UTF8&qid=1310179899&sr=8-11		5

Ice packs 7"x6"x2"	http://www.amazon.com/Rubbermaid-Blue-Brand-Weekender-Pack/dp/B000VPBIZA/ref=sr_1_2?s=sporting-goods&ie=UTF8&qid=1310180124&sr=1-2		20
Plastic Shoe boxes case/20	http://www.containerstore.com/shop?productId=10001753&N=&Ntt=shoe+boxes	10007943	2
Dropper bottles (12 pk, 30 ml)	http://www.aquaticeco.com/subcategories/2377/Narrow-Mouth-Dropper-Bottles	17625	2
Pipette 1 – 10 mL	http://www.coleparmer.com/catalog/product_view.asp?sku=2501424&pfx=LM	LM – 25014 - 24	2
Dipper 16 oz. 6 ft handle	http://www.coleparmer.com/catalog/product_view.asp?sku=0628205&pfx=XL	XL-06282-05	5
Beta bottles w/ case, acrylic	http://www.wildco.com/search.php?mode=search&page=1	1920-G62	2
Vital Sine Refractometer	http://www.aquaticeco.com/subcategories/552/Vital-Sine-Salinity-Refractometer	SR6	6
Stop watch	http://www.aquaticeco.com/subcategories/2421/Water-Resistant-Stopwatch/8112/0	8112	12
Hanna Combo Sensors	http://www.aquaticeco.com/subcategories/1919/Hanna-Combo-Meter	10007943	6
Incubator	http://www.aquaticeco.com/subcategories/2396/Incubator	HC120	1
Low temperature cabinet	http://www.coleparmer.com/catalog/product_view.asp?sku=0381534	EW-03815-34	1
Wash bottles (948 ml)	http://www.aquaticeco.com/subcategories/1444/Wash-Bottles/WB32/0	WB32	6
Clip boards, sheet protectors, pencils	www.staples.com		6
GPS - Garmin GPSMAP 60CSx			4
YSI Multi-parameter Probe			
YSI ProPlus Instrument	http://www.aquaticeco.com/subcategories/4500/YSI-Professional-Plus-Multiparameter-Instrument	Y60500	2
pH sensor	http://www.aquaticeco.com/subcategories/4500/YSI-Professional-Plus-Multiparameter-Instrument	Y6101	2
Galvanic DO sensor	http://www.aquaticeco.com/subcategories/4500/YSI-Professional-Plus-Multiparameter-Instrument	Y6202	2
Galvanic Blue Cap membrane kit (6 pack)	http://www.aquaticeco.com/subcategories/4500/YSI-Professional-Plus-Multiparameter-Instrument	Y5914	1

Quattro cable	http://www.aquaticeco.com/subcategories/4501/YSI-Professional-Plus-Multiparameter-Instrument-Cables	Y579010	2
YSI 9500	http://www.aquaticeco.com/subcategories/3755/YSI-Photometers	Y9500	1
Software			
Nobeltec Tides and Currents 3.7 software	http://www.landfallnavigation.com/-enso1.html?cmp=amazon-ppc&am=ensew&utm_source=ensew&utm_medium=shopping%2Bengine&utm_campaign=amazon-ppc		1
Primer/Permanova			
Ecowatch			
Gear Maintenance			
YSI 600 OMS repair with RS232 port cable			1

Instrument Calibration and Maintenance

In the table below, fill in any calibration or maintenance requirements for the equipment that will be used during the project. State how the calibration information will be documented.

Equipment Type	Calibration Frequency	Standard or Calibration Instrument Used
YSI Pro Plus (pH, salinity, temperature, DO)	DO and pH before each use	According to manufacturer's instructions and standards; salinity and temperature are calibrated by manufacturer
YSI 600 OMS (salinity, temperature, and DO)	DO quaterly	According to manufacturer's instructions and standards; salinity and temperature are calibrated by manufacturer
YSI 9500 (ammonia, phosphate, nitrate)	Before each use	According to manufacturer's instructions and standards
Enterolert (enterrococcus MPN)	none	none
Thermometer	none	NIST Traceable calibration from vendor
Mod. Winkler	none	none
Refractometer	Quaterly	According to manufacturer's instructions and standards
Test strips (pH, ammonia, phosphate, nitrate)	none	none

All calibrations for this project will be documented. Calibration records will be kept on calibration data sheets specific to each piece of equipment. Calibration records will include date, time, name of individual doing calibration, and the calibration results themselves. Acceptance criteria for calibration checks will also be included on the data sheets.

Citizen Science QAPP Template #11
Analytical Methods*

**********NONE**********

Identify all laboratory organization(s) that will provide analytical services for the project. Group by matrix, analytical group/parameter, reporting limit, detection limit, analytical/preparation method SOP, sample volume, containers, preservation requirements, maximum holding time and the laboratory contact information.

***This table only needs to be completed when sample analysis by a laboratory is applicable to the project.**

Matrix	Analytical Group/Parameter	Reporting Limit	Detection Limit	Analytical & Preparation Method/ SOP Reference	Sample Volume	Containers (*number, size, type*)	Preservation Requirements (*chemical, temperature, light protected)*	Maximum Holding Time (*preparation/ analysis)*	Laboratory used for Analysis
Water	*Algae (chlorophyll a)*	*.2 ug/L*	*0.05 ug/L*	*EPA Method 445.0*	*1.0L*	*56 1.0 L HPDE sample containers*	*Store in dark place on ice. Filter as soon as possible. Filters should be stored in -20 °C freezer*	*3.5 weeks once filtered*	*XYZ University Ecology Lab 12 College Dr. Edison, NJ*

Citizen Science QAPP Template #12
Field Data Sheet

Project name ***_EPA Citizen Science Water Quality Monitoring of Governors Island and Lower Manhattan_*** *page ____ of _____*

Initial date _____ Final Date _____ Location _____

Station _____

Sampling Day #	Date (mmddyy)	Time	Sample Vial #	T °C	D.O. mg/L	pH units	PO_3 ppm	NO_3 ppm	NH_3 ppm	pH* units	T* °C	Sal ppt	Current (ebb or flood)	Entero. MPN	Rain Same day (in)	Rain (Prior day)	Rain (2 days prior)	Rain (3 days prior)	Rain (5 days prior)	Air T °C	Wind Direction (use GPS)
DAY ___																					
	Initials																				
	Initials																				
	Initials																				
DAY ___																					
	Initials																				
	Initials																				
	Initials																				
	Initials																				

Use pencil only please. Make sure all required cells are completed including time + initials. ***pH and Temperature with Hanna Combo Sensor**

General Comments:

_____

_____

_____

_____

Ask your group leader if you have any questions.

Citizen Science QAPP Template #13
Training and Specialized Experience

Training

Personnel/Group to be Trained	Description of Training	Frequency of Training
High school and adult volunteers	Field and lab safety protocols; preparation of technical sampling materials before events; protocols of collecting samples in accordance with the QAPP; protocols for obtaining physical-chemical parameter water quality data using technical equipment; use of data tables and data collection management; use of the on-line Webpage for data entry; processes required to conduct the study; and maintenance and storage of technical sampling materials after events	Session at the beginning of the sampling season and each semester after that. (*i.e.* February 2013, October 2013, February 2014, and ber 2014

Specialized Experience

If any individuals have specialized experience that will be utilized by the project please complete the specialized experience table. State who the individual is, what specialized experience they have related to the project and their years of experience.

Person	Specialized Experience	# of Years of Experience
Michael Judge	Marine Ecologist	30
Mauricio Gonzalez	Marine Biologist, use of real-time monitoring equipment such as YSI meters. Experience in the collection of water samples for multiple parameters.	15

Citizen Science QAPP Template #14
Assessments and Oversight

Assessments and project oversight include various reviews to identify shortcomings or deviations from the project. For each type of assessment, describe procedures for handling QAPP and project deviations encountered during the planned project assessments. Fill in all necessary information.

Assessment Type	Frequency of Assessment	What is Being Assessed	Who will Conduct the Assessment	How Issues or Deviations will be Addressed
Data Checks and Assessments	1/month	Field data entries into spreadsheet and database	Matthew Haiken or Sam Janis	Verify with sampling team
On-Site Field Inspection	2 weeks into sampling season and mid-season	Adult and high school volunteers against QAPP/SOP	Mauricio Gonzalez	Re-train if necessary

Citizen Science QAPP Template #15
Data Management

Data Management

Describe the data management processes used throughout the life of the project. Data management includes: recording and transcribing field notes, logging and retrieval of instrument data, transmittal of automated field and laboratory results, data transformation and reduction procedures, compilation of survey results, and data storage, retrieval and security uses throughout the project. Describe the way data handling errors will be controlled (i.e. spot checks for transcription and calculation errors).

Field Datasheets and Field Data:
All data from the field will be recorded on pre-printed datasheets (see template #12). Data will be transcribed from datasheets to an online database **no later than one 1 week** after it has been processed. 100% of the data will be checked for accuracy and transcription errors by the Project Manager. If there are any discrepancies in data entries, Matthew Haiken or Sam Janis will check the field datasheets and discuss them with the field sampling team. Original datasheets will be stored in Mauricio Gonzalez's office for 5 years after the completion of the project. Existing weather data will be obtained from existing database, reviewed and added to an electronic database. The electronic database is located at www.harborseals.org.

Laboratory Analytical Results:
The processing of nutrients and enterococcus samples will be performed at the New York Harbor School's Marine Sciences lab on Governors Island. Lab results will be transcribed on to the same field data sheet and delivered to Mauricio Gonzalez (Project Manager). Any data that does not meet the quality control requirements of the laboratory will be flagged. Once received by Mauricio Gonzalez, the laboratory data will also be entered into the electronic database **no later than one (01) week** after processing. The electronic database is located at www.harborseals.org.

Citizen Science QAPP Template #16
Data Review and Usability Determination

Include in this section the types of checks that will be performed at the end of the project to determine if the data collected is usable for achieving the goals of the project. Examples of data checks are provided in the table below.

Data Checks

Field/Lab	Data Management
Monitoring performed per SOPs or QAPP	Data entry and transcription errors
Field QC samples performed correctly	Calculation/reduction errors
Measurements performed correctly	Proper data and document storage
Calibrations performed correctly	Missing data documented
Data meets acceptance criteria	
Holding times	
Evaluate any deviations from QAPP or SOPs to determine the impact to the data and project objectives	

Describe the process used to determine the usability of your project data. If your data review, based on the table above, does not uncover any issues and all of your QC criteria are satisfied, then your data will be assumed to be usable for the intended project objective. However, this is not always the case and so you will need to lay out a process for determining data usability in the event that all QC criteria are not met.

All data issues identified will be discussed with the QAO to determine data usability on a case by case basis. All decisions to allow data that did not fully comply with QC criteria or QAPP requirements will be explained, and any resultant limitations on data use fully discussed in the final project report.

Citizen Science QAPP Template #17
Reporting

Reports

Specify the frequency of all reports, the names of the originators and to whom they will be issued. Itemize what information and records must be included in the report(s). This might include but is not limited to the following:

- Sample collection records
- QC sample records
- Equipment calibration records
- Assessment reports
- Data reconciliation results and associated recommendations/limitations
- Final report of results

Note: If your project will include posting data to a website for public access, state in your description information about how data limitations will be conveyed.

The Project Manager is responsible for submitting quarterly project reports to the EPA Project Officer. The quarterly reports will provide a status update for the project and will include a summary of the quality assurance data checks conducted and the results of those checks. The final project report will summarize the quality assurance data check results for the entire project along with the data usability determinations made by the Project Quality Assurance Officer. The rational for the use of any data that does not fully comply with the quality criteria requirements of the approved QAPP will be fully explained in the final report and on the program web page.

Bibliography

New York-New Jersey Harbor & Estuary Program. 1996. *Final Comprehensive Conservation and Management Plan.*

New York-New Jersey Harbor & Estuary Program. 2012. *The State of the Estuary 2012: Environmental Health and Trends of the New York-New Jersey Harbor Estuary (Expanded Report).*

Twilley, R.R., W.M. Kemp, K.W. Staver, J.C. Stevenson, and W.R. Boynton. 1985. Nutrient Enrichment of Estuarine Submersed Vascular Plant Communities. I. Algal Growth and Affects on Production of Plants and Associated Communities. *Marine Ecology Progress Series*.23: 179-191.

USACE (United States Army Corps of Engineers). 2010. *Hudson Raritan Estuary Comprehensive Restoration Plan and Feasibility Study*.

APPENDIX: STANDARD OPERATING PROCEDURES (SOPs)

Enterococcus (MPN) with IDEXX Enterolert:

***** Notes: After incubation, the Enterolert trays must be handled as Medical (Infectious) Waste and disposed of properly. *****

Consumables:
Sterile 100 ml sampling bottles, Enterolert media & trays, sterile water.

Reusable Equipment:
Sealer system for Enterolert trays, incubator capable of holding 41˚C, UV light for assessing positives. A sealer and microbiological incubators exist at LDEO. The trays also can be sealed using a standard laundry iron and assessed for positives with a hand-held UV source.

Procedure: (More detailed instructions are available on the manufacturer's website: http://www.idexx.com/view/xhtml/en_us/water/enterolert.jsf#5 There also is a YouTube video available: http://www.youtube.com/watch?v=B5w_zPduf8U)

1. Collect sample using microbiologically uncontaminated sampling equipment. Gloves should be worn when handling sample. Periodically, collect a sample of sterile water only to check background levels of technique.
2. Dilute sample 1:10 with sterile water (e.g. put 10 ml of original sample in sampling bottle and fill to 100 ml with sterile water).
3. Add pre-measured media from Enterolert kit & dissolve.
4. Pour sample into open end of Enterolert tray. Put tray into waffle grid and seal tray.
5. Incubate at 41˚C for 24 hrs.
6. Examine wells with UV light source & count positives in both large and small wells.
7. Look up MPN on chart and multiply by dilution factor to get final MPN.

IDEXX
51-Well Quanti-Tray®
MPN Table

No. of wells giving positive reaction	MPN per 100 ml sample	95% Confidence Limits	
		Lower	Upper
0	<1.0	0.0	3.7
1	1.0	0.3	5.6
2	2.0	0.6	7.3
3	3.1	1.1	9.0
4	4.2	1.7	10.7
5	5.3	2.3	12.3
6	6.4	3.0	13.9
7	7.5	3.7	15.5
8	8.7	4.5	17.1
9	9.9	5.3	18.8
10	11.1	6.1	20.5
11	12.4	7.0	22.1
12	13.7	7.9	23.9
13	15.0	8.8	25.7
14	16.4	9.8	27.5
15	17.8	10.8	29.4
16	19.2	11.9	31.3
17	20.7	13.0	33.3
18	22.2	14.1	35.2
19	23.8	15.3	37.3
20	25.4	16.5	39.4
21	27.1	17.7	41.6
22	28.8	19.0	43.9
23	30.6	20.4	46.3
24	32.4	21.8	48.7
25	34.4	23.3	51.2
26	36.4	24.7	53.9
27	38.4	26.4	56.6
28	40.6	28.0	59.5
29	42.9	29.7	62.5
30	45.3	31.5	65.6
31	47.8	33.4	69.0
32	50.4	35.4	72.5
33	53.1	37.5	76.2
34	56.0	39.7	80.1
35	59.1	42.0	84.4
36	62.4	44.6	88.8
37	65.9	47.2	93.7
38	69.7	50.0	99.0
39	73.8	53.1	104.8
40	78.2	56.4	111.2
41	83.1	59.9	118.3
42	88.5	63.9	126.2
43	94.5	68.2	135.4
44	101.3	73.1	146.0
45	109.1	78.6	158.7
46	118.4	85.0	174.5
47	129.8	92.7	195.0
48	144.5	102.3	224.1
49	165.2	115.2	272.2
50	200.5	135.8	387.6
51	> 200.5	146.1	infinite

IDEXX Sales and Technical Support
1-800-321-0207 or 1-207-856-0496
www.idexx.com/water

09-63234-00

Salinity (ppt) with Vital Sine Refractometer:

VITALSINE Calibration

1. Calibration of ATC refractometers should only be conducted when the previous calibration setting has shifted and is noticeably affecting measurements. **DO NOT PERFORM CALIBRATIONS IN THE FIELD!** Calibration must take place in a controlled environment of 20°C (68°F) using distilled water of the same temperature. It's recommended to allow the refractometer and the distilled water to reach temperature equilibrium with the controlled environment before calibration takes place.
2. Open the daylight plate and apply one or two drops of distilled water on to the surface of the prism. Hold the prism at an angle close to parallel with the floor so the distilled water will not run off of the prism.
3. Gently close the daylight plate over the prism. The distilled water should spread as a thin, even layer in between the daylight plate and the prism. By looking through the daylight plate, ensure that the distilled water covers the ENTIRE surface of the prism. If there are bubbles and gaps or if the distilled water is only on one portion of the prism, the distilled water must be reapplied (Figure 1). Inaccurate calibrations will result if the prism is not covered correctly.
4. Looking through the eyepiece, hold the refractometer and direct the daylight plate upwards towards light. If the scale is not in focus, adjust it by gently turning the eyepiece (rubber hood) either clockwise or counterclockwise. Be careful not to overturn the focusing mechanism.
5. When the refractometer scale is viewed through the eyepiece, the upper field of view will be seen as blue and the lower field will be seen as white (Figure 2). Confirm that the boundary line crosses the scale at "0" (Figure 3).
6. If the boundary line falls above or below zero, gently loosen the set screw on the calibration ring with the supplied screwdriver. While looking through the eyepiece, gently turn the calibration ring clockwise or counterclockwise until the boundary line is at zero. Once this is achieved gently tighten down the set screw with the supplied screwdriver. (NOTE: Do not over-tighten. If the set screw is over-tightened, the boundary line may shift slightly).
7. When calibration is complete, gently wipe the prism using tissue paper.

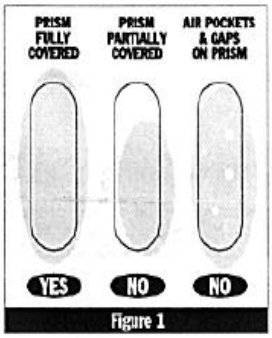


Figure 1

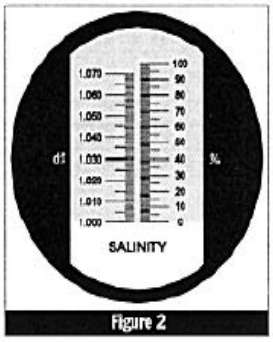


Figure 2

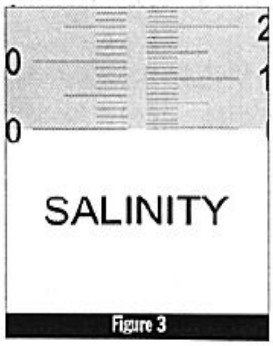


Figure 3

3

Continued

VITALSINE General Use

1. Open the daylight plate and apply one or two drops of the sample solution to the surface of the prism. Hold the prism at an angle close to parallel with the floor so the sample will not run off of the prism.
2. Gently close the daylight plate over the prism. The sample solution should spread as a thin, even layer in between the daylight plate and the prism. By looking through the daylight plate, ensure that the sample solution covers the ENTIRE surface of the prism. If there are bubbles and gaps or if the sample is only on one portion of the prism, the sample solution must be reapplied (Figure 1). Inaccurate readings will result if the prism is not covered correctly.
3. Looking through the eyepiece, hold the refractometer and direct the daylight plate upwards towards light. If the scale is not in focus, adjust it by gently turning the eyepiece (rubber hood) either clockwise or counterclockwise. Be careful not to overturn the focusing mechanism.
4. When the refractometer scale is viewed through the eyepiece, the upper field of view will be seen as blue and the lower field will be seen as white (Figure 4). The reading is taken at the point where the boundary line of the blue and white fields crosses the scale (Figure 5). The value (either permillage or specific gravity) is the salinity level of water.
5. When each measurement is complete, the sample must be cleaned from the prism using tissue paper and water.

Figure 4

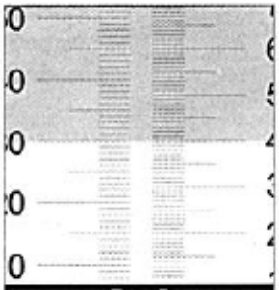


Figure 5

VITALSINE Conversion Table

Salinity (‰)	NaCl (w/w)	$MgCl_2$ (w/w)	$MgSO_4$ (w/w)	K_2SO_4 (w/w)	$CaCl_2$ (w/w)	Brix%
0	0.0	0.0	0.0	0.0	0.0	0.0
10	1.0	0.7	0.9	1.4	0.8	1.3
20	2.1	1.4	1.8	2.9	1.5	2.5
30	3.1	2.1	2.7	4.3	2.3	3.7
40	4.1	2.8	3.6	5.8	3.0	4.9
50	5.1	3.5	4.5	7.3	3.8	6.2
60	6.2	4.2	5.4	8.8	4.5	7.4
70	7.2	5.0	6.3	10.3	5.3	8.6
80	8.3	5.7	7.2	11.8	6.0	9.8
90	9.4	6.4	8.2	13.4	6.8	11.0
100	10.5	7.2	9.1	15.0	7.6	12.3

VITALSINE Specifications

Range:	0-100‰ / 1.000-1.070 Specific Gravity
Resolution:	1.0‰ / 0.001 Specific Gravity
Accuracy:	±1.0‰ / ±0.001 Specific Gravity
ATC Range:	10-30°C
Dimensions:	40 x 40 x 185mm (1.6 x 1.6 x 7.3")
Weight:	285g (10.0 oz.)
Supplied With:	Vinyl Carrying Case (1), Plastic Transfer Pipet (1), Calibration Screwdriver (1)

\

Temperature (C) with calibrated thermometer:

Using a calibrated thermometer, temperature in Degrees Celsius will be measured.

Once the sample is brought up, place thermometer with protective cylinder in bucket.

Wait approximately 1 minute before taking the thermometer out of the water.

Unscrew the cylinder and take reading.

Add data to data table.

Rinse off the thermometer completely with RO/DI water and re-screw the cylinder.

Dissolved Oxygen (ppm) with the modified Winkler method:

KIT CONTENTS

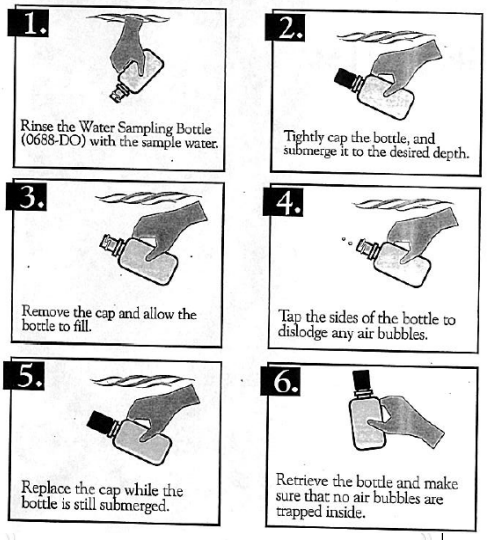
QUANTITY	CONTENTS	CODE
30 mL	*Manganous Sulfate Solution	*4167-G
30 mL	*Alkaline Potassium Iodide Azide	*7166-G
50 g	*Sulfamic Acid Powder (7414 Kit)	*6286-H
30 mL	*Sulfuric Acid, 1:1 (5860 Kit)	*6141WT-G
60 mL	*Sodium Thiosulfate, 0.025N	*4169-H
30 mL	Starch Indicator Solution	4170WT-G
1	Spoon, 1.0 g, plastic (7414 Kit)	0697
1	Direct Reading Titrator	0377
1	Test Tube, 5-10-12.9-15-20-25 mL, glass, w/cap	0608
1	Water Sampling Bottle, 60 mL, glass	0688-DO

*WARNING: Reagents marked with a * are considered to be potential health hazards. To view or print a Material Safety Data Sheet (MSDS) for these reagents go to www.lamotte.com. To obtain a printed copy, contact LaMotte by email, phone or fax.

To order individual reagents or test kit components, use the specified code numbers.

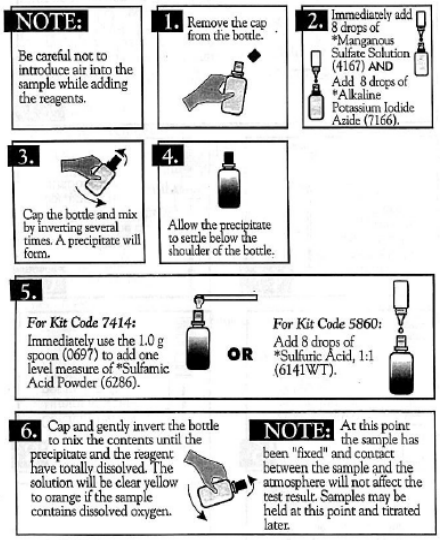
TEST PROCEDURE

PART 1 - COLLECTING THE WATER SAMPLE



TEST PROCEDURE

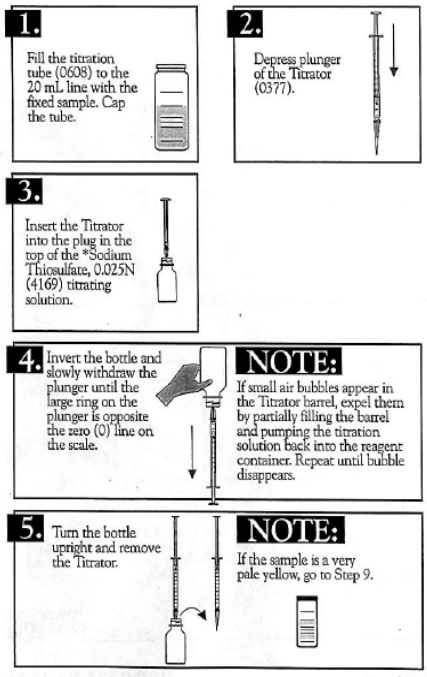
PART 2 - ADDING THE REAGENTS



5

TEST PROCEDURE

PART 3 - THE TITRATION



continued . . .

6

Continued

TEST PROCEDURE

6. Insert the tip of the Titrator into the opening of the titration tube cap.

7. Slowly depress the plunger to dispense the titrating solution until the yellow-brown color changes to a very pale yellow. Gently swirl the tube during the titration to mix the contents.

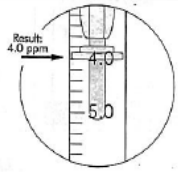
8. Carefully remove the Titrator and cap. Do not to disturb the Titrator plunger.

9. Add 8 drops of Starch Indicator Solution (4170WT). The sample should turn blue.

10. Cap the titration tube. Insert the tip of the Titrator into the opening of the titration tube cap.

11. Continue titrating until the blue color disappears and the solution becomes colorless.

12. Read the test result directly from the scale where the large ring on the Titrator meets the Titrator barrel. Record as ppm Dissolved Oxygen. Each minor division on the Titrator scale equals 0.2 ppm.



TEST PROCEDURE

NOTE:

If the plunger ring reaches the bottom line on the scale (10 ppm) before the endpoint color change occurs, refill the Titrator and continue the titration. Include the value of the original amount of reagent dispensed (10 ppm) when recording the test result.

NOTE:

When testing is complete, discard titrating solution in Titrator. Rinse Titrator and titration tube thoroughly. DO NOT remove plunger or adapter tip.

Dissolved Oxygen (ppm), pH, Salinity (ppt), Temperature (C) with the YSI ProPlus galvanic probe method:

Professional Plus
Quick-Start Guide

This Quick-Start Guide is meant to serve as a quick reference in operating the Professional Plus. It is not intended to replace the information found in the Operations Manual. For your convenience, this quick start guide will enable you to unpack your instrument and get to the field quickly.

GETTING STARTED

Unpack the instrument and install (2) C size batteries in the back of the instrument. Tighten the four screws of the battery plate on to the back of the instrument.

If necessary, install the sensors into the cable assembly by inserting the sensors into the ports and then hand tightening them. Do not use a tool and do not over tighten.

If using a 1010 cable, a sensor must be installed in port 1 for correct operation. If installing a pH/ORP combo sensor into a 1010 cable, ORP will not be measured. If using a 1020 cable, install a pH, ORP, pH/ORP, or an ISE sensor in port 1 and a DO sensor in port 2.

If using a Quatro cable, install a pH, ORP, or ISE sensor in ports label 1 and 2. A sensor must be installed in port 1 for port 2 to operate correctly. If you install a pH/ORP combo sensor into port 1 or port 2, ORP will not be measure. Install the Dissolved Oxygen sensor in the port labeled DO. Install the Conductivity/Temperature sensor in the port labeled CT following the instructions included with the sensor. For ease of installation, YSI recommends that you install a sensor into port 1 first; followed by DO installation, then port 2, and lastly C/T.

Please refer to the Getting Started Setup section of the Manual for a complete list of sensor/cable port configurations.

Install a port plug into any port that does not have an installed sensor. Attach the cable assembly to your instrument.

INSTALLING THE DO MEMBRANE

Note: The DO sensor is shipped with a red protective cap to protect the electrode. A new membrane cap must be installed before the first use.

1. Prepare the O_2 probe solution according to the instructions on the bottle. After mixing, allow the solution to sit for 1 hour. This will help prevent air bubbles from later developing under the membrane.
2. Remove, and discard or save the red protective cap.
3. Thoroughly rinse the sensor tip with distilled or deionized water.
4. Fill a new membrane cap with probe solution. Avoid touching the membrane portion of the cap.
5. Thread the membrane cap onto the sensor, moderately tight. A small amount of electrolyte will overflow.
6. Screw the probe sensor guard on moderately tight.

MENU FUNCTIONS

The Professional Plus has a menu-based interface. Press the "hot keys" to access the System, Sensor, Calibration, and File menus (from left to right at the top of the keypad). To navigate through the menus, use the up and down arrow keys to highlight a desired menu option with a highlight bar, and press the Enter key to activate the selection. Use the left arrow key to go back one screen. Press the Esc key to return to the run screen or to exit an alpha/numeric entry screen. The Pro Plus will automatically power on to the Run screen.

SETTING THE DATE AND TIME

1. Press the System key .
2. Highlight **Date/Time** and press Enter.
3. Highlight **Date Format** and press Enter. Highlight the correct format and press Enter.
4. Highlight **Date** and press Enter. Use the keypad to enter the correct date, then highlight ↵on the display keypad, and press Enter.
5. Highlight **Time Format** and press Enter. Highlight the correct format and press Enter.
6. Highlight **Time** and press Enter. Use the keypad to enter the correct time, then highlight ↵on the display keypad, and press Enter.
7. Press Esc to return to the Run screen.

SETTING UP SENSORS & REPORTING UNITS

A sensor must be enabled in the **Sensor** menu for it to operate. Once a sensor is enabled, the desired units for that sensor must be selected in the **Display** menu to determine what will be displayed.

1. Press the Sensor key.
2. Highlight **Setup** and press enter. Highlight the parameter of interest and press enter. Highlight **Enabled** and press enter to ensure a checkmark in the box. When enabling the ISE1 and ISE2 ports, you must select the correct sensor after enabling the port.
3. When Dissolved Oxygen is enabled, a submenu allows the user to select the sensor type (Polarographic or Galvanic) and membrane type being used. Highlight **Sensor Type** or **Membrane** and press **Enter** to modify these settings.
4. Press the left arrow key to return to the previous screen or press Esc to return to the Run screen.

Once changes to the Sensor menu have been completed, you must determine which units will be reported (i.e. %, mg/L, °C, °F, etc.).

1. Select the Sensor hot key on the keypad, highlight **Display**, and press enter.
2. Highlight the parameter you want to access and press the Enter.
3. A submenu will open allowing you to select the reporting units. Some parameters can be reported in multiple units. For example, DO can be reported in DO%, DO mg/L, and DO ppm. Other parameters, for example temperature, can only be reported in one unit. Make selections from the submenu, and then press the left arrow key to return to the Display menu or press Esc to return to the Run screen.

BAROMETER CALIBRATION

1. Determine your local barometric pressure (BP) in mmHg from a mercury barometer, an independent laboratory, or from a local weather service. If the

Continued

BP reading has been corrected to sea level, use the following equation to determine the true BP in mmHg for your altitude:

True BP = (Corrected BP in mmHG) – {2.5 * (Local Altitude in feet/100)}

2. Press the Cal key.
3. Highlight **Barometer** and press Enter. Use the arrow keys to highlight the desired units and press Enter to confirm.
4. Highlight **Calibration Value** and press enter to adjust.
5. Use the Alpha/Numeric screen to enter your True BP, then highlight <<<ENTER>>> and press enter.
6. Highlight **Accept Calibration** and press enter to finish the calibration.

CONDUCTIVITY, PH, AND ORP CALIBRATION

1. Press the Cal key.
2. Highlight the parameter you wish to calibrate and press enter. For Conductivity, a second menu will offer the option of calibrating **Specific Conductance, Conductivity,** or **Salinity**. Calibrating one automatically calibrates the other two. An additional sub-menu will require you to select the calibration units. For pH, auto-buffer recognition will determine which buffer the sensor is in and it will allow you to calibrate up to 6 points.
3. Place the correct amount of calibration standard into a clean, dry or pre-rinsed container.
4. Immerse the probe into the solution, making sure the sensor and thermistor are adequately immersed. Allow at least one minute for temperature to stabilize.
5. For any of parameters, enter the calibration solution value by highlighting **Calibration Value**, pressing enter, and then using the alpha/numeric keypad to enter the known value. Once you have entered the value of the calibration standard, highlight <<<ENTER>>> and press enter.
6. Wait for the readings to stabilize, highlight **Accept Calibration** and press enter to calibrate.
7. For pH, continue with the next point by placing the probe in a second buffer and following the on-screen instructions or press Cal to complete the calibration.

DO CALIBRATION

The Pro Plus offers four options for calibrating dissolved oxygen. The first is an air calibration method in % saturation. The second and third calibrates in mg/L or ppm to a solution with a known DO concentration (usually determined by a Winkler Titration). Calibration of any option (% or mg/L and ppm) will automatically calibrate the other. The fourth option is a zero calibration. If performing a zero calibration, you must perform a % or mg/L calibration following the zero calibration. For both ease of use and accuracy, YSI recommends performing the following 1-point DO % calibration:

1. Moisten the sponge in the cal/transport sleeve with a small amount of water and install it on the probe. The cal/transport sleeve ensures venting to the atmosphere. For dual port and Quatro cables, place a small amount of water (1/8 inch) in the calibration/transport cup and screw it on the probe. Disengage a thread or two to ensure atmospheric venting. **Make sure the DO and temperature sensors are <u>not</u> immersed in the water.**
2. Turn the instrument on. If using a polarographic sensor, wait 10 minutes for the DO sensor to stabilize. Galvanic sensors do not require a warm up time.
3. Press the Cal key, highlight DO and press enter.
4. Highlight DO%, then press Enter.
5. Verify the barometric pressure and salinity displayed are accurate. Once DO and temperature are stable, highlight **Accept Calibration** and press enter.

TAKING MEASUREMENTS AND STORING DATA

1. The instrument will be in Run mode when powered on.
2. To take readings, insert the probe into the sample. Move the probe in the sample until the readings stabilize. This releases any air bubbles and provides movement if measuring DO.
3. **Log One Sample** is already highlighted in Run mode. Press enter to open a submenu. Highlight **Sites** or **Folders** and press enter to select the site or folder to log the sample to.
4. If necessary, use the keypad to create a new Site or Folder name. If Site List and Folder List are disabled in the System menu, you will not see these options when logging a sample.
5. Once the Site and/or Folder name is selected, highlight **Log Now** and press enter. The instrument will confirm that the data point was logged successfully.
6. If you would like to log at a specific interval vs. logging one sample at a time, press the System key. Use the arrow keys to highlight **Logging** and press enter. Enable **Continuous Mode** and adjust the time **Interval** if necessary. On the Run screen, the option to log will change from **Log One Sample** to **Start Logging** based on the time interval entered.
7. During a continuous log, the **Start Logging** dialog box on the Run screen will change to **Stop Logging**.

UPLOADING DATA TO A PC WITH DATA MANAGER

1. Make sure Data Manager and the USB drivers are installed on the PC. The USB drivers will be installed during the Data Manager installation.
2. Connect the Communications Saddle to the back of the Pro Plus instrument and use the USB cable to connect the saddle to the USB port on the PC.
3. If connecting for the first time, Windows® may prompt you through two 'New Hardware Found' Wizard in order to complete the USB driver installation.
4. Open Data Manager on the PC and turn on the Pro Plus.
5. Click on the correct instrument in Data Manager under the **Select Instrument** heading. Once you've highlighted the correct instrument, click the **Retrieve Instrument Data** tab and check **Data, GLP, Site List, Configuration** or **Select All** options to retrieve data. Click **Start.**
6. After the file transfer is complete, the data is available for viewing, printing, and exporting from Data Manger and the data can be deleted from the Pro Plus if desired.
7. Press the File key and choose **Delete Data** if you no longer need the data on the Pro Plus.

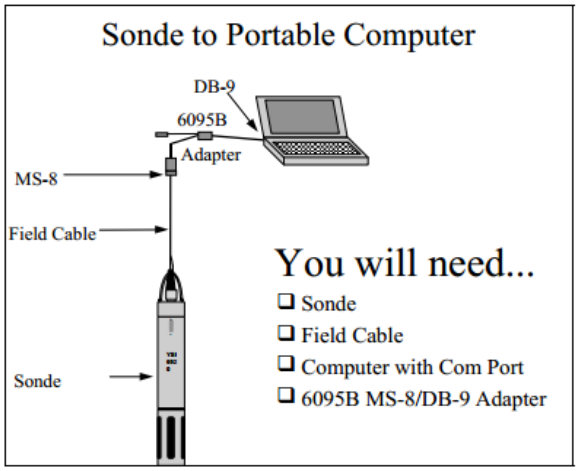
CONTACT INFORMATION

YSI
1700/1725 Brannum Lane
Yellow Springs, OH 45387
Tel: 800-765-4974 (937-767-7241)
Fax: 937-767-1058
E-Mail: proseries@ysi.com
Website: www.ysi.com

Item # 605595
Drawing # A605595
Revision B
February 2009

Dissolved Oxygen (ppm), pH, Salinity (ppt), Temperature (C) with the YSI 600 OMS Multi-probe system::

Figure 3

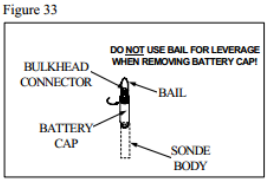


INSTALLING BATTERIES INTO THE YSI 600XLM OR 600 OMS V2-1 SONDES

To install 4 AA-size alkaline batteries into the sonde, refer to the following directions and Figure 33.

Grasp the cylindrical battery cover and unscrew by hand. Then slide the battery lid up and over the bulkhead connector. Insert batteries, paying special attention to polarity. Labeling on the battery compartment posts describes the orientation. It is usually easiest to insert the negative end of battery first and then "pop" the positive terminal into place.

Figure 33



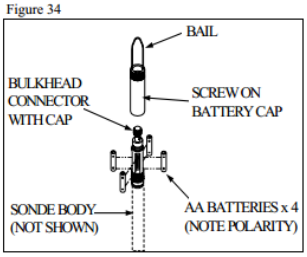
Check the O-ring and sealing surfaces for any contaminants that could interfere with the O-ring seal of the battery chamber.

***CAUTION:* Make sure that there are NO contaminants between the O-ring and the sonde. Contaminants that are present under the O-ring may cause the O-ring to leak when the sonde is deployed.**

Lightly lubricate the o-ring on the outside of the battery cover. DO NOT lubricate the internal o-ring.

Return the battery lid and tighten by hand. *DO NOT OVER-TIGHTEN.*

Figure 34



2.5 SONDE SOFTWARE SETUP

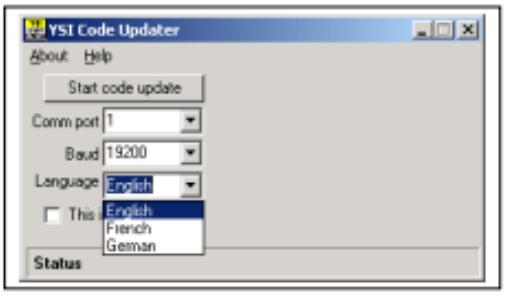
There are two sets of software at work in any YSI environmental monitoring system. One is resident in your PC and is called EcoWatch for Windows. The other software is resident in the sonde itself. In this section, you will first make sure that the language associated with your sonde software is appropriate to your application and change it if necessary. You will set up the sonde software using EcoWatch for Windows as the interface device between the sonde and your PC.

SETTING UP THE SONDE SOFTWARE LANGUAGE

The menus in the sonde software can be viewed in English, German, or French. However, the choice of language CANNOT be made from the sonde software itself. Rather the choice must be selected via a complete update of the software itself from the YSI Website as described below. Note that the menus in your sonde will be shown in English when you receive the instrument and, if this is your language of choice, no further action is required and you should skip to the next section. If you wish to change the language of your menus to German or French, use the following instructions.

Follow the step-by-step instructions below to change the language for the menus in your 6-series sonde:

- Connect your sonde to the serial port of a PC with access to the Internet using the proper cable as described in the previous section of this manual.
- Make sure that the sonde is powered with either internal batteries or a suitable power supply.
- Access the YSI Environmental Software Downloads page at www.ysi.com/edownloads or go to main page at www.ysi.com and click on Support button in green bar.
- Log in, or if a first time user, fill out the registration form and wait for a login password via return E-mail.
- Click on the **Software** folder under the Software Downloads section.
- Inside the folder, click on the file *6-Series & 556MPS Code Updater, M-DD-YYYY* and save the file to a temporary directory on your computer.
- After the download is complete, run the file that you just downloaded and follow the on-screen instructions to install the YSI Code Updater on your computer. If you encounter difficulties, contact YSI Technical Support for advice.
- Run the YSI Code Updater software that you just installed on your computer. The following window will be displayed:

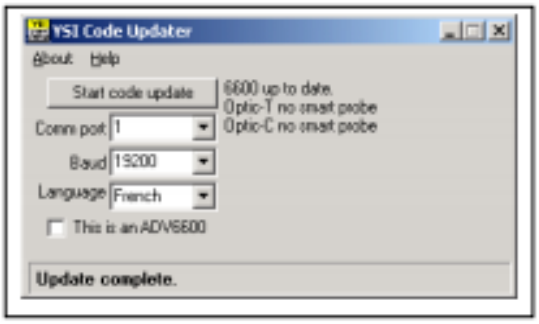


- Set the Comm port number to match the port to which you connected the sonde cable and make sure that the "This is an ADV6600" selection is NOT checked.

- **NEXT, SELECT THE LANGUAGE (ENGLISH, FRENCH, OR GERMAN) WHICH WILL BE USED IN YOUR SONDE MENUS.**

- Then click on the Start Code Update button. An indicator bar will show the progress of the upgrade as shown below.

- When the update is finished (indicated on the PC screen as shown below), close the YSI Code Updater window (on the PC) by clicking on the "X" in the upper right corner of the window.



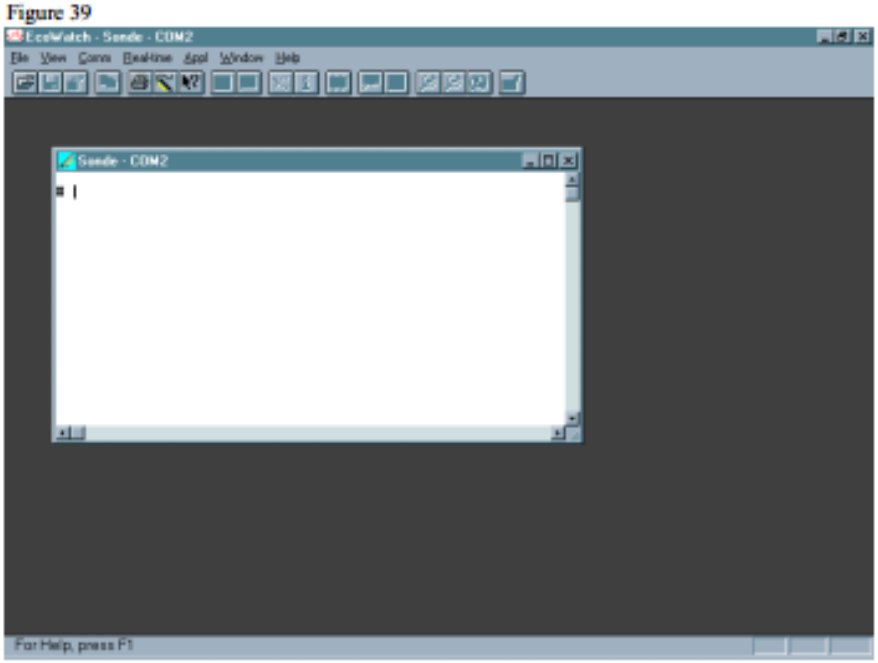
Your sonde menus will now appear in the language which you selected prior to running the updater. If you want to change the language associated with your sonde menu, you MUST rerun the YSI Code Updater and select the new language via this mechanism.

INTERFACING TO THE SONDE WITH ECOWATCH FOR WINDOWS

When you select **Sonde** from the EcoWatch for Windows menus, the PC-based software begins direct communication with the sonde-based software via standard VT100 terminal emulation.

In EcoWatch for Windows, select the sonde icon,  Then select the proper Com port and confirm by clicking **OK**. A window similar to that shown below will appear indicating connection to the sonde as shown in Figure 39. Type "**Menu**" after the **#** sign, press **Enter**, and the sonde Main menu will be displayed.

Figure 39



If your sonde has previously been used, the **Main menu** (rather than the # sign) may appear when communication is established. In this case simply proceed as described below. You will not be required to type "**Menu**".

If you are unable to establish interaction with the sonde, make sure that the cable is properly connected. If you are using external power, make certain that the YSI 6651 or 6038 power supply or other 12 vdc source is properly working. Recheck the setup of the Com port and other software parameters. Also refer to **Section 6, Troubleshooting.**

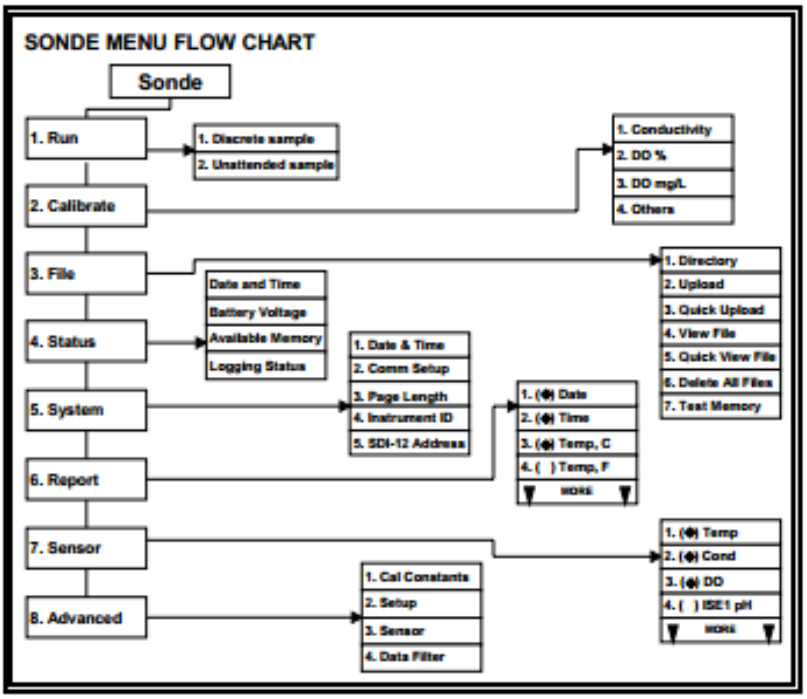
The sonde software is menu-driven. You select functions by typing their corresponding numbers. You do not need to press **Enter** after choosing a selection. Type the **0 or Esc** key to return to the previous menu.

Sonde Main Menu

```
------------------Main-----------------
1-Run                5-System
2-Calibrate          6-Report
3-File               7-Sensor
4-Status             8-Advanced

Select option (0 for previous menu):
```

Figure 40 • Sonde Menu Flow Chart



SYSTEM SETUP

At the Main menu, select **System**. The System Setup menu will be displayed.

System Setup Menu

```
1-Date & time
2-Comm setup
3-Page length=25
4-Instrument ID=YSI Sonde
5-Circuit board SN:00003001
6-GLP filename=00003001
7-SDI-12 address=0

Select option (0 for previous menu):
```

Select **1-Date & time**. An asterisk will appear next to each selection to confirm the entry. Press 4 and 5 to activate the date and time functions. Pay particular attention to the date format that you have chosen when entering date. You must use the 24-hour clock format for entering time. Option **4- ( ) 4 digit year** may be used so that the date will appear with either a two or four digit year display. If you do not enter the correct year format (8/30/**98** for 2-digit, 8/30/**1998** for 4 digit) your entry will be rejected.

```
----------Date & time setup----------
1-(*)m/d/y          4-( )4 digit year
2-( )d/m/y          5-Date=08/30/98
3-( )y/m/d          6-Time=11:12:30

Select option (0 for previous menu):
```

Select **4-Instrument ID** from the System setup menu to record the instrument ID number (usually the instrument serial number), and press **Enter**. A prompt will appear which will allow you to type in the serial number of your sonde. This will make sure that any data that is collected is associated with a particular sonde. Note that the selection **5-Circuit Board SN** shows the serial number of the PCB that is resident in your sonde (not the entire system as for Instrument ID). Unlike the **Instrument ID**, the user cannot change the **Circuit Board SN**. The **6-GLP filename** and **7-SDI-12 address** selections will be explained in Section 2.9.5

Press **Esc** or **0** to return to the **System setup** menu.

Then press **Esc** or **0** again to return to the **Main menu**.

```
-----------------Main-----------------
1-Run               5-System
2-Calibrate         6-Report
3-File              7-Sensor
4-Status            8-Advanced

Select option (0 for previous menu):
```

ENABLING SENSORS

To activate the sensors that are in your sonde, select **Sensor** from the Sonde Main menu.

```
------------Sensors enabled------------
1-(*)Time
2-(*)Temperature
3-(*)Conductivity
4-(*)Dissolved Oxy
5-(*)ISE1 pH
6-(*)ISE2 Orp
7-(*)ISE3 NH4+
8-(*)ISE4 NO3-
9-( )ISE5 NONE
A-(*)Optic T Turbidity - 6136
B-(*)Optic C Chlorophyll

Select option (0 for previous menu):
```

Note that the exact appearance of this menu will vary depending upon the sensors that are available on your sonde. Enter the corresponding number to enable the sensors that are installed on your sonde. An asterisk indicates that the sensor is enabled.

When selecting any of the ISE or Optical ports, a submenu will appear. When this occurs, make a selection so that the sensor corresponds to the port in which the sensor is physically installed. Only ORP can be enabled as ISE2. Optic T, Optic C, Optic B, and Optic O generate a submenu on selection. Each optical port can have one of six probes (6136 Turbidity, 6025 Chlorophyll, 6130 Rhodamine WT, 6131 BGA-PC, 6132 BGA-PE, or 6150 ROX Optical DO) installed as indicated by the submenus.

NOTE CAREFULLY: It is NOT possible to simultaneously activate BOTH the 6562 Rapid Pulse polarographic dissolved oxygen sensor and the 6150 ROX Optical dissolved oxygen sensor. Activation of either sensor will automatically deactivate the other selection. Thus, users of 6600V2-2, 6600EDS V2-2, 6820V2-1, and 6920V2-1 sondes CANNOT measure oxygen with both types of sensors.

After all installed sensors have been enabled, press **Esc or 0** to return to the Main Menu.

ENABLING PARAMETERS

In order for a specific parameter to be displayed:

1. The sensor must first be enabled as described above.
2. That parameter must be activated in the Report Setup menu described below.

Select **Report** from the Main menu. A Report Setup menu similar to the one shown below will be displayed.

```
--------------Report setup-------------
1-(*)Date m/d/y      E-(*)Orp mV
2-(*)Time hh:mm:ss   F-(*)NH4+ N mg/L
3-(*)Temp C          G-( )NH4+ N mV
4-(*)SpCond mS/cm    H-( )NH3 N mg/L
5-( )Cond            I-(*)NO3- N mg/L
6-( )Resist          J-( )NO3- N mV
7-( )TDS             K-(*)Cl- mg/L
8-( )Sal ppt         L-( )Cl- mV
9-(*)DOsat %         M-(*)Turbid+ NTU
A-(*)DO mg/L         N-(*)Chl ug/L
B-( )DOchrg          O-(*)Chl RFU
C-(*)pH              P-(*)Battery volts
D-( )pH mV

Select option (0 for previous menu):
```

Note that the exact appearance of this menu will vary depending upon the sensors that are available and enabled on your sonde. The asterisks (*) that follow the numbers or letters indicate that the parameter will appear on all outputs and reports. To turn a parameter on or off, type the number or letter that corresponds to the parameter.

Note also that since a 6136 turbidity probe was selected in the Sensor menu above, the units of turbidity are presented as "turbid+ NTU". If a 6026 turbidity probe (which was offered by YSI up until 2002) had been selected, the units of turbidity would be presented as "turbid NTU". This designation is designed to differentiate the data from the two sensor types in later analysis.

For parameters with multiple unit options such as temperature, conductivity, specific conductance, resistivity and TDS, a submenu will appear as shown below for temperature, allowing selection of desired units for this parameter.

```
--------------Select units-------------
1-(*)NONE
2-( )Temp C
3-( )Temp F
4-( )Temp K

Select option (0 for previous menu): 2
```

After configuring your display with the desired parameters, press **Esc or 0** to return to the Main menu.

2.6 GETTING READY TO CALIBRATE

2.6.1 INTRODUCTION

HEALTH AND SAFETY

Reagents that are used to calibrate and check this instrument may be hazardous to your health. Take a moment to review health and safety information in Appendix A of this manual. Some calibration standard solutions may require special handling.

CONTAINERS NEEDED TO CALIBRATE A SONDE

The calibration cup that comes with your sonde serves as a calibration chamber for all calibrations and minimizes the volume of calibration reagents required.

Although not recommended except in unusual circumstances, instead of the calibration cup, you may use laboratory glassware to perform some of the calibrations. If you do not use a calibration cup that is designed for the sonde, you are cautioned to do the following:

- ✓ Perform all calibrations with the Probe Guard installed. This protects the probes from possible physical damage.
- ✓ Use a ring stand and clamp to secure the sonde body to prevent the sonde from falling over. Much laboratory glassware has convex bottoms.
- ✓ Insure that all sensors are immersed in calibration solutions. Many of the calibrations factor in readings from other probes (e.g., temperature probe). The top vent hole of the conductivity sensor must also be immersed during calibrations.

CALIBRATION TIPS

1. If you use the Calibration Cup for calibration of either the Rapid Pulse Polarographic or ROX Optical DO sensors in water-saturated air, make certain to loosen the seal to allow pressure equilibration before calibration.
2. If you choose to calibrate your Rapid Pulse Polarographic or ROX Optical DO sensor in air-saturated water in a separate vessel, be sure to sparge the water with an aquarium pump and air-stone for at least 1 hour to assure that the water is truly saturated with air.
3. The key to successful calibration is to insure that the sensors are completely submersed when calibration values are entered. Use recommended volumes when performing calibrations.
4. For maximum accuracy, use a small amount of previously used calibration solution to pre-rinse the sonde. You may wish to save old calibration standards for this purpose.
5. Fill a bucket with ambient temperature water to rinse the sonde between calibration solutions or perform the calibration near a sink where the probes can be rinsed from the tap.

6. Have several clean, absorbent paper towels or cotton cloths available to dry the sonde between rinses and calibration solutions. Shake the excess rinse water off of the sonde, especially when the probe guard is installed. Dry off the outside of the sonde and probe guard. Making sure that the sonde is dry reduces carry-over contamination of calibrator solutions and increases the accuracy of the calibration.

7. Make certain that port plugs are installed in all ports where probes are not installed. It is extremely important to keep these electrical connectors dry.

USING THE CALIBRATION CUP

Follow these instructions to use the calibration cup for calibration procedures with all of the instruments except the 600R, 600QS, and 600 OMS V2-1. For these sondes, the over-the-guard bottle that comes with your sonde, must be used.

- ✓ Ensure that a gasket is installed in the gasket groove of the calibration cup bottom cap, and that the bottom cap is securely tightened. Note: Do not over-tighten as this could cause damage to the threaded portions of the bottom cap and tube.
- ✓ Remove the probe guard, if it is installed.
- ✓ Inspect the installed gasket on the sonde for obvious defects and if necessary, replace it with the extra gasket supplied.
- ✓ Screw the cup assembly into place on the threaded end of sonde and securely tighten. Note: Do not over tighten as this could cause damage to the threaded portions of the bottom cap and tube.
- ✓ Sonde calibration can be accomplished with the sonde upright– i.e. the cable connector end of the sonde is oriented above the probe end, or inverted where the orientation is reversed. A separate clamp and stand, such as a ring stand, is required to support the sonde in the inverted position.
- ✓ When using the Calibration Cup for dissolved oxygen calibration in water-saturated air, make certain that the vessel is vented to the atmosphere by loosening the bottom cap or cup assembly, depending on orientation, and that approximately 1/8" of water is present in the cup.

NOTE CAREFULLY: If you are calibrating a 6136 turbidity sensor for use with a 6820V2-1, 6920V2-1, 6600V2-2, or 6600EDS V2-2, you can use either the calibration cup supplied with your sonde or an optional extended length cup for the calibration. Please see the section below which describes the special calibration recommendations for this sensor.

2.6.2 CALIBRATION PROCEDURES

The following calibration procedures are the most commonly used methods for the 6-series sensors. For detailed information on all calibration procedures, refer to Section 2.9.2, Calibrate.

To ensure more accurate results, you can rinse the calibration cup with water, and then rinse with a small amount of the calibration solution for the sensor that you are going to calibrate. Discard the rinse solution and add fresh calibrator solution. Use tables 1-8 to find the correct amount of calibrator solution.

1. Carefully immerse the probes into the solution and rotate the calibration cup to engage several threads. YSI recommends supporting the sonde with a ring stand and clamp to prevent the sonde from falling over.

2. With the proper cable, connect the sonde to a PC, access EcoWatch for Windows and proceed to the Main menu (for information on how to run EcoWatch for Windows software, see Section 2.4.2, Running EcoWatch Software). From the sonde Main menu, select 2-Calibrate.

```
---------------Calibrate--------------
1=Conductivity          6=ISE3 NH4+
2=Dissolved Oxy         7=ISE4 NO3-
3=Pressure=Abs          8=Optic T=Turbidity=6026
4=ISE1 pH               9=Optic C=Chlorophyll
5=ISE2 ORP

Select option (0 for previous menu):
```


3. Note that the exact appearance of this menu will vary depending upon the sensors that are available and enabled on your sonde. To select any of the parameters from the Calibrate menu, input the number that is next to the parameter. Once you have chosen a parameter, some of the parameters will have a number that appears in parentheses. These are the default values and will be used during calibration if you press Enter without inputting another value. Be sure not to accept default values unless you have assured that they are correct. If no default value appears, you must type a numerical value and press Enter.

4. After you input the calibration value, or accept the default, press Enter. A real-time display will appear on the screen. Carefully observe the stabilization of the readings of the parameter that is being calibrated. When the readings have been stable for approximately 30 seconds, press Enter to accept the calibration. The calibrated value is bolded on the example screen on the following page.

5. Press Enter to return to the Calibrate menu, and proceed to the next calibration.

ROX OPTICAL DISSOLVED OXYGEN

Place the sensor either (a) into a calibration cup containing about 1/8 inch of water which is vented by loosening the threads or (b) into a container of water which is being continuously sparged with an aquarium pump and air stone. Wait approximately 10 minutes before proceeding to allow the temperature and oxygen pressure to equilibrate.

Select ODOsat % and then 1-Point to access the DO calibration procedure. Calibration of your Optical dissolved oxygen sensor in the DO % procedure also results in calibration of the DO mg/L mode and vice versa.

Enter the current barometric pressure in mm of Hg. (Inches of Hg x 25.4 = mm Hg).

Note: Laboratory barometer readings are usually "true" (uncorrected) values of air pressure and can be used "as is" for oxygen calibration. Weather service readings are usually not "true", i.e., they are corrected to sea level, and therefore cannot be used until they are "uncorrected". An approximate formula for this "uncorrection" (where the BP readings MUST be in mm Hg) is:

True BP = [Corrected BP] – [2.5 * (Local Altitude in ft above sea level/100)]

Press Enter and the current values of all enabled sensors will appear on the screen and change with time as they stabilize. Observe the readings under ODOsat %. When they show no significant change for approximately 30 seconds, press Enter. The screen will indicate that the calibration has been accepted and prompt you to press Enter again to return to the Calibrate menu.

The minor advantages and disadvantages of calibration in air-saturated water versus water-saturated air are outlined in **Appendix M, ROX Optical DO Sensor**

NOTE CAREFULLY: As opposed to the 6562 Rapid Pulse Polarographic DO sensor described above, there is no difference between the calibration routine for sensors which will be used for sampling or monitoring applications. Usually the Autosleep RS-232 feature in the Advanced|Setup menu will be activated for ROX calibrations, but there is no problem if it is not active.

Rinse the sonde in water and dry the sonde.

DEPTH AND LEVEL

For the depth and level calibration, make certain that the depth sensor module is in air and not immersed in any solution.

From the Calibrate menu, select Pressure-Abs (or Pressure-Gage if you have a vented level sensor) to access the depth calibration procedure. Input 0.00 or some known sensor offset in feet. Press Enter and monitor the stabilization of the depth readings with time. When no significant change occurs for approximately 30 seconds, press Enter to confirm the calibration. This zeros the sensor with regard to current barometric pressure. Then press Enter again to return to the Calibrate menu.

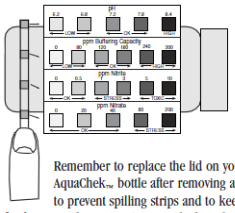
For best performance of depth measurements, users should ensure that the sonde's orientation remains constant while taking readings. This is especially important for vented level measurements and for sondes with side mounted pressure sensors.

pH and Nitrate with Aquacheck colorimetry:

1851 R11-98.Pond-4way.ps - 1/27/2006 11:19 AM

AquaChek™ POND TEST STRIPS

AquaChek™ is a test for pH, Buffering Capacity, Nitrite and Nitrate levels in your pond. The test pads on the strip will change color to indicate the levels in your pond.



Remember to replace the lid on your AquaChek™ bottle after removing a strip to prevent spilling strips and to keep them fresh. **Keep the strips in a cool, dry place**, and leave the packet of drying agent in the bottle — it will help keep the test strips at their best.

Follow these easy, step-by-step instructions

Step 1

Remove an AquaChek™ Pond Test Strip from the bottle and replace the cap tightly. Dip test strip into your pond water for 1 second and remove. Do not shake excess water from strip.

Step 2

Hold strip level for 30 seconds.

Step 3

pH

Compare the end pad of the strip to the pH color chart on the label. The pH pad should turn a shade of red-orange, between 7.2 and 7.8.

Buffering Capacity

Compare the second pad from the end of the strip to the Buffering Capacity color chart on the label. The Buffering Capacity pad should turn a shade of green. The correct range is 120 ppm (parts per million) to 180 ppm.

Nitrite

Compare the third pad from the end of the strip to the Nitrite color chart on the label. The Nitrite pad should remain white or turn a shade of pink. The safe range is between 0 ppm and 0.5 ppm.

Step 4

Nitrate

At 60 seconds after dipping strip, compare the pad nearest the handle to the Nitrate color chart on the label. The pad should remain tan or turn a shade of pink. The safe range is between 0 ppm and 40 ppm.

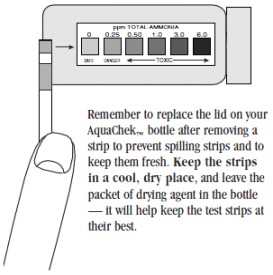
For recommendations on the importance of maintaining proper water conditions, see the reverse side of this instruction sheet.

Ammonia with Aquacheck colorimetry:

1850IN R11-98.Pond Ammonia 5/26/06 2:16 PM Page 1

AquaChek™ POND TEST STRIPS

AquaChek™ Ammonia tests for Total Ammonia in your pond. The test pad on the strip will change color to indicate the Total Ammonia level in your pond.



Remember to replace the lid on your AquaChek™ bottle after removing a strip to prevent spilling strips and to keep them fresh. **Keep the strips in a cool, dry place**, and leave the packet of drying agent in the bottle — it will help keep the test strips at their best.

Follow these easy, step-by-step instructions

Step 1

Remove an AquaChek™ Ammonia Pond Test Strip from the bottle and replace the cap tightly. Fill the sample vial to top line with pond water. Dip the test strip into water sample. Move strip vigorously up and down in the water sample for 30 seconds. Make sure both pads are always submerged.

Step 2

Remove test strip and shake off excess water. Hold strip level (pad side up) for 30 seconds.

Step 3

To read results, **turn strip over** so that both pads are facing away from you. Compare the color of the **small pad** to the color chart on the label. Be sure you are reading the results through the clear plastic of the strip.

Step 4

Rinse sample vial and store for next use. Do not place vial inside bottle of test strips.

For recommendations on the importance of maintaining proper water conditions, see Basic Pond Chemistry on the reverse side of this instruction sheet.

Ammonia (ppm) with Palintest Colorimetry based on the indophenol method:

Test Instructions

1 Fill test tube with sample to the 10 ml mark.
2 Add one Ammonia No 1 tablet and one Ammonia No 2 tablet, crush and mix to dissolve.
3 Stand for ten minutes to allow colour development.
4 Select Phot 4 on Photometer to measure Ammonia mg/l N or select Phot 62 on Photometer to measure Ammonium mg/l NH_4.
5 Take Photometer reading in usual manner (see Photometer instructions).

Sea Water Samples

Palintest Ammonia Conditioning Reagent is required when testing sea water or brackish water samples to prevent precipitation of salts. The reagent is supplied in a special 'spoon pack' to aid measuring out the powder.

Fill the test tube with sample to the 10 ml mark, and add one level spoonful of conditioning reagent. Mix to dissolve reagent then continue the test as described in the above test instructions. If turbidity still forms in the test, repeat using two level spoonfuls of conditioning reagent.

Notes

1 At low temperatures the rate of colour development in the test may be slower. If the sample temperature is below 20°C allow 15 minutes for the colour to develop.
2 Ammonia concentrations can be expressed in a number of different ways. The following factors may be used for the conversion of readings :-

To convert from N to NH_4 multiply by 1.3.
To convert from N to NH_3 multiply by 1.2.

Palintest®
TEST INSTRUCTIONS

PHOT.4.AUTO

Photometer Method

AMMONIA

TEST FOR AMMONIA IN NATURAL, DRINKING AND WASTE WATERS

AUTOMATIC WAVELENGTH SELECTION

0 – 1.0 mg/l N

Ammonia occurs as a breakdown product of nitrogenous material in natural waters. It is also found in domestic effluents and certain industrial waste waters. Ammonia is harmful to fish and other forms of aquatic life, and the ammonia level must be carefully controlled in water used for fish farms and aquariums. Ammonia tests are routinely applied for pollution control on effluents and waste waters, and for the monitoring of drinking water supplies.

The Palintest Ammonia Test provides a simple method of measuring ammonia (ammoniacal nitrogen) over the range 0 - 1.0 mg/l N.

Method

The Palintest Ammonia test is based on an indophenol method. Ammonia reacts with alkaline salicylate in the presence of chlorine to form a green-blue indophenol complex. Catalysts are incorporated to ensure complete and rapid colour development. The reagents are provided in the form of two tablets for maximum convenience. The test is simply carried out by adding one of each tablet to a sample of the water.

The intensity of the colour produced in the test is proportional to the ammonia concentration and is measured using a Palintest Photometer.

Reagents and Equipment

Palintest Ammonia No 1 Tablets
Palintest Ammonia No 2 Tablets
Palintest Automatic Wavelength Selection Photometer
Round Test Tubes, 10 ml glass (PT 595)

Phosphate (ppm) with Palintest Colorimetry based on vanadomolybdate method:

114

Palintest®

PHOSPHATE HR

PHOSPHATE PHOSPHAT FOSFAAT FOSFAT FOSFATOS FOSFATI

Reagents/Réactifs/Reagenzien/Reactivos:

Palintest Phosphate HR
Palintest Phosphate SR

mg/l PO_4	PHOSPHATE FOSFAAT PHOSPHAT FOSFAT FOSFATOS									490 nm
%T	9	8	7	6	5	4	3	2	1	0
90	-	-	-	0.0	0.7	1.8	2.9	4.1	5.2	6.4
80	7.5	8.7	9.9	11	12	14	15	16	18	19
70	20	21	23	24	26	27	28	30	31	33
60	34	36	38	39	41	42	44	46	47	49
50	51	53	55	56	58	60	62	64	66	68
40	71	73	75	77	80	82	84	87	89	92
30	95	97	100	-	-	-	-	-	-	-

Test Instructions **ENGLISH**

These instructions apply with the following test equipment. Use correct grade of tablets for test equipment in use - see packet.

Comparator - Disc CD 114
Pocket Kit - TestCard CC 114
Direct-reading Photometer
- select Program Phot 29
Transmittance-display Photometer (490 nm)
- use Calibration Chart

1 Fill test tube to 10 ml mark.

2 ONLY FOR SILICA CONTAINING SAMPLES (>20 mg/l):
Add one Phosphate SR tablet, crush and mix to dissolve.

3 Add one Phosphate HR, crush and mix to dissolve.

4 Stand for 10 minutes.

5 Take the test reading (see instrument instructions).

Instructions de Test **FRANÇAIS**

Les instructions s'appliquent aux équipment suivants: (Utiliser les pastilles adéquates au type de matérial - voir emballage).

Comparateur - Disque CD 114
Kit de Poche - TestCard CC 114
Photomètre à lecture directe
- sélectionner le programme Phot 29
Photometre en % de transmission (490 nm)
- utiliser la table de calibration

1 Remplir le tube jusqu'au 10 ml.

2 UNIQUEMENT POUR LES ECHANTILLONS CONTENANT DU SILICE (>20 mg/l):
Ajouter une pastille 'Phosphate SR', écraser et remuer pour dissoudre.

3 Ajouter une pastille 'Phosphate HR', écraser et remuer pour dissoudre.

4 Attendre 10 minutes.

5 Lire le résultat (voir mode d'emploi de l'instrument).

Nitrate (ppm) with the Palintest Nitratest Colorimetry method:

Test Procedure

1 Fill the Nitratest Tube with sample to the 20 ml mark.
2 Add one level spoonful of Nitratest Powder and one Nitratest tablet. Do not crush the tablet. Replace screw cap and shake tube well for one minute.
3 Allow tube to stand for about one minute then gently invert three or four times to aid flocculation. Allow tube to stand for two minutes or longer to ensure complete settlement.
4 Remove screw cap and wipe around the top of the tube with a clean tissue. Carefully decant the clear solution into a round test tube, filling to the 10 ml mark.
5 Add one Nitricol tablet, crush and mix to dissolve.
6 Stand for 10 minutes to allow full colour development.
7 Select Phot 23 on Photometer for result as mg/l N, or Phot 63 for result as mg/l NO_3.
8 Take Photometer reading in usual manner (see Photometer instructions).

Note

To convert mg/l N to mg/l NO_3 multiply result by 4.4.

Concentrations of nitrate greater than 1.0 mg/l may be determined by diluting the original sample with deionised water. The test can be conveniently carried out over a range 0 - 20 mg/l N as follows :-

Take a clean Nitratest Tube. Add 1 ml of sample using a pipette or graduated dropper. Fill the Nitratest Tube to the 20 ml mark with deionised water. Continue the test procedure as given in steps 2 to 9 above. Multiply the chart reading obtained by 20 to obtain the nitrate concentration in the original sample.

Nitrite Correction

The Nitratest method will also respond to any nitrite present in the sample. In most natural and drinking waters the amount of nitrite will be small in comparison to the nitrate concentration. If it is desired to correct for nitrite, determine nitrite concentration (as mg/l N) in the prescribed manner (see PHOT.24.) and deduct from the nitrate concentration (as mg/l N) obtained from the Nitratest procedure.

V1-10/05

PM 163 AUTO

Palintest®

TEST INSTRUCTIONS

PHOT.23.AUTO

Photometer Method

NITRATE (NITRATEST)

AUTOMATIC WAVELENGTH SELECTION

TEST FOR NITRATE IN NATURAL, DRINKING AND WASTE WATERS

0 – 1 mg/l N
0 – 20 mg/l N

Nitrates are normally present in natural, drinking and waste waters. Nitrates enter water supplies from the breakdown of natural vegetation, the use of chemical fertilisers in modern agriculture and from the oxidation of nitrogen compounds in sewage effluents and industrial wastes.

Nitrate is an important control test for water supplies. Drinking waters containing excessive amounts of nitrates can cause methaemoglobinaemia in bottle-fed infants (blue babies). The EEC has set a recommended maximum of 5.7 mg/l N (25 mg/l NO_3) and an absolute maximum of 11.3 mg/l N (50 mg/l NO_3) for nitrate in drinking water.

The Palintest Nitratest method provides a simple test for nitrate nitrogen over the range 0 - 1 mg/l N. The test can however be extended to cover the range 0 - 20 mg/l by a simple dilution technique.

Method

In the Palintest Nitratest method nitrate is first reduced to nitrite, the resulting nitrite is then determined by a diazonium reaction to form a reddish dye.

The reduction stage is carried out using the unique zinc-based Nitratest Powder, and Nitratest Tablet which aids rapid flocculation after the one minute contact period. The test is conducted in a special Nitratest Tube - a graduated sample container with hopper bottom to facilitate settlement and decanting of the sample.

The nitrite resulting from the reduction stage, is determined by reaction with sulphanilic acid in the presence of N-(1-naphthyl)-ethylene diamine to form a reddish dye. The reagents are provided in a single Nitricol tablet which is simply added to the test solution.

The intensity of the colour produced in the test is proportional to the nitrate concentration and is measured using a Palintest Photometer.

Reagents and Equipment

Palintest Nitratest Powder (Spoon Pack)
Palintest Nitratest Tablets
Palintest Nitricol Tablets
Palintest Nitratest Tube, 20 ml (PT 526)
Palintest Automatic Wavelength Selection Photometer
Round Test Tubes, 10 ml (PT 595)