

**NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
WATER MONITORING AND STANDARDS ELEMENT
BUREAU OF FRESHWATER AND BIOLOGICAL MONITORING
P.O. Box 420; Mail Code 35-01
TRENTON, NEW JERSEY**

**Quality Assurance/Quality Control Project Plan
Round Valley/ Spruce Run Reservoir Monitoring
2013 Revision**

Prepared By: _____ Date

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1.0 Project Name: Round Valley/ Spruce Run Reservoir Monitoring

2.0 Requesting Agency: NJ State Legislature under A2793 amending R.S. 58:4-1.

3.0 Date of Project: Initiated January 2001 and to continue annually thereafter.

4.0 Project Fiscal Information: Job Number 33340000, Activity Code V4PC

5.0 Project Officer: Chris Kunz, Project Officer, BFBM , Victor Poretti, Section Chief, BFBM

6.0 Special Training Needs/Certification

Assistants to the project will be trained in the operation and use of all sampling equipment. The training will entail calibration methods, deployment techniques and data retrieval from the equipment. The Project Officer or designee will be responsible for any necessary training.

BFBM is certified by the Office of Quality Assurance (certified lab ID # 11896) for the following parameters during field work for this project: temperature, pH, conductance, turbidity, and chlorophyll a.

7.0 Project Background/ Description

The New Jersey Legislature, May 4, 2001, passed Assembly Bill No. A2793 amending R.S. 58:4-1 which states: "...that the amount of water to be released from the Spruce Run reservoir shall not exceed an amount which lowers the water level in the reservoir between June 1 and August 31 more than 8 feet below its usual mean high-water height of each year to ensure the continued availability of the Spruce Run reservoir for water recreational activities". This requirement may institute the need for more water releases from Round Valley Reservoir to meet downstream passing flows in the Raritan River in order to maintain minimum levels in Spruce Run Reservoir as per the statute. More water would thus have to be pumped into Round Valley Reservoir to compensate for these releases. To monitor for potential water quality effects, in particular nutrients, that the release of Round Valley water may have on the Spruce Run Reservoir and its recreational activities, the statute also requires: "...the Commissioner of Environmental Protection shall provide for the continuous monitoring of the impacts associated with releasing water from the Round Valley reservoir for the purpose of sustaining water recreational activities at the Spruce Run reservoir." Because of this requirement, BFBM initiated annual monitoring of Round Valley Reservoir in 2001 (see Attachment C for original QAPP). Monitoring consisted of sampling water quality in Round Valley Reservoir three times per year (August, September and October) at four locations. The sampling frequency and locations were set in a 2001 Quality Assurance/ Quality Control Project Plan prepared by BFBM.

A Workgroup was formed consisting of members from BFBM, NJGWS/ Water Supply Modeling & Planning, Bureau of Environmental Analysis and Restoration, and NJ Water Supply Authority, to review data since the Project's inception, assess the original design to determine if monitoring is adequate, and suggest refinements to the monitoring design if necessary.

8.0 Project Objectives

Data is collected to evaluate the water quality and ecological health of Round Valley Reservoir, in particular nutrients and their effect on the trophic state of the Reservoir. The Workgroup determined that a redesign of the Round Valley monitoring could achieve the objectives of the legislative statute and provide more robust data while realizing fiscal savings. These conclusions were made upon extensive review of the data collected since 2001, and current and historical pumping activities into the Reservoir. The monitoring re-design is outlined in Section 9.0 below. Although sample collection on the reservoir is less frequent (3 sampling events/ year reduced to 1 sampling event/ year), there are 2 additional sites within the Reservoir which increases the water quality characterization. In addition, the Intake Pond will be sampled when water is actively pumped into the Reservoir. Pumping is typically not an annual occurrence and is historically less than four billion gallons per year. Data from the Intake Pond sample further assess potential changes in water quality and ecological health due to pumping water into the Reservoir.

Data will be evaluated by the Workgroup on an annual basis. The Workgroup will periodically reconvene to assess the adequacy and appropriateness of the monitoring designed. The Project Officer will be responsible for providing data to the Workgroup annually.

9.0 Monitoring Design

Five (5) in-lake sites and one site on the South Branch Raritan River designated as SB-1 will be sampled annually in August (see site map, Attachment A). August was chosen because it represents the peak of the growing season and primary producer/ physical chemical interactions. The three in-lake sites from the original design will be retained and two sites will be added that will more accurately characterize the water quality. Each new monitoring station will be recorded on GPS and stored on the NJDEP GIS system. Each lake site will be sampled at two depths: at one meter below the surface and one meter above the bottom.

If water is pumped into Round Valley Reservoir (usually in March, April, or May) additional samples will be collected at the Intake Pond (see site map, Attachment A). On the first sampling event the site will be recorded on GPS and stored on the NJDEP GIS system. Approximately 1 sample will be collected at the Intake Pond per every 1 billion gallons pumped.

Additional samples, at the above designated Reservoir sites, may be collected if unusual event or observations occur in the reservoir, e.g. algal bloom, fish kill, etc... The NJ Water Supply Authority will determine if an unusual event occurs and contact the Project Officer, as soon as possible, to schedule BFBM to perform the sample collection.

10.0 Sampling Procedures

10.1 General Procedures: Sampling will take place during periods in which there has not been any rainfall within 24 hours prior to sampling. Sample bottles will be provided by the contracted New Jersey certified laboratory. 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). Minimum sample volumes are listed in section 14.1. Containers shall be rinsed with sample water before the final volume is collected.

10.2 Cleaning Sample Equipment: Prior to field sampling, all sample collection equipment will be cleaned using the protocol outlined in Attachment B.

10.3 Sampling Procedures and Parameters:

In-Lake Sampling Procedures and Parameters Samples will be collected at designated lake locations at 2 depths. Samples will be collected as per "NJDEP Field Sampling Procedures Manual", 2005. In-lake samples will be taken one meter below the surface and one meter above the bottom. Samples will be collected using a submerged sampler, which will be cleaned at the BFBM office prior to use. Samples will be of sufficient volume for laboratory analysis (see section 14.1) A field blank of PICO® water will be collected on-site from the submerged sampler prior to the first lake sample collected. (PICO® water will be supplied from the BFBM lab system which is analyzed twice per year at a NJ certified laboratory for applicable parameters.) The field blank will be analyzed for Total P, Nitrite and Nitrate, ammonia and TKN. The submerged sampler will be field rinsed with lake water three times at each discreet site prior to collecting a sample.

A sample for Total P, Ortho P, Nitrite and Nitrate, ammonia, TKN, Silica, TSS, turbidity, and chlorophyll 'a' will be collected at each depth. Turbidity will be measured at each in-lake station and at each depth in the field, using a Hach 2100P Turbidity meter. Samples for turbidity will be collected using the submersible sampler. Samples for total phosphorus will be analyzed by QC Laboratories in Southhampton, Pa. Chlorophyll a samples will be analyzed by BFBM. All other parameters will be analyzed by New Jersey Department of Health (NJDOH), Public Health and Environmental Laboratories (PHEL), Environmental and Chemical Laboratory Services (ECLS) in Ewing, NJ.

At each in-lake station and each depth, measurements for specific conductance, pH, water temperature, and dissolved oxygen will be recorded. Conductance and pH will be analyzed at each depth using subsamples from the submersible sampler. Analysis for pH and Conductance will be performed with a Hach (model # HQ40D) multiparameter meter. Dissolved oxygen and water temperature will also be measured with a Hach HQ40D meter, but measurements will be made by lowering the probe to the desired depth. Dissolved oxygen will be measured with a luminescent dissolved oxygen sensor (Hach model # LDO10130).

Stream Sampling Procedures and Parameters: The collection of water samples will be accomplished using the Equal Width Increment (EWI) sampling method and a splitter churn to obtain a cross sectional composite.

Samples will be collected as per "NJDEP Field Sampling Procedures Manual," August 2005; the document available online at the NJDEP's webpage, <http://www.state.nj.us/dep/srp/guidance/fspm/>. All parameters collected and measured for the in-lake samples will also be collected at the stream site RS-1.

Intake Pond Sampling Procedures and Parameters: Samples will be collected at one meter from the surface, using the same procedure as the in-lake collection, at approximately the center of the intake pond. All parameters collected and measured for the in-lake samples will also be collected at the Intake Pond. Samples will be of sufficient volume for laboratory analysis (see section 14.1) The NJ Water Supply Authority will collect all samples at the Intake Pond. NJWSA will notify BFBM prior to sample collection so arrangements can be made to transport samples to the analytical lab and perform analysis within each parameter's holding time (see section 14.1 for holding times).

10.4 Chlorophyll a: A *chl a* sample will be collected at each in-lake site/depth, stream site, and intake pond site. Sample analysis will be performed by BFBM staff at 35 Arctic Parkway. BFBM staff will use a modified version of EPA Method 445.0 for this analysis. Samples will be collected in 500 ml acetone rinsed amber glass bottles, and stored on ice to 4° C.

11.0 Data Quality/Quality Control Requirements

11.1 Testing by BFBM

All pH meters, dissolved oxygen meters, conductivity 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.

BFBM is certified by the Office of Quality Assurance (certified lab ID # 11896) for all parameters listed below:

Temperature, pH, Conductance and DO are measured using a Hach HQ40D. The Hach HQ40D is a multi-parameter water quality system that combines temperature, pH, conductance, and LDO probes into one meter which can analyze discrete samples and that is submersible to the desired depth of the lake.

Temperature: The probe is calibrated with a NIST certified thermometer on a quarterly basis. Records of the calibration shall be maintained by the BFBM.

pH: The probe is calibrated on a daily basis per the manufacturer recommendations. The probe is calibrated each day of use with two standard pH buffers bracketing the value to be measured. After calibration, a standard buffer with pH within the calibration range shall be measured without any control adjustments to check the calibration. When the pH meter is in use for longer than a 3 hour period, the pH of the third buffer shall be checked once every three hours. If the pH differs by more than 0.2 pH units from the standard buffer value, the meter shall be recalibrated. Records of all calibrations and calibration checks shall be maintained in the field log.

Conductance: The probe is calibrated on a daily basis per the manufacturer recommendations. The probe is also checked each day of use with a certified standard which corresponds to the expected range of the values to be measured. Records of all calibrations and calibration checks shall be maintained in the field log.

DO: A Winkler check is performed on a weekly basis and the meter is barometrically compensated and checked at each sampling site. Records of all calibrations and calibration checks shall be maintained in the field log.

Turbidity: HACH Model 2100P turbidimeter is calibrated once a month per manufacturer recommendations. The meter is then checked with certified standards for accuracy within the calibration range during each day of use. Records of all calibrations and calibration checks shall be maintained in the field log.

Chlorophyll a: BFBM will follow the procedures and calibration requirements required by EPA Method 445.0

Bureau of Water Monitoring Certified SOP, for field measurements and calibrations.

NJDEP Field Sampling Procedures Manual (2005).

NJAC 7:18 - Regulations Governing the Certification of Laboratories and Environmental Measurements.

Other Parameters:

Barometer: Thommen TX Mechanical Barometer. Measured for LDO meter compensation only. Not used for project's data objectives.

Ambient Air Temperature: Fisher Brand Traceable Flip-Stick Thermometer is calibrated with a NIST certified thermometer before the sampling run. Measured for general information purposes only. Not used for project's data objectives.

11.2 Analytical Testing performed by a NJ Certified Laboratory

For samples delivered to a NJ certified laboratory, testing will be done by a method for which the laboratory has certification. Quality control procedures (including required calibrations and quality control procedures required by regulation or by the method) shall be defined in the laboratory's Quality Manual (QM) or Standard Operating Procedures (SOPs). The QM and SOPs must be approved by the OQA. Samples for total phosphorus will be analyzed by QC Laboratories in Southampton, Pa. Chlorophyll a samples will be analyzed by BFBM. All other parameters will be analyzed by New Jersey Department of Health (NJDOH), Public Health and Environmental Laboratories (PHEL), Environmental and Chemical Laboratory Services (ECLS) in Ewing, NJ. All sample bottles will be provided by the laboratory performing the analysis.

12.0 Data Analysis

Data is collected to evaluate the water quality and the ecological health of Round Valley Reservoir water, assess potential impacts related to pumping into the Reservoir, and assess potential effects on Spruce Run Reservoir water recreational activities if and when water from Round Valley is used to maintain water levels at Spruce Run.

On an annual basis, the Project Officer will forward the data to the Workgroup who will evaluate the data as it relates to Surface Water Quality Criteria thresholds, historical data, and other sources.

13.0 Sampling Schedule\ Agency Responsibilities

Five (5) in-lake sites and one site on the South Branch Raritan River designated as SB-1 will be sampled annually in August (see site map, Attachment A). The three in-lake sites from the original design will be retained and two sites will be add that will more accurately characterize the water quality. Each new monitoring station will be recorded on GPS and stored on the NJDEP GIS system. Each lake site will be sampled at two depths: at one meter below the surface and one meter above the bottom. BFBM will record all *in situ* measurements and collect samples for laboratory analysis at these sites.

If water is pumped into Round Valley Reservoir (usually in March, April, or May) additional samples will be collected at the Intake Pond (see site map, Attachment A). On the first sampling event the site will be recorded on GPS and stored on the NJDEP GIS system. Approximately 1 sample will be collected at the Intake Pond site coordinates after every 1 billion gallons pumped. This sampling will not prompt additional in-lake sampling. NJWSA will record all *in situ* measurements and collect samples for laboratory analysis at this site. NJWSA will contact the Project Officer prior to sampling to coordinate transport of analytical samples to the laboratory.

Additional samples, at the above designated sites, may be collected if an unusual event or observations occur in the reservoir, e.g. algal bloom, fish kill, etc... The NJ Water Supply Authority will determine if an unusual event occurs and contact the Project Officer, as soon as possible, for BFBM to perform in-lake sampling as above.

14.0 Quality Assurance

14.1 Laboratory Analysis: The following parameters will be analyzed by a qualified New Jersey certified laboratory. Any laboratory used shall be certified by NJDEP's OQA for the requested parameters. Samples for total phosphorus will be analyzed by QC Laboratories in Southampton, Pa. QC Laboratories' analysis for total phosphorus is certified for a reporting level which allows for assessment against New Jersey water quality criteria for lakes (0.05 mg/L) Chlorophyll a samples will be analyzed by BFBM. All other parameters will be analyzed by New Jersey Department of Health (NJDOH), Public Health and Environmental Laboratories (PHEL), Environmental and Chemical Laboratory Services (ECLS) in Ewing, NJ. All sample bottles will be provided by the laboratory performing the analysis.

The reporting levels, listed below, are **required** for this project. Containers shall be rinsed with sample water before final volume is collected.

| Parameter | Laboratory | Method | Detection Limit (mg/L) | Reporting Level (mg/L) | Holding Time | Preservative | Volume |
|----------------------------|------------|--------------|------------------------|------------------------|--------------|-----------------------------|--------|
| Nitrite + Nitrate | NJDOH | SM4500-NO3F | 0.0057 | 0.012 | 28 days | See Note 1 | 500ml |
| Ammonia (Non-distillation) | NJDOH | SM4500-NH3 | 0.0036 | 0.010 | 28 days | See Notes 1 & 2 | |
| Ammonia (Distillation) | NJDOH | SM4500-NH3 | 0.0147 | 0.05 | 28 days | See Note 1 | |
| TKN | NJDOH | EPA351.2 | 0.100 | 0.100 | 28 days | See Note 1 | |
| Total P | QC Labs | SM4500P-B.5E | 0.0099 | 0.010 | 28 days | See Note 1 | 250 ml |
| Ortho P | NJDOH | EPA365.1 | 0.00189 | 0.005 | 48 hrs | Ice to 4°C | 250ml |
| Silica | NJDOH | EPA200.7 | 0.036 | 0.100 | 28 days | HNO3 to pH 2, Ice to 4°C | 250ml |
| TSS | NJDOH | SM2540-D | 1 | 1 | 14 days | Ice to 4°C | 250 ml |
| Chlorophyll a | BFBM | EPA445.0 | 0.05(µg/L) | N/A | 24 hours | Ice to 4°C | 500ml |

Note 1): Conc. H₂SO₄ to pH 2; ice to 4°C

Note 2): Samples with turbidity levels greater than 10NTU's must be distilled. The turbidity level determined by the BFBM will be noted on the chain of custody forms and on the sample bottles relinquished to the NJ certified laboratory for ammonia testing.

14.2 Equipment Blanks: This sample is collected by completely filling a clean submerged sampler (see cleaning protocol in Attachment C) with PICO® water. An equipment blank, of a volume necessary for analysis, is then taken from the submerged sampler by filling the bottle approximately halfway from the first nozzle and then the rest of the way with the second nozzle (if applicable). Analysis includes nutrient chemical parameters listed above.

14.3 Sample Containers: Sample containers shall be dedicated, single-use. Sample containers shall be provided by the NJ certified laboratory.

14.4 Sample Retention: All samples must be retained by the laboratory until such time that the BFBM approves the reported results.

14.5 Chain of Custody: For Chl "a" analysis performed by BFBM, chain of custody forms will not be used; details concerning sample collection and analysts will be recorded in field and lab records. Information to be recorded includes all information required by N.J.A.C. 7:18-5.6(d) and 8.5(c). Chain of custody forms are required for all samples forwarded to a NJ certified laboratory for testing.

15.0 Data Validation

The Project Officer and the Supervisor are responsible for all initial data validation. If apparent anomalous data is suspected (e.g. dissolved values larger than total values; field blank values larger than ambient values), the Project Officer and/or the Supervisor will review the sampling procedures with the field sampler to make sure the proper collection and preservation procedures were followed. Additionally, for nutrient parameters (particularly Ammonia, TKN, Nitrate + Nitrite and Phosphorus), the field sampler, Project Officer and/or the Supervisor may perform further water quality logic tests on the suspect data, as described in the U.S. Geological Survey Open File Report 02/383; 2003, entitled, *"Methods For Quality Assurance Review of Water Quality Data in New Jersey."*

If the data is still suspect, the NJ certified laboratory will be contacted. An internal review of their laboratory procedures and/or calculations used in the analysis of the suspect sample, with special emphasis on transcription of data to assure that no transposition of figures occurred will be conducted. The NJ certified laboratory will be asked to check on equipment calibration. They may be further requested to reanalyze the retained portion of the sample. If no problems are found in the analytical laboratory 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 or not 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 its own review of the data, as it relates to the objectives(s) and data accuracy required in this project.

16.0 Data Storage

Data will be stored locally in electronic format (MS Access). Water quality data will be entered into New Jersey's Water Quality Data Exchange (WQDE) and USEPA STORET Data Warehouse within 60 days of receipt from the analytical laboratory. All raw data records shall be maintained for a period of no less than five years.

The following table contains the complete data storage and availability:

| Public Web Site | Data Source(s) | Data Type | Web Address |
|---|---|---|---|
| 1. National Water Monitoring Council Water Quality Portal | <ul style="list-style-type: none"> USEPA STORET Data Warehouse | <ul style="list-style-type: none"> Physical/ Chemical Chlorophyll a | http://www.waterqualitydata.us/ |
| 2. Exchange Network Browser | <ul style="list-style-type: none"> National Water Monitoring Council Water Quality Portal NJDEP Water Quality Data Exchange | <ul style="list-style-type: none"> Physical/ Chemical Chlorophyll a | http://www.enbrowser.net/enbrowser/ |
| 3. USEPA STORET Warehouse | <ul style="list-style-type: none"> USEPA STORET database | <ul style="list-style-type: none"> Physical/ Chemical Chlorophyll a | http://www.epa.gov/storet/dbtop.html |
| 4. USEPA MyEnvironment | <ul style="list-style-type: none"> USEPA STORET Data Warehouse | <ul style="list-style-type: none"> Physical/ Chemical Chlorophyll a | http://www.epa.gov/myenvironment/ |
| 5. USEPA Enviromapper for Water | <ul style="list-style-type: none"> USEPA STORET Data Warehouse | <ul style="list-style-type: none"> Physical/ Chemical Chlorophyll a | http://www.epa.gov/waters/enviromapper/ |
| 6. NJ-GeoWeb | <ul style="list-style-type: none"> NJDEP Water Quality Data Exchange | <ul style="list-style-type: none"> Physical/ Chemical Chlorophyll a | http://www.nj.gov/dep/gis/geoweb splash.htm |
| 7. NJDEP Data Miner | <ul style="list-style-type: none"> NJDEP Water Quality Data Exchange | <ul style="list-style-type: none"> Physical/ Chemical Chlorophyll a | http://datamine2.state.nj.us/DEP_OPRA/OpraMain/categories?category=Ambient+Water+Quality |

17.0 Performance System Audits

All NJ certified laboratories used are subject to audits and to the requirements of the OQA Laboratory Certification Program as well as internal performance evaluations. The OQA will be notified of field monitoring schedules for possible audits.

18.0 Data Reporting

18.1 Preliminary Reporting of Data

Preliminary analytical data will be reported to BFBM, from the laboratory employed for this project, in either electronic format or by verbal communication to the Project Officer, within 21 calendar days from receipt of sample. Samples which yield results considered anomalous by the Project Officer and/ or Supervisor will be validated as specified in section 16.0, Data Validation, before the holding time of the retained sample is expired. If the results remain suspect after an internal review of the laboratory procedures, calculations, and/or on transcription of data has been conducted, then the sample shall be reanalyzed by the laboratory using the retained portion of the sample. This reanalysis shall be performed within the parameter holding time.

18.2 Final Reports

Final analytical data will be reported to BFBM, from the laboratory employed for this project, in the form of electronic and/ or hard copies of the lab sheets; or in a tabulated form within 40 calendar days from receipt of sample. All data shall be reported in a complete and concise fashion and shall meet the reporting requirements of NJAC 7:18. Routine quality control results must be retained on file for review by the BFBM and the OQA.

Final data will be submitted to New Jersey's Water Quality Data Exchange (WQDE) and USEPA STORET Data Warehouse within 60 days of receipt from the analytical laboratory.

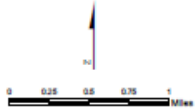
19.0 Assessment, Oversight, and Response

The Project Officer will be responsible for the oversight of all activities relating to this project. The Project Officer will assess field collection functions and make corrections when necessary to maintain the data accuracy as defined in this plan. If any changes or modifications are made to this plan regarding data collection, as it relates to the objectives(s) and data accuracy required in this project, all original signees of the QAPP will be notified.

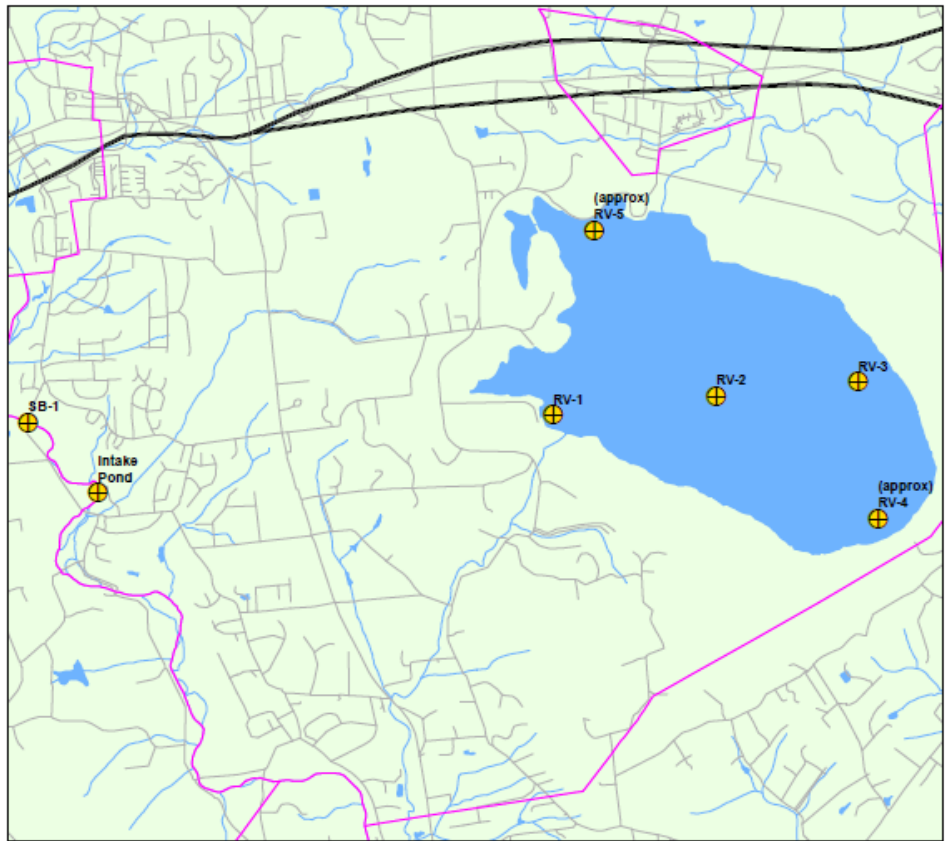
Attachment A
Sample Stations

ROUND VALLEY/SPRUCE RUN MONITORING

- ⊕ Sampling Locations
- ▭ Municipality Boundary
- Major Road
- Local Road
- Stream



Bureau of Freshwater & Biological Monitoring
Water Monitoring, Standards & Assessment
New Jersey Department of Environmental Protection
Map: L. Lager, May 2013



Attachment B
Submerged Water Sampler Cleaning Method

1. Fill small graduated cup with 1oz. of concentrated Liqui-Nox soap. Add this soap into a one-gallon plastic container. Fill container with pico water and mix well. This makes an approximate 1% “Liqui-Nox solution”.
2. Put on a set of disposable gloves and rinse them thoroughly with pico water.
3. With one end sealed and both spouts in the closed position, fill dirty submerged sampler approximately halfway with Liqui-Nox solution.
4. Scrub the submerged sampler thoroughly, inside and out, using the designated lakes monitoring brush stored in the secure lake cabinet in the prep lab. This includes the scrubbing of the open stopper. The open stopper is then closed, the opposite stopper is opened and the process is then repeated.
5. Close the open stopper and vigorously shake the submerged sampler with Liqui-Nox solution inside for approximately 10 seconds.
6. Open both spouts and allow equal amounts of the contained solution to flow through each spout until the bottle is empty.
7. Put on a new set of disposable gloves and rinse them thoroughly with pico water.
8. Open both stoppers and rinse bottle with pico water a minimum of three times.
9. Re-seal one end of the bottle and fill sampler to capacity with pico water. Close the other end and shake vigorously.
10. Repeat steps 8 and 9 two more times.
11. Place an unused polyethylene bag into the submerged sampler carrying case. These bags are stored in secure lake cabinet.
12. Place cleaned submerged sampler into bag and seal.
13. Rinse cleaning brush three times with pico water and replace in bag and store in lake's cabinet.

If a trace nutrient problem arises upon analysis while using the above method, a final step will be added. This step will add an acid rinse, followed by several rinses with pico water to ensure that all trace nutrients are eliminated from the submerged sampler.

Attachment C
2001 QAPP

WORK / QUALITY ASSURANCE PROJECT PLAN

SPRUCE RUN / ROUND VALLEY
RESERVOIR MONITORING PROJECT

NJDEP – WATER MONITORING MANAGEMENT
BUREAU OF FRESHWATER AND BIOLOGICAL
MONITORING

AUGUST, 2001

Prepared by: William Honachefsky Date: 8/8/01
William Honachefsky, Project Officer
Bureau of Freshwater and Biological Monitoring

Reviewed by: Marc Ferko Date: 8/8/01
Marc Ferko, Quality Assurance Officer
NJDEP Office of Quality Assurance

Reviewed by: Karen Schaffer Date: 8/14/01
Karen Schaffer, Division of Science, Research
and Technology

Reviewed by: Lisa Barno Date: 8/14/01
Lisa Barno, Division of Fish and Wildlife

Reviewed by: Edward Buss Date: 8/14/01
Ed Buss, New Jersey Water Supply Authority

Reviewed by: Joe Wallin Date: 8/17/01
Joe Wallin, NJDHSS Inorganic Testing Lab.

- 1.0 Project Name:
Round Valley/Spruce Run Reservoir Monitoring Project
- 2.0 Project Requested By:
N.J. Legislature under A2793 amending R.S. 58:4-1
- 3.0 Date of Request:
January, 2001
- 4.0 Date of Project Initiation:
August, 2001
- 5.0 Project Officer:
William Honachefsky, Section Chief
Bureau of Freshwater and Biological Monitoring
- 6.0 Quality Assurance Officers:
- 6.1 Overall
Marc Ferko, NJDEP Office of Quality Assurance
- 6.2 N.J. Department of Health and Senior Services
Joseph Mierzwicki, Manager, Office of Quality Assurance

7.0 Project Description:

7.1 Objectives:

The New Jersey Legislature passed Assembly Bill No. A2793 amending R.S. 58:4-1 to provide for the maintenance of certain water levels in Spruce Run Reservoir in order to maintain recreational activities. These statutory amendments require that the water levels in Spruce Run Reservoir, located in Clinton and Union Townships, Hunterdon County, not be dropped lower than 8 feet from the normal pool elevation between the months of June 1 and August 31. Because Spruce Run has been the major source of water to supply and maintain the mandatory minimum 90 million gallons a day in the South Branch of the Raritan and the Raritan Rivers for the benefit of downstream water purveyors/users at Bound Brook, the reduction in flows from Spruce Run will require greater reliance upon Round Valley Reservoir water to make up the difference. Round Valley has no contributing waterways and is essentially a

pumped storage facility. Water is pumped into Round Valley from the South Branch of the Raritan River on an as needed basis, usually during Spring high flow periods. The Division of Fish and Wildlife presently manages an excellent cold water fishery at Round Valley which includes Lake Trout.

Section 8 (a) of Chapter 58:22-8.1 as amended by A2793 provides for the following: *"In order to ensure that safe yield is maintained and the drinking water quality standards adopted pursuant to the "Safe Drinking Water Act", P.L. 1977, c.224 (C.58:12A-1 et seq.) are met, the Commissioner of Environmental Protection shall provide for the continuous monitoring of the impacts associated with releasing water from Round Valley Reservoir for the purpose of sustaining water recreational activities at Spruce Run Reservoir*"

This sampling project is the New Jersey Department of Environmental Protection's response to this legislatively mandated monitoring requirement /objective.

7.2 Monitoring Design:

The number of monitoring stations and the parameters to be sampled were discussed at a meeting held on June 6, 2001 between representatives of the NJDEP's Bureau of Freshwater and Biological Monitoring, the Division of Fish and Wildlife's Bureau of Freshwater Fisheries, the Water Assessment Team of the Division of Science, Research and Technology, and the New Jersey Water Supply Authority.

7.3 Monitoring Locations, Parameters and Frequency of Collection:

Four monitoring locations were selected and include:

- In the South Branch of the Raritan River at or near the Hamden Pump Station. Site designated as SB-1.
- In Round Valley Reservoir approximately 100 to 200 feet Northeast of the South Tower inflow from the Hamden Pump Station. Site designated as RV-1.
- In Round Valley Reservoir approximately midway across the reservoir on an east-west transect. Site designated as RV-2.
- In Round Valley Reservoir on the same east-west transect approximately 200 feet off of the far easterly shore. Site designated as RV-3.

(See attached map for site locations)

All monitoring sites will be located accurately located by GPS.

Parameters to be sampled include:

- conductivity
- pH
- D.O.
- Temp.
- Secchi Disk
- Nitrite-N MDL¹ = 0.003 mg/l
- Nitrite-Nitrate N MDL = 0.02 mg/l
- NH3-N MDL = 0.03 mg/l

¹ MDL = Method Detection Limit

- i) TKN MDL = 0.03 mg/l
- j) Total P MDL = 0.03 mg/l
- k) Ortho P MDL = 0.02 mg/l
- l) Chlorophyll 'a'
- m) TSS MDL = 1.0 mg/l
- n) Ca+ MDL = 100 ug/l
- o) Hardness MDL = 5 mg/l

p) Flow (on South Branch of the Raritan River only). All stream flows will be supplied by the New Jersey Water Supply Authority (NJWSA). It should be noted that the pool level elevation of Round Valley Reservoir will be needed for each day of sampling. This will be supplied by the NJWSA.

q) Turbidity

Samples will be collected once a month in August, September and October, with an interval between samplings of no less than 25 days. Due to expected low nutrient concentrations in Round Valley Reservoir one field blank will be collected for the RV sample sites during the August and September samplings.

8.0 Sampling Procedures:

8.1 Sample Collection:

At all sites conductivity, pH, D.O., Temp. Turbidity and Secchi disk will be field measurements. All other parameters will be collected in the appropriate containers supplied by the NJDHSS Environmental and Chemical Laboratory Services facility and delivered to that laboratory for analyses. At site SB-1 a composite sample will be collected using the depth integrated cross sectional collection methodology and a splitter churn. The predominantly used proportional sampling device for composite sampling is a hand held, sealed weight PVC narrow necked 1 liter bottle used only on streams where the velocity is less than 2 feet per second. The DH76 or DH 59 flow proportional samplers are used where the stream flows are more than 2 feet per second. A field determination will be made as to which sampling device will be used based on flows occurring on the day of sampling. At sites RV-1 through RV-3 a discrete set of samples will be taken at 3 different depths; (approximately 0-2 feet; approximately 8-10 feet; and approximately 60 to 100 feet) utilizing a Kemmerer type sampler or equivalent.

9.0 Laboratory Analyses:

All laboratory chemical analyses will be conducted at the NJDHSS Environmental and Chemical Laboratory Services facility in Trenton. This laboratory is certified by the NJDEP's Office of Quality Assurance for the requested parameters. Their analytical and quality assurance procedures are documented in their "Standard Operating Procedures Manual, April, 2000 Revision". All chlorophyll "a" samples

will be analyzed at the Bureau of Freshwater and Biological Monitoring's laboratory located at 35 Arctic Parkway in Ewing Township.

10.0 Field Performance Audits:

The Bureau of Freshwater and Biological Monitorings' field samplers are certified by the NJDEP's Office of Quality Assurance (OQA) for the collection of all of the field parameters specified. (The OQA intends to conduct a field audit of BFWBM personnel sometime during the duration of this project.) Bureau personnel are also audited annually by the U.S. Geological Survey's Quality Assurance personnel.

11.0 Data Quality Requirements:

11.1 Field Measurements:

Bureau of Freshwater and Biological Monitorings' certified SOPs for field measurements and calibrations.

NJDEP Field Sampling Procedures Manual (1992) Chapter 6B

N.J.A.C. 7:18 – Regulations Governing Laboratory Certification and Standards of Performance.

Temperature Measurements: Operating Procedures (YSI 1979)

pH measurements: According to the Beckman pH operating manual , calibrate once in the morning and another check during the day.

Conductance: Meter calibrated at beginning and end of each day with appropriate standard for sample range.

D.O.: Meter calibrated in accordance with instruction manuals for either YSI Model 58 or Orion Model 1230.

Turbidimeter: HACH 2100P Turbidimeter – calibrated in field according to manufacturer's instruction manual.

The results of the daily pH standardizations, D.O. air calibrations, and specific conductance calibrations will be recorded on the field calibration forms, as will the temperature ASTM-QC checks and D.O. Winkler checks.

12.0 Data Representativeness

See Section 8.1

13.0 Data Comparability

Data results will be comparable for all sites as the same sampling techniques, analytical methods, quality control and data reporting will be used.

13.1 Comparability of Data with Historical Data

As discussed at the June 6, 2001 meeting referenced in Section 7.2 above, the data collected from this project will be compared with historical data, if available, collected from earlier samplings of Round Valley Reservoir water by the Division of Fish and Wildlife or other agencies.

14.0 Data Completeness

All samples are needed to complete the project.

15.0 Sample Containers, Preservation and Holding Times

15.1 Sample Container/Equipment Cleaning

The splitter churn and proportional sampling device used to collect samples at Site SB-1 will be cleaned in the laboratory prior to field sampling using the following procedures:

- a) Non-phosphate detergent plus lab grade tap water wash;
- b) Lab grade water rinse;
- c) Distilled/deionized water rinse;
- d) Air dry.

The Kemmerer sampler to be used at sites RV-1 through RV-3 will initially be cleaned in the BFWBM laboratory prior to field use. As the sampling proceeds to the 2 remaining RV sites, field cleaning between sites will be accomplished as outlined in steps a through c immediately above. Rinse waters and wash waters from field cleaning procedures will be collected in sealed containers and taken back to the BFWBM laboratory for proper disposal.

For all parameters, sample container, preservation and holding times will conform with the NJDHSS Standard Operating Procedures Manual, April, 2000 Revision.

16.0 Sample Custody Procedures

Chain of Custody forms and procedures will not be used for this project, since the ambient data will not be used for discharge permits or enforcement actions.

17.0 Data Validation

Bureau of Freshwater and Biological Monitoring personnel will scrutinize the laboratory data for anomalous results when received, and will review the field measurement data on the day collected for similar anomalies. If anomalous results for field parameters are obtained, the meter will be immediately recalibrated and the station retested.

18.0 Data Reporting

Validated data will be provided in a mutually agreeable format to the appropriate participants in this study including the Water Assessment Team in the Division of Science, Research and Technology; the Bureau of Freshwater Fisheries in The

Division of Fish and Wildlife; and the New Jersey Water Supply Authority. All valid data will be entered by BFWBM staff into the STORET program.

19.0 Corrective Action

If corrective action is required during this monitoring project, this project plan will be revised and redistributed.

