Quinsam Coal Corporation – Q2 (July – September 2024)

For Effluent Permit PE: 7008

Environmental Department

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INTRODUCTION

During Quarter 2 (July 1st through September 30th) Quinsam Mine maintained the environmental obligations for permits PE: 7008 held with the Ministry of Environment and Climate Change Strategy and the Mines Act permit C-172. The mine continues to be operated in a "*care and maintenance*" mode with MNP LTD, formerly The Bowra Group Inc. as the Receiver and Manager of Quinsam Coal Corporation.

For Quarter 2 (Q2), environmental monitoring was completed as per stipulations found within the effluent permit PE:7008. There were no permit non-compliance events to report this quarter.

The Receiver submitted a Notice of Departure (NoD) request on June 4, 2024, to The Ministry of Energy, Mines, and Low Carbon Innovation (EMLI), pursuant to Section 10.1.18 of the Health, Safety and Reclamation Code for Mines in British Columbia (the Code), entitled '7-South (2-Mains) Underground Mine Test Flood for the Quinsam Coal Mine (C-172). The proposed mining activity includes completion of a test program to temporarily flood the Quinsam Coal Mine 7-South Area 2 (2-Mains) underground workings to confirm the mine's ability to flood, the extent of flooding and the environmental risks. The 7-South (2-Mains) Underground Mine Test Flood will be carried out as described in *7-South Underground Mine Test Flood Action Plan*, prepared by Lorax Environmental Services and dated May 3, 2024. On August 26th, 2024, a contractor (Drill Well) was onsite to install a cap and sampling port for an open borehole (QU14-10) leading into 7-South 2-Mains area. Once that was completed the flooding trail could commence.

Receiving Environment Monitoring Program (Lakes and Rivers): Concentrations for most parameters of interest (POI) including: aluminum (Al-D), boron (B-T), cadmium (Cd-D), cobalt (Co-T), iron (Fe T and D), lead (Pb), manganese (Mn-T), nickel (Ni-T), selenium (Se-D), silver (Ag-T), sulphate (SO_4-D), total suspended solids (TSS), and zinc (Zn-D)) were not elevated above British Columbia (B.C.) Water Quality Guideline's (WQG) for Freshwater Aquatic Life (FWAL) in the receiving environment, this quarter. Those parameters trending above WQG's include total arsenic (As-T) in the Iron River at IR8 and dissolved copper (Cu-D) in lakes (Middle Quinsam and Long Lake).

Groundwater wells, underground sumps, and dewatering wells throughout the 2 and 3-North, 2 and 3-South, 4-South, 5-South and 7-South mine areas were monitored. Groundwater and flooded mine voids water chemistry is compared to Schedule 3.2 in the Contaminated Sites Regulations (CSR).

There are certain parameters that continually trend above the CSR in groundwater, these include dissolved arsenic, chloride, sulfide as H_2S, sulphate and selenium. As-D is mostly observed in ex-situ formation groundwater. Dissolved selenium (Se-D) is observed periodically in the ex-situ, deep groundwater of QU11-05 D downgradient of the 2-North Mine, River Barrier Pillar (RBP), and 5-South mine. These parameters (except chloride) were observed in groundwater found outside (ex-situ) the mine footprint. Sulfide as H_2S, and dissolved sulphate are observed within the flooded mine voids.

Water levels and flow rates were dry or extremely low at most sites. Discharge from the three authorized discharge locations Settling Pond 1, (SP1 - E218582), Settling Pond 4 (SP4 - E207409) and 7-South Surface Discharge (7SSD - E292069) was limited this quarter. There has been zero discharge from 7SSD in multiple years. Pumping rates are slowed during drought conditions and pond water covers are increased to conserve water covers over Potentially Acid Generating (PAG) material. This procedure reduces discharge, decreasing the overall parameter loading and the potential for adverse aquatic impact in the receiving environment. The biological availability for parameters of concern is much lower than under constant discharge conditions. The Long Lake Seeps were dry throughout the quarter, and flows from LLE were also low.

The 2-North underground dewatering well pumps (1M2N and 5M2N) were turned off to conserve water from July 3rd until August 13th, respectively. The 5M2N faulted after a power outage and faulted upon restart on September 18th, 2024, due to degraded operating performance. The pump was replaced on October 29th and turned on to operate on October 31st. The other two remaining dewatering pumps (1M2N and 3M2N) were in operating condition.

NORTH WATER MANAGEMENT SYSTEM (NWMS):

Stage pumping / dewatering continued from 7-South Area 5 (7SA5) into 1-Mains 7-South (1M7S) sump, where it then pumps into the flooded 5-South mine with no further pumping occurring. Previously, the 5-South mine water (5SMW) was pumped into 3-Mains, 2-North underground mine (3M2N) until the pump failed in January 2022 and was not replaced. The 5SMW levels are monitored (Figure 1) to ensure water remains below the portal, 290 meters above sea level (m asl).

The North Water Management System (NWMS) consists of underground 2-North mine water pumped to surface and discharged into either Brinco brook or the 2-North pit pond, (WP). When discharged to Brinco brook, the combined water is released from the authorized discharge location, Settling Pond 4, with flows directed to the inlet of Middle Quinsam Lake. Refer to Figure 2 and Figure 3, for underground water levels in 2-North mine.

Pumping systems include the following:

- 3-Mains 2-North (3M2N), dewatering 3-Mains area of 2-North mine
- 2-North Portal Sump (2NPS) collects seepage water from the tailings dam and water pumped from underground 2-North mine
- 1-Mains, 2-North (1M2N) dewatering 1-Mains area of 2-North mine
- 5-Mains 2-North (5M2N) dewatering 5-Mains area of 2-North mine.

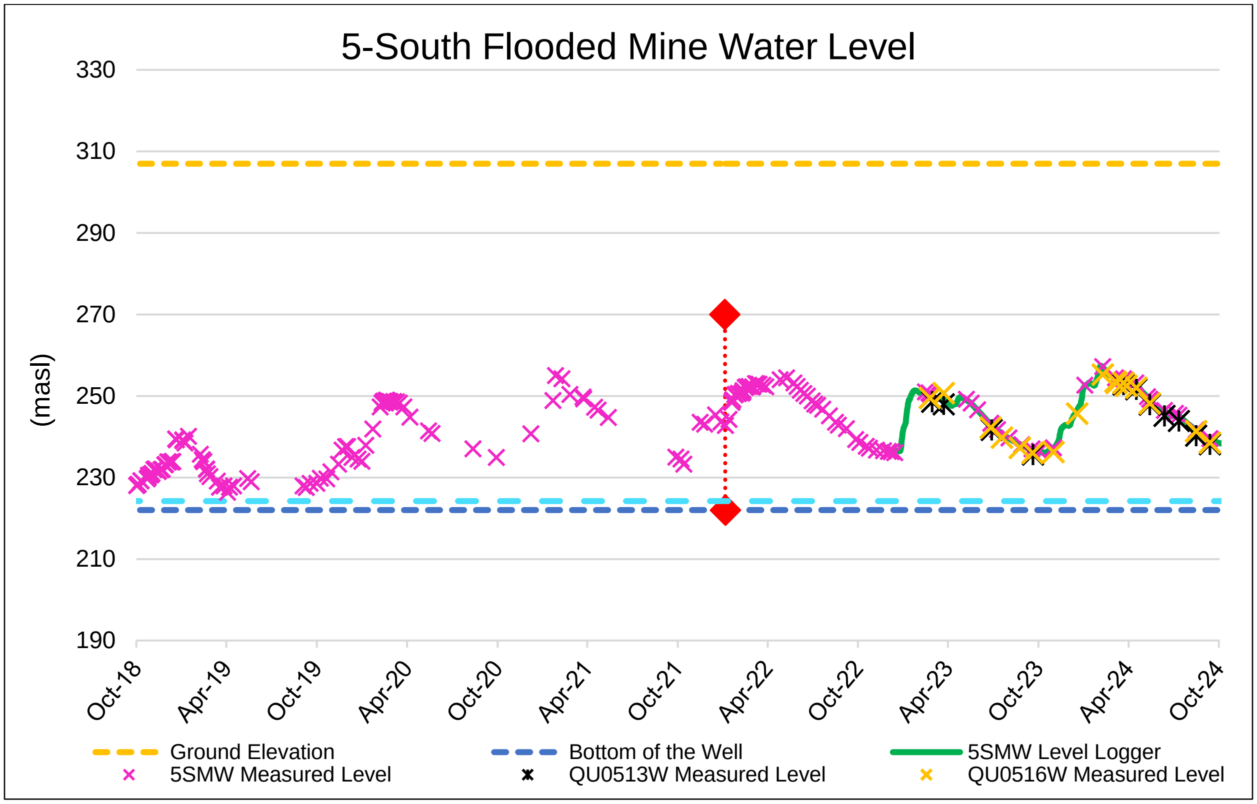


Figure 1: 5-South Flooded Mine Water Level

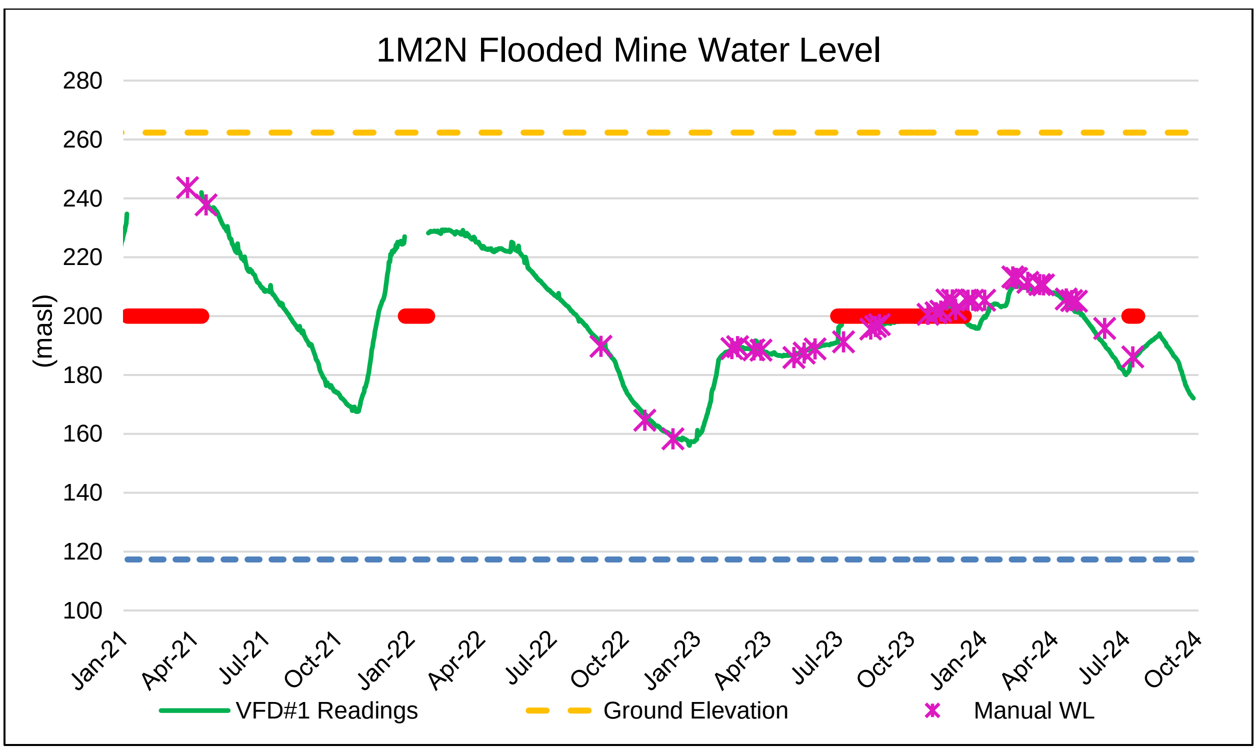


Figure 2: 1M2N Flooded Mine Water Level

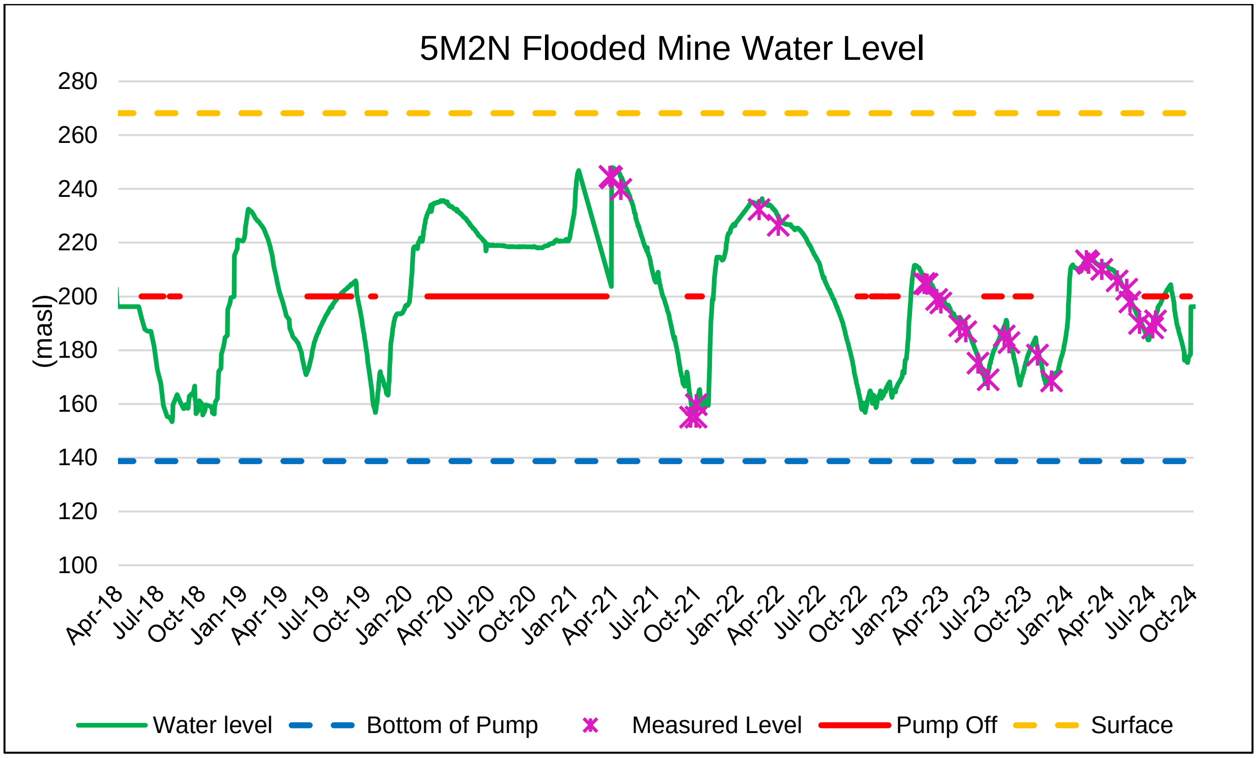


Figure 3: 5M2N Flooded Mine Water Level

Discharge water from pumps (3M2N, 2NPS and 1M2N) enter either Brinco brook or by opening gate valves or moving pipelines, water can be directed into the 2-North pit pond, (WP). The discharge from 5M2N does not have a gate valve and can only discharge into Brinco brook. Water is used to supply sufficient water cover over the Potentially Acid Generating, Course Coal Refuse (PAG-CCR) stored in WP.

During Q2, WP water cover was maintained with water sourced from 1M2N, 3M2N and 2NPS. Table 1, below describes the pumping on / off sequence and direction of water for Q2.

Table 1: Pumping On / Off Sequences and Discharge Direction

Date	Pump	Power ON / OFF	Discharged to:
03-Jul-2024	1M2N	OFF	
03-Jul-2024	5M2N	OFF	
26-Jul-2024	3M2N	ON	WP
01-Aug-2024	3M2N	ON	Brinco Brook
01-Aug-2024	2NPS	ON	WP
13-Aug-2024	1M2N	ON	Brinco Brook
13-Aug-2024	5M2N	ON	Brinco Brook
18-Sep-2024	5M2N	OFF	Faulted

AUTHORIZED DISCHARGE LOCATION SETTLING POND 4 (EMS ID: E207409)

Settling Pond 4 (WD / SP4) is the authorized discharge location for the NWMS, where permit limits are applied to water quality and quantity. Discharge occurred 92 out of 92 days (Figure 4), with cumulative quarterly total, calculated as 396,317 m^3 compared to Q2 2023, where 158,803 m^3 was discharged. Low discharge rates were a result of low pumping rates into Brinco brook with most waters directed into WP.

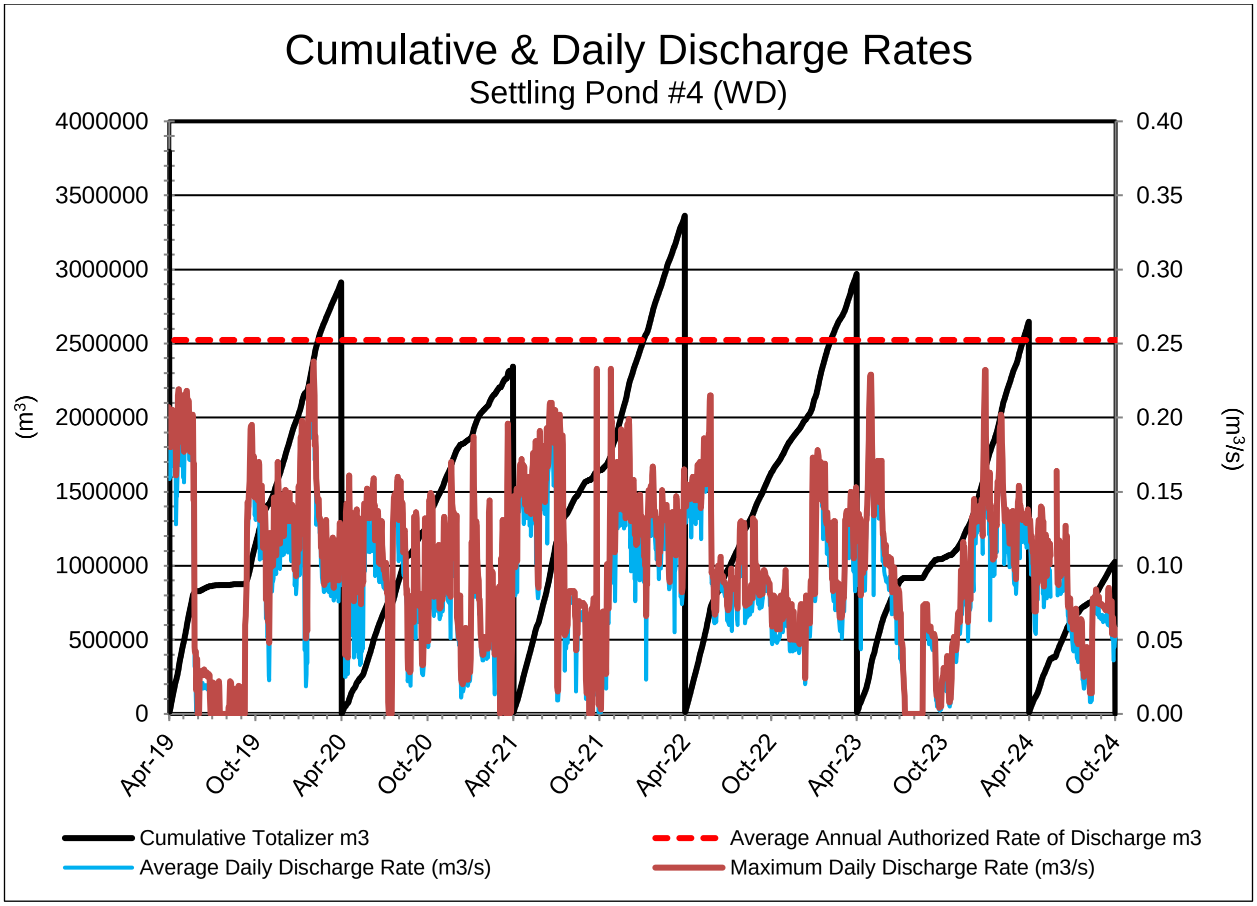


Figure 4: Settling Pond #4 Discharge Rates (E207409)

SOUTH WATER MANAGEMENT SYSTEM (SWMS):

The SWMS is managed by directing discharge water from the Passive Treatment System (PTS) into the 2-South and 3-South pits. This conserves a water cover over stored PAG-CCR in the pits during the dry season and maintains mine water within the authorized works. The 2-South underground pump discharges 2-South mine water into the PTS. Water has been pumped at an average of 4.72 L/s from the 2-South flooded mine void (INF) entering the cells. The PTS includes two cells, the Biochemical reactor (BCREFF) and the Sulphide Polishing Cell (SPCEFF). Treated water flows passively through each cell (BCREFF into SPCEFF) and is gravity feed from the SPCEFF into 2-South pit, entering at 2-South Inflow (2SI). At this location there is a V-notch weir coupled with a pressure transducer and a staff gauge (hydrometric station), where continuous inflow is monitored. A 58-horsepower (Hp) submersible pump installed in 2-South pit, ties into the 3-South pipeline discharging to Settling Pond 1 (SP1/ SPD) (EMS ID: E218582). This pump is used intermittently during the wet season to reduce water levels in the 2-South pit from discharging 3-South pit.

The 3-South pit maintains a water cover over the PAG-CCR via seepage and overflow from the 2-South pit as well as precipitation. Combined water (seepage and water cover overflow) from the 2-South pit enters a channel and flows into the 3-South pit. Continuous discharge of the combined water is measured at location 2-South Culvert (2SC) into 3-South Pit. Here there is an H-flume and a flow meter measuring continuous outflow from the 2-South pit and inflow to 3-South pit.

A 58 Hp pump transports waster from 3-South pit to Settling Pond #1 (SPD / SP1). During summer, a gate valve can be opened at a junction on the 3-South pipeline located on the 2-South highwall. From here the 3-South water can be directed either into the 2-South pit or to SPD. When water pumped from 3-South pit is directed into 2-South pit, this maintains a closed loop circuit and aids in maintaining a water cover over the 2-South Pit PAG CCR, when the PTS is not flowing. As a result, SPD will stop discharging, reducing the load from mine contact water on the receiving environment.

Pumped water from 3-South pit was directed to SPD with discharge occurring intermittently throughout the quarter. At 3-South pit pond water levels were increased from 1.20 m to 1.55 m for the summer months to assist with evaporation losses.

AUTHORIZED DISCHARGE LOCATION SETTLING POND 1 (EMS ID: E218582)

Settling Pond 1 (SP1/ SPD) is the authorized discharge location for the SWMS where permit limits are applied to characteristics of the discharge quality and quantity. Discharge occurred for 60 out of 92 days (Figure 5). With a cumulative quarterly total of 44,971 m^3 compared to Q2, 2022 where 19,552 m^3 was discharged.

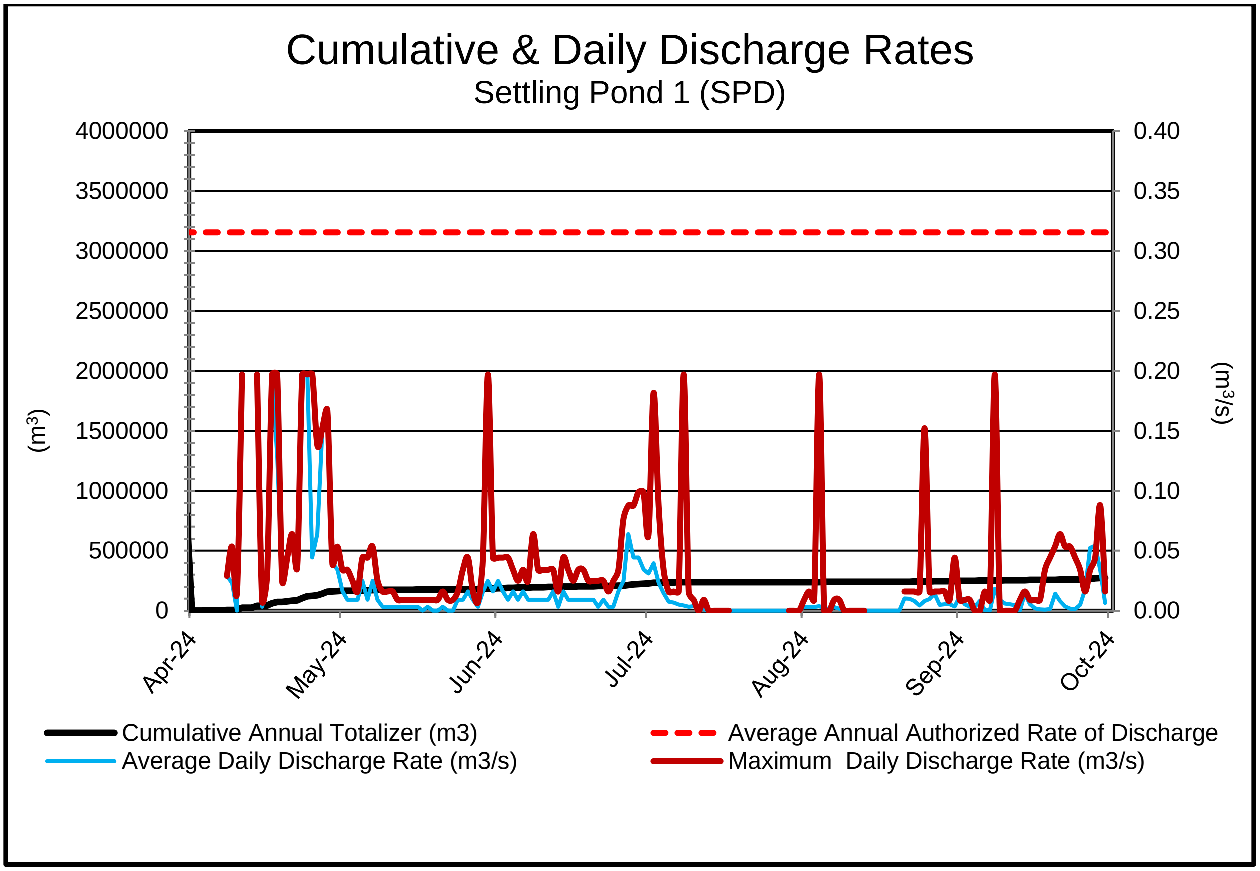


Figure 5: Settling Pond #1 Discharge Rates

AUTHORIZED DISCHARGE LOCATION 7-SOUTH (7SSD) (EMS ID: E218582)

Discharge did not occur during Q2 at the authorized location 7-South Surface Discharge Pond (7SSD). Sedimentation pond outflow is controlled by pumping water accumulated in the pre-settling pond to the 7-South Portal Sump (7SPS).

A quarterly sample was obtained from the water pond (7SSD). There was minimal flow downstream at Stream 1, 7S (EMS ID: E292109), this quarter. The water quality results corresponding to 7SSD sample are available in Appendix I.

Underground sumps collect mine water from 7-South Area 5 (7SA5) that is pumped into 1 Mains 7-South Area 5 (1M7SA5). This underground water normally combines with the 7-South Portal water and is pumped into the 5-South Mine workings. The pipelines transporting water from these areas are equipped with totalizers that record water in gallons (G) and cubic meters (m^3).

From June 23rd to August 28th there was no water pumped from 7SA5. In Q2, from August 28th to September 30th a total of 1303 m^3 was pumped from 7SA5 to 1M7SA5 and allowed to overflow into 2-Mains 7-South for the Test Flood.

The total amount of water from 7-South Portal Sump discharged into the 5-South Mine was 2,963 m³. Refer to Figure 6 and Figure 7 for time series of totalized values from these areas.

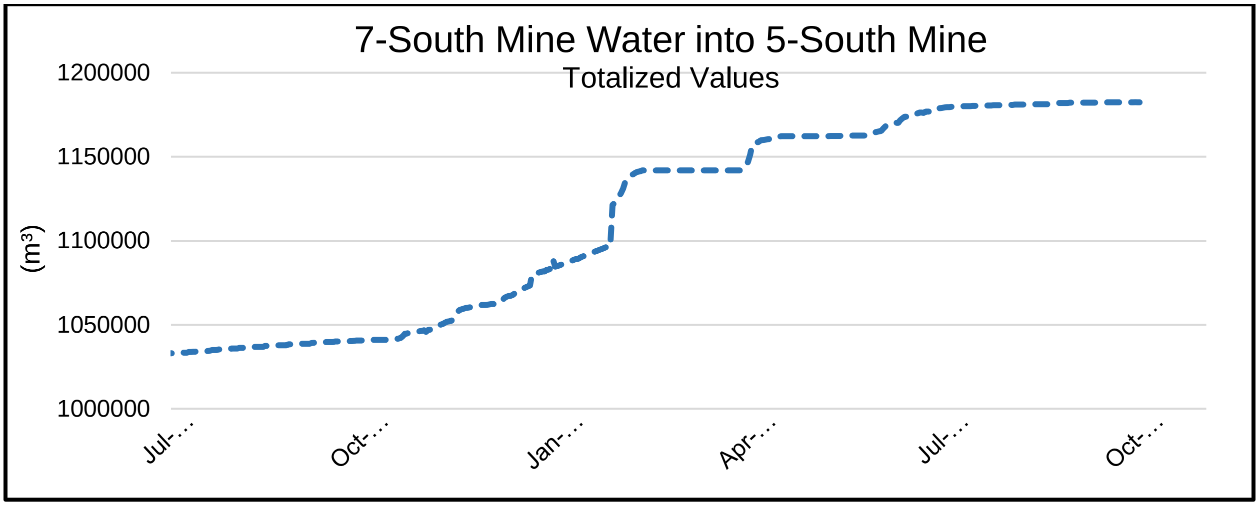


Figure 6: 7-South Area 5 Totalized Values

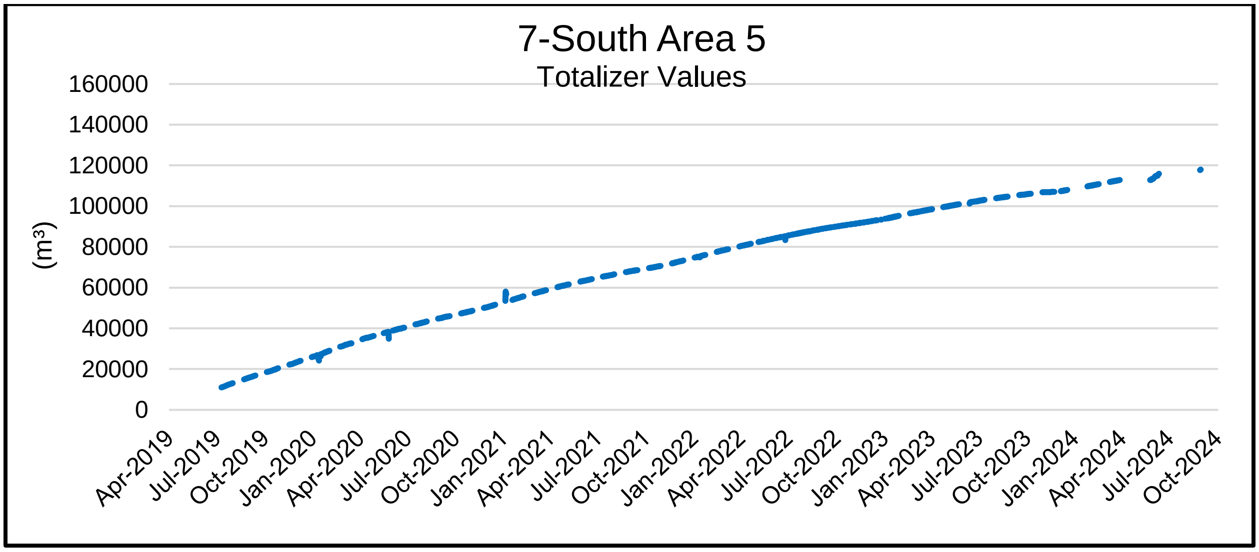


Figure 7: 7-South Mine Water Pumped into 5-South Mine - Totalized Values

QUARTERLY MONITORING:

Summer 2024, receiving environment monitoring program for both lakes and river/stream stations was completed. Quarterly monitoring was performed for groundwater quality, effluent and with-in (in-situ) mine releases. Most environmental sampling and obligations pertaining to permit PE-7008 were completed with results available in Appendix I.

The environmental department also conducted routine inspections and completed any required maintenance of the water management structures.

Non-Compliance Events:

No permit non-compliances occurred this quarter.

Precipitation

The amount of precipitation accumulated this quarter was 144 mm, higher than Q2 last year (100.60 mm). Precipitation in Q2 occurred mostly in August (51 mm), with July and September having 45.3 mm and 48 mm, respectively. This is displayed in Appendix I, Table 30.

Receiving Environment Sites

River, Stream & Lake Monitoring Sites

Effluent Permit PE-7008 Section 4.2.3 identifies river, stream, and lake monitoring sites that represent the receiving environment for various mine related discharge(s). Most of these sites are monitored on a 5 in 30 sampling frequency (5 events in 30 days) during the spring, summer and fall seasons. Table 2: Receiving Water (Stream and Lake) Monitoring Sites lists the receiving water monitoring sites.

Table 2: Receiving Water (Stream and Lake) Monitoring Sites

Streams	Lakes
North Mining Operation	
Quinsam River at Argonaut Road (WA) (EMS # 0126402) Outflow from Middle Quinsam Lake (WB) (EMS # 0900504)	Middle Quinsam Lake (MLQ) Centre (EMS # 206618)
South Mining Operation	
Long Lake Outlet (LLO) (EMS # E219412) No Name Lake Outlet (NNO) (EMS # E217017)	Long Lake at Centre (LLM) (EMS #E206619) No Name Lake (NNL) (EMS # E217018)
7-South Mining Operation (Areas 1 to 4)	
Quinsam River upstream of 7 South Mining Operation (QRDS1) (EMS # E286930) Quinsam River downstream of 7 South Mining Operation (7SQR) (EMS # E292113)	Lower Quinsam Lake (LQL) (EMS #E292118)
7-South Area 5 Mining Operation	
Iron River upstream of 7SA5 (IR6) (EMS # E297231) Iron River downstream of 7SA5 and 242 inputs (IR8) (EMS # E297232) Quinsam River downstream of confluence with Iron River (IRQR) (EMS # E299256)	Lower Quinsam Lake (LQL) (EMS # E292118)

River and Stream Sites in the Quinsam River Sub-Basin

- Quinsam River at Argonaut Road (WA) EMS #0126402 – Located upstream of all mine related discharges; represents background (baseline) conditions for water quality comparisons.
- Outflow from Middle Quinsam Lake (WB) EMS #0900504 – Located at the outflow of Middle Quinsam lake; represents combined discharge from North and South water management systems.
- No Name Lake Outlet (NNO) EMS #E217017 – Located at the outflow of No Name Lake; not presently influenced by surface mine related discharge in the South.
- Long Lake Outlet (LLO) EMS #E219412 – Located at the outflow to Long Lake; captures all South mine related inputs on surface and a percentage of groundwater (*i.e.*, LLE and Long Lake Seep).
- Quinsam River Downstream Site 1 (QRDS1) EMS #E286930 – This site is located downstream of Middle Quinsam Lake Outflow (WB), the North Mining Operation and upstream of the 7-South Mining Operation; captures changes in water quality before the 7-South Mine and groundwater inputs related to mining.
- Quinsam River downstream of the confluence with the Iron River (IRQR) EMS #E299256 –Located downstream of all current and planned (7-South, Area 5) activities; represents the cumulative mine related discharge.
- 7-South Quinsam River (7SQR) EMS #E292113 – Quinsam River downstream of QRDS1, LWO, and 7-South Mining Operation; captures incremental changes in water quality that may be attributed to 7-South PAG-CCR storage and flooded mine pool.

Iron River –7-South Area 5 (7SA5) Mining Operation - (Summer and Fall Only)

- Iron River Upstream of 7SA5 (IR6) EMS #E297231 – Located upstream of any mine related activity (currently); reflects baseline conditions in an area of different geologic formation(s) and baseline water quality influences (mainly arsenic concentrations).
- Iron River downstream of 7SA5 and 242 inputs (IR8) EMS #E297232 – Downstream monitoring site on the Iron River; will be used to monitor potential influence of 7SA5.

Lake Monitoring Sites

- No Name Lake (NNL) EMS #E217018– Located within the South mine development area (Spring Only)
- Long Lake (LLM) EMS #E206619 – Located within the South mine development area and receives water from No Name Lake, 2 and 3 South flooded mine voids and 3-South Pit as groundwater and surface water (Long Lake Seep). The outlet end receives seepage from the 4-South flooded mine pool, estimated at 0.14 m^3/day and south water management discharge (LLE).
- Middle Quinsam Lake (MQL) EMS #E206618 – Located adjacent to the North mine development area and receives all discharge from the North water management system and

upstream (non-mine related) inputs. Long Lake flows into Middle Quinsam Lake at the south end near the outlet (WB) via a small tributary stream (LLO).

- Lower Quinsam Lake (LQL) EMS #E292118 – Located well below mine related discharge(s); reflects the combined influences of Quinsam River and Iron River water quality (Spring Only).

RECEIVING ENVIRONMENT WATER QUALITY:

Water quality in the receiving environment (lakes and rivers) is compared to British Columbia Water Quality Guideline's - Freshwater Aquatic Life (WQG). Summer averages for hypolimnetic dissolved oxygen and total phosphorous in Long and Middle Quinsam Lakes are compared to Provisional Water Quality Objective's (WQO) for Middle Quinsam Lake Sub-Basin.

The receiving environment monitoring program followed the five samples in thirty days schedule with sampling events spanning July 8th through August 7th. This monitoring period is meant to capture the rivers, summer low flow and lake stratification period.

Preamble – Water Hardness and Dissolved Copper

For the purposes of this report, the WQG for hardness dependent parameters has been derived using site background values (i.e., monitoring location upstream of mine influence (WA) hardness ~30mg/L). Quinsam Coal has adopted this approach for the Iron River to provide a conservative comparison of receiving environment water quality.

Dissolved copper (Cu) was calculated from site specific parameters and generated from the Biotic Ligand Model (BLM). The BLM is a series of linked equations that predicts the toxicity of dissolved Cu under specific water chemistry conditions. As a result, the chronic long-term WQG's (Figure 8) and acute short-term (Figure 9) vary between sites. The chronic WQG is compared to each individual weekly result and then the average of the five weeks is compared to a chronic WQG. Each guideline is different for each result and site.

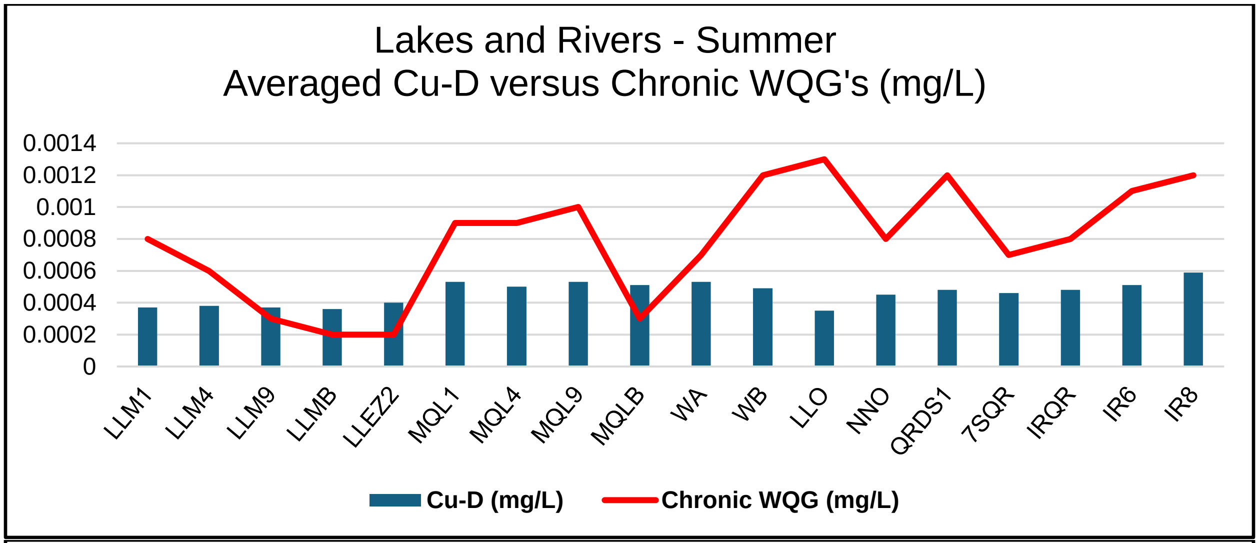
RECEIVING ENVIRONMENT- DISSOLVED COPPER

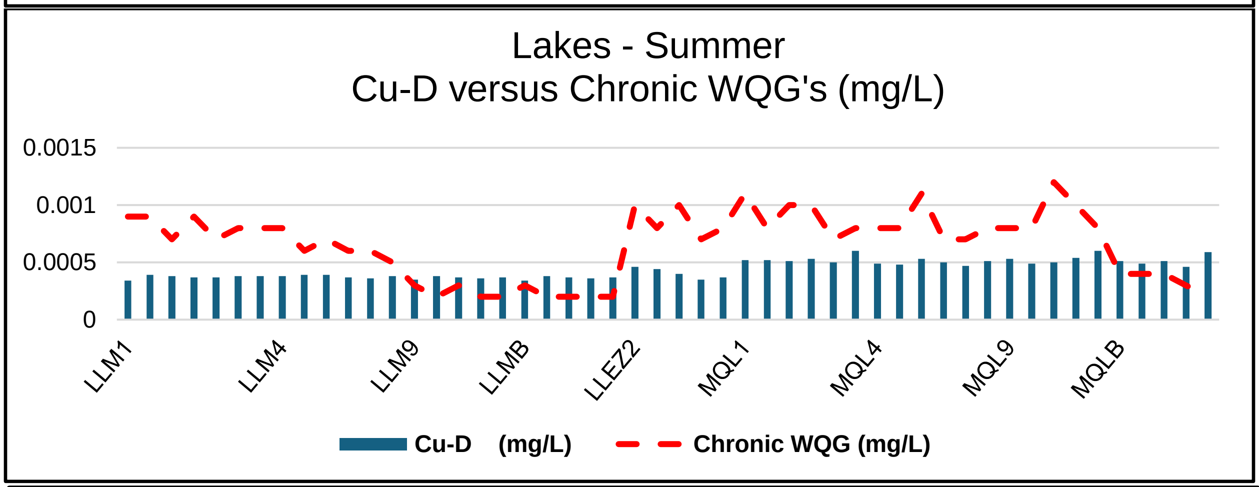
Averaged five weeks of dissolved copper results were compared to chronic Cu-D WQG's with no chronic exceedances observed on the Quinsam or Iron Rivers. Averaged 5 weeks of Cu-D results were elevated above chronic WQG's (0.0002 mg/L to 0.0003 mg/L) in Long Lake (LL) near the outlet (LLEZ2) at 1 m below surface and in the center at depths of 9 meters and 1 meter from bottom (1MB). Middle Quinsam Lake (MQL) was above the chronic WQG of 0.0003 at 1MB.

Individual Cu-D results were trending above the individual chronic WQG's at depth in LL, MQL, Quinsam River (WA and 7SQR) and No Name Lake Outlet (NNO). Individual results for Cu-D were trending upstream (WA and NNO) and downstream of mine influence (7SQR). Stream 1 in 7S had one individual result above the applied chronic WQG. There were no results above acute Cu-D WQG's this quarter. All other parameters remained below WQG's in the receiving environment.

Refer to

Figure 8: Averaged Cu-D and Weekly Results Compared to Chronic WQG's and Figure 9: Cu-D Concentrations Compared to Acute WQG's.





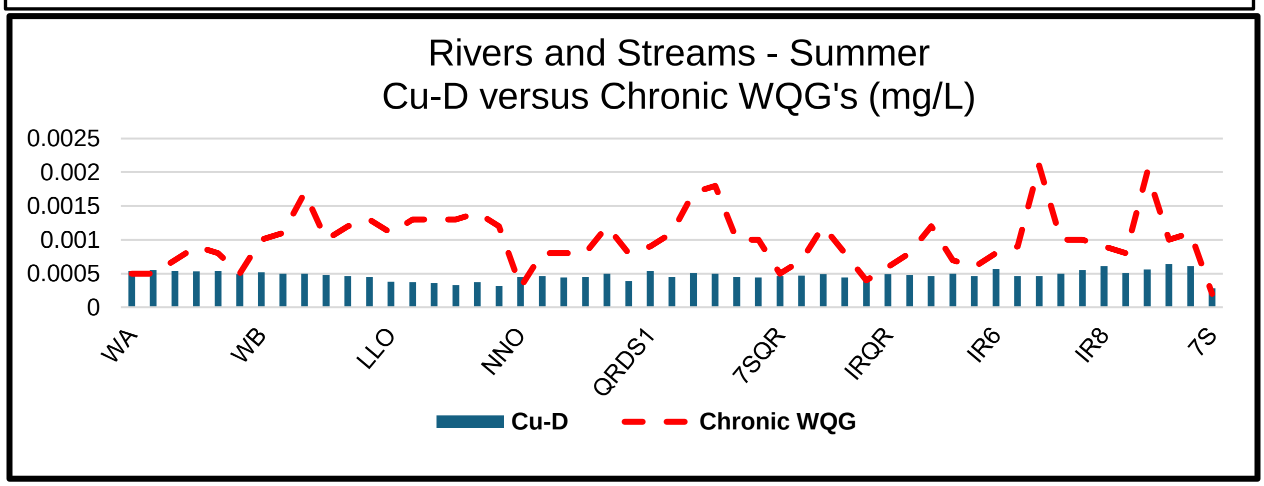


Figure 8: Averaged Cu-D and Weekly Results Compared to Chronic WQG's

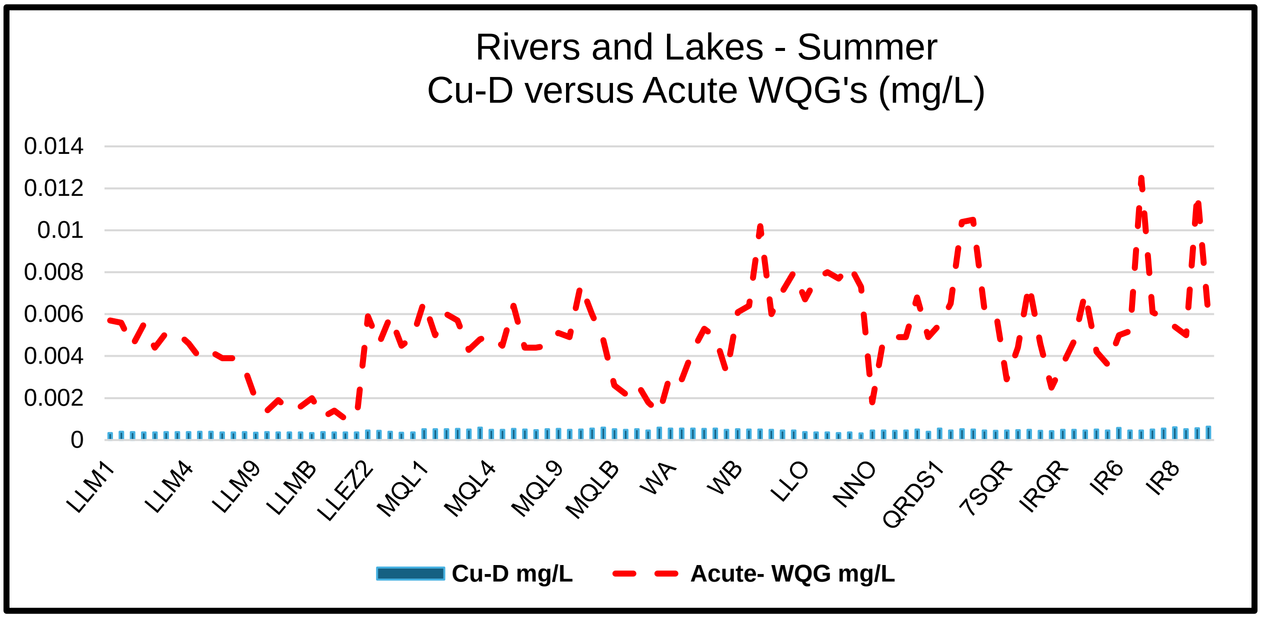


Figure 9: Cu-D Concentrations Compared to Acute WQG's

LAKES

The summer sampling program is scheduled to capture the period of low flow and lake stratification. The summer program represents the lake's seasonal thermal stratification and a time when deeper lakes naturally develop anoxia in deeper waters.

Results from this sampling period represent low dilution conditions when the lakes display minimum assimilative capacity and mine related surface discharges and groundwater infiltration have the greatest influence. There is limited mine related surface discharge during summer low flow. Authorized discharge locations (WD and SPD) had decreased flow rates through July and August. Seep locations (LLS and LLSM) were also dry for summer months. Both the Lakes (LL and MQL) inflow rates remained low from July through September.

The Upper Quinsam River flows into Middle Quinsam Lake. These flow from the Quinsam River have been regulated since 1957 when a diversion dam upstream from Middle Quinsam Lake diverted roughly 72% of the flow of the Quinsam River into the Campbell River system via Gooseneck Lake. Middle Quinsam and Long Lake have rapid flushing rates. The estimated mean residence time for Middle Quinsam Lake water is approximately 17 days; for Long Lake it is approximately 34 days[1],during high flow.

The summer lake monitoring program includes Long Lake (LLM) and Middle Quinsam Lake (MQL). Appendix 1, Table 3 provides a summary of parameters observed trending above WQG’s.

[1] Ambient Water Quality Assessment and Objectives For Middle Quinsam Lake Sub-Basin Campbell River Area. MOE. 1989

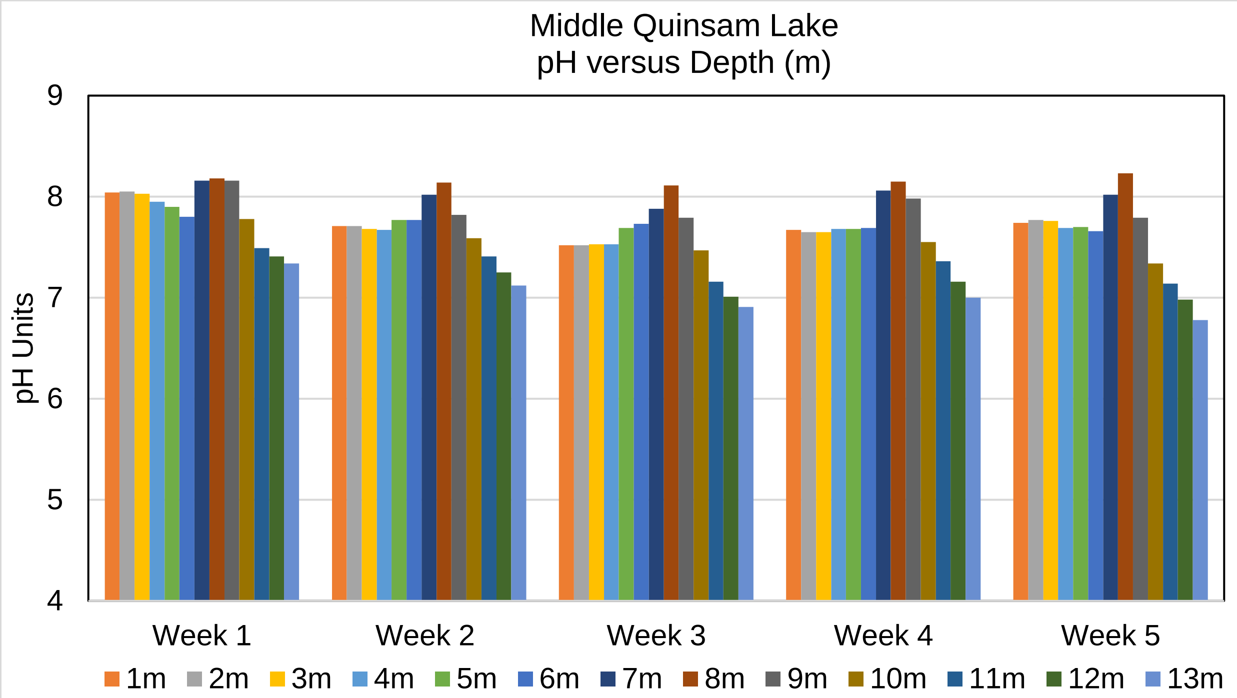
Appendix I, Tables 36 through 38 display results compared to WQG's. Dissolved copper was the only parameter above chronic WQG's.

Summer results for hypolimnetic dissolved oxygen (DO) and total phosphorous (P-T) in Long and Middle Quinsam Lakes were compared to Provisional Water Quality Objectives (WQO) for Middle Quinsam Lake sub-basin. Long Lake displayed anoxic conditions in the hypolimnetic zone (depths 18 to 20 meters below surface) where dissolved oxygen dropped below 3 mg/L. Both lakes (MQL and LL) had average P-T 's below 0.006 mg/L and 0.007 mg/L, respectively.

The below graphs (Figure 10 and
Figure 11) display the results of depth profiling pH and Temperature versus depth on MQL and LLM. With graphs (Figure 12 and Figure 13) displaying averaged dissolved sulphate from five weeks of monitoring compared to the chronic WQG (128 mg/L) using a background hardness of 30 mg/L. All water quality parameters (except copper) were below the WQG during summer monitoring.

Noteworthy observations resulting from the lake monitoring program include:

- Average sulphate concentrations were measured below the chronic WQG (128 mg/L) in both lakes.
- Average sulphate resulted in 47.6 mg/L at 1m, 65.2 mg/L at 4m, 83.8 mg/L at 9m and 84 mg/L at 1MB, in Long Lake
- Average sulphate results for Middle Quinsam Lake were 16.6 mg/L at 1 m and 4m, with 9m, and 1MB averaging 23.8 mg/L and 23.2 mg/L.
- Hypolimnetic dissolved oxygen (minimum 3 mg/L during June, July, and August) fell below 3 mg/L in the hypolimnion zone (18-to-20-meters depths) in Long Lake on weeks 4 and 5.
- Conductivity in Long Lake increases between the epilimnion (surface) to metalimnion (middle).
- Middle Quinsam Lake remained circumneutral to alkaline with pH ranging between 6.78 (1MB) to 8.23 (8M) and averaging 7.66 throughout the lake.
- Long Lake remained circumneutral with pH ranging between 6.27 (1MB) to 7.38 (8M) and averaging 6.60 throughout the lake.



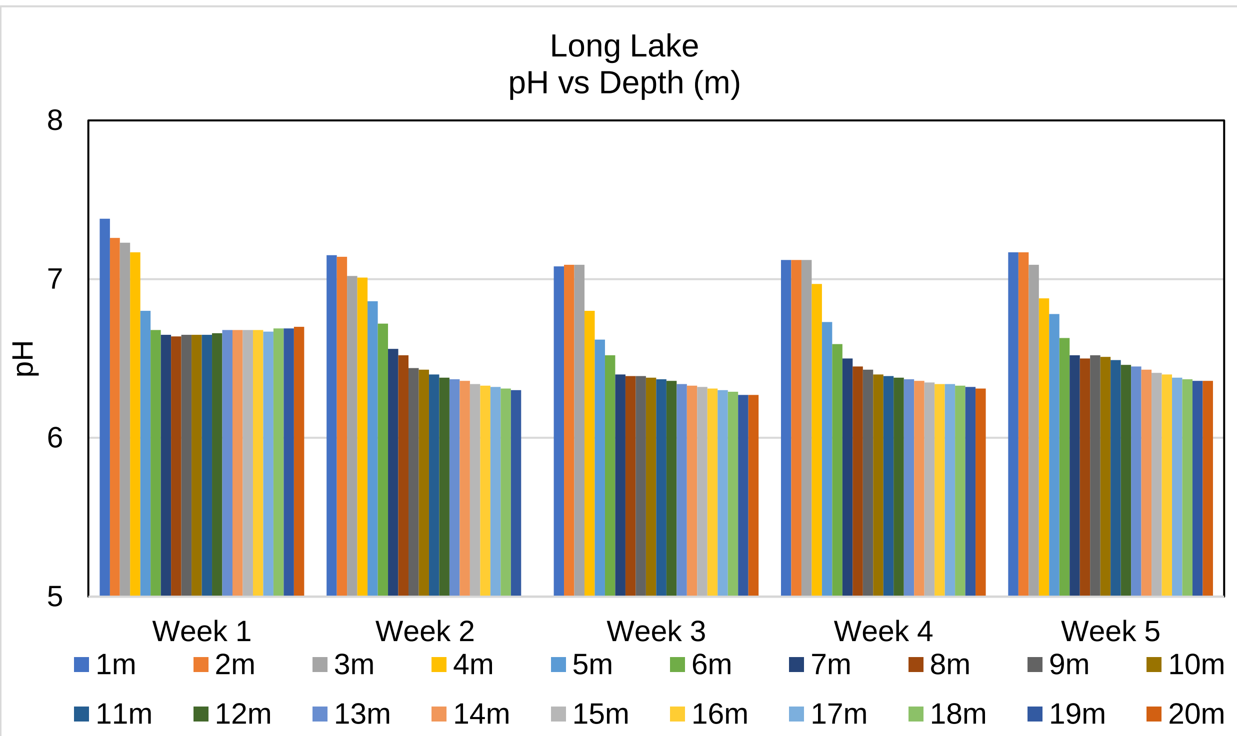
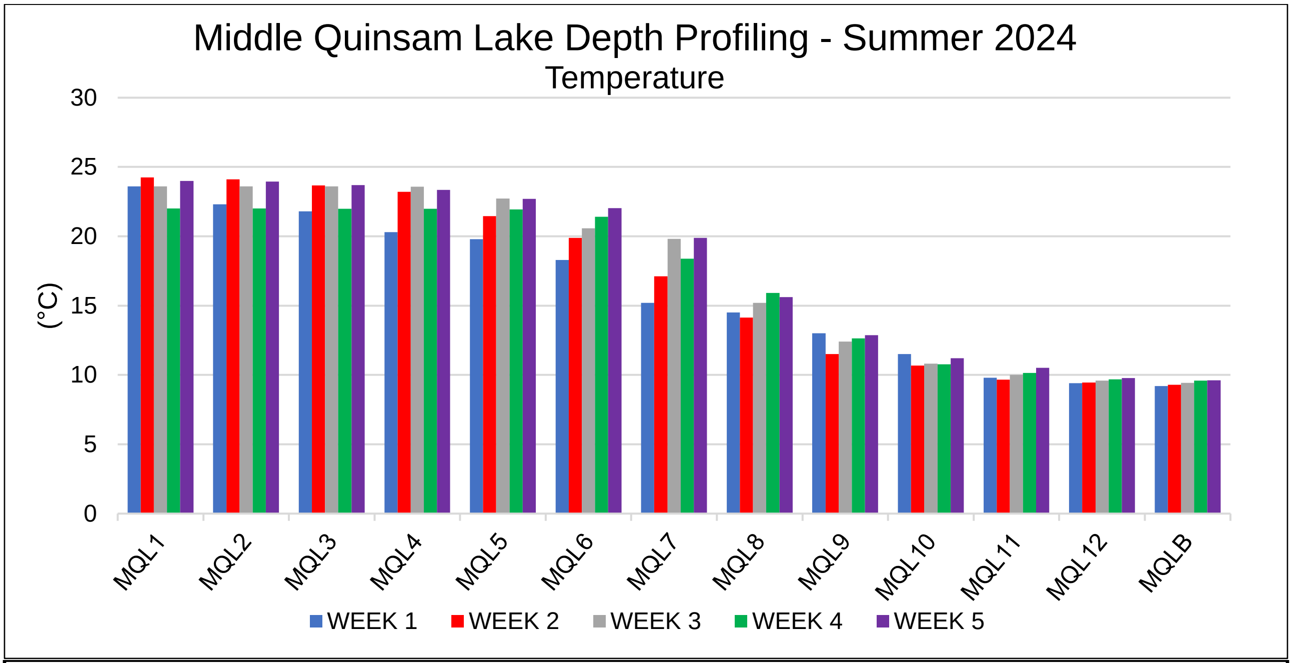


Figure 10:Middle Quinsam and Long Lake's Depth Profiling - pH versus Depth



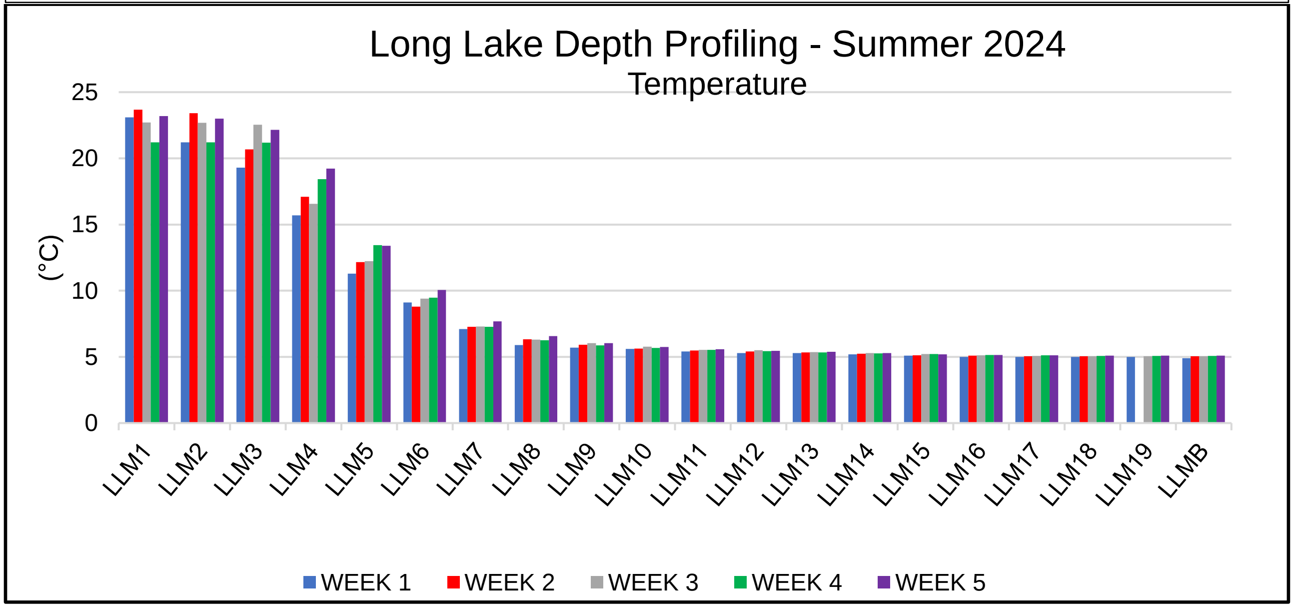


Figure 11: Middle Quinsam and Long Lake's Depth Profiling – Temperature versus Depth

Temperature gradients were observed in both lakes as stratification occurred. In MQL the epilimnion occurred from depths between 1-to-5-meters. The metalimnion occurred at depths between 6-to-9-meters and hypolimnion occurred at depths between 10-to-13-meters. In LL the epilimnion occurred from depths between 1-to-4-meters. The metalimnion occurred at depths between 5-to-8-meters and hypolimnion occurred at depths between 9-to-20-meters refer to Figure 11.

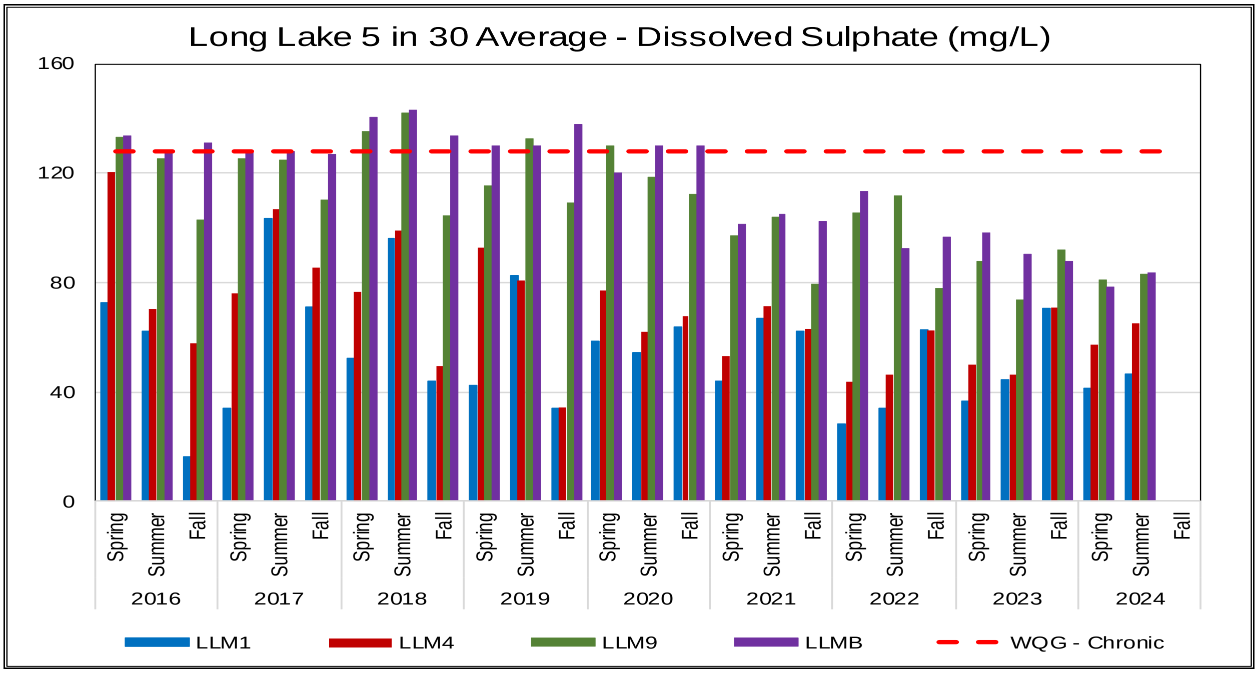


Figure 12: Average Dissolved Sulphate - Long Lake

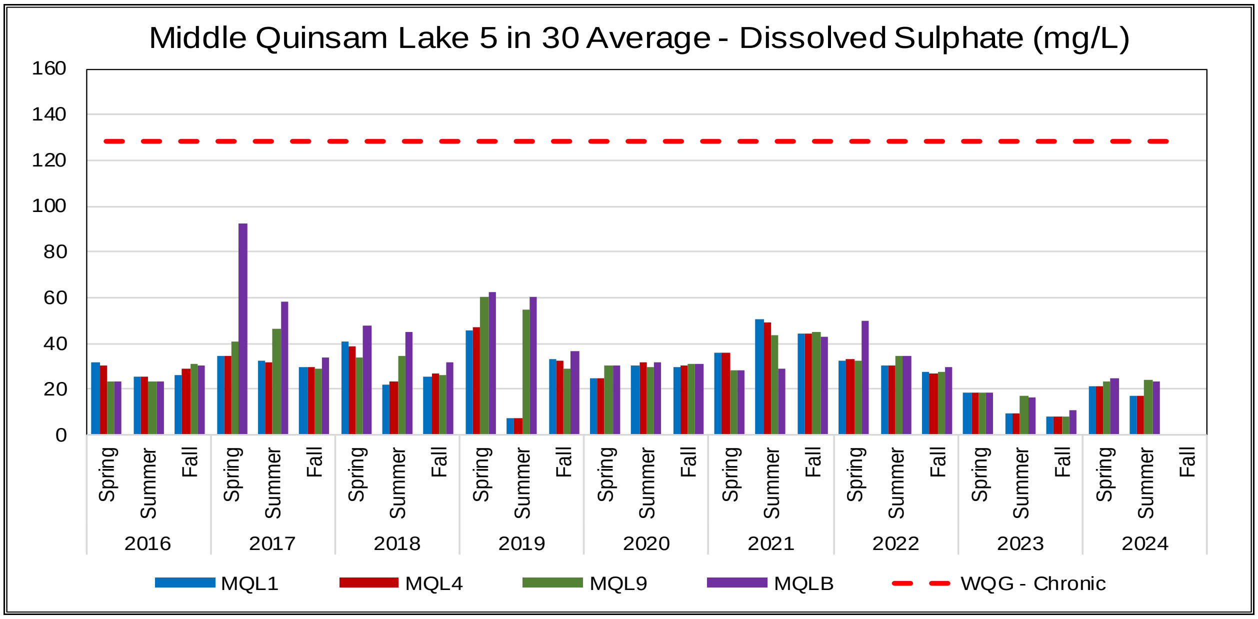


Figure 13: Average Dissolved Sulphate – Middle Quinsam Lake

Concentrations of dissolved sulphate have remained low in MQL historically and continue to be trending below 30 mg/L in spring and summer of 2024.

In LLM, concentrations continue to be on a declining trend especially at depth 9 and 1MB (below 90 mg/L). This may be a result of decreased loading from the Long Lake Seeps during winter (2023), spring and summer (2024).

CHLOROPHYLL "A, PHYTOPLANKTON AND ZOOPLANKTON ABUNDANCE

Refer to Appendix II for the full data sets and reports.

Chlorophyll "*a"* concentrations provide an indication of overall phytoplankton biomass at any given time and provide a basis for comparing primary production among lakes. Summer results for Chlorophyll "*a*" and phytoplankton abundance is shown in Figure 14 and Figure 15 collected on both Long and Middle Quinsam Lake's. Chlorophyll "*a*" results, for Long and Middle Quinsam lakes were (0.66 ug/L and <0.53 ug/L), respectively. Long Lake displayed the lower results compared to previous years with MQL falling within the range of historical results.

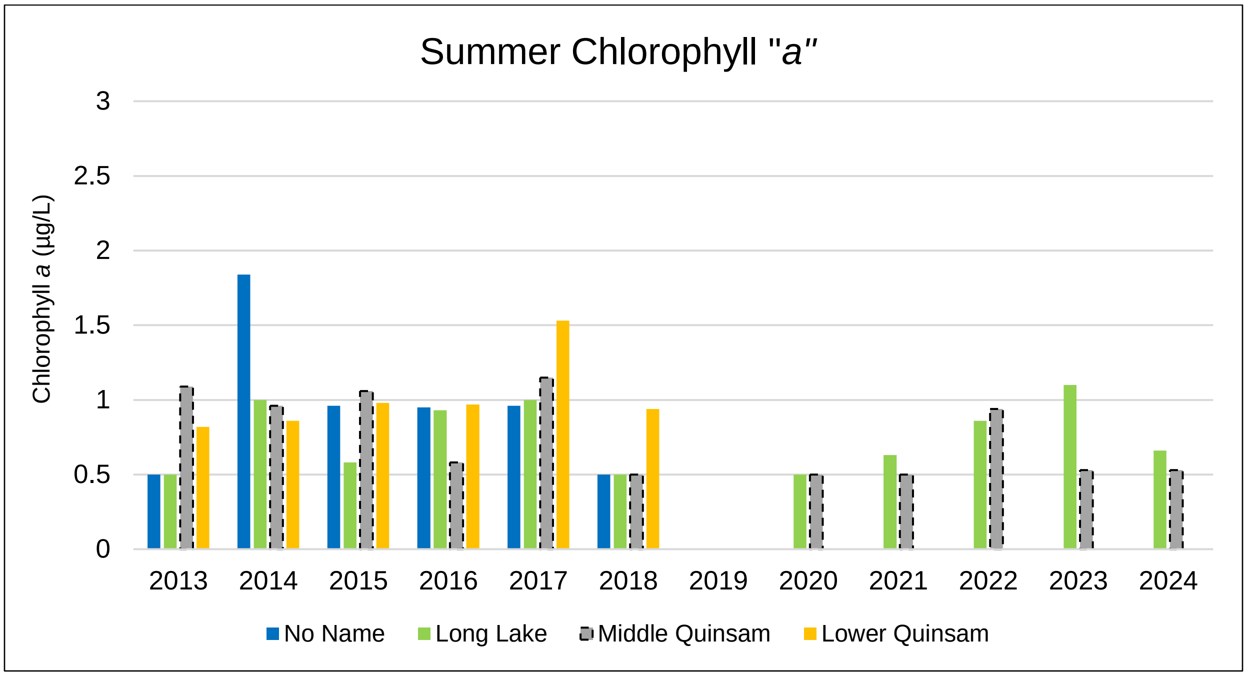


Figure 14: Summer Chlorophyll "a"

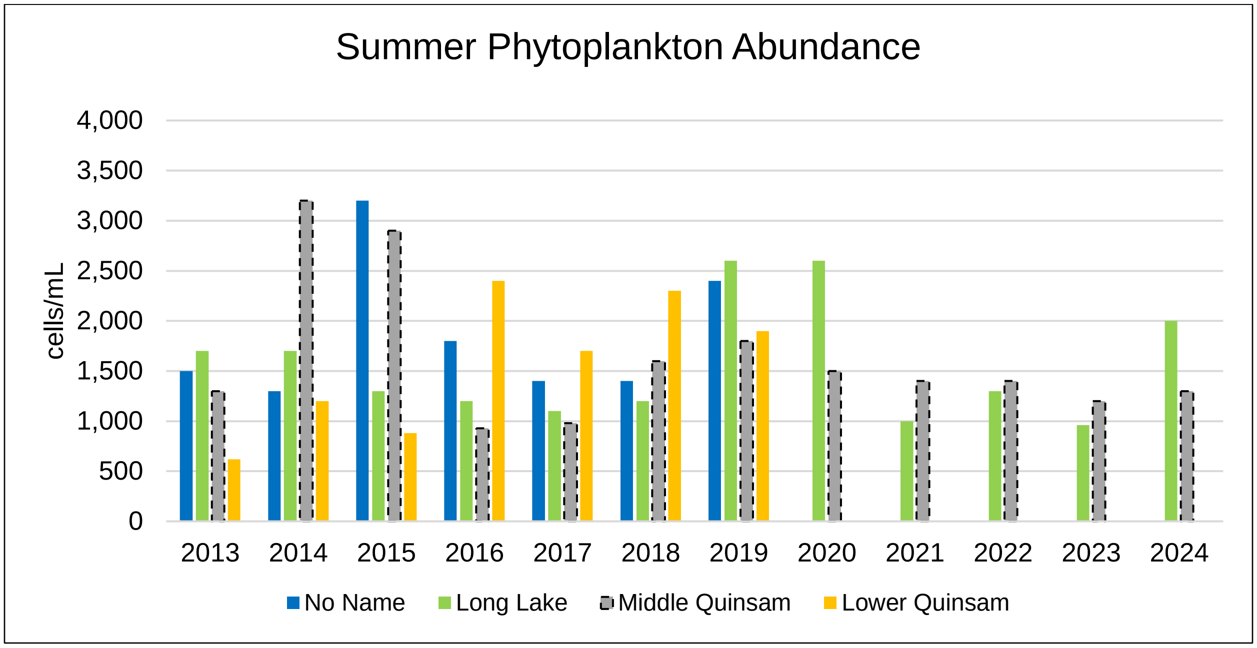


Figure 15: Summer Phytoplankton Abundance

Figure 15: Summer Phytoplankton Abundance, displays summer historical to present total abundance samples. Total abundance for Summer 2024 ranged from 1300 cells/mL to 2000 cells/mL for Middle Quinsam and Long Lakes, respectively. These numbers are in the range reported historically.

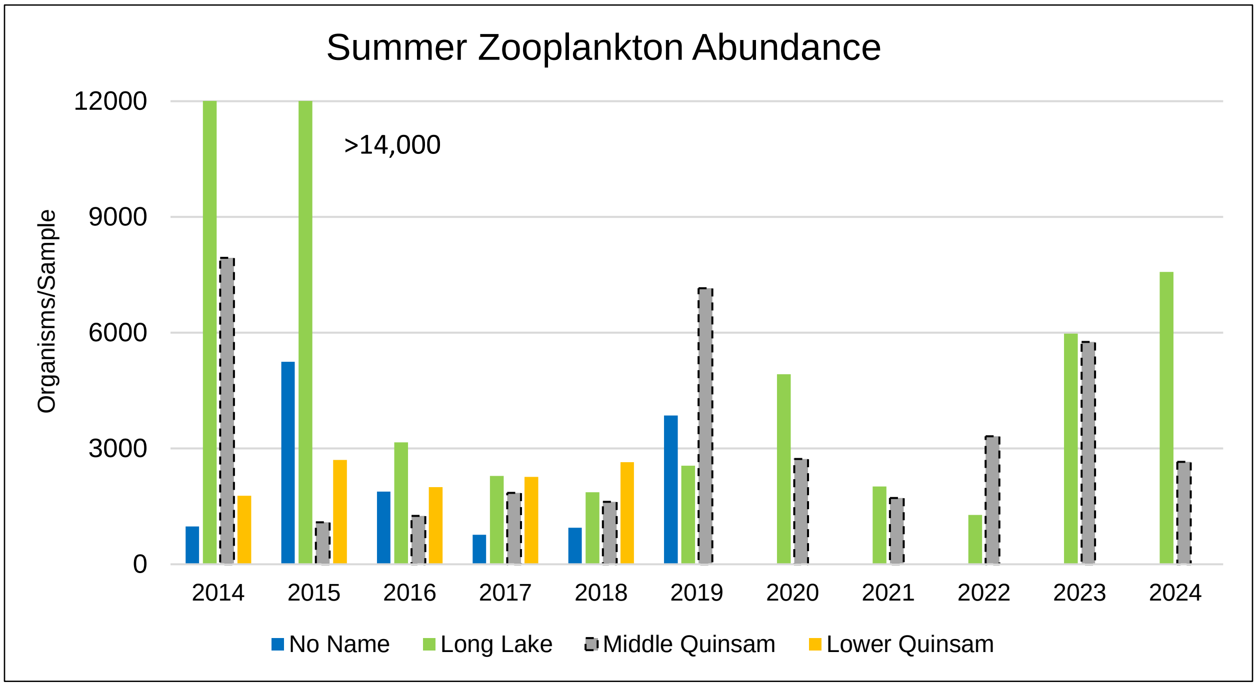


Figure 16: Summer Zooplankton Abundance

Figure 16: Summer Zooplankton Abundance, for Long Lakes total abundance was the highest numbers recorded since 2015 (14704 organisms / sample), resulting in 7575 organisms / sample. In Middle Quinsam Lake results are within the historical range (2656 organisms / sample) but lower than the last two years. Both lakes displayed similar results for abundance.

Species Composition

Phytoplankton species composition data for the August 2024 samples are contained in Appendix II, Attachment B. The most abundant phytoplankton in Long Lake were the very small (less than or equal to 5 µm) chrysoflagellates (*Ochromonas* spp. and *Chromulina* spp.). The small green alga *Oocystis* sp. was predominant in the Middle Quinsam sample, with the chrysoflagellates subdominant. Although these ultra-nanoplankton species were very abundant numerically, they usually contribute little to algal biomass.

Among the larger algae, the most abundant species were as follows:

• Long Lake – diatom *Melosira italica* (predominant), with green algae *Nephrocytium* sp. and *Dictyosphaerium pulchellum*, and chrysophyte *Ochromonas* spp. Common

• Middle Quinsam Lake – cryptophyte *Cryptomonas* spp. (predominant), with chrysophyte *Ochromonas* spp. and green *Dictyosphaerium pulchellum* (common)

Zooplankton species composition data for the August 2024 organisms per sample are displayed in the below graphs and available in Appendix II. In Long Lake, the most abundant species were Rotifera (3425 organisms / sample) followed by Cladocera (1900 organisms / sample) with the replicate also having Rotifera (3125 organisms / sample) and Cladocera (1271 organisms / sample) as the most abundant. For Middle Quinsam Lake the most abundant zooplankton organisms were the Rotifera (983 organisms / sample) followed by Copepod Nauplii (750 organisms / sample). Refer to Figure 17: 2024 Zooplankton – Species Composition.

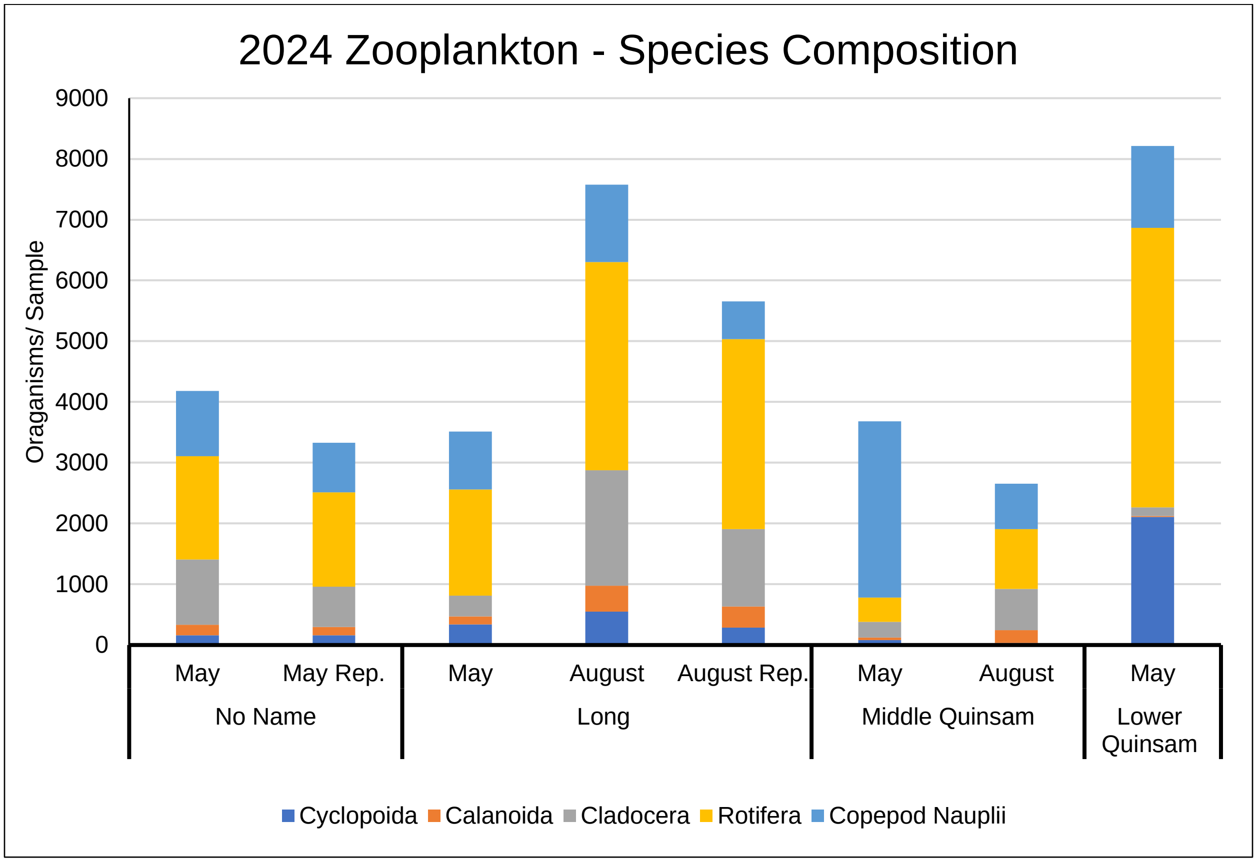


Figure 17: 2024 Zooplankton – Species Composition

Conclusion

Variations in total abundance when comparing lake phytoplankton abundance may be related to the month sampled and phytoplankton blooms. Differences in taxonomic composition are related to seasonal conditions, including food supply (phytoplankton and organic matter) and grazing pressures from fish. The larger Copepods and Cladocera's, both present in all lakes, are preferred food sources for fish. All four lakes are known to be fish bearing (e.g., salmon and trout species), but there is not enough information about fish populations to estimate grazing pressures on zooplankton.

STREAMS AND RIVERS

Appendix I, Table's 3, 4 and 38 display water quality results compared to WQG's for the Quinsam and Iron Rivers including streams, No Name and Long Lake Outlets.

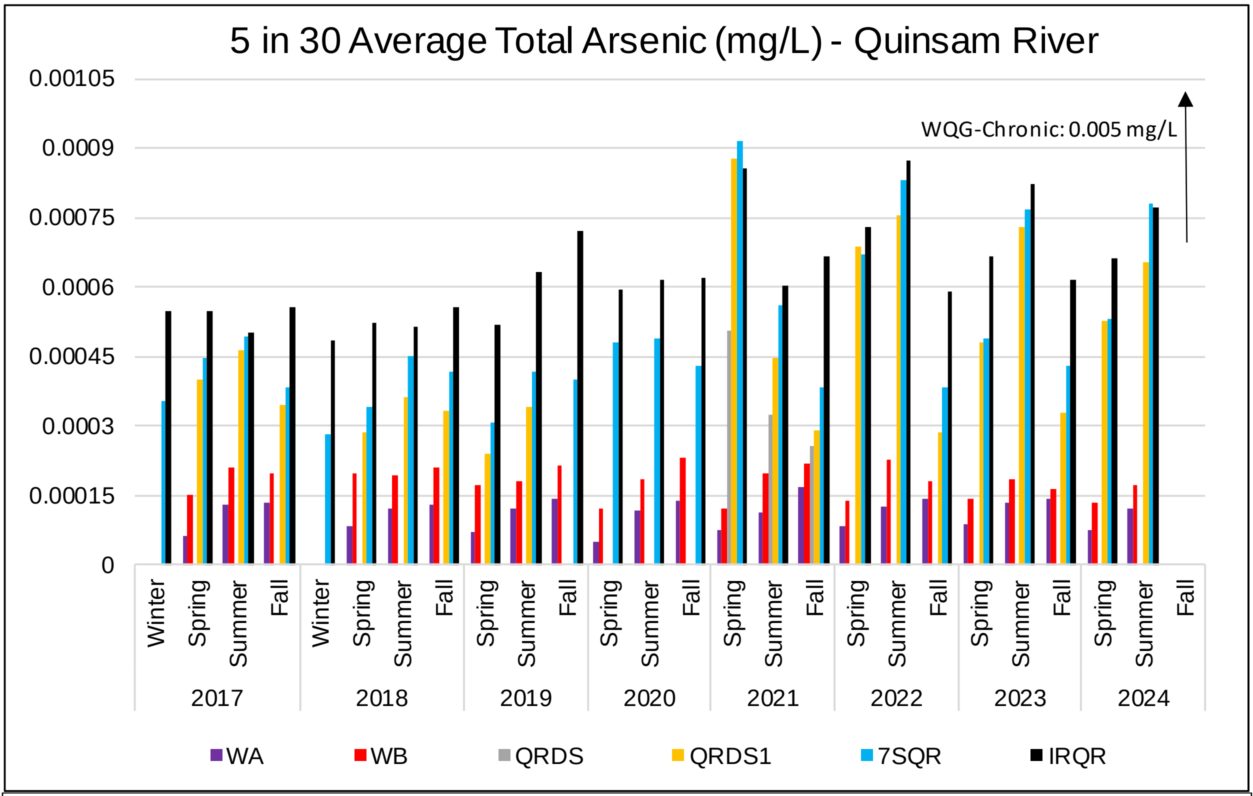
Noteworthy observations resulting from the river/stream monitoring program include:

- Most parameters increase downstream compared to upstream on the Quinsam River.
- Average dissolved sulphate for the Quinsam River upstream of mine influence (WA) was 1.2 mg/L, and downstream of mine influence was 19 mg/L on the Quinsam River during summer low flow.
- Averaged dissolved sulphate at NNO (1.3 mg/L) was lower compared to downstream at LLO (46.2 mg/L)
- Total arsenic was above chronic WQG of 0.005 mg/L in the Iron River (IR8) averaging 0.0062 mg/L.
- All other parameters were below the acute and chronic WQG's for rivers and streams during the summer monitoring including chronic dissolved copper compared to averaged results.

Refer to Figure 18 to 22 below, displaying trends for parameters of interest for total arsenic, total and dissolved iron, total manganese, and dissolved sulphate on the Quinsam River since 2017. Water quality monitoring results on the Quinsam River indicate that while there have been marginal increases in certain parameters, particularly dissolved sulphate, during specific periods (e.g., 2021 and summer low flow), these increases have remained below regulatory water quality guidelines (WQGs). The upstream location (WA) serves as a valuable baseline for assessing the impact of mine influence on dissolved sulphate concentrations and incremental increases in the Quinsam River.

Key parameters, including arsenic, iron, and sulphate, are closely monitored to detect potential trends or exceedances of WQGs. Increases in these parameters could signal potential seepage pathways from the mine site. Therefore, these monitoring locations are crucial for environmental oversight. Additionally, the elevation of underground flooded mine void water is closely monitored to assess potential risks to groundwater quality.

During summer low-flow periods, average dissolved sulphate concentrations on the Quinsam River remained below 19 mg/L. This reduction is attributed to the limited discharge from authorized locations (WD and SPD) as most water was retained on-site for water cover in PAG-CCR ponds.



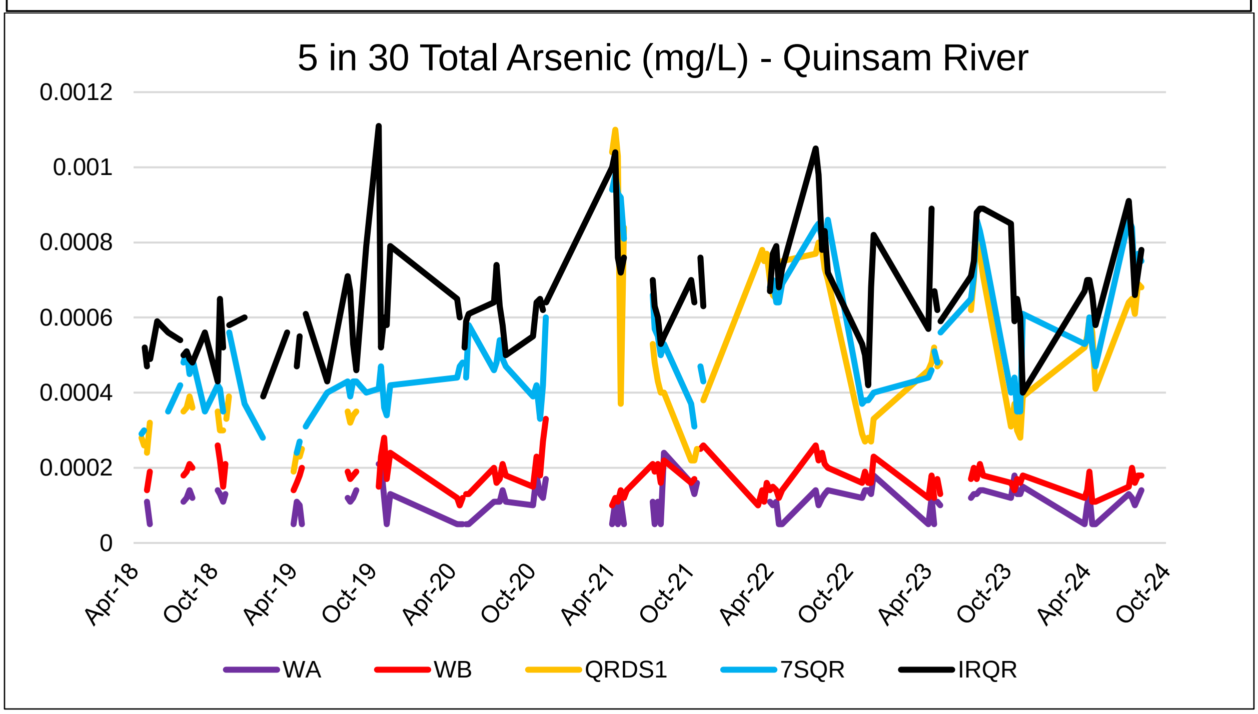
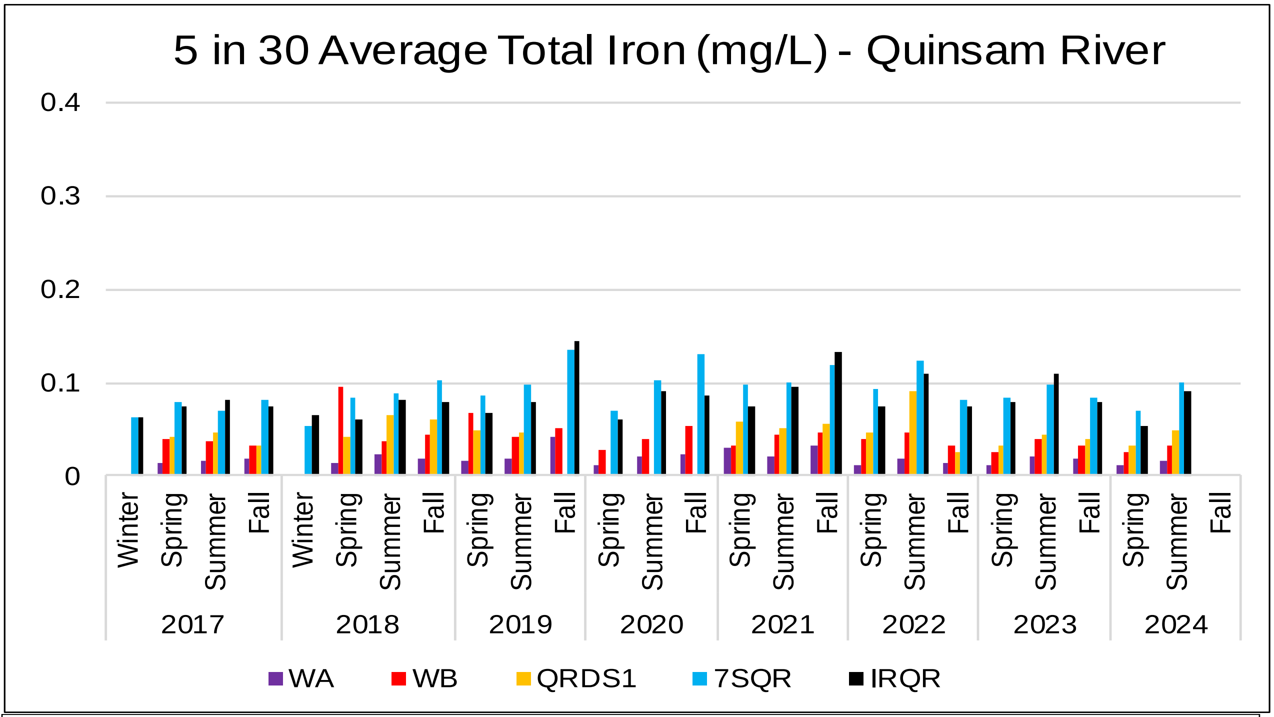


Figure 18: Total Arsenic in Quinsam River Compared to Acute-WQG (0.005 mg/L)



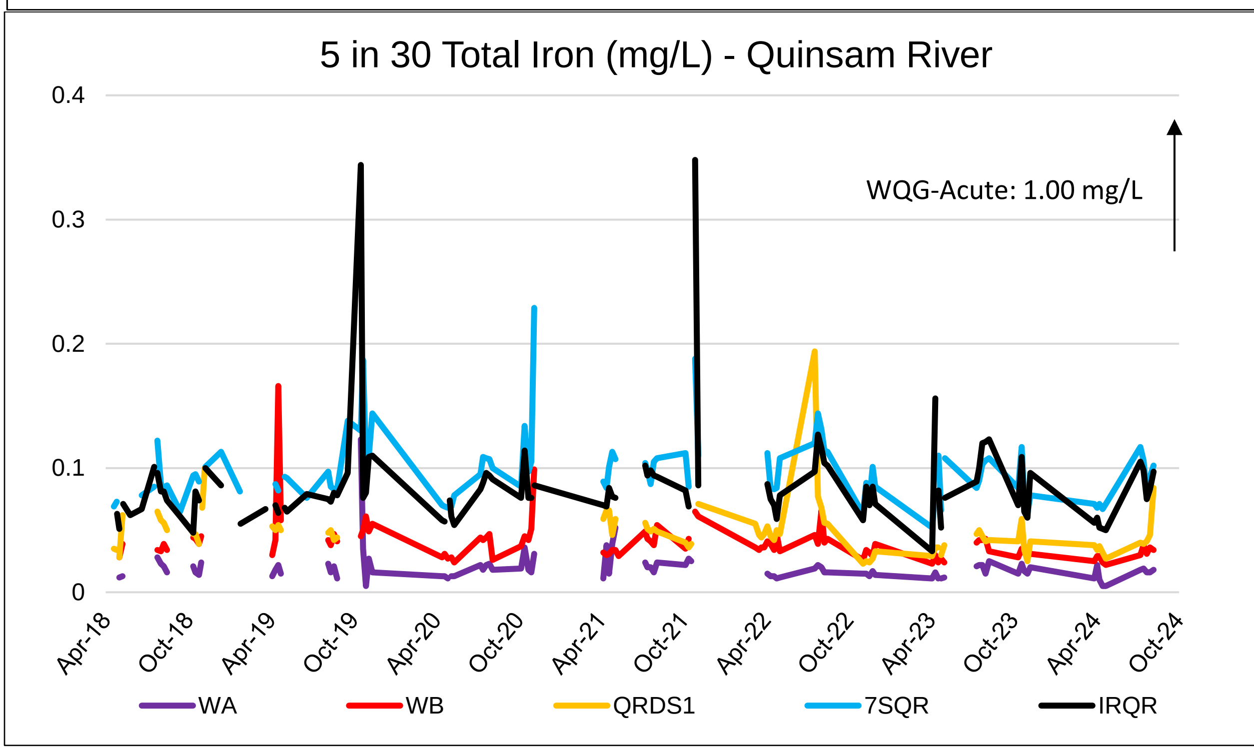
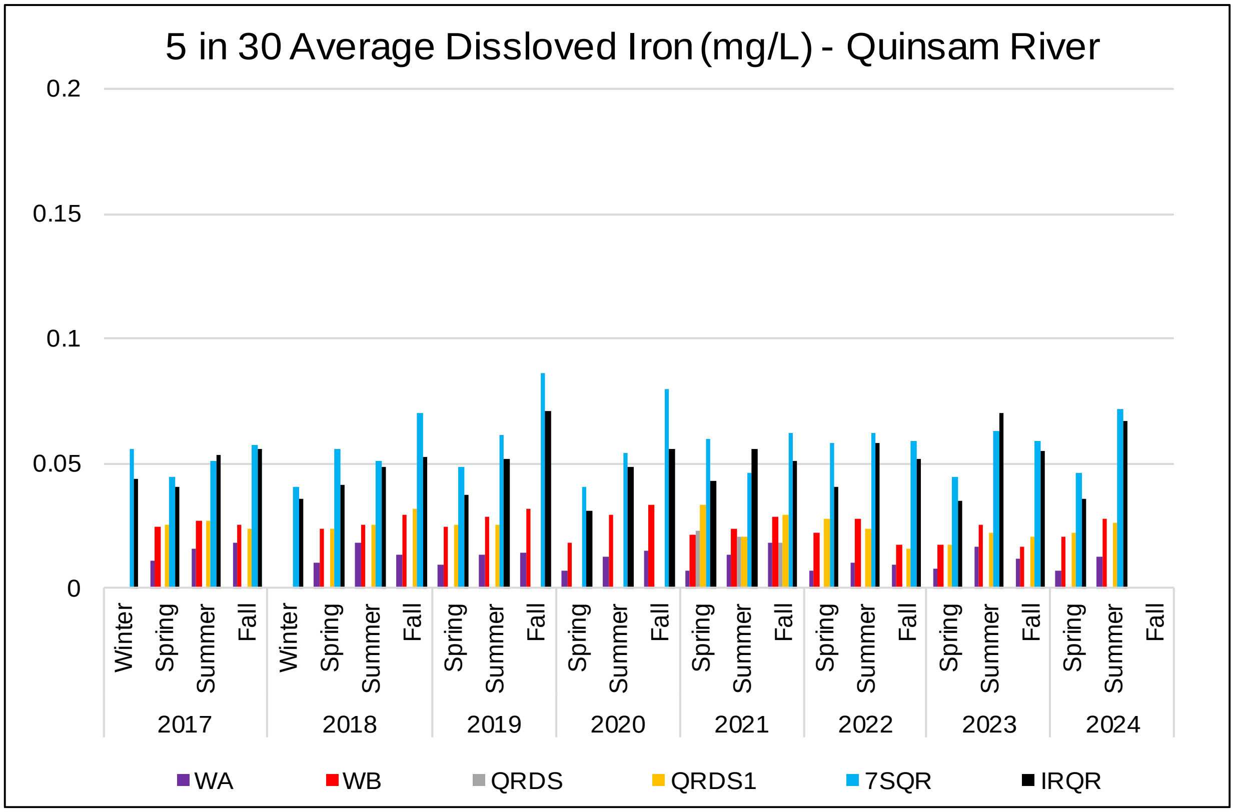


Figure 19: Total Iron in Quinsam River Compared to Acute-WQG (1.00 mg/L)



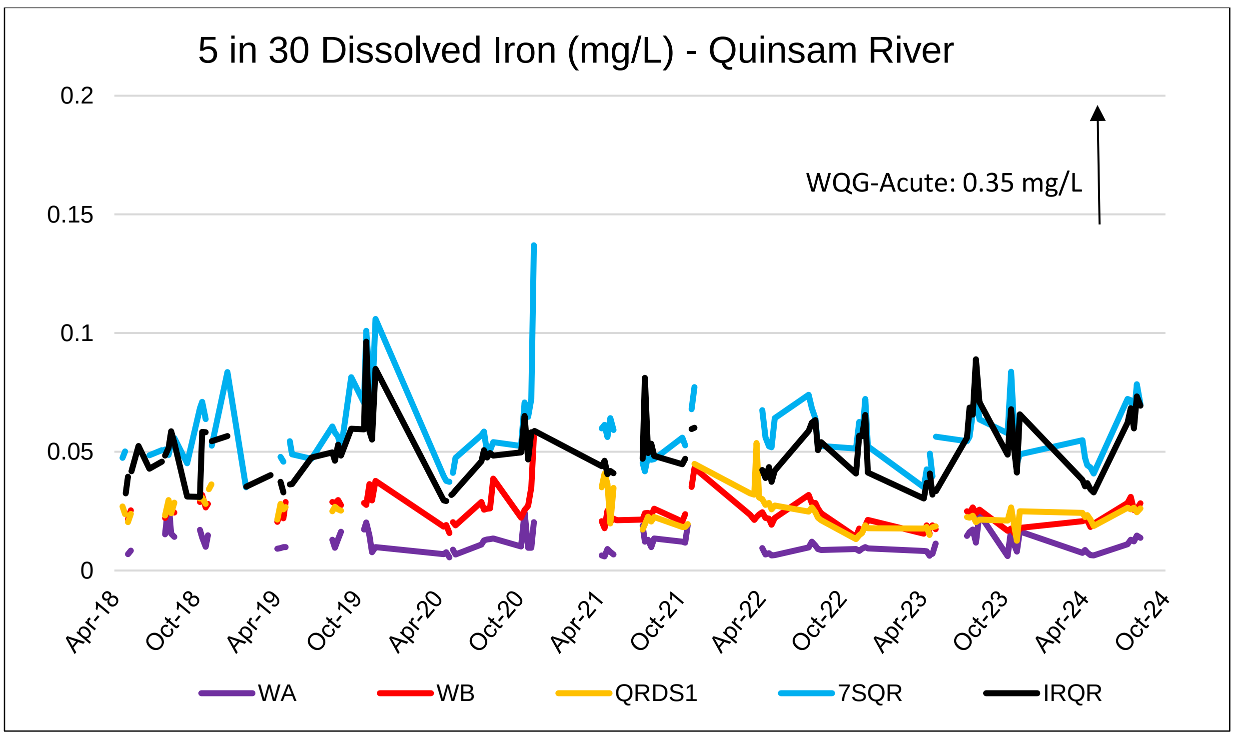
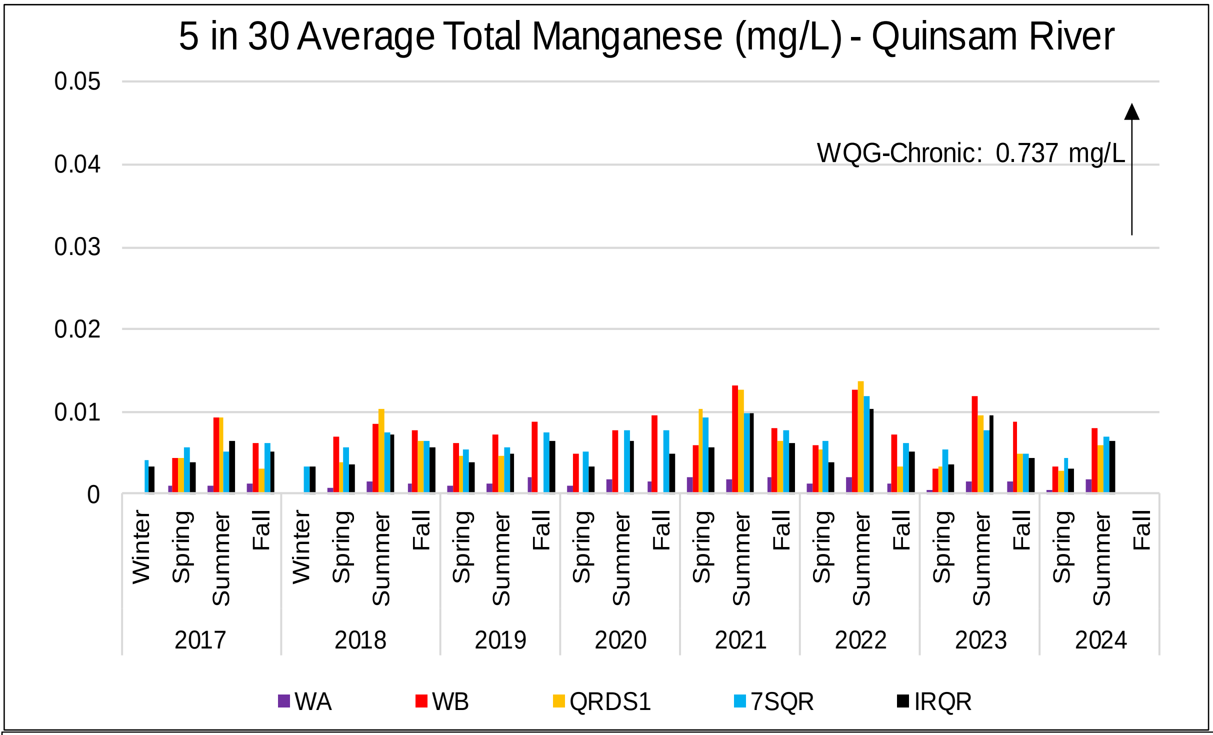


Figure 20: Dissolved Iron in Quinsam River Compared to Acute-WQG (0.35 mg/L)



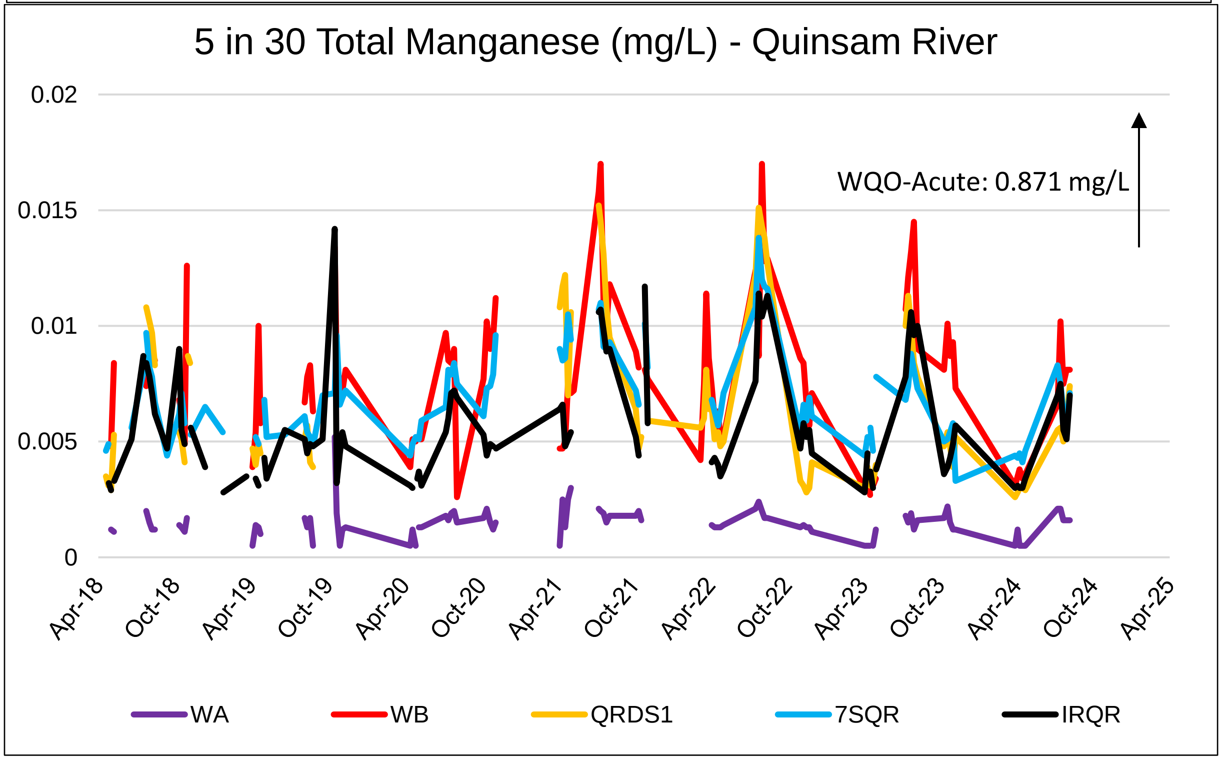


Figure 21: Total Manganese in Quinsam River

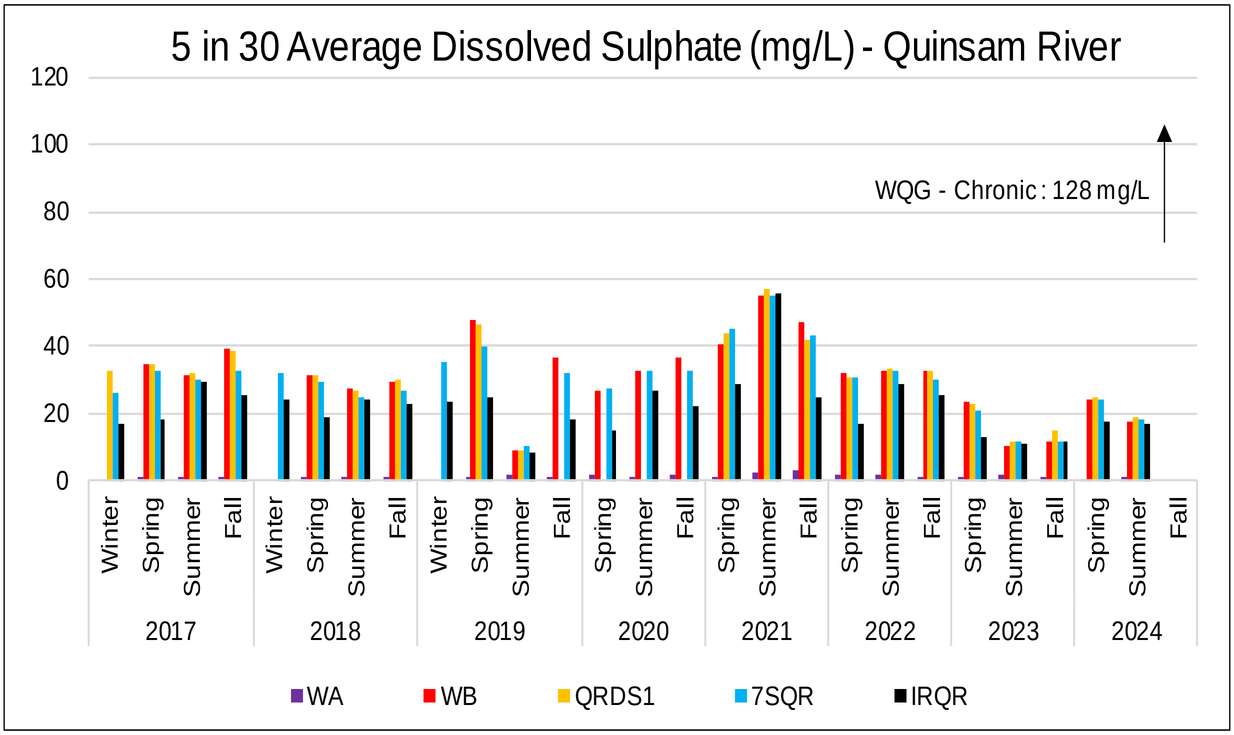
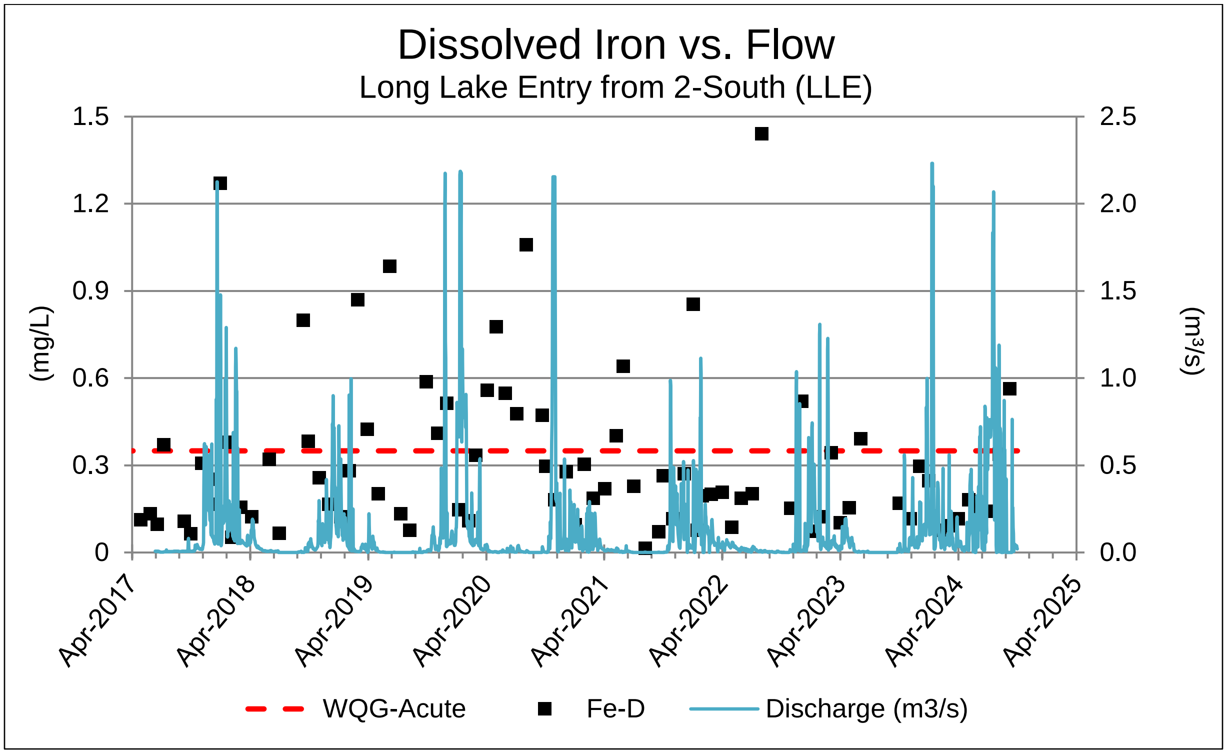


Figure 22: 5 in 30 Average Dissolved Sulphate - Quinsam River

The wetland (LLE) discharges into Long Lake near the outlet displayed elevated parameters of dissolved sulphate (SO4-D) throughout Q2 and iron (Fe) both total and dissolved on one event.

While site LLE is considered the initial dilution zone (for water quality evaluation purposes) it is important to note that this location is a wetland and represents the uppermost extent of an initial dilution zone for the South water management system discharge into Long Lake. During summer, this site has limited inflow, and anoxic conditions occur within the wetland.

Concentrations of iron increase as a result of low dissolved oxygen with concentrations of dissolved sulphate increasing with decreased flow rates. Refer to Figure 23 and 24, for historical concentrations of these parameters compared to discharge rates at the culvert.



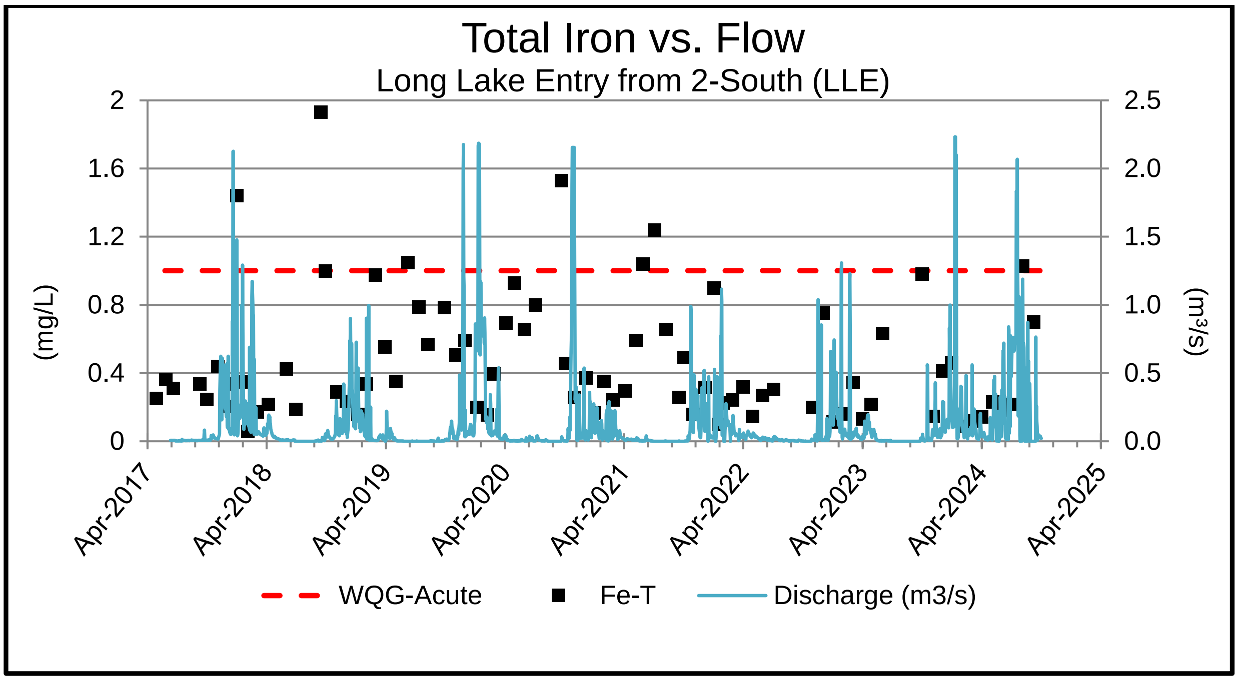


Figure 23: Concentrations of Iron - LLE

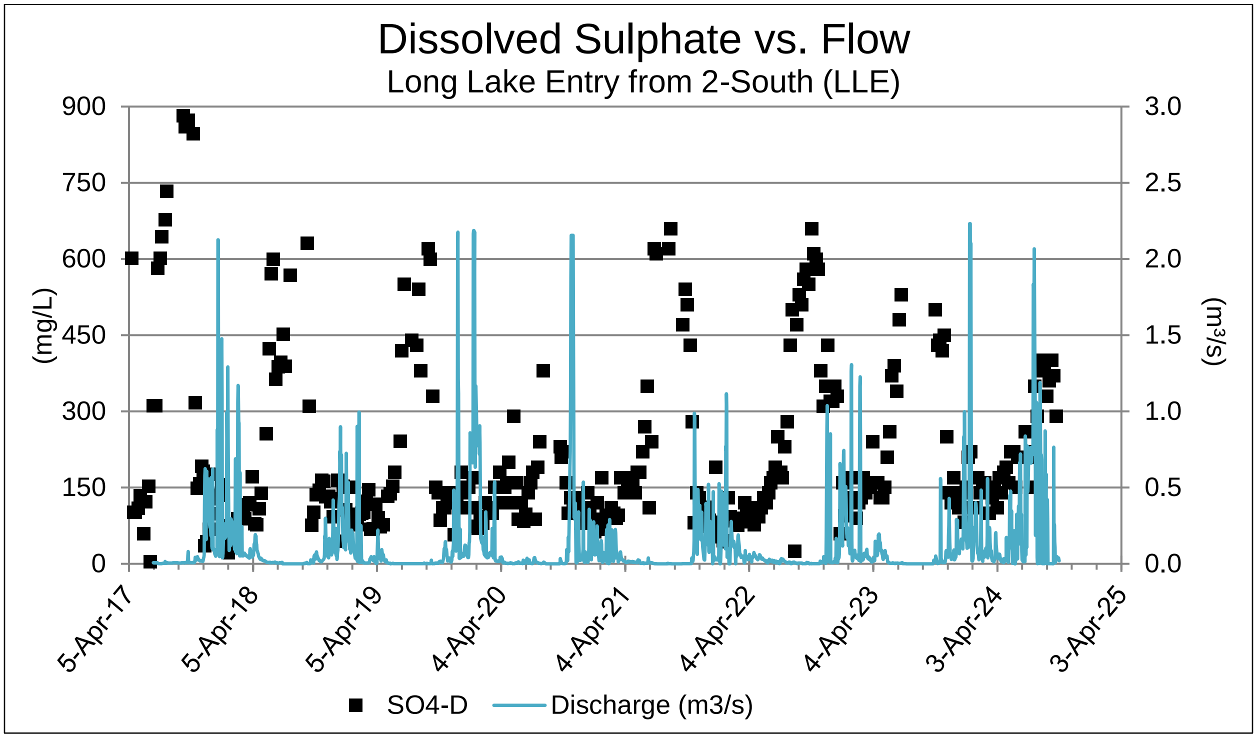


Figure 24: Concentrations of Dissolved Sulphate - LLE

The Long Lake Seeps are not considered receiving environment sites but WQG's are used for comparison purposes only. The seeps were dry from mid-July to late fall.

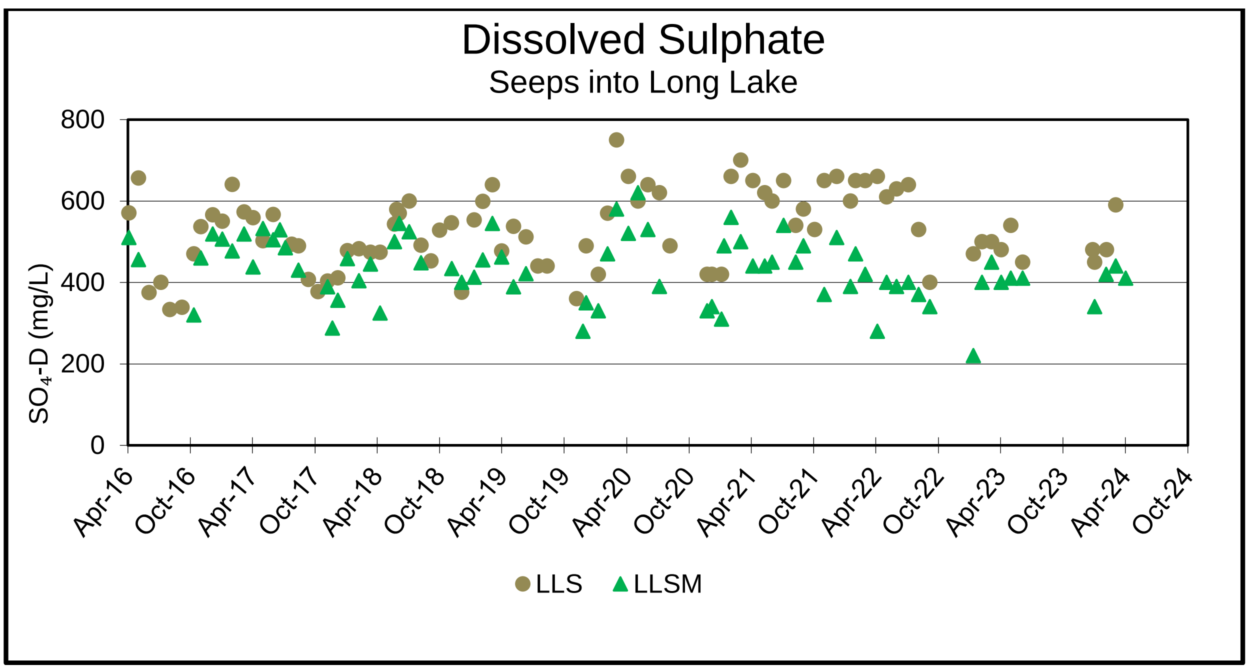


Figure 25: Dissolved Sulphate at Long Lake Seeps

GROUNDWATER

Groundwater wells are categorized as either 'in-situ' or 'ex-situ;' the definition for each is as follows:

- In-situ: groundwater wells located within the mine workings (disturbance footprint) and therefore represent water accumulated within the mining void. In the absence of groundwater well samples, underground sump samples are used for comparison.

- Ex-situ: groundwater wells located outside the mine workings (disturbance footprint) which reflect formation groundwater and indicates seepage from the flooded mine voids towards the receiving environment. This also includes wells up-gradient of workings and formation/ baseline groundwater wells.

The groundwater wells outside the mine footprint (ex-situ) are compared to the British Columbia Contaminated Site Regulation (CSR) found here:
https://www.bclaws.gov.bc.ca/civix/document/id/lc/statreg/375_96_08

The CSR describes water quality standards for freshwater Aquatic Life (AW). The aquatic life standard assumes that a minimum 1:10 dilution is available for groundwater discharged to a freshwater system; together, they are referred to as CSR-AW.

Appendix 1, Table 4, 31 through 33 provide a description of wells and results of the flooded mine void and groundwater chemistry.

Exceedances of the CSR-AW in ex-situ groundwater were observed for dissolved concentrations of arsenic, selenium, sulphate and sulphide as H_2S as displayed in Appendix 1, Table 4. Arsenic is naturally elevated in the groundwater and is associated with perched water tables interacting with the Dunsmuir sandstone and coal seams. This has been observed in baseline groundwater monitoring.

A perched groundwater table above the River Barrier Pillar area is interacting with arsenic bearing sandstone before emerging to surface and entering the Quinsam river. These sites are referred to as S and S2A. Both sites (S and S2A) displayed elevated results above the WQG's on all three sampling events for individual results above the chronic WQG for As-T ranging from 0.0226 mg/L to 0.0804 mg/L and averaging 0.0545 mg/L for both S and S2A. Site S also displayed total boron (B-T) results (1.4 and 1.46 mg/L) above the chronic WQG of 1.2 mg/L. S2A displayed one result for dissolved Iron (Fe-D) of 0.427 mg/L above the acute WQG (0.35 mg/L). Refer to Appendix 1, Table 3.

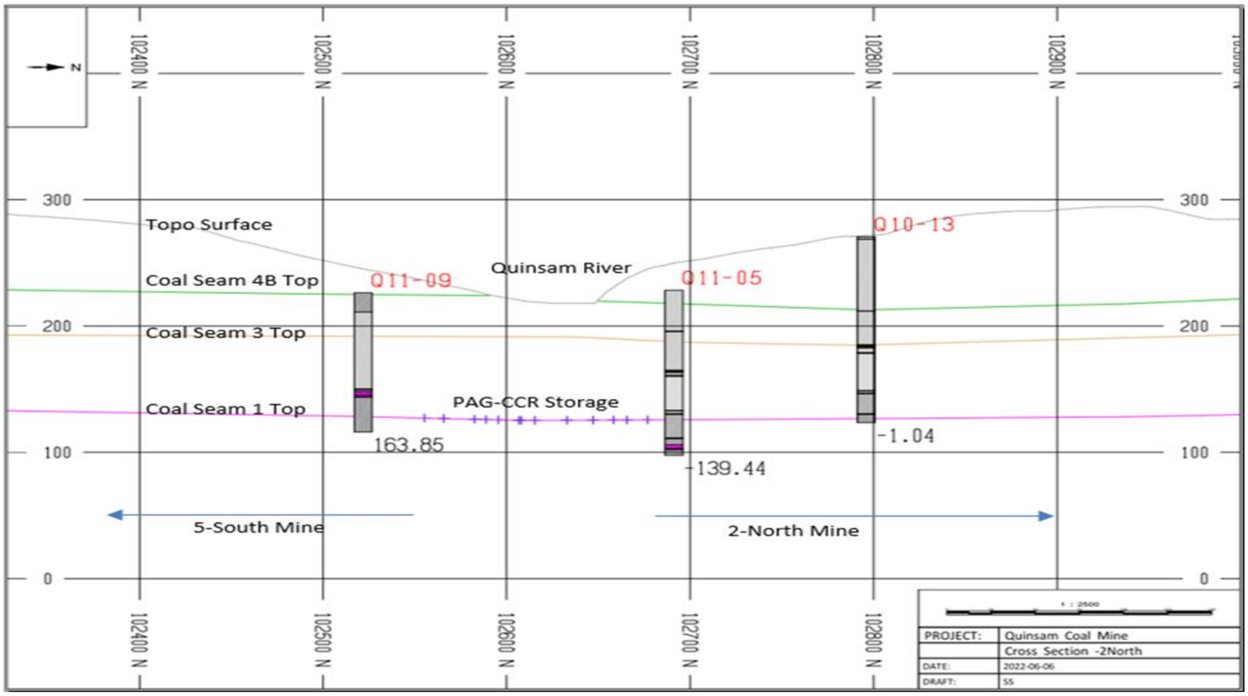


Figure 26: Cross Section in North-South Direction Near Seepage Areas by QU11-09 and QU11-05

Figure 26 above displays a cross section in North-South direction near the groundwater discharge areas S at QU11-09 and S2 at QU11-05. The numbers at the bottom of each borehole are the distance offset from the cross-section line. Positive (negative) sign indicate borehole locates in the north (south) of the cross-section line. The PAG-CCR storage area (blue cross) is projected on the coal seam 1 top surface, where the coal was mined at 2-North. Non-arrowed polylines represent different surfaces.

The relationship between flow rates at the seeps and water elevations in the 2-North flooded mine voids continues to be evaluated. In November 2021, a cap was placed on the well QU11-09 to prevent discharge to surface when the underground mine void filled with water. Pressure transducers were placed in the groundwater wells (shallow and deep) to measure the water levels compared to the 2-North flooded mine void water levels.

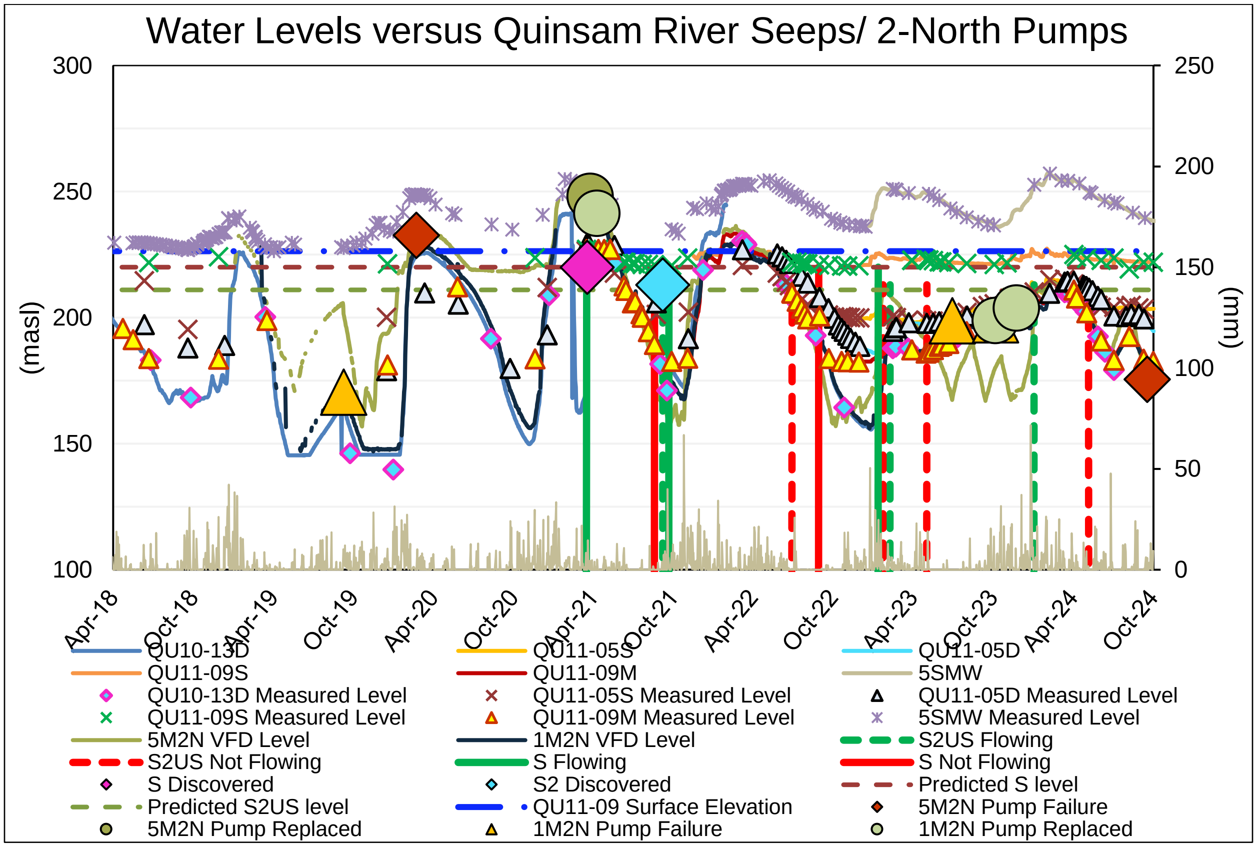
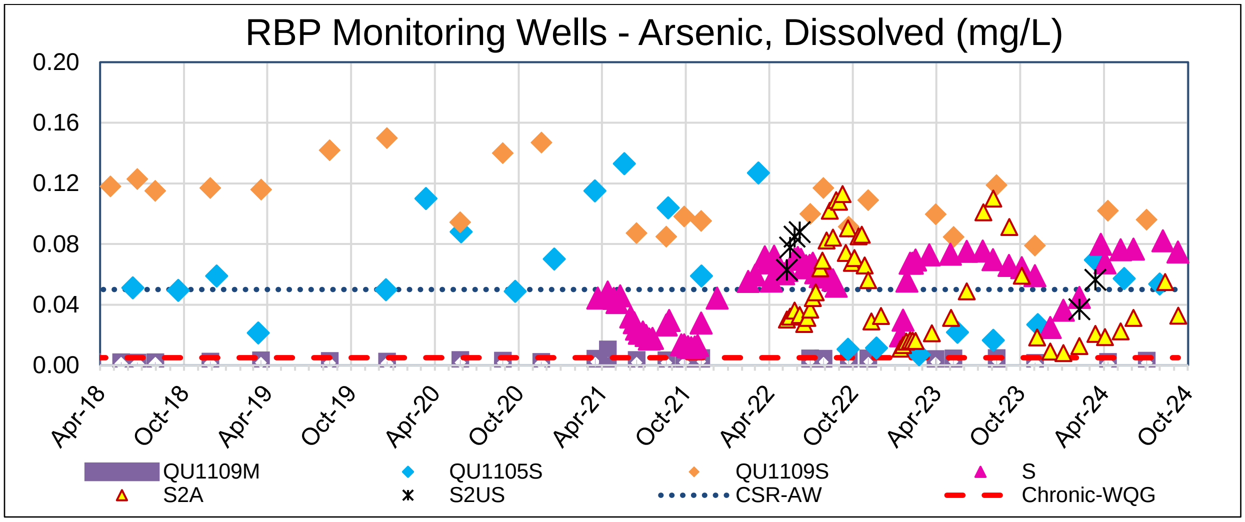


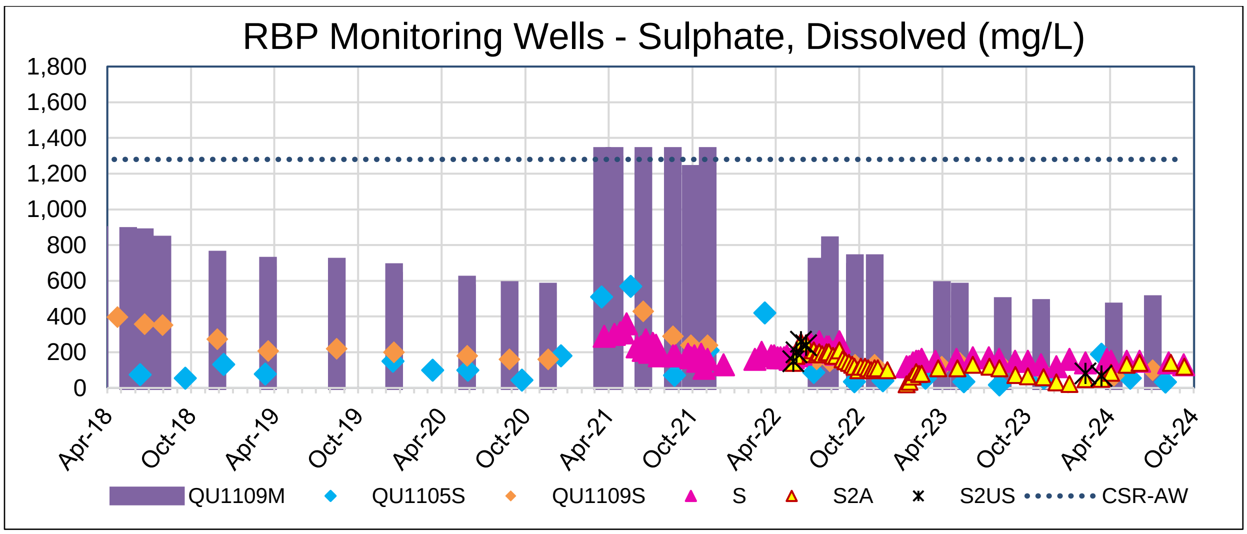
Figure 27: 2 North Flooded Mine Void Compared to Seepage Rates Near QU1109 and QU1105

Figure 27, displays groundwater elevations compared to observations of S and S2 areas since March 2021, when groundwater well QU11-09 was discharging to surface. The groundwater for both shallow and deep water-tables follow a similar trend compared to 2-North mine water levels measured at dewatering well, 1-Mains well pump (1M2N). As displayed in Figure 28, groundwater in wells (QU11-09 M and S and QU11-05 D) increases to approximately 227 meters above sea level (masl) December through April corresponding to the 2-North, 1-Mains well pump water elevation. Flows from the seepage area near QU11-05, named S2US corresponds directly with the 1-Mains well pump water elevation but seepage from S2A and near QU11-09 seepage (S) could be combined mine related and natural groundwater influences.

Appendix I, Tables 3, 34 and 35 present the water quality and quantity from the seepage areas. Figure 28, below displays the concentrations of dissolved arsenic, chloride and sulphate compared to the groundwater in the area. Similar trends are noted for these parameters.

All parameters remained in low concentrations (below WQG's) on the Quinsam River, indicating sufficient mixing and dilution. Flow rates were minimal in the groundwater discharge areas.





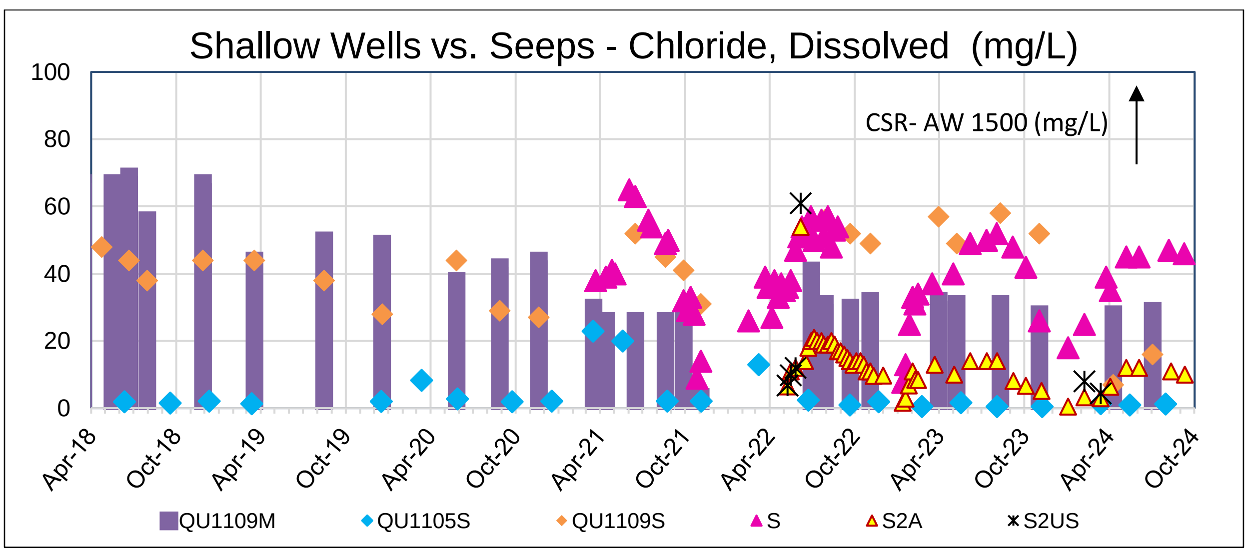


Figure 28: Dissolved Arsenic, Sulphate and Chloride at Groundwater and Seepage Areas

PASSIVE TREATMENT SYSTEM (PTS)

The PTS was operating throughout the quarter. The treatment system was operating at an average of 4.50 L/s, for 91 days in Q2 totaling 35770 m^3 of pumped mine-water. The seep stops flowing when the water level reaches an approximate elevation of 301.5 masl for LLS and 303.5 masl for LLSM measured at MW004. Groundwater levels in MW003 and MW005 also relate to the seep flow as displayed in Figure 29, below. from the 2-South flooded mine void (INF).

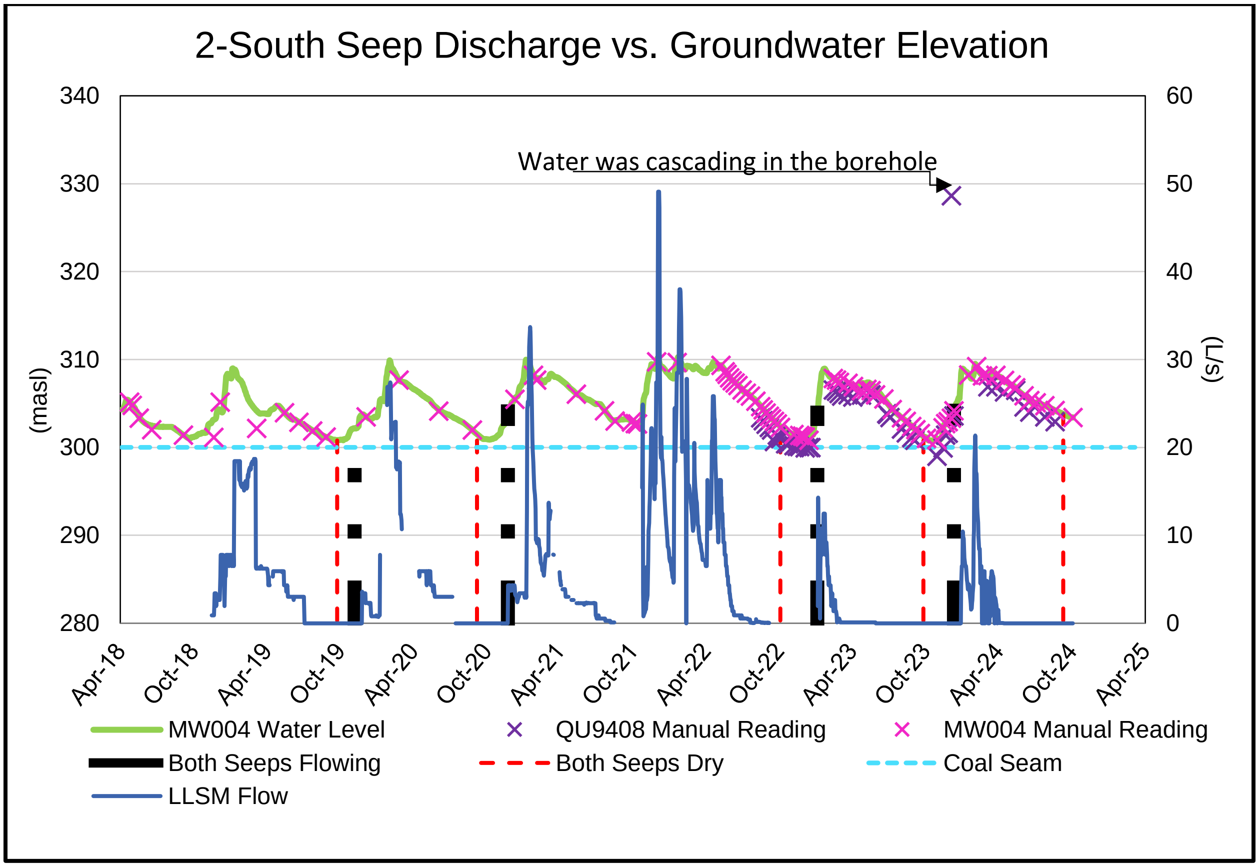
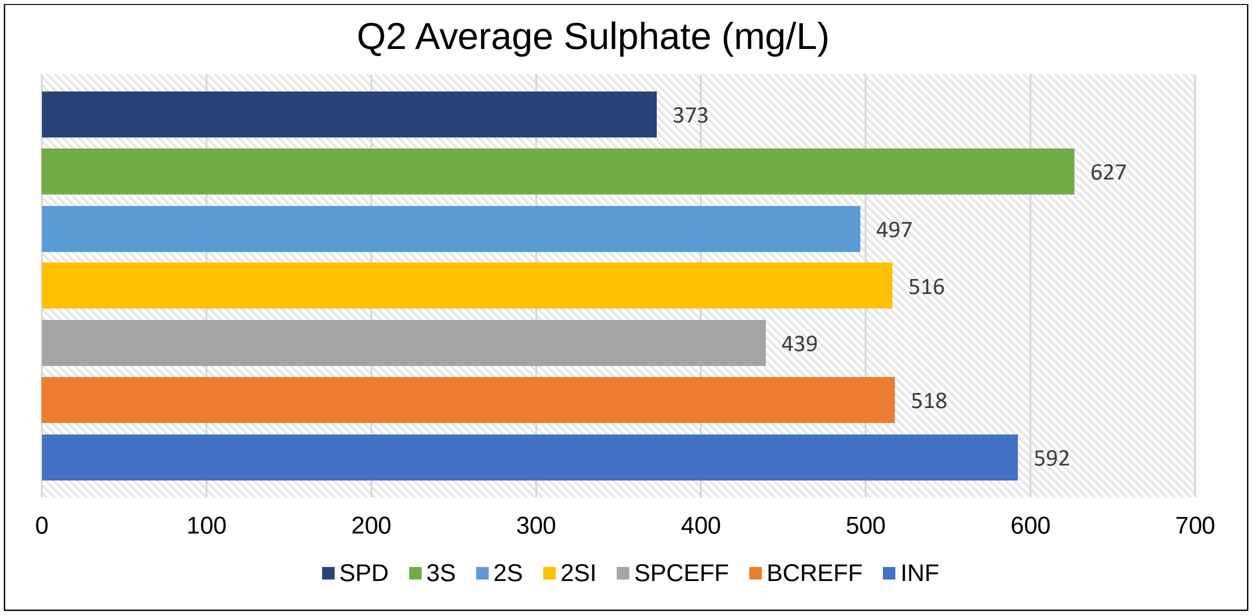


Figure 29: Water Level versus Long Lake Seep Flow

Figure 30, shows average concentrations of dissolved sulphate have been entering the system from 2-South flooded mine void measured at INF resulting in 592 mg/L, average sulphate at the BCR was 518 mg/L and leaving the system at SPCEFF resulting in 439 mg/L. Reduction in average sulphate throughout the PTS (INF to SPCEFF) was 153 mg/L. Station 2-South Inflow (2SI), receives discharge from the PTS, had an average sulphate concentration of 516 mg/L and SPD averaged 373 mg/L during Q2. Overall, a quarterly average sulphate reduction of 219 mg/L was attained between INF and SPD (Figure 30). The original reduction goal for the PTS was to reduce sulphate concentrations to 300 mg/L.

Increased pumping rates reduced the PTS's capability to reduce sulphate. To mitigate this and retain water for the 2S and 3S pits, in case of drought conditions, the pumping rate was decreased from 8 L/s to 4.5L/s in July. In Q2 warmer ambient temperatures increase microbial metabolic activity within the BCR and SPC and a slightly higher reduction efficiency in sulphate is expected but did not occur (78 mg/L compared to Q1, 80 mg/L). Low reduction efficiency may indicate that the substrates need to be changed in the PTS.



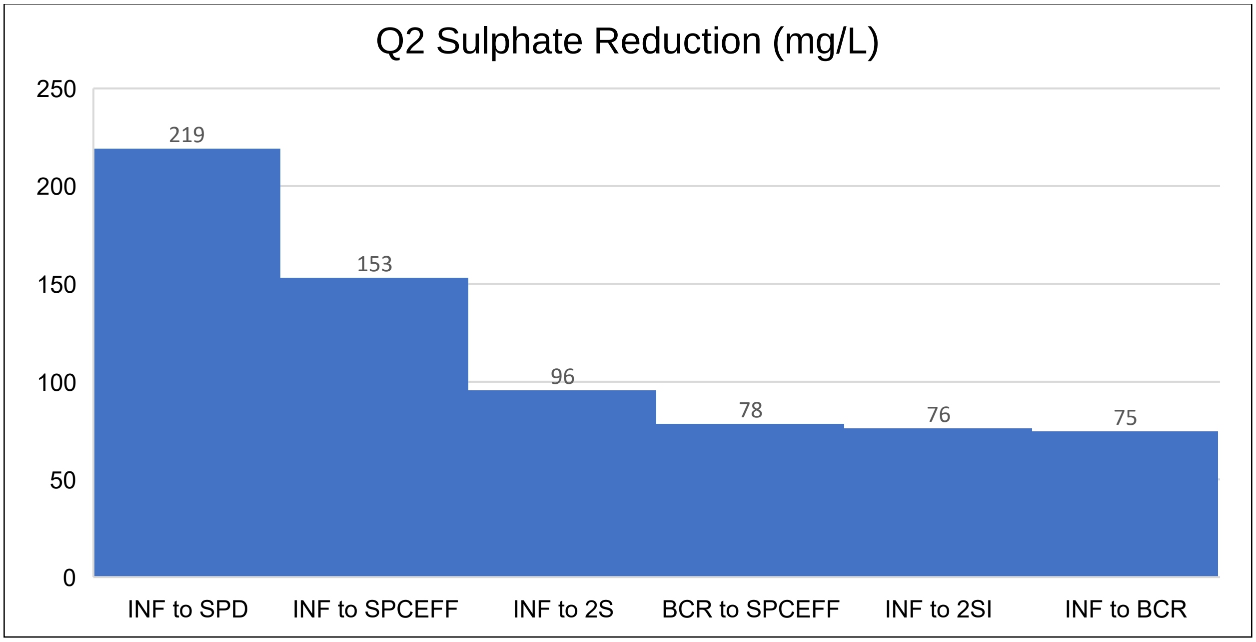


Figure 30: Average Dissolved Sulphate and Average Sulphate Reduction

The PTS is effective at reducing sulphate in mine water, with discharge assisting to maintain a water cover over the PAG-CCR in the 2-South pit during summer and reducing discharge at the Seep into Long Lake during low flow periods. This is accomplished by decreasing the elevation of the 2-South flooded mine void below the elevation of the seep. The period of "no flow" at the Middle Seep into Long Lake (LLSM) has been observed to be extended by pumping down the mine pool. This quarter the seeps stopped flowing in mid-Jul though to late fall.

Further monitoring of the PTS will continue and includes the 2-South and 3-South systems and groundwater wells QU11-11 (INF) and MW004. Relationships between mine pool water elevations and seep flow rates continue to be developed with observations noted every quarter.

Quality Assurance Quality Control

All replicate sampling was performed in compliance with the *British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 2013 Edition.*

As per these guidelines and in accordance with the Quinsam Coal Quality Assurance/Quality Control (QA/QC) program, one field replicate sample was collected per sampling event. Relative Percent Difference, RPD values were calculated in accordance with the B.C. field sampling manual. For RPD's and RPD's calculations greater than 20 percent, and Sample Blanks refer to Appendix I, Tables 40 to 42.

Conclusion:

Quinsam Coal is dedicated to reducing the environmental impacts of mining on the receiving environment. Overall, there were no permit limit exceedances and few parameters outside the provincial Water Quality Guidelines in the receiving environment this quarter. This exemplifies that the environmental management practices employed by the mine are effective at reducing impacts to the surrounding environment. In closing, we trust the information presented in this report satisfies the conditions under Effluent Permit PE-7008. Please contact the Environmental Department if you have any questions or comments.