

Quinsam Coal Corporation Quarterly Report (April-June 2023)

For Effluent Permit PE: 7008

Environmental Department

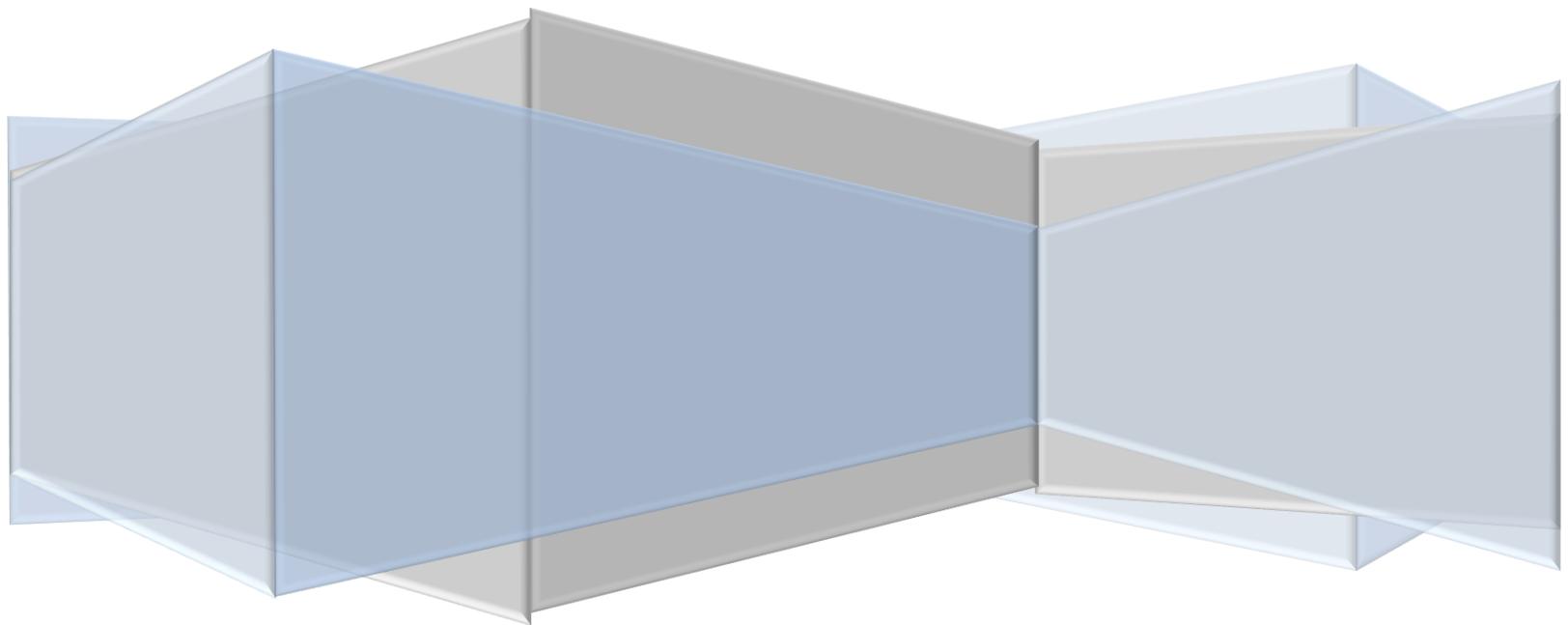


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INTRODUCTION

During Quarter 1 (April 1st through June 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, formerly The Bowra Group Inc. as the Receiver.

For Quarter 1 (Q1), all environmental monitoring was completed as per stipulations in the effluent permit PE:7008. *The Annual Water Quality Monitoring Report* was submitted on June 30th.

NORTH END WATER MANAGEMENT SYSTEM:

Water levels in underground workings are managed through a series of pumping systems. Stage pumping / dewatering continued from 7-South Area 5 (7SA5) into 1-Mains 7-South (1M7S) sump, where it then pumps into the 5-South Mine (5SMW). In late 2017, the 5-South mine water was directed into 3-Mains, 2-North flooded mine void (3M2N) until the pump failed in January 2022. Before pump failure, all 5-South Mine water was directed into Settling Pond #1. Water levels are monitored in the 5-South mine to ensure they remain below the portal at an elevation of 290 meters above sea level (masl). Seasonal fluctuations are observed within the flooded mine void as groundwater infiltrates and pumping from 7-South increases. Refer to Figure 1: 5-South Flooded Mine Water Level, below.

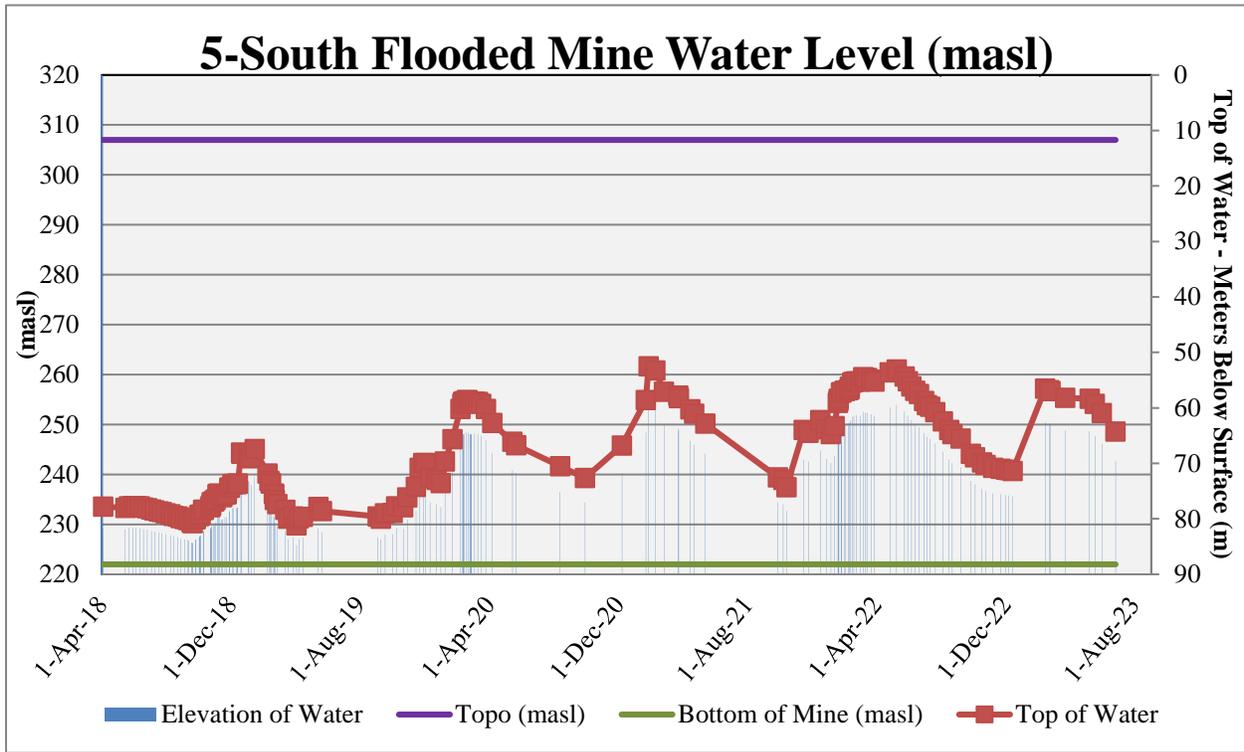


Figure 1: 5-South Flooded Mine Water Level

Water levels in the flooded 2-North Mine are managed by dewatering wells and pumps located in 1-Mains 2-North (1M2N) and 5-Mains 2-North (5M#2), including the underground pumps (3M2N) and the 2-North Portal Sump (2NPS). All water from these pumps is mostly discharged into Brinco Brook flowing into Settling Pond 4. 1M2N and 3M2N pipelines are equipped with gate valves where discharge water can be directed into the 2-North Sump (WP). Water is used to supply sufficient water cover over the Potentially Acid Generating (PAG), Course Coal Refuse (CCR) in WP during the dry season.

During Q1, the 1M2N gate valve was split directing water into both WP and Brinco Brook. The 3M2N pump discharge was directed into Brinco brook until June 15 when the valve was opened to direct all water into WP. The 2NPS discharge is directed into Brinco brook, this sump collects seepage water from the tailings dam and underground 2-North mine. Refer to Figure 2: North Water Management System (NWMS).

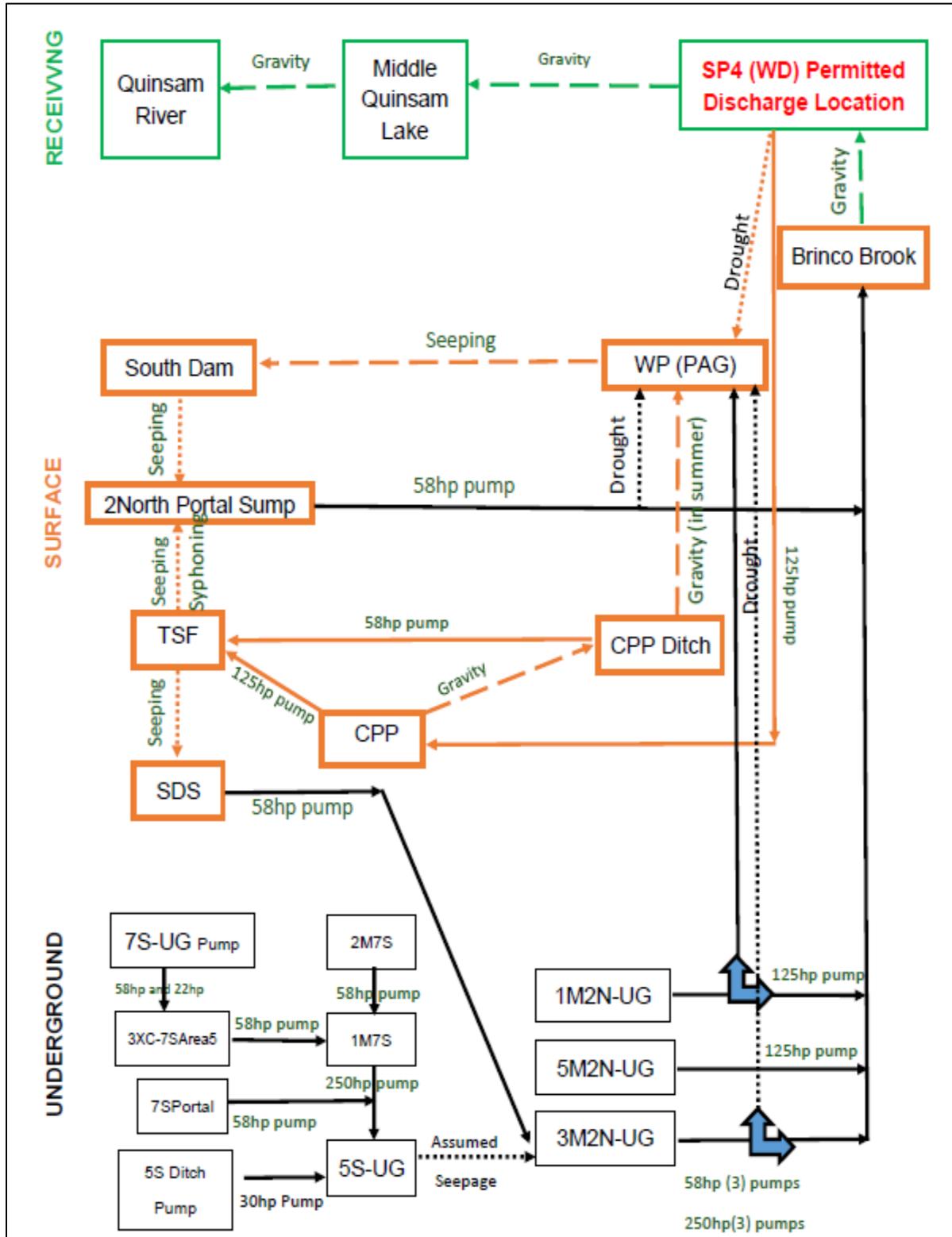


Figure 2: North Water Management System (NWMS)

Water levels in the 2-North mine are monitored from surface at 1M2N and 5M2N. Refer to the Figure 3: 2-North Underground Water Level (masl). Water levels in underground workings are influenced by groundwater infiltration and have a seasonal trend of increased water levels in the wet seasons and lower water levels in the dry seasons. If pumping was eliminated the mine would fill, reducing the range between fluctuating water levels through the seasons. Water levels would become more stable throughout the year.

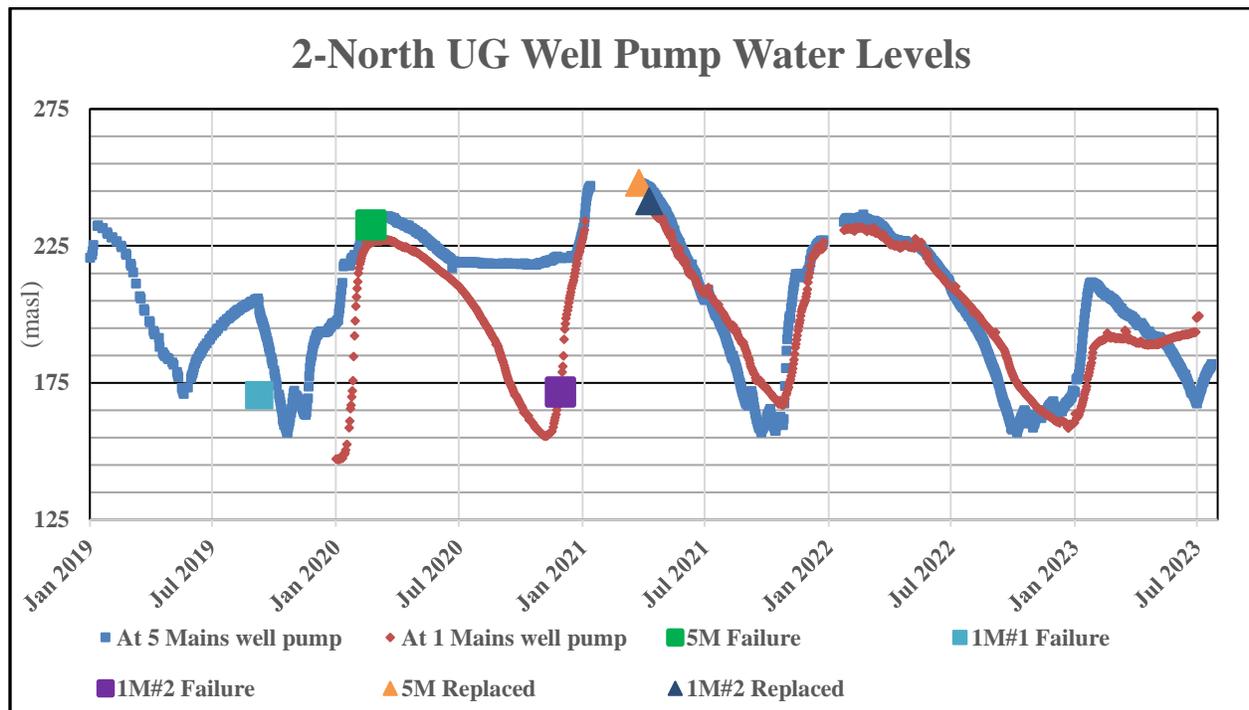


Figure 3: 2-North Underground Water Level (masl)

Settling Pond 4 (WD / SP4) is the authorized discharge location for the North Water Management System, where permit limits are applied to water quality and quantity. All water quality remained within permit limits. Discharge occurred 91 out of 91 days, refer to Figure 4: Settling Pond #4 Discharge Rates. Cumulative discharge at SP4 was calculated as 889, 564 m³ compared to 2022 Q1 where 970, 099 m³ was discharged. All water quality remained below effluent permit limits at SP4.

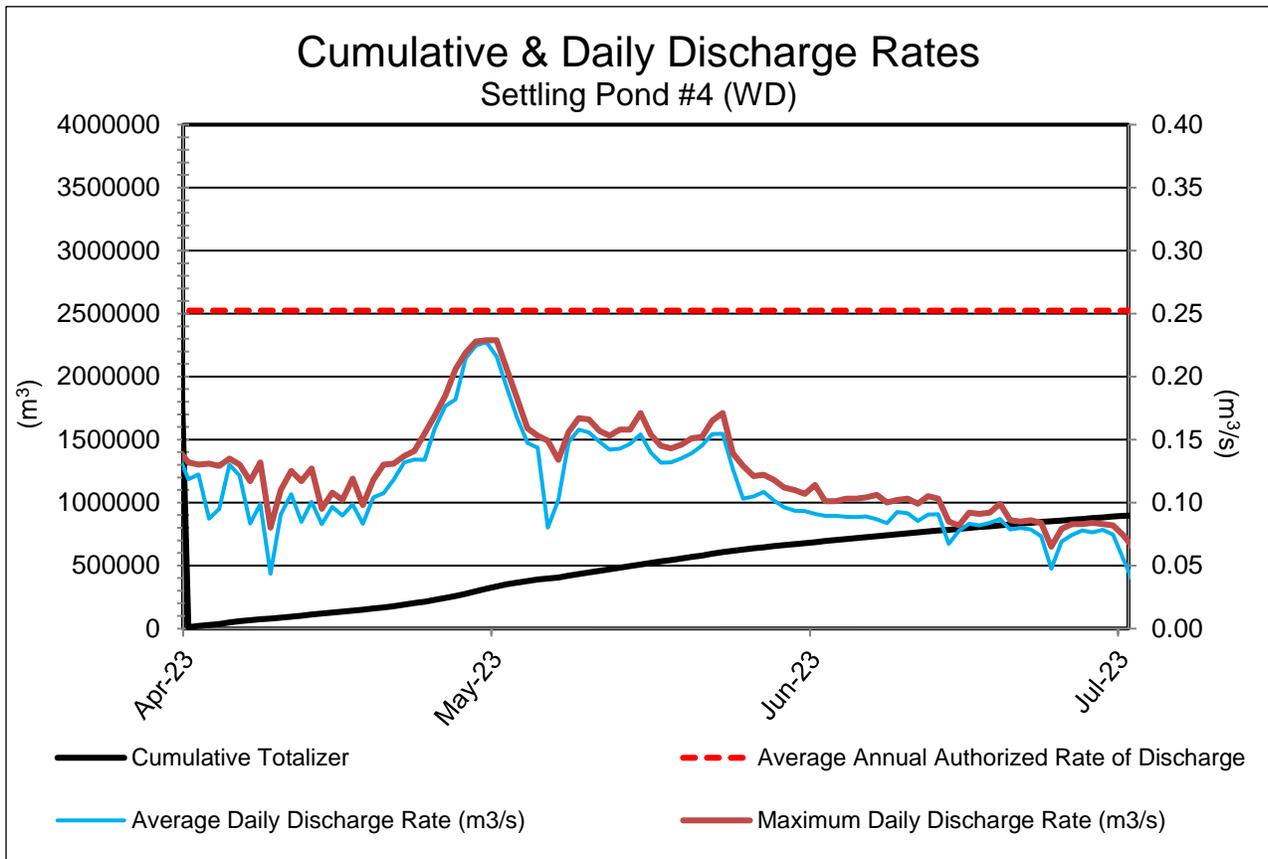


Figure 4: Settling Pond #4 Discharge Rates

SOUTH END WATER MANAGEMENT SYSTEM:

The South Water Management System (SWMS) is managed by directing all water from the Passive Treatment System (PTS) into the 2-South and 3-South pits to maintain a water cover over the PAG-CCR (1.00 m) during the dry season and maintain the 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 8.2 L/s from the 2-South mine pool (INF) with 5.0 L/s into the PTS and 3.2 L/s (untreated) into the 2-South pit. 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 to the 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.

The 3-South pit maintains a water cover over the PAG-CCR via seepage from the 2-South pit, overflow from the water cover at 2-South pit and precipitation. This water flows down a channel from 2-South to 3-South. Continuous discharge 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 2-South Pit and inflow to 3-South Pit. Water pumped from the 3-South Pit is pumped to Settling Pond #1 during spring, fall and winter. During summer if required, 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 Settling Pond #1 (SPD / SP1). 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. As a result, SPD will stop discharging (normally during mid-May) reducing the load from mine contact water on the receiving environment. The valve directing water from 3S to 2S was not opened this quarter and all water has been directed to SP1. Refer to Figure 5: South Water Management System (SWMS).

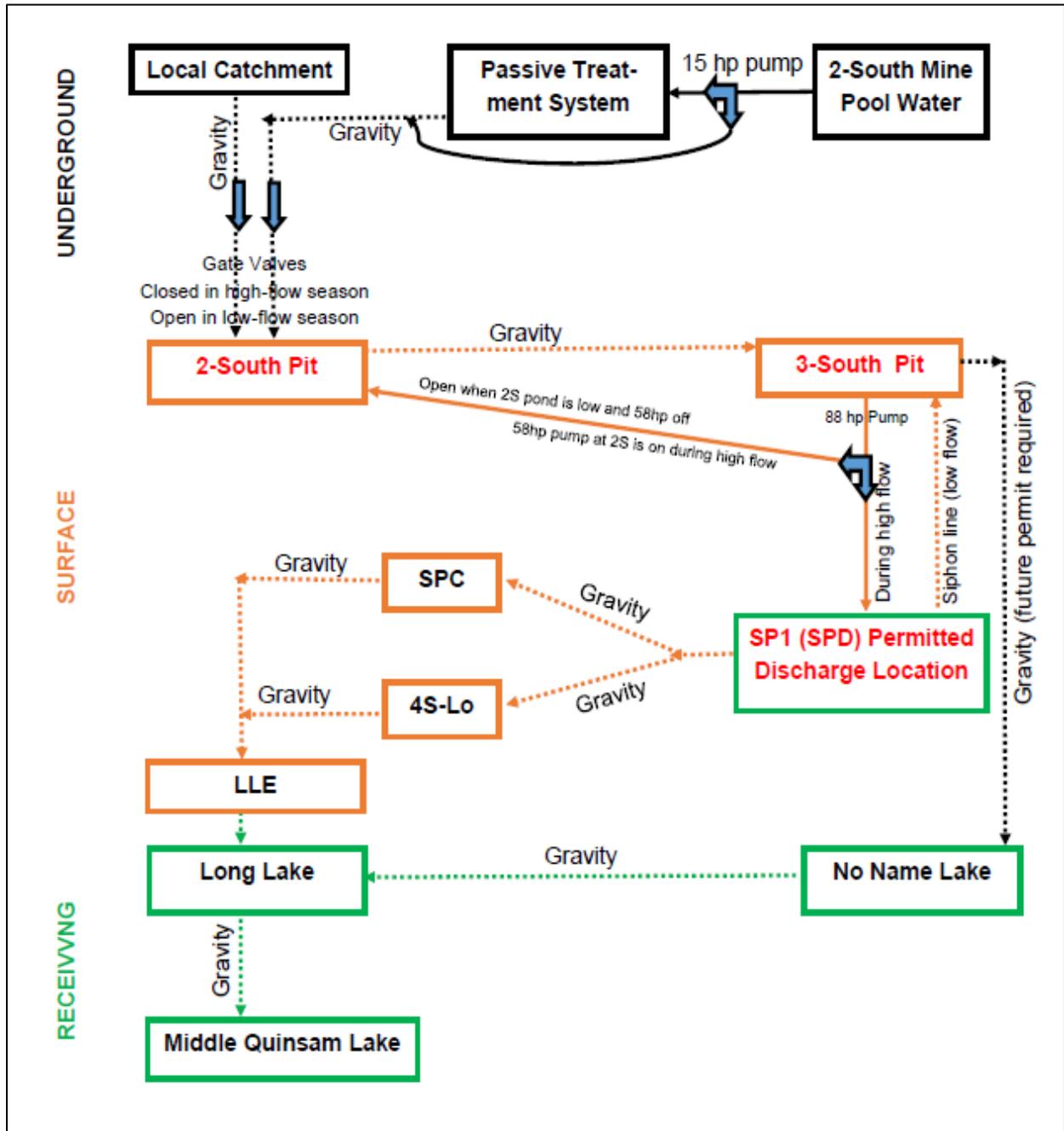


Figure 5: South Water Management System (SWMS)

SP1 is the authorized discharge location for the SWMS where permit limits are applied to water quality and quantity. Discharge occurred for 91 out of 91 days. Refer to Figure 6: Settling Pond #1 Discharge Rates. With a cumulative quarterly total of 145, 817 m³ compared to last year Q1 where 23, 0982 m³ was discharged. All water quality remained below effluent permit limits at Settling Pond #1.

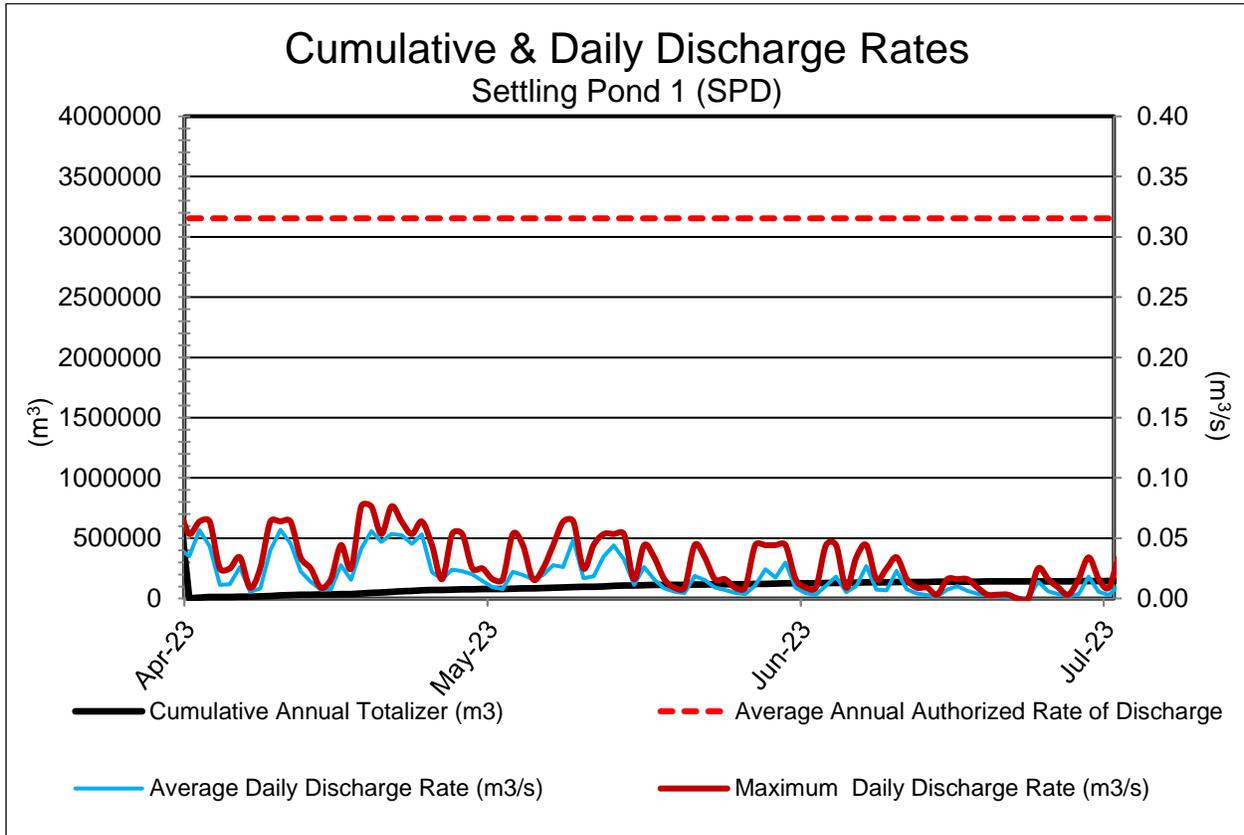


Figure 6: Settling Pond #1 Discharge Rates

7-SOUTH (7SSD) WATER MANAGEMENT:

Discharge did not occur during Q1 at 7SSD. Sedimentation pond outflow is controlled by pumping water accumulated in the pre-settling pond to the 7-South Portal Sump. This procedure reduces discharge, decreasing the overall parameter loading and the potential for adverse aquatic impact in the receiving environment as the biological availability for parameters of concern is much lower than under constant discharge conditions. Refer to Appendix 1, Tables 28 and 30 for 7SSD and 7S discharge rates, respectively. Stream 1, 7S stopped flowing on May 28, 2023, and has not flowed since.

A quarterly sample was obtained from the ponded water (7SSD) and monthly samples collected from Stream 1, 7S. This quarter, parameters of interest remained within the specified limits of the Water Quality Guidelines (WQG) during all sampling events at 7S. The water quality results corresponding to these samples are available in Appendix I, Tables 23 and 25.

QUARTERLY MONITORING:

Spring 2023 receiving environment monitoring program for both lakes and river/stream stations was completed. Quarterly monitoring was performed for groundwater quality, effluent and within (in-situ) mine releases. All environmental sampling and obligations pertaining to permit PE-7008 were completed and results are available in Appendix I with phytoplankton results available in Appendix II. Spring zooplankton results have not been received on time for this report.

The reader should note that concentrations for most parameters of interest were not elevated above water quality guideline (WQG) levels in the receiving environment throughout the spring sampling period, apart from dissolved copper. Dissolved copper was trending above Chronic WQG's upstream of the mine influence on the Quinsam River (WA) for 2 out of 5 weekly samples and at No Name Lake for all but 1 sample during the 5 weeks of monitoring. The downstream lakes (Long, Middle Quinsam and Lower Quinsam) were also elevated above the Chronic WQG's. This could be associated with spring turnover and the upstream influences (WA and No Name Lake). Appendix 1, Table 4 displays the results for dissolved copper compared to both chronic and acute WQG's.

At LLE, average dissolved sulphate was above the Chronic WQG of 128 mg/L when a background hardness of 30 mg/L is applied. Averages were taken from 5 weeks of consecutive samples and rolled forward. Using this application there were 11 averages above the Chronic WQG. Averages ranged from 146 mg/L to 422 mg/L, concentrations increase with decreased flow.

At LLE and Long Lake Seeps (LLS and LLSM) dissolved iron concentrations were above the Acute WQG's of 0.35 mg/L. At LLE and LLSM this occurred for 1 out of 3 monthly samples resulting in 0.391 mg/L and 0.419 mg/L, respectively. At LLS, 3 out of 3 monthly samples were elevated above Acute WQG's. Results were 0.799 mg/L, 0.743 mg/L and 0.903 mg/L, for April, May and June, respectively.

Groundwater sourced potential seepage areas entering the Quinsam river at S and S2, displayed elevated results for total arsenic above the Acute WQG's of 0.005 mg/L. Results for arsenic at S were 0.0772 mg/L and 0.0722 mg/L and S2 resulted in 0.0318 mg/L and 0.0453 mg/L.

Groundwater wells, underground sumps, and dewatering wells throughout the 2 North and 3 North, 2 South and 3 South, 4 South, 5 South and 7 South mine areas were monitored. There are certain parameters that continually result above the CSR-AW. These include arsenic, chloride and sulphide as H₂S. Selenium is also observed periodically in the ex-situ deep groundwater of QU11-05D downgradient of the 2-North Mine, River Barrier Pillar and 5-South mine.

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

NON-COMPLIANCE EVENTS:

An unauthorized discharge continues from the from the Long Lake Seeps until an application for a permit amendment is submitted. Permit non-compliances for missing required parameters (dissolved sulphate and turbidity) resulted from the Analytical Laboratory not including chain of custody requested parameters sent with the samples. The sites that have no results for May, dissolved sulphate include 3S Pit, 2S Pit and 2-North Portal Sump. In addition, week one of sampling for No Name Lake at all four require depths (1m, 4m, 9m and 1MB) have no turbidity results. All samples were collected and submitted to the laboratory for analysis. The results were not included in the laboratory reports received by Quinsam.

RECEIVING ENVIRONMENT WATER QUALITY:

The receiving environment monitoring program followed the five samples in thirty days schedule with sampling events spanning April 4th through May 2nd. This monitoring period is meant to capture the “*spring freshet*.”

Preamble – Water Hardness

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

PRECIPITATION

The amount of precipitation accumulated this quarter was 119 mm, lower than Q1 last year (248 mm). Precipitation in Q1 occurred mostly in April (84.80 mm), with May and June receiving 26 mm and 8 mm, respectively, Appendix I, Table 31.

LAKES

The spring lake monitoring program included No Name Lake (NNL), Long Lake (LLM), Middle Quinsam Lake (MQL) and Lower Quinsam Lake (LQL). Appendix 1, Tables 3 and 4 provide a summary of those parameters observed above WQG’s for spring monitoring. Appendix I, Tables 36 through 39 display results compared to guidelines. Only dissolved copper was elevated above the WQG’s during spring. Average results for pH ranged from 6.54 to 7.05 at No Name Lake for all depths sampled. Averages pH was above the chronic minimum WQG of 6.5, an increase from historical results.

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 acute short-term and chronic long-term WQG’s vary between sites (Figure 7). Dissolved Cu was elevated above the Acute WQG (0.0002 mg/L) in No Name at 1 meter from bottom on one sampling event resulting

in 0.00035 mg/L. Average copper results were observed above the chronic WQG's upstream of mine influence in No Name Lake also in Long, Middle Quinsam and Lower Quinsam Lake's. Results above the Chronic WQG's ranged from 0.00029 mg/L to 0.00101 mg/L. Averaged results above Chronic WQG's ranged from 0.00036 mg/L to 0.000712 mg/L. There were 68 out of 86 lake samples above the Chronic WQG's. Lower Quinsam Lake displays the highest average concentrations at 4m (0.000528 mg/L) compared to Chronic WQG (0.0005 mg/L). Appendix 1, Table 4 displays the results above the WQG's.

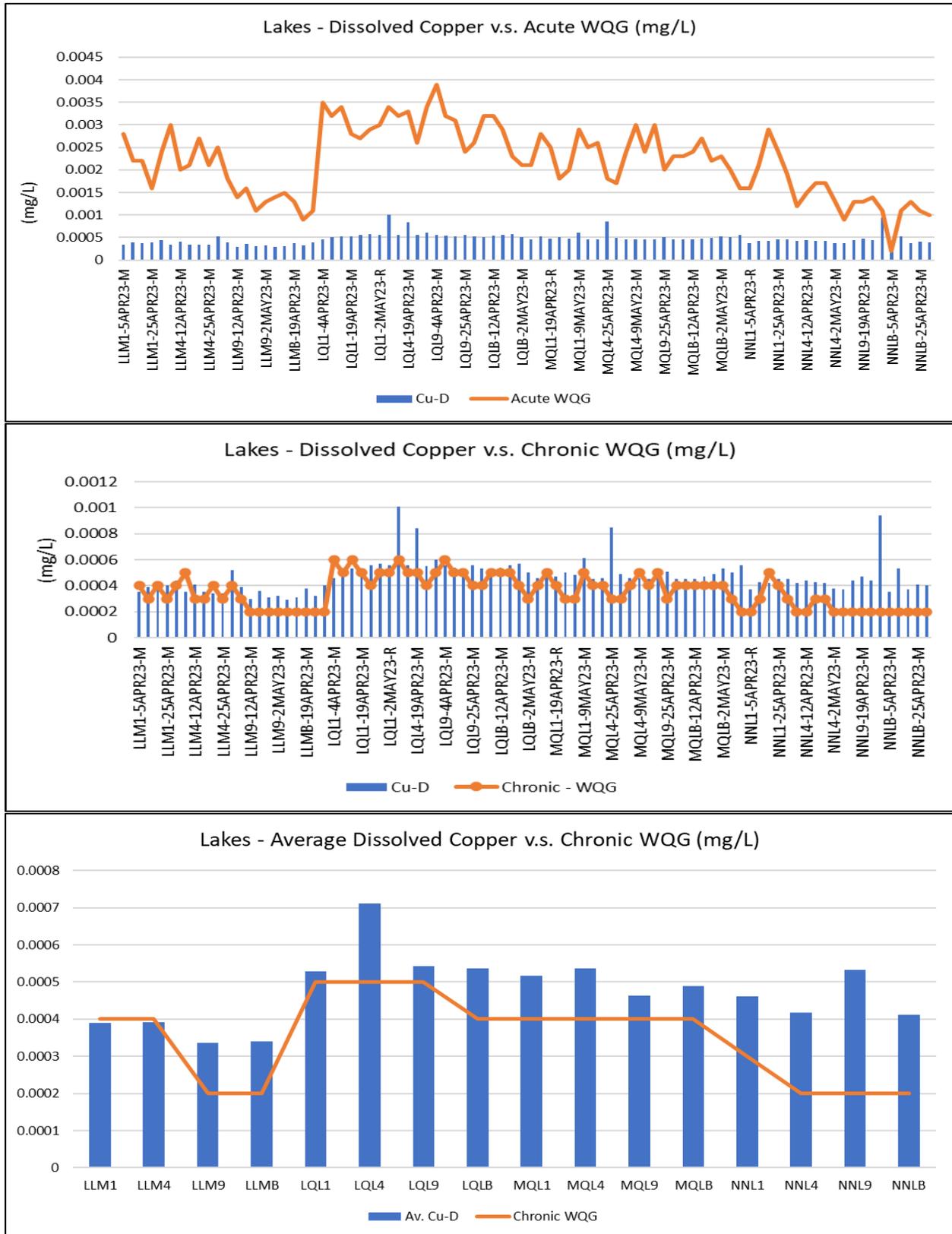


Figure 7: Dissolved Copper Concentrations Compared to Acute and Chronic WQG's

Noteworthy observations resulting from the lake monitoring program include:

- Average sulphate concentrations were measured below the water quality guideline (128 mg/L) in all lakes
- Average sulphate concentrations resulted in 87.6 mg/L at 9 m and 98.4 mg/L at 1 metre from bottom (1MB), in Long Lake
- Sulphate in Middle Quinsam lake remained well below average guideline levels throughout the lake, averaging 18.4 mg/L to 18.8 mg/L at 1m, 4m, 9m and 1MB.
- No Name Lake was not acidic with an average pH above the minimum guideline of 6.5 at all depths.
- Dissolved copper was elevated in all lakes, possibly related to spring turnover.

Figure 8 and Figure 9 below, include the averaged sulphate results for Long and Middle Quinsam Lakes compared to the Chronic WQG.

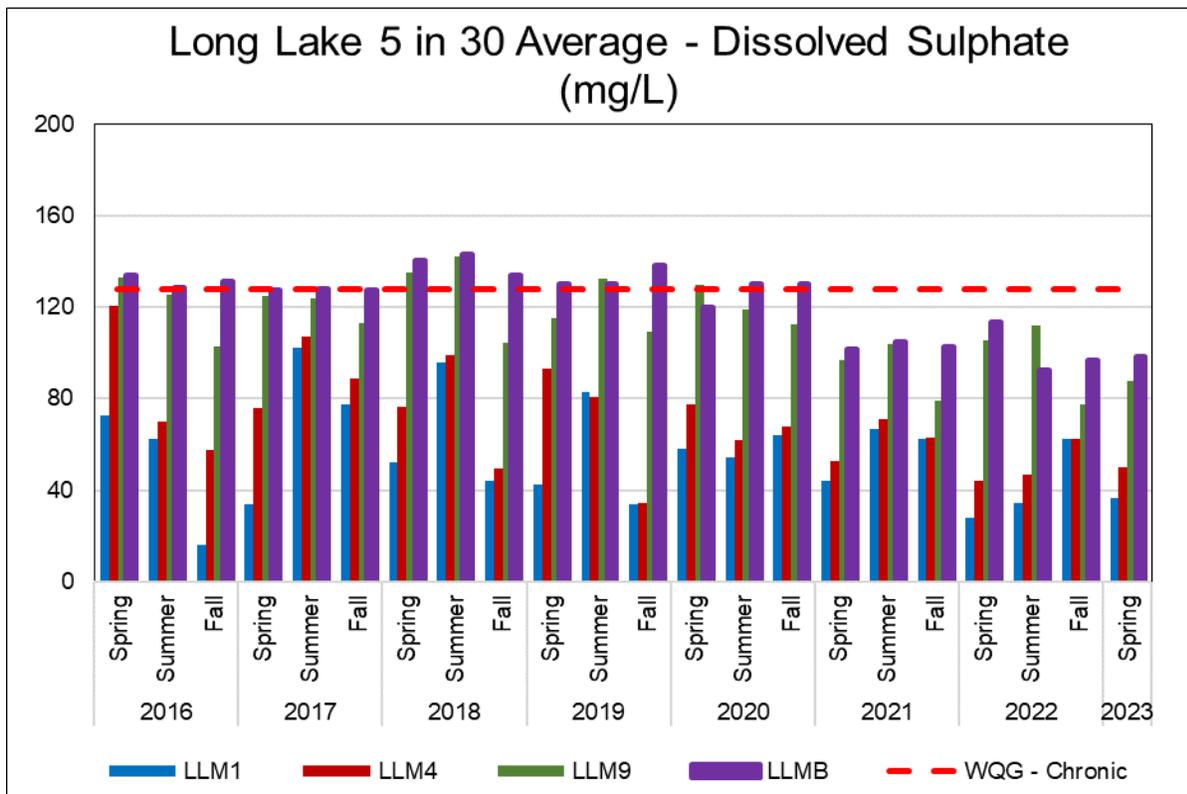


Figure 8: Average Dissolved Sulphate - Long Lake

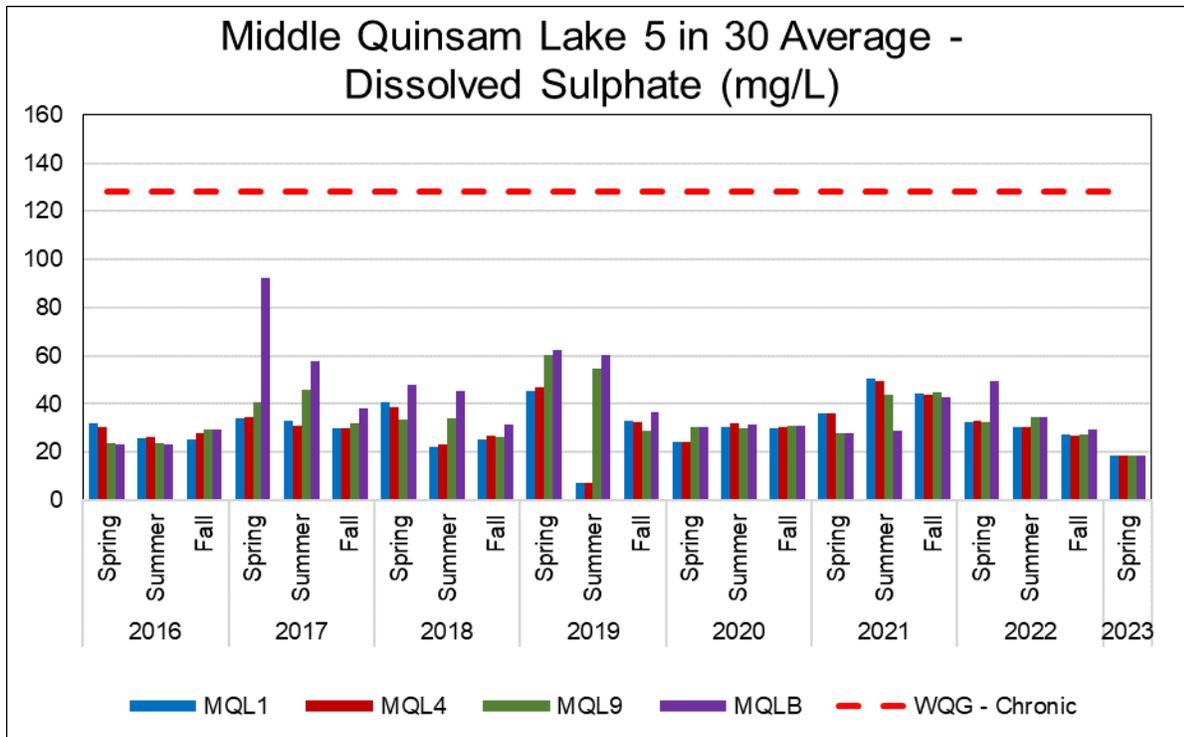


Figure 9: Average Dissolved Sulphate – Middle Quinsam Lakes

STREAMS AND RIVERS

The five samples in thirty days receiving environment program at river and stream sites commenced April 4th and concluded May 2nd. Appendix I, Table 39 display water quality results from this program compared to WQG’s for the Middle Quinsam Lake Sub-basin and Iron River.

Monitoring stations captured within the Middle Quinsam Lake sub-basin and Quinsam river include:

- Middle Quinsam Lake Inlet (WA),
- Middle Quinsam Lake Outlet (WB),
- Quinsam River Downstream Site 1 (QRDS1)
- No Name Lake Outlet (NNO),
- Long Lake Outlet (LLO),
- 7-South Quinsam River (7SQR),
- Quinsam River downstream of the confluence with Iron River (IRQR).

Refer to Appendix 1, Table 3 and 4 for a summary of WQG observations.

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

- Average dissolved copper results remained below chronic -WQG in all river and stream locations during spring.
- Average copper results for the Quinsam River downstream of mine influence and Iron River were not above the acute or chronic WQG's.
- Highest average concentrations were observed at WA, QRDS1 and IRQR
- WA had 2 out of 6 weekly results above the Chronic WQG for copper.
- All other parameters were below the Acute and Chronic WQG's for rivers and streams during the spring monitoring.

Refer to Figure 10: Rivers and Streams - Dissolved Copper vs. Chronic and Acute WQG's, below. displays trends for parameters of interest such as total arsenic, dissolved iron, and average dissolved sulphate on the Quinsam River since 2016. All results have remained below WQG levels. The main indication of the mine influence on water quality is observed with dissolved sulphate increasing downstream compared to the upstream location (WA).

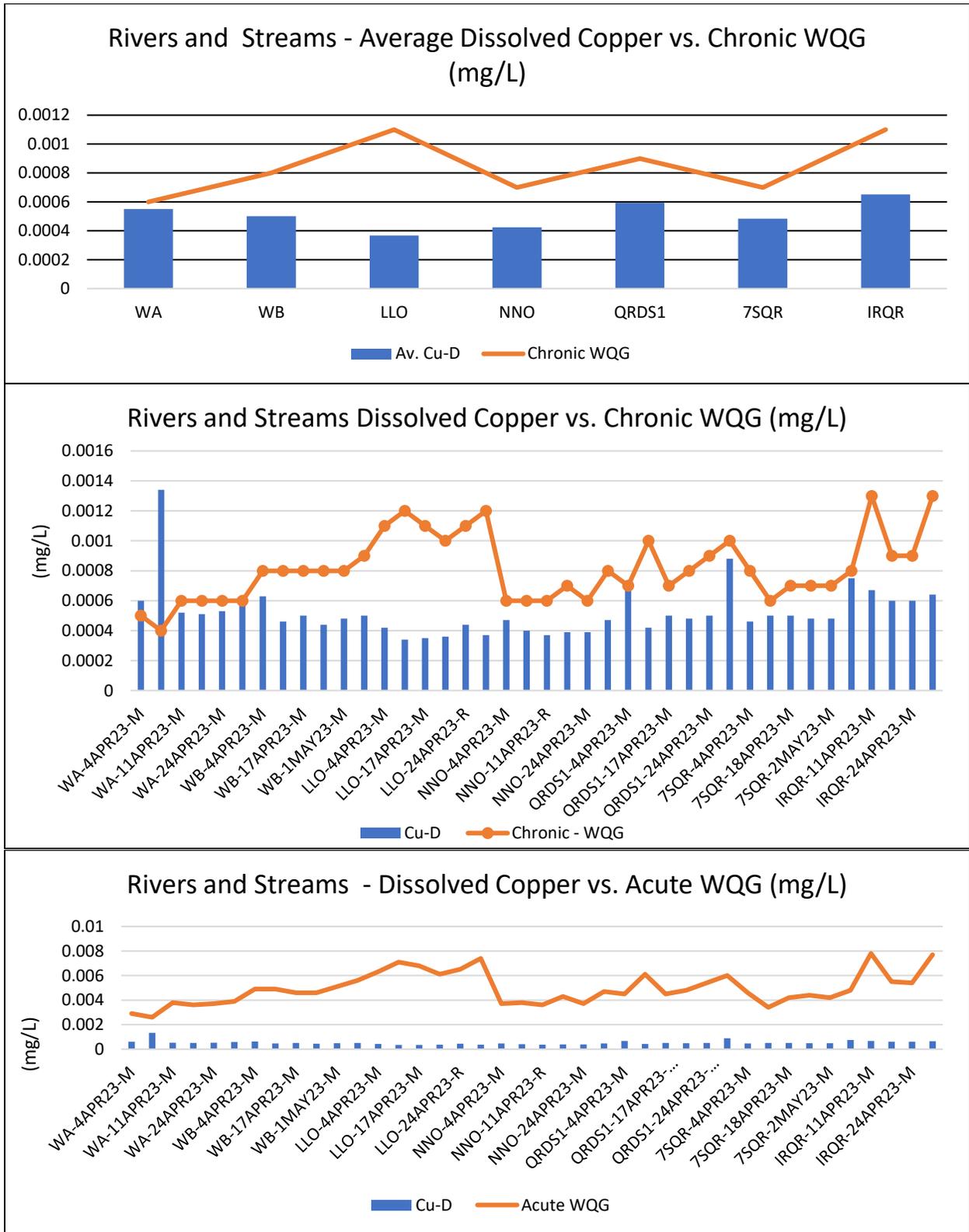


Figure 10: Rivers and Streams - Dissolved Copper vs. Chronic and Acute WQGs

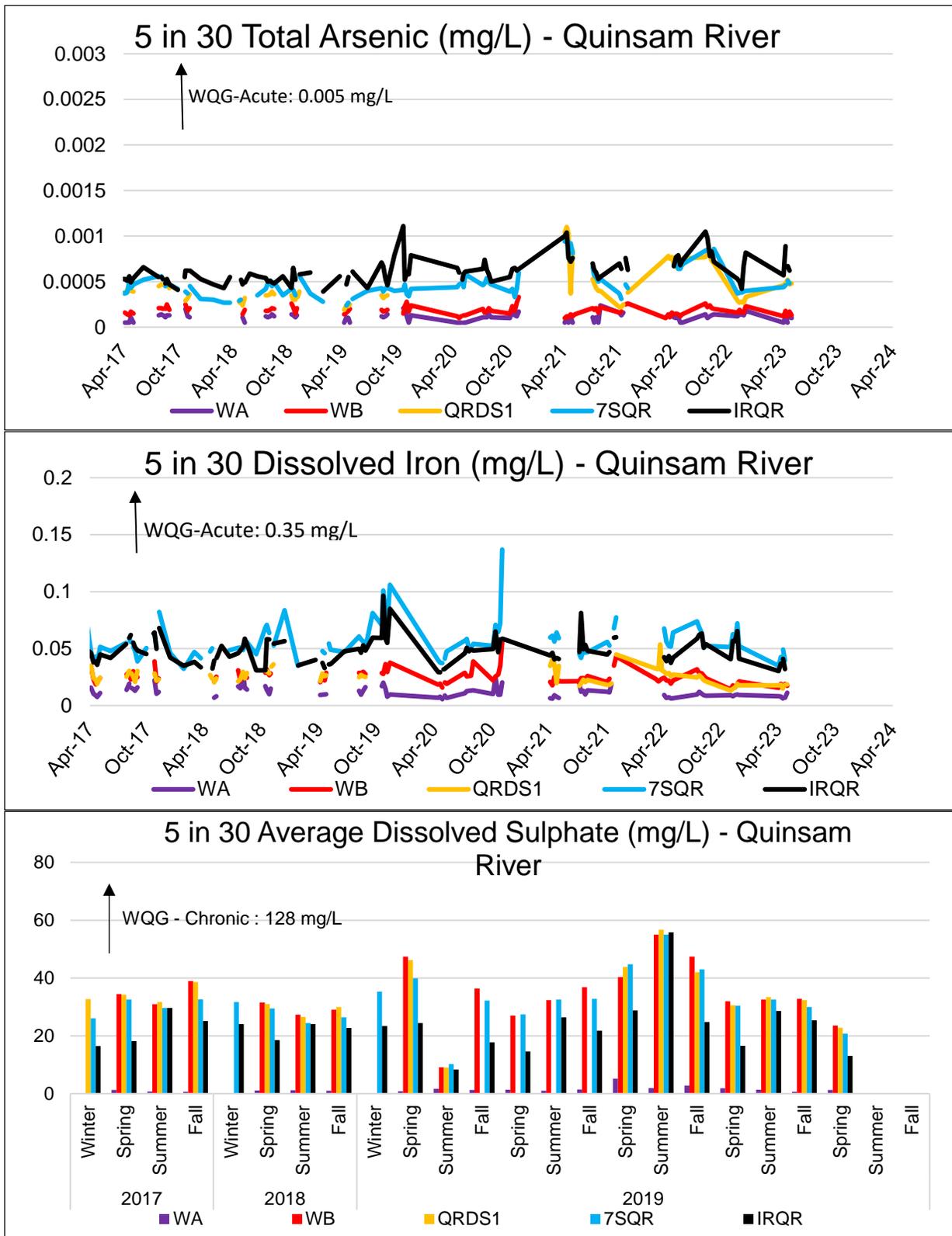


Figure 11: Total Arsenic, Dissolved Iron and Average Dissolved Sulphate - Quinsam River

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.

The Long Lake Seeps are not considered receiving environment sites but WQG's are used for comparison purposes only.

Noteworthy observations resulting from the Long Lake Seeps and LLE wetland monitoring locations:

- Long Lake Seep (LLS) displayed elevated dissolved iron, for all three-monthly sampling events and the larger seep (LLSM) and LLE had 1 out of 3 results above Acute-WQG's of 0.35 mg/L.
- LLE displays elevated concentrations of dissolved sulphate compared to the WQG's.
- Rolling averages for weekly sulphate samples were above Chronic-WQG of 128 mg/L for 11 out of 11 rolling averages.
- Peak sulphate concentrations at LLE are observed with decreased flow rates.

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) (BC reg.37/96. O.C. 1480/96), describing 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, Tables 32 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 and sulphide as H₂S as displayed in Appendix 1, Table 5. 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.

Ex-situ groundwater areas elevated above the CSR-AW for dissolved arsenic (0.05 mg/L) include the 2 and 3 North areas at QU08-21 (GS and GD), the River Barrier Pillar at QU11-09 (S), 7-South at QU08-13 (A and B), and the 4-South area at QU1008 D, QU10-09 (S and D). The deep and shallow ground water at QU11-05 (D and S) and the water cover over the PAG-CCR in QU11-09 M did not contain elevated arsenic.

The potential seepage areas S and S2 located next to the Quinsam river near groundwater wells QU11-09 and QU11-05, continue to be monitored for water quality and quantity.

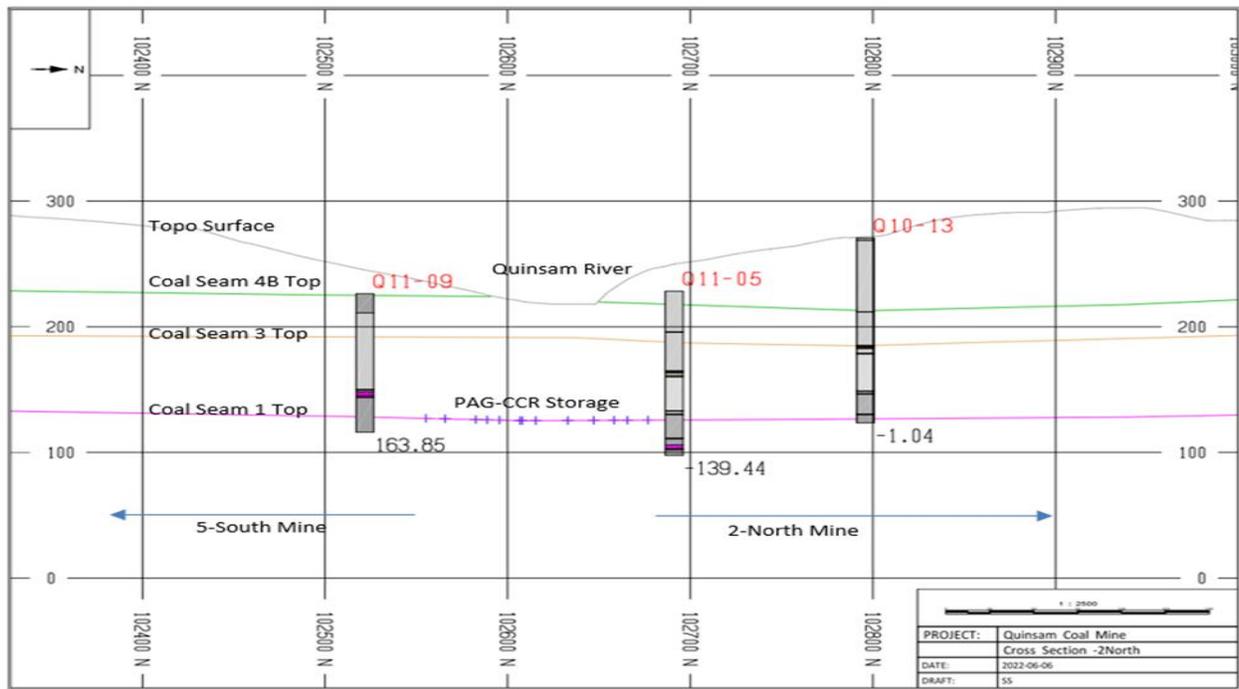


Figure 12: Cross Section in North-South Direction Near Seepage Areas by QU11-09 and QU11-05

Figure 12: Cross Section in North-South Direction Near Seepage Areas by QU11-09 and QU11-05, above displays a cross section in North-South direction near the seepage 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. Work is underway for the Minesite Water Balance and Source Terms Update with preliminary results expected in November 2023.

PASSIVE TREATMENT SYSTEM (PTS)

The PTS was operating throughout the quarter. The 2-South well pump was dewatering the 2-South flooded mine void at an average flow rate of 8.4 L/s. Water was entering the PTS at the BCR at an average flow rate of 5.0 L/s with 3.4 L/s of untreated mine water flowing into the 2-South pit. The objective being to pump down the mine pool faster to stop the seep discharge for a longer period. The mine pool water level was measured at 10.6 m above the pump in April and decreased to 8.3 m at the end of June. Seepage stops at a mine water elevation of 303 Masl and starts at 304 Masl measured at Groundwater well, MW004. Groundwater levels in MW004 also relate to the seep flow as displayed in Figure 13: Water Level Versus Long Lake Seep Flow, below.

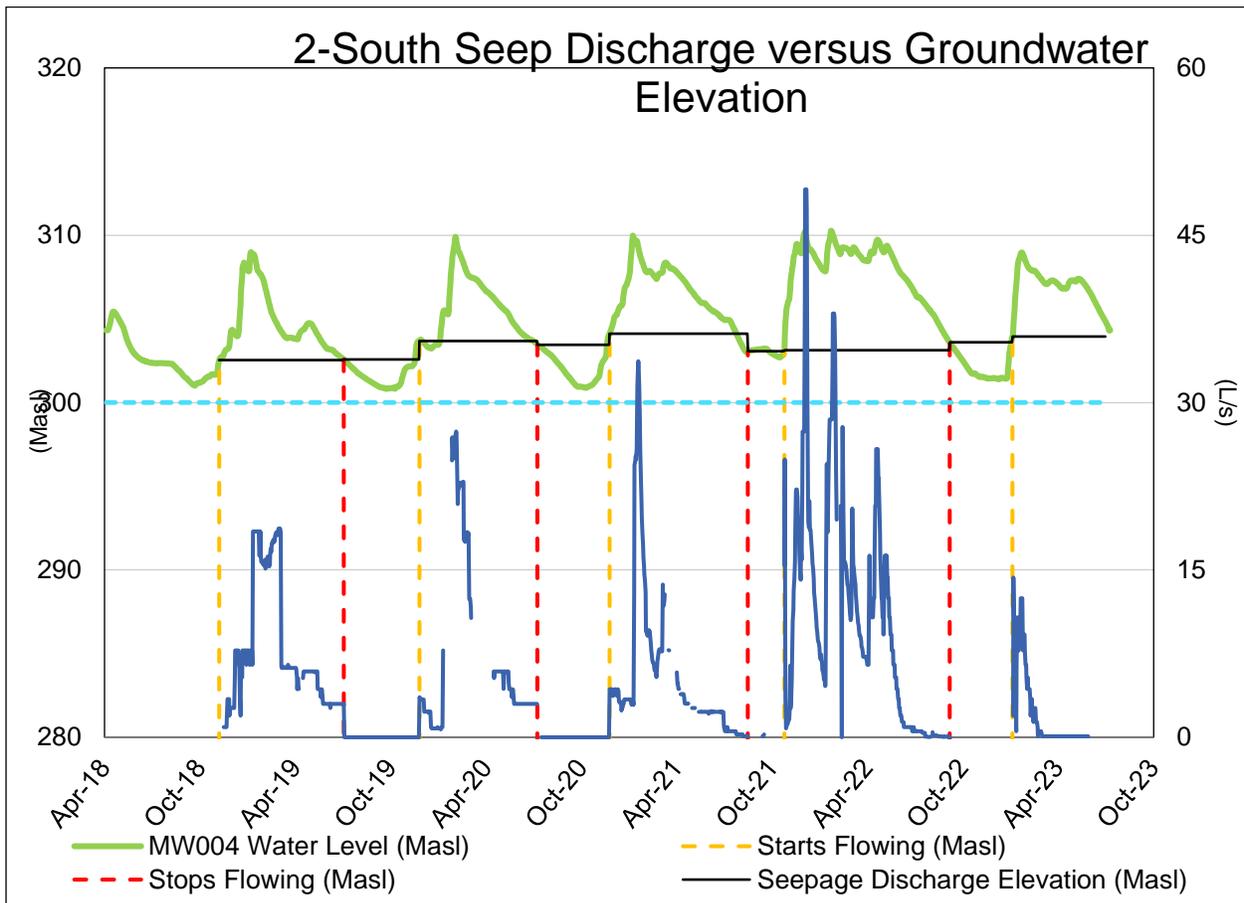


Figure 13: Water Level Versus Long Lake Seep Flow

Average concentrations of dissolved sulphate have been entering the system from the 2-South mine pool measured at INF resulting in 652 mg/L, average sulphate at the BCR was 549 mg/L and leaving the system at SPCEFF resulting in 515 mg/L. This has led to a reduction in average sulphate of 136 mg/L. The station 2-South Inflow (2SI), receives discharge from the PTS, had an average sulphate concentration of 522 mg/L and SP1 averaged 375 mg/L, during Q1. Overall, a quarterly average sulphate reduction of 276 mg/L was attained between INF and SPD. The original reduction goal for the PTS, was to reduce sulphate concentrations to 300 mg/L. This was not

achieved this quarter, but the results are still favorable, refer to Figure 14: Average Sulphate and Average Sulphate Reduction, below.

In Q2, the warmer ambient temperatures will increase microbial metabolic activity within the BCR and SPC and a greater reduction in sulphate is expected. The substrate in the PTS is aging and requires replacement in order to continue to be effective.

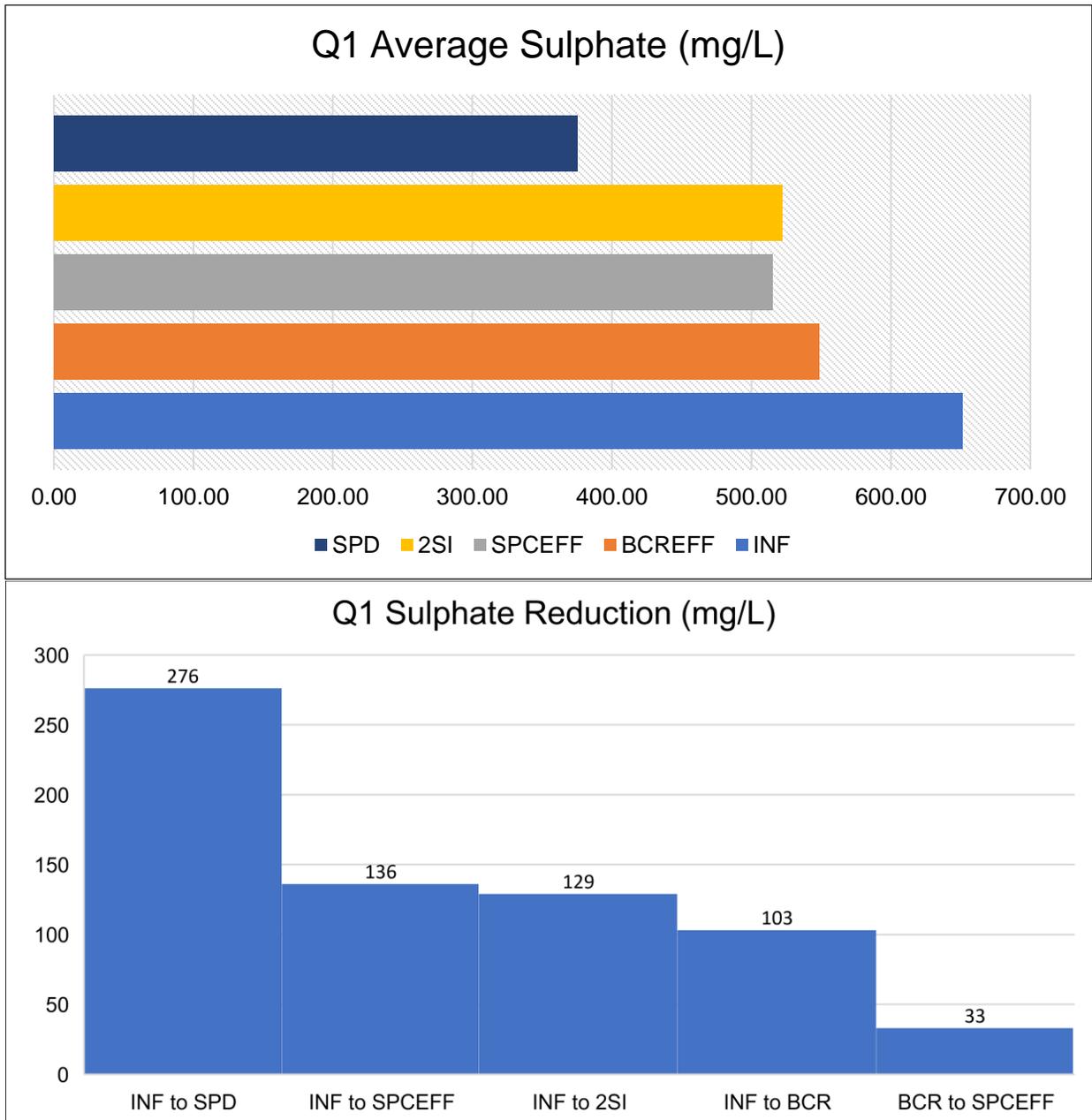


Figure 14: Average Sulphate and Average Sulphate Reduction

The PTS is effective at maintaining water cover over the PAG-CCR in the 2-South pit and reducing discharge at the Seep into Long Lake during low flow periods. This is accomplished by decreasing the elevation of the mine pool below the elevation of the seeps. 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.

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.

CONCLUSION:

Quinsam Coal is dedicated to reducing the environmental impacts as a result 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.