A1 Title Page

Quality Assurance Project Plan

for

Nutrient Monitoring of Tidal Tributaries to the Lower Delaware River

NJDEP QAPP Number:
FY24-62

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Prepared for:
New Jersey Department of Environmental Protection (NJDEP)
Bureau of Freshwater and Biological Monitoring
Final
September 2024

Funding Source:
NJDEP Funding, Job Number 35950000, Activity Code V38A.

Period of Applicability:
2024-2027

A2 Approval Page

My signature below indicates my approval of the plan and my commitment to follow the procedures noted herein. I understand that changes to this plan shall not be made without approval/signature by all below signatories.

Project Manager	Jacob Bransky Jake Bransky, DRBC	09/18/2024 Date
NJDEP Project Manager	Alexander Dinkel Alexander Dinkel, NJDEP-BFBM	9/13/24 Date
Project QA Manager	Chris Kunz Chris Kunz, NJDEP-BFBM	9/17/2024 Date
NJDEP QA Manager	Megan Rutkowski Megan Rutkowski, NJDEP-OQA	9/18/2024 Date

QAPP Approval Date*: 9/18/2024

*Any environmental information operations conducted prior to the OQA approval date may not be in compliance with the final approved version of the QAPP.

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A4 Project Purpose, Problem Definition, and Background

Title of Document	Date of Document	Pertinence to this QAPP
NJDEP's Quality Management Plan (QMP)	7/1/2020 – 6/30/2025	This QAPP was developed in accordance with the NJDEP's QMP.
DRBC's QMP	2/1/2023 – 1/31/2028	This QAPP was developed in accordance with the DRBC's QMP.
Nutrient Monitoring of Tidal Tributaries to the Lower Delaware River (QAPP 2023-2027) – NJDEP QAPP #23-26	11/17/2023	The referenced QAPP covers work performed by NJDEP BFBM with the same project objectives of this current QAPP.

Project Purpose and Problem Definition

a. The objective of this project is to collect continuous and discrete water quality data in the tidal portions of the tributaries to the Delaware River in New Jersey.

b. This project will fulfill the Department's commitment made to the USEPA to conduct additional monitoring on the tidal tributaries to the Delaware River to augment existing ongoing monitoring in the Delaware River Basin.

c. The data will be used to assess the waterbodies and serve as the foundation for the future efforts related to numeric nutrient criteria development.

d. The additional monitoring will make the ongoing water quality studies more scientifically defensible while ensuring the protection of designated uses.

Project Background

The New Jersey Department of Environmental Protection (NJDEP) amended the numeric nutrient standards in the Department's Surface Water Quality Standards (N.J.A.C. 7:9B) in 2011 to remove applicability of total phosphorus criteria of 0.1 mg/L to the tidal freshwaters. The USEPA approved this change in 2020 based on the NJDEP's commitment to conduct additional monitoring in the tidal tributaries to the Delaware River. The additional monitoring will facilitate assessing the waterbodies and will enable NJDEP to enhance the understanding of the cause-and-effect relationship of any deviation from the water quality standards applicable to these waterbodies.

NJDEP is currently relying on narrative nutrient criterion until site-specific numeric nutrient criteria are developed for the tidal freshwaters. Additionally, the Delaware River Basin Commission (DRBC) and USEPA are collaborating with the co-regulators to develop a rule proposal that will update the aquatic life designated uses and corresponding dissolved oxygen criteria for Zones 2 through 5 of the mainstem of the Delaware River based on the water quality study completed by DRBC in 2023. The dissolved oxygen criteria will also be applicable to the tidal portions of the tributaries. The DRBC has determined that developing numeric nutrient criteria for the mainstem Delaware River is not warranted because eutrophication is not causing dissolved oxygen deficits in the mainstem.

The DRBC is assisting NJDEP, the agency primarily responsible for this project, to conduct tidal tributary nutrient monitoring. This Quality Assurance Project Plan (QAPP) details the work to be completed by DRBC, whereas NJDEP has its own QAPP (Nutrient Monitoring of Tidal Tributaries to the Lower Delaware River (QAPP 2023-2027) - #23-26). The additional data collected through this QAPP will also enable NJDEP to evaluate the need for site-specific numeric nutrient criteria development in addition to the dissolved oxygen criteria that DRBC and USEPA are developing.

A5 Project Task Description

Table 1: Task / Deliverable Schedule			
Task/Deliverable	Responsible Individual	Anticipated Start Date	Anticipated End Date
QAPP development	Elaine Panuccio	03/2024	08/2024
Sampling	Jake Bransky	08/2024	12/2027
Data management and delivery to NJDEP	Jake Bransky	08/2024	12/2027
Annual QAPP review	Jake Bransky	02/2025	02/2027

A6 Information/Data Quality Objectives and Performance/Acceptance Criteria

Precision

Precision is the measure of the degree to which two or more measurements are in agreement. Precision is assessed through the collection and measurement of replicates. Laboratory replicates will be analyzed as part of the laboratory's routine QC procedures. In addition, replicate samples will be taken once per year at each sampling site. Both the sample and the corresponding replicate will be sent to the laboratory separately for analysis (the identity of the replicate sample will be blind to the laboratory). Upon receipt of results, DRBC will calculate the relative percent difference (RPD) between the original sample and the field duplicate and will assess the RPD result against the RPD acceptance criteria described in the applicable analytical method.

Relative Percent Difference (RPD) shall be calculated for each of the replicates for all the parameters analyzed. Precision in the laboratory is assessed through the calculation of RPD for matrix spikes and matrix spike duplicates. See methods of project parameters for more details. Calculation of RPD for the matrix spikes shall be performed by the Laboratory for all matrix spikes performed.

RPD is calculated using the equation shown below.

$$RPD = (S-D)/(0.5\,(S+D))\times 100$$

Where:
S = Amount in Spike 1 or concentration of parameter in original
D = Amount in Spike 2 or concentration of parameter in replicate

Accuracy (Bias)

Accuracy is the degree of agreement between an observed value and an accepted reference value. Accuracy in the field is assessed through the use of rinsate (field) and trip blanks and through the adherence to all sample handling, preservation and holding times. The field accuracy objective is to have no quantifiable concentrations of any of the analytical parameters in either the rinsate or the trip blanks, and to adhere to all sample handling, preservation and holding times. Where concentrations are present in blank samples, the appropriate WQX / STORET data qualifier will be added to the record for all analytes where quantifiable concentrations were present in the blank samples for that sampling event. Laboratory accuracy and matrix interference is assessed through the analysis of matrix spikes and the determination of percent recoveries.

Representativeness

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the sampling and analysis plan is followed and that proper sampling techniques are used. Representativeness in the laboratory is ensured by using the proper analytical procedure, meeting sample holding times and analyzing and assessing field duplicate samples.

Comparability

Comparability is an expression of the confidence with which one data set can be compared with another. Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the field sampling plan is followed and that proper sampling techniques are used. Planned analytical data will be comparable when similar sampling and analytical methods are used and documented in the QAPP. Comparability is also dependent on similar QA objectives.

Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data that was expected to be obtained under normal conditions. Field completeness is a measure of the amount of valid measurements obtained from all the measurements taken in the field. Laboratory completeness is a measure of the amount of valid measurements obtained from all the measurements taken in the project.

Completeness is the ratio of the number of sample results to the total number of samples analyzed with a specific matrix and/or analysis. Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\text{Completeness} = V/P \times 100$$

Where:

V = Number of valid measurements.
P = Number of planned measurements.

The completeness goal for this project is 95%. If this goal is not met, a note will be made in the final report package.

Sensitivity

Sensitivity ensures that the data collected meets the required standards and accurately reflects any changes or variations in the parameters being measured. Sensitivity is a measure of the capability of a lab or field method used to detect an analyte, commonly known as the detection limit. For field data, the sensitivity of the instrument, information usually provided by the instrument manufacturer, is described by its range, accuracy, and resolution. For laboratory instrumentation, the method detection limit (MDL) is typically used to describe sensitivity. The reporting limit (RL) is typically a little higher than the MDL and may also be used. Sensitivity plays a crucial role in guaranteeing the reliability of and accuracy of the data collected and needs to be considered to ensure that the instruments and methods are capable of providing data that meet the intended quality standards. For this project, all analytical method MDLs and RLs meet the data quality objectives.

See Appendix D for MDLs and RLs.

A7 Distribution List

Table 2: Distribution List

Name	Organization	Title	E-mail Address
Jake Bransky	DRBC	Project Manager	jacob.bransky@drbc.gov
Elaine Panuccio	DRBC	DRBC QAPP Lead	elaine.panuccio@drbc.gov
Alex Dinkel	NJDEP -- Bureau of Freshwater and Biological Monitoring	NJDEP Project Manager	Alexander.Dinkel@dep.nj.gov
Chris Kunz	NJDEP – Bureau of Freshwater and Biological Monitoring	Project QA Manager	Chris.Kunz@dep.nj.gov
Biswarup Guha	NJDEP – Bureau of Environmental Analysis Restoration and Standards	Project Orchestrator	Biswarup.guha@dep.nj.gov
Frank Klapinski	NJDEP – Bureau of Environmental Analysis Restoration and Standards	Assessment Lead	Frank.klapinski@dep.nj.gov
Megan Rutkowski	NJDEP – Office of Quality Assurance	NJDEP QA Manager	Megan.Rukowski@dep.nj.gov

A8 Project Organization

Table 3: Roles and Responsibilities of Key Project Personnel			
Name	Organization	Project Role	Project Duties
Jake Bransky	DRBC	Project Manager	Overall responsibility for the DRBC-led portion of the project including project planning, sampling, and reporting.
Elaine Panuccio	DRBC	DRBC QAPP Lead	Documenting, maintaining, and distributing QAPP.
Alex Dinkel	NJDEP	NJDEP Project Manager	Overall responsibility for the project, including coordination between DRBC and NJDEP.
Chris Kunz	NJDEP – Bureau of Freshwater and Biological Monitoring	Project QAM*	Planning, documenting, coordinating, and assessing effectiveness of the QAPP.
Megan Rutkowski	NJDEP – Office of Quality Assurance	NJDEP QAM**	QAPP review and approval.

* *The project QAM has the authority to access and discuss quality-related issues with senior management outside of their direct supervisory chain as necessary.*

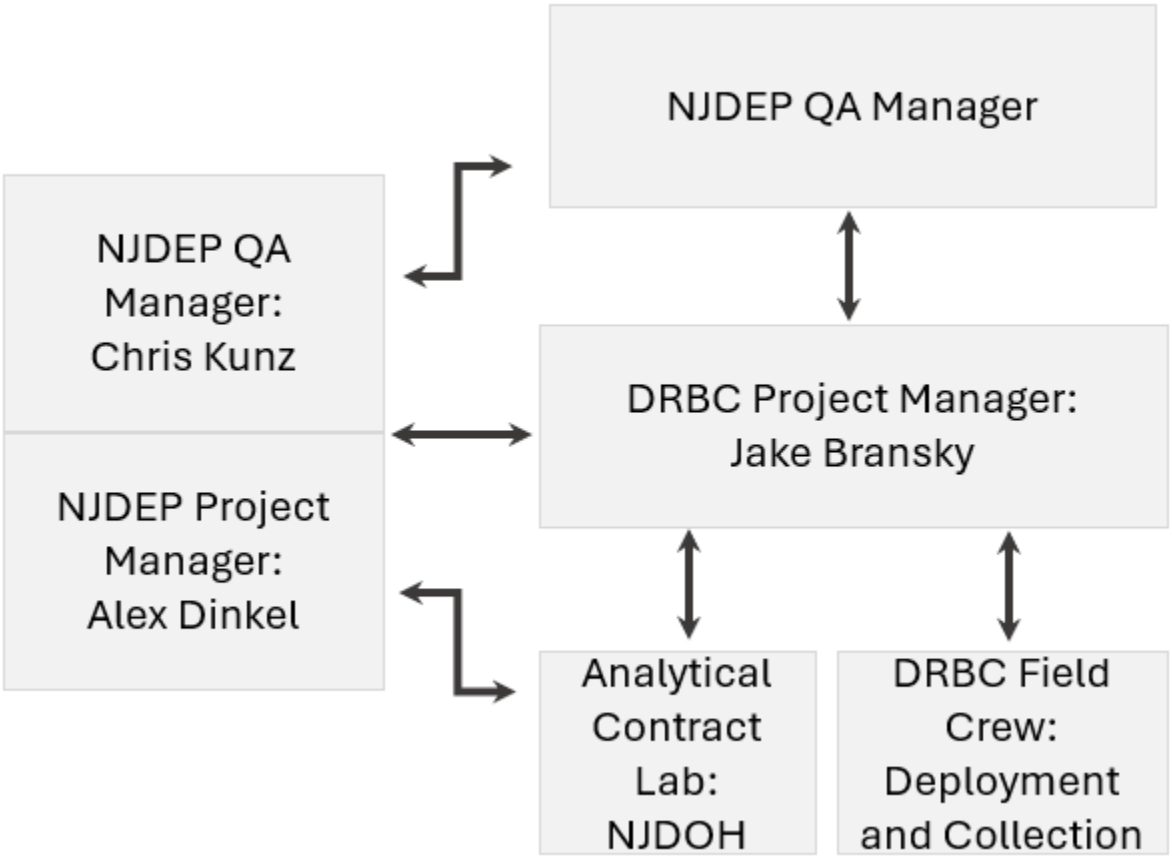
** *The assistant QAM from the NJDEP OQA has been delegated QAPP signature authority from the EPA as described in the Department's Quality Management Plan (QMP).*

A9 Project QAM Independence

The project Quality Assurance Manager (QAM), as stated in DRBCs Quality Management Plan (QMP) has organizational independence from environmental information-generating operations. This independence is ensured by the QAM having an oversight role and not participating in environmental information-generating operations.

A10 Project Organizational Chart and Communications

Figure 1: Organizational Chart



A11 Personnel Training / Certification

All staff participating in this project will be trained in proper collection techniques as outlined in "DRBC Field Safety Manual."

The DRBC is certified by the NJ Office of Quality Assurance (certified lab ID # 11013) for the following parameters for this project: dissolved oxygen, temperature, pH, conductance, and turbidity.

Assistants to the project will be trained in the operation and use of the continuous YSI EXO2 datasondes (loaned to DRBC by NJDEP) and DRBC's Eureka Sub2 and Sub3 datasondes. The training will entail calibration methods, deployment techniques, data retrieval and correction. The Project Manager will be responsible for any necessary training in this regard.

A12 Documents and Records

The Project Manager will be responsible for maintaining all documents and records associated with this project. Documents and records associated with this project will be kept and maintained in the project file at the Delaware River Basin Commission (DRBC) offices in West Trenton, New Jersey. Records will be maintained for a minimum of 5 years after completion of sampling and analysis. Documents include this QAPP and other relevant documents provided by NJDEP for this project. Records include water quality meter calibration logs, continuous sonde QA forms, and field sheets with records of in-situ water quality measurements and field notes (see Appendix E to view forms). Upon performance of the data reconciliation, verification, and approval of the data, the data will be sent to NJDEP for further data validation and useability determination.

Revisions to this QAPP which are made after signature will need to undergo the same review and approval process as the original QAPP. The revised document, after revision and signature, will be provided to the individuals listed in Table 1 by electronic mail. If revisions are made after signature, the Revision No. at the top of the page will be changed to reflect the current Revision number. Changes made to this QAPP prior to signature will not result in a change in Revision number.

The QAPP shall be reviewed at least annually to ensure that the project will achieve all intended purposes. Project managers, QA staff and other applicable personnel in Table 1 shall participate in the review of the QAPP. In addition, it is expected that from time to time, ongoing, and perhaps unexpected, changes will need to be made to the project. The Project Manager(s) shall authorize all changes or deviations in the operation of the project. Any significant changes will be noted in the project file and shall be incorporated into an amended QAPP that will be submitted for review. The Quality Assurance Officer will document the effective date of all changes made in the QAPP and distribute new revisions to all individuals listed in Table 1 whenever a substantial change is made. The QAPP is valid for the length of the project not to exceed 5 years from approval date.

B1 Identification of Project Environmental Information Operations

This project will employ the environmental information operations identified with an "x" in Table 4 below. These operations will satisfy the project purpose through the implementation of the tasks described in A5. This task implementation will ensure satisfaction of the data quality objectives and performance and acceptance criteria described in sections A4 and A6.

Table 4: DRBC Environmental Data Collection Responsibilities

Environmental Information	X	direct measurements of environmental parameters or processes.
	X	analytical testing results of environmental conditions (e.g., geophysical or hydrological conditions).
	X	information on physical parameters or processes collected using environmental technologies.
	X	calculations or analyses of environmental information.
		information provided by models.
		information compiled or obtained from databases, software applications, decision support tools, websites, existing literature, and other sources.
		development of environmental software, tools, models, methods, applications;

Environmental Technology	X	systems, devices and their components applicable to both hardware and methods or techniques that measure and/or remove pollutants or contaminants and/or prevent them from entering the environment
		pollution prevention: measurement, monitoring, reduction, control, and/or treatment processes, such as wet scrubbers (air), granulated activated carbon unit (water), filtration (air, water).
		Contamination: containment to prevent further movement of the contaminants, such as capping, and solidification or vitrification, and biological treatment.
		Storage containers, methods, or facilities, such as drums, tanks, and ponds or lagoons.
		Design, construction, and operation or application of environmental technology.
		Remediation processes and their components, and/or technologies, such as soil washing (soil), pump and treatment, soil vapor extraction (soil), land farming and other bioremediation processes.
Other		

B2 Methods for Environmental Information Acquisition

Field Activities

New Jersey's tidal freshwaters do not have numeric nutrient thresholds and are protected from nutrient impairment by the narrative nutrient standards at N.J.A.C. 7:9B-1.14(d)4. The freshwaters, which are influenced by tides and are in the Department's jurisdiction, include only a few tributaries to the Delaware River. Among all the tributaries to the Delaware River, the four tributaries, Blacks Creek and Crosswicks Creek (one system), Pennsauken Creek, Raccoon Creek and Rancocas Creek were considered for the water quality study, because of known water quality impairments and presence of municipal New Jersey Pollutant Discharge Elimination System (NJPDES) facilities discharging into these systems. NJDEP is conducting the water quality monitoring at Raccoon Creek and Rancocas Creek. For this project, DRBC is conducting the water quality monitoring at Blacks-Crosswicks and Pennsauken Creek.

At each of the locations in Blacks-Crosswicks and Pennsauken Creeks, DRBC will install a continuous monitoring sonde to measure the following parameters: dissolved oxygen, phycocyanin, temperature, specific conductance, pH, and turbidity. The sondes will be deployed in a deep location and in a way that allows movement with direction of tides. If any of the NJDEP provided coordinates are inaccessible, DRBC staff will find alternative locations that represent the originally intended sampling locations. If sondes are already deployed and a site is temporarily inaccessible, DRBC staff will either wait until another day to collect grab samples and maintenance the sondes. For alternative locations, the coordinates will be recorded in a field notebook or electronic device to later share with NJDEP staff. For temporary inaccessibility, such as heavy rain events, DRBC staff will reschedule to collect samples and maintenance sondes under safer conditions.

Additionally, grab samples will be collected when the sondes are maintained and swapped, which will occur about every four weeks. The grab sampling events will consist of in-situ field measurements for temperature, pH, dissolved oxygen, specific conductance, turbidity, and secchi depth (if deep enough). Secchi depth will be obtained using a Secchi disk to measure the clarity of the water column.

The depth at which the Secchi disk cannot be seen by the naked eye is recorded as the Secchi depth (when the disk is no longer visible). The results of the grab sample in-situ measurements, measured during both deployment and retrieval of continuous sondes, will be used to compare to the continuous sondes' readings. Refer to Appendix C for drift check tolerances. Surface water grab samples will be obtained from the center of flow (thalweg). Samples will be collected as per "NJDEP Field Sampling Procedures Manual," August 2024 Section 6.8.2 (the document is available online at the NJDEP's webpage, http://www.state.nj.us/dep/srp/guidance/fspm/). The water column grab samples will be sent to the New Jersey Department of Health (NJDOH) Laboratory, a NJDEP certified laboratory for analysis of the parameters listed in Appendix D.

During the grab sampling events, the YSI EXO2 continuous monitoring sondes will be replaced by recalibrated data sondes. Data will be downloaded from the retrieved sondes and checked by the DRBC Data Manager. For maintenance events where the continuous sondes are cleaned but not replaced with recalibrated data sondes, please see Appendix E for the NJDEP BFBM Sonde QA Field Form to fill out parameter readings before and after cleaning.

A total of ten sites were selected (by NJDEP) among four tidal tributary waterbodies (Blacks-Crosswicks, Pennsauken, Rancocas, and Raccoon Creeks) for this project. For each tributary system, two to three locations were selected for monitoring (see Appendices A and B for site information). For each tributary, one sampling location is located just upstream of the confluence with the Delaware mainstem, and the second location is located just downstream of the head-of-tide. For the Crosswicks Creek tributary system, a location on Blacks Creek (part of the Crosswicks Creek tributary system) as a third monitoring location. The DRBC will be responsible for monitoring at 3 sampling locations within the Blacks-Crosswicks tributary system and 2 sampling locations within the Pennsauken tributary system for a total of 5 sampling locations. NJDEP will monitor all other locations (see Appendices A and B).

See Appendix A for a summary of project information. A list of the specific sites that will be monitored by DRBC during each calendar year is also included in Appendix A (Monitoring Location Table). Appendix B includes the Site Distribution Map with all project monitoring locations (including those monitored by NJDEP). Should any revisions be made to this list, signatories will be notified, and a new list will be circulated for their ratification.

For continuous monitoring, datasondes will be deployed year long, barring any sampling or technical limitations that may occur due to colder temperatures. If weather limitations are consistent, datasondes will be deployed from March to November.

Field parameters are recorded every 15 minutes featuring temperature, dissolved oxygen, dissolved oxygen saturation (%), pH, turbidity, specific conductivity, specific conductance and phycocyanin. Details concerning deployment and retrieval protocols can be found in Appendix C.

Sample bottles for analytical parameters will be provided by the NJDOH, lab certification ID # 11036. Sample volume and container type will be as described in the respective laboratory's "Quality Manual" and/ or SOP, approved by the Office of Quality Assurance (OQA). Additional information on sample requirements and information on laboratory methods is included in Appendix D.

No sampling equipment is used. Rather, samples will be collected directly into the sample bottles provided by NJDOH from the DRBC boat. Please see Appendix D for parameters' preservation requirements. All samples will be preserved right after sample collection (acid preserved for applicable parameters and on ice in a cooler for all samples).

Samples submitted to NJDOH are provided with labels denoting sample type (i.e., nutrients, metals), provided by NJDOH. Time and date of samples are tracked via NJDOH 'Chem 44' forms. Requested analyses are submitted via standard NJDOH sample receiving form and tracked with provided with internal tracking numbers. Chain of custody regarding samples are also included on the standard form, which samplers and lab personnel will sign with exact date and time samples are submitted. An example of this form can be found in Appendix D. See Figure 2 in Section B3 for labeling convention.

Field readings for analyze immediately parameters (dissolved oxygen, pH, specific conductance, water temperature, air temperature and turbidity) will be made at each site during each sampling event to be recorded on the submittal form and DRBC field data sheets. Chemical and field parameters are listed in Attachment D. See Section B5 for more information about DRBC's certified parameters along with calibration and quality check steps and acceptance criteria.

Laboratory Analyses

Analytical samples will be delivered to the New Jersey Department of Health (NJDOH) laboratory certification # 11036). Testing will be done using the only methods for which the NJDOH laboratory holds NJ environmental laboratory certification. The methods to be used during this project are listed in Appendix D. Quality control procedures (including required calibrations and quality control procedures required by regulation or by the method) are defined in the laboratory's current Quality Manual and Standard Operating Procedures (SOPs).

Based on the date the samples are submitted, the current certified method will be followed. All archived SOPs are kept by NJDOH on the network server. SOPs revision/amendment, when needed, is coordinated by the laboratory-specific QA staff. Collected data will be screened for errors and noted in the generated excel file of the site measured.

It is the responsibility of the NJDOH laboratory personnel regarding issues during laboratory analysis. For immediate issues, such as holding time or preservation issues, NJDOH shall be in contact with the respective sample collector(s) to sign relevant forms. Otherwise, NJDOH will notify DRBC and/or NJDEP staff about analytical issues that arise to determine next steps (e.g. discard results and resample).

Laboratory Custody Procedures

Upon receipt of the sample cooler(s), the Laboratory shall initiate a documentation procedure to verify the custody and condition of the samples. On a standard check-in sheet or in a notebook, the Laboratory shall note the presence and number of sample custody seals, including seal number and condition of seals. Immediately upon opening the cooler, the Lab shall measure the internal

temperature of the cooler and document the temperature. Also, the sample log-in sheet shall include a record of the presence and condition of the chain of custody documentation and the number of samples received. The log-in sheet shall be signed and dated by the log-in personnel.

Existing Information

The DRBC does not intend to use existing information for this project.

Environmental Technology

This project does not involve any environmental technology (e.g., pollution prevention, contamination containment, storage, or remediation).

B3 Integrity of Environmental Information

Sample ID and Labeling

A unique sample ID shall be assigned to each sample. The label will consist of a waterproof printed label or a label with tape affixed over it to prevent contact with water. The sample ID shall incorporate the body of water where the sample was collected along with sample collection data as shown below (note that the sample ID name is only an example):

Figure 2. Sample Identification Key

Sample ID– YYYYMMDD – HHMM
Example: "CWKS1 – 20240506 – 1400"

Where:

"Sample ID" = Site ID to link to Site location
YYYY = year (e.g. 2024)
MM = month (e.g. 05)
DD = day (e.g. 06)
HHMM = military time

Chain of Custody Documentation

The CHEM-44 form serves as both field data sheet and chain of custody form for the samples. A copy of this form is in Appendix D.

The sample collection team is responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples. The sample collection team must complete a CHEM-44 chain of custody form documenting the custody of each sample as soon as the samples are collected. Samples must be accompanied by a properly completed chain of custody form. The sample numbers and locations will be listed on the chain of custody form.

When transferring the possession of the samples, the individuals relinquishing and receiving will sign, date, and note the time on the form. This form documents transfer of custody of the samples from sampler to another person, to a mobile laboratory, or to/from secure storage. Samples will be properly packaged for transport to the NJDOH laboratory for analysis, accompanied by the form. For this project, DRBC will convey the samples directly to the lab.

Sample Preservation, Holding, and Transportation

The sample collection team shall place samples into pre-preserved sample bottles and maintain samples at or below 4˚C on site, during transport, and until receipt by the lab. The Laboratory shall maintain the samples and any sample extracts at or below 4˚C until analysis. Each filled labeled sample bottle shall be sealed inside a sealable plastic bag, to prevent direct contact with melt water from the ice. Containers will be supplied by the lab, certified clean, and preserved with the appropriate preservative for the analysis requested.

Appendix D includes information on the maximum holding time and preservative requirements for each analysis under this QAPP.

B4 Quality Control

All continuous datasondes will be inspected prior to deployment. The continuous datasondes will be serviced, maintained, and calibrated per manufacturer's specifications. Sonde probes will be inspected before use, cleaned, and checked for functionality.

Calibration of the continuous datasondes will take place as close to the deployment time as possible. YSI EXO series datasondes feature calibration checks to ensure sensors remain properly calibrated. Calibration issues or failures will be indicated by error messages in the software during calibration.

Calibrations for in-situ field meters utilized in the project for grab sample analysis will take place the day of sampling (see DRBC's Instrument/Equipment Calibration steps in Section B5).

Calibrations & recalibrations of continuous datasondes will be performed by the Project Manager and/or staff assigned to the project. Calibrations of these datasondes should be done before deployment, preferably the day before. Calibrating a few days before deployment is acceptable.

Calibration details for in-situ field meters can be found in Section B5 and Table 5.

Laboratory QA / QC procedures and criteria are fully defined in the analytical methods. NJDEP instructs that replicate samples will be taken once a year at each discrete sampling site. For a full discussion of the Laboratory QA / QC requirements, the assessment method, and the acceptance criteria, the reader is directed to the analytical methods and corresponding SOPs listed in Appendix D.

B5 Instrument / Equipment Calibration, Testing, Inspection and Maintenance

To ensure that all data collected under this project are of sufficient quality, all instruments and equipment used are maintained on a regular basis. Records of all maintenance activities are documented in an Equipment Service Logbook that is stored in the DRBC laboratory, near the equipment preparation area. A kit, which includes replacement parts for each of the pieces of equipment to be used as well as tools to conduct the maintenance, is present at the time of sampling.

All discrete meters and thermometers shall be operated and maintained according to the "Regulations Governing the Certification of Laboratories and Environmental Measurements", N.J.A.C. 7:18. DRBC is certified by the Office of Quality Assurance (certified lab ID # 11013) for all parameters listed below:

- Temperature
- Dissolved Oxygen
- pH
- Specific conductance
- Turbidity

These parameters are measured using the Eureka Sub2 or Eureka Sub3, and Hach 2100P or Hach 2100Q (turbidimeters), for discrete in-situ samples. Parameters collected for discrete samples must be calibrated daily as required for DRBC's certification regarding 'Analyze Immediately' parameters.

All Eureka Sub2 and Sub3 instruments are subject to daily, routine maintenance as well as annual maintenance. The daily maintenance includes both lab and field procedures to ensure that all measurements taken are both accurate and precise. Between sites, the sonde is rinsed with deionized water to prevent fouling by accumulation of contaminants found in the water samples. The storage cup, used to store the sonde while transporting from site to site, is filled with tap water, according to manufacturer's recommendations. After daily sampling is complete, the sonde is cleansed with a gentle soap and brush and rinsed with tap water. For long-term storage, the storage cup is filled with pH 4.01 standard solution to prevent colonization of bacteria and other biological contaminants on the sonde. All service performed on the units is documented in DRBC's Equipment Service Logbook in the lab.

The YSI EXO2 continuous datasondes will collect dissolved oxygen, phycocyanin, pH, temperature, specific conductance, and turbidity at 15-minute intervals during deployment periods. See Section B2 Field Activities section for more information about deployment and maintenance procedures. About every 4 weeks, the continuous datasondes will be swapped out with a newly calibrated continuous datasonde. See Appendix C for continuous datasonde calibration steps, which mirror DRBC's in-situ field meter calibration steps except phycocyanin, for which DRBC will follow NJDEP's protocols for calibration.

The Eureka Sub2 and Sub3 in-situ field meters will concurrently collect spot measurement data during datasonde maintenance and water sampling events. These meters include sensors for temperature,

pH, conductance, and dissolved oxygen. The Hach 2100P and 2100Q turbidimeters will be used to measure turbidity. See Table 5 below for Field Meter Calibration descriptions.

Instrument/Equipment Calibration and Frequency

All calibrations will be conducted as recommended by the manufacturer. Field meter calibration procedures and frequency of calibration can be found in Table 5. If, during sample collection, any values seem to fall outside of the expected range, these values will be noted, and check standard will be analyzed to see whether the meter calibration is still valid. If the check reveals meter calibration is no longer satisfactory, a calibration will occur upon completion of sampling to verify measurements taken. All calibrations will be documented in the Calibration Logbook. Table 6 below summarizes the calibration procedures for all meters referenced above.

Table 5: Field Meter Calibration and Quality Check Summary				
Parameter	**Calibration / Check Description**	**Frequency**	**Location Performed**	**Standard Operating Procedure Revision # / Date**
Water Temperature (SM 2550 B-10)	Checked against NIST certified thermometer at 3 different temperature ranges (0-5˚C, 15-20 ˚C, and 30-35 ˚C); . Temperature differences between the standard and measured reading exceeding 0.2°C require a correction factor	Once per quarter	DRBC laboratory	# 140.03 / April 4, 2022
Dissolved Oxygen (Other In-Situ Method 1002-8-2009)	Checked against Winkler Titration measurement of DO	Within one week prior to sampling activity	DRBC laboratory	# 150.02 / February 5, 2018
	Saturated water calibration, as recommended by the manufacturer	At least once per day, prior to field measurements	In the field	
Conductivity (EPA 120.1)	Calibration at 500 µS/cm and check at 200 or 500 µS/cm (1% acceptance criteria)	At least once per day, prior to field measurements	DRBC laboratory	#120.03 / April 4, 2022
pH (SM 4500-H B-11)	2-point calibration with pH 4 and pH 10 buffers, followed by a check against pH 7 buffer (0.1 pH unit acceptance criteria)	At least once per day, prior to field measurements	DRBC laboratory	

	pH 7 buffer check (less than 0.2 pH units from post-calibration check)	Minimum every 3 hours	In the field	#110.03 / April 4, 2022
Turbidity (EPA 180.1)	Calibrated quarterly; 10 NTU check after calibration and during each day of use to measure accuracy within the calibration range (± 10% of the true value)	Prior to, after every 10 (or half-way point if <10 samples), and after field measurements	In the field or DRBC laboratory (portable unit)	#160.02 / November 20, 2017

B6 Inspection/Acceptance of Supplies and Services

All field supplies and consumables will be inspected by the sample collection team, including the Project Manager and Field Staff, for defects and obvious signs of improper handling before use. This inspection will be overseen by the Project Manager. Supplies and consumables which show signs of defects or improper handling will not be used by the sample collection team. Applicable supplies for each analysis are described in the applicable parameter's SOP.

All laboratory supplies and consumables are the responsibility of the analytical laboratory. Requirements for the inspection and acceptance of supplies and consumables are defined in the laboratory SOPs. The reader is directed to the methods in section B5 and in Appendix D for a complete discussion of these requirements.

B7 Environmental Information Management

All continuous data will be downloaded and processed through the device's dedicated software. Once the data has been downloaded and validated, it will then be exported into an Excel spread sheet format for storage and reporting.

DRBC will download data from the field and provide all raw data to NJDEP via email for data validation. The NJDEP has their own set of standards for data validation that will be conducted upon review of the raw data provided by DRBC.

Datasondes deployed in the field will be checked for drift at time of retrieval. This check will consist of using another datasonde alongside the first and comparing readings between the two units. Temperature sensors on water quality meters will be checked against a NIST certified thermometer when calibrated prior to deployment.

Details concerning this check can be found in Appendix C.

C1 Assessments and Response Actions

At any point during the project, the NJDEP Office of Quality Assurance may audit compliance with the required elements of this QAPP.

Any staff participating in any function of the program may be subjected to a Performance Review by the Project Officer or the Office of Quality Assurance for the purposes of Quality Control. All data generated for the program is also subject to Quality Control review by the Project Officer or Supervisor.

During the project, it is important to assess the project's activities to ensure that the QAPP is being implemented as planned. This helps to ensure that everything is occurring appropriately and serves to minimize learning about critical deviations toward the end of the project when it may be too late to remedy the situation. Ongoing assessments that will occur on behalf of DRBC during this project include field oversight and coordination with NJDEP (project lead). If NJDEP reviews reveal necessary changes to this QAPP, an addendum will be prepared and circulated for signature.

In addition, at any point during the project, the NJDEP Office of Quality Assurance may audit compliance with the required elements of this QAPP.

Field Oversight

- *Readiness review of the field team prior to starting field efforts*

Sampling personnel will be properly trained by qualified personnel before any sampling begins. Equipment maintenance records will be checked to ensure all field instruments are in proper working order and any required field calibrations will be performed. Adequate supplies of all preservatives and bottles will be obtained and stored appropriately before heading to the field. Sampling devices will be checked to ensure that they were properly cleaned. Required logbooks, log sheets, chain-of-custody forms, etc. will be assembled by the sampling personnel. The DRBC Project Manager will review all field equipment, instruments, containers, and paperwork to ensure that all is ready prior to each sampling event. Any problems observed will be corrected before the sampling team departs for the sampling event.

- *Field activity audits*

During at least one annual sampling event, the DRBC Project Manager will assess the sample collection methodologies, field measurement procedures, and record keeping of the field team to ensure activities are being conducted as described in this QAPP. Any deviations noted will be corrected immediately to ensure all subsequent samples and field measurements and observations are valid. If any deviations are associated with technical changes and/or improvements made to the procedures, the project manager will verify that the changes have been documented and addressed in an amendment to this QAPP. The project manager may stop any field activity that could potentially compromise data quality.

The DRBC Project Manager will discuss any noted issues or concerns informally and openly with the field team while on-site. Any findings will be recorded while on-site in field notebook or field sheet (Appendix E). Once back in the office, they will formalize the audit findings and corrections thereof in an e-mail to the NJDEP Project Manager, DRBC QAPP Lead, NJDEP QAM, and all project field staff.

In this e-mail, the person responsible for correcting the issue or concern will be identified, as applicable.

- *Post-field activity reviews*

Following each field event, the DRBC Project Manager will review field datasheets and records to ensure that all information is complete and any deviations from planned methodologies are documented. This review will be conducted in the office, not in the field. The results of this review, as well as comments associated with potential impacts on field samples and field measurement integrity will be documented and used as a guide to identify areas requiring improvement prior to the next sampling event. If any identified findings have potential to impact subsequent field activities, a corrective action response will be prepared as described under "Response Actions," below.

Laboratory Oversight

As DRBC is responsible for sample collection only, NJDEP personnel will be responsible for laboratory oversight (see NJDEP's NJ Tributary Nutrient Monitoring QAPP).

Annual Review

An annual review will be performed by the DRBC's QAPP Lead to confirm the suitability of and evaluate the effectiveness of the QAPP. During this annual review, DRBC's QAPP Lead will verify that NJDOH continues to be certified for the methods specified herein. The results of the annual review will be documented in an email to project participants.

Response Actions

For any findings (deviations from the QAPP) identified during the assessments described above, a root cause analysis will be performed by applicable project personnel (e.g., the project manager, field staff, etc.), depending on the nature of the problem. A root cause analysis is an investigation to determine and address the cause that led to the finding. Once the root cause is identified, the applicable project personnel will develop a plan to correct the identified finding, with a copy of this plan sent to the NJDEP's Project Manager in the form of an email. The plan will document steps to be taken to correct the problem, and to prevent future occurrences of the problem.

The NJDEP's QAM will periodically review all corrective actions to ensure continued effectiveness at preventing future instances of the any identified finding. Any new instances of the initial finding will undergo the response action process described above.

C2 Oversight and Reports to Management

Oversight

The NJDEP's Standards team (Biswarup Guha) will confirm the assessment activities described in C1, above, are performed at the planned frequencies. If any required assessment activities were not performed as specified, an email will be issued to the responsible project personnel to remind them

of their responsibilities and the QAPP requirements. Any omitted assessment activities will be identified during the annual review and in the final project report (if applicable).

Reports to Management

The NJDEP data manager will upload the continuous and discrete data generated by the project. DRBC will provide NJDEP the raw continuous and discrete data to NJDEP via email. Continuous data will be uploaded to the Rutgers Website by NJDEP staff once it has been validated and passed Quality Assurance protocols. The final output of this project is contingent upon the goals of NJDEP.

Discrete data received from the lab will be validated and uploaded to the US EPA WQX data portal by NJDEP or NJDOH.

Validated data (continuous and discrete) upload will occur in January or February of the following year by NJDEP.

For this project, phycocyanin and Secchi depth results cannot be used for regulatory purposes. In addition, the results obtained using the continuous monitoring equipment cannot be used for regulatory purposes since this equipment is not being calibrated and verified at the frequency required under the laboratory's certification.

DRBC will not be preparing any interim or final reports.

D1 Environmental Information Review

DRBC will perform initial view by verification of the dataset to evaluate the completeness, correctness, and compliance to the method, procedural, and contractual requirements upon receival of the data. NJDEP will be responsible for further data validation and quality assessments.

More details and steps that NJDEP will implement in the data review processes are provided in Appendix C and NJDEP's "Nutrient Monitoring of Tidal Tributaries to the Lower Delaware 2023-2027" QAPP.

Establishing procedures for environmental information review helps to ensure that project data are evaluated in an objective and consistent manner. The review will consist of verification, validation and data quality assessment.

Verification is the process of evaluating the completeness, correctness, and compliance of a specific data set to method, procedural, or contractual requirements (e.g., ensuring that method requirements were met during analytical procedures). While on site, field staff will check all field logs for missing data before departing for the next site. Upon return to the office, the post-field activity reviews described above will be carried out by the personnel specified in C1, above, as an additional verification to ensure data are consistent, correct, and complete, with no errors or omissions. The verification will include confirming whether all sites were sampled as planned. In addition, for the

analyses performed in contracted laboratories, verification will be performed by laboratory staff prior to issuing the analytical laboratory report. Decisions on whether to accept, reject, or qualify data during verification will be made based on the nature and significance of any identified deviation. The verification process related to sample collection activities in the field will be performed by DRBC's Project Manager, whereas all other verification actions will be performed by _NJDEP's Project Manager or QA Manager. The results of the process, including any observed deviations, will be recorded in a location selected by the aforementioned NJDEP personnel. Communication between DRBC Project Manager and NJDEP Project Manager and QA Manager will occur via email.

Validation involves determining whether the requirements for a specific intended use or application have been fulfilled (e.g., were the project-specific data quality objectives presented in this QAPP met?). For analyses performed in contracted laboratories, data validation will be performed upon receipt of results from the laboratory by project personnel as described in the laboratory oversight activities subsection of section C1, above. For analyses performed in the field, the data quality objective requirements contained herein align with those in the methods being employed by the project field staff, so additional validation beyond the verification described above is not required for this project. Decisions on whether to accept, reject, or qualify data during validation will be made based on the nature of any identified deviation. The validation process will be performed by NJDEP's Project Manager or QA Manager. The results of the process, including any observed deviations, will be recorded in a location selected by the aforementioned NJDEP personnel who hold primary responsibility for project outcomes.

Data Quality Assessment is the scientific and statistical evaluation of data to determine if the data obtained from environmental information operations are of the right type, quality, and quantity to support their intended use. Project data quality will be evaluated as detailed in this document, with respect to the sampling design, sampling methods, field and laboratory analyses, quality control, and maintenance.

By adhering to the requirements contained in this document and any documents referenced (e.g., equipment manuals, standard operating procedures, etc.), the data quality will be ensured. If samples or procedures used in this study fail to meet the guidelines listed in this document, the data will be flagged appropriately. Any flagged data will be carefully scrutinized to determine whether the data can be used in decision making. The data quality assessment will be made and documented by the personnel tasked with performing the useability assessment described in section D2.

D2 Useability Determination

DRBC will follow QAPP guidelines and associated SOPs, and will provide all relevent documentation to NJDEP, who will ultimately determine useability of data for the intended purposes of the project.

Determining whether environmental information may be used for the project purpose is the culmination of the entire QA process. Only data that has been verified and validated as described in D1, above, shall be considered usable. The NJDEP Project Manager or Project QAM will determine whether project data is usable by recording answers to the questions in the "Useability Determination" table that is attached as Appendix F. The useability determination will occur at the

discretion of the NJDEP Project Manager or QAM Manager. Records maintained and corrective actions made by DRBC during the length of the project will be shared with the aforementioned NJDEP personnel to inform the useability determination process.

E1 References

Standard Methods for the Examination of Water and Wastewater. American Public Health Association, American Water Works Association, Water Environment Federation. 24th Edition. 2022.

U.S. EPA. 1993. "Method 365.1: Determinaton of Phosphorous by Semi-Automated Colorimetry," Revision 2.0. Cincinnati, OH

U.S. EPA. 1993. "Method 351.2: Determination of Total Kjeldahl Nitrogen by Semi-Automated Colorimetry," Revision 2.0. Cincinnati, OH

U.S. EPA. 1994. "Method 200.7: Determination of Metals and Trace Elements in Water and Wastes by Inductively Coupled Plasma-Atomic Emission Spectrometry," Revision 4.4. Cincinnati, OH

E2 Appendices

Appendix A: Project Information Tables

Inventory Table	
Dates	Q4 2024 -November 2027
Status	In Progress-continual
Sample Frequency	Continuous
Seasons Sampled	Spring, Summer, Fall, Winter *
Waterbody Type	River/Stream
Salinity Category	Fresh
Tidal Influence	Yes
Project Description	Continuous and discrete monitoring of select tidal tributaries lowing into the lower Delaware River regarding the validity of narrative nutrient criteria.

Data Management Table (NJDEP information)

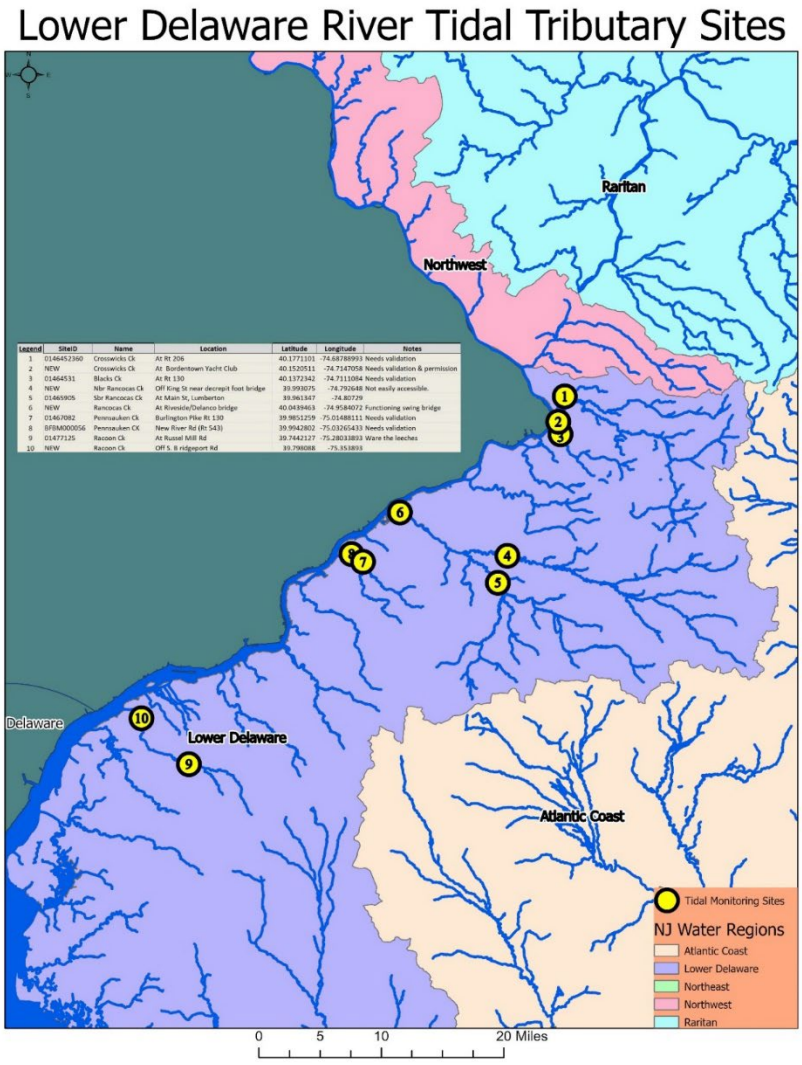
QAPP network path file location?	V:\LUM\BFBM\Bfbm\Quality Assurance Plans\Calendar Year 2023
Where will data be recorded in field (media)	Paper
If on tablets or phones, will download at office occur or will you connect wirelessly?	N/A
If on tablets or phones, who will do the download?	N/A
If data collected electronically, where will it be stored?	DWMS/Rutgers Website
Format to be received from Lab	N/A
Method of receipt from lab/s	N/A
Personnel receiving outside lab data	N/A
Is data expected to go to WQDE/STORET?	No
Data Officer – (Bureau and Name)	BFBM Chris Kunz

Monitoring Location Table (monitored by DRBC)

Site	Location	Latitude	Longitude
Crosswicks Creek 1	Route 206	40.1771101	-74.6878899
Crosswicks Creek 2	Bordentown Yacht Club	40.1520511	-74.7147058
Blacks Creek	Route 130	40.1372342	-74.7111084
Pennsauken Creek 1	Burlington Pike Rt 130	39.9851259	-75.0148811
Pennsauken Creek 2	New River Rd Rt 543	39.9942802	-75.0326543

Appendix B: Site Distribution Map

DRBC monitoring sites 1 (Crosswicks at Rt 206), 2 (Crosswicks at Bordentown Yacht Club), 3 (Blacks Creek near Rt 130), 7 (Pennsauken Creek at Rt 130) and 8 (Pennsauken Creek at Rt 543) on the map below. The other site locations on the Rancocas and Raccoon Creeks are monitored by NJDEP.



Legend	SiteID	Name	Location	Latitude	Longitude	Notes
1	0146452360	Crosswicks Ck	At Rt 206	40.1771101	-74.6878993	Needs validation
2	NEW	Crosswicks Ck	At Bordentown Yacht Club	40.1520511	-74.7147058	Needs validation & permission
3	01464531	Blacks Ck	At Rt 130	40.1372342	-74.7111084	Needs validation
4	NEW	Nbr Rancocas Ck	Off King St near decrepit foot bridge	39.993075	-74.792648	Not easily accessible.
5	01465905	Sbr Rancocas Ck	At Main St, Lumberton	39.961347	-74.80729	
6	NEW	Rancocas Ck	At Riverside/Delanco bridge	40.0439463	-74.9584072	Functioning swing bridge
7	01467082	Pennsauken Ck	Burlington Pike Rt 130	39.9852259	-75.01488111	Needs validation
8	BFBM000056	Pennsauken CK	New River Rd (Rt 543)	39.9942802	-75.03265433	Needs validation
9	01477125	Racoon Ck	At Russel Mill Rd	39.7442127	-75.28033803	Ware the leeches
10	NEW	Racoon Ck	Off S. B ridgeport Rd	39.798088	-75.353893	

Appendix C: Datasonde Standard Operating Procedures & Sensor Specifications

Datasonde Calibrations

All calibrations for YSI EXO series datasondes are performed in accordance with manufacturer's recommendations and requirements dictated by NJDEP's Office of Quality Assurance (OQA). Except for dissolved oxygen, parameters successfully calibrated are checked against an appropriate standard to ensure the calibration was successful.

Dissolved Oxygen: Calibration of the Optical Dissolved Oxygen Sensor will be done using the 1-point air saturation method. This method utilizes a container of water that is continuously shaken for 1 minute. A period of 5 minutes shall elapse before calibration takes place to allow temperature and oxygen to equilibrate. The sensor is then calibrated to 100% saturation using the current barometric pressure. Dissolved oxygen will be checked against a Winkler titration before deployment. Differences greater than 0.3 mg/l will require recalibration.

pH: pH sensors will be calibrated using two standard pH buffers bracketing the value to be measured (4.01 and 10.01, respectively). After calibration, a 7.00 pH standard buffer (mid-point) shall be measured without any control adjustments to check the calibration. The results of this check must read within ± 0.1 pH units of the true buffer value. Records of all calibrations and calibration checks shall be maintained in the field log. A 7.00 pH check will be conducted every 3 hours and must read within ± 0.2 pH units of the true buffer value. If check fails, recalibrate.

Specific Conductivity: Specific Conductivity sensors will be calibrated via a one-point calibration then checked against the same or a different standard. The measured check must be within 1% of the standard used (i.e. if a 200 uS/cm is used as a check, the reading must be between 198 – 202 uS/cm).

Turbidity: Turbidity sensors on the Hach 2100P and 2100Q instruments will be calibrated via a three-point calibration (20, 100, and 800 NTU). The calibration will be verified with the 10 NTU calibration verification standard and mut read within ± 10% of the true value. The meter is then checked with the 10 NTU verification standard for accuracy within the calibration range during each day of use. The check standard is required to read within ± 10% of the true value of the standard prior to using the meter. Differences between the standard and measured reading exceeding 1 NTU will require recalibration.

Temperature: Temperature will be checked against a NIST certified thermometer on a quarterly basis. Temperature differences between the standard and measured reading exceeding 0.2°C require a temperature correction factor.

Phycocyanin: The total algae sensor (chlorophyll-a and phycocyanin) is calibrated according to YSI recommendations using a 2-step calibration process. Currently, the sensor is calibrated toward detecting Chlorophyll A using *RFU* as a unit of measurement. For calibration, BFBM follows the YSI recommended procedure of using a 625 µG/L Rhodamine WT dye solution to simulate the expected fluorescence of PC at a given temperature.

Datasonde Deployment

The protocol concerning datasonde deployment is as follows:

- Deployment sites will be located with a global positioning system (GPS) or placed at an established site with previous locational information.
- Datasonde units will be calibrated before deployment. Optimum time frame for calibration would be the day before deployment. Calibrations occurring a few days earlier than deployment is acceptable.
- Datasonde units must be completely submerged, preferably in shaded, flowing water. Center flow channel stream placement is optimum.
- Sensor cluster of the unit should be aimed downstream to prevent scouring of the probe heads.
- All units must be secured via a cable and lock, affixed to a tree or similar fixture on the stream bank.
- A picture or site sketch of the unit's placement in a stream must be made for retrieval by NJDEP-BFBM personnel if necessary.
- Steps should be taken to conceal the unit if the location has foot traffic by non-DEP personnel to prevent tampering.

Datasonde Retrieval

Datasondes will be checked against another calibrated datasonde or equivalent unit (ProDSS) at retrieval. This duplicate analysis will be done in a standard bucket filled with a grab sample of stream water. All values are to be recorded in the appropriate fields on the NJDEP Continuous Monitoring form. The 'Retrieval Check' process entails the following:

- Remove deployed unit from the water. **Do not** clean the probes of the deployed unit.
- Place Datasondes in the grab sample bucket.
- Wait for 5 minutes to elapse to allow sensors to equilibrate.
- Record values from both units for Temp, SC, D.O. D.O. %, Ph, NTU, and phycocyanin (if used).
- Remove the deployed unit from bucket. Clean/rinse the probe heads of the unit with deionized lab pure water.
- Record values from both units for Temp, SC, D.O., D.O. %, pH, NTU, and phycocyanin (if used).

Drift Check Tolerance

For the drift check, the difference between the two readings will be measured and checked against the following parameter criteria:

Parameter	Maximum
Temperature	1.5° C
Specific Conductivity	20%
pH	1.0
Dissolved Oxygen	1.0 mg/l
Turbidity	20%
Phycocyanin	20%

Should the difference be found to be below the Maximum criteria threshold, then the data will be reported as is.

DRBC will not omit any data from the record but will flag data outside drift check tolerance for NJDEP to evaluate further. Reasons for any omissions will be added to the data record for future use by NJDEP. Once the comparison check is completed, the data will be screened for errors. Sources of errors can be attributed to the following:

1. Non-stream conditions readings (open air)
2. Hardware failure
3. Tampering by non-DEP personnel (causing non-stream readings)
4. Fouling.

Errors involving loss of data (i.e., out of water) will be truncated from the dataset. Errors that involved hardware failure and fouling will result in the truncation of data from the moment of failure to the point of normal operation (if any).

Datasonde Data Validation

Once the drift check is completed, data from the unit will be downloaded and validated. The data is processed through a Microsoft Access database designed to examine the data for expected range values and spikes.

For the range, test the process compares the value to a range expected set for each parameter. The range is based on historical data for fresh waters.

Parameter	Acceptable Data Range	Questionable Data Ranges	Unacceptable Data Values
Dissolved Oxygen (mg/l)	0.20 to 16.00	0.10 – 0.19 and 16.01-20.00	< 0.10 or > 20.00
Dissolved Oxygen % saturation	10 to 140	1 – 9 and 141-250	< 1 or > 250
pH	3.0 to 9.5	2.1 -2.9 and 9.6 – 10.4	0 – 2.0 or 10.5 - 14.0
Specific Conductance (uS/cm)	20 to 6,000	10 – 19 and 6,001 -35,000	< 10 or > 35,000
Water Temperature (˚C)	1.0 to 35.0	0.0 – 0.9 and 35.1 – 40.0	< 0.0 or > 40.0
Turbidity (NTU)	0.20 to 900	0.10 - 0.20 and 901 – 5,000	< 0.10 or > 5,000
Phycocyanin (µg/L)	0.01 to 100	NA*	< 0.01 or > 100

Values falling in the 'Questionable Data Range' are examined closely for possible hardware errors or unexpected influences. Values in the 'Questionable Data Range' determined as errors or values that fall outside the 'Acceptable Data Range' are truncated from the data set and not reported. For phycocyanin, because the range of expected values measured in the field is limited and still being developed, a warning range has not yet been determined. The validation range is the manufacturer's specification range for this probe.

For the Spiking test**,** the process compares the values to an unlikely interval difference, for each parameter at 15-minute intervals.

Parameter	Unlikely Interval Difference (15-minute interval) +/-
Dissolved Oxygen (mg/l)	2
Dissolved Oxygen % saturation	20
pH	0.50
Specific Conductance (uS/cm)	5,000
Temperature (˚C)	1.5
Turbidity (NTU)	2500
Phycocyanin(µg/L)	3

Flagged data values by this test will be examined to determine validity. Spikes determined to be the result of 'Noise', Fouling or Hardware malfunctions will be truncated from the data set.

The Project Officer and their Supervisor are responsible for all initial data validation. If apparent anomalous data is present, the Project Officer and/or the Supervisor will review the sampling procedures with the field sampler to make sure the proper calibration and placement procedures were followed.

If no problems are found in the procedures, the data may then be compared to any historical data that might have been collected at the same site prior to the most recent sampling event to see if similar anomalies might have been found previously. The suspect data may also be compared to literature values or standard analytical treatises to verify whether the results are within the limits of accuracy of the test method.

If no obvious problems are found after these reviews, the complete data set will be reported with the suspect data identified as such. The BFBM will then conduct a review of the data, as it relates to the objectives(s) and data accuracy required in this project.

Datasonde Sensor Specifications

Logger/Probe Type	Manufacturer	Model #	Range	Resolution	Accuracy
Temperature	YSI	EXO	- 5 - + 50° C	.001	-5 to 35° +/- .01°C, 35-50°C +/- .05
pH	YSI	EXO	0 - 14 units	0.01 units	+/- 0.1 units within 10° C
D.O. optical	YSI	EXO	0 - 50 mg/l	0.01 mg/l	0 - 20 mg/l +/- 1% of the reading whichever is greater
Turbidity	YSI	EXO	0 - 4000 FNU	0 - 999 FNU	0-999 FNU or +/- 2 NTU whichever is greater
Conductivity	YSI	EXO	0 - 200 mS/cm	0.001mS/cm - 0.1 mS/cm (range dependent)	0-100 mS/cm:.001, 100-200 mS/cm: +/1%
Temperature	YSI	EXO	-5 - 45° C	0.01° C	-5 - 35° C: +/- 0.01; 35-50° C +/- 0.05° C
Phycocyanin	YSI	EXO	0 - 100 µg/L	0.01 µg/L	Linearity: r2 ≥ 0.999 for Rhodamine WT across full range

Appendix D: Laboratory Methods & Documentation

Lab: NEW JERSEY DEPARTMENT OF HEALTH – 11036

The following table indicates the discrete parameters that are collected for the project along with method, reporting and detection limits used by the above licensed lab.

Parameter	Method	Lower Reporting Limit	Units	Method Detection Limit	Holding Time	Bottle volume and type	Preservative	Standard Operating Procedure Revision # / Date
Ammonia as N (Distilled)	SM 4500-NH3 B plus H-11	0.050	mg/L	0.023	28 days	500 ml/plastic	H2SO4 to pH<2, Ice to 4 deg C	8: 4/22/24
Ammonia as N (Undistilled)	SM 4500-NH3 B plus H-11	0.01	mg/L	0.0049	28 days	1000ml/plastic	H2SO4 to pH<2, Ice to 4 deg C	3: 2/6/23
Calcium (Dissolved)	EPA 200.7	0.500	mg/L	0.120	6 months	500 ml/plastic	HNO3 to pH<2, Ice to 4 deg C	9: 5/17/24
Organic Carbon (Dissolved)	SM 5310 C-14	1.00	mg/L	0.454	28 days	1000ml/plastic	H2SO4 to pH<2, Ice to 4 deg C	4: 9/23/22
Organic Carbon (Total)	SM 5310 C-14	1.00	mg/L	0.402	28 days	1000ml/plastic	H2SO4 to pH<2, Ice to 4 deg C	4: 9/23/22
Magnesium (Dissolved)	EPA 200.7	0.500	mg/L	0.056	6 months	500ml/plastic	HNO3 to pH<2, Ice to 4 deg C	9: 5/17/24
Nitrate + Nitrite as N - Dissolved	SM 4500-NO3 F-16	0.0120	mg/L	0.0069	28 days	500 ml/plastic	H2SO4 to pH<2, Ice to 4 deg C	8: 7/7/23
Phosphorus, Total	EPA 365.1	0.01	mg/L	0.007	28 days	1000ml/plastic	H2SO4 to pH<2, Ice to 4 deg C	2: 2/28/22
Phosphorus, Ortho (Dissolved)	EPA 365.1	0.0100	mg/L	0.004	2 days	250ml/plastic	Filter within 15 minutes through 0.45 µm filter. Ice to 4 deg C	2: 8/22/22
Potassium (Dissolved)	EPA 200.7	0.500	mg/L	0.093	6 months	500ml/plastic	HNO3 to pH<2, Ice to 4 deg C	9: 5/17/24
Sodium (Dissolved)	EPA 200.7	0.500	mg/L	0.045	6 months	500 ml/plastic	HNO3 to pH<2, Ice to 4 deg C	9:5/17/24
Total Kjeldahl Nitrogen (Total)	EPA 351.2	0.100	mg/L	0.041	28 days	1000ml/plastic	H2SO4 to pH<2, Ice to 4 deg C	1: 1/14/22
Total Kjeldahl Nitrogen (Dissolved)	EPA 351.2	0.100	mg/L	0.041	28 days	500 ml/plastic	H2SO4 to pH<2, Ice to 4 deg C	1: 1/14/22

NJDOH Sample Submittal Form

Field ID Number

New Jersey Department of Health
Environmental and Chemical Laboratory Services
PO Box 361, Trenton, NJ 08625-0361
Phone: 609-530-2820
ORGANIC AND INORGANIC CHEMISTRY SAMPLE SUBMITTAL
(See Instructions)

Lab Sample Number (For Lab Use Only)

AGENCY INFORMATION

Submitting Agency	Send Results To	Agency No.	Project Name
NJDEP/BFBM	Alex Dinkel	207	LDRTNM
Street Address	**Final Report Option** ☐ Tier 1 ☐ Tier 2	Would you like copies of the internal chain of custody forms sent with your report? ☐ Yes ☐ No	**Project Code** LDRTNM-1
35 Arctic Pky	**Electronic Report Option** ☐ EDD ☐ E-2		**Memo Number**
City, State, Zip Code	**Phone**	**Fax**	**Email**
Trenton NJ	609-292-0427		

SAMPLE INFORMATION

Sample Point/Station ID Number/Water Facility ID	Collection Date (YY/MM/DD) __ __ / __ __ / __ __	**Sample Type**
Sampling Site/Facility/Supply/Location/Sampling Point ID	Coll. Time (24h) Start __ __ __ __ Coll. Time (24h) End __ __ __ __	
Waterbody Name	Sample Retention Retain? ■ No ☐ Yes Duration _____	
Municipality/County	Type of Sampling Event ■ Regular ☐ Compliance ☐ Repeat ☐ Non-Regulatory ☐ Other	
Sampling Point Street Address	If Repeat or GWR, List Original Lab Sample No.	
	Sample Collector	
PWSID	Trip #	

Sample Type

Non-Potable:
- ■ Stream/Surface
- ☐ Ground Water
- ☐ Private Well
- ☐ Septic
- ☐ Ocean/Saline
- ☐ Sediment
- ☐ Tissue
- ☐ Sewage: ☐ Raw ☐ Effluent
- ☐ Industrial: ☐ Raw ☐ Effluent

Potable:
- ☐ Groundwater Rule ☐ Source ☐ Confirmation
- ☐ Raw
- ☐ Finished
- ☐ Private Well
- ☐ At Source
- ☐ Flushed
- ☐ 1st Draw
- ☐ Lead Source Line
- ☐ Surface H_2O Intake
- ☐ Distribution System

Fraction: ■ Total ☐ Dissolved
Other: ☐ _____
Priority: ■ Routine ☐ Priority ☐ Emergency

FIELD INFORMATION

Air Temp °C	Water Temp °C	Stream Flow-CFS
Weather Conditions	Sample pH (Field)	Gage Height-Ft.
Preserved in: ■ Field ☐ Lab Date: __ __ / __ __ / __ __ Time: __ __ __ __	DO (mg/l)	Spec.Cond. (µS/CM)
	DO% Sat	Salinity (ppm)
Chlorine Residual	Sample Depth Ft.	Tide Stage
Comments/Field Checks	Barometric Pressure (mmHg)	Turbidity (NTU)

ANALYSIS REQUESTS

Metals

☐ Ag Silver	☐ Mg Magnesium	☐ Al Aluminum	☐ Mn Manganese
☐ As Arsenic	☐ Mo Molybdenum	☐ B Boron	☐ Na Sodium
☐ Ba Barium	☐ Ni Nickel	☐ Be Beryllium	☐ Pb Lead
☐ Ca Calcium	☐ Sb Antimony	☐ Cd Cadmium	☐ Se Selenium
☐ Co Cobalt	☐ Si Silica	☐ CR-T Chromium	☐ Tl Thallium
☐ Cu Copper	☐ U Uranium	☐ Fe Iron	☐ V Vanadium
☐ K Potassium	☐ Zn Zinc		

Preferred Methodology
☐ EPA 200.7 / 200.9 ☐ EPA 200.8

Residues
- ☐ Total Suspended Solids (TSS)
- ☐ Total Solids (TS)
- ☐ Total Dissolved Solids (TDS)
- ☐ Settleable Solids (SS)
- ☐ Total Volatile Solids (TVS)

General

☐ Alkalinity	☐ Fluoride by IC
☐ Bromide by IC	☐ Hardness
☐ Chloride	☐ MBAS
☐ Chloride by IC	☐ Odor
☐ Chromium, Hexavalent	☐ pH
☐ Chromium, Hexavalent by IC	☐ Phenols (PW)
☐ Color	☐ Phenols (NPW)
☐ Conductance	☐ Sulfate by IC
☐ Cyanide	☐ Sulfate Lachat
☐ Dissolved Oxygen	☐ Turbidity
☐ Fluoride	

Mercury
- ☐ Mercury by EPA 245.1
- ☐ Low Level Mercury EPA 1631E

Nutrients

☐ Nitrite	■ Nitrite + Nitrate
■ Total Phosphorus	☐ Ortho Phosphorus
■ Ammonia	■ Total Kjeldahl Nitrogen (TKN)
☐ Nitrate (Calculated)	
☐ Nitrogen, Total (Calculated)	

Other
☐ _____ ☐ _____ ☐ _____

Organics (Drinking Water)
- ☐ EPA 504.1 - EDB, DBCP,123TCP
- ☐ EPA 505 - Chlordane
- ☐ EPA 505 - Toxaphene
- ☐ EPA 507 - N and P containing Pesticides
- ☐ EPA 515.3 - Chlorinated Acid Herbicides
- ☐ EPA 524.2 - Purgeables
- ☐ EPA 525.2 - Liquid-Solid Extractables
- ☐ EPA 531.1 - N-Methylcarbamoyloximes and N-Methylcarbamates

Organics (Non-Potable Water)
- ☐ EPA 624 – Purgeables
- ☐ EPA 625 - Base/Neutral and Acid Extractables

Demands
- ■ Total Organic Carbon (TOC)
- ☐ Dissolved Organic Carbon (DOC)
- ☐ Chemical Oxygen Demand (COD)

Suggested Dilutions
☐ BOD5 ☐ BOD20 ___ ___ ___
☐ CBOD5 ☐ CBOD20 ___ ___ ___

Relinquished By:	Affiliation:	Received By:	Affiliation:	Date/Time	Reason for Custody Change
Name (Print):		Name (Print):			
Signature:	NJDEP	Signature:			Transfer to Lab
Name (Print):		Name (Print):			
Signature:		Signature:			

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Field ID Number		Lab Sample Number (For Lab Use Only)

New Jersey Department of Health
Environmental and Chemical Laboratory Services
PO Box 361, Trenton, NJ 08625-0361
Phone: 609-530-2820

ORGANIC AND INORGANIC CHEMISTRY SAMPLE SUBMITTAL

(See Instructions)

AGENCY INFORMATION

Submitting Agency	Send Results To	Agency No.	Project Name
NJDEP/BFBM	Alex Dinkel	207	LDRTNM
Street Address	**Final Report Option** ☐ Tier 1 ☐ Tier 2	Would you like copies of the internal chain of custody forms sent with your report? ☐ Yes ☐ No	**Project Code** LDRTNM1
35 Arctic Pky	**Electronic Report Option** ☐ EDD ☐ E-2		**Memo Number**
City, State, Zip Code	**Phone**	**Fax**	**Email**
Trenton NJ	609-292-0427		

SAMPLE INFORMATION

Sample Point/Station ID Number/Water Facility ID	Collection Date (YY/MM/DD) __ __ / __ __ / __ __	**Sample Type**
Sampling Site/Facility/Supply/Location/Sampling Point ID	Coll. Time (24h) Start __ __ __ __ Coll. Time (24h) End __ __ __ __	**Non-Potable:** ☐ Stream/Surface ☐ Ground Water ☐ Private Well ☐ Septic ☐ Ocean/Saline ☐ Sediment ☐ Tissue ☐ Sewage: ☐ Raw ☐ Effluent ☐ Industrial: ☐ Raw ☐ Effluent
Waterbody Name	Sample Retention Retain? ■ No ☐ Yes Duration _____	
Municipality/County	Type of Sampling Event ☐ Regular ☐ Compliance ☐ Repeat ☐ Non-Regulatory ☐ Other	**Potable:** ☐ Groundwater Rule ☐ Source ☐ Confirmation ☐ Raw ☐ Finished ☐ Private Well ☐ At Source ☐ Flushed ☐ 1st Draw ☐ Lead Source Line ☐ Surface H_2O Intake ☐ Distribution System
Sampling Point Street Address	If Repeat or GWR, List Original Lab Sample No.	
	Sample Collector	**Fraction:** ☐ Total ■ Dissolved
PWSID	Trip #	**Other:** ☐ _____
		Priority: ■ Routine ☐ Priority ☐ Emergency

FIELD INFORMATION

Air Temp °C	Water Temp °C	Stream Flow-CFS
Weather Conditions	Sample pH (Field)	Gage Height-Ft.
Preserved in: ■ Field ☐ Lab Date: __ __ / __ __ / __ __ Time: __ __ __ __	DO (mg/l)	Spec.Cond. (µS/CM)
	DO% Sat	Salinity (ppm)
Chlorine Residual	Sample Depth Ft.	Tide Stage
Comments/Field Checks	Barometric Pressure (mmHg)	Turbidity (NTU)

ANALYSIS REQUESTS

Metals

☐ Ag ..... Silver	☐ Mg ..... Magnesium
☐ Al ..... Aluminum	☐ Mn ..... Manganese
☐ As ..... Arsenic	☐ Mo ... Molybdenum
☐ B ..... Boron	■ Na ..... Sodium
☐ Ba ..... Barium	☐ Ni ..... Nickel
☐ Be ..... Beryllium	☐ Pb ..... Lead
■ Ca ..... Calcium	☐ Sb ..... Antimony
☐ Cd ..... Cadmium	☐ Se ..... Selenium
☐ Co ..... Cobalt	☐ Si ..... Silica
☐ CR-T .... Chromium	☐ Tl ..... Thallium
☐ Cu ..... Copper	☐ U ..... Uranium
☐ Fe ..... Iron	☐ V ..... Vanadium
■ K ..... Potassium	☐ Zn ..... Zinc

Preferred Methodology
☐ EPA 200.7 / 200.9 ☐ EPA 200.8

Residues
☐ Total Suspended Solids (TSS)
☐ Total Solids (TS)
☐ Total Dissolved Solids (TDS)
☐ Settleable Solids (SS)
☐ Total Volatile Solids (TVS)

General

☐ Alkalinity	☐ Fluoride by IC
☐ Bromide by IC	☐ Hardness
☐ Chloride	☐ MBAS
☐ Chloride by IC	☐ Odor
☐ Chromium, Hexavalent	☐ pH
☐ Chromium, Hexavalent by IC	☐ Phenols (PW)
☐ Color	☐ Phenols (NPW)
☐ Conductance	☐ Sulfate by IC
☐ Cyanide	☐ Sulfate Lachat
☐ Dissolved Oxygen	☐ Turbidity
☐ Fluoride	

Mercury
☐ Mercury by EPA 245.1
☐ Low Level Mercury EPA 1631E

Nutrients

☐ Nitrite	■ Nitrite + Nitrate
■ Total Phosphorus	■ Ortho Phosphorus
■ Ammonia	■ Total Kjeldahl Nitrogen (TKN)
☐ Nitrate (Calculated)	
☐ Nitrogen, Total (Calculated)	

Other
☐ _____ ☐ _____ ☐ _____

Organics (Drinking Water)
☐ EPA 504.1 - EDB, DBCP,123TCP
☐ EPA 505 - Chlordane
☐ EPA 505 - Toxaphene
☐ EPA 507 - N and P containing Pesticides
☐ EPA 515.3 - Chlorinated Acid Herbicides
☐ EPA 524.2 - Purgeables
☐ EPA 525.2 - Liquid-Solid Extractables
☐ EPA 531.1 - N-Methylcarbamoyloximes and N-Methylcarbamates

Organics (Non-Potable Water)
☐ EPA 624 – Purgeables
☐ EPA 625 - Base/Neutral and Acid Extractables

Demands
☐ Total Organic Carbon (TOC)
■ Dissolved Organic Carbon (DOC)
☐ Chemical Oxygen Demand (COD)

Suggested Dilutions
☐ BOD5 ☐ BOD20 ___ ___ ___
☐ CBOD5 ☐ CBOD20 ___ ___ ___

Relinquished By:	Affiliation:	Received By:	Affiliation:	Date/Time	Reason for Custody Change
Name (Print):		Name (Print):			
Signature:	NJDEP	Signature:			Transfer to Lab
Name (Print):		Name (Print):			
Signature:		Signature:			

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Appendix E. Meter Calibration and Field Forms

Delaware River Basin Commission - Field Sheet

Water Quality Monitoring Form

1.) Project Information

Project & Site Name: _____

Water Quality Meter: _____

2.) Date (YYYY/MM/DD): _____

	Reading 1		Reading 2		
3.) Time *(Military):*					
4.) Water Quality Meter Readings:					**RPD (%)**
Dissolved Oxygen		mg/L		mg/L	
		%		%	
Water Temperature		°C		°C	
Specific Conductance		µmhos/cm		µmhos/cm	
pH		pH units		pH units	
Chloride (Big Blue only)		mg/L		mg/L	

5.) 3-hour pH 7.0 check:

Time pH calibration completed: _____ **pH 7.0 check:** _____ **Buffer Temp (°C):** _____

+/- 0.20 pH units? *y* or *n*

6.) Gage Height (non-tidal): _____ (measurement) + _____ (leader) = _____ ft.

7.) Water & Site Conditions: _____

8.) Dates of Last Rain: _____ and _____

9.) Weather: _____

10.) Personnel:

Name	Role

11.) Turbidity: _____ NTU

_____ NTU

_____ NTU

Average Turbidity: _____ **NTU**

12.) Air Temperature: _____ °C

Source: _____

Water Quality Meter Calibration Log

Water Quality Meter: _____

Date: _____ **Time:** _____ **Name / Signature:** _____

Location: _____

DO % Saturation

Initials

**Air Calibration*

Time Air Calibration Set-up Completed: _____

Tap water Source: _____

Barometric Pressure (+ source): _____

Circle Method: In Situ 1002-8-2009 (optical) or SM4500 O G -11 (membrane)

Two-Point Calibration

1) Air-Saturated Water

	Time	Temperature (° C)	DO (mg/L)	DO (% Sat)	
1.					
2.					
3.					
4.					

	Initial Value	Calibration Y or N	Final Value	
DO % Saturation:				

2) Zero DO

	Initial Value	Calibration Y or N	Final Value	
DO % Saturation:				

Duplicate RPD	measured DO (%sat)	RPD			
1.					
2.			≤20 percent	yes	no

DO - Winkler Titration (weekly)

Method SM 4500-O C-11

Weekly determination:

*Acceptable criteria: **+/- 0.3 mg/L***

Field Location (or lab water bath): _____

Time field meter deployed: _____

Dissolved Oxygen Level

	Winkler (mg/L)	Field Meter (mg/L)	Field Meter (% Sat)	Temperature (° C)	Time	Initials
Original Titration:						
Rep. Titr. (optional):						

Comments: _____

pH Calibration (2 point w/ validations [*1 validation following calibration; every 3 hrs thereafter*])

Method SM4500-H B-11

	Initial Value	Calibration Y or N	Final Value	Initials
4.0 Buffer:				
10.0 Buffer:				

*Acceptable criteria (4 & 10 pH): **+/- 0.05***

Time pH calibration complete: _____

Validations:	**7.0 Buffer:**	**time:**	*** required**	
	7.0 Buffer:	time:		
	7.0 Buffer:	time:		
	7.0 Buffer:	time:		
	7.0 Buffer:	time:		

*Acceptable criteria (7 pH post-calibration): **+/- 0.1***

*Acceptable criteria (7 pH 3-hour check): **+/- 0.2***

Comments: _____

Specific Conductance

Method EPA 120.1

	Standard	Initial Value	Calibration Y or N	Final Value	Initials
Acceptance criteria:					
within 1% range					

Comments: _____

NJDEP BFBM Sonde QA Field Form

STOP SONDE DEPLOYMENT (from handheld Deploy > Stop Deployment)

Is film present on sensor tops? Yes No

Date:		Sampler:	
Stop Time:		Check Unit Model:	
Station #:		Check Unit #:	
Sonde #:		Buoy #:	

Side by Side Checks - CALIBRATE DEPTH ONSITE BEFORE DEPLOYING!

	Before Cleaning		*After Cleaning*	
Parameter	**Sonde**	**Check Unit**	**Sonde**	**Check Unit**
Temp (°C)				
DO (%)				
DO (mg/l)				
Spec Cond (µs/cm)				
pH				
Turbidity (NTU)				
BGA-PC (µg/l or RFU)				
Chlorophyll (µg/l or RFU)				
Depth (m)				
Battery (V)				

Notes:

Appendix F. Useability Determination Form (to be used by NJDEP)

Useability Determination		
Project Name:		Date:
Name of Person Completing Form:		QAPP #:

Item	Assessment Activity	Useability Review Results
Data Deliverables	Was all necessary information (e.g., results and reports) performed/provided, including validation and verification of results?	
Deviations from QAPP (e.g., sampling sites, sample handling (preservatives, holding times, etc.), analytical methods, QC sample failures)	Were there any deviations from the QAPP? If so, what impact do these deviations have on usability?	
SOP deviations	Were there any deviations from the SOPs that were used? If so, what impact did these have on adhering to the QAPP?	
Metrological effects/site conditions	Were there any weather or site conditions that may have affected results?	
DQI: Precision	Were precision criteria met for all samples? If not, what percent of samples had precision issues? Is there enough data that met criteria for use in decision making?	
DQI: Accuracy (Bias)	Were accuracy criteria met for all QC samples? Is there enough data that met criteria for use in decision making?	

DQI: Representativeness	Was the data collected in a manner that ensured representativeness (e.g., if it was planned that samples would be taken every month to ensure seasonal differences were captured, but three samples were missed, can you confirm that the 3 samples that were missed were not all from the winter months?)	
DQI: Completeness	Was any planned data collection omitted? Is there enough data that met criteria for use in decision making?	
DQI: Comparability	Did results from different environmental information operations agree in an expected manner?	
DQI: Sensitivity	Were the quantitation/ reporting limits specified in the QAPP met?	
Usability decision	Based on an evaluation of all criteria tabulated above, is there enough usable data to make a specific decision?	