
**QUALITY ASSURANCE PROJECT PLAN
FOR SPECIAL STUDY OF
DISSOLVED OXYGEN CONCENTRATIONS IN
THE JACKSON RIVER WATERSHED
ALLEGHANY COUNTY AND COVINGTON CITY, VA**

**Commonwealth of Virginia
Department of Environmental Quality
Blue Ridge Regional Office
901 Russell Drive
Salem, VA 24153**

Document Approval Initials:

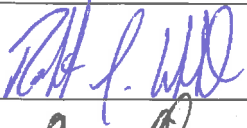
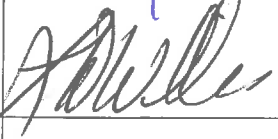
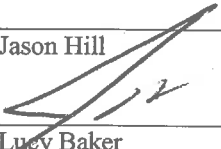
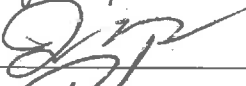
TITLE	NAME	DATE	APPROVAL
Office Director / BRRO Regional Director	Robert Weld	4/25/19	
Regional Manager / BRRO Regional Water Planning & Monitoring Manager	Larry Willis	4/29/19	
Project Manager / BRRO WQMA Team Lead	Jason Hill 	4/25/2019	
Project Manager / BRRO Regional TMDL Coordinator	Lucy Baker	4/25/2019	
VADEQ Water Quality Monitoring Quality Assurance Officer	James Beckley 	4/25/2019	
Project Manager/ West Rock Environmental Manager	Roseann Lee	4/25/2019	
Project Manager/ West Rock Director of Environmental Services	James Taylor	4/25/19	
Field Team Coordinator/ 3 rd Party Technician	Kerry McAvoy ONE Environmental Group	4/25/19	

TABLE OF CONTENTS

1.	PROJECT MANAGEMENT	5
1.1.	Project/Task Organization	5
1.2.	Problem Definition/Background	5
1.3.	Project Task/Description.....	6
1.4.	Project/Task Description.....	7
1.5.	Quality Objectives and Criteria for Measurement Data	8
1.6.	Special Personnel Training Requirement.....	8
1.7.	Documentation and Records.....	8
2.	MEASUREMENT/ DATA ACQUISITION	10
2.1.	Experimental Design.....	10
2.2.	Field Sampling Methods Requirements.....	12
2.3.	Field Corrective Action.....	15
2.4.	Sample Handling and Custody.....	15
2.5.	Quality Control Requirements	15
2.6.	Instrument and Equipment Testing, Inspection, and Maintenance Requirements.....	15
2.7.	Inspection/Acceptance Requirements for Supplies and Consumables	15
2.8.	Data Management	15
3.	OVERSIGHT AND ASSESSMENT	16
3.1.	Technical System Audits (TSAs).....	16
4.	DATA VALIDATION AND USABILITY	16
4.1.	Data Review, Validation, and Verification.....	16
4.2.	Validation and Verification Methods.....	16
4.3.	Data Reduction, Analysis and Interpretation in Preparation of the Final Report	16
5.	REFERENCES	17

Distribution List

TITLE	NAME
Office Director / BRRO Regional Director	Robert Weld
Regional Manager / BRRO Regional Water Planning & Monitoring Manager	Larry Willis
Project Manager / BRRO Regional TMDL Coordinator	Lucy Baker
Project Manager/ BRRO WQMA Team Lead	Jason Hill
Project Manager/ West Rock Director of Environmental Services	James Taylor
Project Manager/ West Rock Environmental Coordinator	Roseann Lee
VADEQ Water Quality Monitoring Quality Assurance Officer	James Beckley
Field Team Coordinators	Kerry McAvoy (ONE Environmental), Lucy Baker, Roseanne Lee
Data Users	Lucy Baker Jason Hill

1. PROJECT MANAGEMENT

1.1. Project/Task Organization

1.1.1. Management Responsibilities

1.1.1.1. Office Director / Regional Director

The office or regional director, Robert Weld, is responsible for the final approval of the Quality Assurance Project Plan (QAPP), including all associated monitoring costs.

1.1.1.2. Regional Manager / BRRO Regional Water Planning and Monitoring Manager

The regional manager, Larry Willis, is responsible for the approval of the monitoring project design and overseeing TMDL and monitoring project activities.

1.1.1.3. Project Managers

The Project Managers, Lucy Baker, Jason Hill, Roseann Lee and James Taylor are responsible for project design and performing or overseeing data evaluation activities.

1.1.1.4. Field Team Coordinator (FTC)

The FTCs, Lucy Baker, Roseann Lee and Kerry McAvoy are responsible for monitoring and directing the field effort. The FTC will ensure that the field technical staff is properly trained and equipped to execute the field sampling methods and procedures, and that the QA/QC procedures described in this QAPP are followed. There are three FTCs because DEQ, West Rock, and ONE Environmental Group will be sharing the monitoring responsibilities depending on the sampling season. See section 2.1 for more details.

1.1.1.5. Water Quality Monitoring (WQM) Quality Assurance Officer

The WQM QA Officer, James Beckley, works independently of the Project Managers and will report on the adequacy, status, and effectiveness of the QA program to the Project Manager, conduct audits of field activities, and ensure that corrective action, if necessary, is properly implemented and documented.

1.1.1.6. Field Staff

The field staff is responsible for all field activities including preparation and calibration of equipment, preparation and organization of sampling equipment and containers, collection of samples, packaging and preparation of samples for transportation to the contract lab and any other assignments as needed.

1.2. Problem Definition/Background

A 11.36-mile segment of the Jackson River from the West Rock paper mill main processing outfall downstream to just above the Low Moor Community, located in Alleghany County, is listed on Virginia's 2016 303(d) list, as not supporting the Aquatic Life Use standard due to dissolved oxygen violations. The original listing was based on data from 1998 at 2-JKS022.15, where 222 excursions of the minimum 4.0 mg/L Water Quality Standard criterion from 481 measurements. Since this data was collected, a TMDL was conducted for nutrients in response to the biological communities observed. Along with nutrient

reductions from point source dischargers, a flow augmentation plan was designed and implemented in collaboration with DGIF, WestRock, DEQ, and USACE to better represent natural storm events and introduce more variability to summer and fall flows in the Jackson River. As a result of these changes, biological communities have improved and algae have been reduced likely leading to higher dissolved oxygen levels in early morning hours and less diurnal dissolved oxygen variations. The goal of this effort is to provide data to the Department to confirm and quantify the improvement in dissolved oxygen for use in a de-listing effort on this reach of the river. This data could also be used by DEQ in other efforts associated with assessments of the benthic community.

1.3. Monitoring History

1.3.1. DEQ Biological Monitoring History

Regional biologists have historically conducted semi-annual (spring and fall) benthic macroinvertebrate sampling and habitat assessments at stations 2-JKS030.65, 2-JKS023.61, 2-JKS018.68, 2-JKS013.29, and 2-JKS006.67. The stations are listed below in Table 1.

1.3.2. DEQ Ambient Monitoring History

Ambient monitoring is conducted at JKS044.10, 2-JKS030.65, 2-JKS023.61, 2-JKS018.68, 2-JKS013.29, and 2-JKS006.67. The stations are listed below in Table 1.

Table 1. Stations on Jackson River

STATION	DESCRIPTION	Latitude	Longitude	DEQ Ambient	DEQ Biological
2-JKS044.10	Jackson River below Gathright Dam at gage	37.95	-79.95	Yes	No
2-JKS030.65	Jackson River at Rt. 687 Bridge – Clearwater Park	37.84	-79.99	Yes	Yes
2-JKS023.61	Jackson River at City Park – Covington at gage	37.79	-80.00	Yes	Yes
2-JKS018.68	Jackson River at Rt. 18 Bridge at Covington	37.76	-79.987	Yes	Yes
2-JKS013.29	Jackson River off Rt. 696 above Low Moor	37.78	-79.93	Yes	Yes
2-JKS006.67	Jackson River at low water bridge near Dabney Lancaster Community College	37.81	-79.85	Yes	Yes

This plan includes monitoring at stations that have been monitored by DEQ in the past, but are not necessarily assessed on a yearly basis. DEQ intends to continue its annual ambient and biological monitoring through the ambient and trend monitoring programs. The stations to be monitored in this effort are identified in Tables 2 and 3.

1.3.3. USGS History

There are two gaging stations in the Jackson River watershed. USGS gaging station 02011800 is located on the Jackson River below Gathright Dam near Hot Springs, VA. USGS station 02013100 is located on the Jackson River below Dunlap Creek at Covington. Real-time flow data for these gages are available on-line from the USGS website at the following URL: <http://waterdata.usgs.gov>.

1.4. Project/Task Description

This section describes the project tasks and work schedule.

1.4.1. Project Tasks

Task 1. The project team selects sample locations and establishes protocols for monitoring time and frequency.

Task 2. The Project Manager develops the Quality Assurance Project Plan (QAPP). The QAPP must describe the whole project in detail. The QAPP must be approved prior to implementation. See page 2 for approval initials.

Task 3. The field staff will collect field parameters including temperature, dissolved oxygen, and conductivity. The FTC will oversee the field staff in setting up the yearly schedule and monthly run schedule in CEDSWQM. The sampling procedures are presented in Section 2.2.

Task 4. The WQM QA Officer will oversee QA of the field data collected and audit calibration sheets from all field collectors.

Task 5. The FTC, Project Managers, and when necessary the QA Officer will meet to discuss logistics and results.

Task 6. The WQM QA Officer, FTC and laboratory QA Officer will audit field and laboratory activities throughout the project. These technical systems audits are further described in Section 3.

Task 7. The Project Managers will summarize the results when the data have all been collected, validated, approved, and analyzed.

Task 8. The Project Manager will submit a final report and assessment of data to support keeping or delisting the DO impairment on the section of Jackson River covered by this special study.

1.4.2. Work Schedule

Table 2 shows the work schedule for this study.

Table 2. Work Schedule

Task	Description	Schedule
1	Establish stations, determine sample collection logistics	January 2019
2	Develop QAPP	March 2019
3	Collect field data	April 2019 – March 2021
4	Data validation	April 2019 – March 2021
5	Quarterly meetings with project group	April, August, November 2019; February, April, August, November 2020; February, April, August 2021
6	Auditing	April 2019 – April 2021
7	Review data	May –June 2021

Task	Description	Schedule
8	Submit final report that will either support or reject delisting of the Jackson River DO impairment	December 2022

1.5. Quality Objectives and Criteria for Measurement Data

Data produced by this survey are used for evaluating the environmental condition of State waters or identifying other water quality problems. Data generated in this survey may be used to make decisions on the sources of the contaminants in the State water. Both field and laboratory personnel will work to achieve the highest possible level of confidence in the quality of study results by using established procedures to ensure the accuracy, precision, representativeness, comparability, and completeness of the data.

1.6. Special Personnel Training Requirement

No specialized training is required to conduct this study. Standard DEQ sampling procedures are to be followed. In general, all samplers will have reviewed the sampling methodology and current DEQ SOP manual and understand the procedures and methods to be utilized in this study.

1.7. Documentation and Records

Documentation of field and laboratory data is to be stored in the Comprehensive Environmental Data System Water Quality Module (CEDSWQM) or external spreadsheet that will be submitted to DEQ for consideration as Level III data. In addition, the QAPP and any final reports or conclusions are to be stored in CEDSWQM. This section identifies the documents and reports to be generated throughout the survey and the information to be included in these documents and reports.

Copies of the QAPP, any other interim or final reports, and data are to be made available online at <http://www.deq.virginia.gov>.

1.7.1. Field Documentation

Field documentation requirements are described in section 2.2.4. All the data collected in the field will be entered into CEDSWQM or an external tracking sheet that will be submitted to DEQ as Level III data on a monthly basis.

In summary, the field team will be responsible for maintaining the following documents:

- (1) Field Data Sheet or data collected electronically via the YSI EXO multi-parameter sonde using the KorEXO software; and
- (2) Quality Control Checks for pre- and post-calibration checks of field equipment.

1.7.2. Laboratory Documentation

There are no laboratory samples expected to be required for this study. Only field parameter data will be collected. However, if it is determined that samples are required to be collected and submitted to a laboratory, all below laboratory documentation requirements will be met.

1.7.3. Audit Reports

Technical system audits will be conducted as needed by the FTC during field activities or by the WQM QA Officer during field and calibration activities, and are described in more detail in Section 3. The auditors will prepare and provide a report that summarizes the observations and findings of each of these audits. As needed, the audit reports will be supplemented by a corrective action plan, to be implemented as soon as feasible, to correct each observation or finding of erroneous procedures.

Audit report recommendations will be incorporated into the final QAPP as appropriate.

1.7.4. Data Validation Reports

There are no laboratory samples expected to be required for this study. Only field parameter data will be collected. Only valid and certified data will be transferred to the VADEQ. Data validation flags will be applied to those sample results that fall outside of specific limits.

2. MEASUREMENT/ DATA ACQUISITION

2.1. Experimental Design

The Jackson River was listed for dissolved oxygen impairment in 1996. Approximately 11.36 miles of stream, from the West Rock main processing outfall downstream to just above the Low Moor community are impaired for DO. Implementation of the Jackson River nutrient TMDL by point source dischargers and flow augmentation of the Gathright Dam has resulted in improved water quality on the Jackson River as evidenced by healthier macroinvertebrate communities and reduced nutrient concentrations. Recent data showed that parts of the Jackson and upper James Rivers that previously had benthic impairments are no longer impaired, resulting in delisting a total 29.16 miles of the two rivers. However, there are still 14.37 miles that have yet to be delisted on the Jackson River. In light of the recent data, DEQ biologists suspect that the dissolved oxygen sag that contributed to the original DO impairment has been substantially reduced. To confirm this suspicion, a study is proposed to collect robust dissolved oxygen measurements (along with temperature and specific conductivity) throughout two (2) full years (April 2019 - April 2021). Field parameters will be collected during early morning hours (6am - 10am) when dissolved oxygen is expected to be at its lowest. During more stressful periods (September – November 15) when flows are lower and temperatures are higher, a higher sampling frequency of three (3) times per week will occur. Due to limited staff availability a third-party technician from ONE Environmental Group, will collect data during these months. During less stressful seasons, winter and spring (December - May), one sample per month will occur. Field staff from DEQ and West Rock will alternate who collects measurements during the winter months. For the summer sample season (June-August) weekly monitoring at pre-determined stations will occur. West Rock field staff will collect measurements during summer months. Additionally, once in September and once in October, extensive sampling (one sample collected per each three (3) hour time zone as described below) will occur at two (2) of the stations for three (3) weekdays in a row to understand diurnal dissolved oxygen effect.

We propose collecting field measurements at the following stations on the Jackson River: 2-JKS026.01, 2-JKS023.61, 2-JKS022.78, 2-JKS022.15, 2-JKS021.09, 2-JKS018.68, 2-JKS015.60. Table 3 contains location information for the stations used in this study. An outline of sampling frequency is in Tables 4 and 5 and a map of the sample stations is included in Figure 1. Quarterly meetings will be held with the project team to discuss the progress of the project and preliminary data.

For all data collected other than the aforementioned diurnal effect samples, if DO measurements collected in the first morning time zone (6am–9am) are below 5.0 mg/L, follow-up monitoring will be conducted during the day to understand if the low DO observed is a chronic issue or single occurrence as described below.

If morning DO is <5 mg/L at any station during any of the monthly samples for that season, conduct sampling at all stations in the second and third three (3)-hour time zones (9am-12pm and 12pm-3pm). Additional samples may be collected in the fourth three (3)-hour time zone (3pm-6pm) if desired and will be included in the average for that day.

If morning DO is <5 mg/L at any station during the summer weekly sampling, collect DO measurement from 2-JKS022.15 as soon as practicable and then conduct sampling at all stations (2-JKS022.78, 2-JKS022.15, 2-JKS021.09, and 2-JKS018.68) in the second and third three (3)-hour time zones (9am-12pm and 12pm-3pm). Additional samples may be collected in the fourth three (3)-hour time zone (3pm-6pm) if desired and will be included in the average for that day.

If morning DO is <5 mg/L at any station during the fall three (3) times per week sampling, conduct sampling at all stations (2-JKS022.78, 2-JKS022.15, 2-JKS021.09, 2-JKS018.68, and 2-JKS015.60) in the second and third three (3)-hour time zones (9am-12pm and 12pm-3pm). Additional samples may be collected in the fourth three (3)-hour time zone (3pm-6pm) if desired and will be included in the average for that day.

Table 3. Monitoring Stations for Study.

Waterbody Name	Station ID	Description	Latitude	Longitude	Sample Method
Jackson River	2-JKS026.01	Covington Water Filtration Plant	37.811111	-79.988889	Wade/ Streambank
Jackson River	2-JKS023.61	At USGS gauge 02013100	37.788611	-80.000833	Wading/ Streambank
Jackson River	2-JKS022.78	Upstream side of Route 154 bridge	37.778333	-79.991111	Bridge
Jackson River	2-JKS022.15	Industrial Park Behind Wal-Mart	37.767363	-79.9887	Wading/ Streambank
Jackson River	2-JKS021.09	South Rayon Drive crossing	37.761111	-80.000833	Bridge
Jackson River	2-JKS018.68	Idlewilde/Rt. 18 Bridge	37.757	-79.9875	Bridge
Jackson River	2-JKS015.60	Behind Mallow Mall	37.771667	-79.966389	Wading/ Streambank

Figure 1. Map of the Jackson River DO impairment and proposed monitoring stations

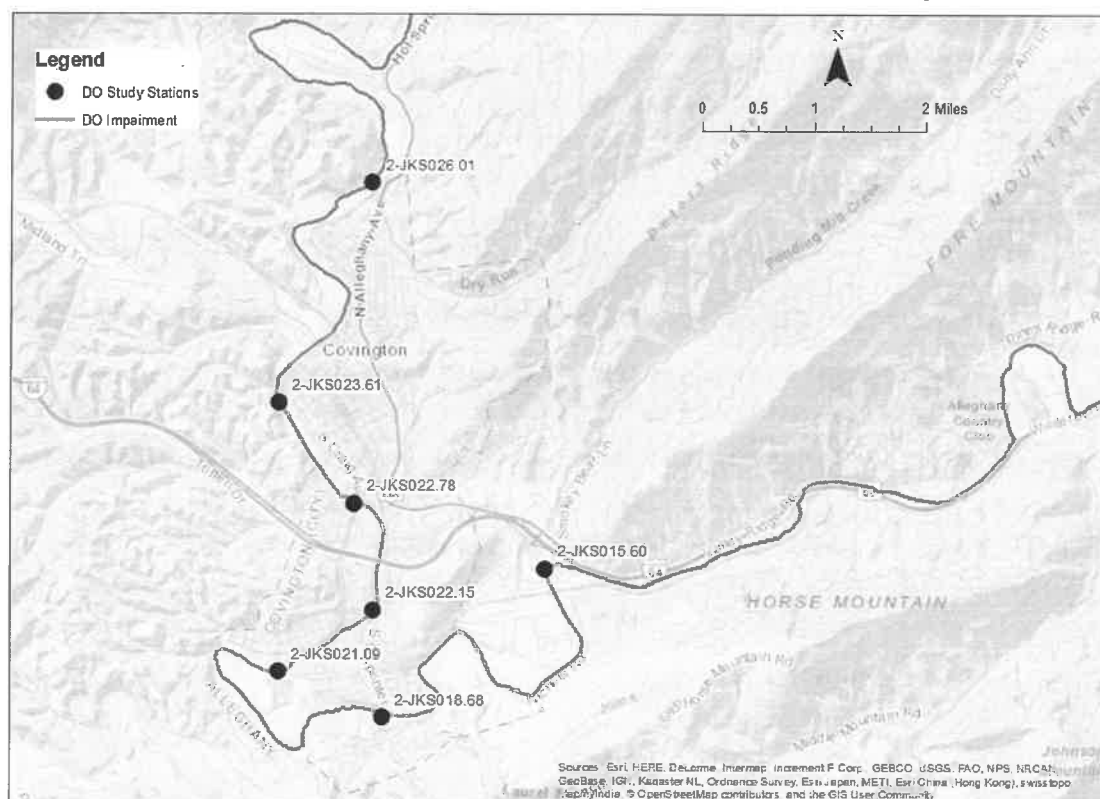


Table 4. Physical monitoring schedule and frequency for each station – Summer and Winter/Spring Seasons

		Summer		Winter/Spring
Station ID	Description	15 June- August		Dec. - May
2-JKS026.01	Filtration plant	1/ month		1/month
2-JKS023.61	Playground	1/month		1/month
2-JKS022.78	Fudges Bridge	1/month	1/week	1/month
2-JKS022.15	Industrial Park	1/month		1/month
2-JKS021.09	Hercules	1/month	1/week	1/month
2-JKS018.68	Idlewilde/Rt. 18	1/month	1/week	1/month
2-JKS015.60	Behind Mallow Mall	1/month		1/month

Table 5. Physical monitoring schedule and frequency for each station – Fall Season

		Fall	
Station ID	Description	Sept. – Nov 15	
2-JKS026.01	Filtration plant	1/ month	
2-JKS023.61	Playground	1/month	
2-JKS022.78	Fudges Bridge	Potentially collect diurnal data once a month to understand diurnal effect	3/week
2-JKS022.15	Industrial Park		3/week
2-JKS021.09	Hercules		3/week
2-JKS018.68	Idlewilde/Rt. 18		3/week
2-JKS015.60	Behind Mallow Mall		3/week

Note: If morning DO <5 mg/L at any station, the protocol listed above in Section 2.1 will be followed.

2.2. Field Sampling Methods Requirements

This section briefly describes the field procedures for sample collection. A more detailed description is provided in the most current version of the Standard Operation Procedures (SOP) manual for the Department of Environmental Quality (Office of Water Quality Assessment).

2.2.1. Preparation for Field Work

Before field work begins, the field staff will ensure that the necessary equipment is cleaned, calibrated and in good working order.

2.2.2. Sampling Preparation and Procedures

A specified series of procedures, described below, must be followed for sampling. However, in the event of extraordinary circumstances whereby deviation from any established procedures is required, these deviations must be well-documented.

Sampling will follow procedures listed in section 2.2.2.2 of this document.

2.2.2.1. Sampling Preparation

All sampling equipment preparation and cleaning procedures found in the current DEQ SOP manual will be followed. All field calibration and testing procedures outlined in the current DEQ SOP manual will be followed.

Prior to sample collection each morning, the DO probe of the sampling equipment will be calibrated according to the current DEQ SOP manual and equipment manual. The DEQ-provided oxygen saturation chart and current local barometric pressure will be utilized to ensure calibration is accurate and that there is not a calculated difference of 0.10 mg/L or more and 0.50 mg/L or more for post checks. If this does occur, the equipment will be recalibrated. The equipment may also be recalibrated at any point during the sampling day if needed.

Calibrations will be documented on a calibration log provided in Appendix A.

Additionally, a post-check of the sampling equipment will be performed at the end of each sampling day within four (4) hours of collecting the last sample. The DEQ-provided oxygen saturation chart and current barometric pressure will be utilized to ensure post-calibration is accurate and that there is not a calculated difference of greater than 0.50 mg/L. If this does occur, the data from the time the equipment was last calibrated will be removed from the data set.

2.2.2.2. Sampling Procedures

Flow measurements, when required, will be collected using the nearby USGS gage stations. Sampling will be conducted at each station based on the safest and most effective option available for that location (i.e. wading, streambank sampling, or collecting from a bridge). For locations where wading will occur, DO sample collection will occur in the middle third of the river during base or low flow. During high flow or high turbidity, streambank sampling will be utilized at stations where there is no bridge to sample from to assure the safety of the sampler. If the sampler deems it is unsafe to wade or sample from the streambank, only stations sampled from a bridge will be sampled that day.

For locations where samples must be collected by wading, the field team shall not sample by wading if the discharge is above 500 cfs at USGS gage 02013100, Jackson River BL Dunlap Creek at Covington, VA (https://waterdata.usgs.gov/va/nwis/uv?site_no=02013100). Streambank samples may be collected in lieu of wading if the sampler deems wading to the middle third of the channel to be unsafe. During the weeks where the Gathright Dam will have a large pulse release, sampling will not be conducted on Wednesdays and sampling will be limited to either Monday/Tuesday or Thursday/ Friday. The project teams will meet in the spring to discuss and identify the weeks were pulses will occur. If a scheduled pulse does not occur, sampling will be conducted under normal sampling frequencies (Table 4 and 5).

The field team shall also not sample at locations where wading is required if turbidity is elevated to the point where the sampler cannot see the bottom of the river and does not feel it is safe to sample. It is at the discretion of the field team to make decisions based on safety considerations to not sample on a given day or location due to any perceived unsafe condition. These instances will be well documented by the field team.

As indicated in the DEQ SOP manual, for sampling locations from a bridge, in-situ measurements will be collected by dropping the sonde off bridge with a long cable or if the conditions are hazardous to the equipment, water will be collected from a stainless steel bucket. Direct in-situ measurements are preferred; however, bucket methods will be accepted if the sampler deems the conditions are hazardous to the equipment. If bucket sampling is conducted then the sample must be taken within 2 minutes of taking the sample and the sampler must achieve minimal splashing.

2.2.3. Sample Containers, Preservation, and Holding Times

There are no laboratory samples expected to be required for this study. Only field parameter data will be collected.

2.2.4. Field Documentation

All necessary field documentation, including observations, measurements, and any other documentation pertaining to the survey will be kept by the field sampling team. Entries will be made in blue or black indelible ink. Corrections will consist of a single line-out deletion and/or corrections that are initialed.

2.2.5. Sample Numbering System

There are no laboratory samples expected to be required for this study. Only field parameter data will be collected. Field readings are recorded in a manner that samples are linked to the station they were collected from.

2.2.6. Field Forms

The field sampling team will be responsible for maintaining field data sheets. An entry will be made on the field data sheet for each sample collected. The intent of the field data sheet is to document the place, date and time for each sample collected. The same data sheet entry shall record any known deviation from the specified sampling described herein, and other pertinent field observations associated with the samples. Field data collection may be recorded on the data collection log or may be collected electronically utilizing the YSI Sonde KorEXO software. Data collected by West Rock or ONE Environmental will be submitted electronically to DEQ for entry into the CEDS database.

The DO level that will be documented at each sampling location during each sampling event will be the value on the hand-held YSI instrument or on the computer software when the DO has stabilized for 1-2 minutes. When sampling from a bucket, DO shall be recorded within 2 minutes.

Additionally, if the DO level collected in the first time zone of a sampling event is <5.0 mg/L, subsequent sampling will be performed as outlined in Section 2.1 and an average of the values will be utilized as the documented DO level for that station for that day.

2.3. Field Corrective Action

Corrective actions will be initiated, at the direction of the WQM QA Officer, if the field team is not adhering to the sampling or documentation SOPs, or if laboratory results indicate interference, systematic contamination, or problems with sample handling protocols.

2.4. Sample Handling and Custody

There are no laboratory samples expected to be required for this study. Only field parameter data will be collected. However, if it is determined that samples are required to be collected and submitted to a laboratory, all below sample handling and custody and analytical method requirements will be met.

The samples are preserved as described in CEDSWQM. Upon reaching the laboratory, samples will be handled in accordance with the laboratory sample handling procedures.

2.4.1. Analytical method Requirements

All sample analyses will be conducted using either standard, approved analytical test methods or methods acceptable to DEQ. If laboratory analysis is performed, analytical procedures and standard test methods used by the laboratory will be identified in the lab catalog of CEDSWQM.

2.5. Quality Control Requirements

There are no laboratory samples expected to be required for this study. Only field parameter data will be collected. However, if it is determined that samples are required to be collected and submitted to a laboratory, all below quality control requirements will be met.

2.5.1. Field Quality Control Samples

All field quality control samples will be collected in accordance with the current DEQ SOP manual. Due to the project involves two non-DEQ organizations, a side by side sample event with each partner will be performed each year of the study to verify the field equipment used has readings comparable to DEQ instrumentation.

2.6. Instrument and Equipment Testing, Inspection, and Maintenance Requirements

The field staff will be responsible for the maintenance of equipment used to measure all the requested water quality field parameters, in accordance with the current DEQ SOP manual. This includes an annual check of sensor accuracy of the field probes by either comparing against validated equipment or references.

2.7. Inspection/Acceptance Requirements for Supplies and Consumables

The field staff will be responsible for inspecting incoming equipment and supplies to be used in the special study before placing them in service.

2.8. Data Management

Project data will include computer and handwritten entries. Field observations, measurements and records such as sample collection and shipping information will be recorded on hardcopy forms, and in CEDS.

3. OVERSIGHT AND ASSESSMENT

3.1. Technical System Audits (TSAs)

TSAs of field activities will be conducted by the FTC and/or the WQM QA Officer. TSAs of laboratory operations will be performed by the laboratory QA Officer and/or the WQM QA Officer, if applicable.

Field TSAs focus on availability and proper use of field equipment; adherence to project-controlling documents for sample collection, identification, handling, and transport; proper collection and handling of QC samples. Laboratory TSAs include reviews of sample handling procedures, internal sample tracking, SOPs, analytical data documentation, QA/QC protocols, and data reporting.

4. DATA VALIDATION AND USABILITY

4.1. Data Review, Validation, and Verification

The purpose of this section is to describe the process for documenting the degree to which the project objectives were met, individually and collectively, and to estimate the effect of any QA/QC procedural deviations on the ability to use the data.

Each of following areas will be reviewed (as applicable):

- (1) Sample collection procedures
- (2) Sample handling
- (3) Analytical procedures
- (4) Quality control verification of equipment blanks (EB) and field splits (S1 & S2).

4.2. Validation and Verification Methods

There are no laboratory samples expected to be required for this study. Only field parameter data will be collected. However, if it is determined that samples are required to be collected and submitted to a laboratory, all below data validation requirements will be met.

Data validation will be performed, reviewed and interpreted by the WQM QA Officer on an ongoing basis. Any analytical laboratory report will be reviewed for compliance with the applicable method and for the quality of the data reported. The data validation procedures are designed to identify biases inherent in the data including assessment of laboratory performance, overall precision and accuracy, representativeness, and completeness. Data validation flags from the laboratory will be applied, in the form of Remark Codes, to those sample results that fall outside of the QC acceptance criteria.

4.3. Data Reduction, Analysis and Interpretation in Preparation of the Final Report

After the project is complete, the Project Managers are responsible for collecting all the data, analyzing the data and preparing a written final interpretation to be included in the CEDS special study as the Final Report. A delist package will be constructed using the DO data and submitted to EPA for approval in

VADEQ's 2024 Integrated Report. Data collected from the study will be used in the 2024 Integrated Report to support or reject delisting the DO impairment on the monitored section of the Jackson River.

5. REFERENCES

DEQ. Standard Operating Procedures Manual for the Department of Environmental Quality. Office of Water Quality Assessment.

<https://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/WaterQualityMonitoring/QualityAssuranceQualityControl.aspx>

2001. EPA Requirements for Quality Assurance Project Plans. Office of Environmental Information. EPA QA/R-5. <https://www.epa.gov/quality/guidance-quality-assurance-project-plans-epa-qag-5>

**Appendix A:
Calibration Log Example**

WQM SOP
Revision No.: 20
Rev. Date: 6/5/2017

Multiprobe Cal Log Sheet Sonde Make/Model:

Sonde S/N:

Region:

Cal Type	Date/Time	Initial and Run ID	Temp C	BP (mmHg)	Chart DO	DO		Specific Conductivity Cond Std. (uS/cm)	Conductivity		pH		
						Meter DO	Cal DO		Cond Init/Cal	Cond	pH 7 Init/Cal	pH 4 or 10 Init/Cal	3 rd pH check Init/Cal
Pre													
Post													
Comments:					DO QA:			Cond QA:			pH QA:		
Pre													
Post													
Comments:					DO QA:			Cond QA:			pH QA:		
Pre													
Post													
Comments:					DO QA:			Cond QA:			pH QA:		
Pre													
Post													
Comments:					DO QA:			Cond QA:			pH QA:		
Pre													
Post													
Comments:					DO QA:			Cond QA:			pH QA:		

DO QA: YSI DO Gain -0.7 to 1.5, DO Charge 25 to 75. Cond QA: YSI Cell Constant 4.55 to 5.45 pH QA: pH 7 0 ±50 mV, pH 4 180 ±50 mV, pH10 -180 ±50 mV