



QA/QC REPORT FOR 2025 CLARK FORK RIVER MONITORING

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ACRONYM LIST

Acronym	Definition
B	data validation flag – blank contamination
°C	degrees Celsius
COC	chain of custody
DEQ	Department of Environmental Quality (Montana)
DQI	data quality indicators
DQO	data quality objective
H	data validation flag -holding time
J	data validation flag - estimated result value
LRL	lower reporting limit
MDWQD	Missoula County Water Quality District
MDL	method detection limit
mg/l	milligrams per liter
MS/MSD	matrix spike/matrix spike duplicate
QA/QC	quality assurance/quality control
QAPP	quality assurance project plan
QC	quality control
RPD	relative percent difference
SAP	sampling and analysis plan
SRP	soluble reactive phosphorus (alternative name to orthophosphate)
UM	University of Montana

1.0 INTRODUCTION

A data quality control (QC) review has been completed on all data collected in 2025 and submitted to Montana Department of Environmental Quality (DEQ) for the Clark Fork River-Pend Oreille Watershed Water Quality Monitoring Program. Monitoring activities were performed in accordance with the “*Clark Fork River Watershed Water Quality Monitoring Program from Headwaters to Below Cabinet Gorge Dam-Quality Assurance Project Plan (QAPP); Update for the 2023-2027 Sampling Program*”, and associated 2025 sampling and analysis plans (SAPs) for Avista, Clark Fork Coalition and the University of Montana. The scope of the QC evaluation was to evaluate documentation associated with sampling and measurement (i.e., field logbooks and site visit forms) and laboratory analytical results to verify data quality. The QC evaluation included a review of the data quality objectives (DQOs) and data quality indicators (DQIs) as outlined in the QAPP and an assessment of compliance with the DEQ Quality Assurance/Quality Control (QA/QC) process. The review also included:

- Review of field data sheets to verify calibration and to identify field notes that explain any deviations from the QAPP.
- Review of field notes and field data sheets for a data logic check and to identify any notes indicating deviations from the QAPP.
- Review of the sample delivery group to evaluate the overall quality of the data including reporting errors, data omissions, and suspect or anomalous values.

The QC review applies to the monthly and peak flow nutrient monitoring by Avista, the summer nutrient sampling by the Clark Fork Coalition (CFC), and benthic algae monitoring by the University of Montana (UM).

2.0 FIELD COMPONENTS

FIELD DOCUMENTATION

Avista

Avista provided detailed calibration logs and field forms as part of their data deliverable. The YSI meter was calibrated the same day as sampling, and the calibration sheets for each sampling event are very clear and include standard solution expiration dates. The instruments were not calibrated on the dates of the six peak flow monitoring events below Cabinet Gorge Dam (CFRPO-30).

Avista’s field forms included all the relevant field metadata including Sample IDs, Station IDs, site name, date/time, and personnel. All the fields were complete, and the forms were easy to read.

Clark Fork Coalition

CFC staff continued the sampling efforts of the Clark Fork River Water Quality Monitoring Program. CFC collected water samples according to the Clark Fork River (CFR) QAPP and SAP. CFC ensured that field staff involved with collecting field data were adequately trained in accordance with the CFR QAPP and SAP. DEQ staff accompanied CFC for the first sample event to ensure staff were trained in accordance with the CFR QAPP and SAP. Samples were collected, preserved, and stored as defined in the CFR SAP.

CFC field forms included all the relevant field metadata including sample IDs, station IDs, site names, date/times, and personnel.

University of Montana

The UM's field forms were in a consistent format and contained most of the relevant field metadata including sample IDs, site names, dates, and samples collected.

CHAIN OF CUSTODY FORMS**Avista**

Avista submitted chain of custody (COC) forms for each monthly nutrient and peak flow sampling date. None of them included a relinquished signature by Avista field personnel, but the lab reports provided a copy with the signatures in the data packages. All Avista's monthly nutrient sampling COC forms indicate the samples were transferred from a cooler with ice directly to the freezer.

The monthly nutrient samples were relinquished by the Avista field personnel three to thirty days after the samples were collected. The peak flow samples were relinquished by the field personnel three to twenty-one days after samples were collected. Completed COC forms including a receiving signature by Energy Laboratories in Helena were not received by DEQ from Avista, but the Energy Lab in Helena includes a copy of the signed COC forms with their data package. Cooler temperature at the time it was received by the lab was included on the lab copy of the COC.

Clark Fork Coalition

CFC submitted COC forms for each monthly nutrient sampling date to Energy Labs in Helena and the CFC monthly nutrient samples were relinquished by the field personnel to the lab from eight to twenty-nine days after the samples were collected. Completed COC forms including a receiving signature by Energy Laboratories in Helena were delivered by CFC, and Energy Labs in Helena includes a copy of the signed COC forms with their data package. The data was processed using the signed forms. Cooler temperature at the time it was received by the lab was included on the original COC and on the lab copy of the COC.

University of Montana

UM did not fill out COC forms for the benthic algae samples since the samples did not change hands and were always in UM's custody.

SAMPLE SITES

All the field forms from Avista, CFC and UM included site name, description, coordinates, and Station IDs that matched locations specified in the QAPP.

FREQUENCY OF FIELD BLANKS AND FIELD DUPLICATES

At least one field blank sample and one duplicate sample were collected for each nutrient monitoring event. For the peak flow monitoring below Cabinet Gorge Dam (CFRPO-30), one field blank sample and one field duplicate sample were collected. Both the field blanks and field duplicate samples were collected at or above the frequency of 10% of the total sampling as outlined in the QAPP. Field blanks and field duplicates were not required for chlorophyll samples.

3.0 SAMPLE HANDLING

PRESERVATION

Preservation methods were reviewed for all samples using the SAP, field forms, and lab reports. Table 3.1 summarizes the planned preservation methods.

Table 3.1 Sample Preservation Summary

Analytes	Method	Required Quantification Limit	Filtered?	Sample Volume	Container	Preservation and Storage	Holding Time
Total Persulfate Nitrogen	A4500 N-C	40 ug/l	N	250 ml	Acid-washed HDPE	Cool on ice in field	28 days
Total Phosphorus	EPA 365.1	2 ug/l	N	250 ml		H ₂ SO ₄ , Cool to ≤ 4 °C (on ice) in field	
Low level dissolved nitrate + nitrite-nitrogen (NO ₂ +NO ₃ -N)	EPA 353.2	2 ug/l	Y	250 ml		Filter, cool on ice in field, then freeze solid	45 days*
Dissolved ammonia-nitrogen (NH ₃ +NH ₄ -N)	EPA 350.1	10 ug/l	Y				
Soluble reactive phosphorus	EPA 365.1	2 ug/l	Y				

The reporting limits shown in Table 3.1 have been selected intentionally to maintain consistency with past years' RRLs for statistical trend analysis purposes. The project laboratory has confirmed that they can achieve these RRLs.

*(SRP hold time is 2 days if not frozen, and N+N and Ammonia is 28 days if not frozen)

All the coolers shipped by Avista personnel had solid or thawed ice. All the orthophosphate samples arrived frozen or partially thawed. The coolers arrived with a temperature ranging from 0.2° C to 6.0° C. One cooler was over the required maximum temperature of 4.4° C (6.0° C).

All the coolers transferred to DEQ by CFC personnel and delivered to Energy Labs in Helena by DEQ personnel had solid ice and frozen samples. The coolers with regular water samples arrived with a temperature ranging from 4.3 °C to 6.0 °C, with four of the coolers over the required maximum temperature of 4.4 °C. The Orthophosphate samples all arrived frozen, and the cooler temperatures ranged from -3.3 °C to 0.6 °C. The algae samples arrived at UM on ice and the samples were frozen at -20 °C. The samples were analyzed within 90 days of collection, following procedure.

HOLDING TIMES

Analytical holding times were reviewed for the Clark Fork River monthly, peak flow, and summer nutrient monitoring. All samples have a 28-day holding time if put on ice, but a 45-day holding time if frozen, except for orthophosphate. Orthophosphate samples have a 2-day hold time when not frozen or

after thawing, and a 45-day holding time when frozen. Orthophosphate, ammonia, and Nitrate-nitrite were frozen together. Total phosphorus was preserved, but not frozen and total persulfate nitrogen was not frozen. The following results were “H” flagged for exceeding the method holding times.

Table 3.2: Results H Flagged for Exceeding Method Holding Time (Avista)

Activity ID	Characteristic Name	Lab Method	Sample Date	Analysis Date	Req. Hold Time	Actual Hold Time
CFRPO-28-091025-S	Nitrate + Nitrite	353.2	09/10/2025	10/09/2025	28	29
CFRPO-29-091025-S	Nitrate + Nitrite	353.2	09/10/2025	10/09/2025	28	29
CFRPO-30-091025-QC-FB	Nitrate + Nitrite	353.2	09/10/2025	10/09/2025	28	29
CFRPO-30-091025-QC-FD	Nitrate + Nitrite	353.2	09/10/2025	10/09/2025	28	29
CFRPO-30-091025-QC-FD	Total nitrogen, mixed forms	4500-N-C	09/10/2025	10/14/2025	28	34
CFRPO-30-091025-S	Nitrate + Nitrite	353.2	09/10/2025	10/09/2025	28	29
CFRPO-30-031125-S	Total Phosphorus, mixed forms	365.1	03/11/2025	04/10/2025	28	30

Table 3.3: Results H Flagged for Exceeding Method Holding Time (Clark Fork Coalition)

Activity ID	Characteristic Name	Lab Method	Sample Date	Analysis Date	Req. Hold Time	Actual Hold Time
CFRPO-07-080625-S	Total nitrogen, mixed forms	4500-N-C	08/06/2025	09/09/2025	28	34
CFRPO-07-080625-S	Total Phosphorus, mixed forms	365.1	08/06/2025	09/09/2025	28	34
CFRPO-09-080625-S	Total nitrogen, mixed forms	4500-N-C	08/06/2025	09/09/2025	28	34
CFRPO-09-080625-S	Total Phosphorus, mixed forms	365.1	08/06/2025	09/09/2025	28	34
CFRPO-10-080625-S	Total nitrogen, mixed forms	4500-N-C	08/06/2025	09/09/2025	28	34
CFRPO-10-080625-S	Total Phosphorus, mixed forms	365.1	08/06/2025	09/09/2025	28	34
CFRPO-12-080625-QC-FD	Total nitrogen, mixed forms	4500-N-C	08/06/2025	09/09/2025	28	34
CFRPO-12-080625-QC-FD	Total Phosphorus, mixed forms	365.1	08/06/2025	09/09/2025	28	34
CFRPO-12-080625-S	Total nitrogen, mixed forms	4500-N-C	08/06/2025	09/09/2025	28	34
CFRPO-12-080625-S	Total Phosphorus, mixed forms	365.1	08/06/2025	09/09/2025	28	34
CFRPO-15.5-081125-S	Total nitrogen, mixed forms	4500-N-C	08/11/2025	09/09/2025	28	29
CFRPO-15.5-081125-S	Total Phosphorus, mixed forms	365.1	08/11/2025	09/09/2025	28	29
CFRPO-18-081125-S	Total nitrogen, mixed forms	4500-N-C	08/11/2025	09/09/2025	28	29
CFRPO-18-081125-S	Total Phosphorus, mixed forms	365.1	08/11/2025	09/09/2025	28	29

Activity ID	Characteristic Name	Lab Method	Sample Date	Analysis Date	Req. Hold Time	Actual Hold Time
CFRPO-2.5-080625-S	Total nitrogen, mixed forms	4500-N-C	08/06/2025	09/09/2025	28	34
CFRPO-2.5-080625-S	Total Phosphorus, mixed forms	365.1	08/06/2025	09/09/2025	28	34
CFRPO-26-081225-FB	Total Phosphorus, mixed forms	365.1	08/12/2025	09/23/2025	28	42
CFRPO-10-091125-QC-FD	Total Phosphorus, mixed forms	365.1	09/11/2025	10/21/2025	28	40
CFRPO-10-091225-QC-FB	Total Phosphorus, mixed forms	365.1	09/12/2025	10/21/2025	28	39

4.0 ANALYSIS

REQUIRED ANALYTICAL METHODS

All requested parameters specified in the SAPs were reported. The reported methods matched the methods in the QAPP and SAPs.

REQUIRED DETECTION LIMITS

The laboratory lower reporting limits (LRL) met the project-required detection limits defined in the QAPP and SAPs for all parameters.

Orthophosphate had a lower reporting limit (LRL) of 0.001 mg/l for 33 of the results, and 0.002 mg/l for 48 results. The 0.001 mg/L is lower than the 0.002 mg/L limit specified in the SAP. The lower limit resulted in no additional "J" flags for results between the LRL and MDL.

FIELD BLANKS

Results associated with a field blank are "B" flagged when the blank result is at or above the LRL. Non detects are not flagged. This year, neither Avista nor the Clark Fork Coalition had any blank results at or above the LRL, so no B flags were applied.

FIELD DUPLICATES

All field duplicates were within the data quality objective for relative percent difference (RPD). No "J" flags were applied for RPD.

REJECTED

No results were rejected.

GENERAL QUALITY CHECKS

Total phosphorus was compared to orthophosphate, and total nitrogen was compared to nitrate+nitrite plus ammonia. The results were reviewed to make sure the individual components were not more than the total by more than 10%. No results were flagged.

LABORATORY QC

Percent Recovery: The percent recovery for all lab samples, particularly the matrix spike and matrix spike duplicate (MS/MSD), should be within the low and high limits established by the QAPP (90/110%). If an MS/MSD result is outside the limits, the associated results are “J” flagged and include the comment “MS/MSD failed [high/low] (xx/xx%), expect [high/low] bias.” A result is considered associated if it is the same parameter and analyzed in the same lab batch as the MS/MSD.

Table 4.1: Results J Flagged for Low MS/MSD, Expect Low Bias (Avista)

Activity ID	Characteristic Name	Result Value (mg/l)	MS (%)	MSD (%)
CFRPO-30-100725-QC-FD	Total Phosphorus, mixed forms	0.016	89	89
CFRPO-30-100725-S	Total Phosphorus, mixed forms	0.013	89	89
CFRPO-29-091025-S	Nitrate + Nitrite	0.043	89	89
CFRPO-30-091025-QC-FD	Nitrate + Nitrite	0.007	89	89
CFRPO-30-091025-S	Nitrate + Nitrite	0.007	89	89

Table 4.2: Results J Flagged for High MS/MSD, Expect High Bias (Avista)

Activity ID	Characteristic Name	Result Value (mg/l)	MS (%)	MSD (%)
CFRPO-30-050125-S-PF-1	Total Phosphorus, mixed forms	0.007	111	112

Table 4.3: Results J Flagged for Low MS/MSD, Expect Low Bias (CFC)

Activity ID	Characteristic Name	Result Value (mg/l)	MS (%)	MSD (%)
CFRPO-07-092525-S	Nitrate + Nitrite	0.003	88 and 89	88 and 89
CFRPO-2.5-092525-S	Nitrate + Nitrite	0.015	88 and 89	88 and 89

5.0 QC SUMMARY

FLAGGED DATA

The overall project data had:

- 27 results “H” flagged for exceeding the holding time.
- 35 results “J” flagged for result value between the MDL and LRL.
- 1 result “J” flagged for MS/MSD failed high, expect high bias.
- 7 results “J” flagged for MS/MSD failed low, expect low bias.

COMPLETENESS

The overall project completeness rate was 100%, which was well above the 90% requirement set forth in the QAPP. All data are acceptable and may be used for analysis. With 1,784 total results, and 70 results flagged, approximately 3.9 percent of the data needs to be used with caution.

6.0 CORRECTIVE ACTIONS

As a result of the QA review, the following are corrective actions items for 2025:

- Develop plan of action to meet sample holding times.