H2 2022 BIANNUAL REPORT
for the State of Alaska
Waste Management Permit No. 2020DB0001

Hecla Greens Creek Mining Company

2 March 2023

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1. INTRODUCTION

Greens Creek Mining Company (HGCMC) prepared this report per Section 2.4 of the Alaska Department of Environmental Conservation (ADEC) Waste Management Permit No. 2020DB0001 (WMP). This report presents the results from inspections and monitoring performed from July 2022 through December 2022 as required by the WMP and described in the *Hecla Greens Creek General Plan of Operations Appendix 1 – Integrated Monitoring Plan (IMP)*. Compliance monitoring of wastewater and stormwater discharges, air emissions, and other resources, such as Hawk Inlet monitoring, are addressed under specific permits and not included in this document.

2. AQUATIC BIO-MONITORING

Aquatic bio-monitoring at Sites 63 and 54 on Greens Creek and Site 9 on Tributary Creek is performed annually by the Alaska Department of Fish and Game (ADFG). The 2022 monitoring results are summarized in Technical Report No. 23-07, Aquatic Biomonitoring at Greens Creek Mine, 2022, prepared by ADFG (Lindgren, J. W., and E. M. King. 2023).

3. TAILINGS DISPOSAL FACILITY

3.1. Background

The Mill at the Greens Creek Mine generates approximately 2,100 dry short tons (DST) of filter-pressed tailings per day, or approximately 750,000 DST of tailings annually. Tailings are dewatered in a filter press, with about 50% being mixed with cement, and hauled underground for disposal in mined-out areas as backfill. The remaining tailings are transported in covered trailers from the Mill and placed, using dry-stacking techniques, in the surface tailings disposal facility (TDF) near Hawk Inlet in the upper reaches of the Tributary Creek drainage.

3.2. Facility Operation and Management

Standard development and placement methodologies at the TDF have been established and reviewed and will be used for future tailings disposal. A detailed description of the TDF operation and management, including standard operating procedures, is presented in GPO Appendix 3 – Tailings Disposal Facility Management Plan.

3.2.1. Material Placement Records

Table 1 contains the monthly placement records for tailings, production rock, and other materials at the TDF for the reporting period. The calculated tonnage of tailings was derived by subtracting the tons of production rock and other material from the surveyed total. Tailings generated but not hauled to the TDF were disposed of in the underground mine. Estimates of other miscellaneous materials disposed of in the facility are shown in Table 2.

The 2013 Final Environmental Impact Statement and Record of Decision approved approximately 2.1 million cubic yards of tailings storage extending south (S3P1) of the existing TDF (Attachment J, Tailings As-built). The pile currently contains about 5.93 million cubic yards of material. Based on the survey data presented in Table 1, there is a remaining capacity of approximately 2.6 million cubic yards. Though it is difficult to determine the exact amount of time it will take to fill the TDF, HGCMC estimates that the facility will be full in mid-2032, based on historic placement rates. To prevent impacts to operations due to a full TDF, HGCMC has actively been pursuing a Supplemental Impact Statement for a TDF expansion which is still in progress.

Table 1: Tailings Placement

Month	Surveyed Volume		Tonnage				
	Monthly (cy)	Cumulative (cy)	Waste Rock (tons)	Other (tons)	Tailings* (tons)	Monthly (tons)	Cumulative (tons)
Jul 2022	29,443	5,820,623	22,902	3,391	33,329	59,622	10,840,726
Aug 2022	25,418	5,846,041	8,311	3,000	40,160	51,471	10,892,197
Sep 2022	25,424	5,871,465	9,467	2,380	39,637	51,484	10,943,681
Oct 2022	15,428	5,886,893	0	0	31,242	31,242	10,974,923
Nov 2022	17,978	5,904,871	0	892	35,513	36,405	11,011,328
Dec 2022	22,868	5,927,739	0	10,366	35,942	35,942	11,047,270
TOTAL	**136,559**		**40,680**	**20,029**	**215,823**	**266,166**	

*Tonnage calculated using a density of 150 pounds per cubic foot.

Table 2: Miscellaneous Materials Disposal Estimates

Surface Tailings	CY	Underground	CY
Pressed Sewage Sludge	6.5	Tires, Sump Sediment, Shop, Mine, Electrical & Mill Refuse	2,630
Pressed Water Treatment Plant Sludge	137.5		

3.2.2. Inspections

Several independent inspections are carried out at the TDF throughout the year. Operators working at the site carry out daily visual workplace inspections. The Surface Civil Engineer and/or Surface Operations Shifter or designees carry out weekly visual inspections of the TDF area, as well as a checklist inspection of Ponds 7 and 10. The environmental department carries out a monthly checklist inspection of the TDF. All inspections mentioned above were completed as required by the IMP.

During the reporting period, the Forest Service conducted five routine inspections to monitor for best management practices effectiveness and compliance with the General Plan of Operations. No issues of non-compliance or poor operations practices of the TDF were noted during the routine inspections. The Forest Service typically noted that the facility is being developed and operated to the required operations and maintenance specifications of GPO Appendix 3 (HGCMC 2020).

3.2.3. Acid-Base Accounting (ABA)

Greens Creek Mine tailings contain pyritic sulfur, which through weathering processes, can lead to acid generation. However, the tailings also contain significant carbonate, which neutralizes the acid. Previous studies have shown that the lag time for acid generation from exposed tailings is on the order of decades. The prevention of acid generation from the TDF is one of the primary management objectives. As part of the TDF standard operating procedure, composite samples are collected from the tailings filter press monthly for ABA analyses. Analytical results for samples collected during the reporting period are shown in Table 3 below. As shown, tailings samples had an average acid potential of 354 $tCaCO_3$/kt, an average neutralization potential of 263.6 $tCaCO_3$/kt, and an average net neutralization of -90.4 $tCaCO_3$/kt. A graph showing results from tails monthly composite ABA samples collected since 2012 is included in Attachment D.

Table 3: Tailings Acid-Base Accounting($tCaCO_3/kt$)

2022	Acid Potential	Neutralization Potential	Net Neutralization Potential
July	389.96	256.86	-133.10
August	407.90	269.03	-138.87
September	356.24	272.80	-83.44
October	344.04	266.23	-77.81
November	327.18	245.08	-82.10
December	298.48	271.63	-26.85
Average	**353.97**	**263.60**	**-90.36**

3.2.4. Meteorology

HGCMC maintains meteorological stations near the TDF and at the 920 mill that record air temperature, precipitation, wind speed, and wind direction. Table 4 shows the temperature and precipitation data collected across the property during the reporting period.

Table 4: Meteorological Data

Location	Month	Min Temp (°C)	Max Temp (°C)	Avg Temp (°C)	Precipitation (in)
Tailings Meteorological Station	Jul-22	9.56	27.32	14.11	6.05
	Aug-22	8.76	25.15	14.27	5.49
	Sep-22	4.52	17.92	11.05	9.96
	Oct-22	0.17	14.72	7.72	8.62
	Nov-22	-8.80	7.67	0.72	3.10
	Dec-22	-12.99	6.85	-3.09	1.65
Hawk Inlet Meteorological Station	Jul-22	9.83	24.26	13.61	6.18
	Aug-22	9.31	22.11	13.78	5.48
	Sep-22	4.67	16.21	10.90	10.49
	Oct-22	0.36	14.56	7.73	8.39
	Nov-22	-8.25	7.67	1.05	2.90
	Dec-22	-12.09	7.02	-2.64	1.26
920 Meteorological Station	Jul-22	7.78	27.49	13.26	5.60
	Aug-22	7.31	23.59	13.42	7.29
	Sep-22	4.14	16.62	9.87	10.50
	Oct-22	-0.47	15.15	6.25	**
	Nov-22	-12.11	4.24	-1.30	**
	Dec-22	-16.80	4.15	-4.54	**

** Measurement device was not operating for the entire month

3.2.5. Water Level Data

The Tailings Facility as-built is shown in Attachment H. The maximum saturated thickness (approximately 35 feet) occurs near the center of the main portion of the pile. However, this elevated water table level does not extend close to the down-slope toe of the pile. The foundations of the West Buttress and southern portion of the stack are well-drained, as indicated by typically consistent unsaturated conditions in the blanket drains and at the West Buttress base. Low head elevations near the toe of the pile maximize the pile's geotechnical stability. Intermittent head increases in the foundation drains are localized and short duration and should not affect pile stability.

3.2.6. Dust Monitoring and Abatement

Since 2011 HGCMC has been monitoring fugitive dust emissions from the TDF using 10-liter Atmospheric Depositional Containers (ADC) mounted approximately 1.3 meters off the ground. The methodology is an adaptation of an ASTM standard test method (ASTM D1739). It is similar to the Dustfall Jar Particulate Deposition monitoring conducted by Teck Cominco Alaska Red Dog Mine (Teck 2005). The adapted methodology lacks the specified windscreen, uses a variable sampling frequency, and the filtrate is not analyzed.

Multiple ADCs have been deployed proximal to the dry stack tailings pile. Four ADCs loosely correlate to the cardinal points on a compass, with others located to the southwest and southeast. In 2019 the monitoring program was expanded to include two additional points to the southwest (Pond 10 Pump House and Pond 10 South). To develop an understanding of natural conditions (background), an ADC was installed approximately 4.5 kilometers upwind (north) of the TDF and away from other facilities.

At a variable frequency, seasonally dependent, the ADCs are collected and filtered through a pre-weighed 2.5-micron, 90 mm quartz filter. The filters are dried, weighed, and analyzed for total lead. The analysis equates to the amount of material passing through the mouth of the ADC over a known period, making it possible to calculate a qualitative average daily load per unit area. Though described as 'crude' in the standard, the methodology is 'useful in the study of long-term trends.'

Since the inception of monitoring, the size and type of the filter used have been modified. When monitoring started in 2011, a 1.5-micron, 47 mm glass fiber filter was used. A switch to 90 mm filters was made in late 2016 to decrease filtering time. A short time later, the filter brand changed as the ones being used were being discontinued. It was not noticed at the time, but the new filters had a higher blank value for lead than previously measured. This was recognized in early 2019 when reviewing the data for the background site. Dust monitoring was halted over the summer months in 2019, while a filter was sourced with a low lead blank value. Only Whatman 1851-090 filters (2.5-micron, 90 mm quartz fiber) have been used in the analysis since 2020. When the higher blank filters were used, the baseline for those years increased, though the seasonal trends remain the same.

Table 5 presents the ADC monitoring program's loading data for 2022, and Table 6 summarizes yearly loading for the past several years. Data presented in Table 5 support the statements made previously about the seasonality (winter) of fugitive dust emissions: most of the dusting occurs under cold, dry desiccating conditions with moderate wind speeds from the north or northeast. These conditions typically occur in the late fall and winter and are the most predominant mid-December through late February. Also, monitoring stations downwind (south of the TDF) historically have the highest rates of loading.

Monitoring performed under the FWMP has identified lead levels in shallow peat wells south (Site 27) and west (Site 29 and Site 32) of the TDF and in surface water (Site 9) that approach or exceed Alaska water quality standards. The formation water around the TDF is generally very dilute (low conductivity and hardness) and acidic (due to the organic acids), ideal for promoting lead mobility. Dust from the tailings pile may contribute to the lead levels observed. Water quality monitoring is discussed in Section 8.

For 2022, the southeast ADC had the highest lead load of 66,071 µg/m^2/yr, followed by the south system with 24,108 µg/m^2/yr. The other monitoring stations were comparable with values between 2,040 and 6,728 µg/m^2/yr.

Charts of the monitoring data are provided in Attachment I.

Table 5: Summary of Average Daily Lead Loading by Month at the TDF

Month	TDF								Background
	East (µg/m²/day)	Northeast (µg/m²/day)	West (µg/m²/day)	Southwest (µg/m²/day)	South (µg/m²/day)	Southeast (µg/m²/day)	Pond 10 Pumphouse (µg/m²/day)	Pond 10 South (µg/m²/day)	A-Road (µg/m²/day)
Jul-22	0.2	0.7	1.5	0.2	0.2	0.2	2.5	0.2	0.1
Aug-22	1.0	5.6	1.1	4.6	2.3	1.5	4.3	5.9	0.8
Sep-22	2.5	6.3	3.7	6.4	3.5	4.6	6.0	4.4	2.8
Oct-22	7.5	3.3	123.5	4.1	7.9	6.9	3.6	2.8	2.9
Nov-22	21.4	12.7	8.0	18.4	270.2	304.5	22.9	8.8	1.2
Dec-22	13.6	7.2	8.5	74.0	181.3	175.5	50.9	21.5	2.0

Table 6: Summary of Yearly Lead Loading at the ADCs

Year	TDF								Background
	East (µg/m²/year)	Northeast (µg/m²/year)	West (µg/m²/year)	Southwest (µg/m²/year)	South (µg/m²/year)	Southeast (µg/m²/year)	Pond 10 Pumphouse (µg/m²/year)	Pond 10 South (µg/m²/year)	A-Road (µg/m²/year)
2018	9,770	6,856	10,974	5,547	90,437	45,319			3,106
2019	1,802	1,226	2,359	2,336	14,626	13,515	1,764	2,818	830
2020	2,649	2,886	2,897	2,226	41,964	11,030	2,419	1,438	576
2021	2,691	2,695	1,639	1,616	27,792	4,953	1,797	1,433	770
2022	3,333	2,229	4,424	6,728	24,108	66,071	4,593	2,040	541

With the predominant winds being from the north/northeast and tailings placement occurring entirely in the facility's southern extent, the expected loading region is to the south, as supported by the data. Reduced activity in the west and northwest portions of the TDF and placement of an interim cover has led to lower loading in the west and southwest relative to previous years.

Because of the extensive lag between collection and results from the ADC program, HGCMC has installed a single TSI DustTrac real-time monitor (RTM). The monitor was out of service for all but a 2 week period of this reporting period due to communication issues with the unit. The unit is now functioning correctly and being used as was intended.

The following BMPs are taken to reduce dust loss from the tailings pile:

- Snow removal is limited to only active placement areas
- Interim slopes are covered with rock
- Outer slopes are hydroseeded where appropriate
- Water is applied to tailings as necessary
- Open surfaces are kept at a minimum
- Logs are placed as wind breaks
- Wind fences are placed along placement area

3.2.7. West Tailings Water Quality Monitoring

Further Creek is the drainage located immediately west of the TDF. This drainage is monitored to determine if leakage is occurring from the facility. Leakage from the TDF would likely produce a chemical signature similar to Wet Well 3. The concentrations of zinc, manganese, and sulfate in Wet Well 3 are an order of magnitude or more, higher than those measured in the Further Creek drainage, suggesting that effects from seepage, if any, from the tailings pile are minimal.

3.2.8. Internal Water Quality Monitoring

Internal water quality monitoring refers to sampling conducted within the boundaries of the TDF. Sample locations include wet wells that collect flows from the above liner and below liner drains. This water is contained within the TDF and is routed to treatment facilities before discharging under the HGCMC APDES permit. Therefore, water quality data is not compared to AWQS. The objective of the monitoring is to provide a continuing perspective on in-pile geochemical processes. Maps showing these monitoring locations is provided in Attachment N.

Attachment A provides water quality graphs for Wet Well 3 (Site 380), Wet Well A (Site 1789), Wet Well 14 (Site 2066), S3P1 Expansion above liner drains (Site 1922), and the East Ridge Expansion above liner drains (Site 1424).

Water quality graphs for below liner drains in the East Ridge Expansion (Site 1422), Pond 7 (Site 396), Pond 10 (Site 1924), and the S3P1 Expansion (Sites 1918, 1919, and 1920) are provided in Attachment B. Water quality of the below liner drains in the S3P1 Expansion area is potentially influenced by the imported construction rock.

The current results are consistent with past years, and a detailed analysis of water quality within the TDF can be found in the *Tailings and Production Rock Site 2014 Annual Report.*

3.3. Site As-built

As-built drawings for the TDF are presented in Attachment I. The drawings depict the topography, water management features, monitoring device locations, and other significant features of the site. There is an additional drawing that includes cross-sections that show the following TDF features:

- existing topographic surface
- the prepared ground upon which the pile was constructed

4. WASTE ROCK SITE 23

4.1. Background

Site 23 was constructed in 1995 and is currently the only active surface placement area for waste rock besides the TDF. The site boundary covers approximately 18 acres. See the Site 23 as-built in Attachment C for facility layout. The site is under the regulatory authority of the Forest Service and the ADEC.

4.2. Site 23 Operation and Management

HGCMC manages Site 23 to safely receive material during production, maintain pile stability and reduce impacts to the receiving environment through classification and segregation of waste rock, placement methodologies, and implementation of best management practices to control surface drainage. A detailed description of Site 23 operation and management, including standard operating procedures, is presented in GPO Appendix 11 – Waste Rock Management Plan.

4.2.1. Inspections

Several inspections are conducted at Site 23 annually. Operators working at the site carry out daily visual workplace inspections. Engineers from the Surface Operations group and or Surface Operations Shifters perform weekly visual inspections. The Environmental department carries out a monthly checklist inspection. No visible signs of physical instability were observed at Site 23 during this reporting period. All inspections mentioned above were completed as required by the IMP.

During the reporting period, the Forest Service conducted five routine inspections to monitor for best management practices effectiveness and compliance to the General Plan of Operations. No issues of non-compliance or poor operations practices were noted during the routine inspections. The Forest Service typically comments that the facility is being developed and operated to required operations and maintenance specifications of GPO Appendix 11.

4.2.2. Placement Records

Table 7 shows the quantity of waste rock placed at Site 23 during this reporting period. This represents the combined total of Class 1, Class 2, and Class 3 waste rock, as determined by the underground geologists. Class 4 waste rock remains underground as backfill. Some of the Class 1 rock (argillite) is used at the TDF but is stockpiled at Site 23 before doing so.

Table 7: Site 23 Production Rock Placement

Month	Surveyed Volume		Tonnage					
	Monthly (cy)	Cumulative (cy)	Class 1 (tons)	Class 1* (tons)	Class 2 (tons)	Class 3 (tons)	Monthly (tons)	Cumulative (tons)
Jul 2022	3,564	1,279,760	7,197	-3,604	865	1,599	6,057	2,165,468
Aug 2022	5,290	1,285,050	7,954	-629	1,730	1,366	10,421	2,175,889
Sep 2022	4,619	1,289,669	6,395	-9,467	308	345	-2,419	2,173,470
Oct 2022	4,451	1,294,120	5,077	0	2,723	601	8,401	2,181,871
Nov 2022	4,722	1,298,842	6,614	0	1,689	1,642	9,945	2,191,816
Dec 2022	4,244	1,303,086	4,181	0	587	1,902	6,670	2,198,486

* Some Class 1 material is used in the tailings disposal facility.

4.2.3. Acid-Base Accounting (ABA)

Waste rock from the mine generally consists of two varieties, argillite, and phyllite. Characterization of Greens Creek Mine argillite and phyllite using ABA and other laboratory and field testing indicates that argillite is clearly not acid generating and that most samples of phyllite are potentially acid generating. Due to these characteristics, management objectives have been established for the management of waste rock materials.

Management and routing of waste rock initiates in the underground mine. Production geologists visually inspect the active mining face and muck piles to determine the waste rock lithology and pyrite content, estimate the Net Neutralization Potential value and assign the heading a class (1-4). Chip samples of the headings are collected and sent to a lab for ABA analysis. The ABA results help document the types of material produced and validates the visual classification system. Samples are also collected on a quarterly basis from the active placement areas on Site 23.

The ABA results from Class 1 and Class 2/3 waste rock samples collected from Site 23 during the monitoring period are shown in Table 8 below.

Table 8: Site 23 Acid-Base Accounting ($tCaCO_3/kt$)

Class / Sample Date	Acid Potential	Neutralization Potential	Net Neutralization Potential
Class 1 – 8/30/22	40.3	151.6	111.2
Class 1 - 8/30/22	51.3	226.5	175.2
Class 1 – 11/11/22	84.2	567.2	483.0
Class 1 – 11/11/22	83.2	547.4	464.2
Class 1 Average	**64.8**	**373.2**	**308.4**
Class 2/3 – 8/30/22	106.2	192.4	86.3
Class 2/3 – 8/30/22	237.2	305.2	68.0
Class 2/3 – 11/11/22	12.1	170.7	158.6
Class 2/3 – 11/11/22	14.8	171.9	157.1
Class 2/3 Average	**92.6**	**210.0**	**117.5**

4.2.4. Stability

The design, construction, placement methodologies, and implementation of best management practices to control surface runoff ensure the stability of Site 23. The facility is constructed from the bottom up on a prepared foundation. As the height increases, native material is excavated from the backslope, and the excavated volume is replaced with production rock. The production rock is placed in 0.6-meter lifts with a dozer and compacted with a 12-ton drum compactor. Exterior slopes are constructed with a 3H:1V maximum overall slope. Drainage of the foundation is facilitated by a series of finger drains. Surface runoff and drainage from the pile are collected and routed to treatment facilities.

4.2.5. Slope Monitoring

Geotechnical investigations have concluded that Site 23 is constructed on top of a large regional block slide or sackung, which is defined as a deep-seated gravitational deformation. Four inclinometers have been installed to monitor the movement of the slide. Trigger level monitoring for inclinometer movement rates and piezometer water levels for instrumentation installed at Site 23/D, ensure stable static site conditions. More frequent monitoring and site reassessment for stability becomes necessary if movement is documented along the slide plane in excess of 1-inch (25.4 mm) per month, or 3 inches (76.2 mm) total. Immediate notification and response action is necessary if movement along the slide plane in excess of 4 inches (101.6 mm) per month is documented. For water levels, the general guidelines are that if water levels are trending 5-ft above the winter average for a given piezometer, that the Surface Operations Manager should notify the Design Engineer for further assessment. If the water levels are trending 10-ft above the winter average for a given piezometer, appropriate emergency response notifications and actions shall be implemented. Piezometer levels are discussed further in the next section of this report.

Inclinometer IN-23-05-01 was installed at Site 23 at the end of 2005 to aid with stability monitoring at Site 23/D. Due to the amount of movement at IN-23-05-01 since it's installation, it became difficult to take readings. Inclinometer IN-23-20-01 was installed next to IN-23-05-01 to serve as its replacement. Movement appears to be confined to a surface approximately 79.3 feet below ground surface (864.8 ft elevation). This depth roughly corresponds to the base of the slide/colluvium unit and the top of the dense till in the foundation. The movement observed at this location shows a total movement of approximately 72.05 mm. The measurements are presented as incremental displacement and a time plot (Attachment L).

Inclinometer IN-23-20-02 was installed at the top of Site D in 2020 and minimal movement has been observed since installation.

Readings in inclinometers IN-23-10-01, IN-23-10-02, and IN-23-10-08 are consistent with the data obtained previously from IN-23-05-01. Inclinometer IN-23-10-01 was installed in the lower portion of Site D and no movement has been observed in this inclinometer. Inclinometer IN-23-10-02 was installed west of the mid-slope of Site 23 and approximately 2.3 mm of movement was observed at approximately 114.4 ft bgs in 2022 (approximately 32 mm total incremental movement since November 2010). This movement is along a silty sand lens between silt and the glacial till. Inclinometer IN-23-10-08 was installed at the top of Site 23 and the movement zone ranges from 125.8 to 135.8 ft bgs. This movement zone is below the landslide materials and just above the glacial till. The movement rate has remained relatively constant, with approximately 33.5 mm total incremental movement since November 2010.

4.2.6. Water Level Data

Well and piezometer water level data are provided in Attachment G. The lack of significant pressure in piezometers installed close to the base of Site 23 demonstrates that the pile remains free draining. This is consistent with the construction of a network of finger drains under the pile and a blanket drain at the pile toe. The lack of pore pressure at the toe indicates that pile stability has been maximized. The inferred water table is 30 to 60 feet below the base of the production rock pile material up-slope of the Site 23 active placement area and 5 to 20 feet below the base of material placed in Site D and the toe of Site 23, respectively. Observations from wells completed in the colluvium below the sites indicate that perched water tables and braided flow paths exist beneath the site (e.g., compare MW-23-A2D and MW-23-A2S). This unit also shows large (up to 10 feet) fluctuations in head levels, which are consistent with perched, confined conditions and channel-like flow. There is a distinct seasonal pattern to the water level fluctuations beneath Site 23/D, particularly in the alluvial sands (MW-23-A4 and MW-D-94-D3).

The silty/clay till that underlies the colluvial unit impedes downward flow and has an upward hydrologic gradient caused by its confining the more permeable bedrock below it. MW-23-98-01 is completed in the till unit and indicates a water table near the top of the till approximately 100 feet below the existing topographic surface. Alluvial sands occur between the colluvial unit, and the silt/clay till near the toe of Site 23 and under Site D. Data from MW-23-A4 and MW-D-94-D3 indicate that the sands are saturated. A curtain drain installed in between Site D and Site 23 in 1994 collects water that flows at the base of the colluvial unit and the top of the alluvial sands (see as-built and sections in Attachment J). This drain helps reduce pore pressures in the foundation of Site D, as well as capturing infiltration waters from Site 23.

4.2.7. Hydrology

Surface and groundwater are managed using a network of drains, ditches, and ponds at both Site D and Site 23. Water collected in the finger drains beneath Site 23 is routed to Pond 23 along with Site 23 runoff via a lined ditch. Pond 23 also periodically receives stormwater via pipeline from the 920 area. A curtain drain below the toe of Site 23 captures groundwater from the colluvial unit beneath the site and reports to the Pond D wet well via pipelines. Pond D also captures surface water and drainage from seeps near the toe of Site D. Pond D water is returned to the Pond 23 pumphouse, where it is sent to the Mill or down to the Pond 7 water treatment facility. Monthly temperature and precipitation data at the Mill are provided in Table 4.

4.2.8. Internal Water Quality Monitoring

Internal water quality monitoring refers to sampling conducted within the boundaries of Site 23. Sample locations include the finger drains beneath Site 23, outlets of the curtain drain that was installed below the toe of Site 23, and three monitoring wells in Site 23 and Site D. The finger drains have been monitored extensively since 1999 and are currently sampled on a quarterly schedule. The curtain drain outlets have been monitored since 2003 and are sampled quarterly. The finger drains and curtain drains with sufficient flow were sampled during this reporting period. Water quality graphs showing the past five years of monitoring data for the Site 23 finger drains (site numbers 310 – 316) are included as Attachment C. Water quality graphs for the Site D drain outlets (site numbers 317, 319 and 328 – 330) are included in Attachment D. These flows are captured and routed to treatment facilities. For a detailed analysis of water quality within the Site 23 / D see the *Tailings and Production Rock Site 2014 Annual*

Report. The current results are consistent with past years and suggest that carbonate minerals in the waste rock continue to maintain near-neutral to alkaline conditions in the drainage from Site 23/D.

5. INACTIVE WASTE ROCK SITES

Several sites were utilized for disposal of production rock during the early operations of the Greens Creek Mine, including the 1350 Site, 960 Site, Mill Backslope, Site C, Site D, and Site E. These sites have been inactive since 1994 or earlier. The initial reclamation plan called for engineered covers to be constructed on each site to prevent acid generation and potential long-term water quality impacts. HGCMC plans to remove all of the production rock from each site for placement underground as backfill or disposal in the tailings facility. Removal activities were initiated in 2000 and have continued intermittently as mining operations allow. However, complete removal of some sites cannot occur until the cessation of mining operations due to the need to protect/maintain site infrastructure. A monitoring program is in place to evaluate potential impacts from each site on water quality and the acid generation potential of the material.

Site E is located 4.6 miles up the B Road, halfway between the Hawk Inlet port facility and the 920 Mill facility. Approximately 95,000 cubic yards of glacial till and 270,000 cubic yards of production rock were placed at the site from 1988 to 1994. Removal of production rock material from Site E for disposal at the tailings facility commenced in 2006. Since 2006, approximately 169,000 cubic yards of material has been removed. Approximately 22,400 cubic yards of material has been removed in 2022.

HGCMC monitors seeps around the perimeter of Site E and three small surface drainages on at least an annual basis. Sites 703 and 704 are two drainages south of Site E that enter Greens Creek between FWMP Sites 711 and 712. Site 356 is in a drainage at the northwest edge of Site E. A map showing the monitoring locations is provided in Attachment N. Water quality graphs showing the past five years of monitoring data are included as Attachment F.

6. UNDERGROUND MINE WASTE DISPOSAL

Disposal of wastes in the underground workings as backfill is authorized under the WMP. The majority of the backfill consists of cemented tailings and Class 4 waste rock. Other wastes include tires, steel, and small quantities of inert wastes as authorized in the WMP. Table 9 lists the quantities of tailings and waste rock disposed of in the underground mine during this reporting period.

Table 9: Quantities of Wastes Disposed of in the Underground Mine

Month	Tailings (DST)	% of tailings generated	Waste Rock (tons)
Jul 2022	26,975	44%	11,320
Aug 2022	23,834	38%	8,186
Sep 2022	27,686	42%	7,146
Oct 2022	29,087	48%	6,343
Nov 2022	29,436	48%	6,061
Dec 2022	26,715	44%	10,874
Total	**163,733**		**49,930**

7. POND 7 / 10 SYSTEM

7.1. Background

The Pond 7 Dam and Pond 10 Dam are referred to collectively as the Pond 7/10 Dam System. The combined capacity is 66.7 acre-ft (21,760,000 gallon) of off-channel impoundment designed to retain direct surface runoff, and underdrain flows from the TDF and water via pipelines from the Hawk Inlet Port Facility, Waste Rock Site 23, and the 920 facilities. The design capacity is for containment of the 25-yr/24-hr storm event for the TDF and Site 23, and the 10-yr/24-hr storm event for Hawk Inlet and the 920 facilities. The ponds are located southwest of the TDF.

Pond 7, constructed in 2005, has a capacity of 31.5 acre-ft (10,260,000 gallon). It consists of rock fill embankments on the west and southwest sides. The pond bottom and other embankments are bedrock excavations. The pond was constructed with an 80-mil HDPE liner placed over a sand bedding layer and has an underdrain collection system. Pond 7 and its embankments are regulated by the Alaska Department of Natural Resources (ADNR) as a jurisdictional dam (NID No. AK 00307). As required by the ADNR – Dam Safety and Construction Unit, HGCMC prepared an Operation and Maintenance Manual for Pond 7 that lists the operational, maintenance, monitoring, and inspection records for the dam and all supporting infrastructure.

As part of the recent expansion of the TDF, HGCMC constructed Pond 10 in 2016-17 to provide adequate containment volume for the modeled 25-yr/24-hr storm event. Pond 10 is 35.2 acre-feet (11,500,000 gallons) pond built adjacent to Pond 7 and interconnected via five 36-inch diameter pipes. The pipes are set at an elevation that flow between the ponds occurs when Pond 7 reaches approximately 70 percent capacity. Pond 10 is primarily excavated in bedrock and clay and was constructed with a double layer, 80-mil HDPE liner system. Pond 10 is also regulated by the ADNR as a jurisdictional dam (NID No. AK00316). An Operation and Maintenance Manual has been prepared to cover both ponds.

7.2. Stability

Pond 7/10 Dam System embankment stability is assessed by conducting GPS surveys of permanently embedded concrete monuments. Key performance parameters require a horizontal movement of less than 3 inches per year and a vertical movement of less than 6 inches per year. The total horizontal and vertical movement for Pond 7 has been well below the threshold. The survey results to date for both ponds do not indicate any concerns with the stability of their associated embankments.

7.3. Visual Inspections

Visual inspections of the Pond 7/10 Dam System and the embankments are performed on a weekly basis. Operations and Damn Safety Inspections are performed on a monthly basis. Inspections are also completed following large precipitation or seismic events. Records of the inspections (checklists) are retained electronically on the HGCMC server. There were no unusual findings or observations during this reporting period.

7.4. Water Balance

All waters captured by containment systems and wastewaters generated by facility processes are collected in Pond 7/10 Dam System for subsequent treatment and discharge to Hawk Inlet under the HGCMC APDES permit. As required by the APDES permit, HGCMC performs continuous monitoring of effluent discharge flows. The primary sources include the mill process water, Pond 23 flow (all combined groundwater and stormwater collected from the underground mine, 920 area and Site 23), the Hawk

Inlet port facilities (combined stormwater, wastewater from the camp facilities, and truck wash water), and flows from the TDF area (surface runoff, underdrain collection systems, and the truck wash).

Flows from individual sources are highly variable day-to-day, depending on operations and weather conditions. Operational experience has shown that the percentage of flow from the primary sources is within consistent ranges when longer time periods, such as monthly, are viewed (Table 10). These ranges are as follows:

- 40-50%: Mill process water
- 30-40%: Pond 23
- 15-20%: Tailings area
- 1-3%: Hawk Inlet facilities

Process water generated by the Mill remains relatively consistent. Typically, about 50% of the process water is recycled through the Mill, and the remainder is sent to the Pond 7 WTP for treatment and discharge. The approximate long-term average flow rate of mill process water to the Pond 7 WTP is 500 gpm.

The total volume of water and average flow in gallons per minute that was treated and discharged from the Pond 7 WTP during this reporting period is shown in Table 10.

Table 10: Sitewide Water Balance

Month	INPUT								OUTPUT	
	Port Facility Flow Data		Mine/Mill Complex Flow Data		TDF Flow Data		Other Flow Data		Pond 7 Treated Volume Flow Data	
	Total (gallons)	Avg. (gpm)	Total (gallons)	Avg. (gpm)	Total (gallons)	Avg. (gpm)	Total (gallons)	Avg. (gpm)	Total (gallons)	Avg. (gpm)
Jul-22	2,673,843	62	18,803,131	435	2,444,082	57	21,397,185	495	45,318,241	1,049
Aug-22	3,181,147	74	22,227,342	515	3,017,745	70	22,405,265	519	50,831,499	1,177
Sep-22	4,911,845	114	32,919,380	762	3,845,290	89	23,860,128	552	65,536,643	1,517
Oct-22	5,165,647	120	39,093,286	905	4,536,104	105	34,724,351	804	83,519,388	1,933
Nov-22	3,078,567	71	26,654,790	617	3,501,375	81	28,931,112	670	62,165,844	1,439
Dec-22	2,205,160	51	20,008,104	463	2,395,130	55	20,322,560	470	44,930,954	1,040

8. FRESH WATER MONITORING PROGRAM

8.1. Summary

Since operations began, monitoring fresh water quality has been an intricate part of the environmental and operational management system for the Greens Creek Mine. The Fresh Water Monitoring Program (FWMP), in conjunction with the Quality Assurance Project Plan (QAPP), documents the necessary methods and procedures for sample collection, laboratory analysis, data management, and information utilization necessary to ensure that the monitoring requirements are fulfilled. A detailed description of the FWMP is provided in the IMP. This report presents monitoring results and interpretative analysis for the surface water and groundwater monitoring sites.

This section contains a list of any exceptions, omissions, or errors that occurred during data collection. Each site's dataset is compared to all applicable AWQS. Finally, a series of summary tables and X-Y graphs have been generated to meet each site's specific statistical goals.

8.2. Introduction

A description of each monitoring site is presented below, along with a discussion of monitoring results collected during this reporting period. Maps showing site locations are provided in Attachment N. Qualified Data by QA Reviewer report are in Attachments R. Comparison to AWQS is required for all sites. Water quality graphs for each site representing the past five years of data, if available, are included in Attachment P. In Attachment O, the specific water quality criteria used for each comparison are summarized. Up-gradient, and down-gradient graphs were prepared for specific sites to allow visual comparison and are included as Attachment S.

The monitoring schedule varies, and occasionally, sites scheduled for sampling may not be available due to weather or, more rarely, operational reasons. A copy of the sampling log is included in Attachment M, and variations from the schedule are noted.

Comparison to AWQS is required for all sites. Two different methods are used for trend analysis. The first method is a visual trend analysis for each analyte. A series of time-concentration graphs are created for each site sampled for the previous five years. The second method is a non-parametric statistical method, Mann-Kendall seasonal trend analysis (Attachment S) that is routinely done for conductivity, pH, alkalinity, and dissolved zinc. These are the key parameters, along with sulfate, that can be strongly affected by Acid Mine Drainage. Finally, for all downgradient sites that are paired with an upgradient reference site and are monitored with a frequency greater than four (4) times per year, a comparison of medians is presented for each pair. These pairs (down gradient site - upgradient site) include Site 6-Site 48, Site 54-Site 6, and Site 62-Site 54. For each of these, a comparison of medians was performed for total alkalinity, pH, conductivity, total sulfate, and dissolved zinc. The statistical test utilized is a non-parametric, Wilcoxon signed-rank test (Attachment S). A summary of the statistical procedures, the Wilcoxon-Mann-Whitney rank-sum test, and the Mann-Kendall seasonal trend are given below.

8.3. Statistical Tests

The Mann-Kendall seasonal trend test is a non-parametric test for zero slope of a linear regression of time-ordered data verse time. Briefly, the test consists of tabulating the Mann-Kendall statistic S_k (k=1 to 12, for each month) and its variance VAR(S) for data from each season (month). The S_k statistic is simply the

sum of the number of positive differences minus the number of negative differences for time-ordered data pairs. Any seasonal trend is removed by only considering data pairs taken within the same month. The individual monthly Mann-Kendall statistics (S_k) are tested for homogeneity of the trend, which is used to determine if it is reasonable to combine the monthly S_k statistics into an overall annual statistic (S_k). If the test for monthly homogeneity is rejected, the annualize statistic is not meaningful. However, the individual monthly Mann-Kendall statistics can still be tested for trend, and a Sen's slope estimator can be calculated for each month (noted as Q_m in the interpretive section) with a significant trend.

The advantages of the Seasonal Kendall trend test are that it is a rank-based procedure especially suitable for non-normally distributed data, censored data, data containing outliers, and non-linear trends. The null hypothesis (H_0) states that the data (x_1, ., x_n) are a sample of n independent and identically distributed random variables. The trend test statistic Z is used as a measure of trend magnitude or of its significance. A positive Z value indicates an upward trend, while a negative value indicates a downward trend. However, the Z statistic is not a direct quantification of trend magnitude. A separate statistic, Sen's slope estimator, is calculated for trends of significant magnitude by computing the seasonally adjusted (monthly) median value for the slope. For datasets that fail the homogeneity test, individual monthly S_k statistics are compared to a theoretical probability distribution of S derived by Mann and Kendall (Table A18 in Gilbert, 1987). Statistically significant trends ($\alpha/2 = 2.5\%$) are noted for p-values >=0.975 or <=0.025. Further guidance and background on these statistical methods can be found in Gilbert (1987) or Helsel and Hirsch (1992).

The Wilcoxon signed-rank test is used to determine if the median difference between paired data points is equal to zero. In general terms, the signed-rank is used to determine if a set of paired data observations, x's and y's, come from the same population (i.e., have the same median) or as the alternative hypothesis differ only in the location of the central value (median). If the data are from the same population, then the differences of the paired data should be equally distributed around 0, or about half the differences should be greater than 0, and half should be less than 0. Computationally the test is straightforward. First, the differences $D_i=x_i-y_i$, i=1…N are computed for each pair. The absolute values of the differences $|D_i|$, i=1…N are ranked from smallest to largest, and data pairs that are tied, thus having differences of zero, are ignored. The ranks of the absolute differences are assigned the sign of the actual differences. For example, negative differences have negative-signed ranks, and positive differences have positive-signed ranks; thus, the term "signed-rank" in the method name. The test statistic W_+ is the sum of all positively signed ranks. The statistic W_+ is then compared to tabled values that vary based on N. The one-tailed version of the signed-rank test has been applied to the key indicator analytes of conductivity, pH, total alkalinity, sulfate, and dissolved zinc as listed in the table below. For a significant difference to be noted, the difference must be in the direction indicated in the table and at a significance level of $\alpha=0.05$ (p-value less than or equal to 0.05).

Analyte	Rationale	median |D|	Tail	Reject H_0 if:
Specific Conductance	Conductivity, as a proxy for total dissolved solids, **increases** due to sulfide oxidation.	<0	X's < Y's	$W^*(calc)<W(table)_{\alpha,n}$
Field-pH	pH **decreases** though the addition of H^+ generated by pyrite oxidation.	>0	X's > Y's	$W^*(calc)>W(table)_{\alpha,n}$
Total Alkalinity	Total alkalinity **decreases** by consumption of buffing capacity due to H^+ produced by pyrite oxidation associated with waste rock.	>0	X's > Y's	$W^*(calc)>W(table)_{\alpha,n}$
Total Alkalinity	Total alkalinity **increases** by the weathering of carbonate mineralogy, associated with tailings	<0	X's < Y's	$W^*(calc)<W(table)_{\alpha,n}$
Total Sulfate	Total sulfate **increases** due to oxidation of sulfides	<0	X's < Y's	$W^*(calc)<W(table)_{\alpha,n}$
Dissolved Zinc	Dissolved zinc **increases** due to sulfide oxidation and is more readily soluble at neutral pH than other metals.	<0	X's < Y's	$W^*(calc)<W(table)_{\alpha,n}$

X: Upgradient Site
Y: Downgradient Site

8.4. Qualified Data by QA Reviewer

The QA report (Attachment R) provides a summary of each site's data limitations found in the QA reviews. It lists all data for the FWMP that the QA Reviewer qualified for the reporting period and the reason for qualification. These data are included in the data analyses unless identified as an outlier in the Qualified Data Summary.

8.5. Interventions

This section identifies procedural changes, natural phenomena, mine operational changes, or other interventions that could have affected the recent monitoring results. Results of any visual data analyses to detect the effects of these interventions are also indicated.

Prior interventions (and negotiated program modifications such as changes to laboratories, methods, detection limits, and reporting limits), and anything else that may affect data comparability and quality, are documented in section "General History" and previous annual FWMP reports.

8.6. Modifications

There were no modifications made to the FWMP monitoring program.

8.7. Proposed Program Modifications

HGCMC proposes the removal of Site 61 from the FWMP. Comparisons graphs for Site 54 and Site 62 show minimal influence from Site 61 on Greens Creek. A more detailed letter summarizing the proposed changes will be submitted separate from this report.

8.8. Sample Suites

Suite P (Surface water only)	**Suite Q** (Groundwater and surface water)
Conductivity pH Temperature Hardness Sulfate Total Alkalinity Dissolved Arsenic Dissolved Cadmium Dissolved Copper Dissolved Lead Dissolved Mercury Dissolved Zinc	Conductivity pH Temperature Hardness Sulfate Total Alkalinity Dissolved Arsenic Dissolved Barium Dissolved Cadmium Dissolved Chromium Dissolved Copper Dissolved Lead Dissolved Mercury Dissolved Nickel Dissolved Selenium Dissolved Silver Dissolved Zinc

8.9. Discussion

All required sampling was accomplished as specified in the monitoring schedule, except at Site 61. Samples were not collected from Site 61 due to there being no water present during the sampling event. The selected analytic suite (P or Q) was performed on the collected samples for the remaining sites. Applicable holding times were achieved for all analytes, and no data points were qualified as outliers.

No exceedances (Table 11) of AWQS occurred at Sites 6, 37, 46, 48, 49, 54, 57, 62, 609, 711, 712, or 1923.

Site 13 was in exceedance for dissolved cadmium and dissolved zinc. HGCMC removed production rock from the 1350 area during the 2014 summer season, after which the exceedances started to occur. This has been seen before with other reclamation projects. In 2015 HGCMC removed additional material from the access to the raised bore ventilation shafts. Late in August 2016, a collection system was installed at the base of the remaining material. In 2022, a drain hole was drilled in the area downstream of the collection system where water is still pooling. The hole reports to a sump in the underground mine and removes the seasonal operation associated with pumping the water. HGCMC will continue to monitor the area as it stabilizes and matures.

Exceedances in the tailings area were noted for low pH and low alkalinity. The shallow wells (Site 27, Site 29 and Site 32) continued to express the natural conditions of low pH and low alkalinity that characterize these sites in organic-rich peat sediments.

Site 60 had exceedances for low alkalinity, copper, lead and mercury. The alkalinity is characteristic of the formation waters (peat) for Site 60. Dissolution of tailings dust particles, which contain small amounts of mercury, and atmospheric deposition of mercury from natural (e.g., volcanoes) and

anthropogenic sources (e.g., coal-fired power plants in Asia) are potential sources of this metal in the drainage area. Sampling in adjacent drainages during the Water Year 2009 and Water Year 2013 showed that this issue was isolated to only the Site 60 watershed.

Site 9 on Tributary Creek south of the facility had exceedances for low alkalinity and lead. Low alkalinity values are expected given the naturally occurring acidic muskeg conditions in the headwaters.

Table 11: FWMP Exceedances

Site	Date	Parameter	Result	Hardness	Limits	
					Lower	Upper
9	19-Jul-22	Alk Tot, mg/l	15.9		20	
9	19-Jul-22	Pb Diss, ug/l	0.67	27.6		0.60
29	20-Jul-22	pH Field, su	5.52		6.5	8.5
32	20-Jul-22	pH Field, su	5.62		6.5	8.5
60	20-Jul-22	Alk Tot, mg/l	7.73		20	
60	20-Jul-22	Cu Diss, ug/l	2.25	17.1		1.98
13	20-Jul-22	Cd Diss, ug/l	1.26	80.6		0.21
13	20-Jul-22	Zn Diss, ug/l	452	80.6		98
60	20-Jul-22	Pb Diss, ug/l	0.44	17.1		0.35
13	13-Sep-22	Cd Diss, ug/l	0.76	69.1		0.19
13	13-Sep-22	Zn Diss, ug/l	357	69.1		86.4
27	14-Sep-22	pH Field, su	6.44		6.5	8.5
29	14-Sep-22	pH Field, su	5.19		6.5	8.5
29	14-Sep-22	Alk Tot, mg/l	6.92		20	
32	14-Sep-22	pH Field, su	5.76		6.5	8.5
60	14-Sep-22	pH Field, su	6.39		6.5	8.5
60	14-Sep-22	Alk Tot, mg/l	7.28		20	
60	14-Sep-22	Pb Diss, ug/l	0.68	21.3		0.45
9	7-Nov-22	Alk Tot, mg/l	19.8		20	
27	8-Nov-22	pH Field, su	6.15		6.5	8.5
29	8-Nov-22	pH Field, su	5.13		6.5	8.5
29	8-Nov-22	Alk Tot, mg/l	9.68		20	
32	8-Nov-22	pH Field, su	5.54		6.5	8.5
32	8-Nov-22	pH Field, su	5.54		6.5	8.5
60	8-Nov-22	pH Field, su	6.12		6.5	8.5
60	8-Nov-22	Alk Tot, mg/l	3.96		20	
60	8-Nov-22	Hg Diss, ug/l	0.013			0.012

Table 12: Mann-Kendall Trend Analysis Significant Results

Site	Parameter	Period		Trend	Sen's Slope
		Start	End		
013FMS	SO4 Tot, mg/l	12/31/2022	12/31/2017	ACCEPT	-3.53
027FMG	Cond Fld, umho	12/31/2022	12/31/2017	ACCEPT	-14.28
027FMG	Alk Tot, mg/l	12/31/2022	12/31/2017	ACCEPT	-4.67
029FMG	SO4 Tot, mg/l	12/31/2022	12/31/2017	ACCEPT	0.10
032FMG	Cond Fld, umho	12/31/2022	12/31/2017	ACCEPT	-20.50
032FMG	pH Field, su	12/31/2022	12/31/2017	ACCEPT	-0.07
032FMG	Alk Tot, mg/l	12/31/2022	12/31/2017	ACCEPT	-7.63
032FMG	SO4 Tot, mg/l	12/31/2022	12/31/2017	ACCEPT	0.09
048FMS	Zn Diss, ug/l	12/31/2022	12/31/2017	ACCEPT	0.67
060FMS	Cond Fld, umho	12/31/2022	12/31/2017	ACCEPT	-6.34
060FMS	SO4 Tot, mg/l	12/31/2022	12/31/2017	ACCEPT	-1.68
060FMS	Zn Diss, ug/l	12/31/2022	12/31/2017	ACCEPT	1.00
609FMS	Alk Tot, mg/l	12/31/2022	12/31/2017	ACCEPT	7.18
609FMS	Zn Diss, ug/l	12/31/2022	12/31/2017	ACCEPT	-4.94
062FMS	pH Field, su	12/31/2022	12/31/2017	ACCEPT	-0.09
009FMS	SO4 Tot, mg/l	12/31/2022	12/31/2017	ACCEPT	-1.16

Table 13: Wilcoxon Signed Rank Test Significant Results

Sites		Parameter	Period		Medians		p-test	Trend
Up	Down		Start	End	Up	Down		
048FMS	006FMS	SO4 Total, mg/L	12/31/2022	1/1/2022	13.6	16.6	0.031	ACCEPT
006FMS	054FMS	Conductivity, µmho	12/31/2022	1/1/2022	84.5	106.5	0.031	ACCEPT
006FMS	054FMS	Alkalinity Total, mg/L	12/31/2022	1/1/2022	52.3	55.0	0.031	ACCEPT
006FMS	054FMS	SO4 Total, mg/L	12/31/2022	1/1/2022	16.6	15.0	0.000	ACCEPT
054FMS	062FMS	Conductivity, µmho	12/31/2022	1/1/2022	106.5	135.5	0.016	ACCEPT
054FMS	062FMS	Alkalinity Total, mg/L	12/31/2022	1/1/2022	55.0	58.7	0.016	ACCEPT
054FMS	062FMS	SO4 Total, mg/L	12/31/2022	1/1/2022	15.0	15.7	0.031	ACCEPT

8.9.1. Surface Water

8.9.1.1. Site 048FMS

This Greens Creek site is upstream of all mining activities and represents natural background water quality. It is located approximately 300 meters upstream from the Greens Creek Bridge at the 920 portal and has been sampled since 1996.

During the fall of 2017, Greens Creek carved a new channel segment beginning just below the mouth of tributary Big Sore Creek that bypasses Site 48. The confluence of the new channel and the existing channel is located approximately 40 meters downstream of Site 48. Due to the lack of flow at Site 48, water quality sampling since November 2017 has occurred just below the confluence of the new

channel with the existing channel. The new sample location is still representative of natural background water quality, and samples have continued to be identified as Site 48. Water quality during this reporting period met applicable AWQS with no anomalous results. The concentrations of measured parameters were within expected ranges based on the seasonal trends established in the long-term data set.

8.9.1.2. Site 006FMS

This Greens Creek site is downstream of the mine and mill complex; it is located approximately 15 meters upstream of the confluence with Bruin Creek and has been sampled since 1990. During the winter of 2020, Bruin Creek carved a new channel just above the mouth of the creek where it enters Greens Creek. Due to the confluence of the two streams changing, Site 6 was moved upstream of the previously location to continue being upstream of the confluence. Water quality sampling has occurred at this location since January 2021. Water quality during this reporting period met applicable AWQS with no anomalous results. Comparisons to the up-gradient Site 48 are shown in Attachment Q. As shown on the charts, the water quality at Site 6 is very similar to the up-gradient Site 48 with consistent, slight increases in some constituent concentrations, including conductivity, sulfate, and zinc.

8.9.1.3. Site 054FMS

This Greens Creek site is downstream of waste rock areas 23 and D; it is located about 20 meters upstream of the confluence with Gallagher Creek and has been sampled since 1996. Water quality during this reporting period met applicable AWQS with no anomalous results. Monitoring at Site 54 has the same or slightly lower constituent concentrations compared to that of the upstream Site 6, potentially due to added flow contribution in Greens Creek's from various sources, including Bruin Creek.

8.9.1.4. Site 062FMS

This Greens Creek site is downstream of waste rock areas 23 and D; it is located approximately 250 meters downstream of Site 54 and has been sampled since March 2013. Water quality during this reporting period met applicable AWQS with no anomalous results. Water quality at Site 62 is very similar to the up-gradient Site 54 with consistent, slight increases in some constituent concentrations, including alkalinity, conductivity, and sulfate, with a minor decrease in pH.

8.9.1.5. Site 013FMS

This site monitors a small drainage to the east of the 1350 adit. Due to the drainage's natural characteristics (i.e., low flow and steep gradient), it is not suitable for fish habitat. Flow from this drainage enters Greens Creek below Site 48 and has been routinely monitored since 1985. From 2010 through 2019, monitoring was performed in May, August, and November. In 2020, monitoring was switched to May, July, September, and November.

Dissolved cadmium and zinc concentrations exceeded the hardness-based AWQS in the reporting period. Since other metals, major ions, conductivity, or alkalinity have not varied considerably, HGCMC believes this is the effect of desorption of stored zinc and cadmium.

8.9.1.6. Site 061FMS

This site is in the Greens Creek floodplain, approximately 40 meters west, and downgradient of Pond D. Springs from the hillside on the north side of Greens Creek contribute the majority of the flow at Site 61. Flows from this site enter Greens Creek upstream from Site 62. Monitoring at this site began in May

2013, and it is currently sampled on a quarterly schedule. Water quality samples were not able to be collected during this reporting period due to lack of flow.

8.9.1.7. Site 049FMS

This site on Bruin Creek upstream of waste rock Site 23 represents natural background water quality and has been routinely monitored since 1996. In 2010, the monitoring frequency was reduced from monthly to quarterly. Water quality during this reporting period met applicable AWQS with no anomalous results.

8.9.1.8. Site 046FMS

This site on Bruin Creek downstream of waste rock Site 23 is located approximately 20 meters above the confluence with Greens Creek and has been routinely monitored since 1994. In 2010, the monitoring frequency was reduced from monthly to quarterly. Water quality during this reporting period met applicable AWQS with no anomalous results.

During the December 2020 storm event, the lower reach of the Bruin Creek was sedimented in, and a new channel was cut. HGCMC moved the monitoring location accordingly.

8.9.1.9. Site 711FMS

This Greens Creek site is located approximately 50 meters upstream of potential runoff contributions from waste rock Site E. It was added to the FWMP in 2014 (October – September) for comparison with Site 712 to assess potential influence from Site E on Greens Creek water quality. Monitoring is conducted twice annually, typically in May and September. Water quality during this reporting period met applicable AWQS.

8.9.1.10. Site 712FMS

This Greens Creek site is located approximately 250 meters downstream of Site 711. It was added to the FWMP beginning in 2014 (October – September) for comparison with Site 711 to assess Site E's potential influence on Greens Creek water quality. Monitoring is conducted twice annually, typically in May and September. Water quality during this reporting period met applicable AWQS.

8.9.1.11. Site 009FMS

This site is on Tributary Creek and is located approximately one kilometer downstream from the Tailings Disposal Facility and about 500 meters upstream of the confluence with Zinc Creek. Monitoring began in 1985 but monitoring at this location began in 2006. It is currently monitored six times per year. Water quality during this reporting period met applicable AWQS, the exception being total alkalinity in May and November and dissolved lead in July.

8.9.1.12. Site 060FMS

This site is located in a small drainage, approximately 200 meters southwest of the tailings facility. The drainage flows into Hawk Inlet from a naturally low alkalinity and acidic muskeg area. Flow rates, estimated at sample collection, are typically less than five gallons per minute. This site was added to the FWMP in 2006 and is currently monitored six times per year. Water quality during this reporting period met the applicable AWQS, with the exceptions of alkalinity, copper, lead and mercury. Low alkalinity is typical for this site and is representative of natural background conditions. Mercury and lead have fluctuated about the standard for several years.

8.9.1.13. Site 609FMS

This site is located in a small drainage, approximately 200 meters west of the tailings facility. Due to the natural characteristics of the drainage (i.e., low flow and steep gradient), it is not suitable for fish habitat. The drainage flows into Hawk Inlet. This site was added to the FWMP in 2013 and is currently monitored six times per year. Water quality during this reporting period met the applicable AWQS.

8.9.1.14. Site 1923FMS

This site is located on Cannery Creek, approximately 100 meters downgradient of the B-road. FWMP monitoring began in 2020. Water quality during this reporting period met applicable AWQS.

8.9.1.15. Site 037FMS

This site is located on Cannery Creek, approximately 30 meters upgradient of the B-road, and serves as a background site to Site 1923FMS. FWMP monitoring began in 2020. Water quality during this reporting period met applicable AWQS.

8.9.2. Groundwater

8.9.2.1. Site 057FMG

This site is a 68 ft. deep well completed in sand and gravel at the up-gradient edge of waste rock Site 23 and represents natural background groundwater quality for this area. This site has been monitored since 2001 and is sampled quarterly. Water quality during this reporting period met applicable AWQS.

8.9.2.2. Site 027FMG

This site is an 8 ft. deep well completed in the peat/sand unit and is located approximately 50 meters south of the new Stage 3/Phase 1 (S3P1) Tailings Disposal Facility boundary. This site has been routinely monitored since 1988 and is currently sampled four times per year between May and November. Water quality during this reporting period met applicable AWQS, except for pH, which was naturally low.

8.9.2.3. Site 029FMG

This site is a 15 ft. deep well completed in the peat/sand unit and is located approximately 50 meters west of the Tailings Disposal Facility. This site has been routinely monitored since 1988 and is currently sampled four times per year between May and November. Alkalinity and pH are naturally low due to the weakly acidic muskeg and were below the AWQS lower limits during this period.

8.9.2.4. Site 032FMG

This site is a shallow well completed in the peat/sand unit and is located approximately 50 meters west of the Tailings Disposal Facility. This site has been routinely monitored since 1988 and is currently sampled four times per year between May and November. Water quality during this reporting period met the applicable AWQS, except for pH, which was naturally low.

9. RECLAMATION / CLOSURE PLAN

HGCMC maintains and periodically updates its reclamation plan and cost estimate for closure, reclamation, and long-term maintenance and monitoring (GPO Appendix 14 with attachments). The Reclamation Plan includes all estimated costs (labor, materials, equipment, consumables, administration, monitoring, and long-term maintenance) for task-specific work associated with the property's final closure under a default scenario.

The plan's elements encompass the entire mine site and include reclamation performance monitoring and facility maintenance after final closure according to the Waste Disposal Permit standards.

The Stage 3 Tailings Expansion process included a National Environmental Policy Act (NEPA) review through an Environmental Impact Statement (Forest Service 2013) to analyze the project's potential environmental effects. The 2014 Waste Management Permit (Permit Number 2014DB0003) included the increased disturbance from the TDF expansion.

As part of the WMP renewal, HGCMC submitted (12 April 2019) an updated bond model and reclamation and closure plan to the applicable agencies. This update has been incorporated into the renewed WMP issued on 20 February 2020 (Permit Number 2020DB0001). The financial instruments to cover the increase in the bond and five years of inflation were provided and accepted. Since the issuance of the WMP in February 2020, there have been no substantive changes to the operations that affect the reclamation cost estimate.

9.1. Reclamation Projects

HGCMC continued using interim reclamation measures, such as hydroseeding and various erosion controls at the TDF, to improve and maintain established site controls. HGCMC also continued using other sediment control measures, including silt fencing, jute mat, rock check dams, solid and flexible runoff collection pipes, coarse-rock slope armoring, and slope contouring throughout the site. HGCMC is committed to the continued use of site controls as the operation has consistently demonstrated the benefits of these interim reclamation programs to reduce impacts during the operational period.

10. BIBLIOGRAPHY

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ASTM Standard D1739, "Standard Test Method for Collection and Measurement of Dustfall (Settleable Particulate Matter," ASTM International, West Conshohocken, PA, www.astm.org.

ASTM Standard D6938 "Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)," ASTM International, West Conshohocken, PA, www.astm.org.

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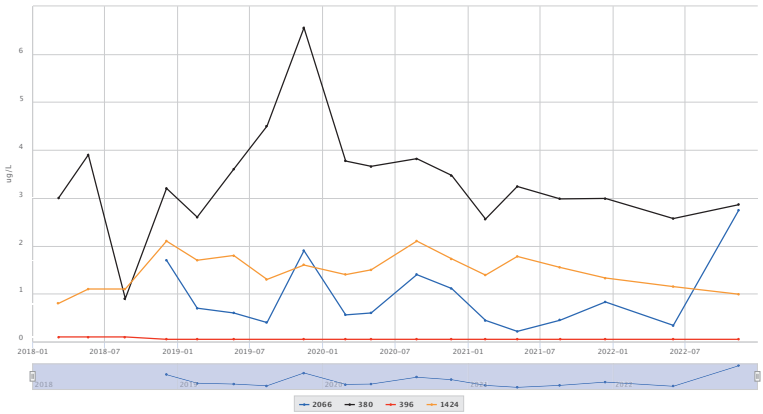
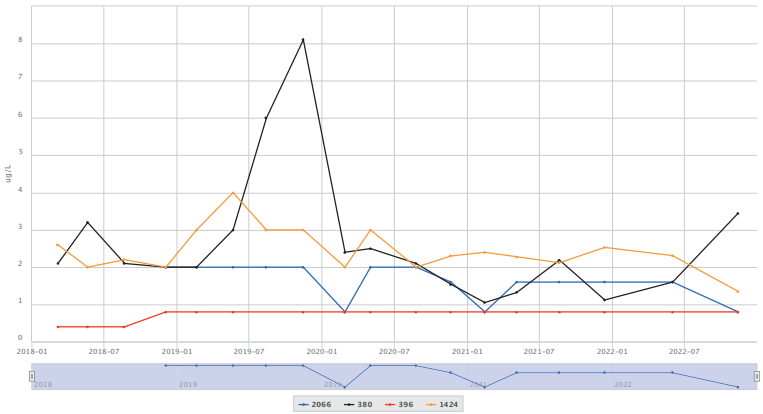
Attachment A: Tailings Area Above Liner Drains

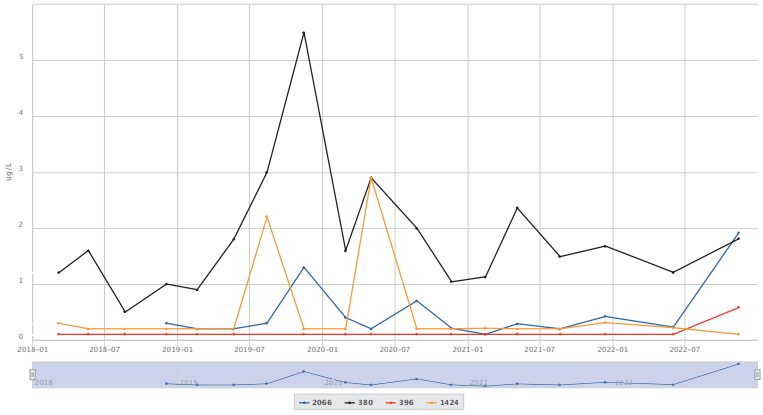
Cadmium, Dissolved



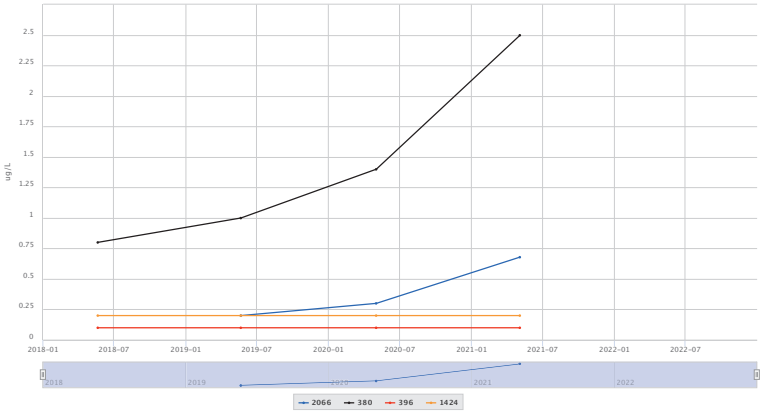
Copper, Dissolved



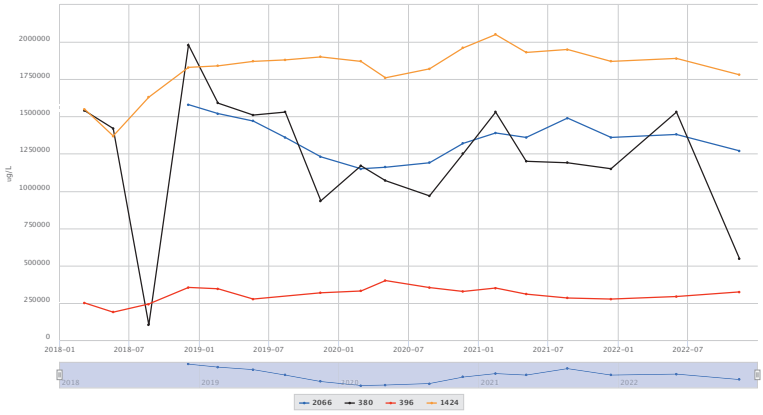
Lead, Dissolved



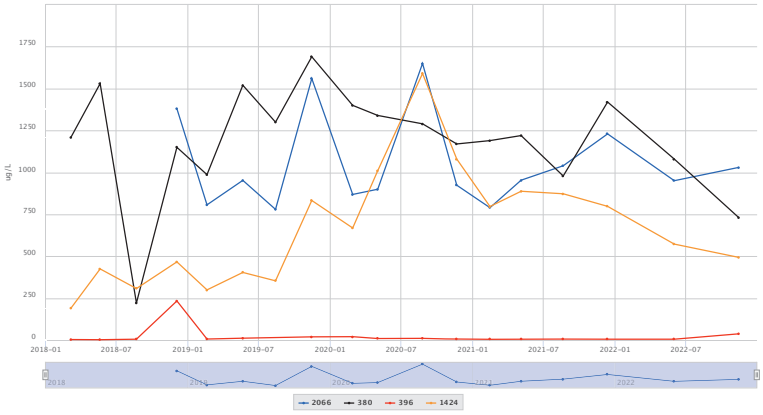
Selenium, Dissolved



Sulfate, Total

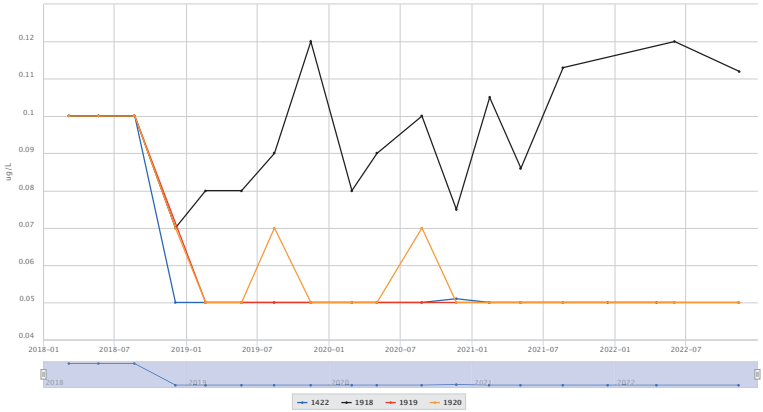


Zinc, Dissolved



Attachment B: Tailings Area Underdrains

Cadmium, Dissolved



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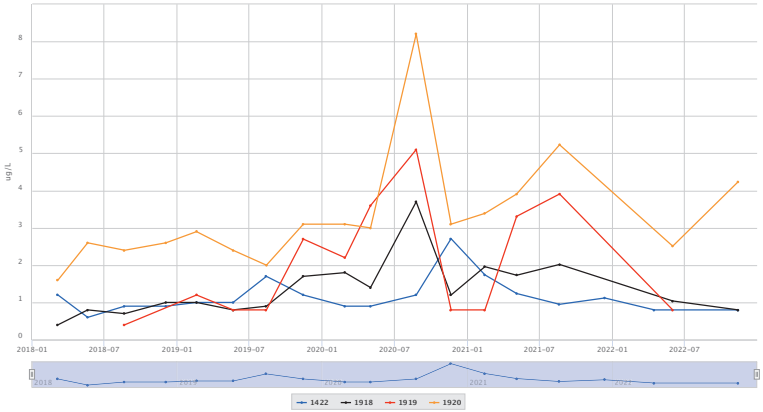
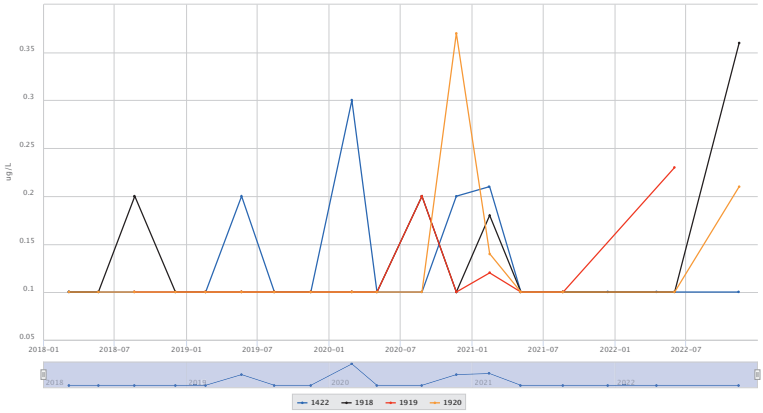
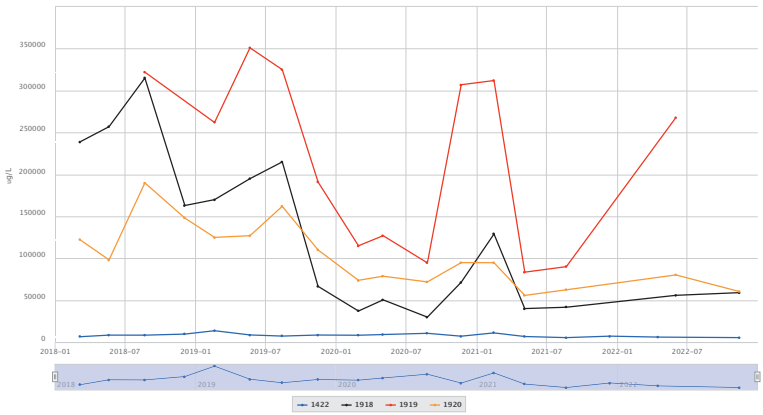


Lead, Dissolved

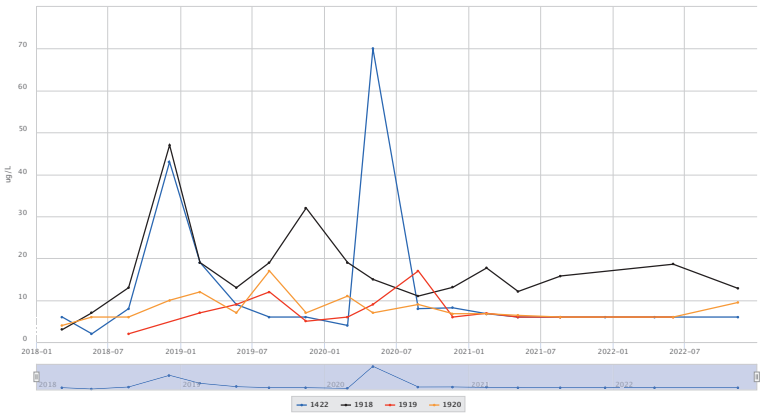


Selenium, Dissolved

Sulfate, Total

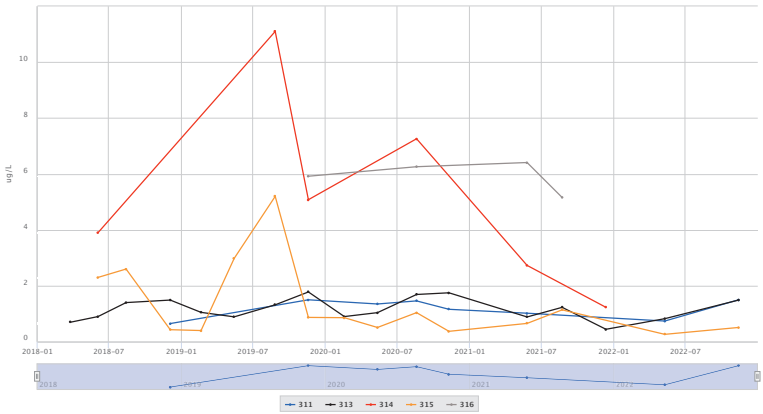


Zinc, Dissolved



Attachment C: Site 23 Finger Drains

Cadmium, Dissolved



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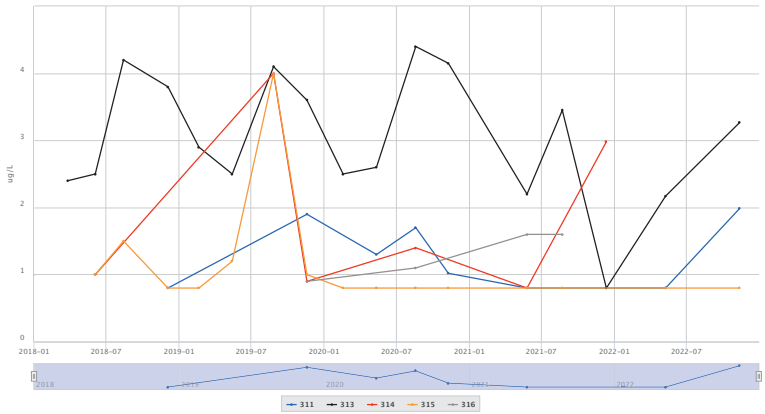
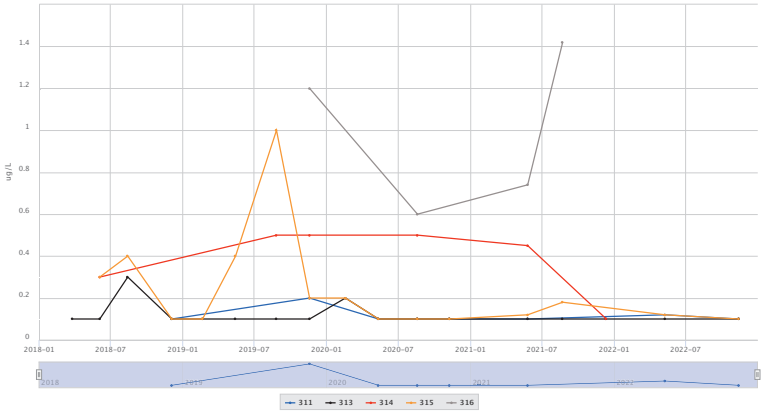


Lead, Dissolved



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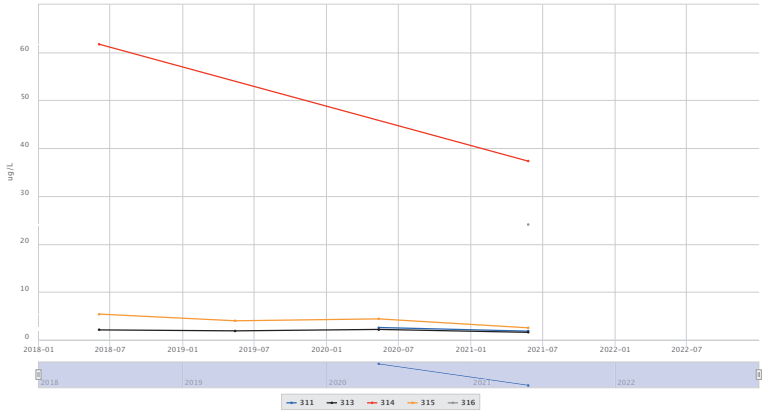
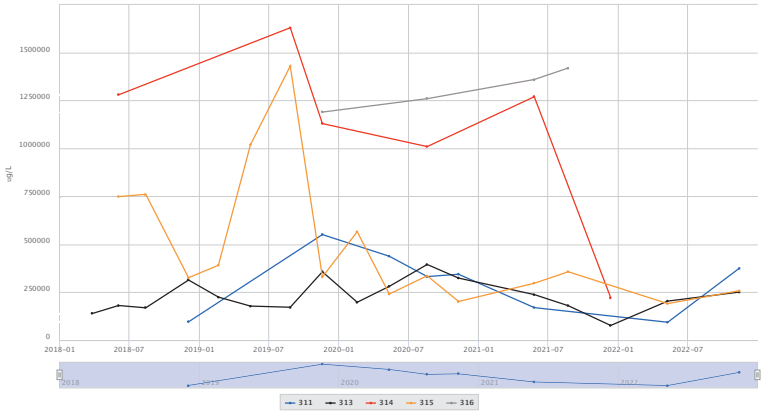


Sulfate, Total



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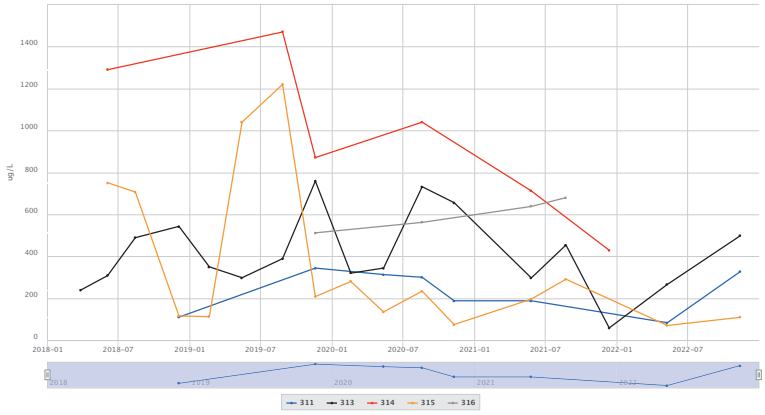

Attachment D: Site 23 and D Pile Curtain Drains

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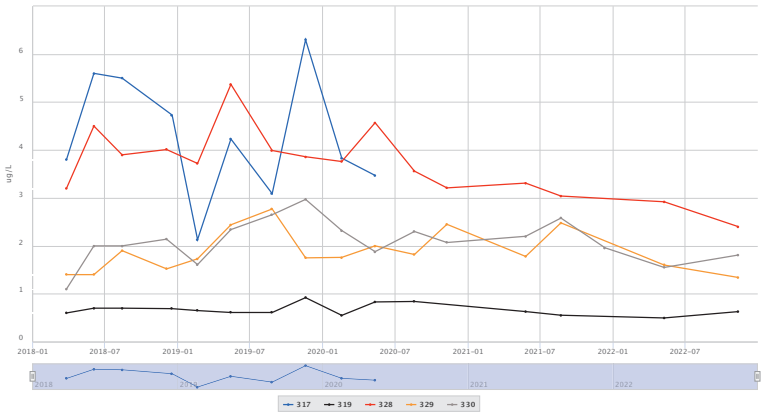

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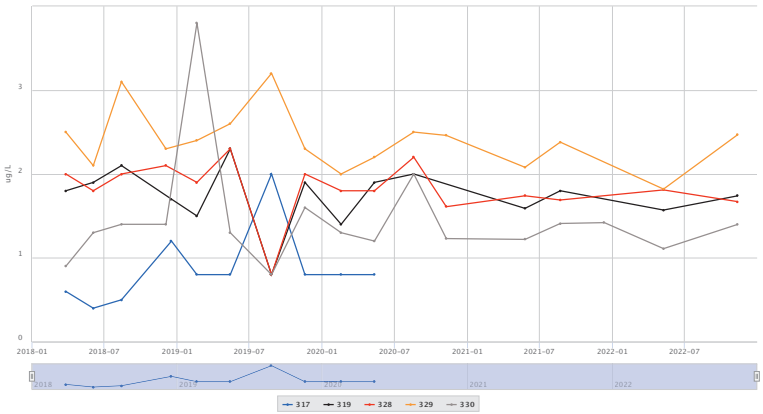

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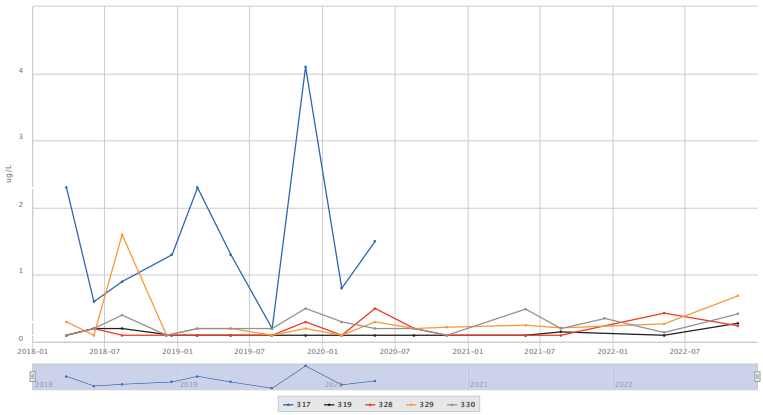
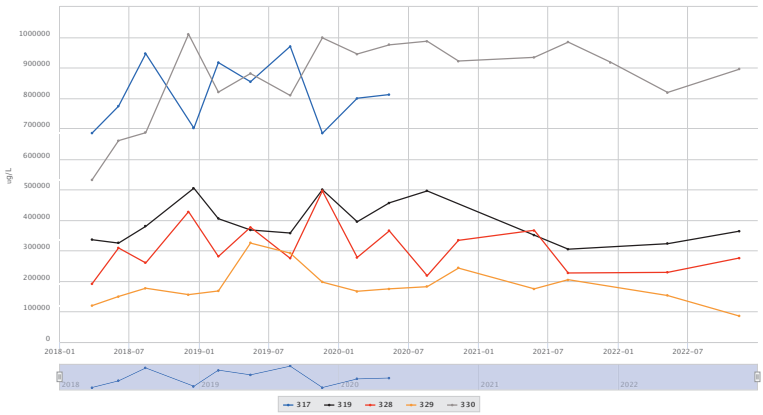


Selenium, Dissolved

Sulfate, Total



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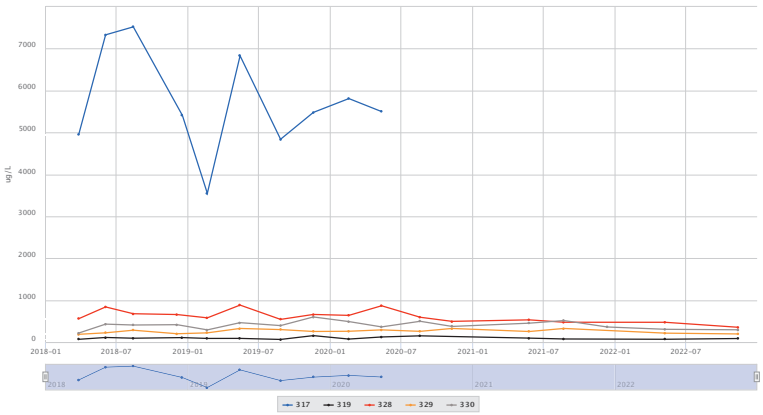
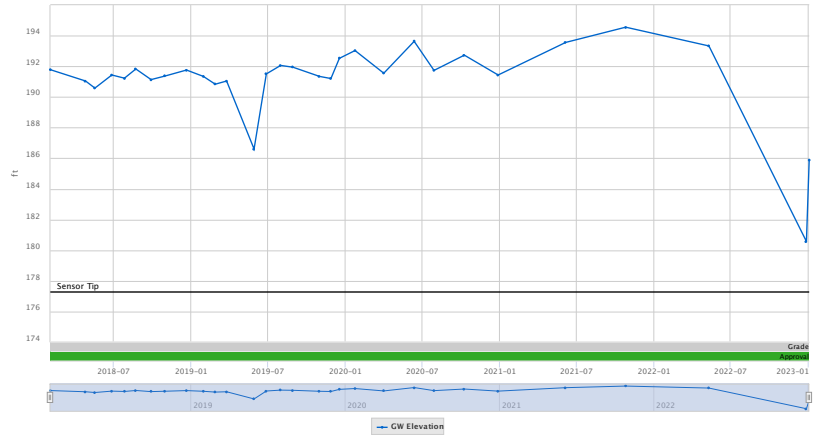
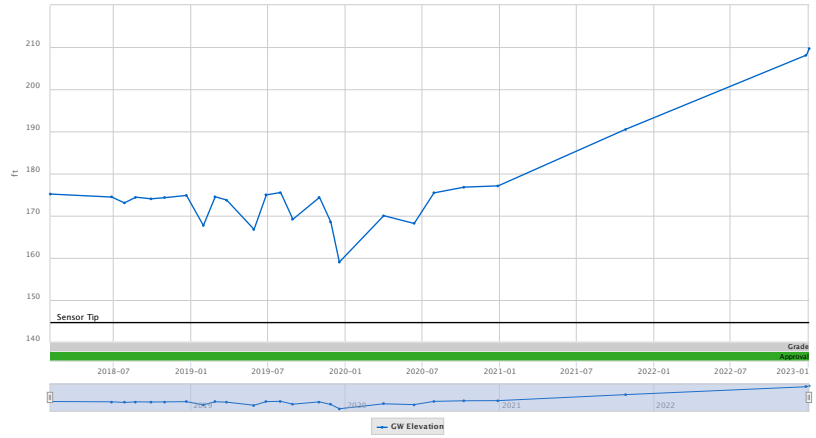


Attachment E: Water Level Data at the TDF

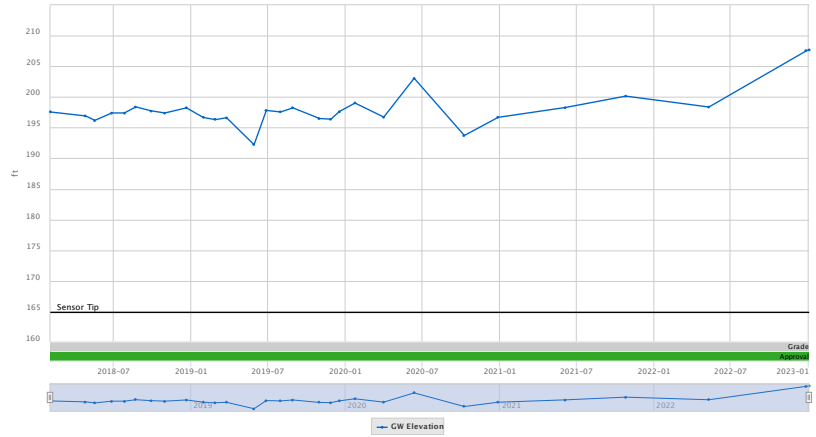
Site 1144



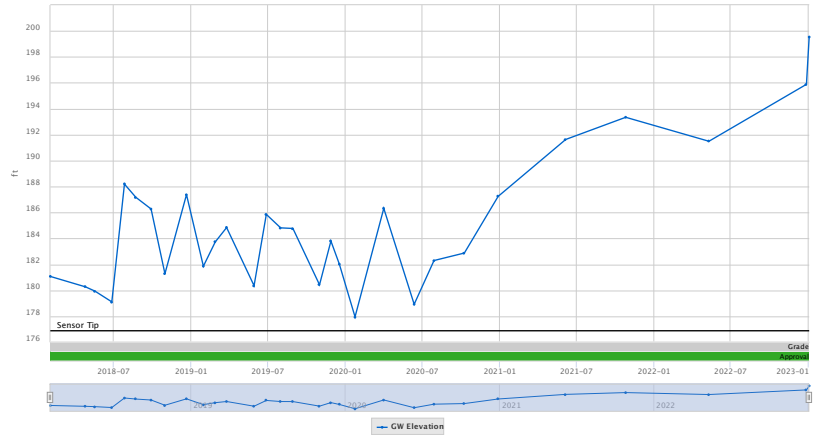
Site 1147



Site 1150



Site 1151



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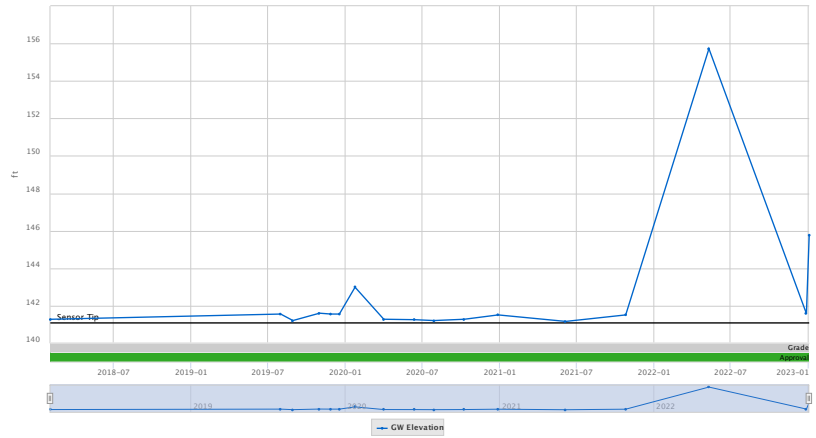

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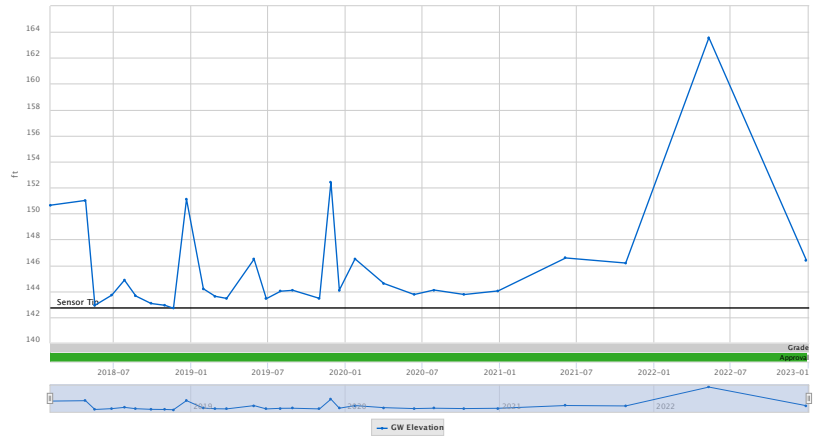

Attachment F: Site E

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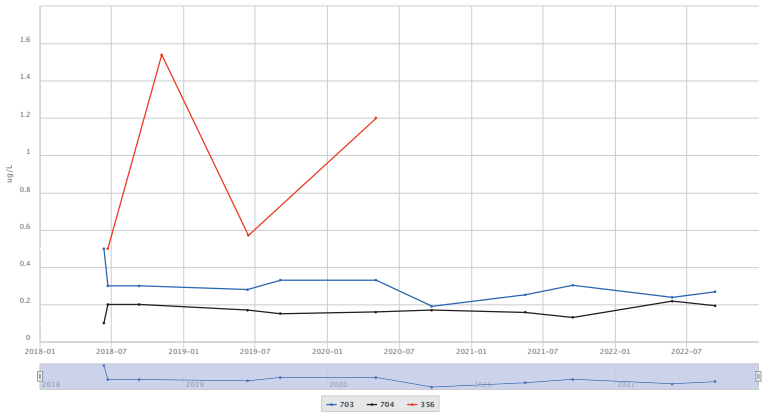

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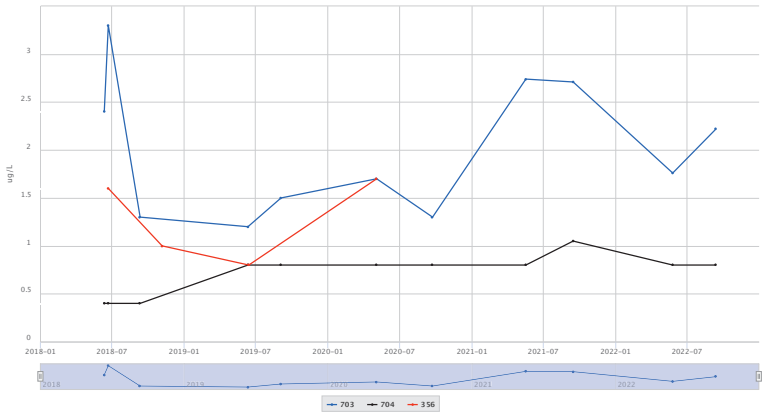
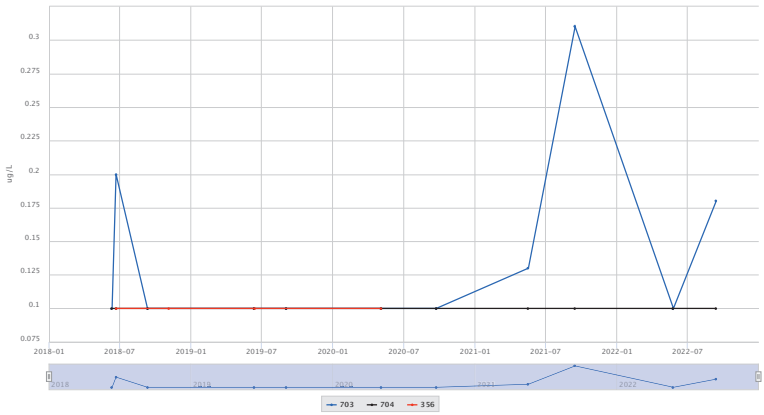
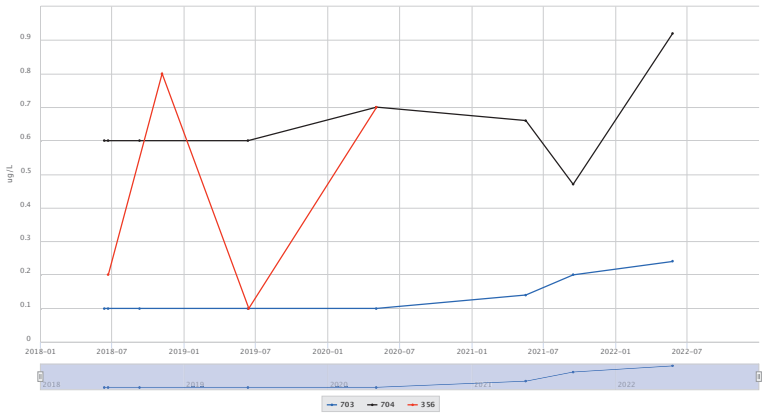


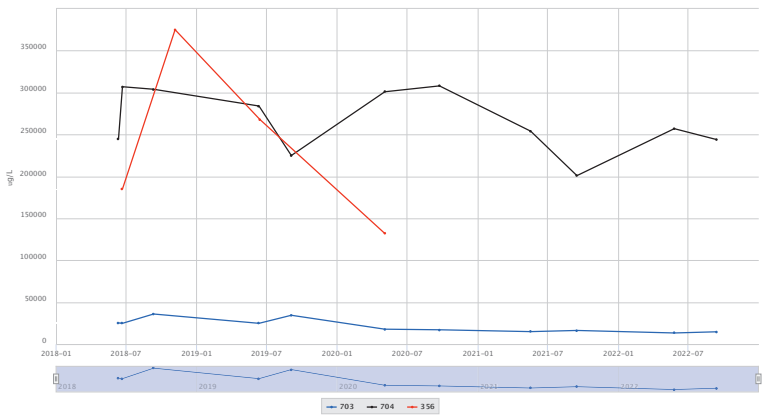
Lead, Dissolved



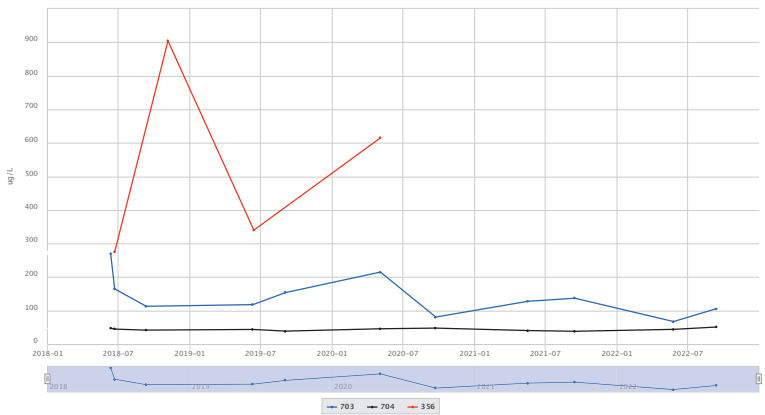
Selenium, Dissolved



Sulfate, Total

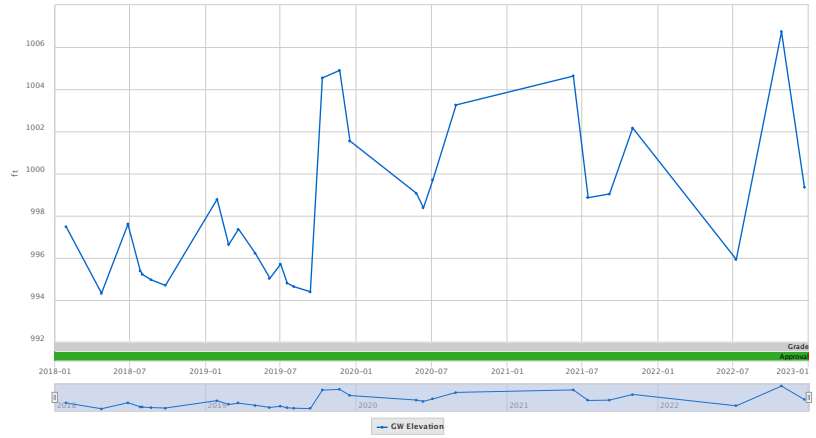


Zinc, Dissolved

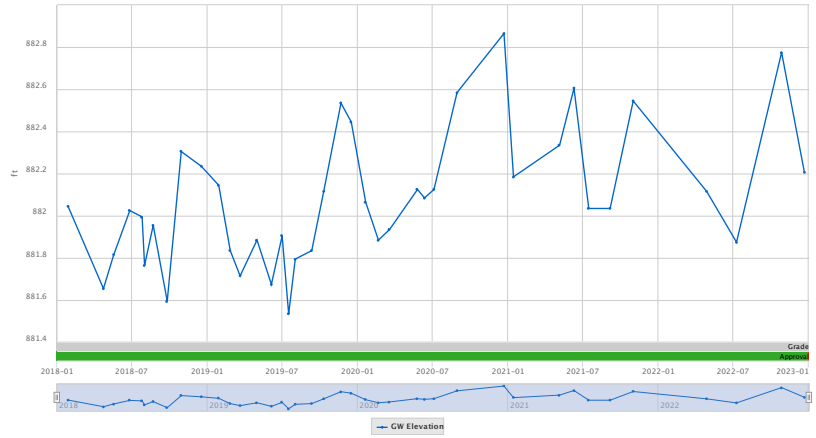


Attachment G: Site 23 and D Pile Water Level Data

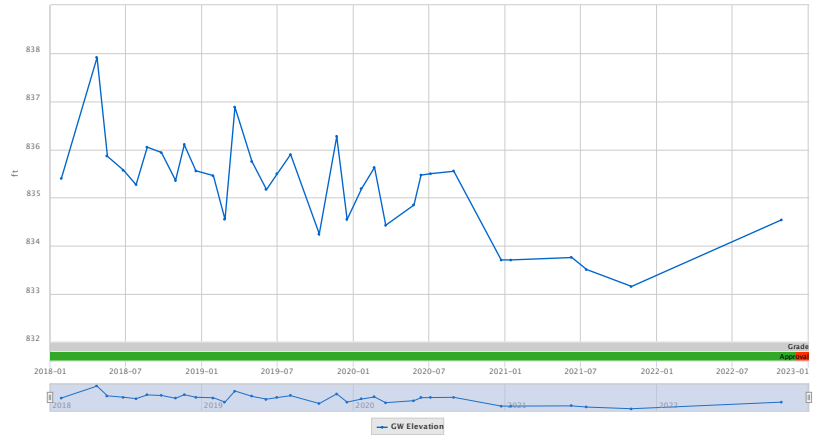
Site 50



Site 51



Site 56



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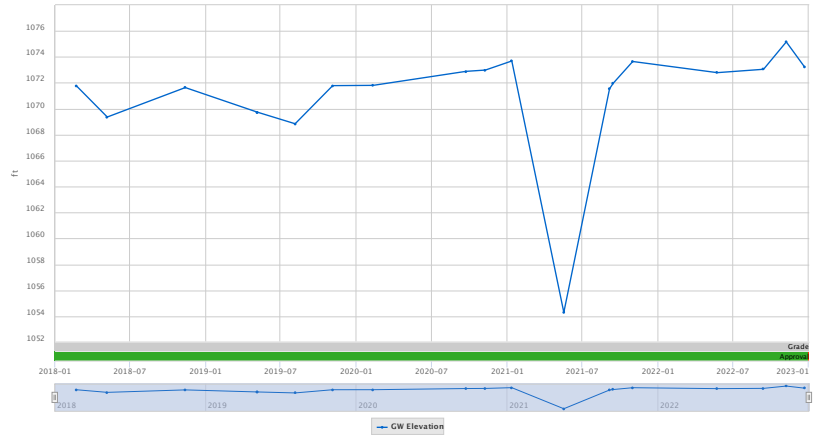
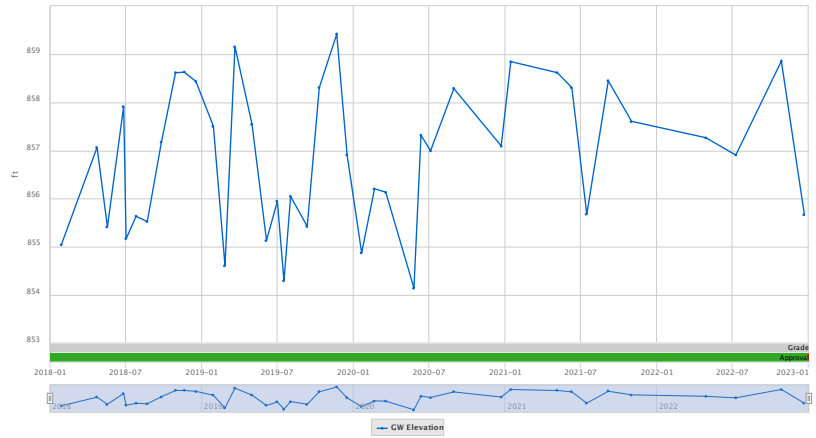
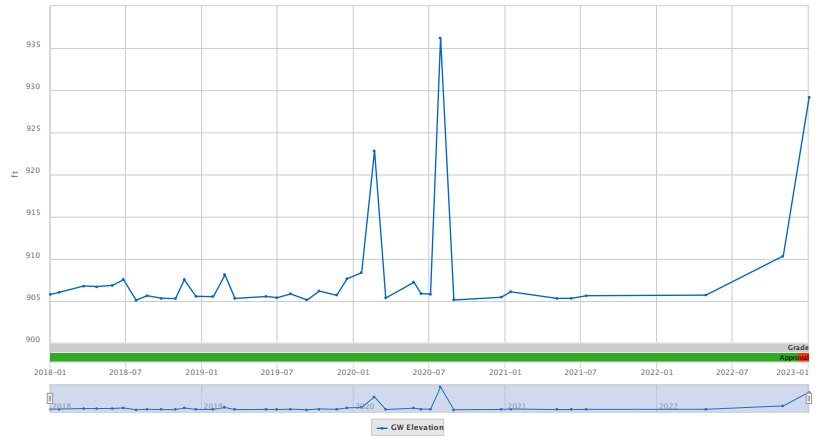


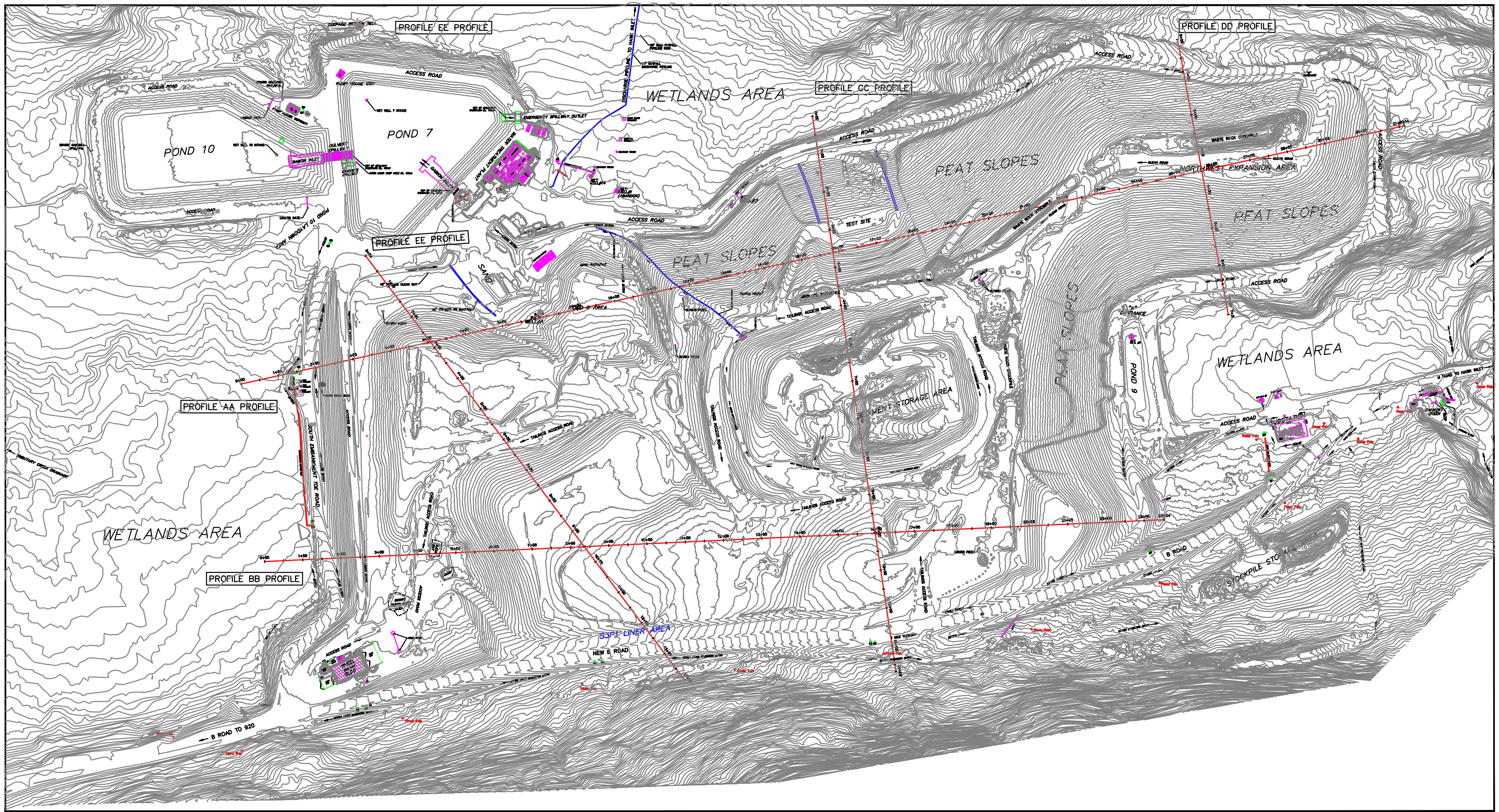
Site 326



Site 1152



Attachment H: TDF As-Built Layout



HECLA GREENS CREEK MINING CO.

P.O. BOX 32199 JUNEAU, ALASKA 99803

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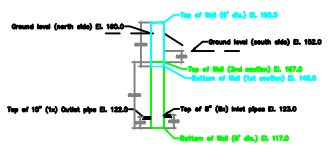
WWA Detail



INFRASTRUCTURE LEGEND:

BUILDINGS
WATER UTILS
ROADS
ELECT UTILS
FUEL UTILS
LINED DITCHES & CONCRETE

SYMBOLS:

FIRE HYDRANT
BOLLARDS
WATER VALVE
MONITORING POINT
POWER POLES
CATCH BASIN

GRAPHIC SCALE:

0 50 100 200 400

TRUE

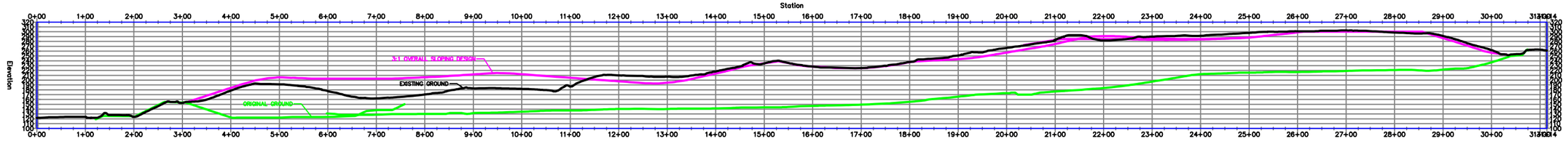
DRAWING BY: Shelby Edwards
DESIGN BY: ----
REVIEWED BY: ----
PROJ OR REF. ----

TITLE: Tailings Asbuilt

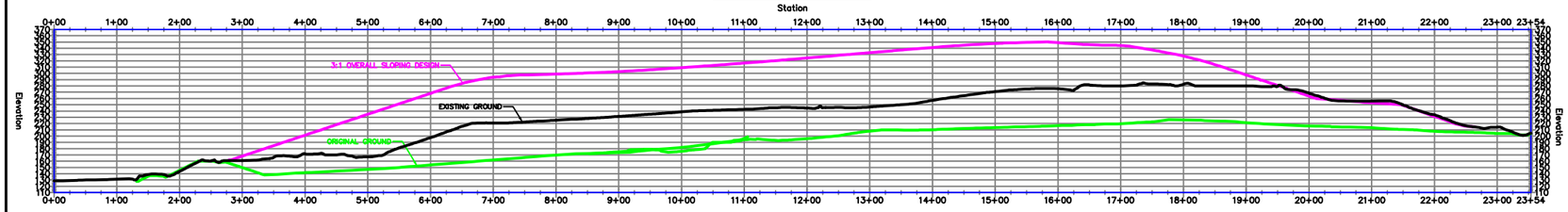
SHEET: 12/31/22

SHEET: 1 OF 1

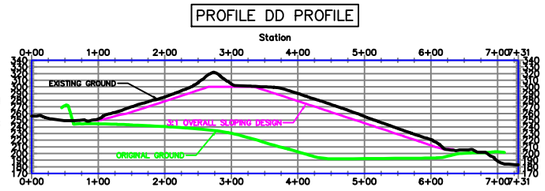
PROFILE AA PROFILE



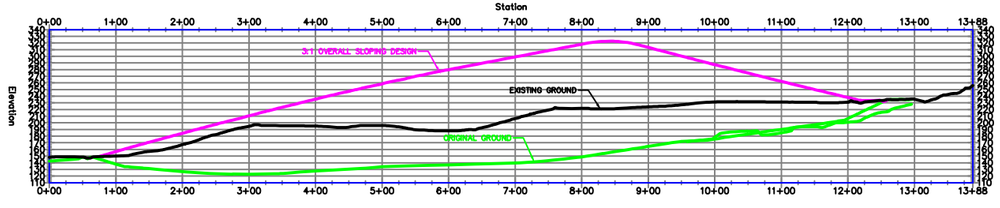
PROFILE BB PROFILE



PROFILE DD PROFILE



PROFILE EE PROFILE



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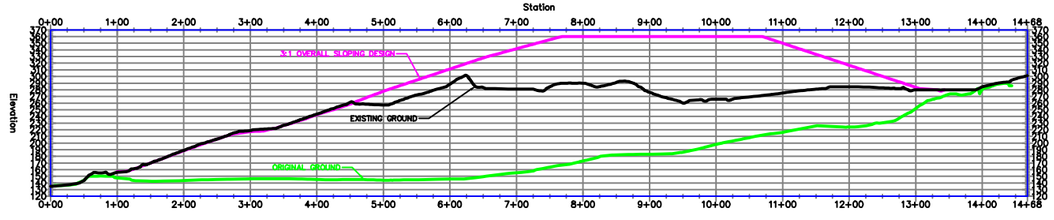

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Hecla MINING COMPANY

LEDGEND:
- ORIGINAL GROUND
- EXISTING GROUND
- STAGE 2&3 DESIGN

SYMBOLS:
- FIRE HYDRANT
- BOLLARDS
- WATER VALVE
- MONITORING POINT
- POWER POLES
- CATCH BASIN

GRAPHIC SCALE:

DRAWING BY: Shelby Edwards
DESIGN BY: ----
REVIEWED BY: ----
PROJ OR REF. ----

TITLE: PROFILE VIEWS

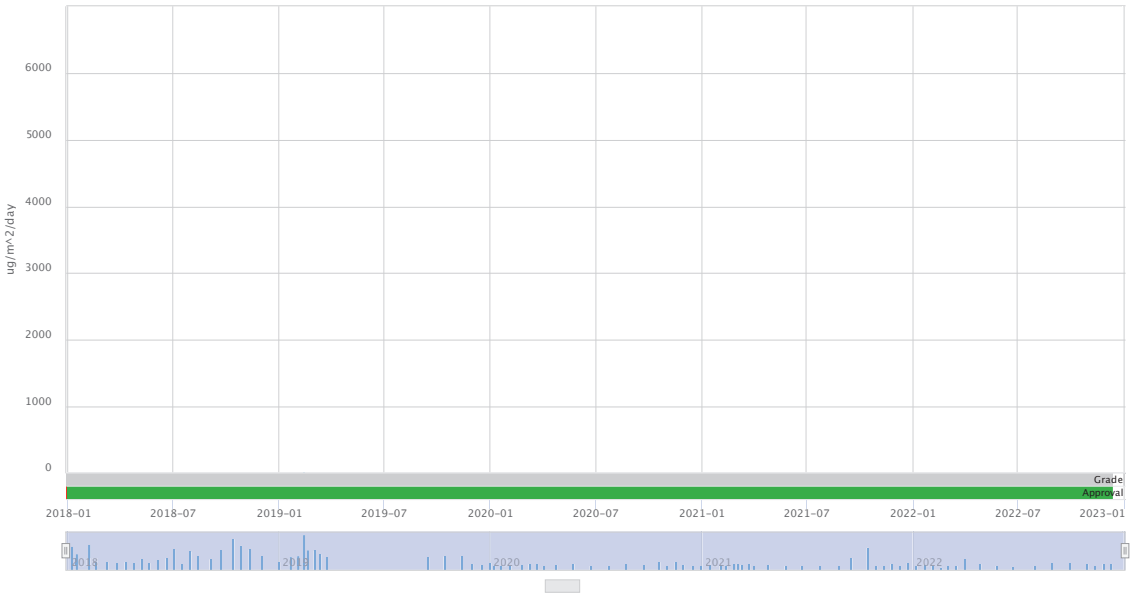
SHEET: 12/31/22

SHEET: 1 OF 1

Attachment I: ADC Dust Charts

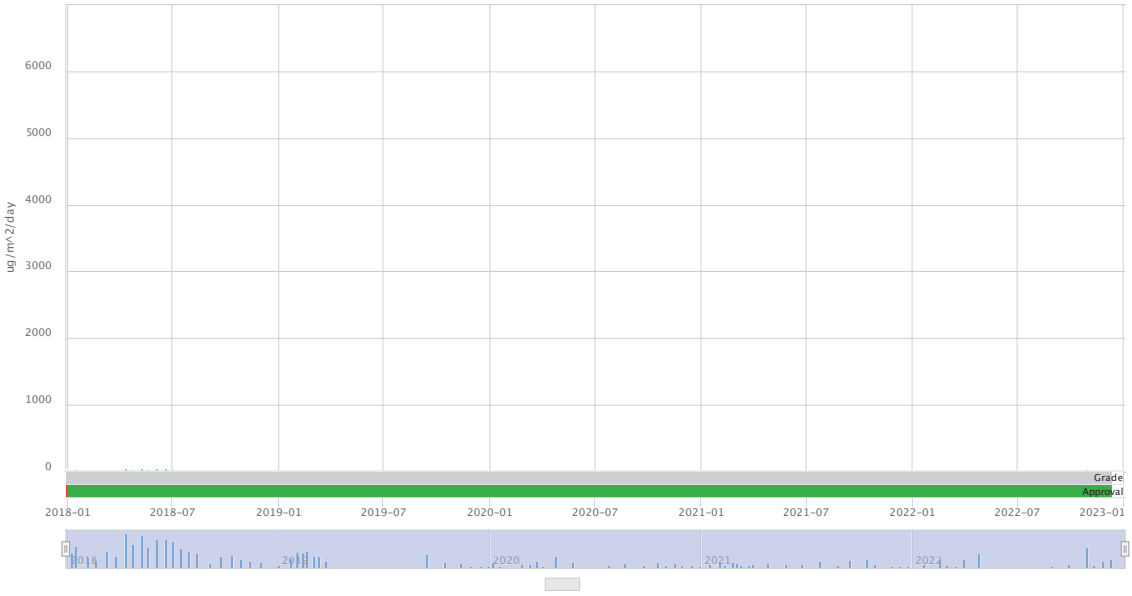
A-Road

Average Daily Accumulation of Lead in the ADC



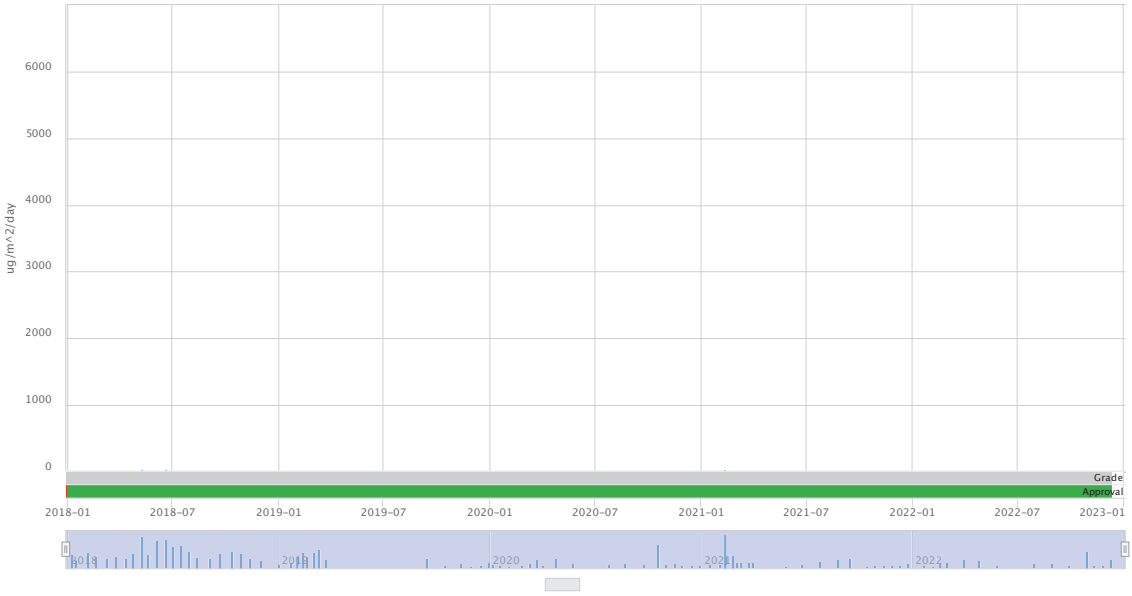
East

Average Daily Accumulation of Lead in the ADC



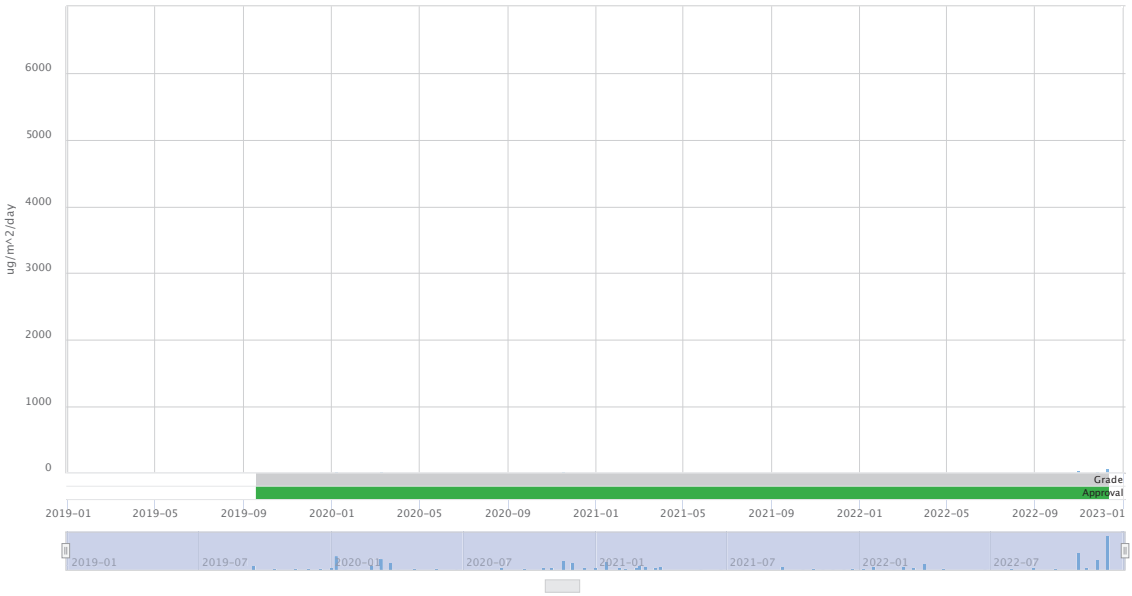
Northeast

Average Daily Accumulation of Lead in the ADC



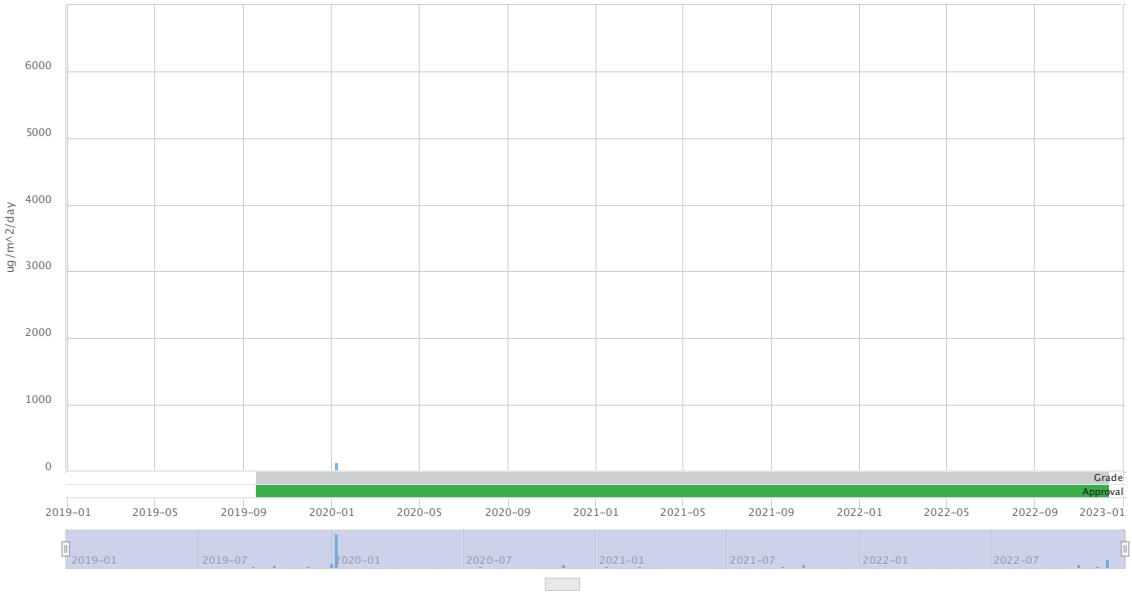
Pond 10 Pumphouse

Average Daily Accumulation of Lead in the ADC



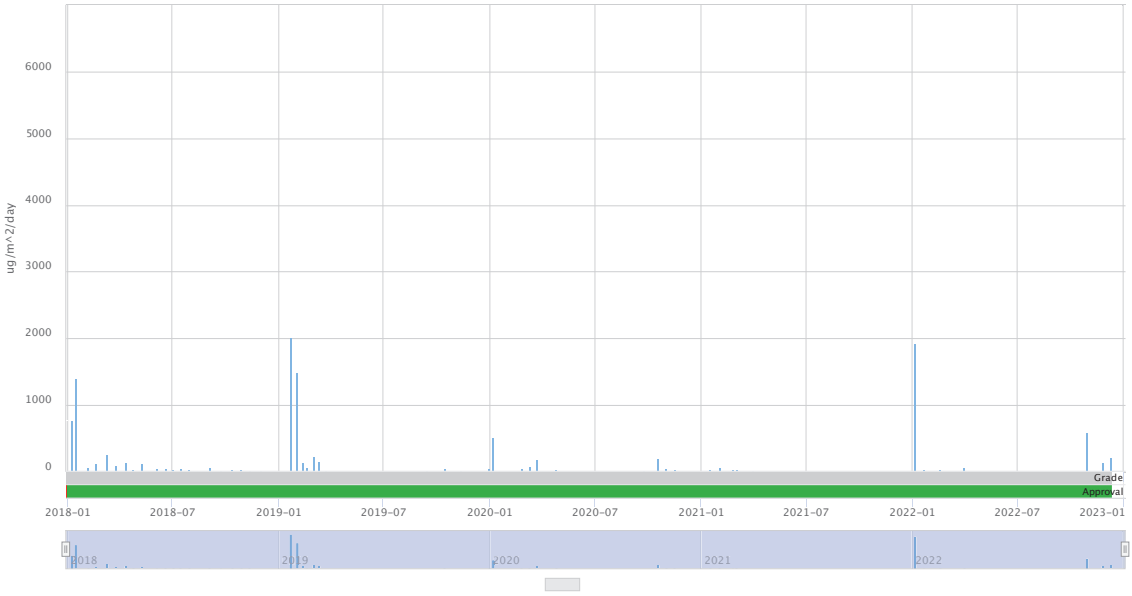
Pond 10 South

Average Daily Accumulation of Lead in the ADC



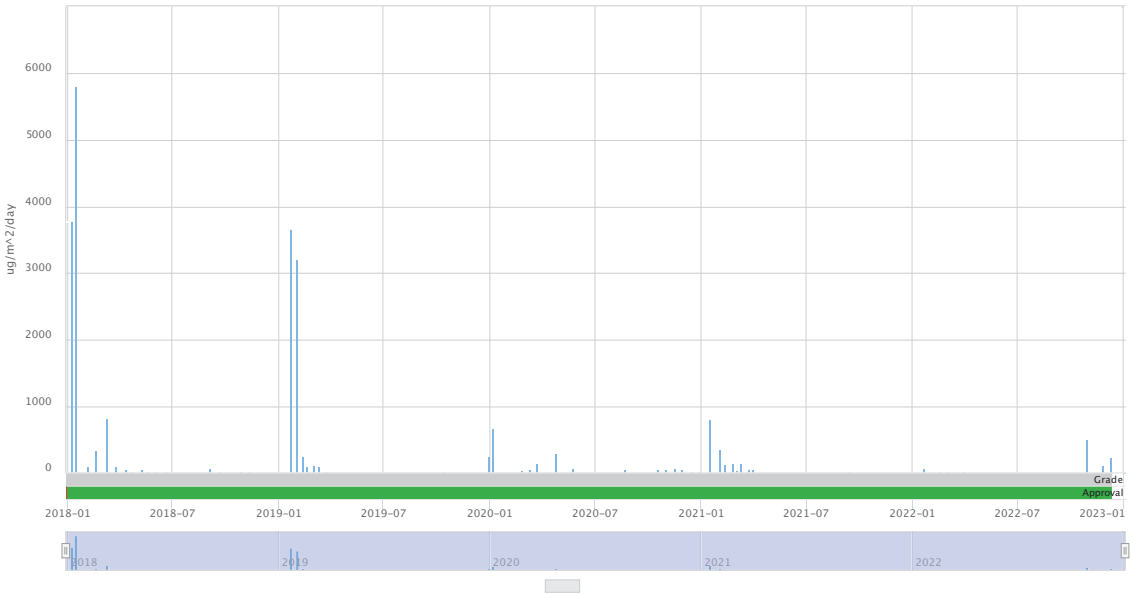
Southeast

Average Daily Accumulation of Lead in the ADC



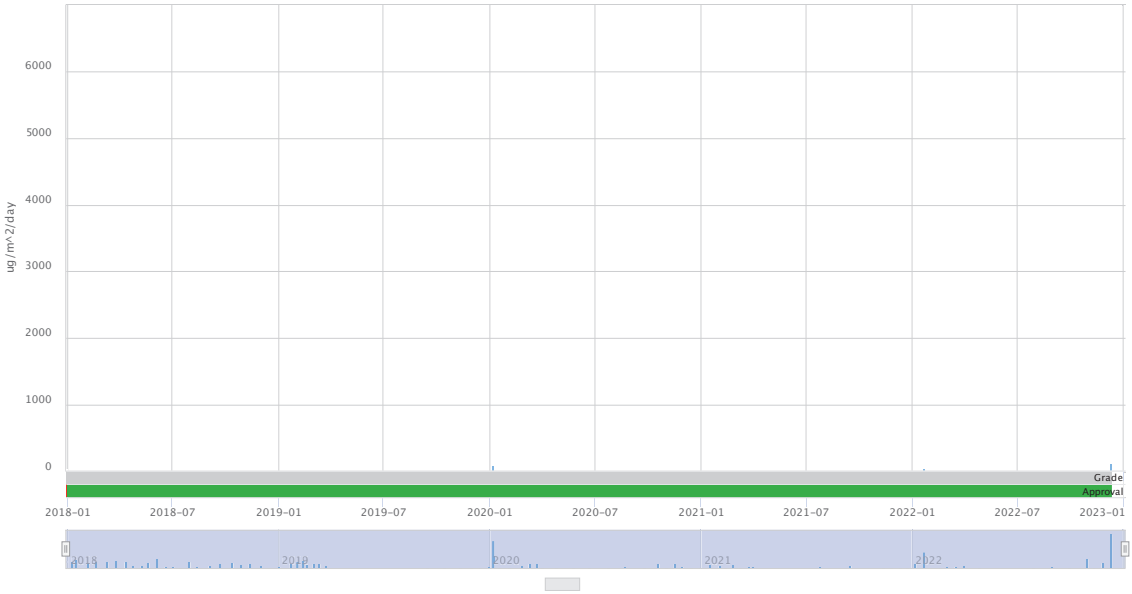
South

Average Daily Accumulation of Lead in the ADC



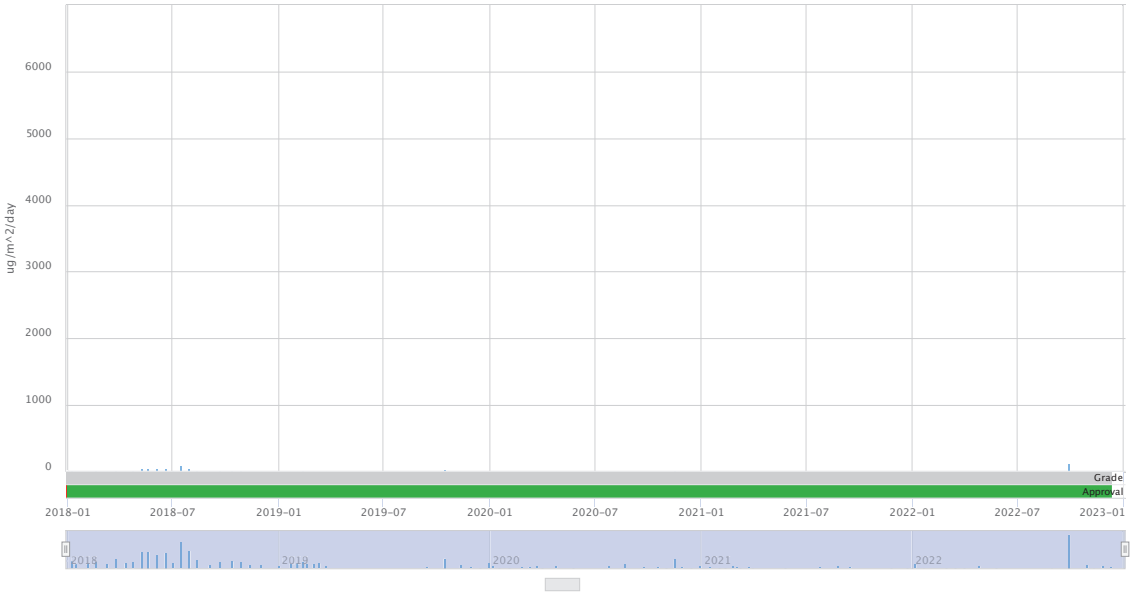
Southwest

Average Daily Accumulation of Lead in the ADC

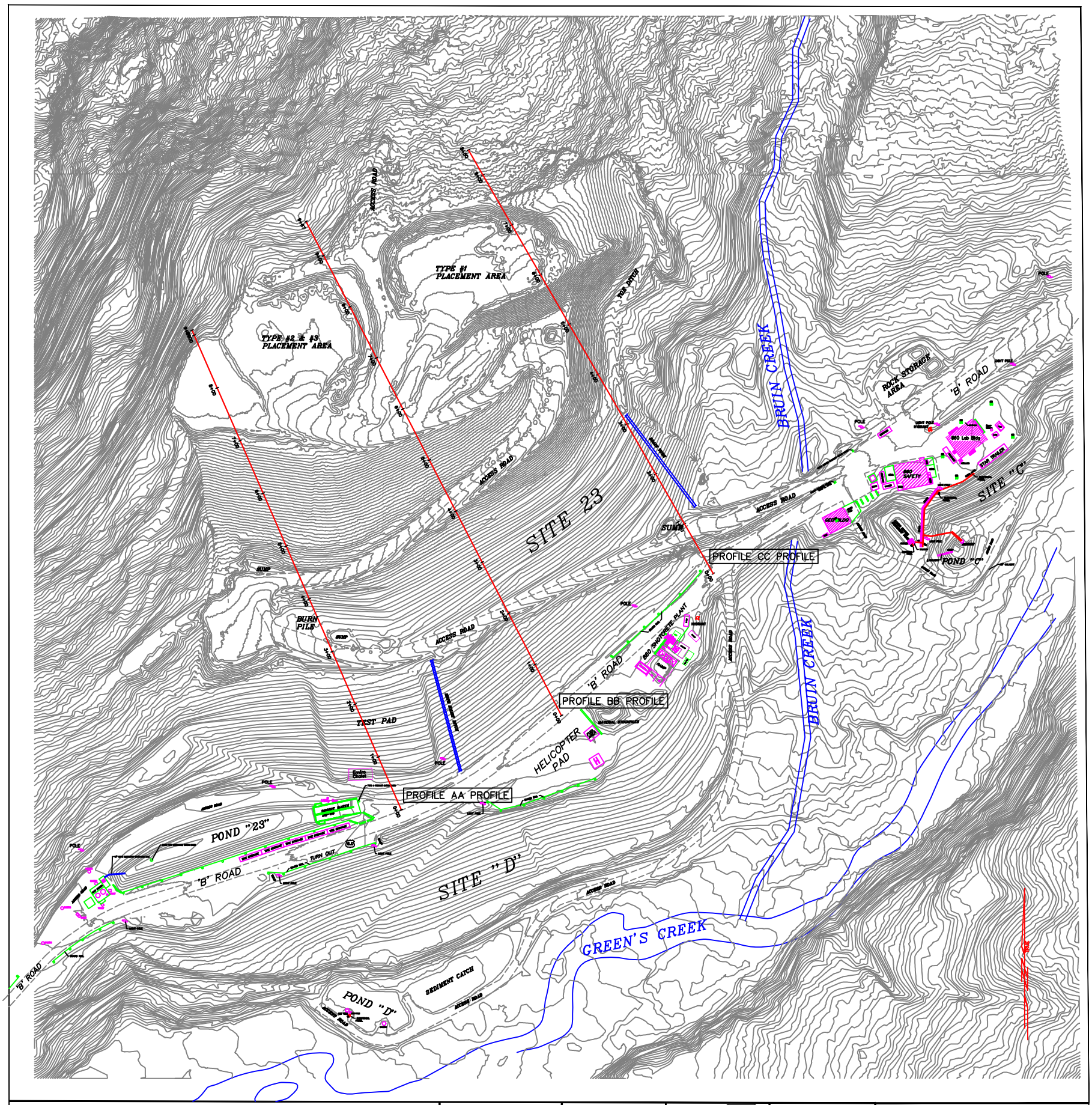


West

Average Daily Accumulation of Lead in the ADC



Attachment J: Site 23 As-Built Layout



HECLA GREENS CREEK MINE

ADMIRALTY ISLAND, ALASKA

LEGEND

- (A) CHEMICAL TANK
- (24) PETROLEUM TANK
- TO- TRANSFORMER
- (SC) SPILL RESPONSE

LEGEND:

ROADS/DITCHES
SEWER
WATER UTILS
ELECT UTILS
BUILDINGS
CONCRETE CURBS

SYMBOLS:

FIRE HYDRANT
BOLLARDS
WATER VALVE
MONITORING POINT
POWER POLES
CATCH BASIN

PREPARED BY:
HECLA GREENS CREEK MINE
P.O. BOX 32199
JUNEAU, ALASKA 99801
PHONE: (907)790-8441 FAX: (907)790-8448

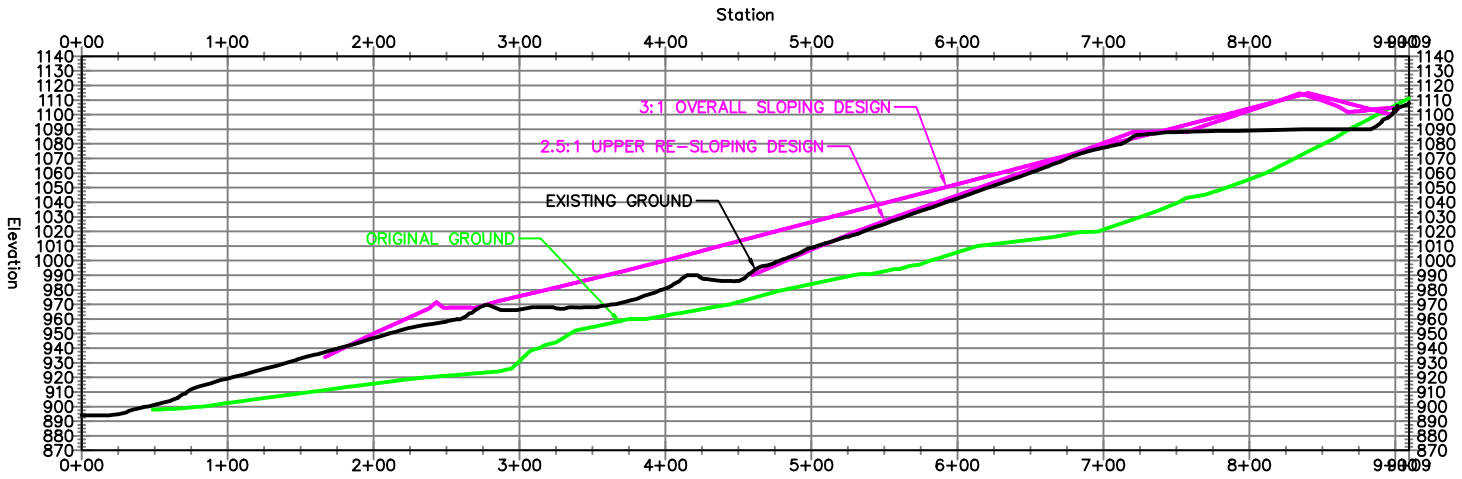
DRAWING BY: Shelby Edwards
DESIGN BY: -----
REVIEWED BY: -----
PROJ OR REF. -----

SITE 23 Asbuilt

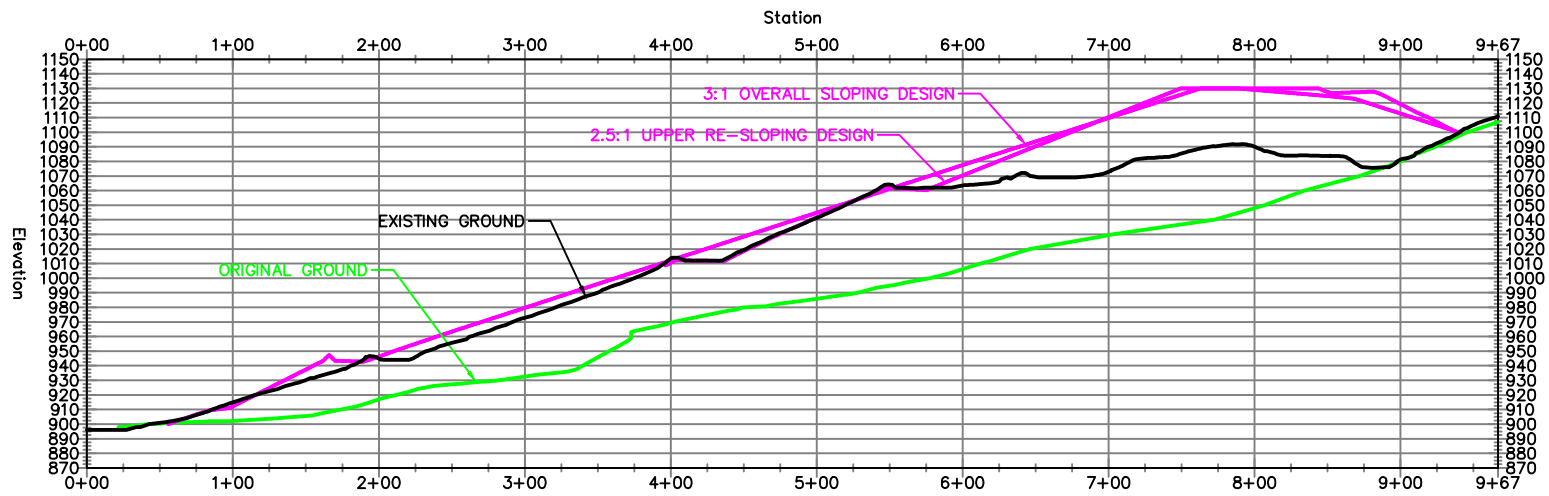
12/31/22

SHEET: 1 OF 2

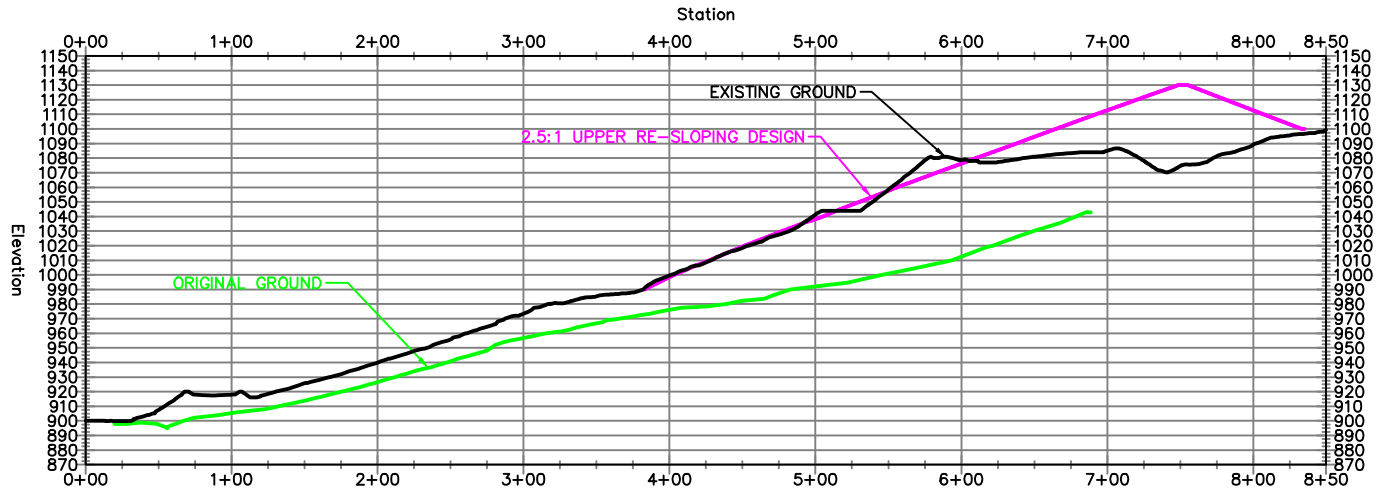
Alignment – AA PROFILE



Alignment – BB PROFILE



Alignment – CC PROFILE



LEDGEND:

- ORIGINAL GROUND
- EXISTING GROUND
- 2.5:1 DESIGN

SYMBOLS:

- FIRE HYDRANT
- BOLLARDS
- WATER VALVE
- MONITORING POINT
- POWER POLES
- CATCH BASIN

Hecla MINING COMPANY

DATE: 12/31/22

DRAWING BY: Shelby Edwards

DESIGN BY: ----

REVIEWED BY: ----

PROJ OR REF. ----

HECLA GREENS CREEK MINING CO.
P.O. BOX 32199 JUNEAU, ALASKA 99803
PHONE: (907)790-8441 FAX: (907)790-8448

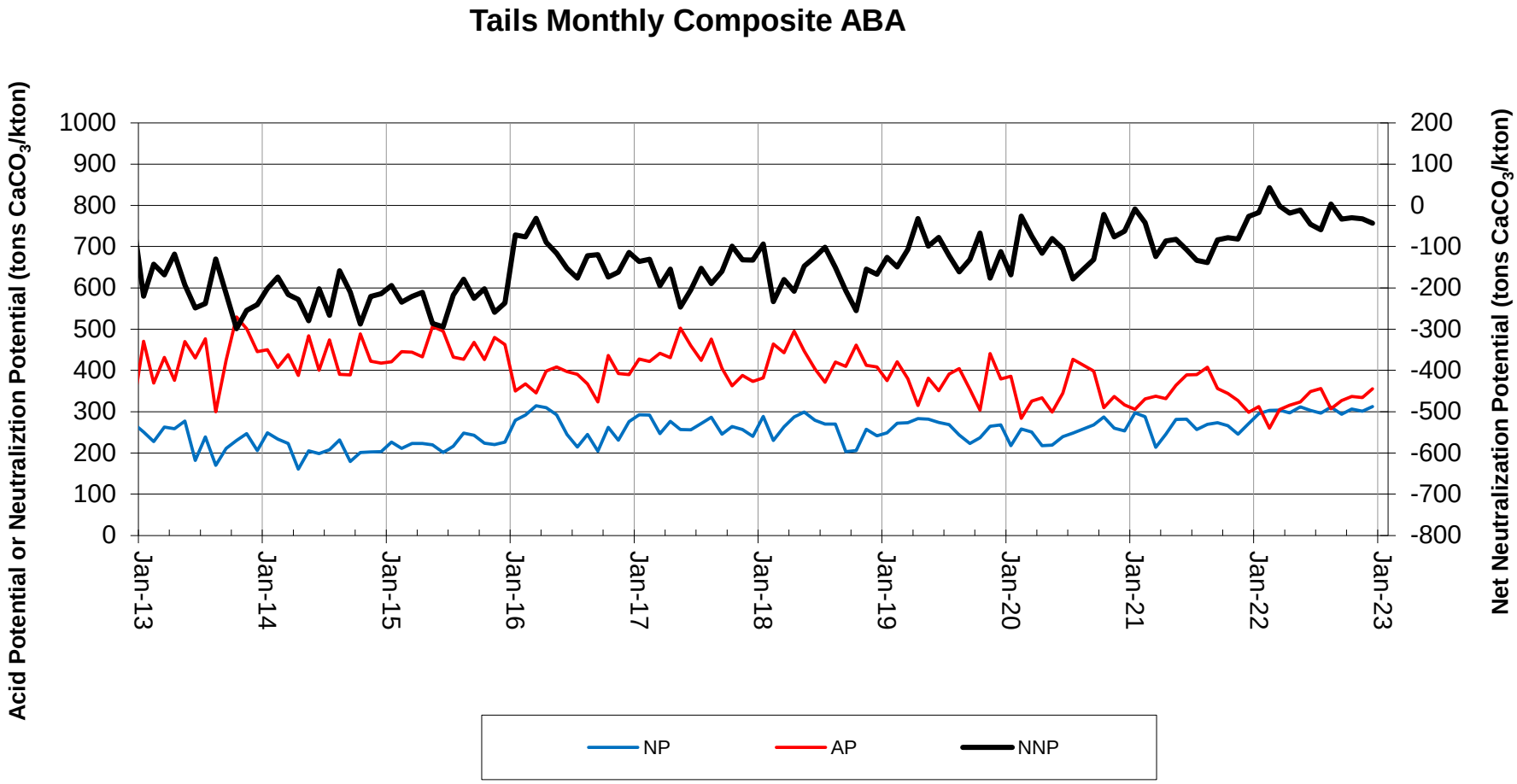
TITLE:

PROFILE VIEWS

0 20 60 100

SHEET: 2 OF 2

Attachment K: ABA Laboratory Graphs


Tails Monthly Composite ABA
Acid Potential or Neutraliztion Potential (tons CaCO3/kton)
Net Neutralization Potential (tons CaCO3/kton)
1000
900
800
700
600
500
400
300
200
100
0
200
100
0
-100
-200
-300
-400
-500
-600
-700
-800
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
NP
AP
NNP

Attachment L: Site 23 Inclinometer Displacement

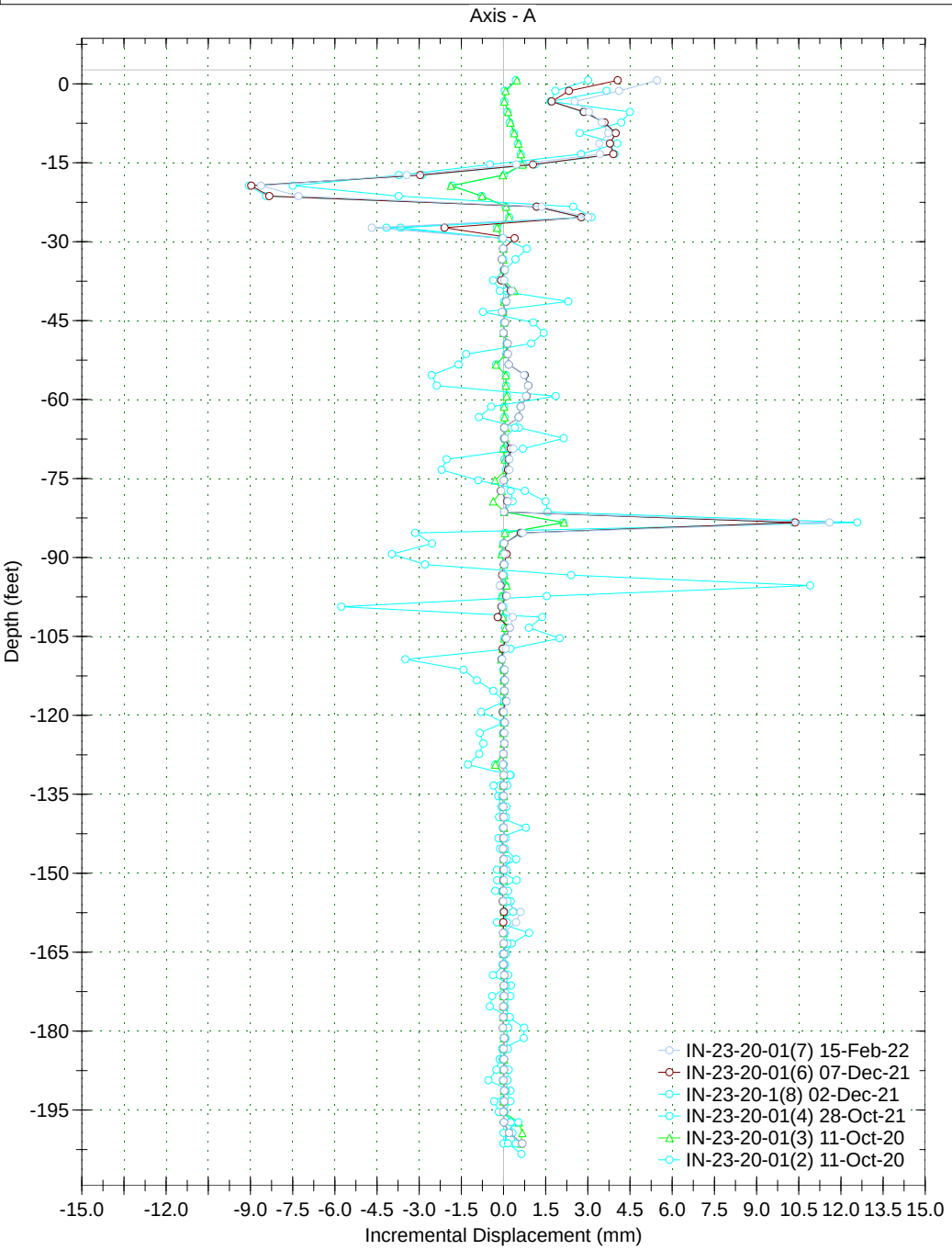
RST Instruments Ltd.

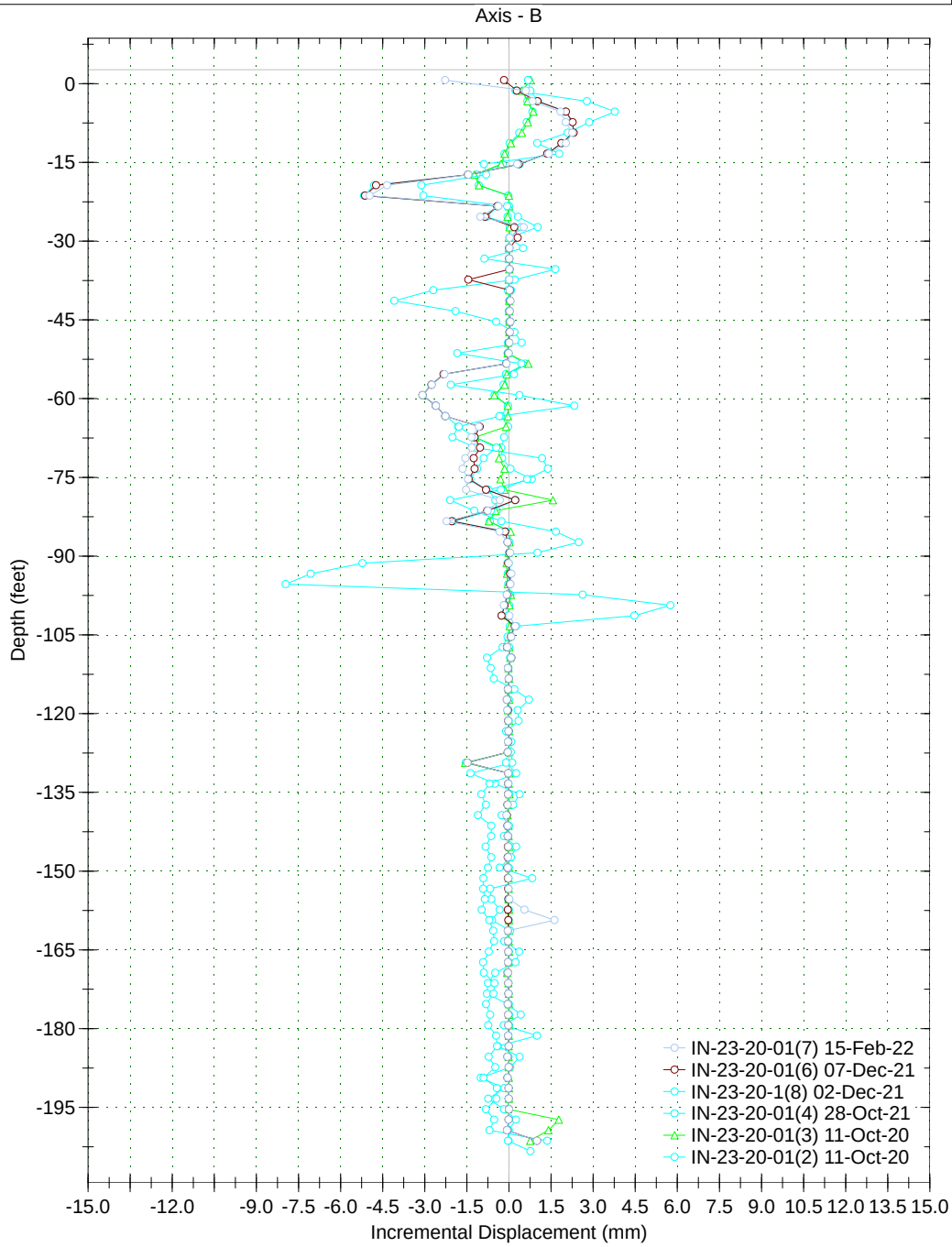
INCREMENTAL DISPLACEMENT

Inclinalysis v. 2.48.7

Borehole : IN-23-20-01
Project : Site 23
Location :
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : :2.65 feet
Reading Depth : 204.0 feet
A+ Groove Azimuth :
Base Reading : 2020 Jul 08 15:55
Applied Azimuth : 0.0 degrees





RST Instruments Ltd.

TIME PLOT

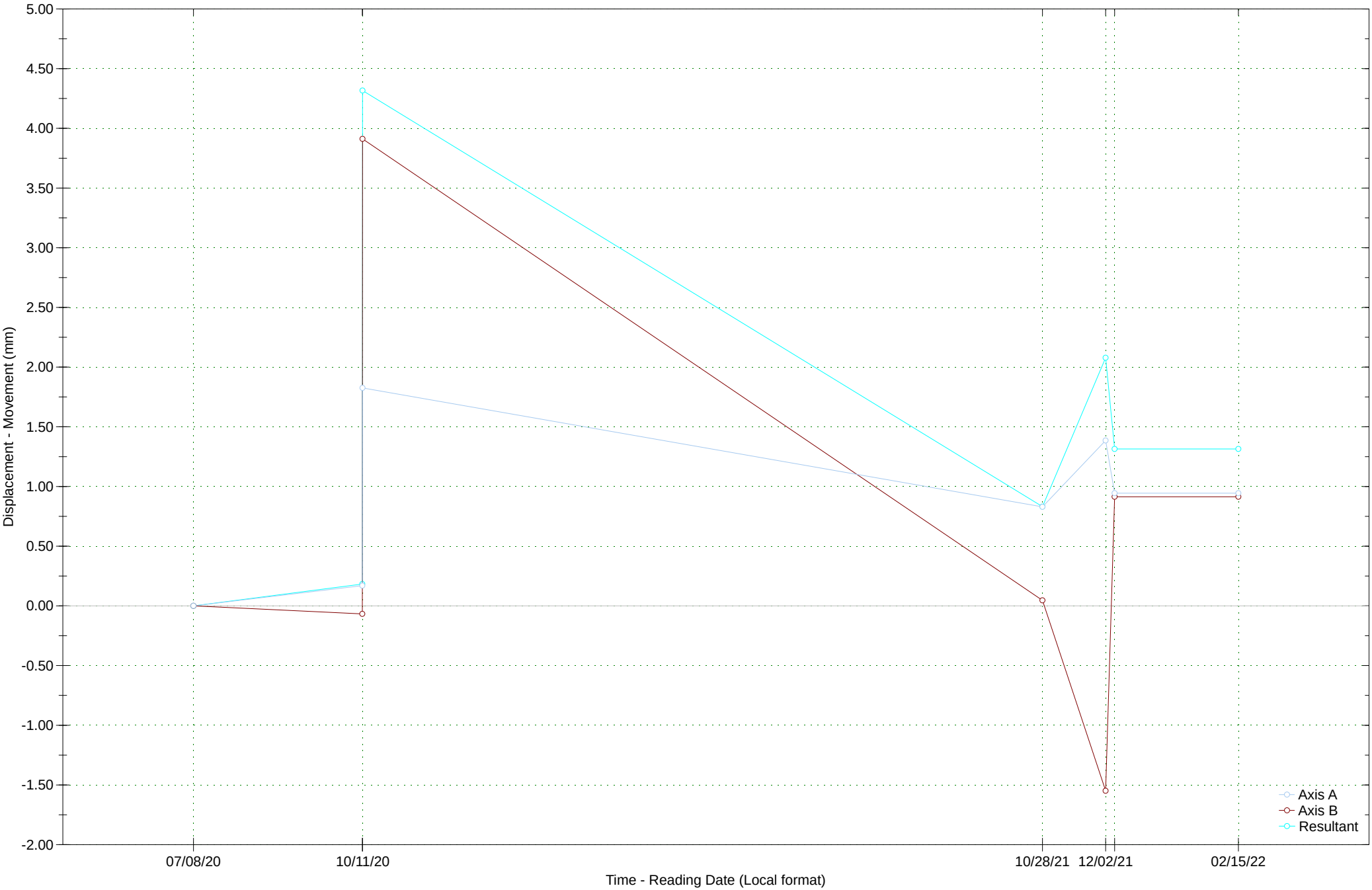
Displacement vs. Time

Inclinalysis v. 2.48.7

Borehole : IN-23-20-01
Project : Site 23
Location :
Northing :
Easting :
Collar :
Collar Elev : 2.65 feet

Spiral Correction : N/A
Movement Depth : 194.0 - 204.0 feet
Reading Depth : 204.0 feet
A+ Groove Azimuth :
Latest Reading : 2022 Feb 15 11:17
Initial Reading : 2020 Jul 08 15:55
Applied Azimuth : 0.0 degrees

Time Plot : 194.0 - 204.0 feet



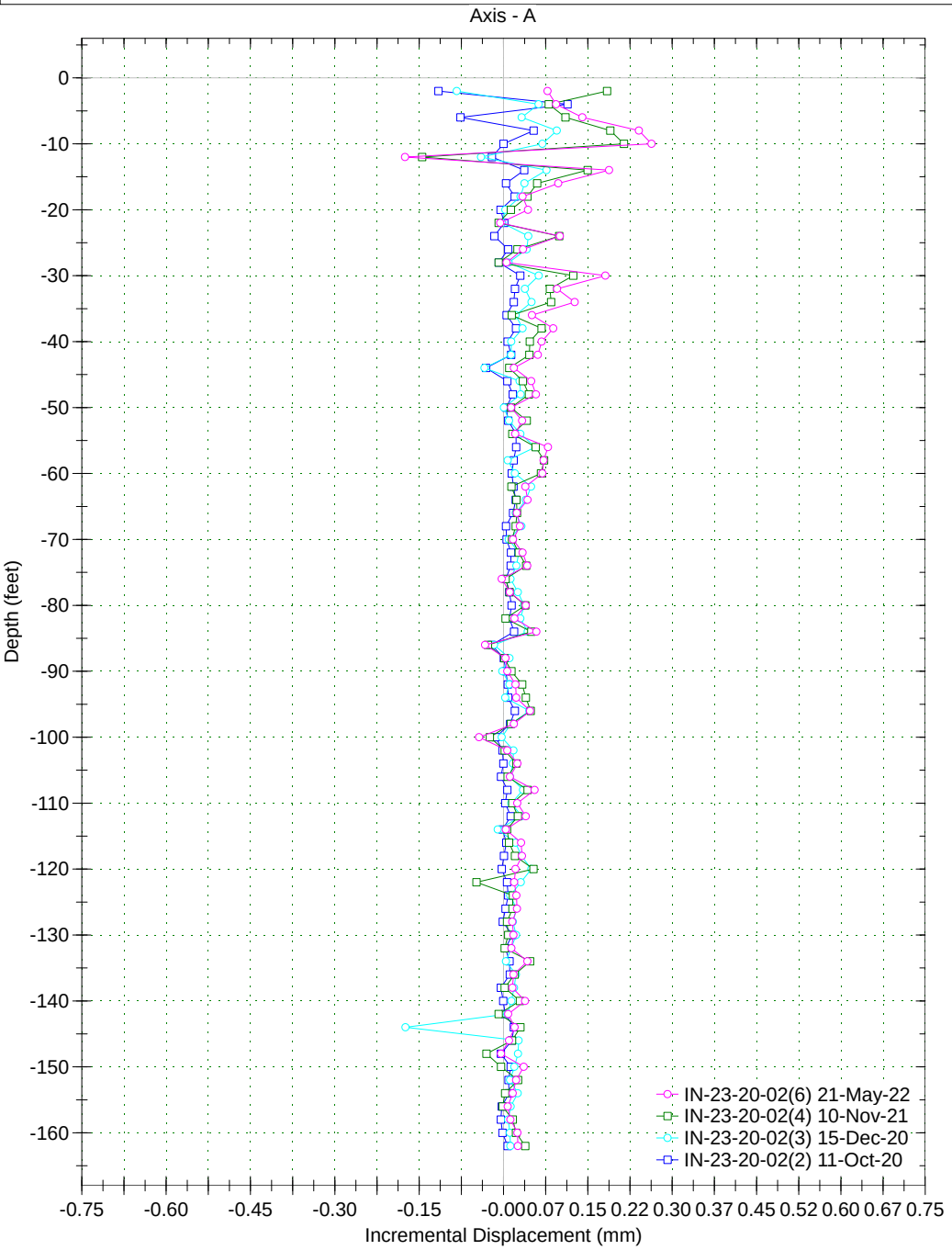
RST Instruments Ltd.

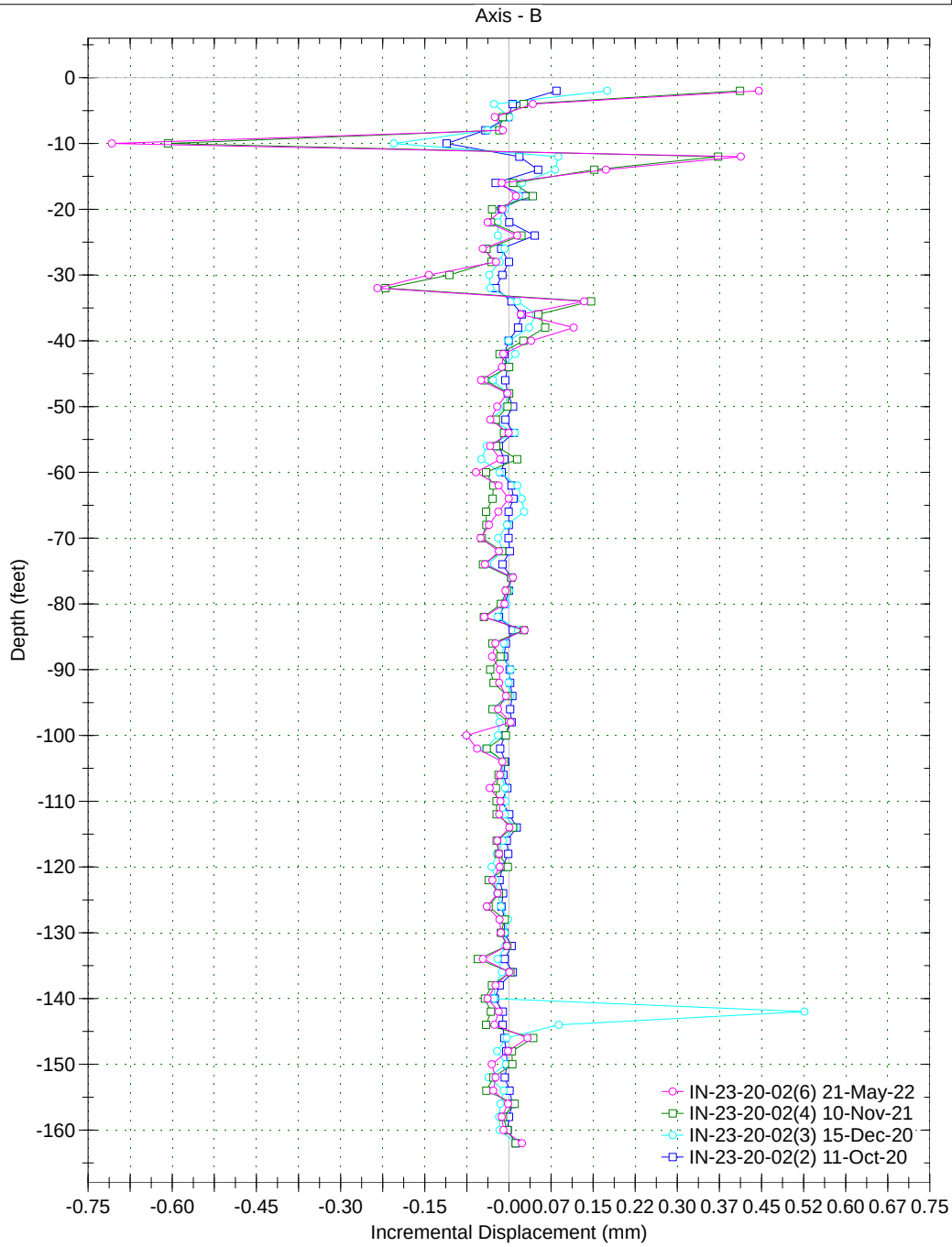
INCREMENTAL DISPLACEMENT

Inclinalysis v. 2.48.7

Borehole : IN-23-20-02
Project : Site 23
Location :
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : 0.00 feet
Reading Depth : 162.0 feet
A+ Groove Azimuth :
Base Reading : 2020 Jul 10 14:18
Applied Azimuth : 0.0 degrees





RST Instruments Ltd.

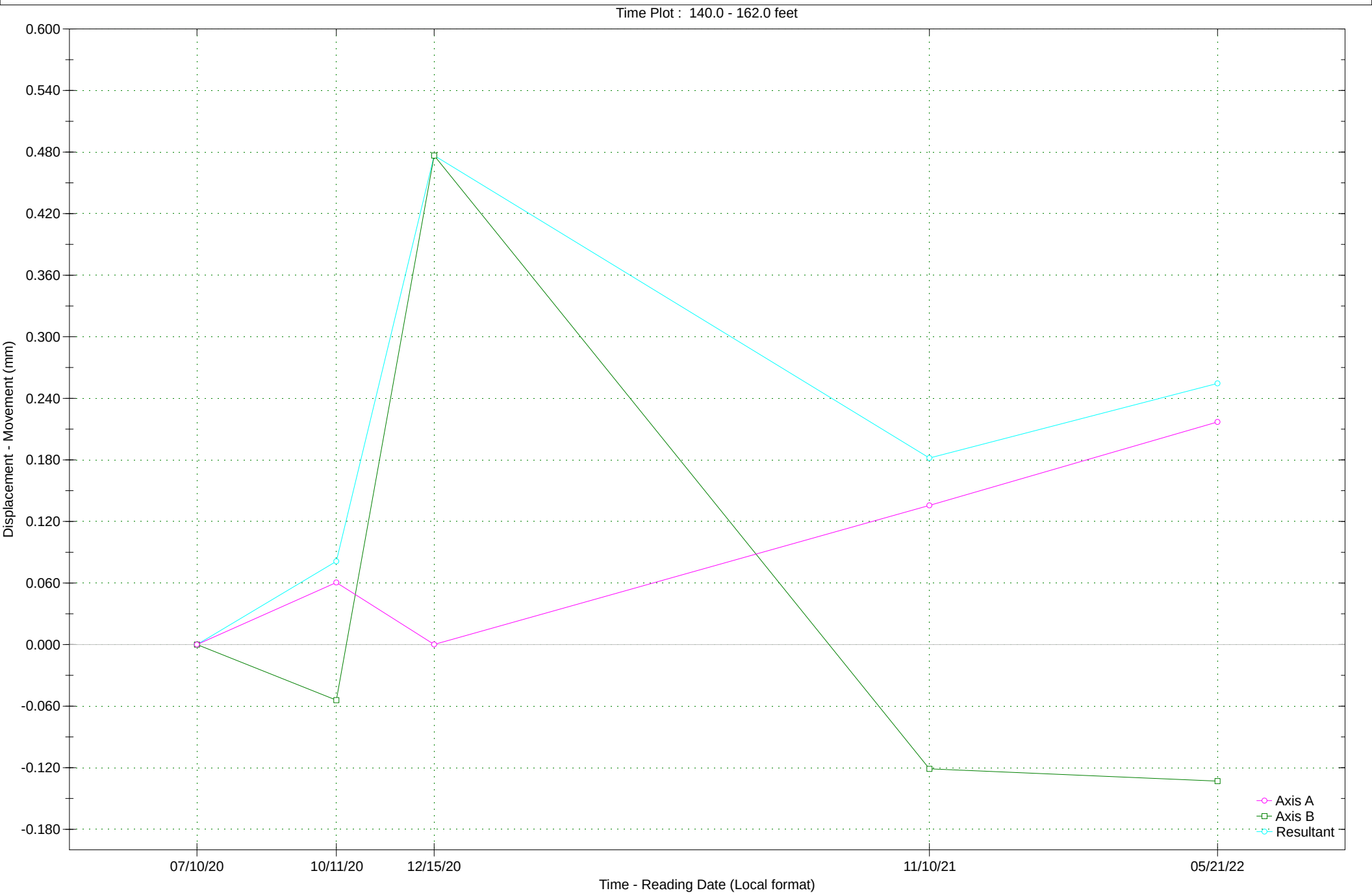
TIME PLOT

Displacement vs. Time

Inclinalysis v. 2.48.7

Borehole : IN-23-20-02
Project : Site 23
Location :
Northing :
Easting :
Collar :
Collar Elev : 0.00 feet

Spiral Correction : N/A
Movement Depth : 140.0 - 162.0 feet
Reading Depth : 162.0 feet
A+ Groove Azimuth :
Latest Reading : 2022 May 21 12:22
Initial Reading : 2020 Jul 10 14:18
Applied Azimuth : 0.0 degrees



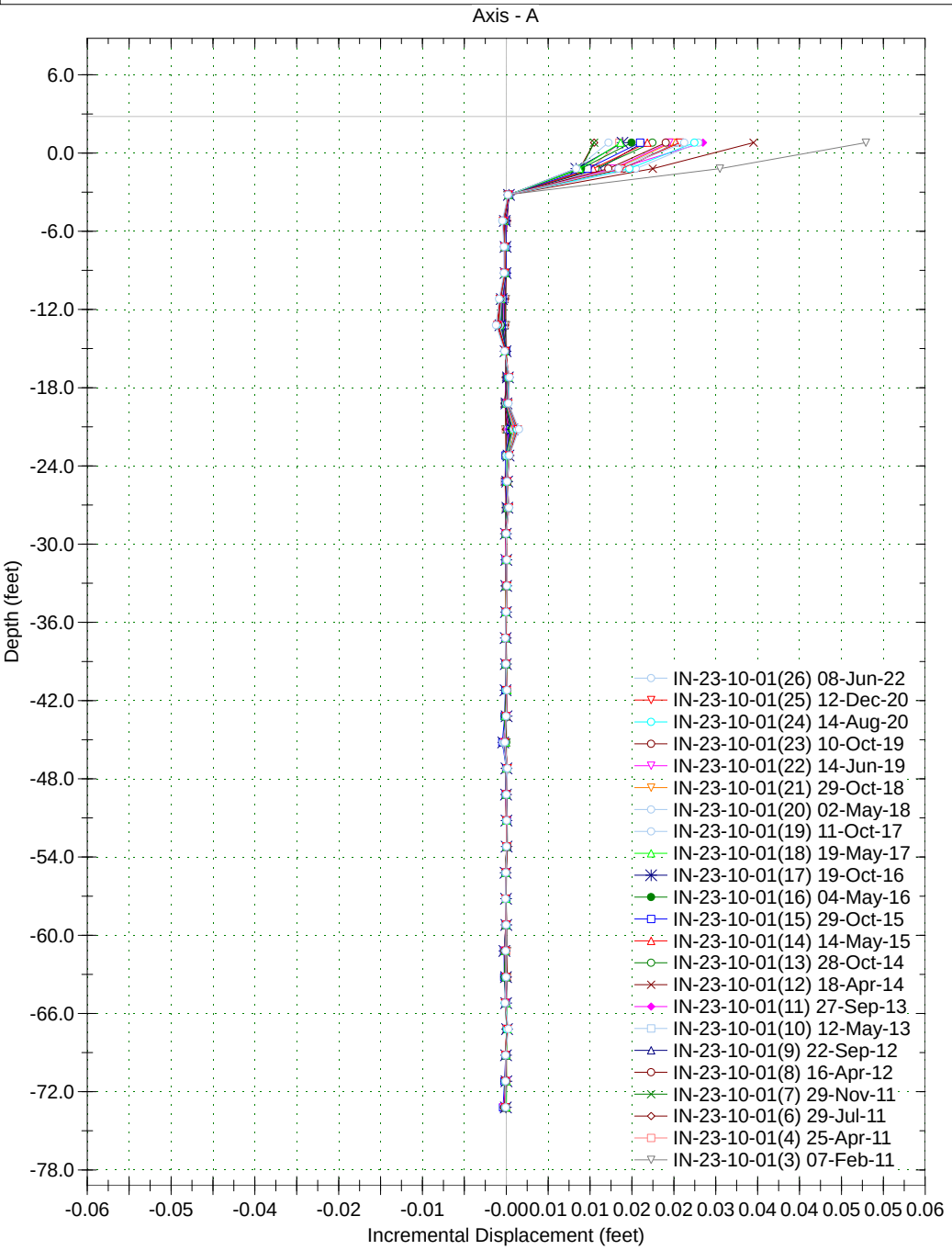
RST Instruments Ltd.

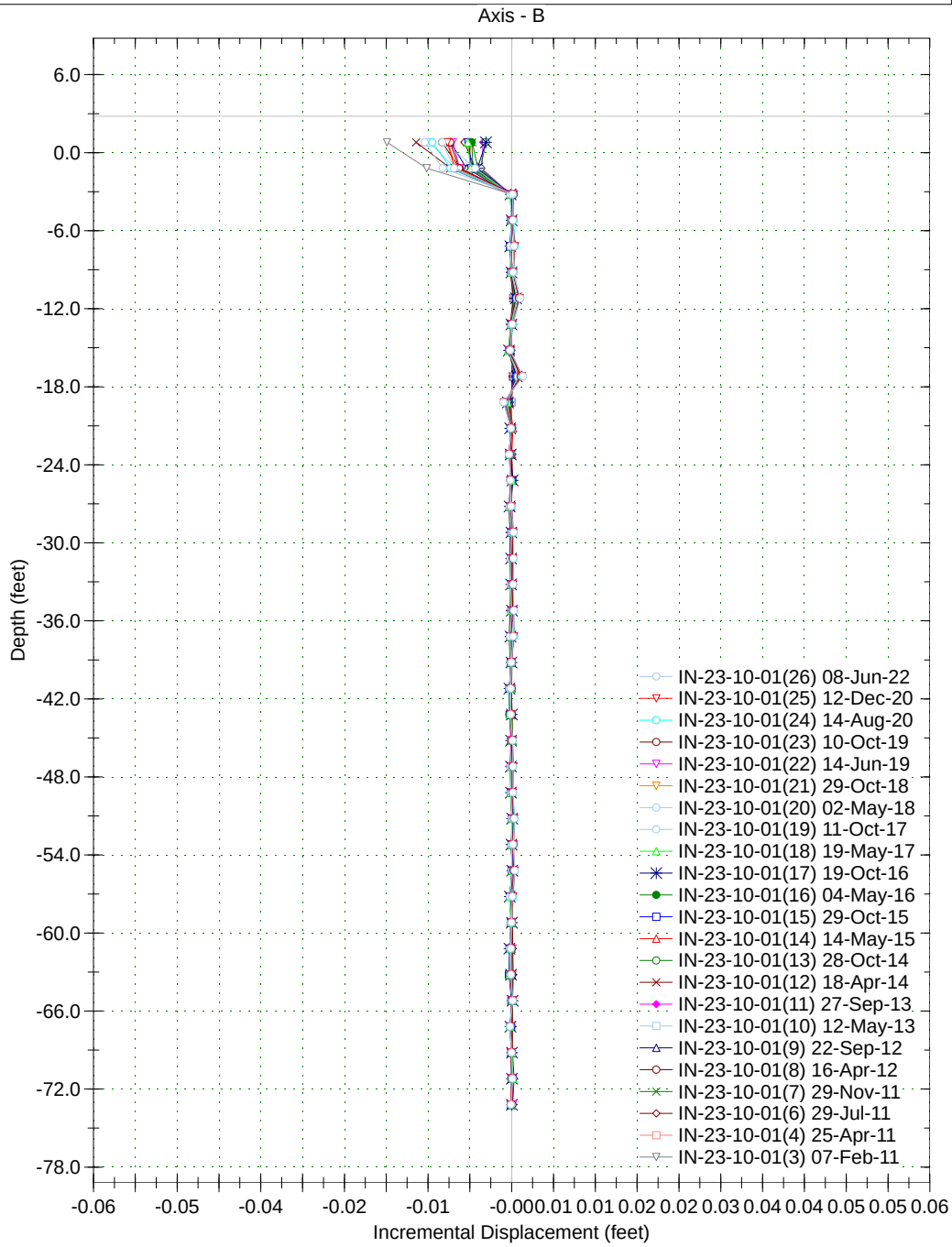
INCREMENTAL DISPLACEMENT

Inclinalysis v. 2.48.7

Borehole : IN-23-10-01
Project : Site 23
Location : Toe, Site 23 / Site D
Northing : 20416.09 ft
Easting : 17572.32 ft
Collar : 864.2' Top of Casing

Spiral Correction : N/A
Collar Elevation : :2.80 feet
Reading Depth : 76.0 feet
A+ Groove Azimuth : 163 degrees
Base Reading : 2010 Nov 15 15:53
Applied Azimuth : 0.0 degrees





RST Instruments Ltd.

TIME PLOT

Displacement vs. Time

Inclinalysis v. 2.48.7

Borehole : IN-23-10-01
Project : Site 23
Location : Toe, Site 23 / Site D
Northing : 20416.09 ft
Easting : 17572.32 ft
Collar : 864.2' Top of Casing
Collar Elev : 2.80 feet

Spiral Correction : N/A
Movement Depth : 4.0 - 76.0 feet
Reading Depth : 76.0 feet
A+ Groove Azimuth : 163 degrees
Latest Reading : 2022 Jun 08 11:40
Initial Reading : 2010 Nov 15 15:53
Applied Azimuth : 0.0 degrees

Time Plot : 4.0 - 76.0 feet

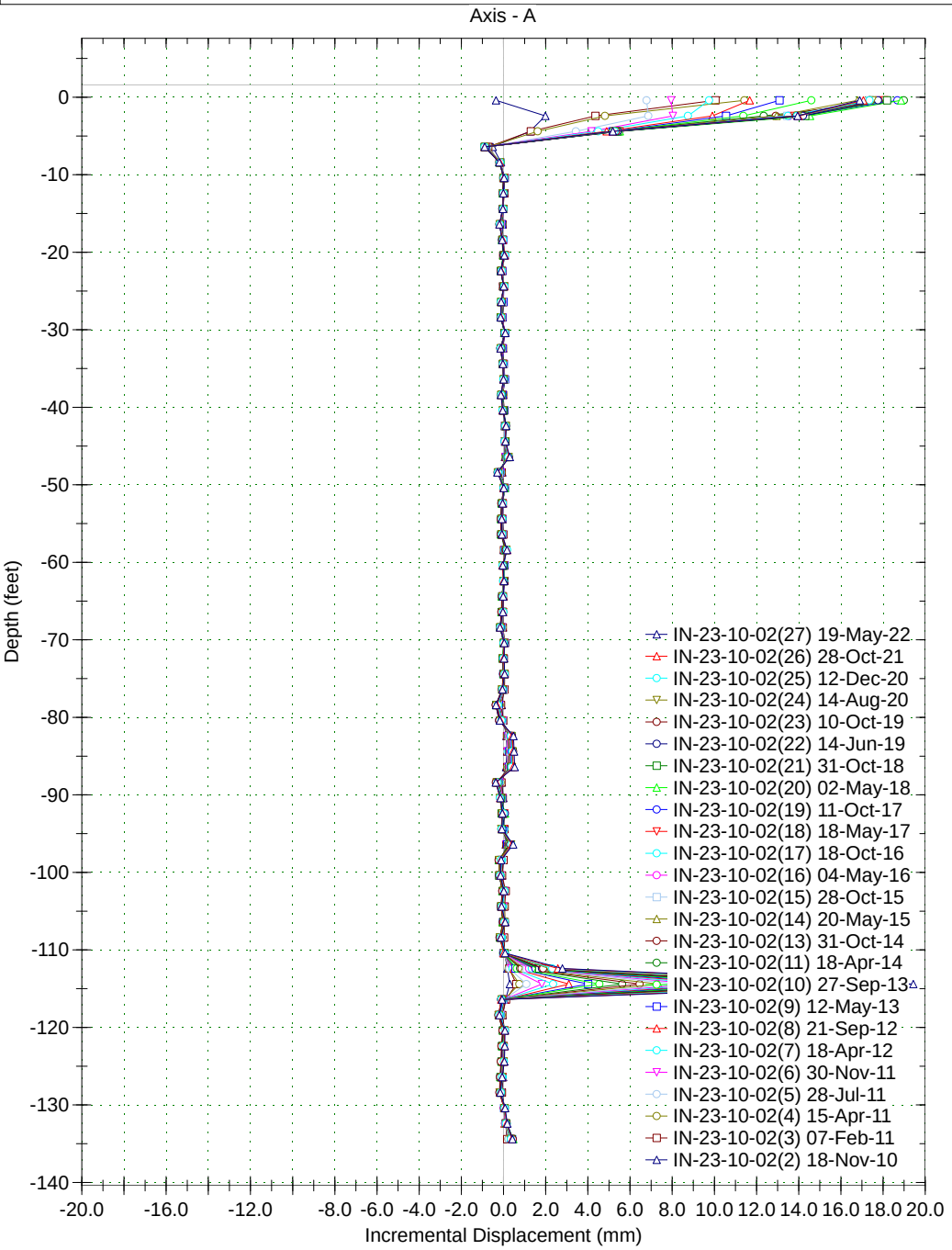
RST Instruments Ltd.

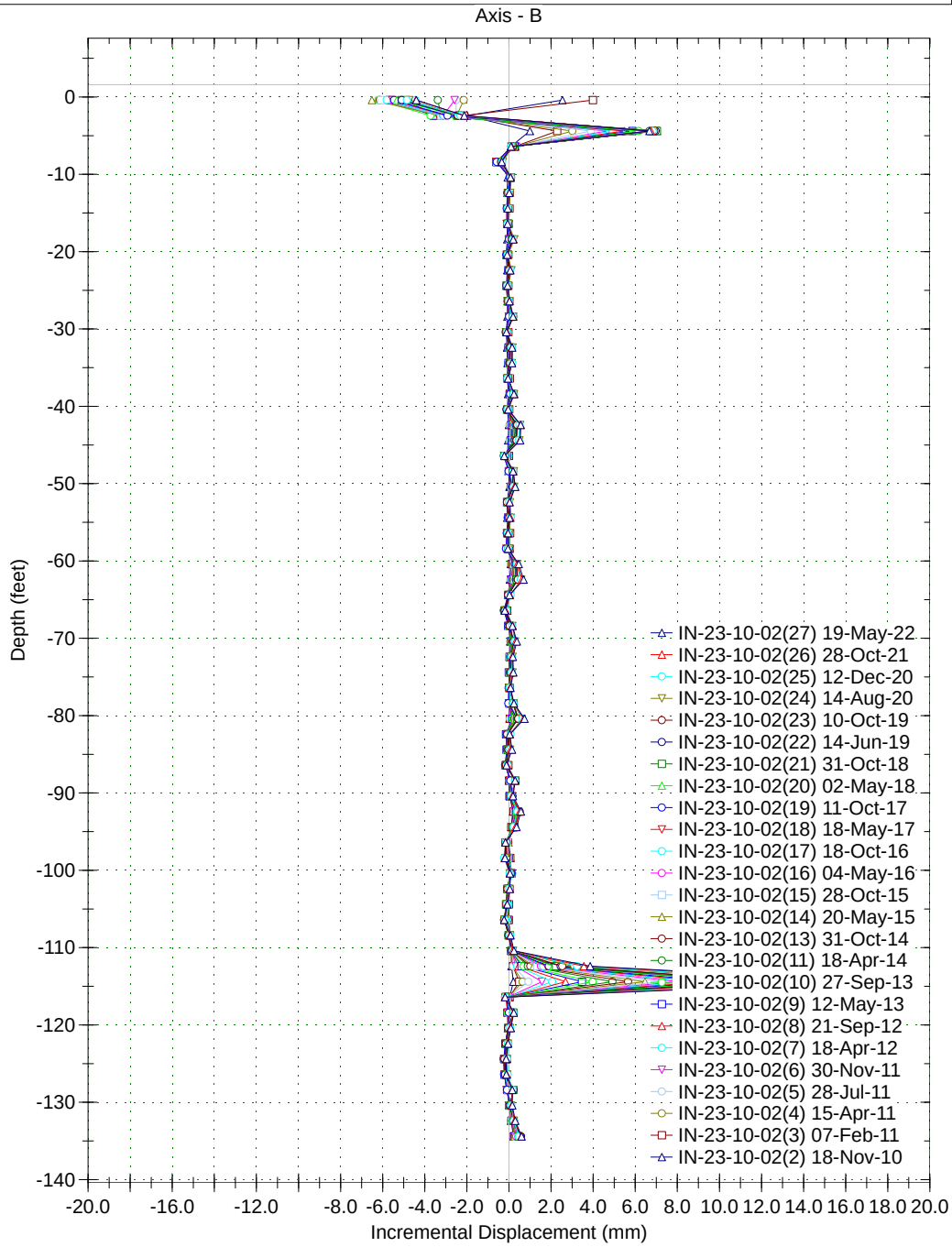
INCREMENTAL DISPLACEMENT

Inclinalysis v. 2.48.7

Borehole : IN-23-10-02
Project : Site 23
Location : West, Site 23 Midslope
Northing : 20629.02 ft
Easting : 16595.27 ft
Collar : 995.0' Top of Casing

Spiral Correction : N/A
Collar Elevation : :1.60 feet
Reading Depth : 136.0 feet
A+ Groove Azimuth : 115 degrees
Base Reading : 2010 Sep 20 14:23
Applied Azimuth : 0.0 degrees





RST Instruments Ltd.

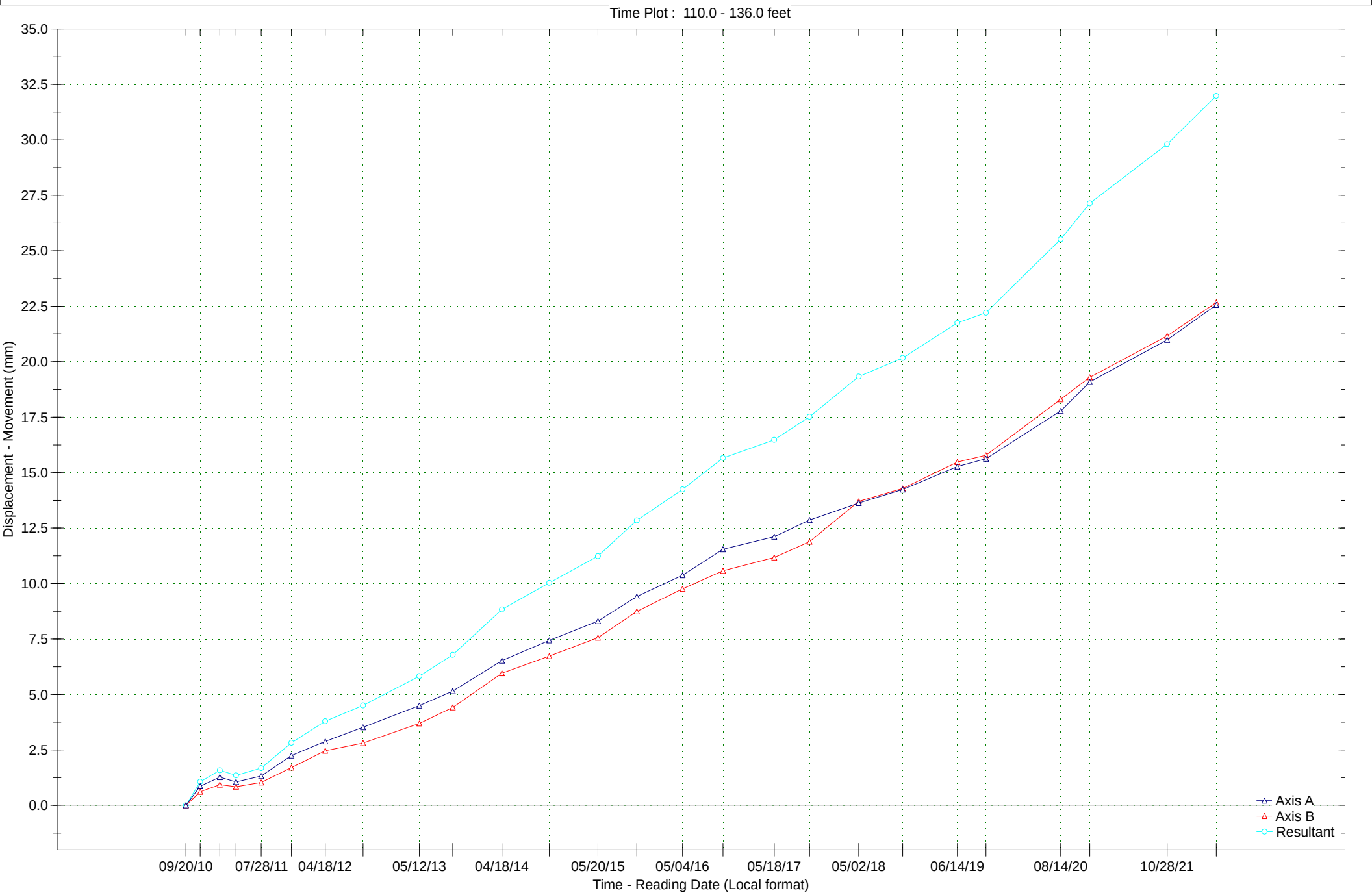
TIME PLOT

Displacement vs. Time

Inclinalysis v. 2.48.7

Borehole : IN-23-10-02
Project : Site 23
Location : West, Site 23 Midslope
Northing : 20629.02 ft
Easting : 16595.27 ft
Collar : 995.0' Top of Casing
Collar Elev : 1.60 feet

Spiral Correction : N/A
Movement Depth : 110.0 - 136.0 feet
Reading Depth : 136.0 feet
A+ Groove Azimuth : 115 degrees
Latest Reading : 2022 May 19 14:20
Initial Reading : 2010 Sep 20 14:23
Applied Azimuth : 0.0 degrees



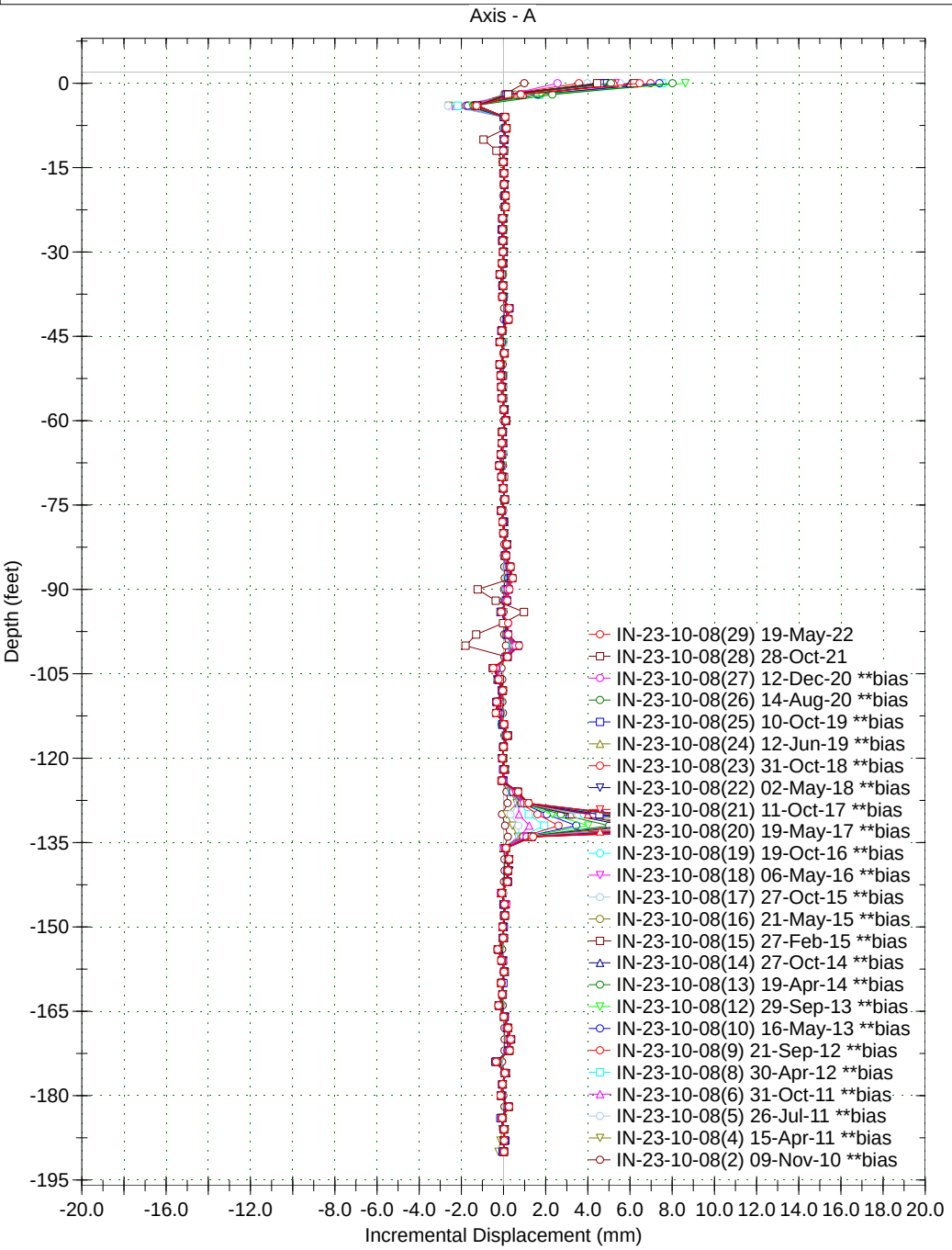
RST Instruments Ltd.

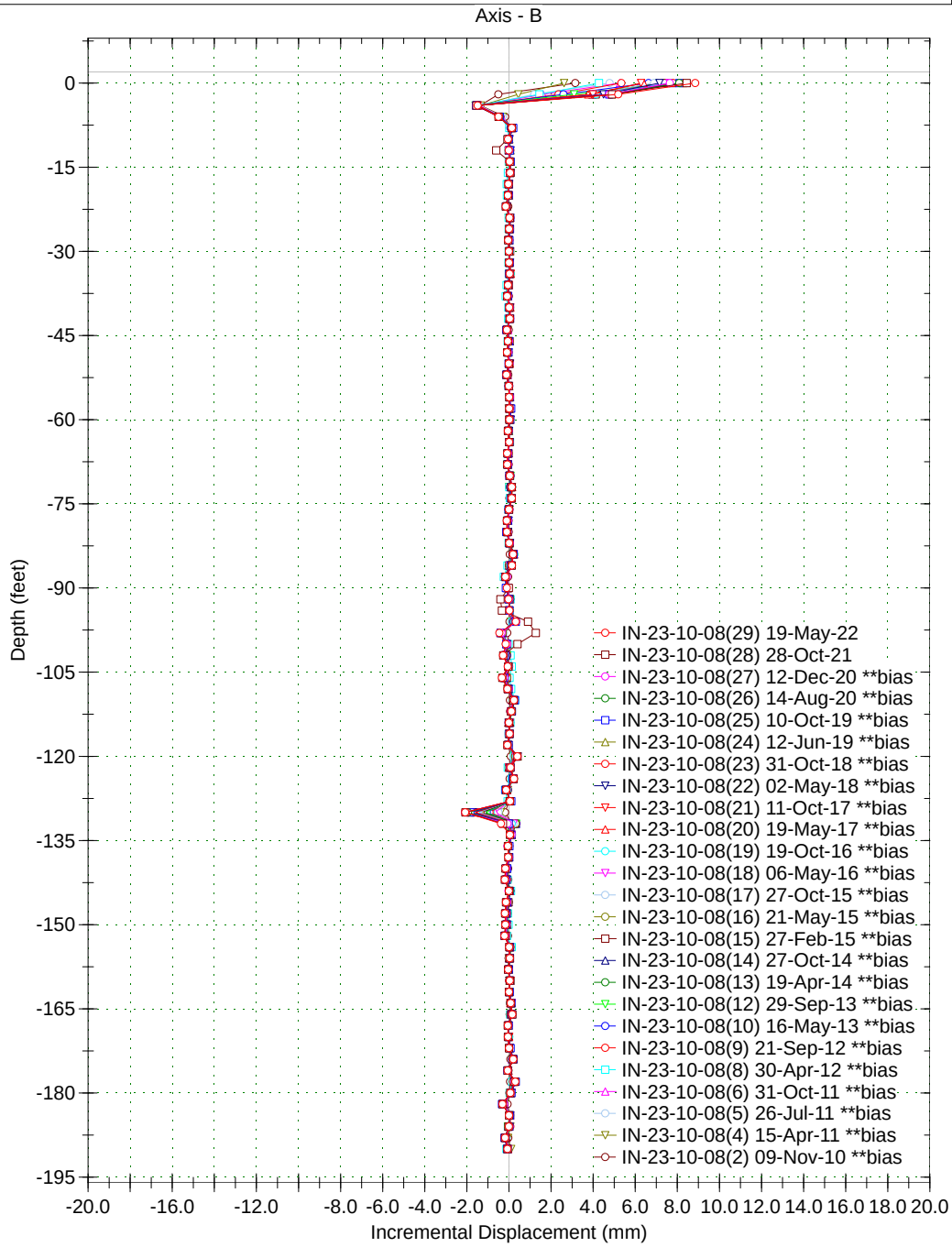
INCREMENTAL DISPLACEMENT

Inclinalysis v. 2.48.7

Borehole : IN-23-10-08
Project : Site 23
Location : Site 23 Top of Slope
Northing : 21533.0840 ft
Easting : 17089.7920 ft
Collar : 1102.3' Top of Casing

Spiral Correction : N/A
Collar Elevation : :2.00 feet
Reading Depth : 192.0 feet
A+ Groove Azimuth : 152 degrees
Base Reading : 2010 Sep 15 15:59
Applied Azimuth : 0.0 degrees





RST Instruments Ltd.

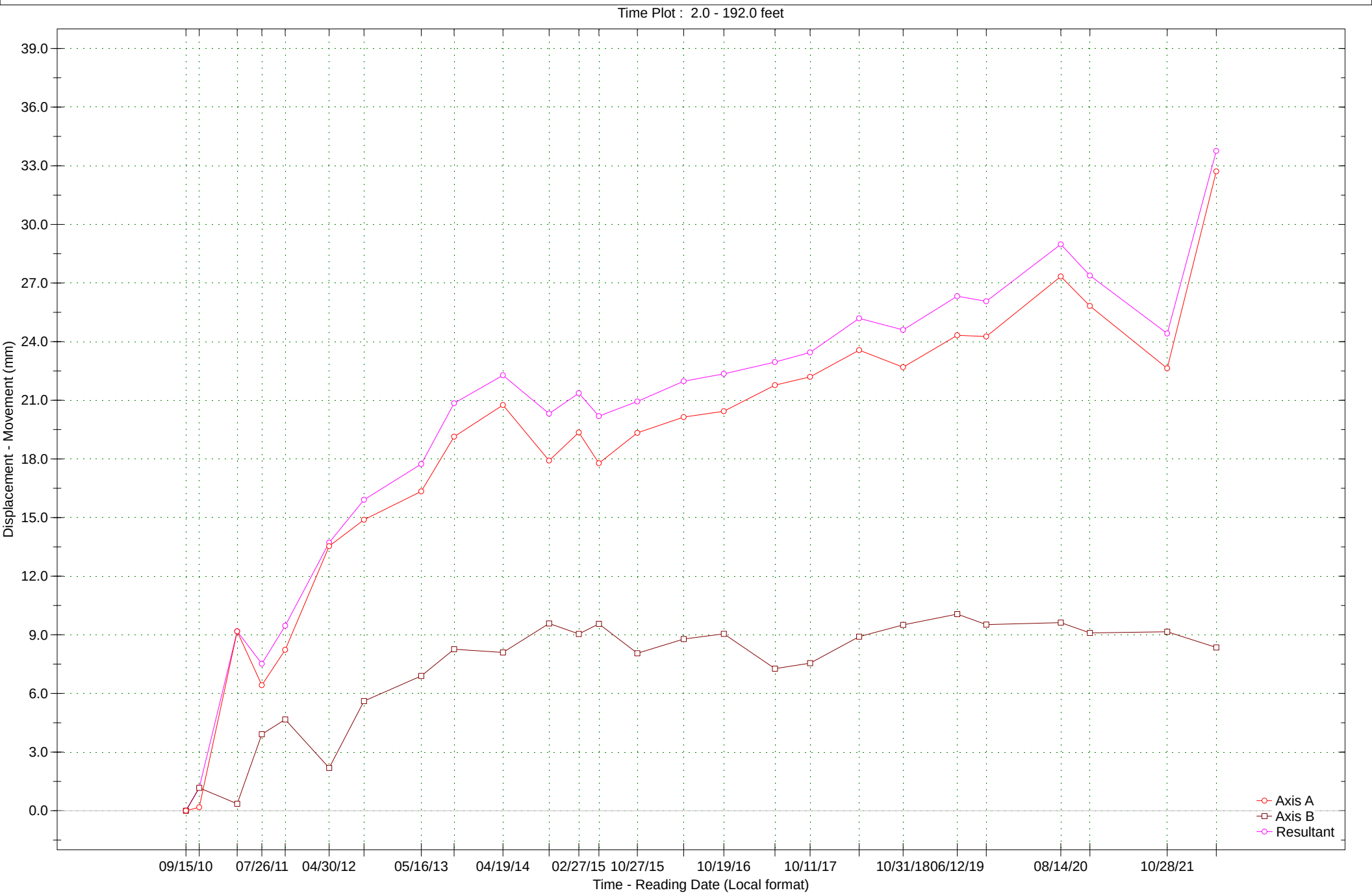
TIME PLOT

Displacement vs. Time

Inclinalysis v. 2.48.7

Borehole : IN-23-10-08
Project : Site 23
Location : Site 23 Top of Slope
Northing : 21533.0840 ft
Easting : 17089.7920 ft
Collar : 1102.3' Top of Casing
Collar Elev : 2.00 feet

Spiral Correction : N/A
Movement Depth : 2.0 - 192.0 feet
Reading Depth : 192.0 feet
A+ Groove Azimuth : 152 degrees
Latest Reading : 2022 May 19 15:30
Initial Reading : 2010 Sep 15 15:59
Applied Azimuth : 0.0 degrees

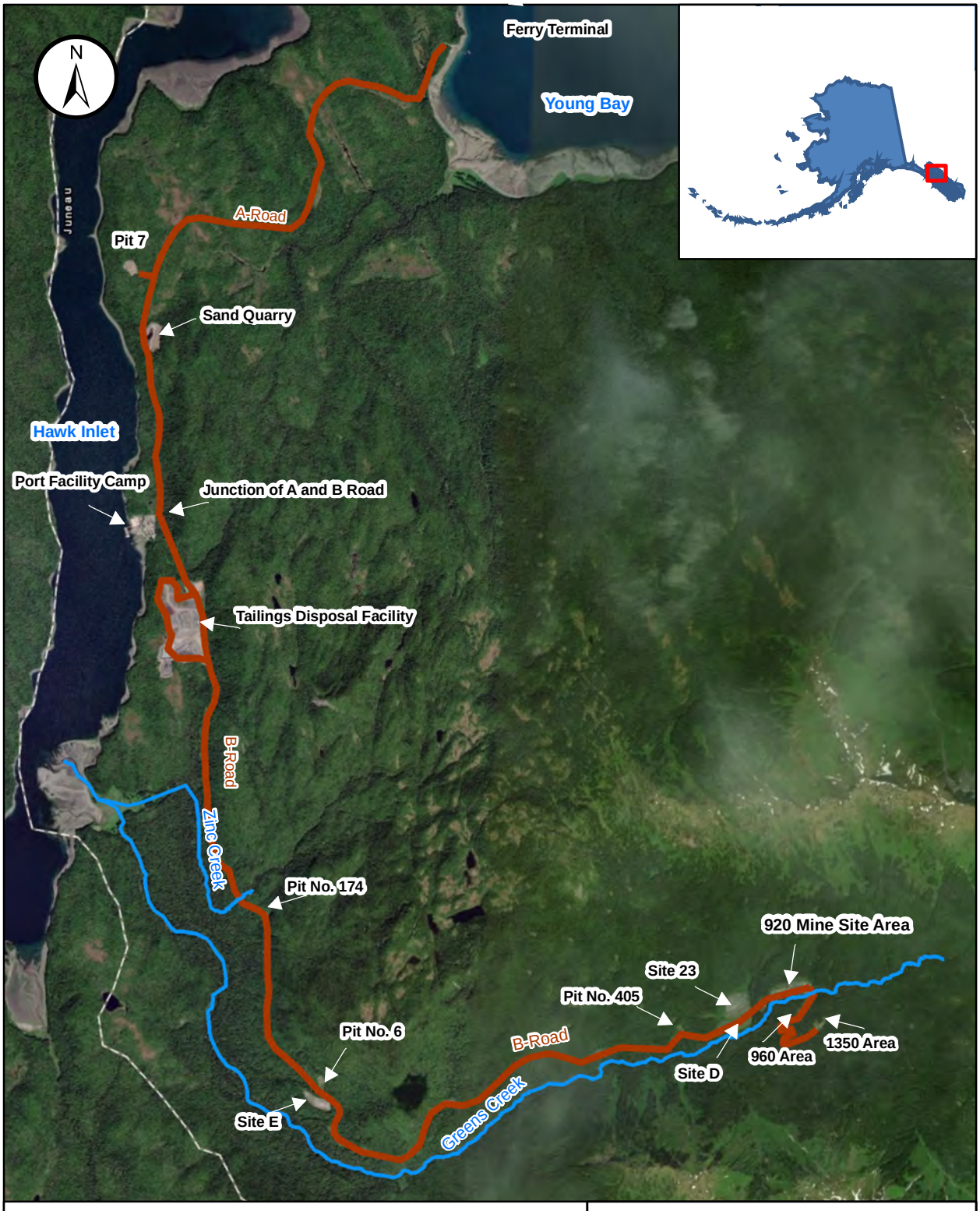


Attachment M: FWMP Sample Log

FWMP Water Quality Monitoring Schedule

Sample Identifier	Site Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
006FMS	Middle Greens Creek	Q		P		P		P		P		P	
009FMS	Tributary Creek-Lower	Q		Q		Q		Q		Q		Q	
013FMS	Mine Adit Discharge East					Q		Q		Q		Q	
027FMG	Monitoring Well 2S					Q		Q		Q		Q	
029FMG	Monitoring Well 3S					Q		Q		Q		Q	
032FMG	Monitoring Well 5S					Q		Q		Q		Q	
046FMS	Lower Bruin Creek	Q				P				P		Q	
048FMS	Upper Greens Creek	Q		P		P		P		P		P	
049FMS	Control Site Upper Bruin Creek	Q				P				P		Q	
054FMS	Greens Creek below D-Pond	Q		P		P		P		P		P	
057FMG	Monitoring Well - 23-00-03	Q				Q				Q		Q	
060FMS	Althea Creek - Lower					Q		Q		Q		Q	
061FMS	Greens Creek Floodplain	Q		P		P		P		P		P	
062FMS	Greens Creek Lower Than 54	Q		P		P		P		P		P	
609FMS	Further Creek Lower					Q		Q		Q		Q	
711FMS	Greens Creek Above Site E					Q				P			
712FMS	Greens Creek Below Site E					Q				P			
037FMS	Cannery Creek Upper	Q		P		P		P		P		Q	
1923FMS	Cannery Creek Lower	Q		P		P		P		P		Q	

Attachment N: Monitoring Site Location Maps



Hecla GREENS CREEK

Mine Site Location Map

Hecla Greens Creek Mining Company
Admiralty Island, Alaska

0 0.25 0.5 1 1.5 2
Miles

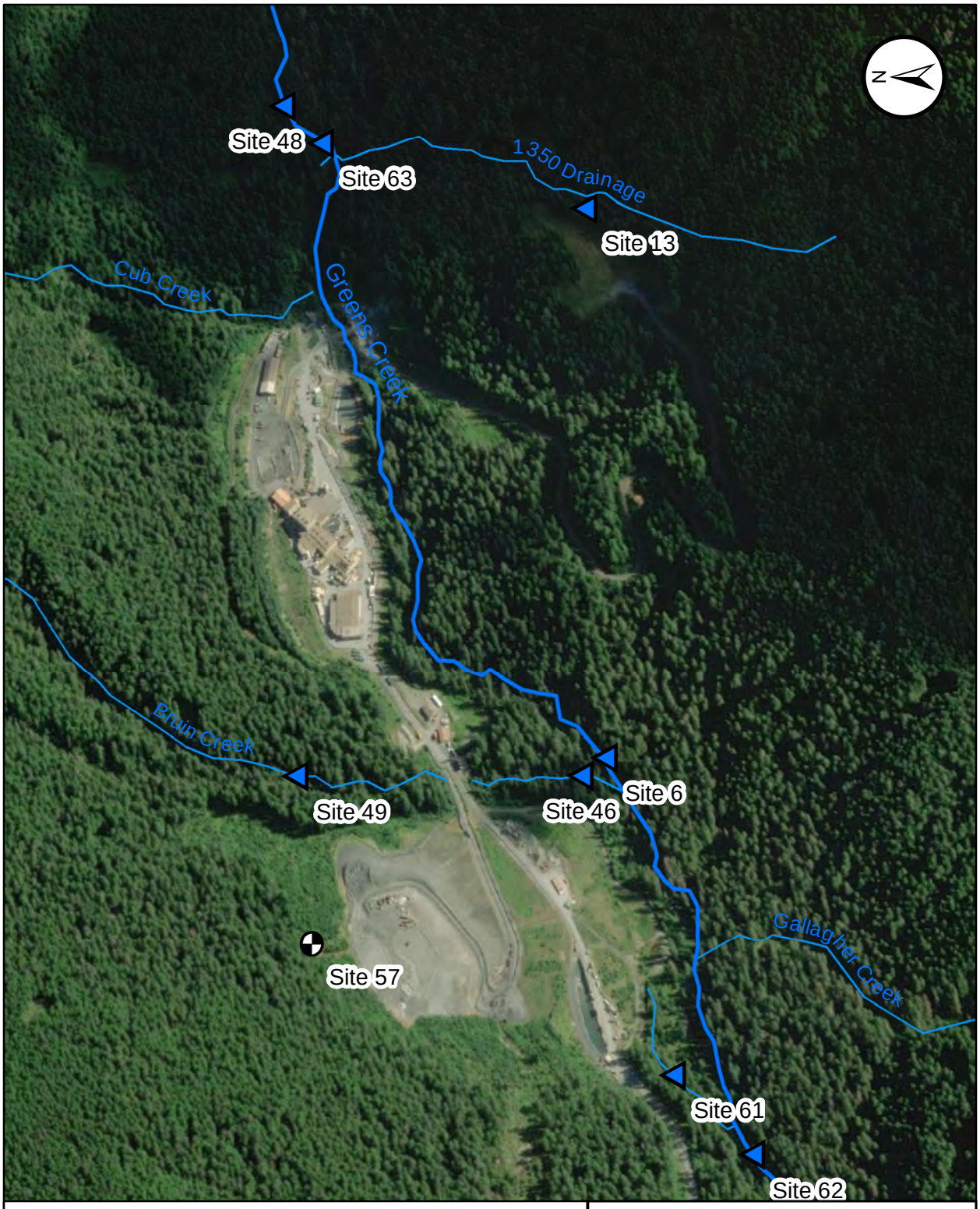
Hecla GREENS CREEK

Tailings Disposal Facility FWMP Monitoring Locations

Hecla Greens Creek Mining Company
Admiralty Island, Alaska

0 150300 600 900 1,200

Feet



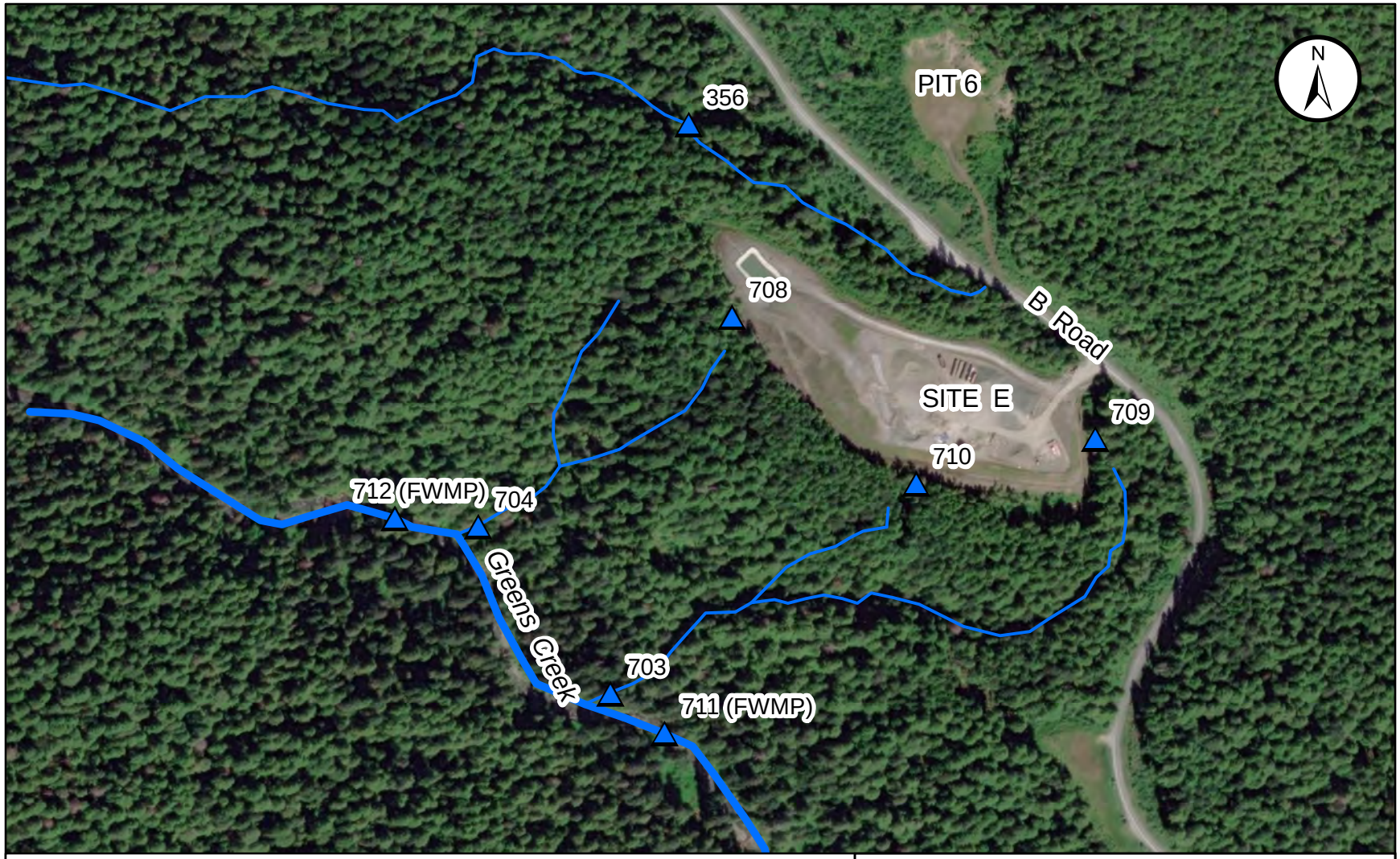
Hecla GREENS CREEK

920 Area FWMP Monitoring Locations

Hecla Greens Creek Mining Company
Admiralty Island, Alaska

0 150 300 600 900 1,200

Feet



Hecla GREENS CREEK

Site E Monitoring Locations

Hecla Greens Creek Mining Company
Admiralty Island, Alaska

0 125 250 500 750 1,000

Feet

Hecla GREENS CREEK

Tailings Disposal Facility
ADC Monitoring Location Map

Hecla Greens Creek Mining Company
Admiralty Island, Alaska

0 50 100 200 300 400 500 600 700 800
Feet

Attachment O: FWMP Water Quality Standards

Alaska Water Quality Criteria

adapted by JVohden from "Alaska Water Quality Criteria Manual for Toxic and Other Deliterious Organic and Inorganic Substances" (as amended through May 15, 2003)

note: this is not a complete compilation of the regulations, only metals and related parameters, some of which require calculation to derive the appropriate criterion.

updated 9 Septtember 2003

all units in micrograms per liter (ug/L)

all units in micrograms per liter (ug/L)

Parameter	Drinking Water	Stockwater	Irrigation Water	Aquatic Life-Fresh Water							
				Acute				Chronic			
				criteria	as	conversion factor	to convert to	criteria	as	conversion factor	to convert to
alkalinity (as CaCO3)								**20,000 minimum**			
arsenic	**10**	50	100	340	D			150	D		
barium	**2000**										
cadmium	5	10	10	e^1.0166(ln hardness)-3.924	TR	1.136672-[(ln hardness)(0.041838)]	D	**e^0.7409(ln hardness)-4.719**	**TR**	**1.101672-[(ln hardness)(0.041838)]**	**D**
chromium	100										
chromium (total)			100								
chromium III				e^0.819(ln hardness)+3.7256	TR	0.316	D	e^0.819(ln hardness)+0.6848	TR	0.860	D
chromium VI		50		16	D			**11**	**D**		
copper			200	e^0.9422(ln hardness)-1.700	TR	0.960	D	**e^0.8545(ln hardness)-1.702**	**TR**	**0.960**	**D**
lead		50	5000	e^1.273(ln hardness)-1.460	TR	1.46203-[(ln hardness)(0.145712)]	D	**e^1.273(ln hardness)-4.705**	**TR**	**1.46203-[(ln hardness)(0.145712)]**	**D**
mercury	2			1.4	D			**0.012**	**TR**		
nickel	100		200	e^0.846(ln hardness)+2.255	TR	0.998	D	**e^0.846(ln hardness)+0.0584**	**TR**	**0.997**	**D**
selenium	50	10	20	1/[([selenite]/185.9)+([selenate]/12.83]	TR	0.922	D	**5**	**TR**	**0.922**	**D**
silver				**e^1.72(ln hardness)-6.52**	**TR**	**0.850**	**D**				
zinc			2000	e^0.8473(ln hardness)+0.884	TR	0.978	D	**e^0.8473(ln hardness)+0.884**	**TR**	**0.986**	**D**

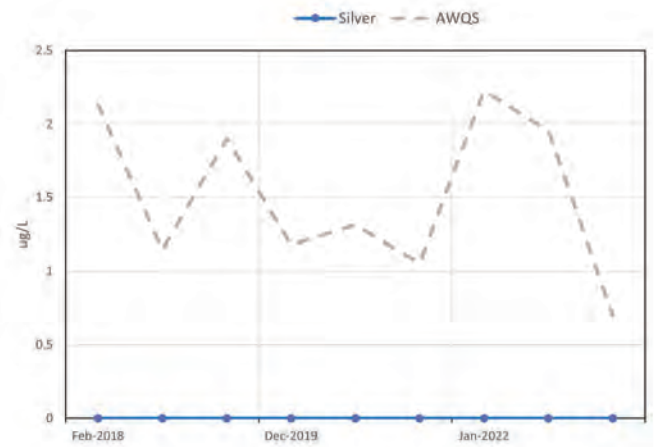
all units in micrograms per liter (ug/L)

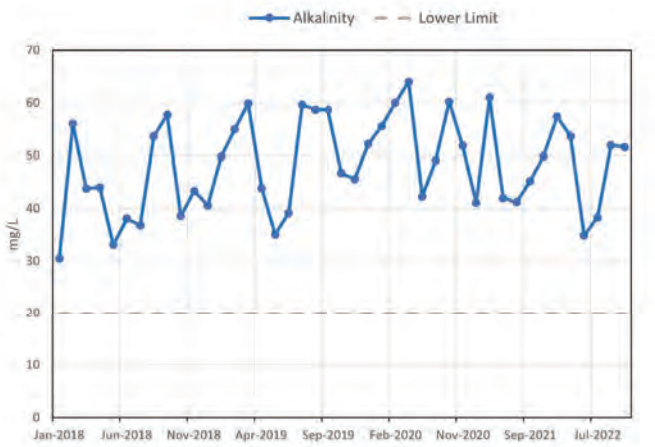
DENOTES STRICTIST CRITERIA

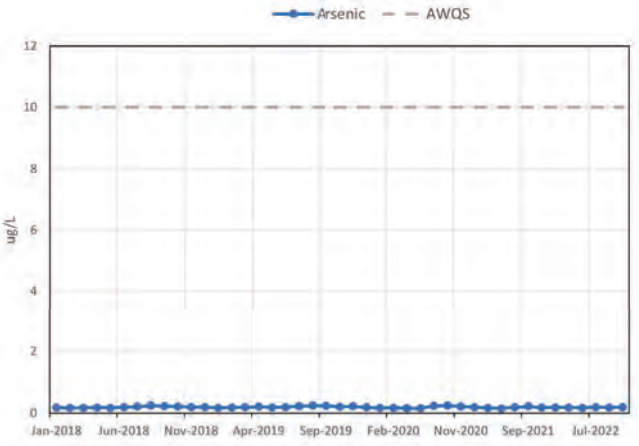
TR	total recoverable
D	dissolved
H	some of the criteria for this parameter are hardness dependant
FWA	Fresh Water Acute
FWC	Fresh Water Chronic

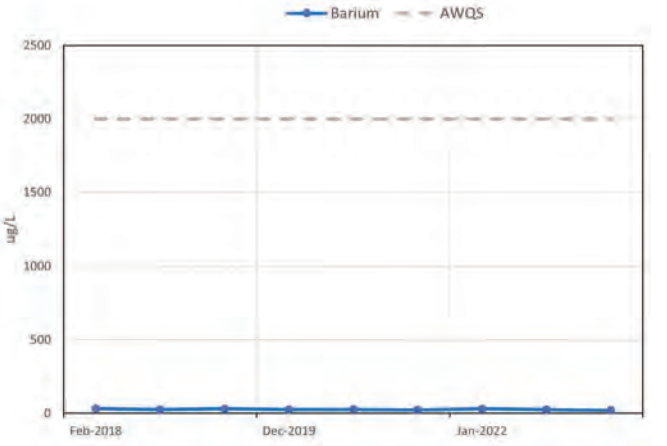
Attachment P: FWMP Water Quality Charts

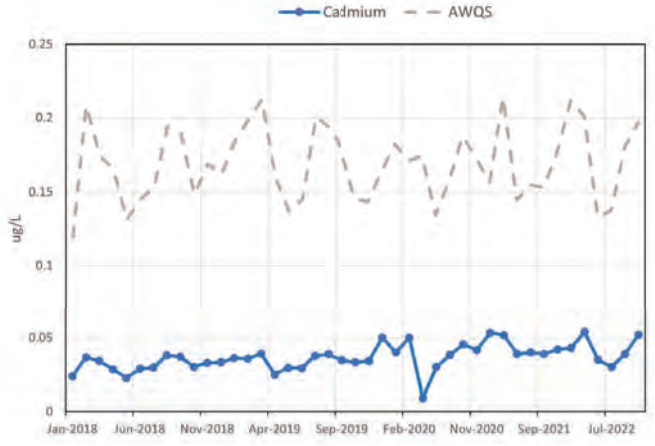
Site 48

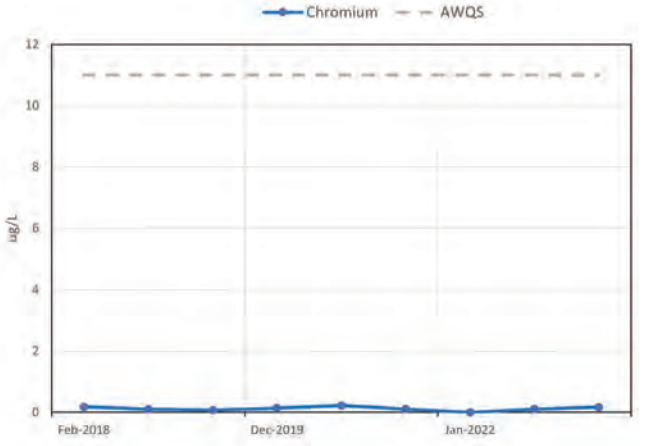

Silver
AWQS
ug/L
2.5
2
1.5
1
0.5
0
Feb-2018
Dec-2019
Jan-2022

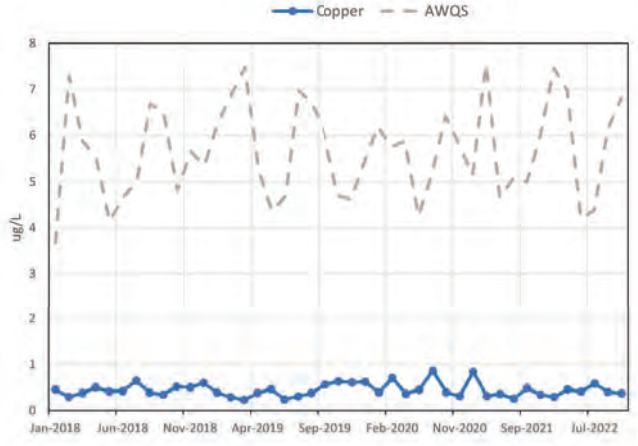

Alkalinity
Lower Limit
mg/L
70
60
50
40
30
20
10
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

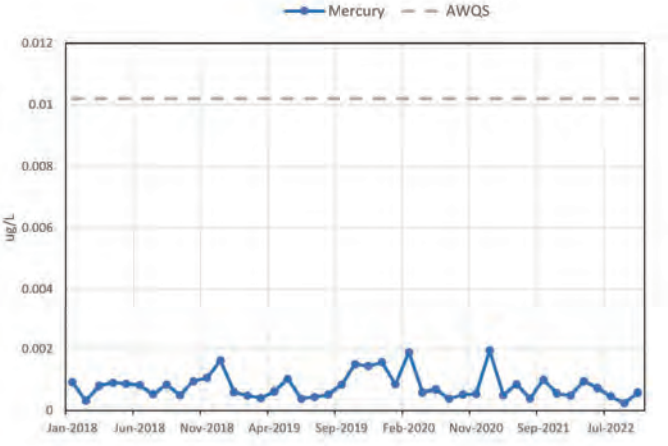

Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

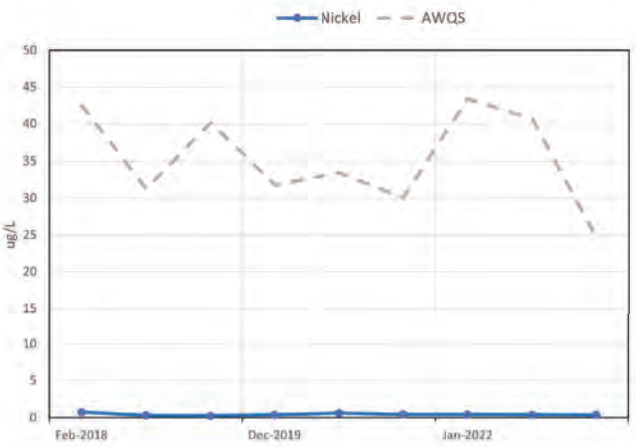

Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
Feb-2018
Dec-2019
Jan-2022

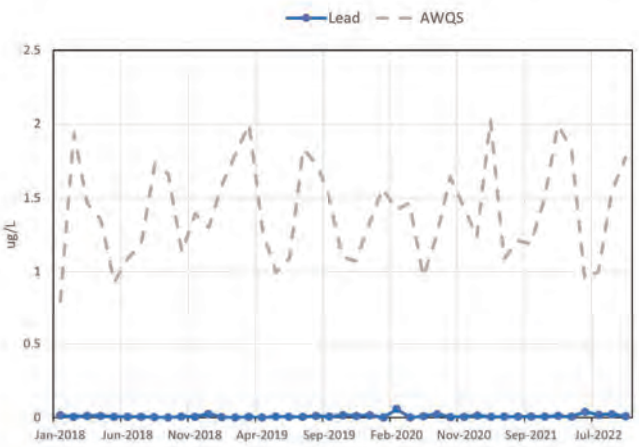

Cadmium
AWQS
ug/L
0.25
0.2
0.15
0.1
0.05
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

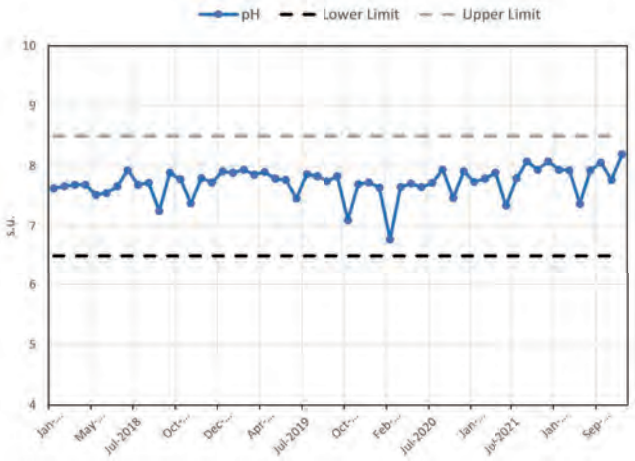

Chromium
AWQS
ug/L
12
10
8
6
4
2
0
Feb-2018
Dec-2019
Jan-2022

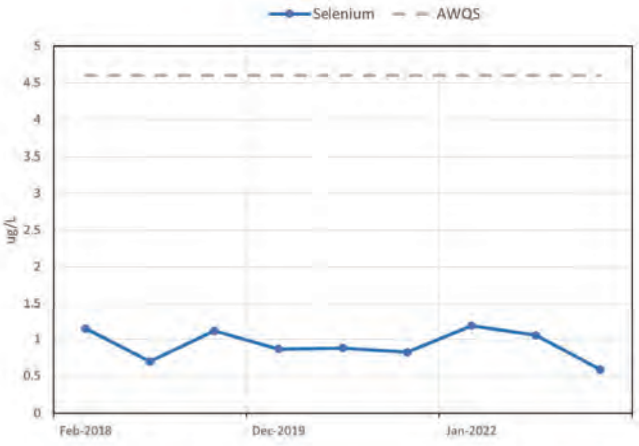

Copper
AWQS
ug/L
8
7
6
5
4
3
2
1
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

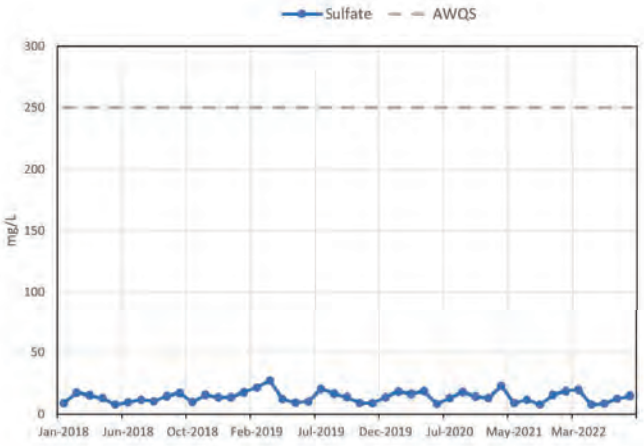

Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

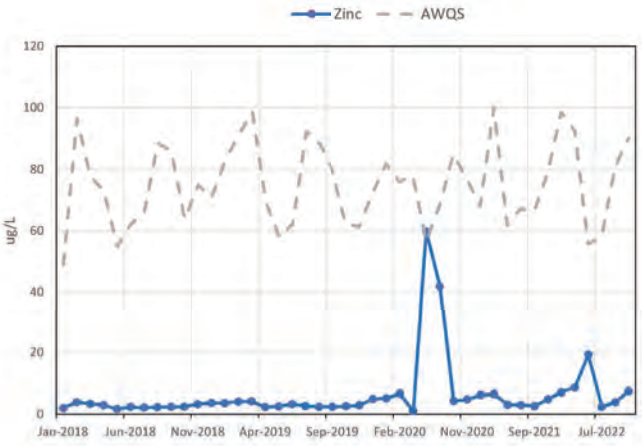

Nickel
AWQS
ug/L
50
45
40
35
30
25
20
15
10
5
0
Feb-2018
Dec-2019
Jan-2022


Lead
AWQS
ug/L
2.5
2
1.5
1
0.5
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

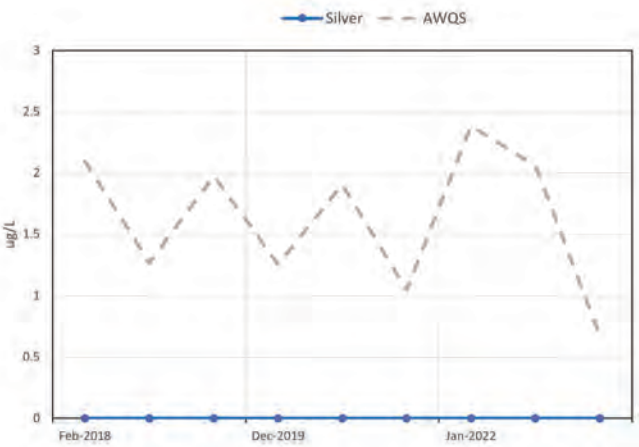

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
Jan-...
May-...
Jul-2018
Oct-...
Dec-...
Apr-...
Jul-2019
Oct-...
Feb-...
Jul-2020
Jan-...
Jul-2021
Jan-...
Sep-...

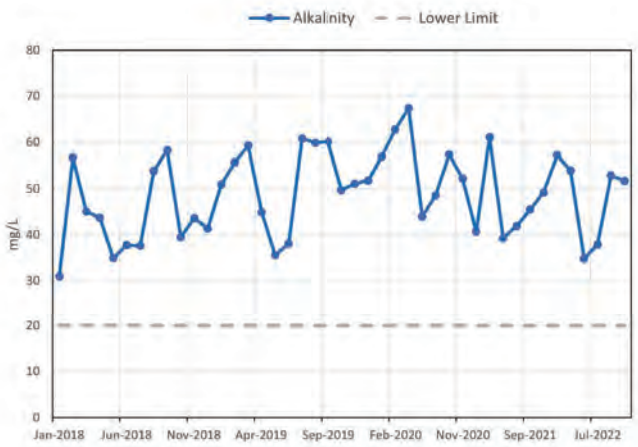

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Feb-2018
Dec-2019
Jan-2022

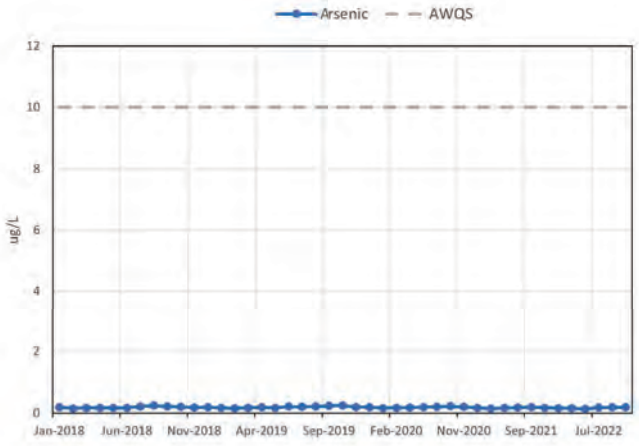

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
Jan-2018
Jun-2018
Oct-2018
Feb-2019
Jul-2019
Dec-2019
Jul-2020
May-2021
Mar-2022

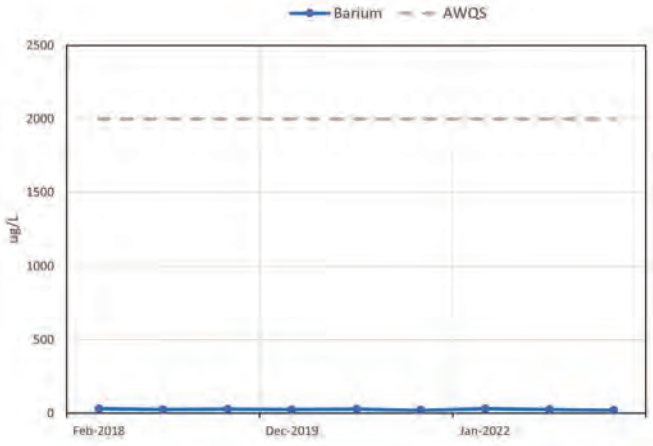

Zinc
AWQS
ug/L
120
100
80
60
40
20
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

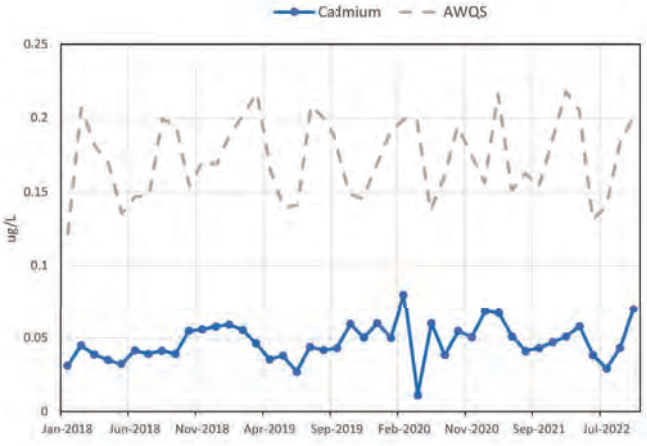
Site 6

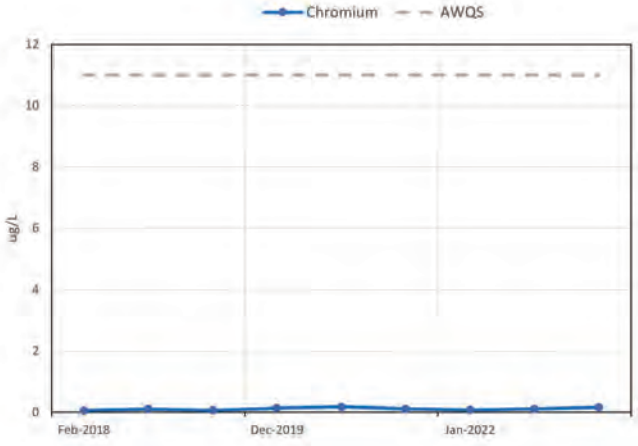

Silver
AWQS
ug/L
3
2.5
2
1.5
1
0.5
0
Feb-2018
Dec-2019
Jan-2022

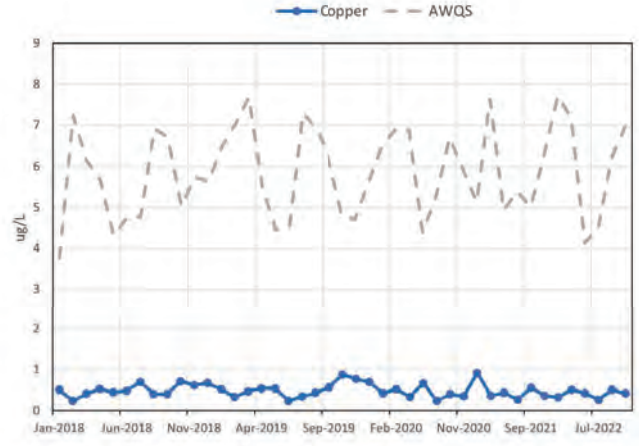

Alkalinity
Lower Limit
mg/L
80
70
60
50
40
30
20
10
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

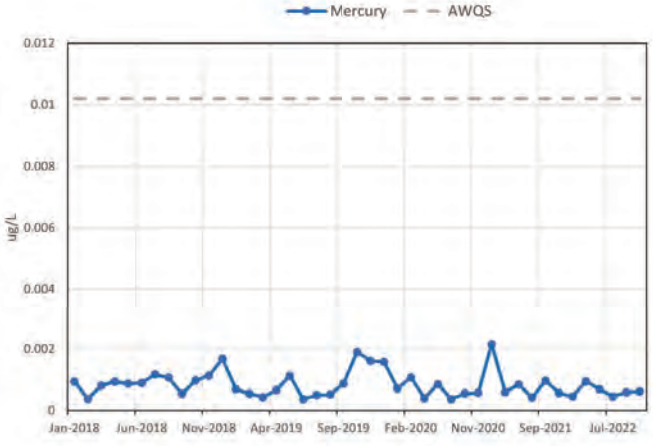

Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
Feb-2018
Dec-2019
Jan-2022

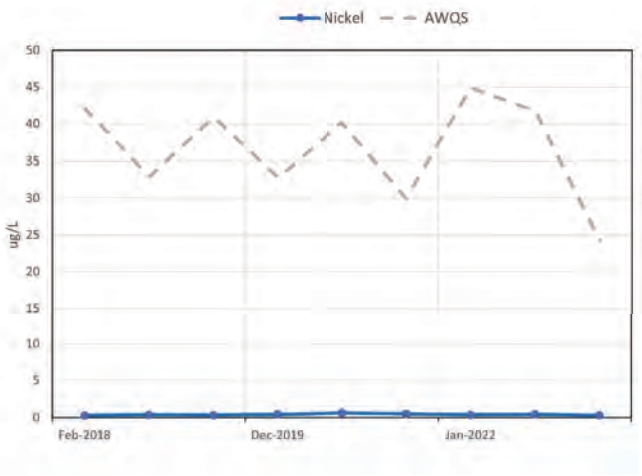

Cadmium
AWQS
ug/L
0.25
0.2
0.15
0.1
0.05
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

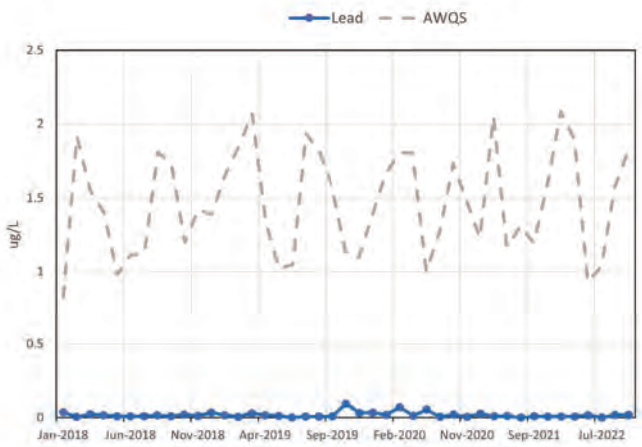

Chromium
AWQS
ug/L
12
10
8
6
4
2
0
Feb-2018
Dec-2019
Jan-2022

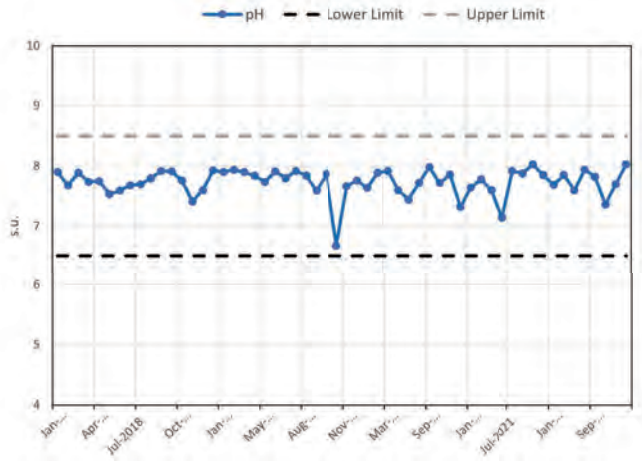

Copper
AWQS
ug/L
9
8
7
6
5
4
3
2
1
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

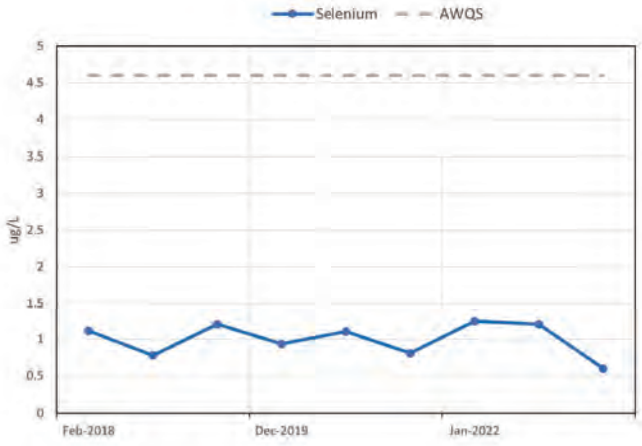

Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

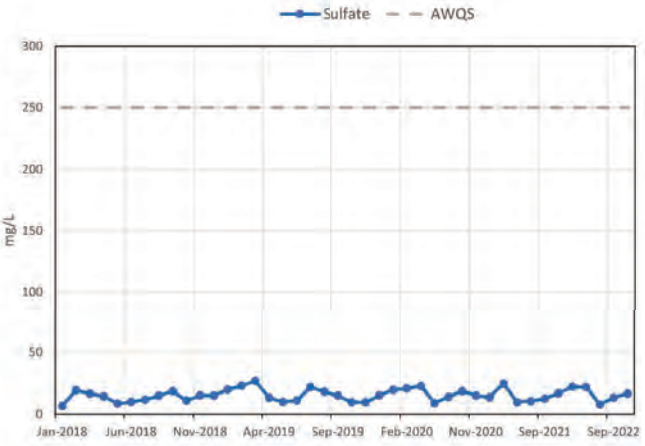
Site 6

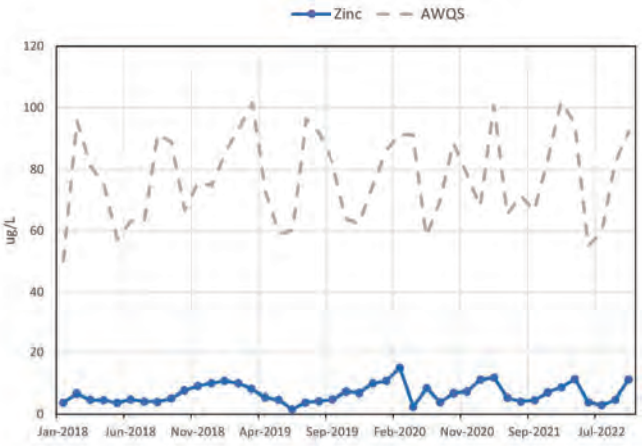

Nickel
AWQS
ug/L
50
45
40
35
30
25
20
15
10
5
0
Feb-2018
Dec-2019
Jan-2022


Lead
AWQS
ug/L
2.5
2
1.5
1
0.5
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

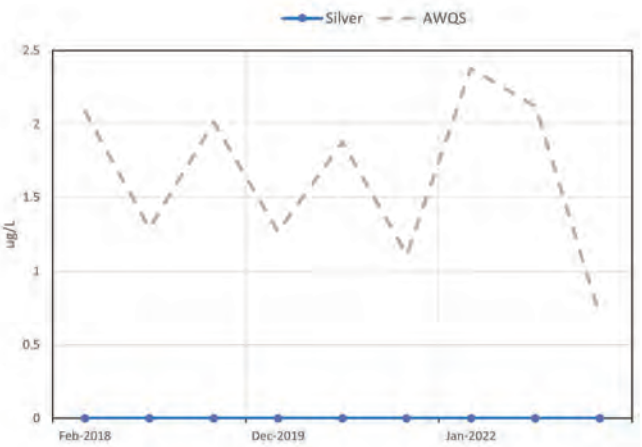

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
Jul-2018
Jul-2021

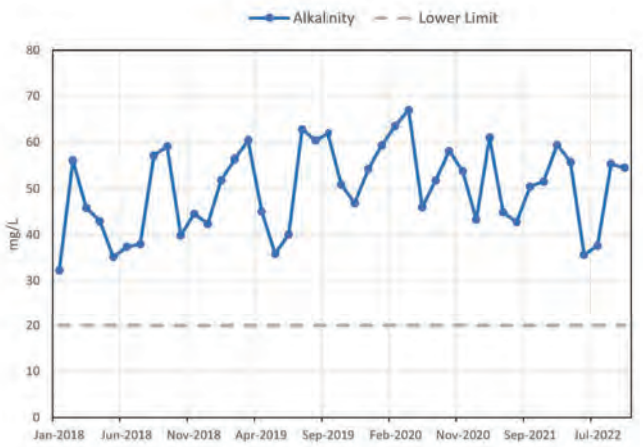

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Feb-2018
Dec-2019
Jan-2022

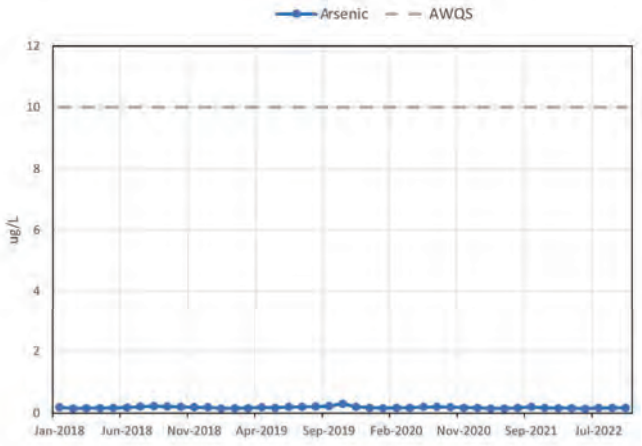

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Sep-2022

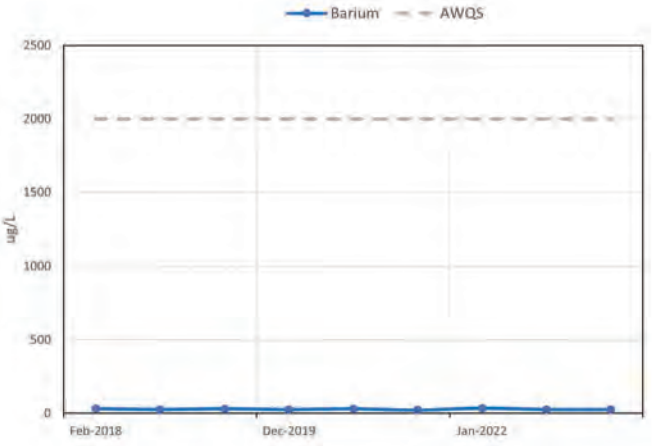

Zinc
AWQS
ug/L
120
100
80
60
40
20
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

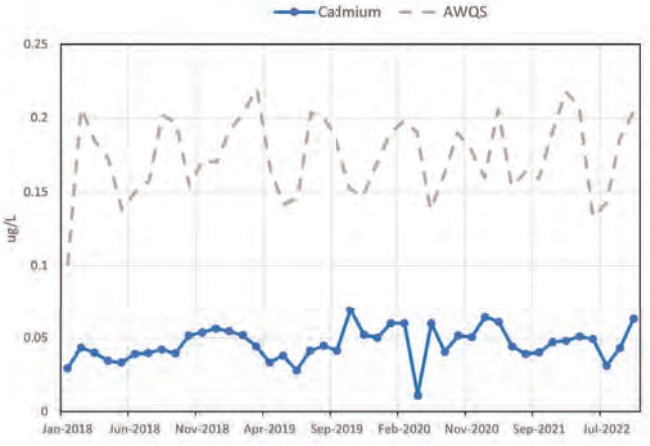
Site 54

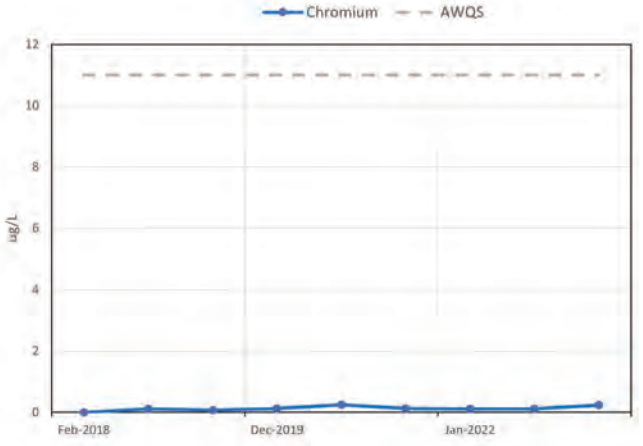

Silver
AWQS
ug/L
2.5
2
1.5
1
0.5
0
Feb-2018
Dec-2019
Jan-2022

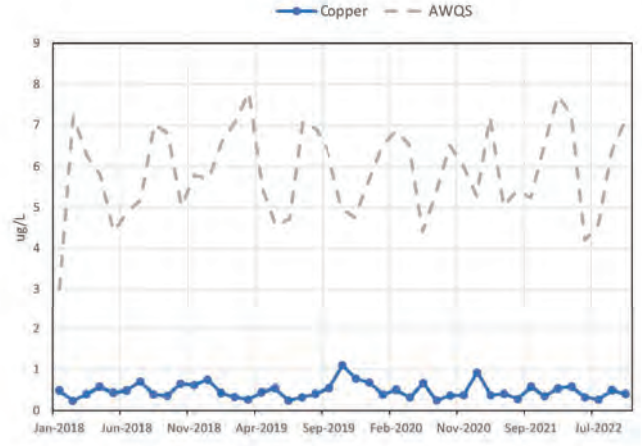

Alkalinity
Lower Limit
mg/L
80
70
60
50
40
30
20
10
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

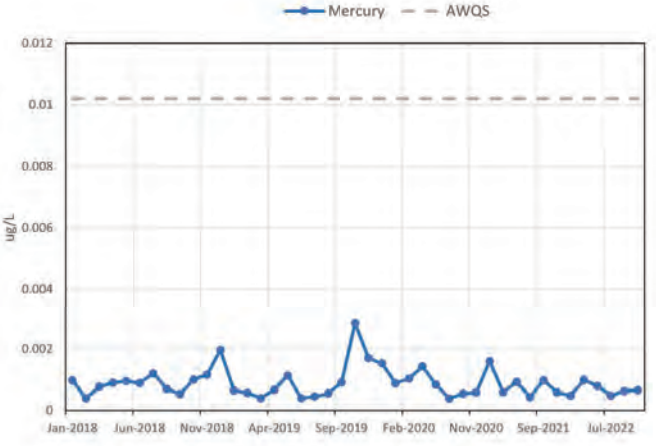

Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
Feb-2018
Dec-2019
Jan-2022

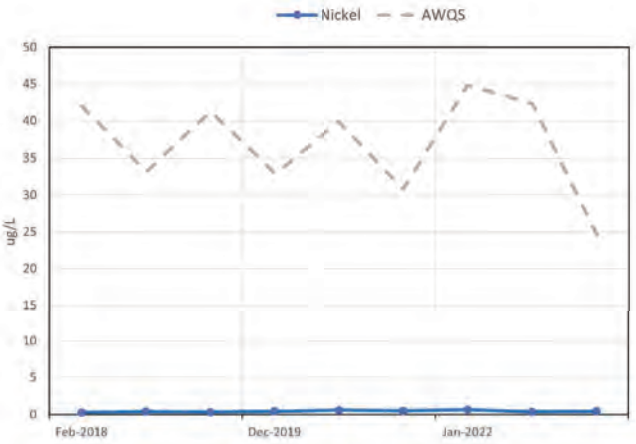

Cadmium
AWQS
ug/L
0.25
0.2
0.15
0.1
0.05
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

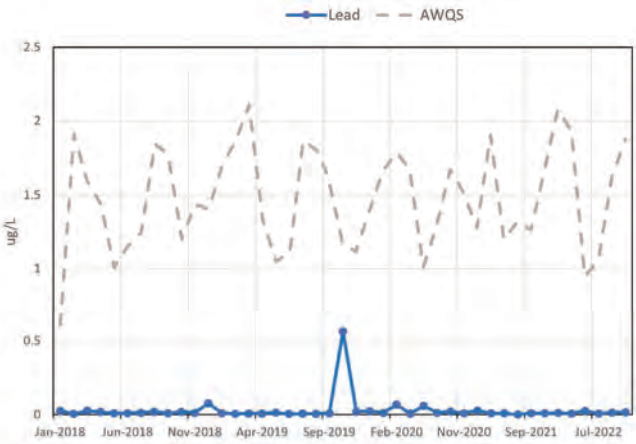

Chromium
AWQS
ug/L
12
10
8
6
4
2
0
Feb-2018
Dec-2019
Jan-2022

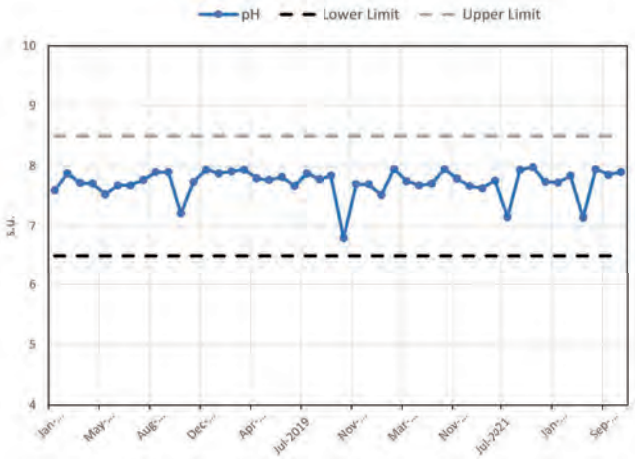

Copper
AWQS
ug/L
9
8
7
6
5
4
3
2
1
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

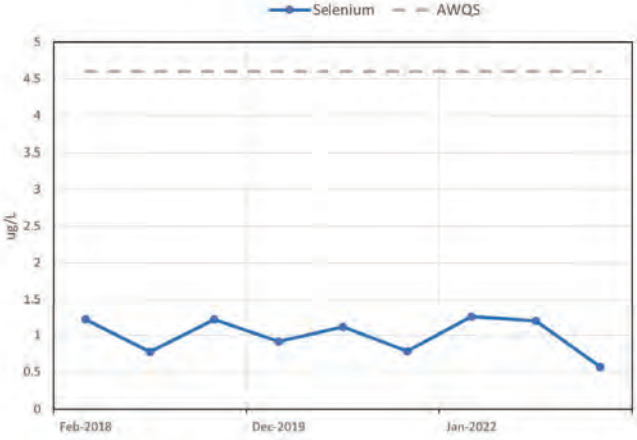

Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

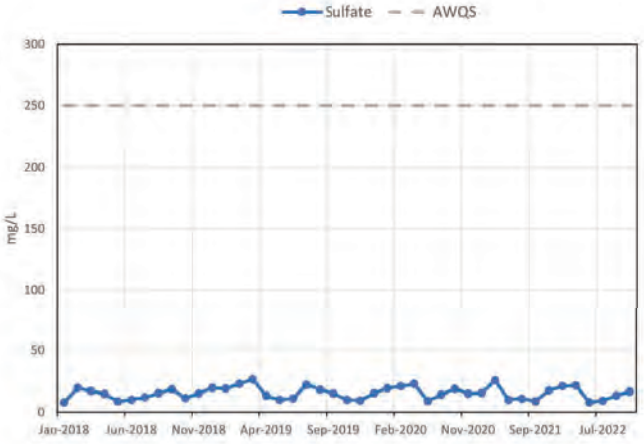
Site 54

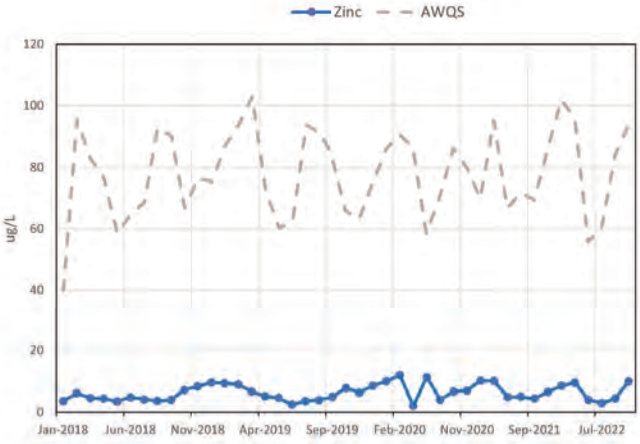

Nickel
AWQS
ug/L
Feb-2018
Dec-2019
Jan-2022

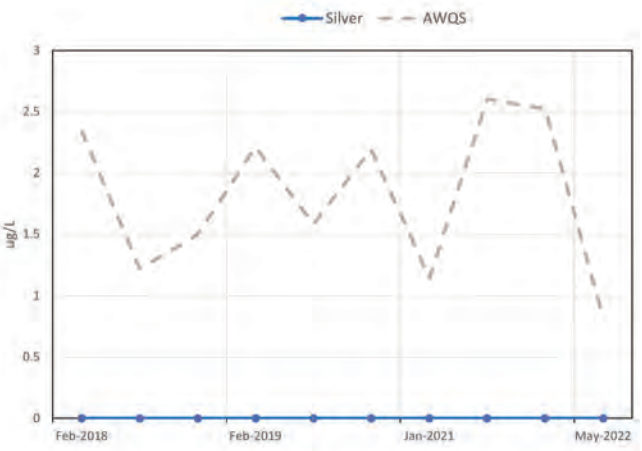

Lead
AWQS
ug/L
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

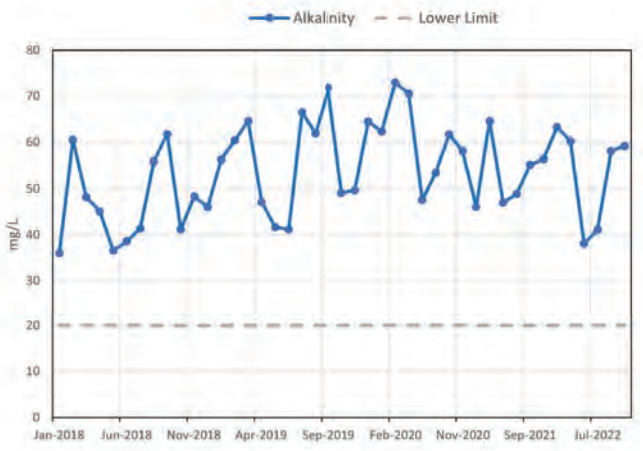

pH
Lower Limit
Upper Limit
s.u.

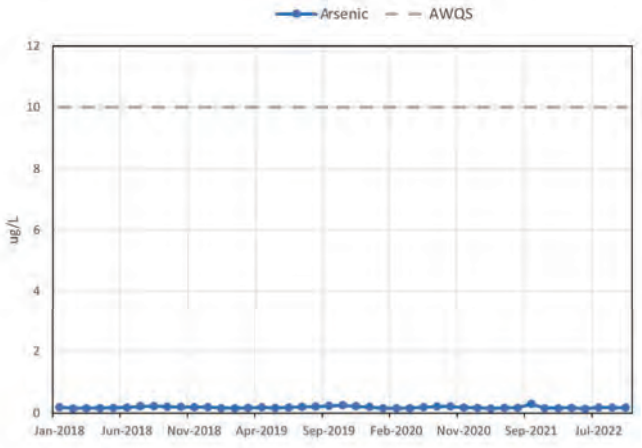

Selenium
AWQS
ug/L
Feb-2018
Dec-2019
Jan-2022

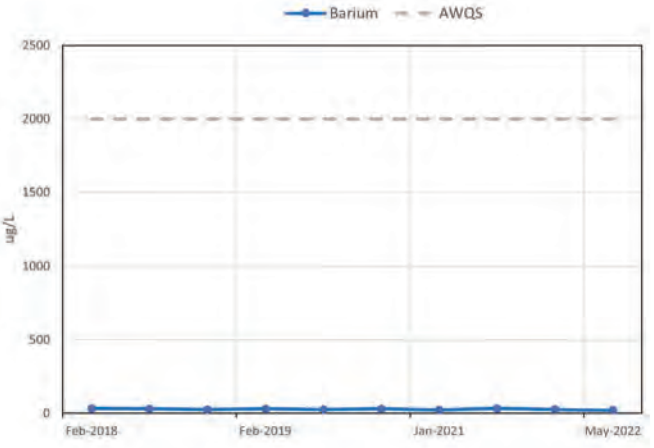

Sulfate
AWQS
mg/L
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

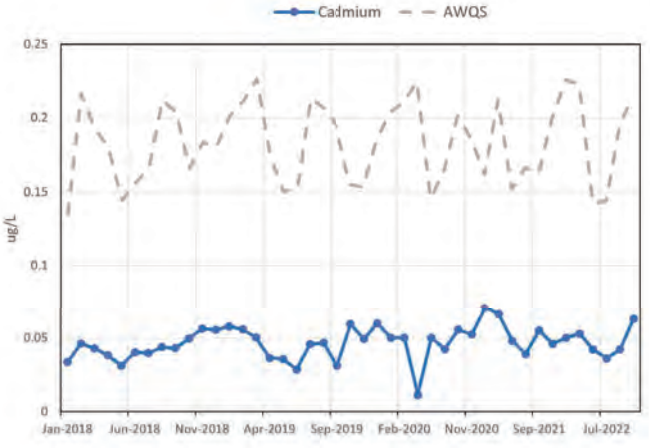

Zinc
AWQS
ug/L
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

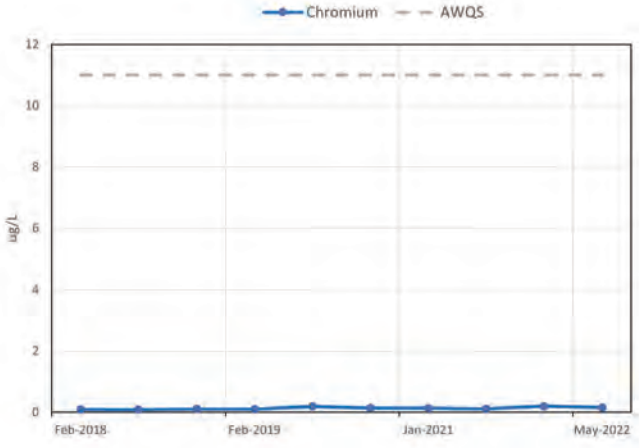

Silver
AWQS
ug/L
3
2.5
2
1.5
1
0.5
0
Feb-2018
Feb-2019
Jan-2021
May-2022

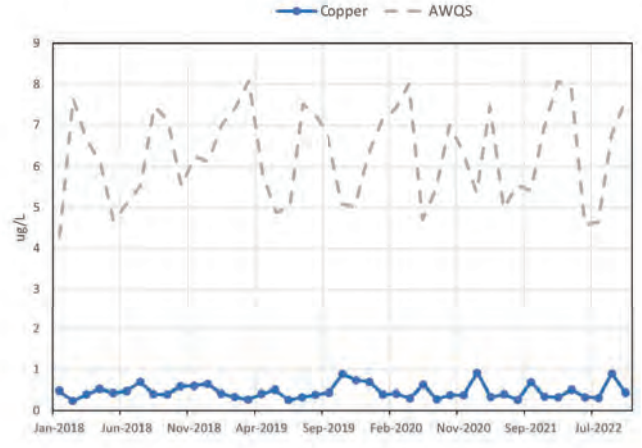

Alkalinity
Lower Limit
mg/L
80
70
60
50
40
30
20
10
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022


Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
Feb-2018
Feb-2019
Jan-2021
May-2022


Cadmium
AWQS
ug/L
0.25
0.2
0.15
0.1
0.05
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022


Chromium
AWQS
ug/L
12
10
8
6
4
2
0
Feb-2018
Feb-2019
Jan-2021
May-2022


Copper
AWQS
ug/L
9
8
7
6
5
4
3
2
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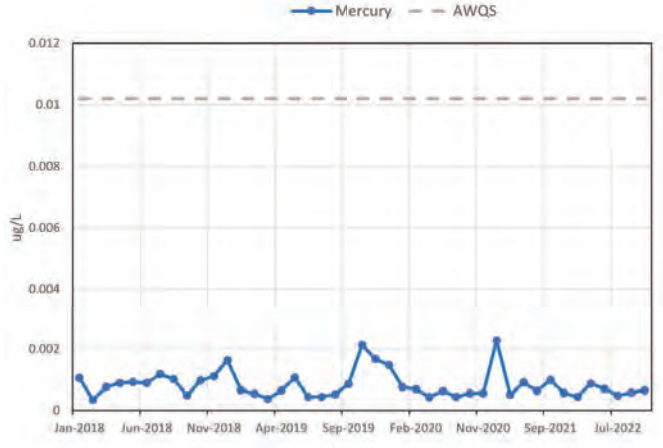
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022


Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
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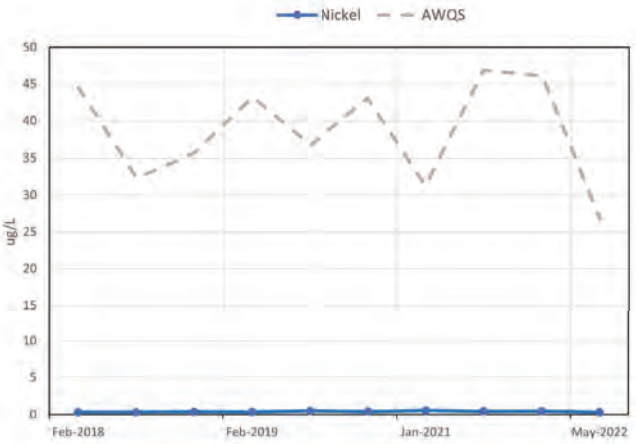
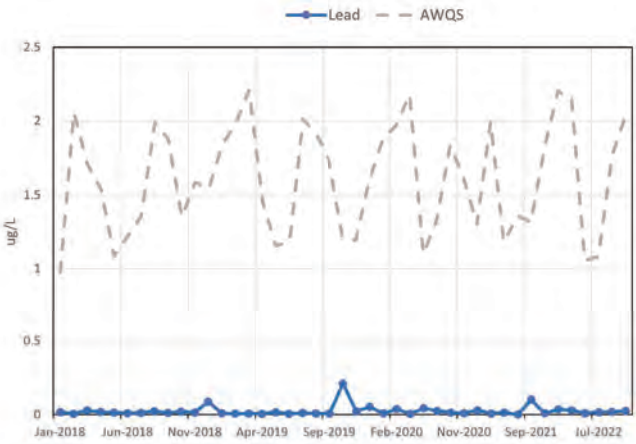
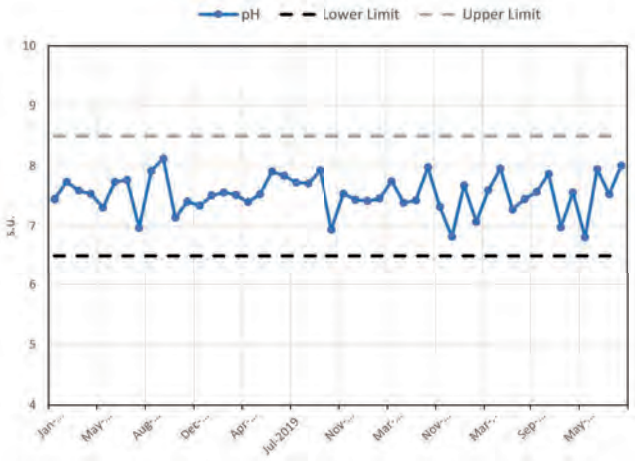
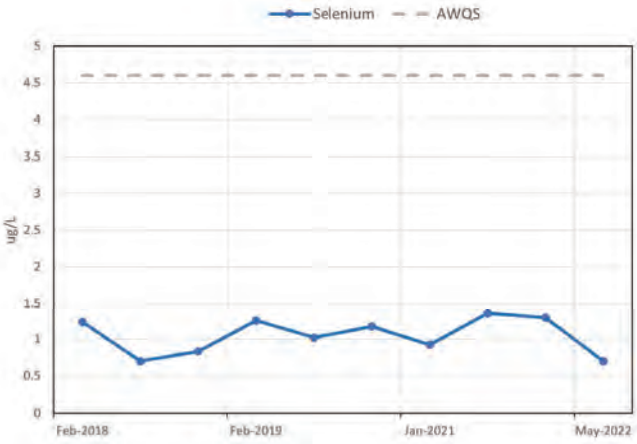
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

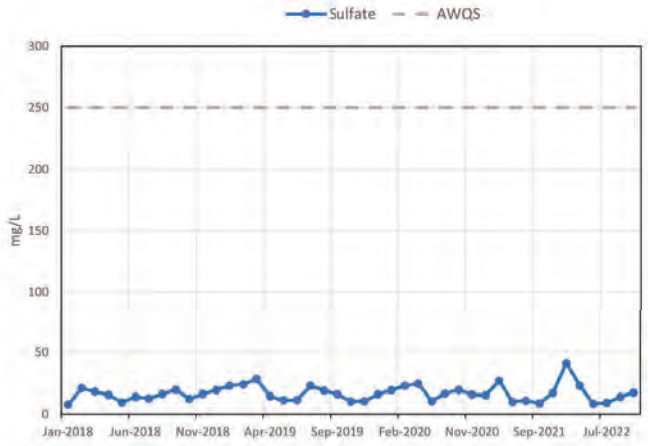
Site 62

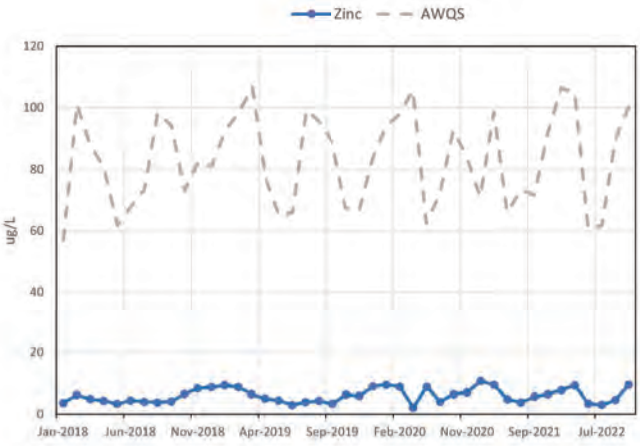

Nickel
AWQS
ug/L
50
45
40
35
30
25
20
15
10
5
0
Feb-2018
Feb-2019
Jan-2021
May-2022


Lead
AWQS
ug/L
2.5
2
1.5
1
0.5
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

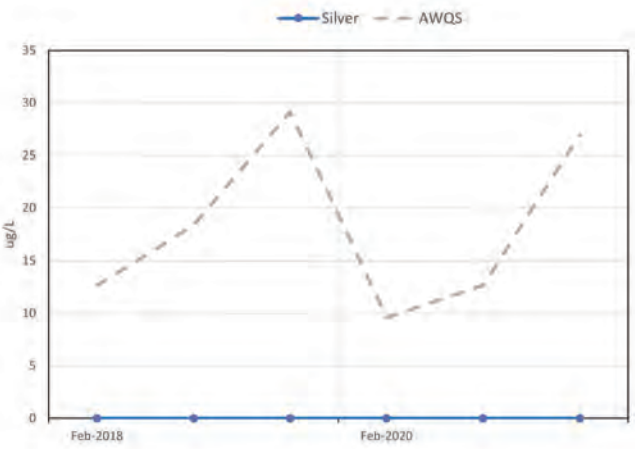

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
Jan-...
May-...
Aug-...
Dec-...
Apr-...
Jul-2019
Nov-...
Mar-...
Nov-...
Mar-...
Sep-...
May-...

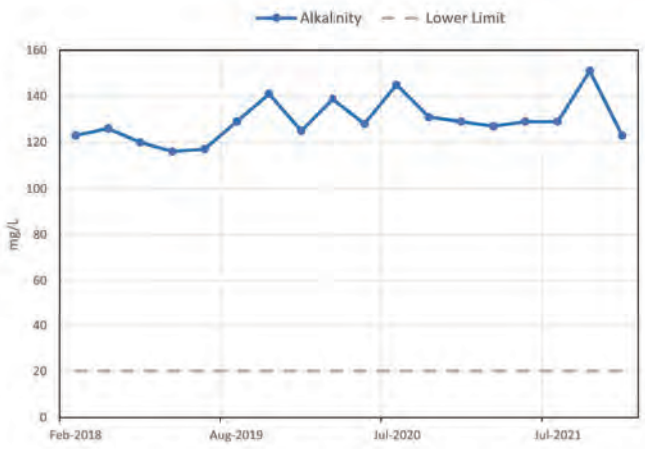

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Feb-2018
Feb-2019
Jan-2021
May-2022

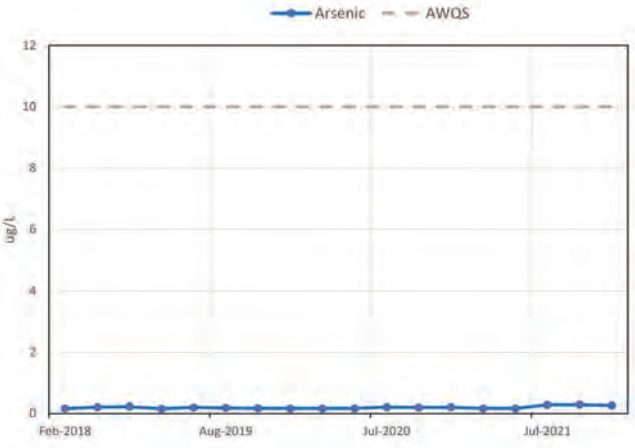

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

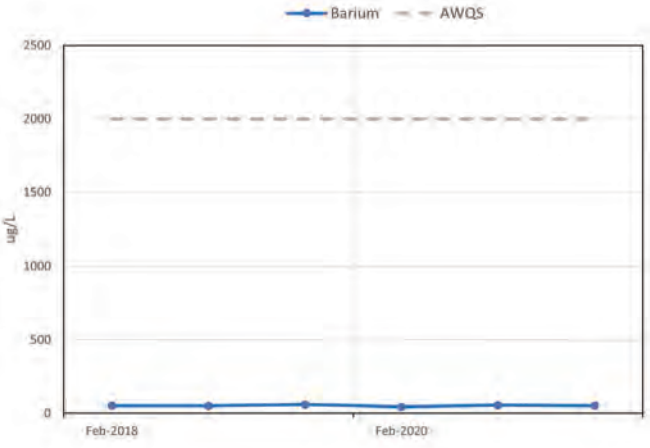

Zinc
AWQS
ug/L
120
100
80
60
40
20
0
Jan-2018
Jun-2018
Nov-2018
Apr-2019
Sep-2019
Feb-2020
Nov-2020
Sep-2021
Jul-2022

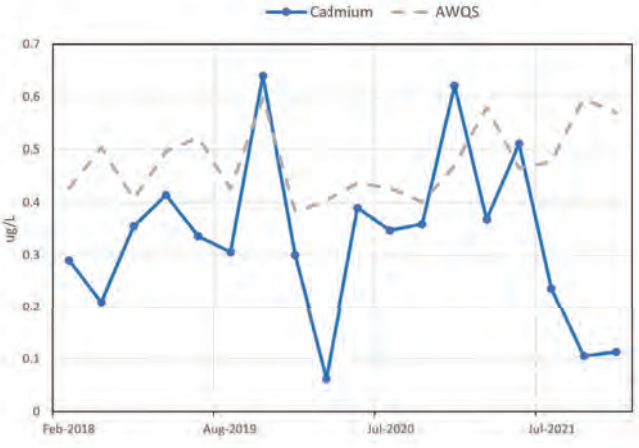
Site 61

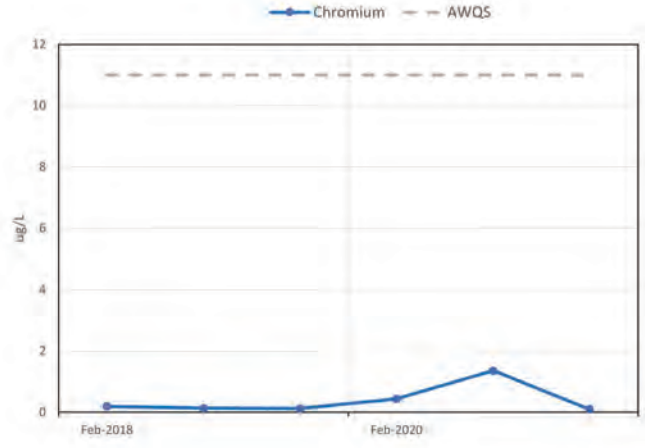

Silver
AWQS
ug/L
35
30
25
20
15
10
5
0
Feb-2018
Feb-2020

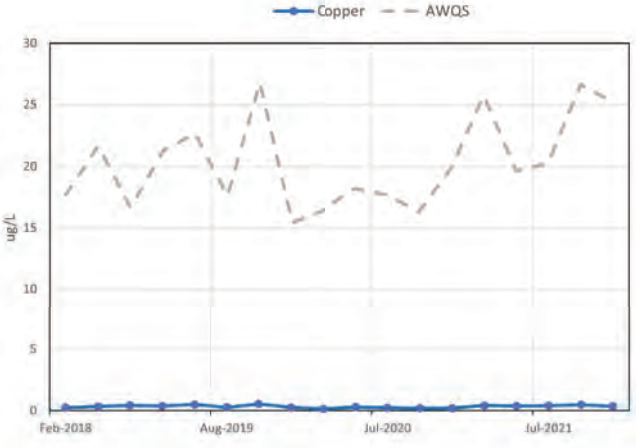

Alkalinity
Lower Limit
mg/L
160
140
120
100
80
60
40
20
0
Feb-2018
Aug-2019
Jul-2020
Jul-2021

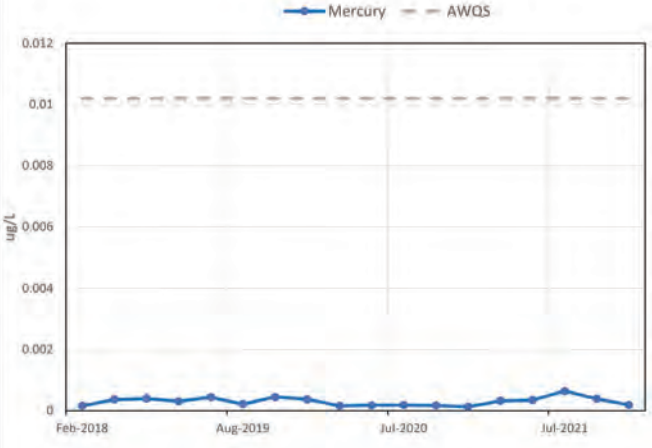

Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
Feb-2018
Aug-2019
Jul-2020
Jul-2021


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
Feb-2018
Feb-2020

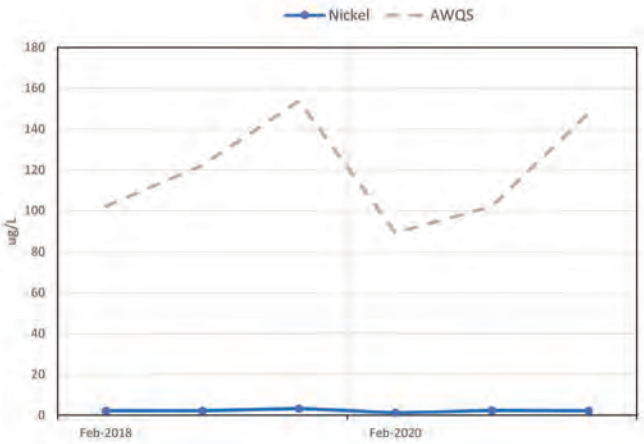

Cadmium
AWQS
ug/L
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Feb-2018
Aug-2019
Jul-2020
Jul-2021

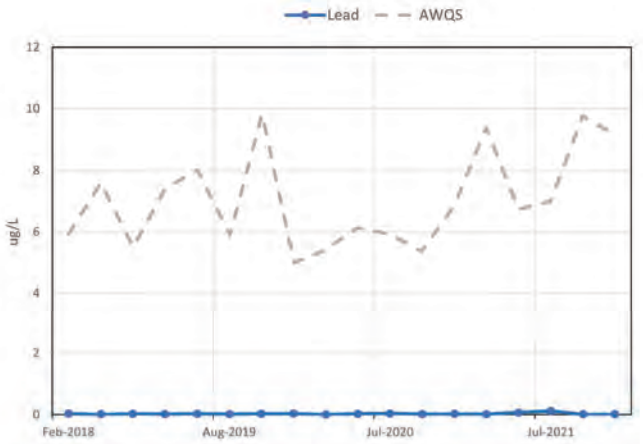

Chromium
AWQS
ug/L
12
10
8
6
4
2
0
Feb-2018
Feb-2020

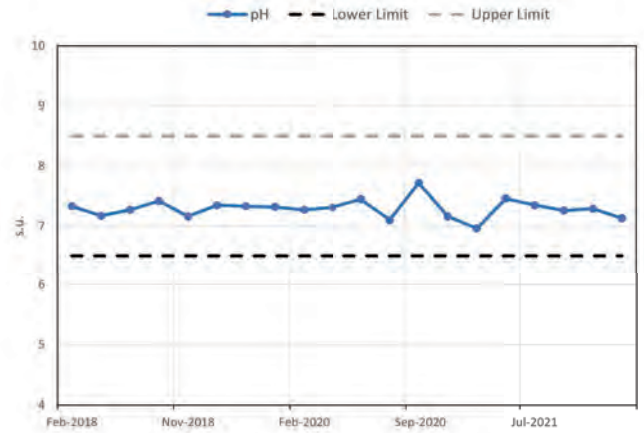

Copper
AWQS
ug/L
30
25
20
15
10
5
0
Feb-2018
Aug-2019
Jul-2020
Jul-2021

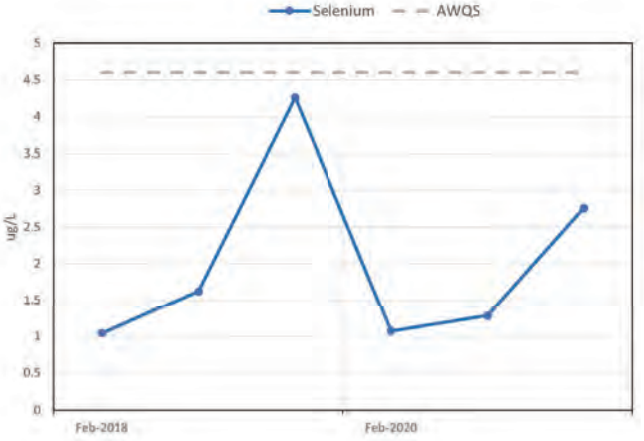

Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
0
Feb-2018
Aug-2019
Jul-2020
Jul-2021

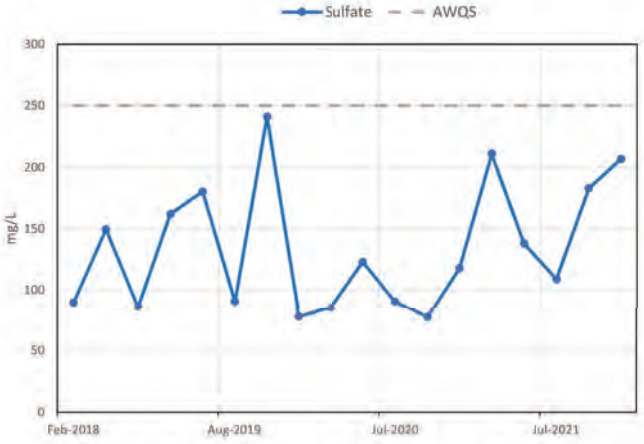
Site 61

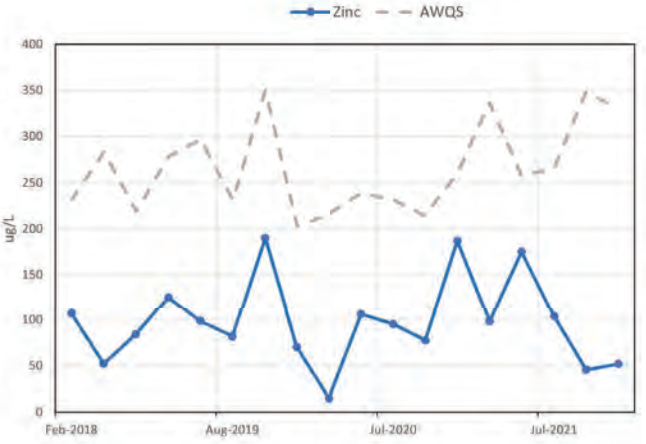

Nickel
AWQS
ug/L
180
160
140
120
100
80
60
40
20
0
Feb-2018
Feb-2020


Lead
AWQS
ug/L
12
10
8
6
4
2
0
Feb-2018
Aug-2019
Jul-2020
Jul-2021


pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
Feb-2018
Nov-2018
Feb-2020
Sep-2020
Jul-2021


Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Feb-2018
Feb-2020


Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
Feb-2018
Aug-2019
Jul-2020
Jul-2021


Zinc
AWQS
ug/L
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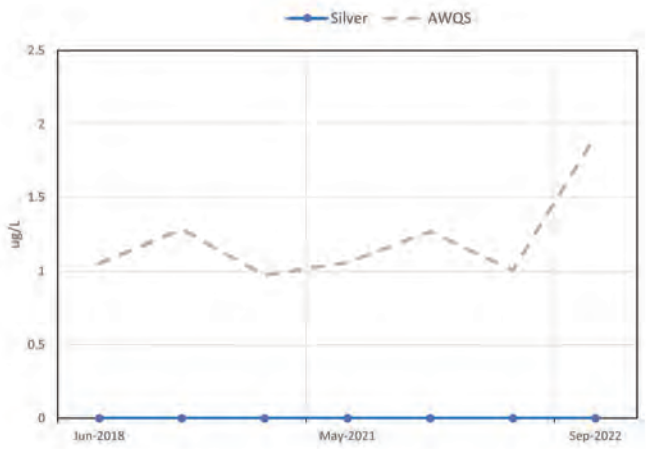
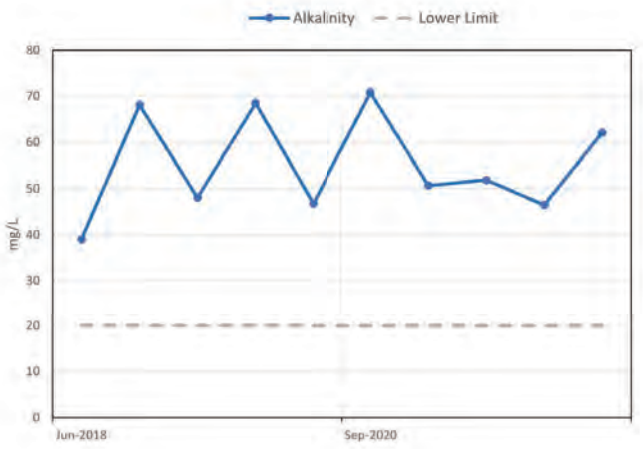
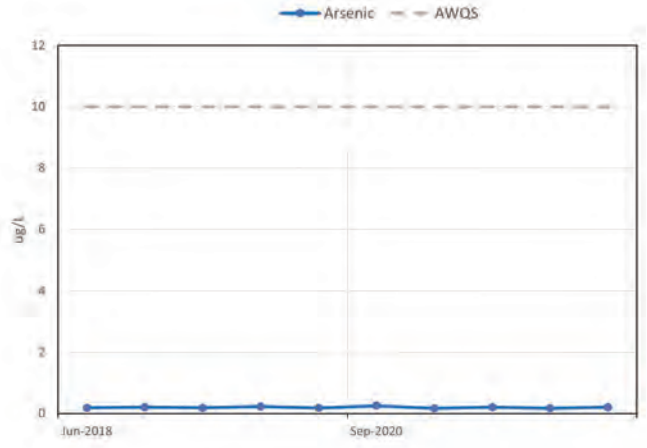
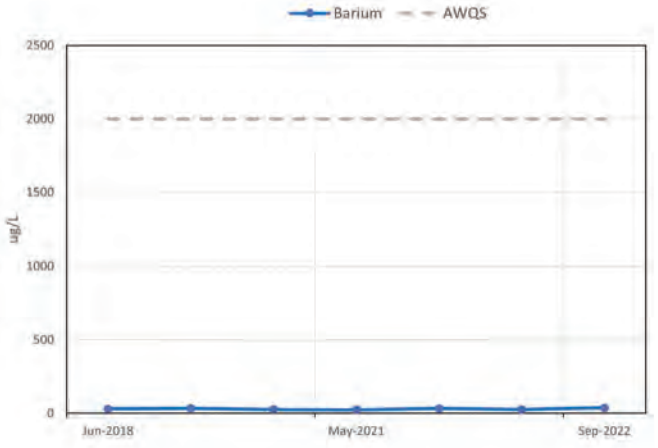
350
300
250
200
150
100
50
0
Feb-2018
Aug-2019
Jul-2020
Jul-2021

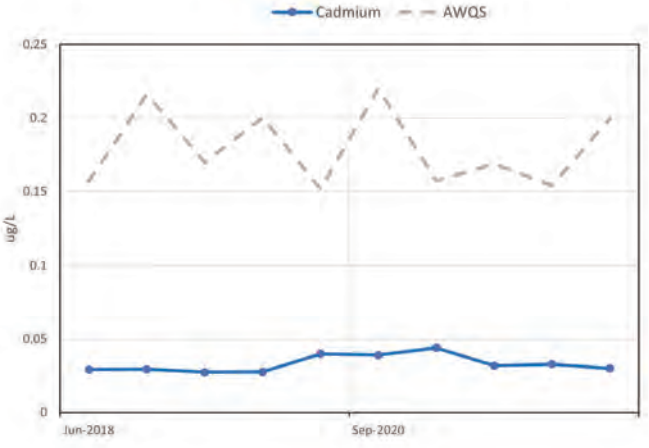
Site 711

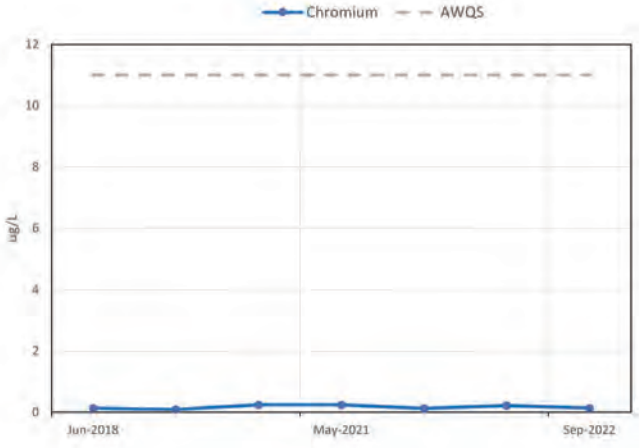

Silver
AWQS
ug/L
2.5
2
1.5
1
0.5
0
Jun-2018
May-2021
Sep-2022

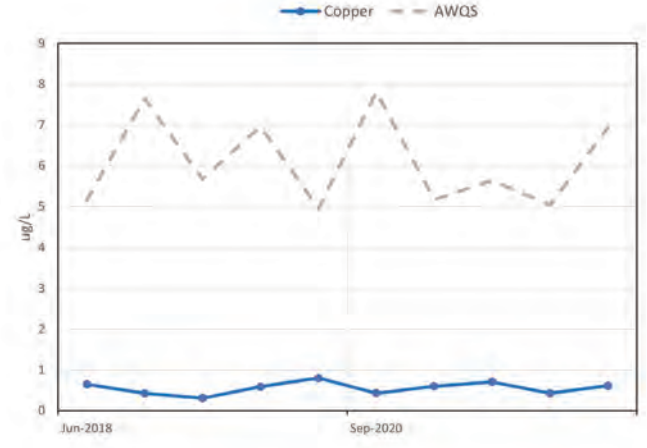

Alkalinity
Lower Limit
mg/L
80
70
60
50
40
30
20
10
0
Jun-2018
Sep-2020

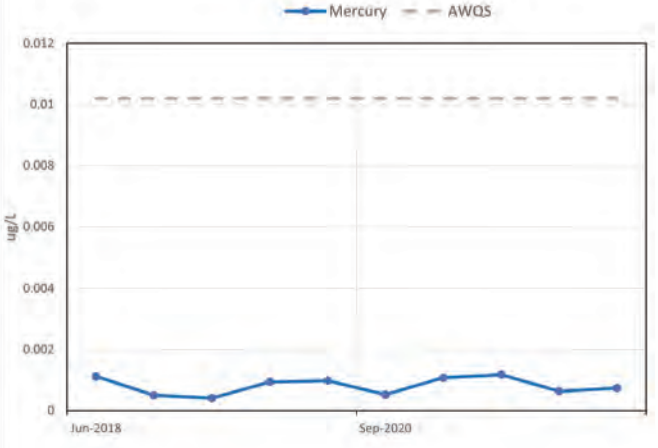

Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
Jun-2018
Sep-2020


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
Jun-2018
May-2021
Sep-2022

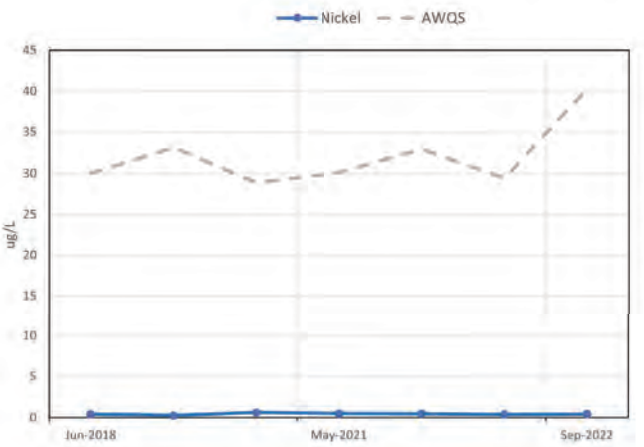

Cadmium
AWQS
ug/L
0.25
0.2
0.15
0.1
0.05
0
Jun-2018
Sep-2020

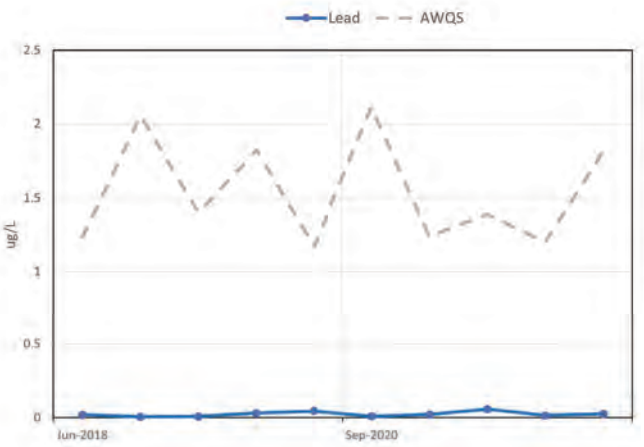

Chromium
AWQS
ug/L
12
10
8
6
4
2
0
Jun-2018
May-2021
Sep-2022

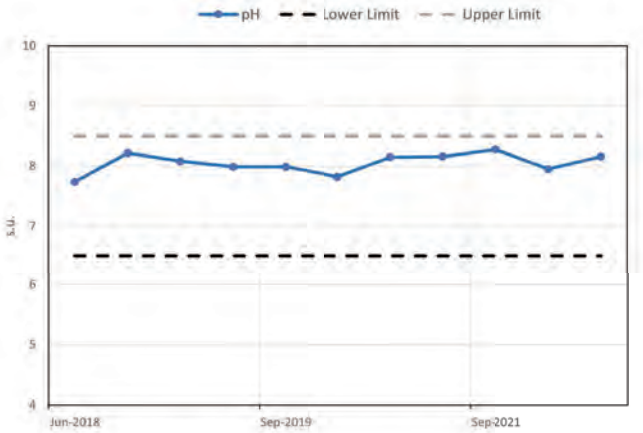

Copper
AWQS
ug/L
9
8
7
6
5
4
3
2
1
0
Jun-2018
Sep-2020

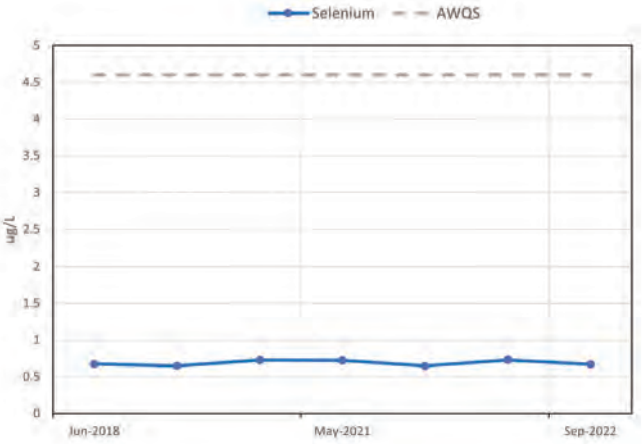

Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
0
Jun-2018
Sep-2020

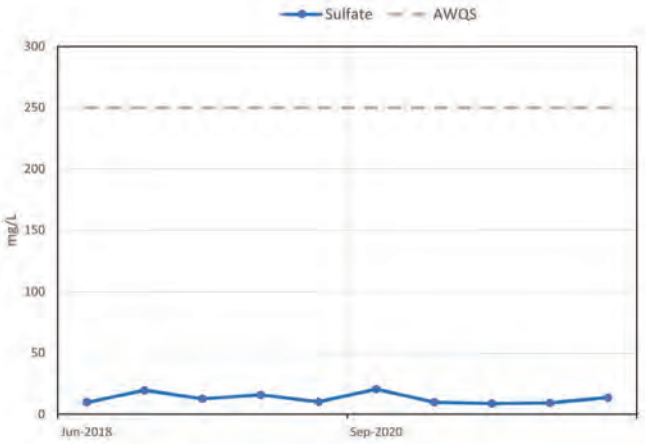
Site 711

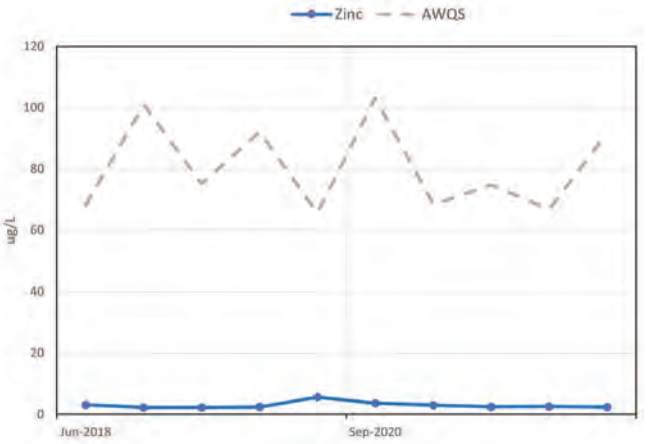

Nickel
AWQS
ug/L
45
40
35
30
25
20
15
10
5
0
Jun-2018
May-2021
Sep-2022


Lead
AWQS
ug/L
2.5
2
1.5
1
0.5
0
Jun-2018
Sep-2020

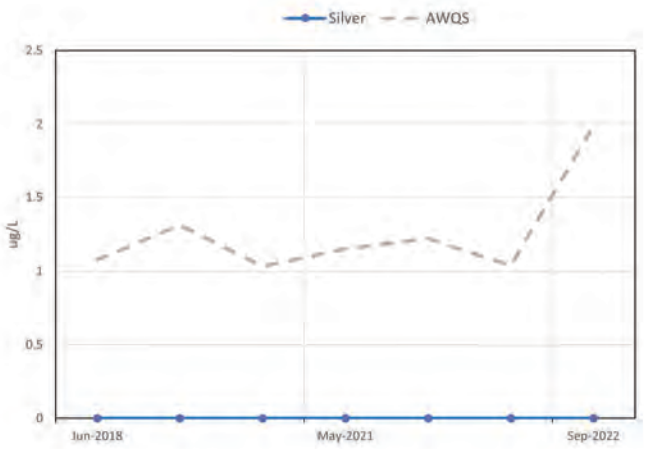

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
Jun-2018
Sep-2019
Sep-2021

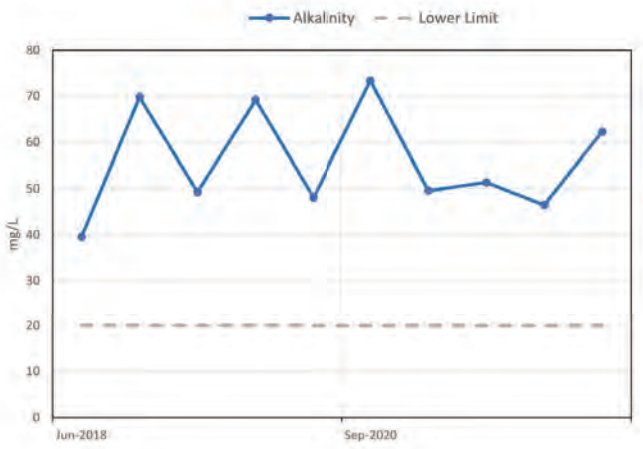

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Jun-2018
May-2021
Sep-2022

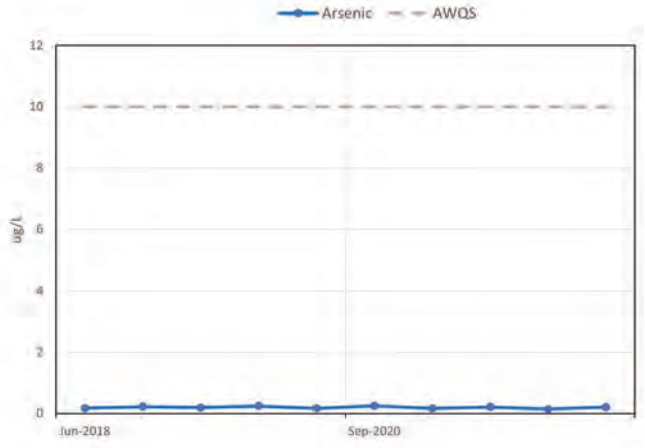

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
Jun-2018
Sep-2020

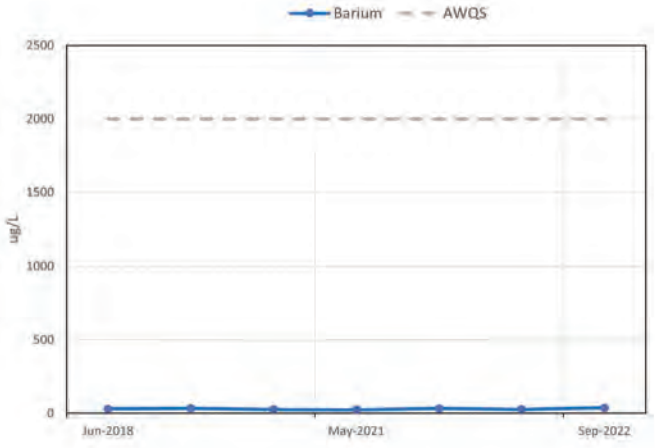

Zinc
AWQS
ug/L
120
100
80
60
40
20
0
Jun-2018
Sep-2020

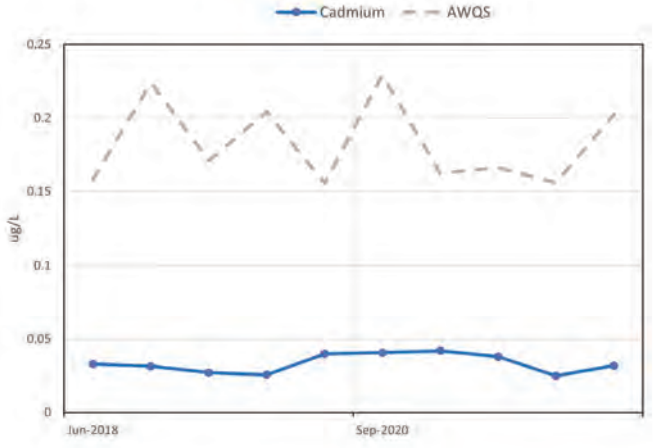
Site 712

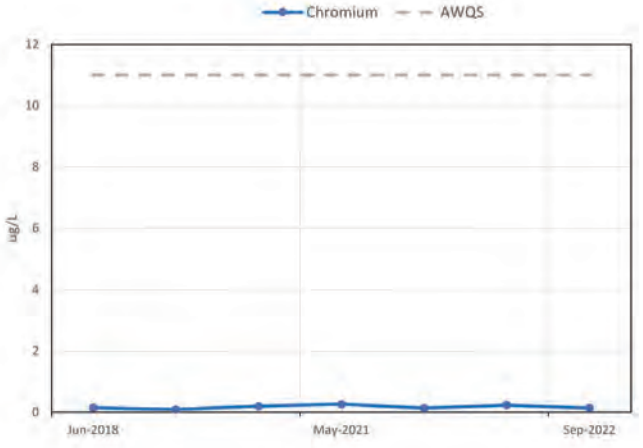

Silver
AWQS
2.5
2
1.5
1
0.5
0
ug/L
Jun-2018
May-2021
Sep-2022

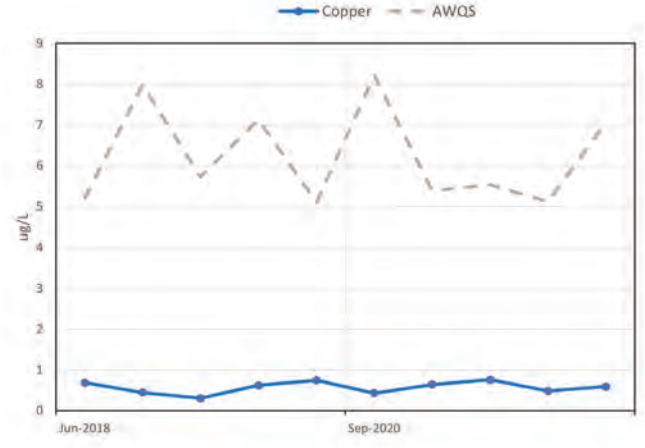

Alkalinity
Lower Limit
80
70
60
50
40
30
20
10
0
mg/L
Jun-2018
Sep-2020

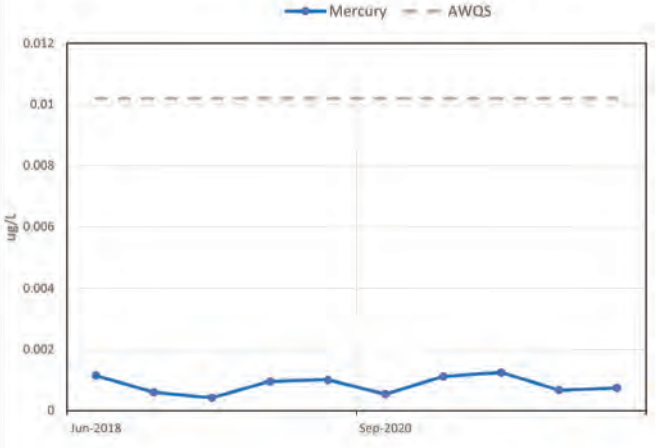

Arsenic
AWQS
12
10
8
6
4
2
0
ug/L
Jun-2018
Sep-2020


Barium
AWQS
2500
2000
1500
1000
500
0
ug/L
Jun-2018
May-2021
Sep-2022

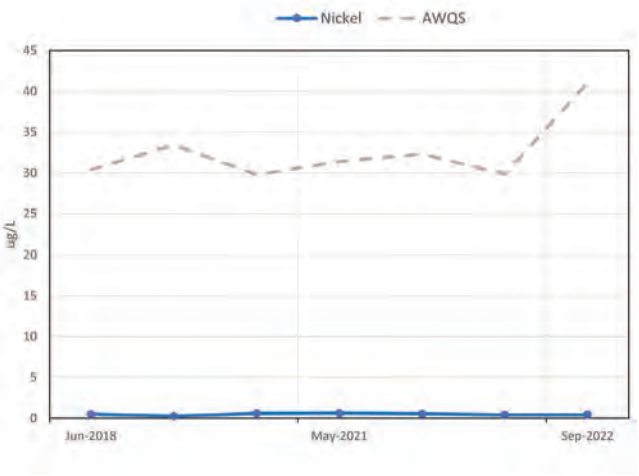

Cadmium
AWQS
0.25
0.2
0.15
0.1
0.05
0
ug/L
Jun-2018
Sep-2020

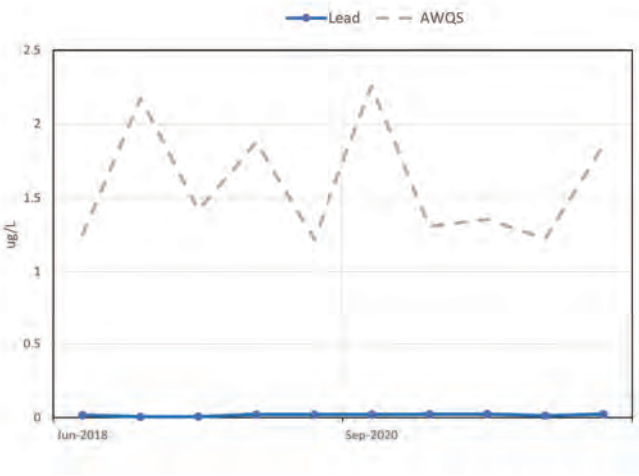

Chromium
AWQS
12
10
8
6
4
2
0
ug/L
Jun-2018
May-2021
Sep-2022

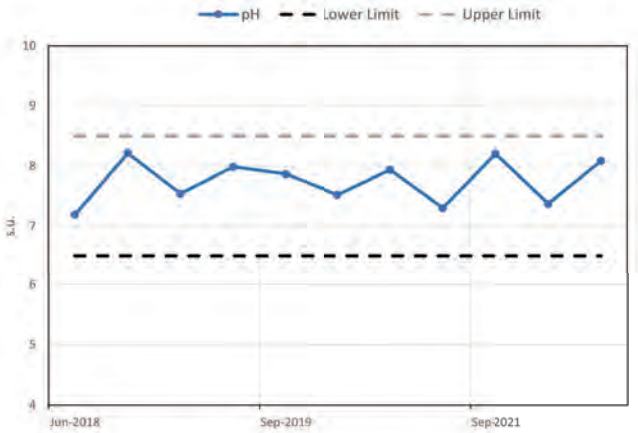

Copper
AWQS
9
8
7
6
5
4
3
2
1
0
ug/L
Jun-2018
Sep-2020

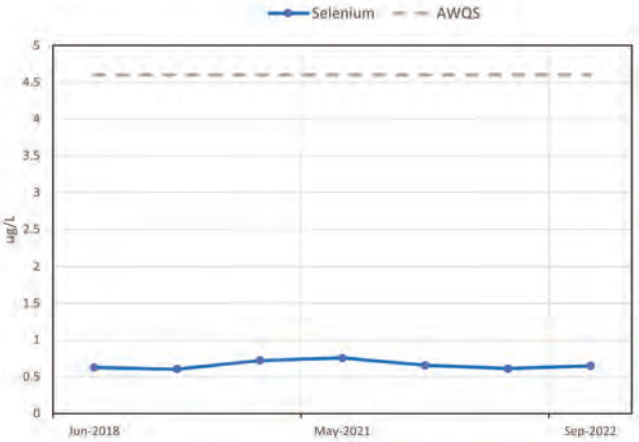

Mercury
AWQS
0.012
0.01
0.008
0.006
0.004
0.002
0
ug/L
Jun-2018
Sep-2020

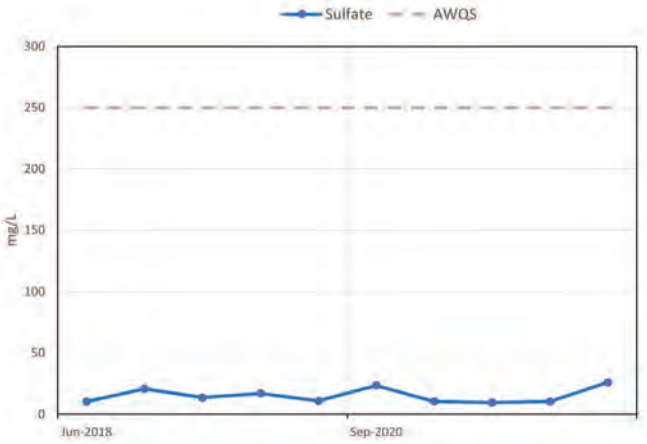
Site 712

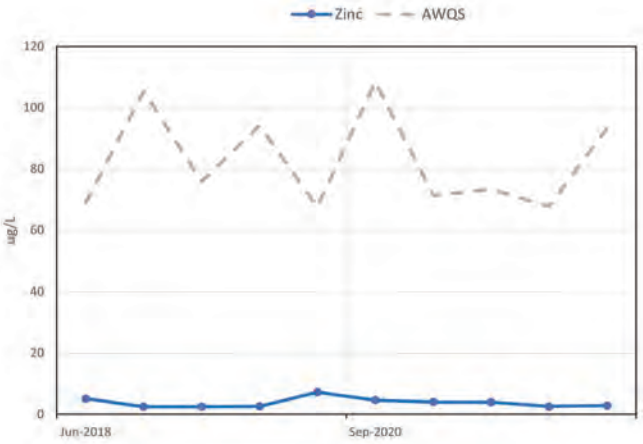

Nickel
AWQS
ug/L
45
40
35
30
25
20
15
10
5
0
Jun-2018
May-2021
Sep-2022


Lead
AWQS
ug/L
2.5
2
1.5
1
0.5
0
Jun-2018
Sep-2020

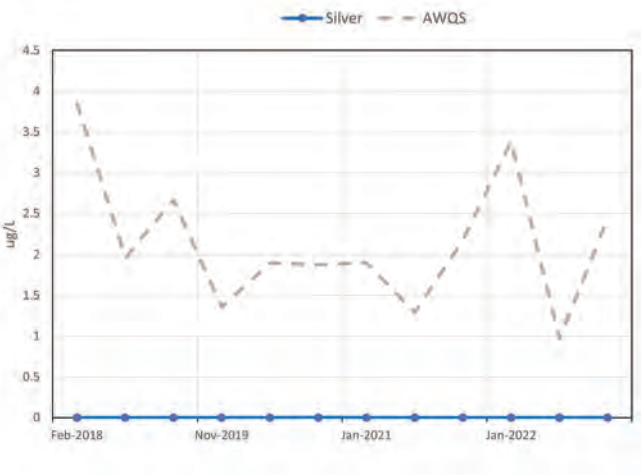

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
Jun-2018
Sep-2019
Sep-2021

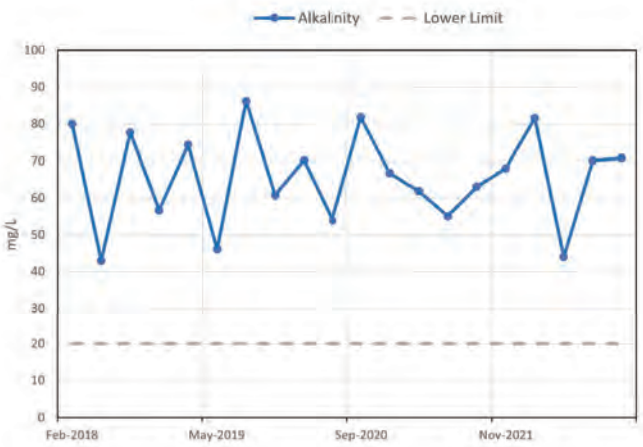

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Jun-2018
May-2021
Sep-2022

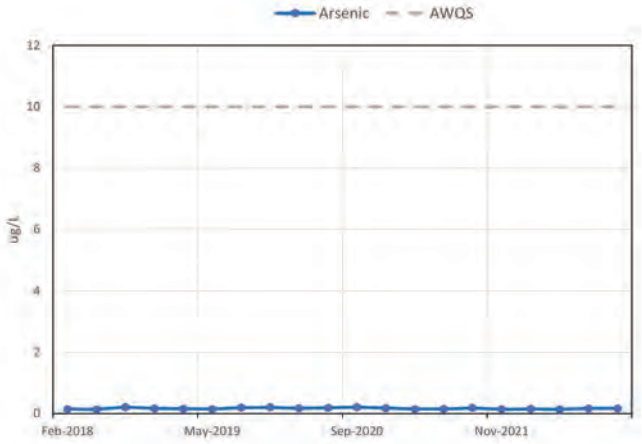

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
Jun-2018
Sep-2020

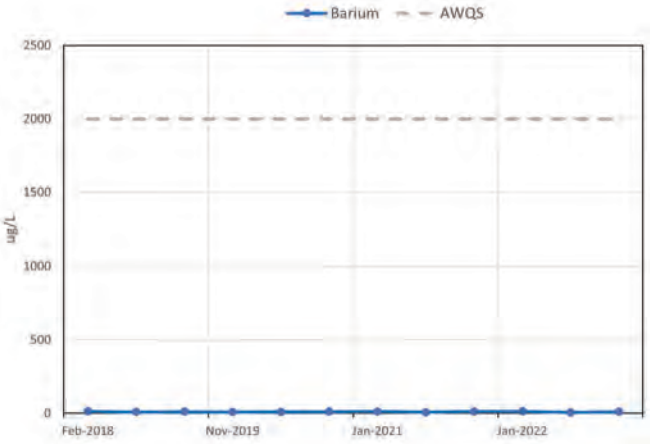

Zinc
AWQS
ug/L
120
100
80
60
40
20
0
Jun-2018
Sep-2020

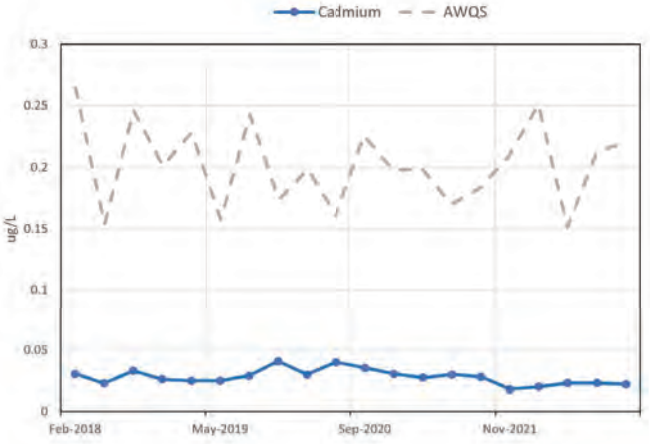
Site 49


Silver
AWQS
ug/L
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Feb-2018
Nov-2019
Jan-2021
Jan-2022


Alkalinity
Lower Limit
mg/L
100
90
80
70
60
50
40
30
20
10
0
Feb-2018
May-2019
Sep-2020
Nov-2021


Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
Feb-2018
May-2019
Sep-2020
Nov-2021


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
Feb-2018
Nov-2019
Jan-2021
Jan-2022


Cadmium
AWQS
ug/L
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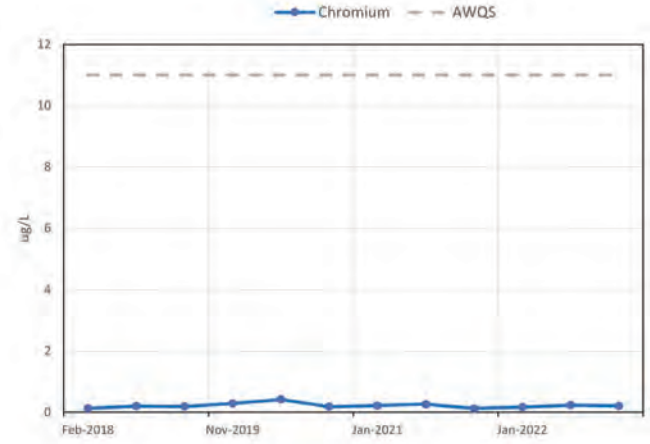
0.25
0.2
0.15
0.1
0.05
0
Feb-2018
May-2019
Sep-2020
Nov-2021


Chromium
AWQS
ug/L
12
10
8
6
4
2
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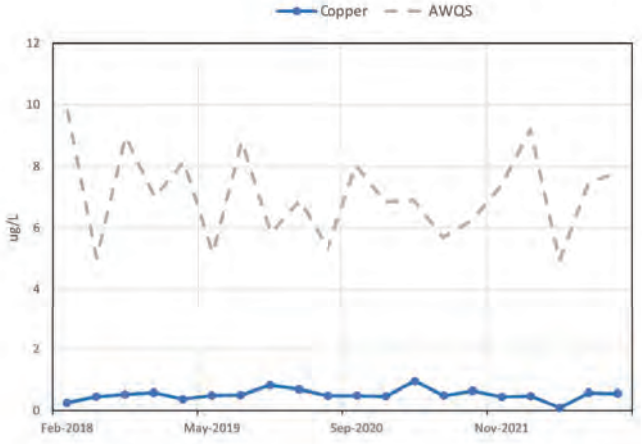
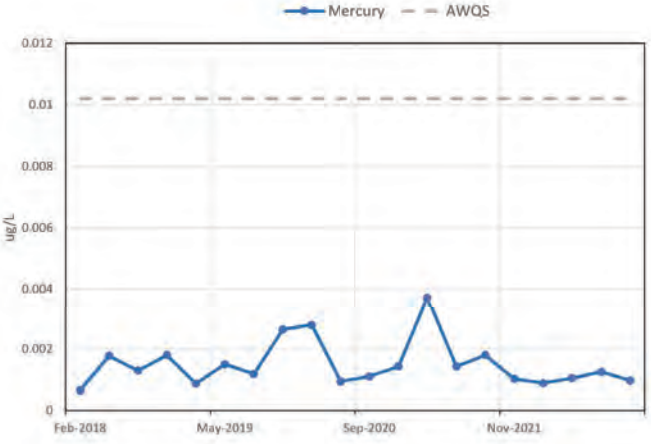
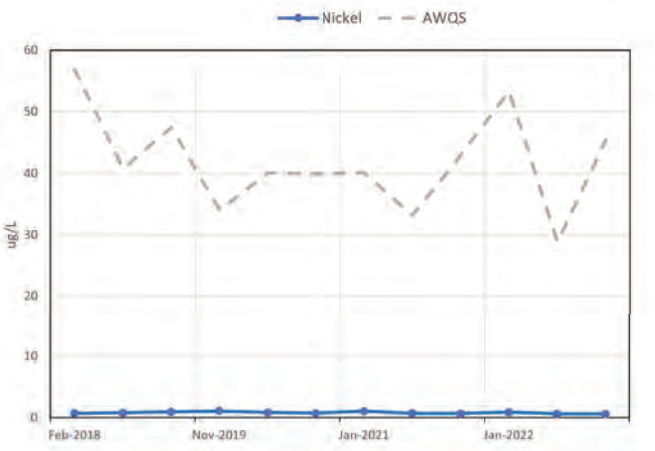
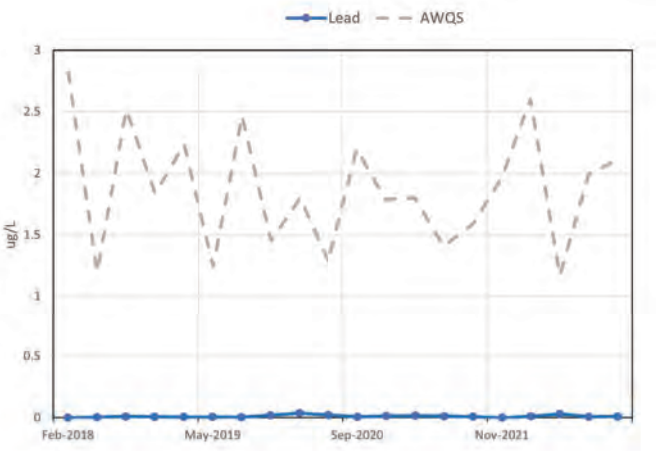
Feb-2018
Nov-2019
Jan-2021
Jan-2022

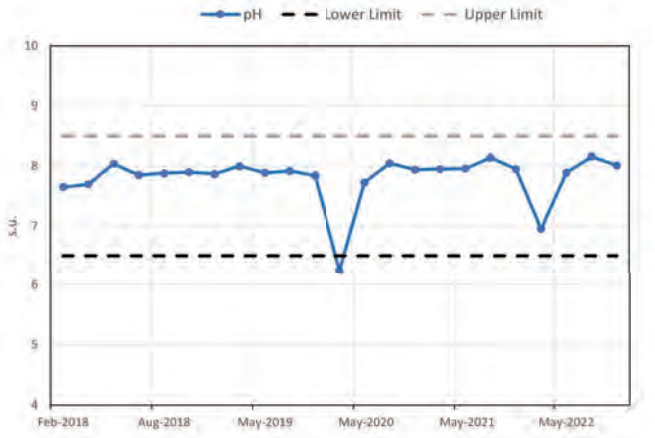

Copper
AWQS
ug/L
12
10
8
6
4
2
0
Feb-2018
May-2019
Sep-2020
Nov-2021

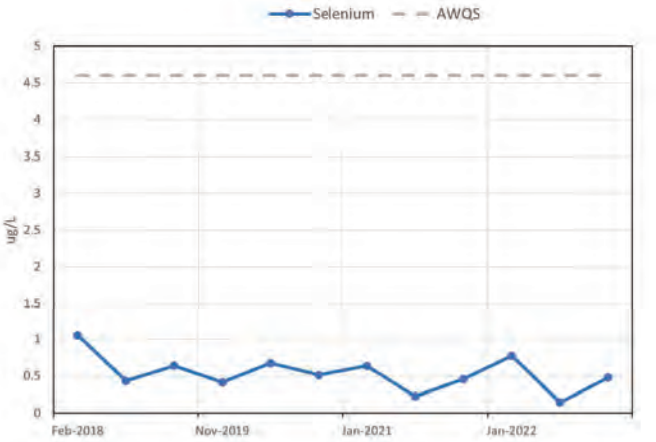

Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
0
Feb-2018
May-2019
Sep-2020
Nov-2021

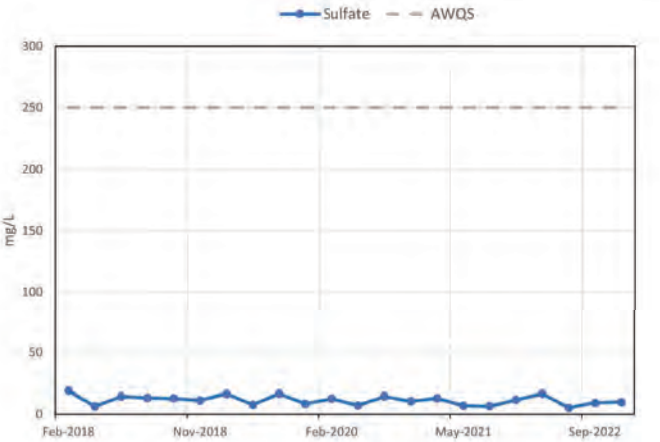
Site 49

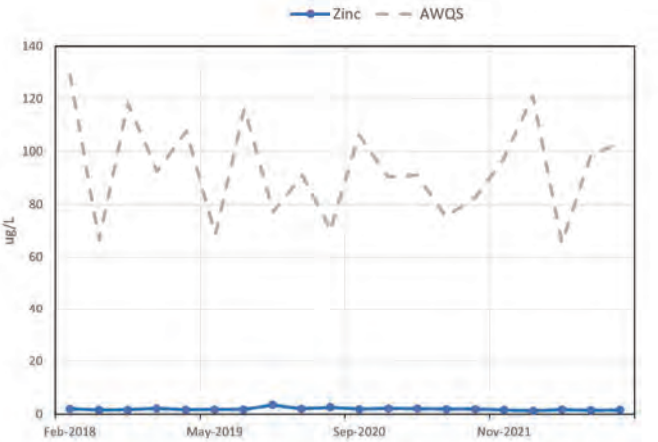

Nickel
AWQS
ug/L
60
50
40
30
20
10
0
Feb-2018
Nov-2019
Jan-2021
Jan-2022


Lead
AWQS
ug/L
3
2.5
2
1.5
1
0.5
0
Feb-2018
May-2019
Sep-2020
Nov-2021

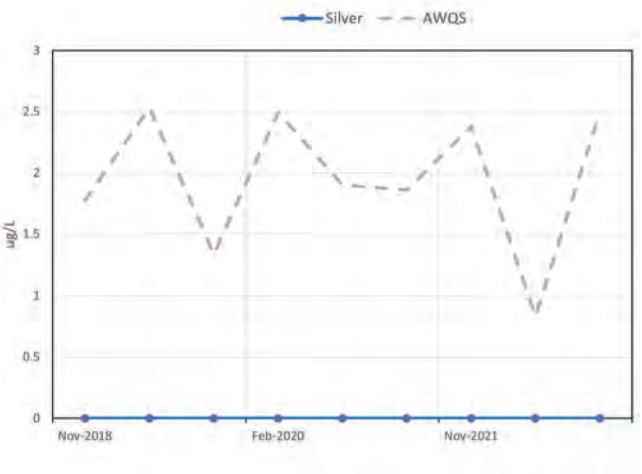

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
Feb-2018
Aug-2018
May-2019
May-2020
May-2021
May-2022

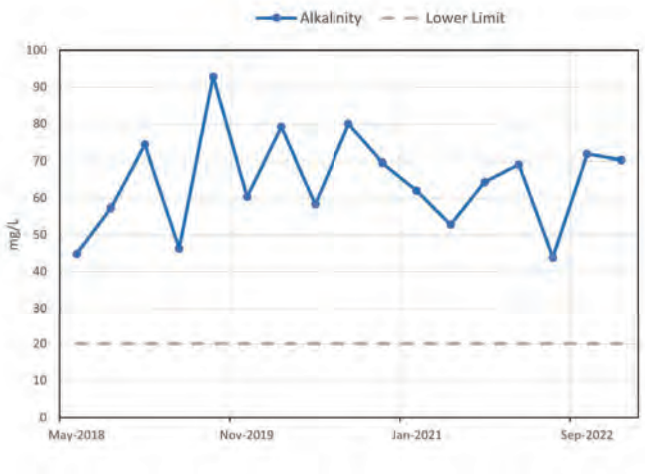

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Feb-2018
Nov-2019
Jan-2021
Jan-2022


Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
Feb-2018
Nov-2018
Feb-2020
May-2021
Sep-2022


Zinc
AWQS
ug/L
140
120
100
80
60
40
20
0
Feb-2018
May-2019
Sep-2020
Nov-2021

Site 46


Silver
AWQS
ug/L
3
2.5
2
1.5
1
0.5
0
Nov-2018
Feb-2020
Nov-2021


Alkalinity
Lower Limit
mg/L
100
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80
70
60
50
40
30
20
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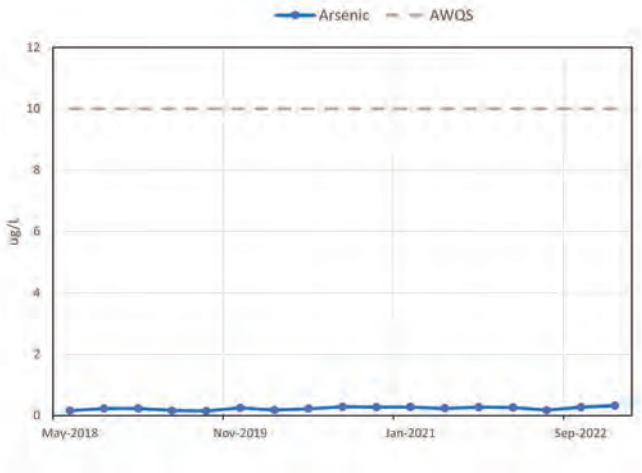
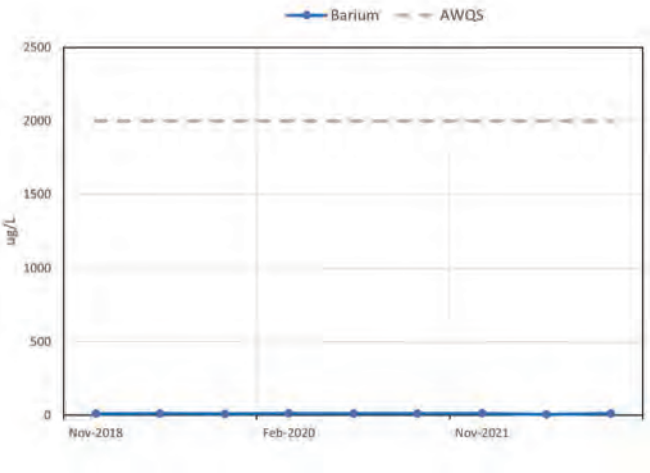
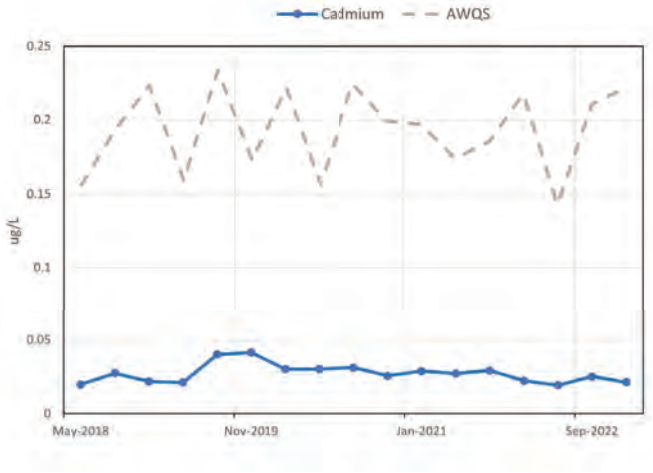
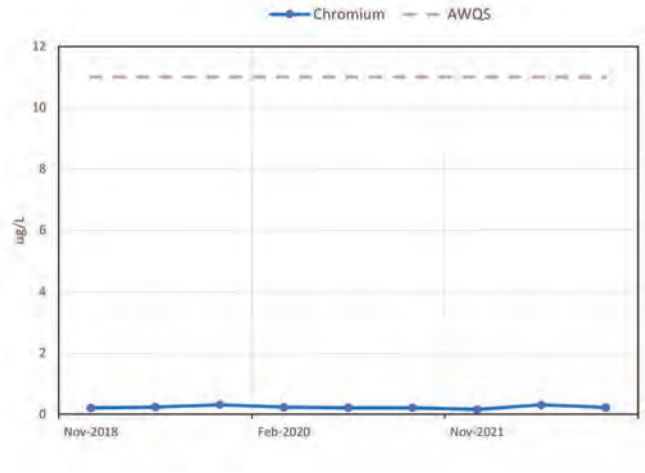
0
May-2018
Nov-2019
Jan-2021
Sep-2022


Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
May-2018
Nov-2019
Jan-2021
Sep-2022


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
Nov-2018
Feb-2020
Nov-2021


Cadmium
AWQS
ug/L
0.25
0.2
0.15
0.1
0.05
0
May-2018
Nov-2019
Jan-2021
Sep-2022


Chromium
AWQS
ug/L
12
10
8
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4
2
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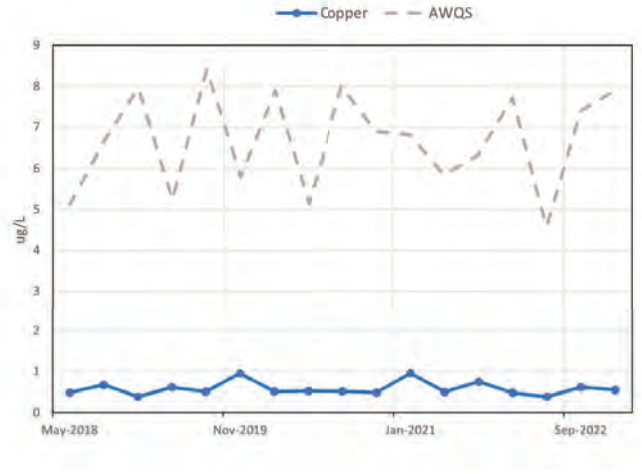
Nov-2018
Feb-2020
Nov-2021


Copper
AWQS
ug/L
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8
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6
5
4
3
2
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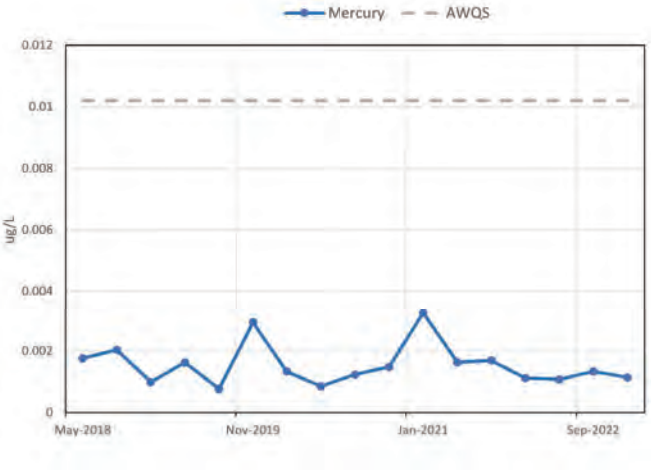
0
May-2018
Nov-2019
Jan-2021
Sep-2022


Mercury
AWQS
ug/L
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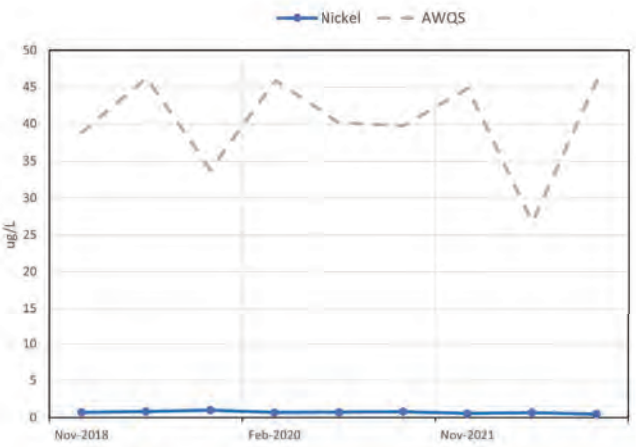
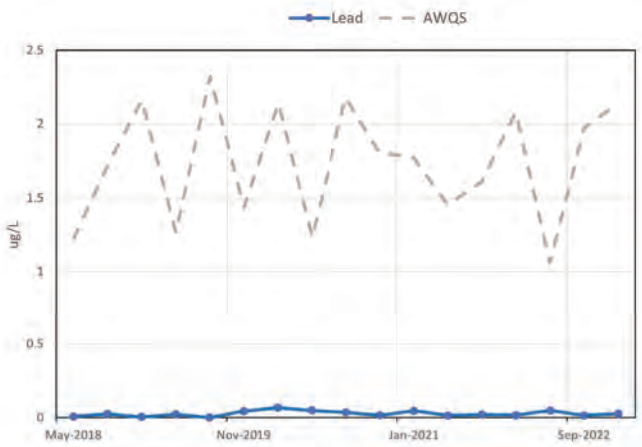
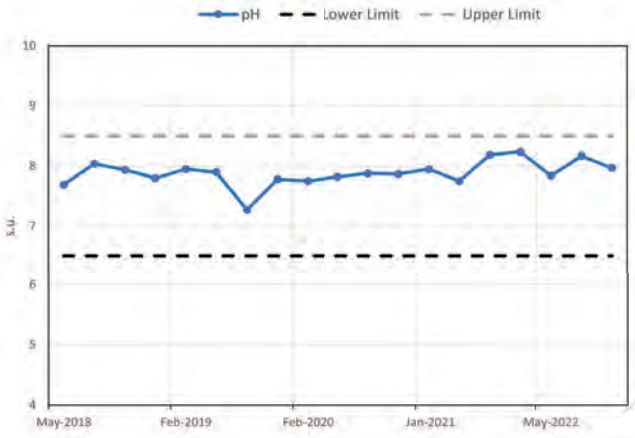
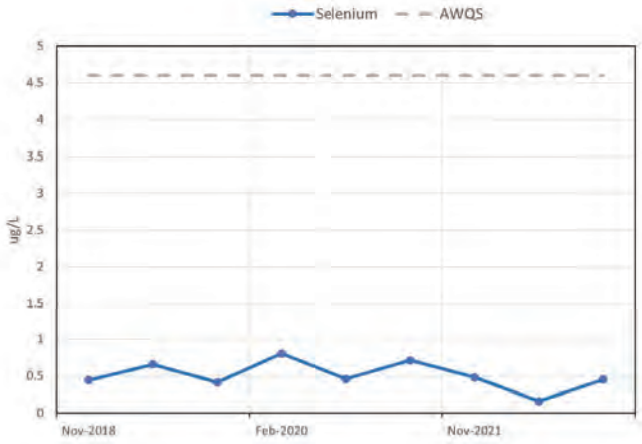
0.01
0.008
0.006
0.004
0.002
0
May-2018
Nov-2019
Jan-2021
Sep-2022

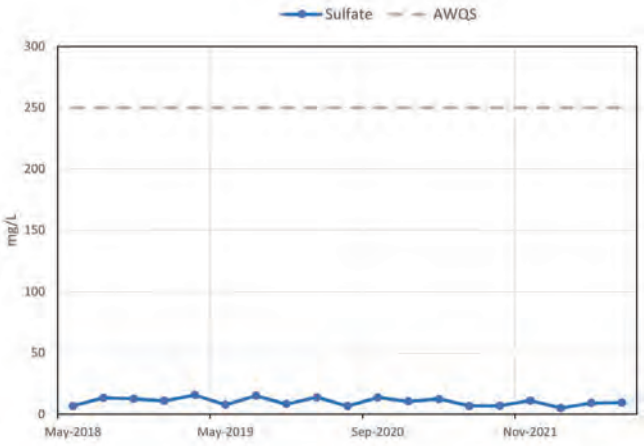
Site 46

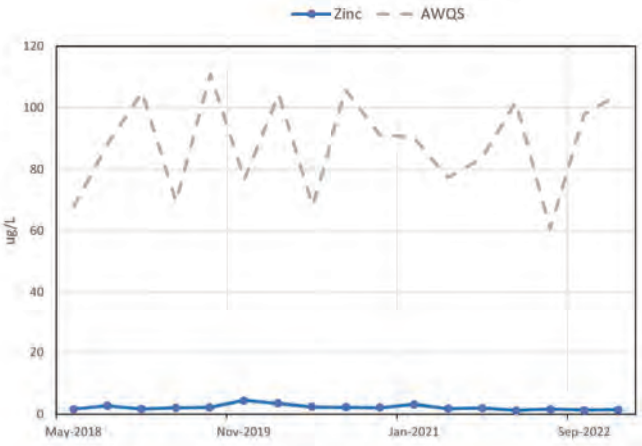

Nickel
AWQS
ug/L
50
45
40
35
30
25
20
15
10
5
0
Nov-2018
Feb-2020
Nov-2021


Lead
AWQS
ug/L
2.5
2
1.5
1
0.5
0
May-2018
Nov-2019
Jan-2021
Sep-2022

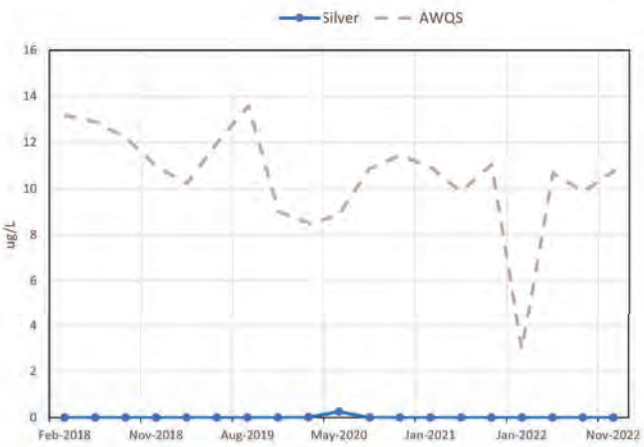

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
May-2018
Feb-2019
Feb-2020
Jan-2021
May-2022

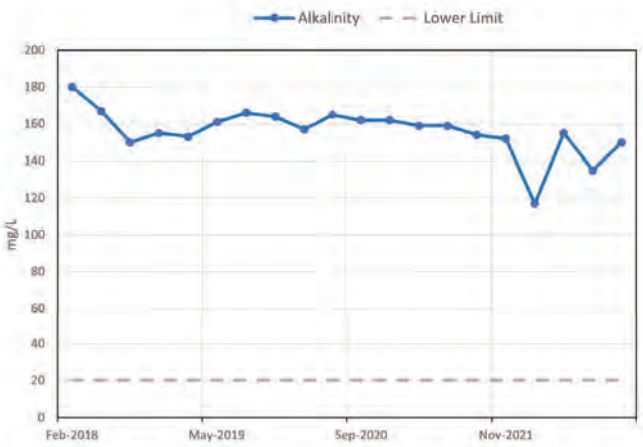

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Nov-2018
Feb-2020
Nov-2021

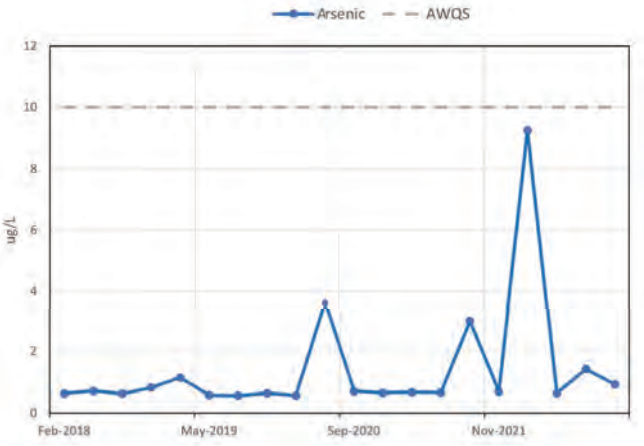

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
May-2018
May-2019
Sep-2020
Nov-2021

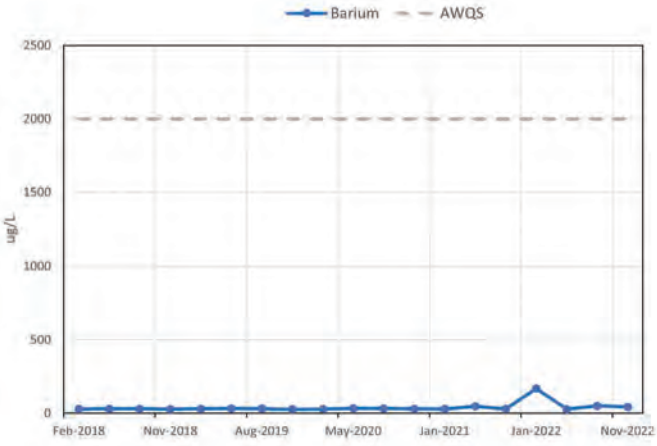

Zinc
AWQS
ug/L
120
100
80
60
40
20
0
May-2018
Nov-2019
Jan-2021
Sep-2022

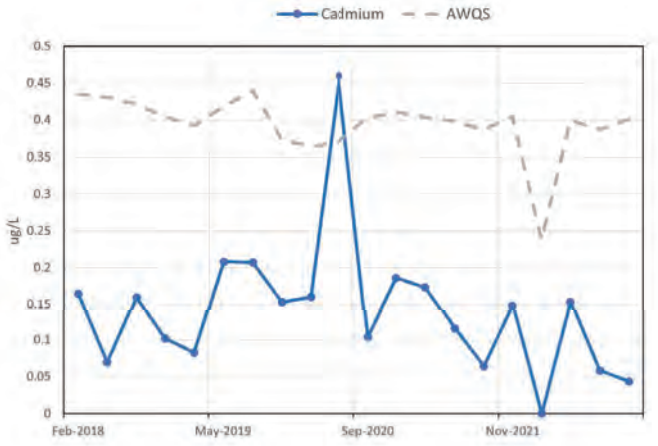
Site 57

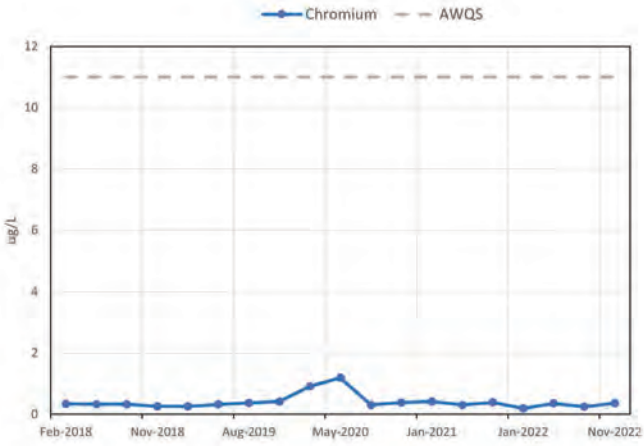

Silver
AWQS
ug/L
16
14
12
10
8
6
4
2
0
Feb-2018
Nov-2018
Aug-2019
May-2020
Jan-2021
Jan-2022
Nov-2022

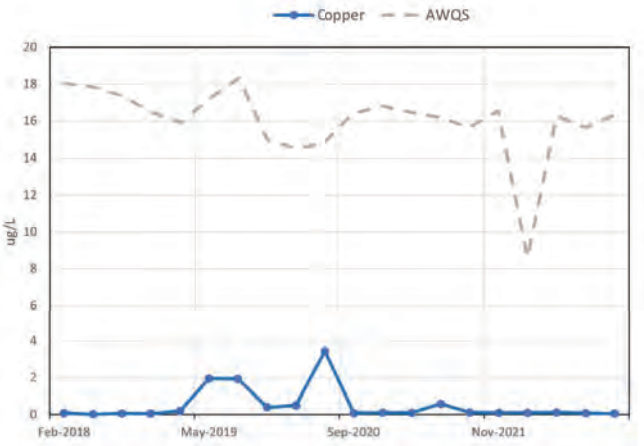

Alkalinity
Lower Limit
mg/L
200
180
160
140
120
100
80
60
40
20
0
Feb-2018
May-2019
Sep-2020
Nov-2021

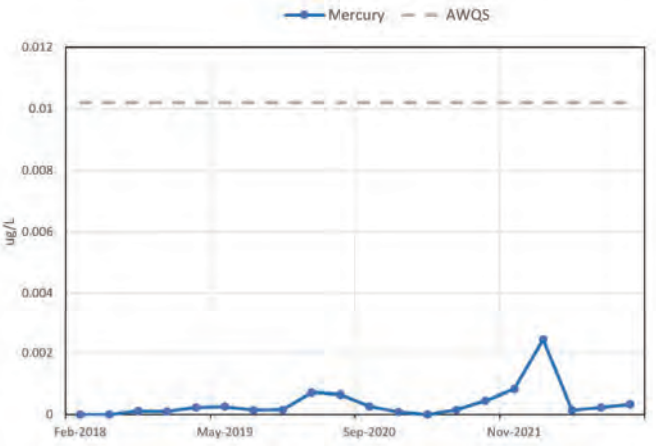

Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
Feb-2018
May-2019
Sep-2020
Nov-2021


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
Feb-2018
Nov-2018
Aug-2019
May-2020
Jan-2021
Jan-2022
Nov-2022

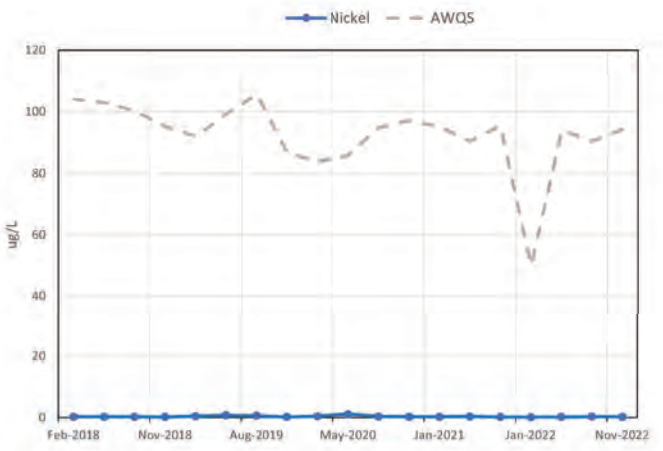

Cadmium
AWQS
ug/L
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Feb-2018
May-2019
Sep-2020
Nov-2021

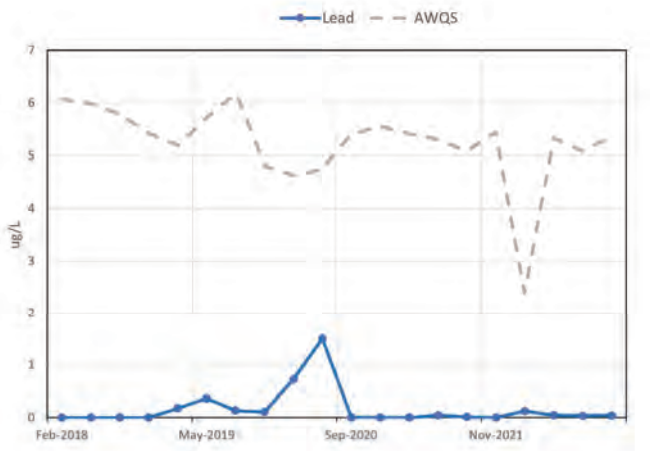

Chromium
AWQS
ug/L
12
10
8
6
4
2
0
Feb-2018
Nov-2018
Aug-2019
May-2020
Jan-2021
Jan-2022
Nov-2022

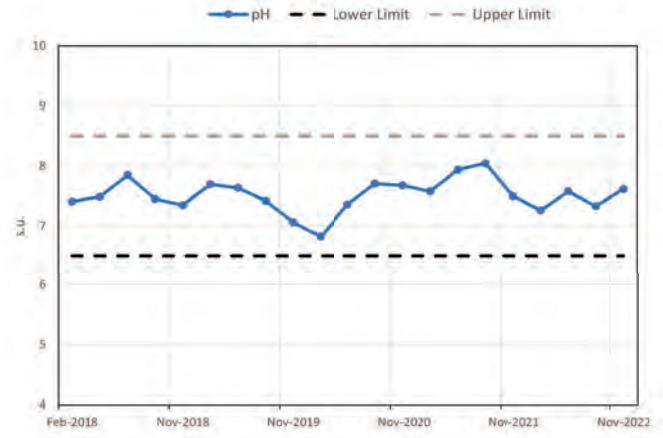

Copper
AWQS
ug/L
20
18
16
14
12
10
8
6
4
2
0
Feb-2018
May-2019
Sep-2020
Nov-2021

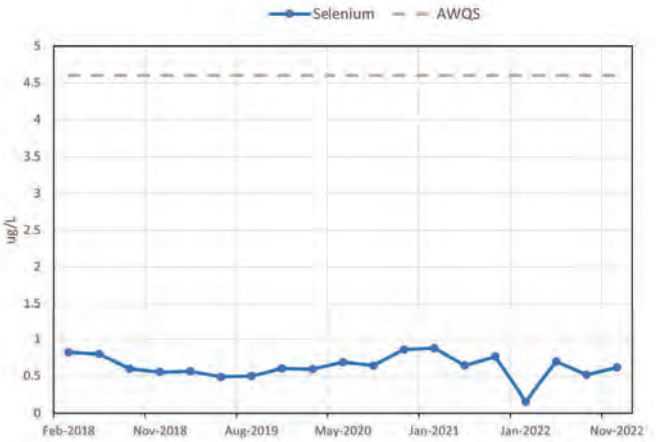

Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
0
Feb-2018
May-2019
Sep-2020
Nov-2021

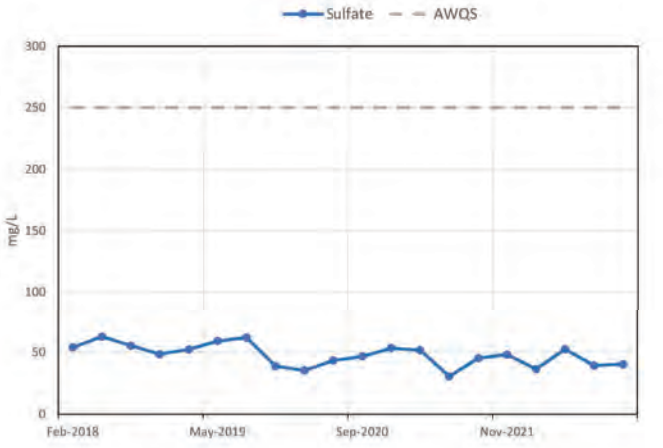
Site 57

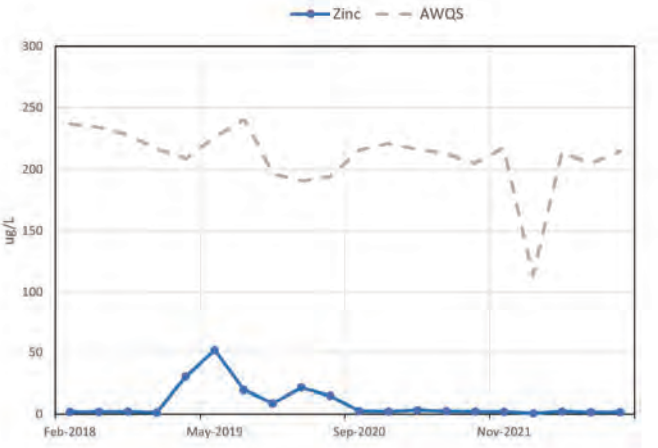

Nickel
AWQS
ug/L
120
100
80
60
40
20
0
Feb-2018
Nov-2018
Aug-2019
May-2020
Jan-2021
Jan-2022
Nov-2022


Lead
AWQS
ug/L
7
6
5
4
3
2
1
0
Feb-2018
May-2019
Sep-2020
Nov-2021

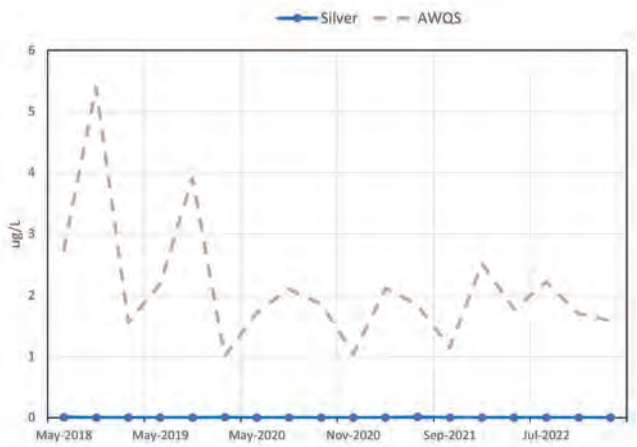

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
Feb-2018
Nov-2018
Nov-2019
Nov-2020
Nov-2021
Nov-2022

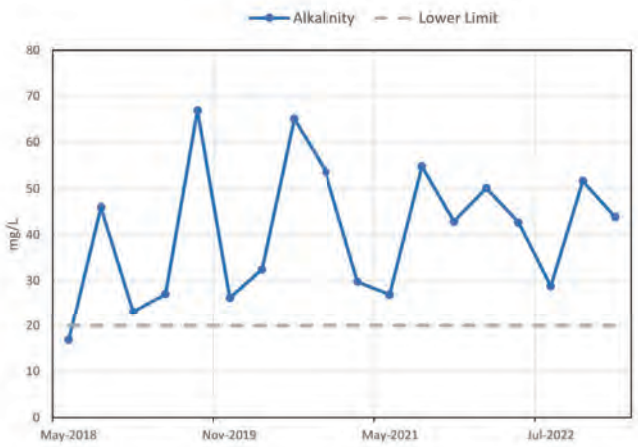

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Feb-2018
Nov-2018
Aug-2019
May-2020
Jan-2021
Jan-2022
Nov-2022

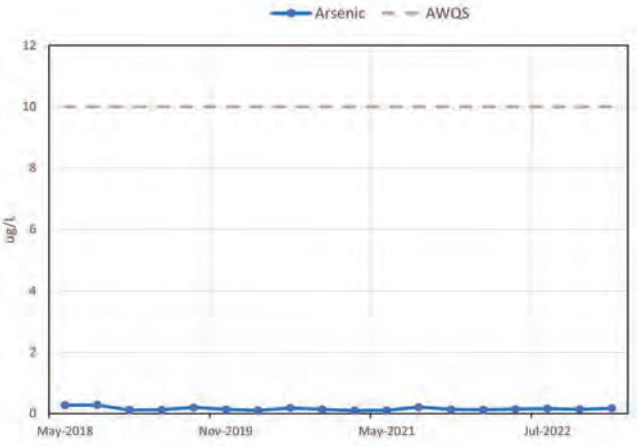

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
Feb-2018
May-2019
Sep-2020
Nov-2021

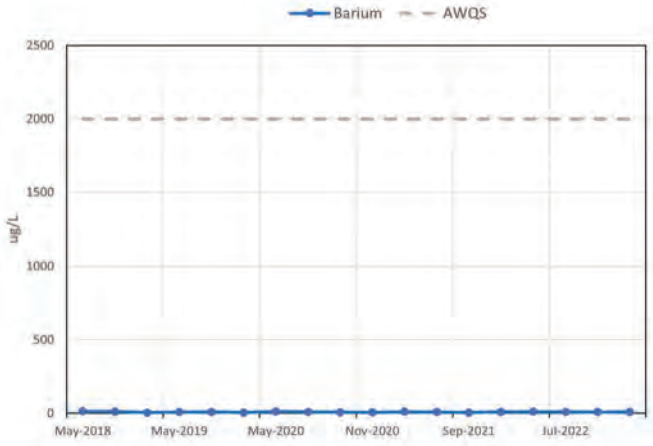

Zinc
AWQS
ug/L
300
250
200
150
100
50
0
Feb-2018
May-2019
Sep-2020
Nov-2021

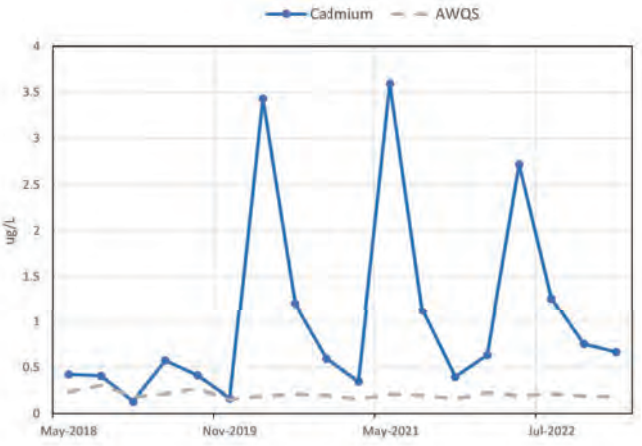
Site 13

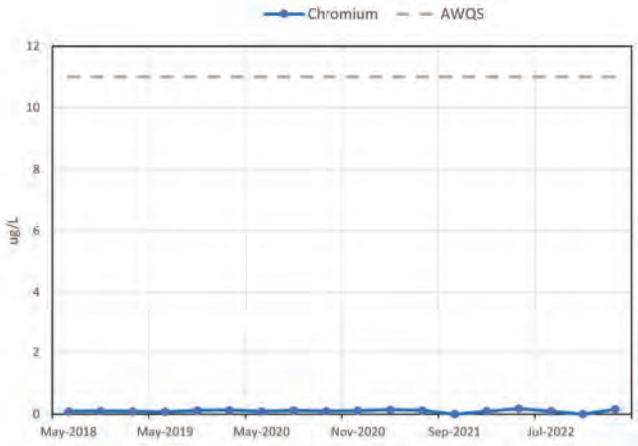

Silver
AWQS
ug/L
0
1
2
3
4
5
6
May-2018
May-2019
May-2020
Nov-2020
Sep-2021
Jul-2022

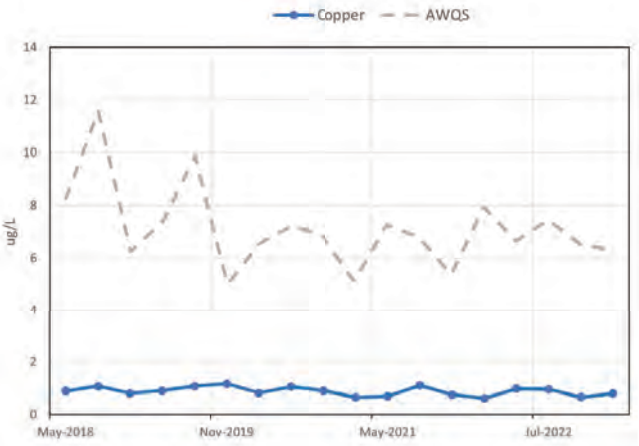

Alkalinity
Lower Limit
mg/L
0
10
20
30
40
50
60
70
80
May-2018
Nov-2019
May-2021
Jul-2022

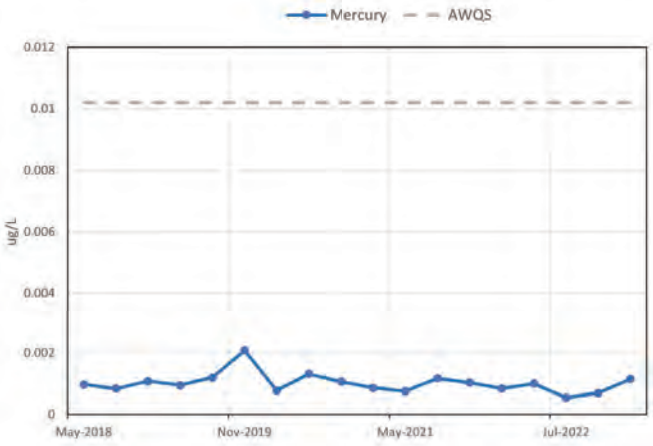

Arsenic
AWQS
ug/L
0
2
4
6
8
10
12
May-2018
Nov-2019
May-2021
Jul-2022


Barium
AWQS
ug/L
0
500
1000
1500
2000
2500
May-2018
May-2019
May-2020
Nov-2020
Sep-2021
Jul-2022

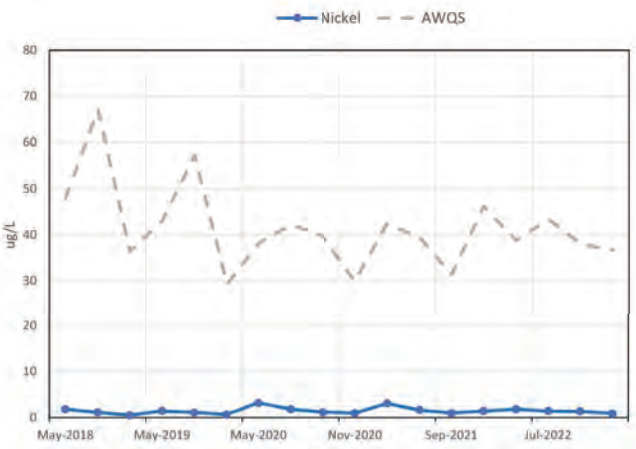

Cadmium
AWQS
ug/L
0
0.5
1
1.5
2
2.5
3
3.5
4
May-2018
Nov-2019
May-2021
Jul-2022

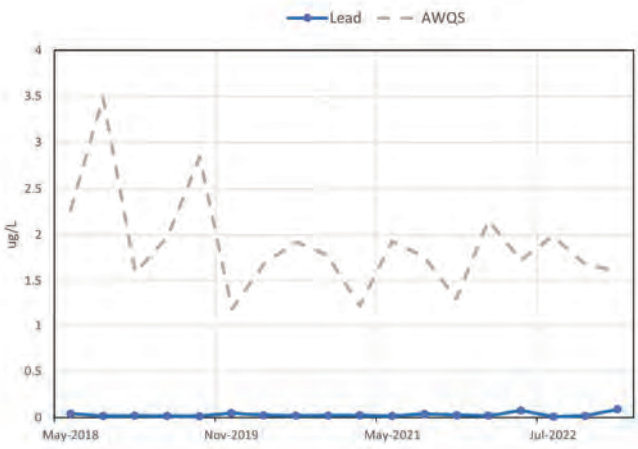

Chromium
AWQS
ug/L
0
2
4
6
8
10
12
May-2018
May-2019
May-2020
Nov-2020
Sep-2021
Jul-2022

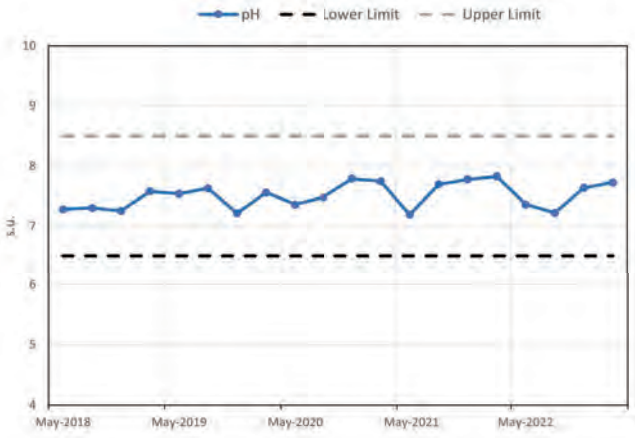

Copper
AWQS
ug/L
0
2
4
6
8
10
12
14
May-2018
Nov-2019
May-2021
Jul-2022

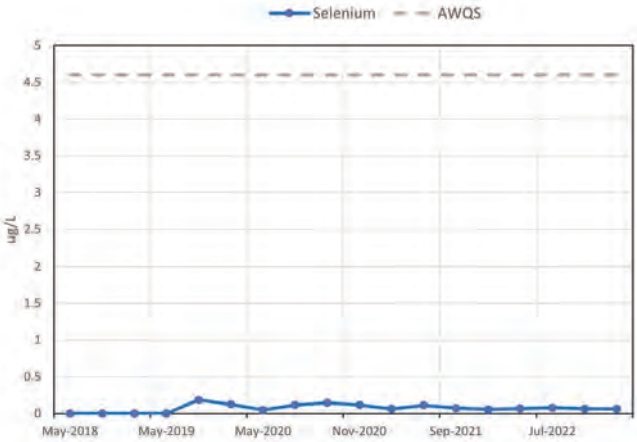

Mercury
AWQS
ug/L
0
0.002
0.004
0.006
0.008
0.01
0.012
May-2018
Nov-2019
May-2021
Jul-2022

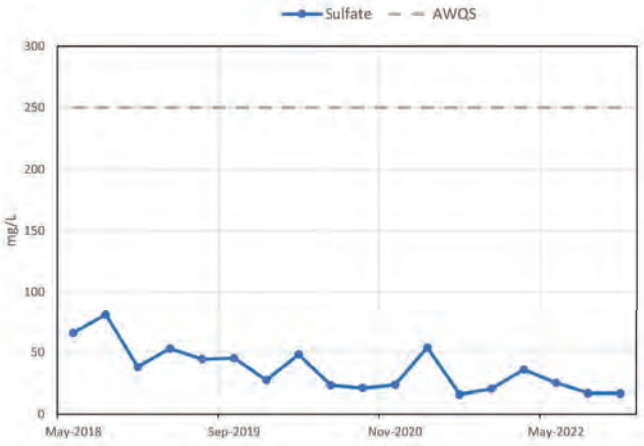
Site 13

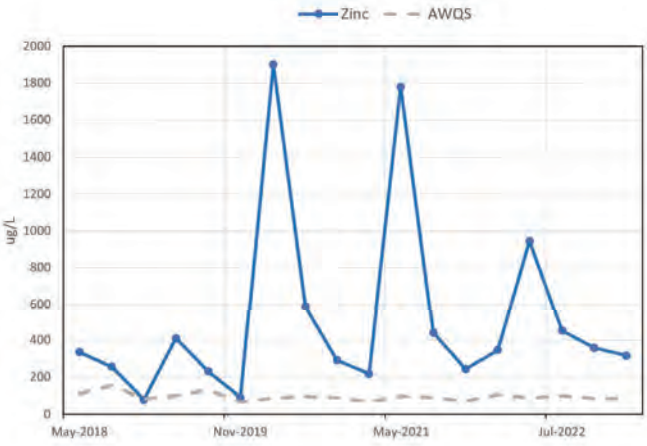

Nickel
AWQS
ug/L
80
70
60
50
40
30
20
10
0
May-2018
May-2019
May-2020
Nov-2020
Sep-2021
Jul-2022


Lead
AWQS
ug/L
4
3.5
3
2.5
2
1.5
1
0.5
0
May-2018
Nov-2019
May-2021
Jul-2022

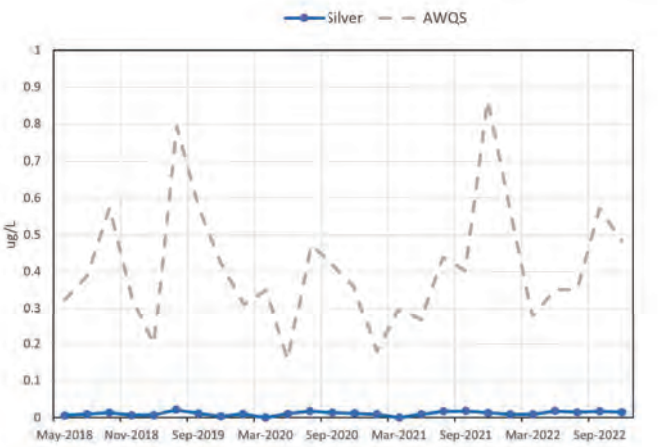

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
May-2018
May-2019
May-2020
May-2021
May-2022

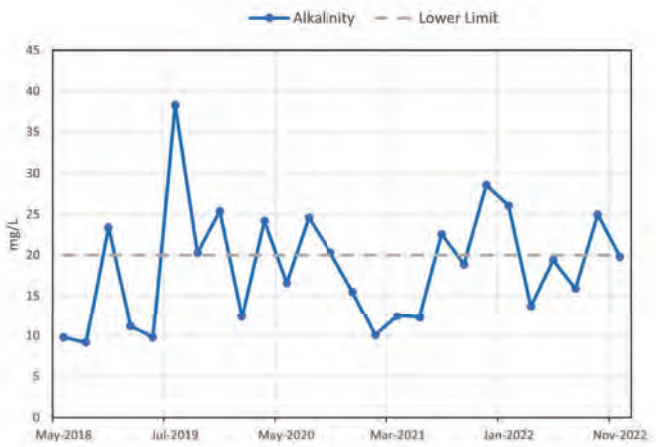

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
May-2018
May-2019
May-2020
Nov-2020
Sep-2021
Jul-2022

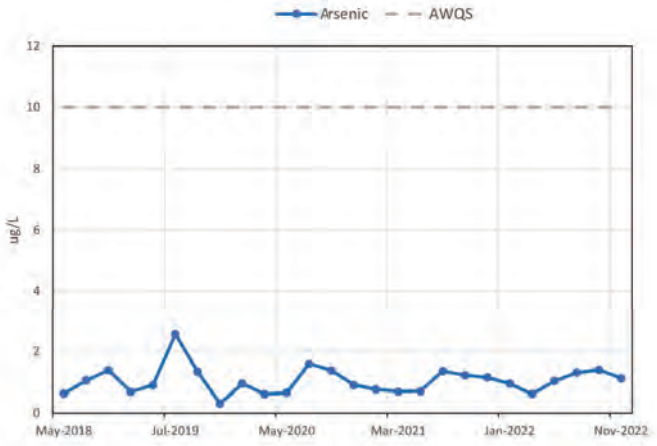

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
May-2018
Sep-2019
Nov-2020
May-2022

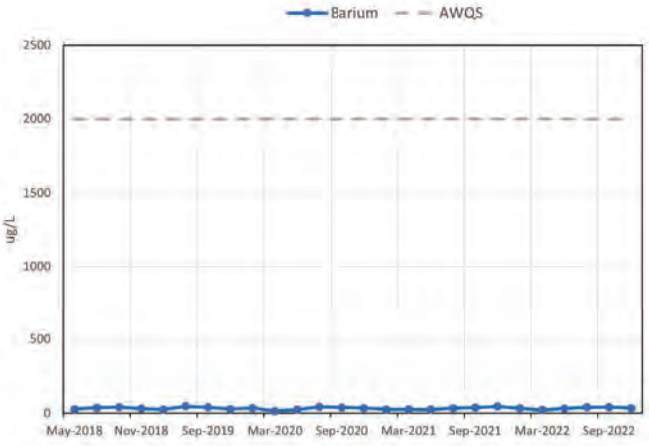

Zinc
AWQS
ug/L
2000
1800
1600
1400
1200
1000
800
600
400
200
0
May-2018
Nov-2019
May-2021
Jul-2022

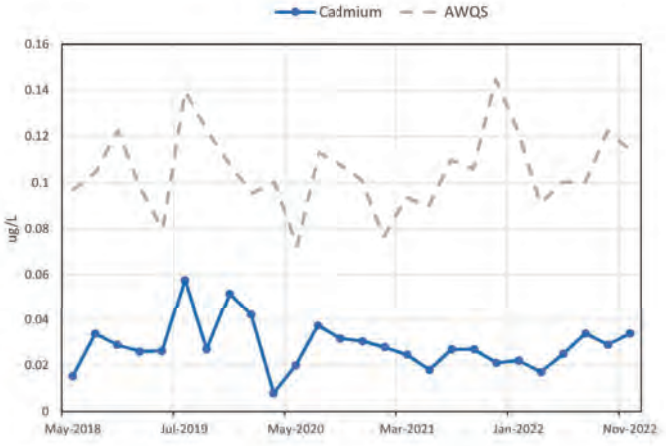
Site 9

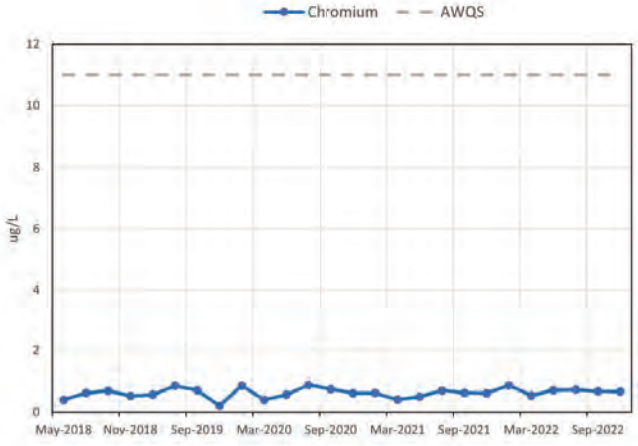

Silver
AWQS
ug/L
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
May-2018
Nov-2018
Sep-2019
Mar-2020
Sep-2020
Mar-2021
Sep-2021
Mar-2022
Sep-2022

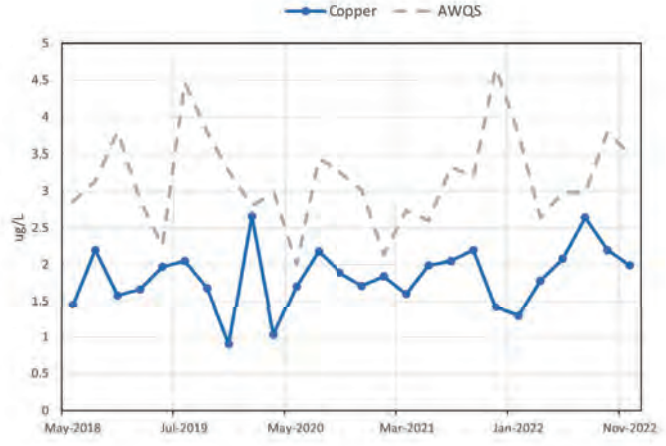

Alkalinity
Lower Limit
mg/L
45
40
35
30
25
20
15
10
5
0
May-2018
Jul-2019
May-2020
Mar-2021
Jan-2022
Nov-2022

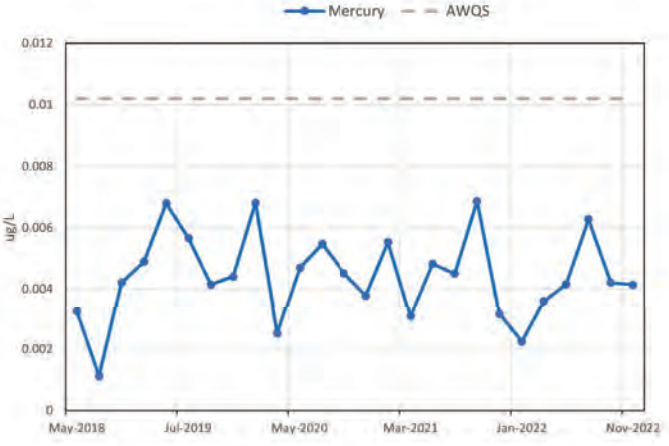

Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
May-2018
Jul-2019
May-2020
Mar-2021
Jan-2022
Nov-2022


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
May-2018
Nov-2018
Sep-2019
Mar-2020
Sep-2020
Mar-2021
Sep-2021
Mar-2022
Sep-2022

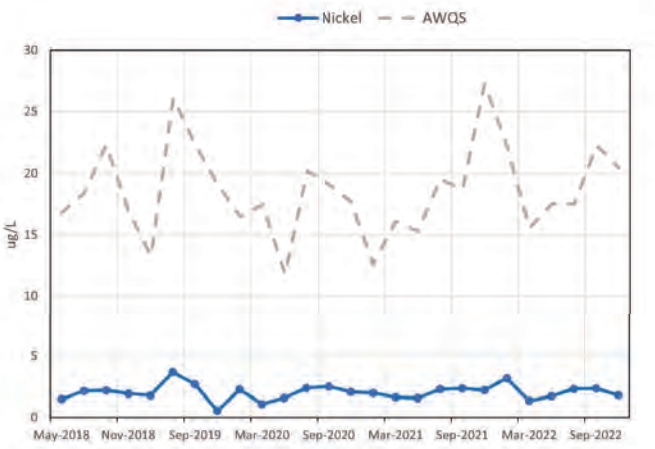

Cadmium
AWQS
ug/L
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
May-2018
Jul-2019
May-2020
Mar-2021
Jan-2022
Nov-2022

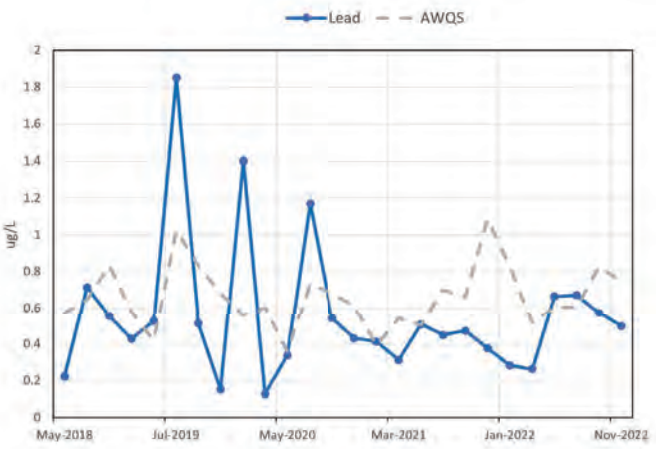

Chromium
AWQS
ug/L
12
10
8
6
4
2
0
May-2018
Nov-2018
Sep-2019
Mar-2020
Sep-2020
Mar-2021
Sep-2021
Mar-2022
Sep-2022

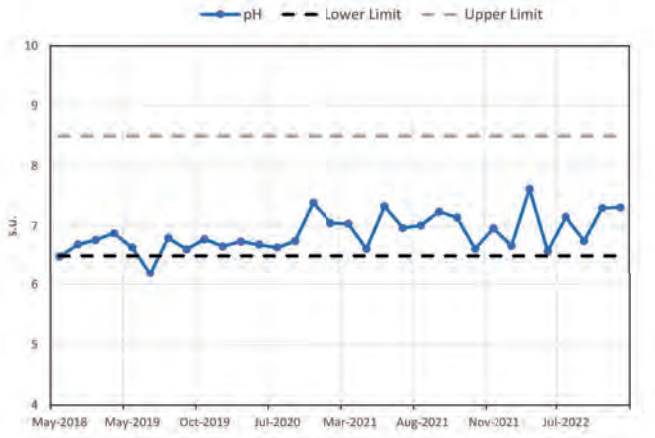

Copper
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
May-2018
Jul-2019
May-2020
Mar-2021
Jan-2022
Nov-2022

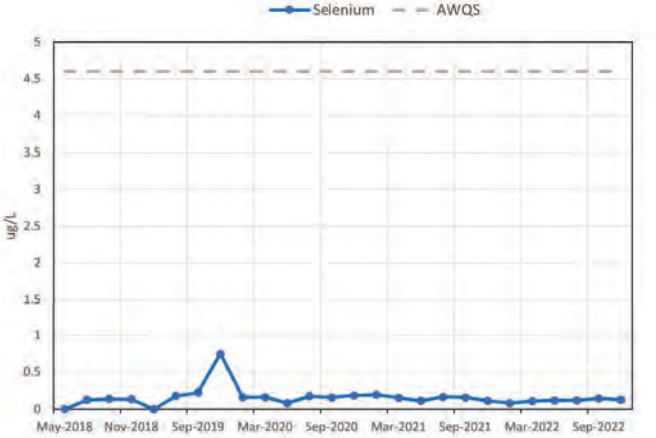

Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
0
May-2018
Jul-2019
May-2020
Mar-2021
Jan-2022
Nov-2022

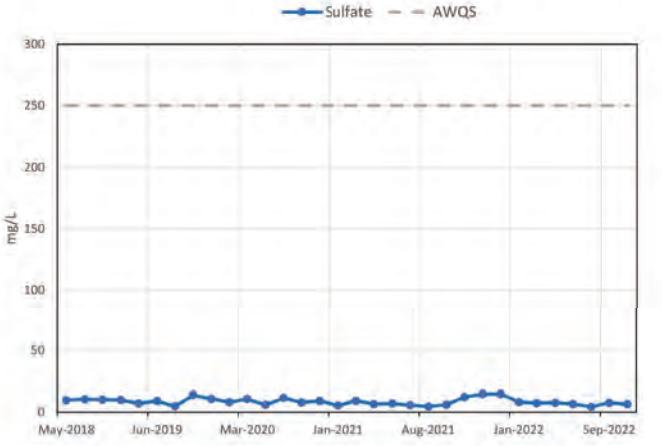
Site 9

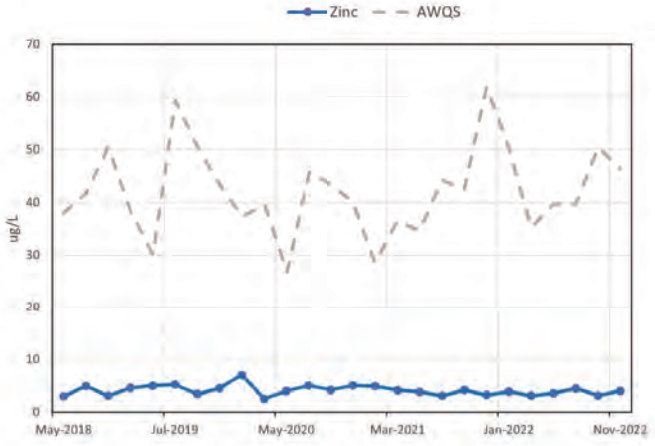

Nickel
AWQS
ug/L
30
25
20
15
10
5
0
May-2018
Nov-2018
Sep-2019
Mar-2020
Sep-2020
Mar-2021
Sep-2021
Mar-2022
Sep-2022


Lead
AWQS
ug/L
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
May-2018
Jul-2019
May-2020
Mar-2021
Jan-2022
Nov-2022

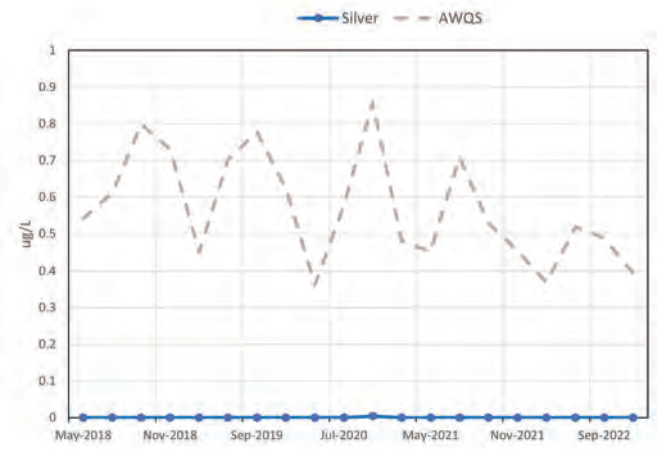

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
May-2018
May-2019
Oct-2019
Jul-2020
Mar-2021
Aug-2021
Nov-2021
Jul-2022

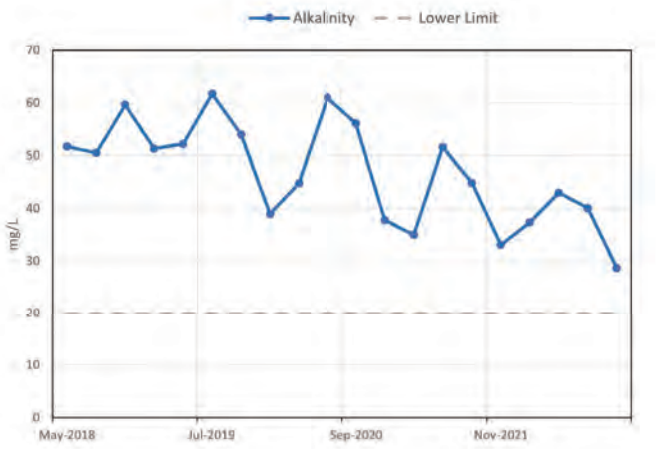

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
May-2018
Nov-2018
Sep-2019
Mar-2020
Sep-2020
Mar-2021
Sep-2021
Mar-2022
Sep-2022

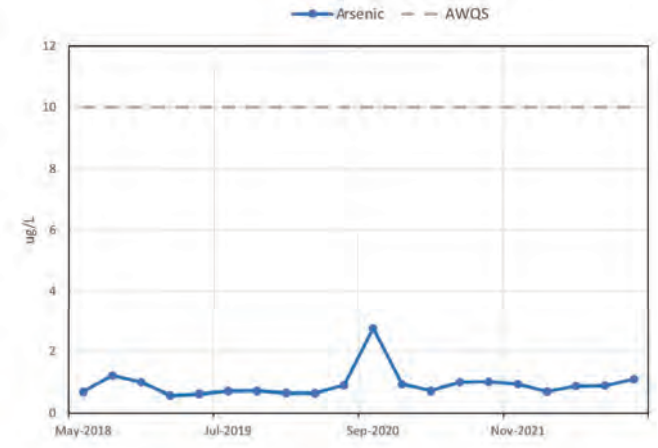

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
May-2018
Jun-2019
Mar-2020
Jan-2021
Aug-2021
Jan-2022
Sep-2022

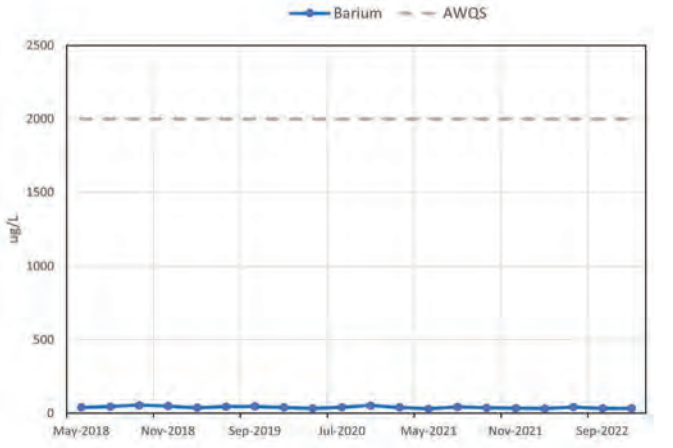

Zinc
AWQS
ug/L
70
60
50
40
30
20
10
0
May-2018
Jul-2019
May-2020
Mar-2021
Jan-2022
Nov-2022

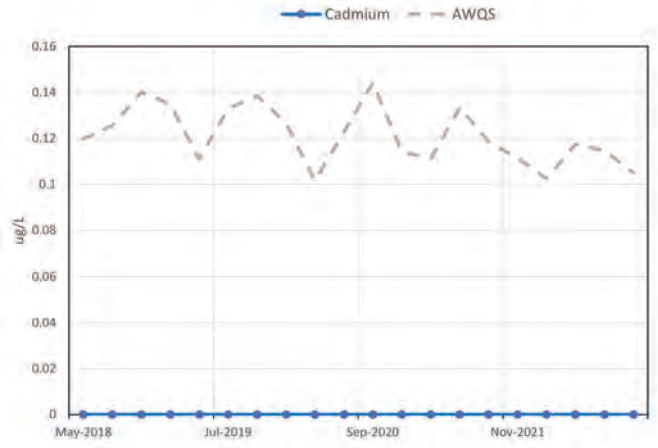
Site 27

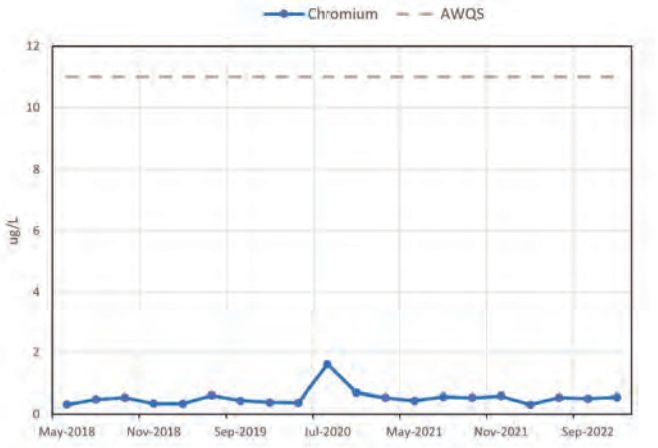

Silver
AWQS
ug/L
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

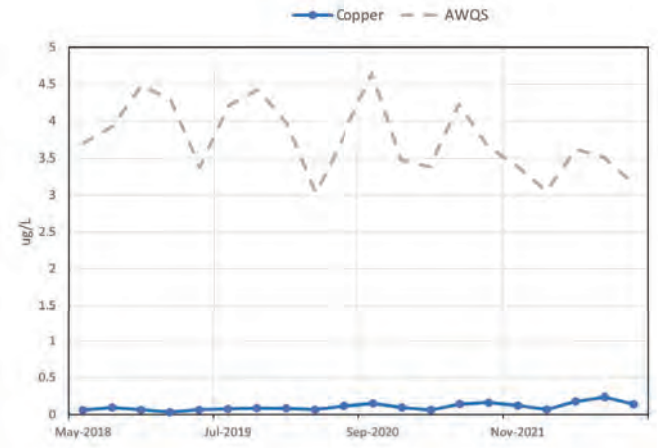

Alkalinity
Lower Limit
mg/L
70
60
50
40
30
20
10
0
May-2018
Jul-2019
Sep-2020
Nov-2021

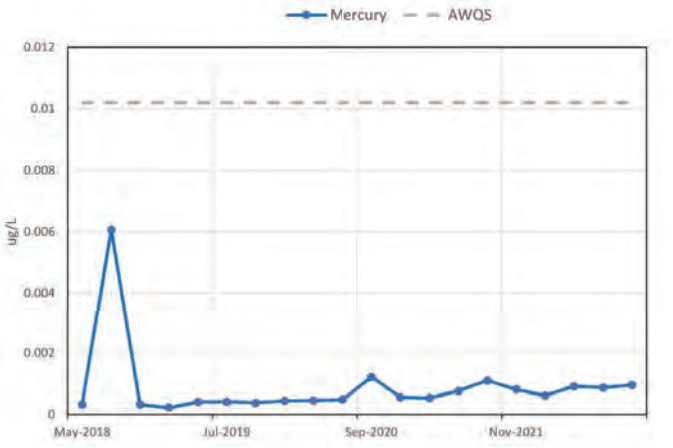

Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
May-2018
Jul-2019
Sep-2020
Nov-2021


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

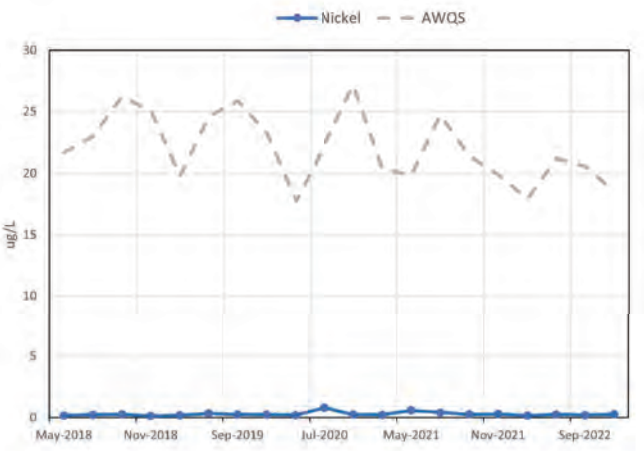

Cadmium
AWQS
ug/L
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
May-2018
Jul-2019
Sep-2020
Nov-2021

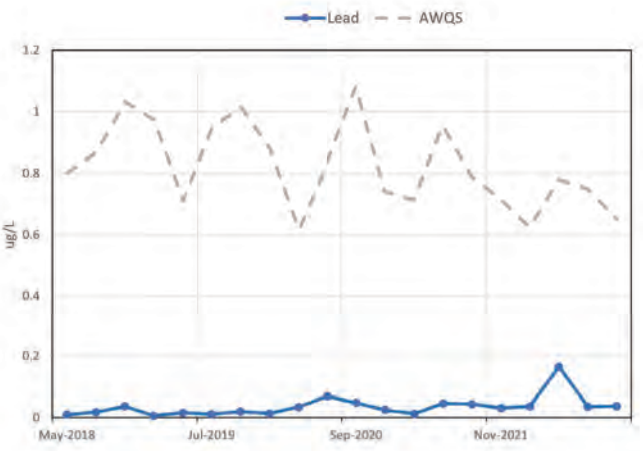

Chromium
AWQS
ug/L
12
10
8
6
4
2
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

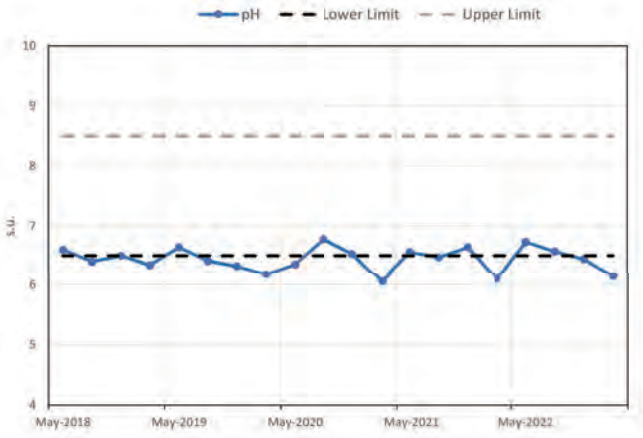

Copper
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
May-2018
Jul-2019
Sep-2020
Nov-2021

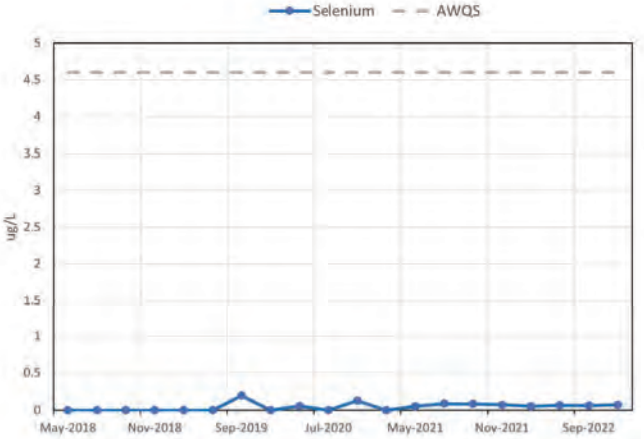

Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
0
May-2018
Jul-2019
Sep-2020
Nov-2021

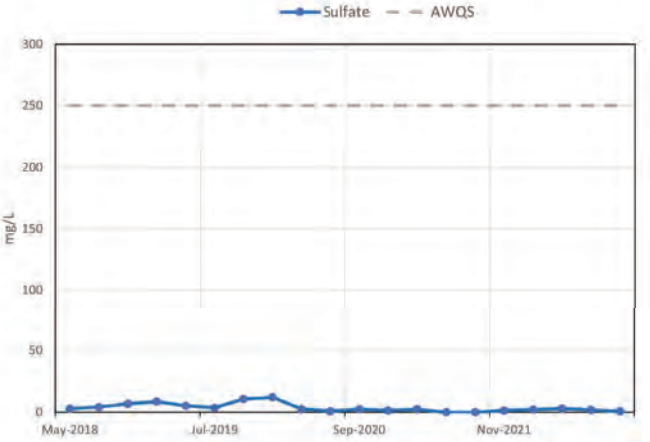
Site 27

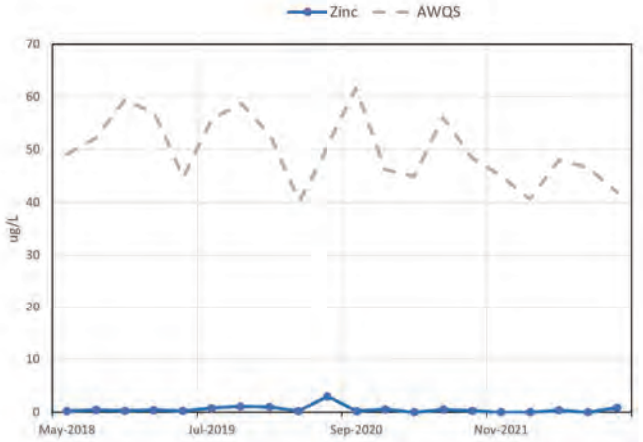

Nickel
AWQS
ug/L
30
25
20
15
10
5
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022


Lead
AWQS
ug/L
1.2
1
0.8
0.6
0.4
0.2
0
May-2018
Jul-2019
Sep-2020
Nov-2021


pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
May-2018
May-2019
May-2020
May-2021
May-2022

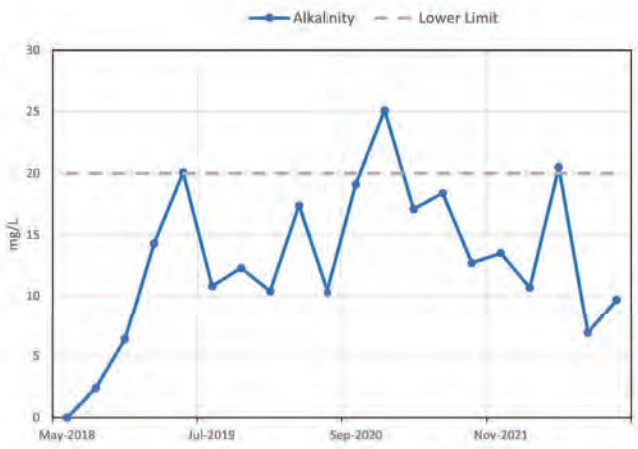

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

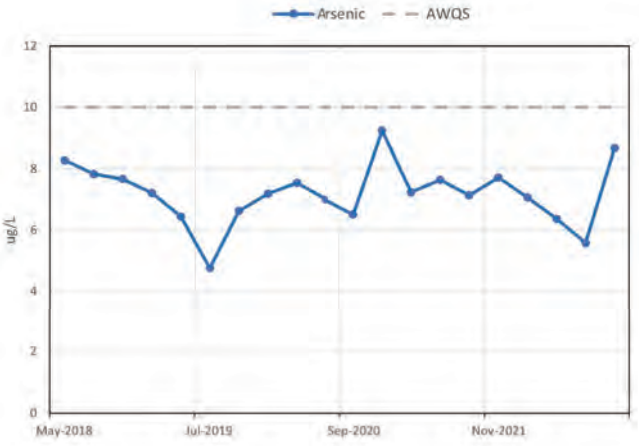

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
May-2018
Jul-2019
Sep-2020
Nov-2021


Zinc
AWQS
ug/L
70
60
50
40
30
20
10
0
May-2018
Jul-2019
Sep-2020
Nov-2021

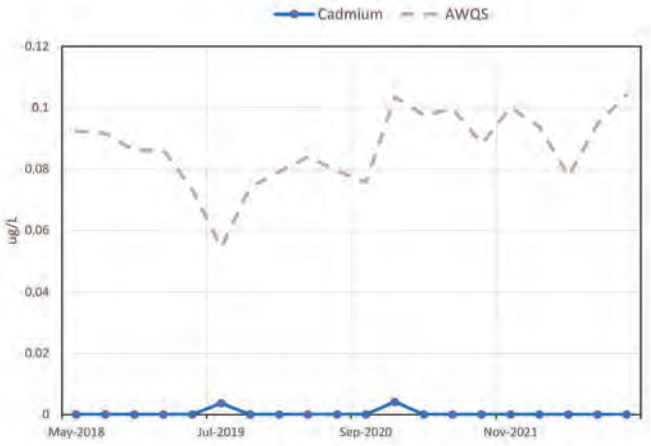
Site 29

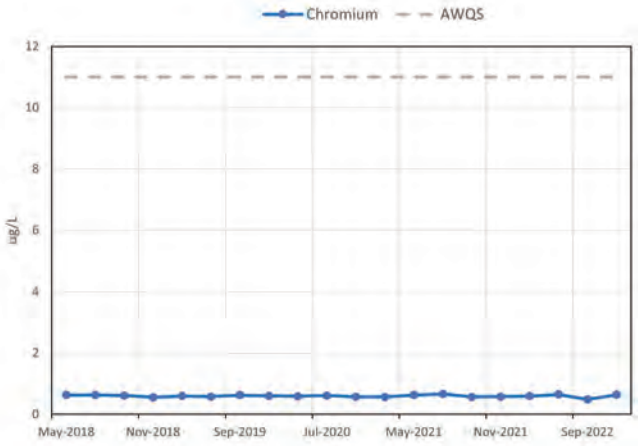

Silver
AWQS
ug/L
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

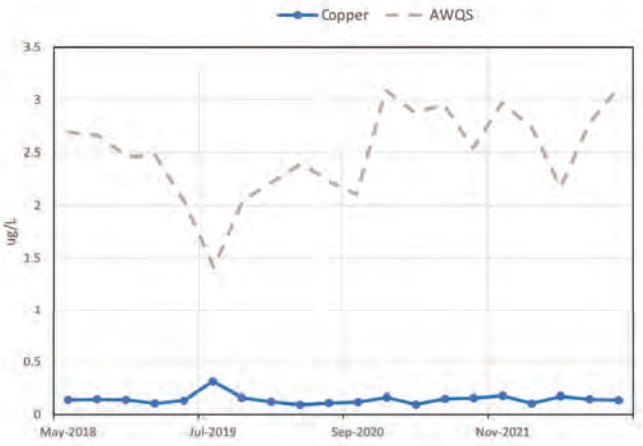

Alkalinity
Lower Limit
mg/L
30
25
20
15
10
5
0
May-2018
Jul-2019
Sep-2020
Nov-2021

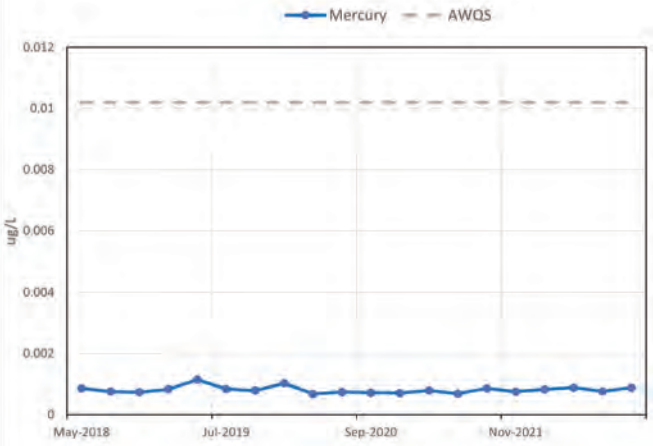

Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
May-2018
Jul-2019
Sep-2020
Nov-2021


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

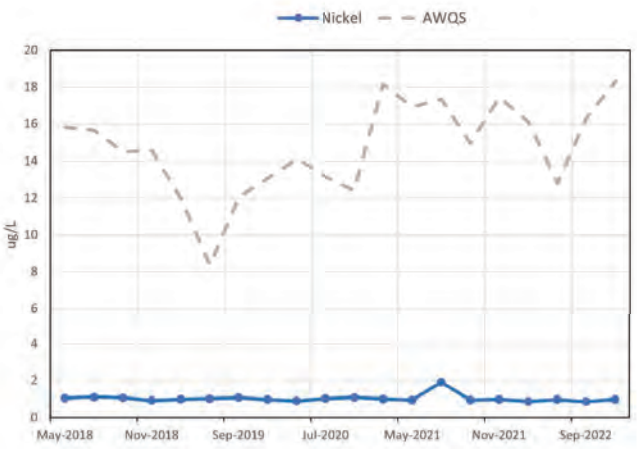

Cadmium
AWQS
ug/L
0.12
0.1
0.08
0.06
0.04
0.02
0
May-2018
Jul-2019
Sep-2020
Nov-2021

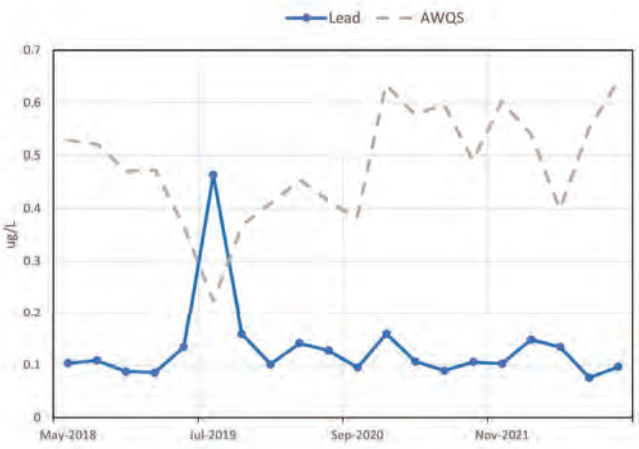

Chromium
AWQS
ug/L
12
10
8
6
4
2
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

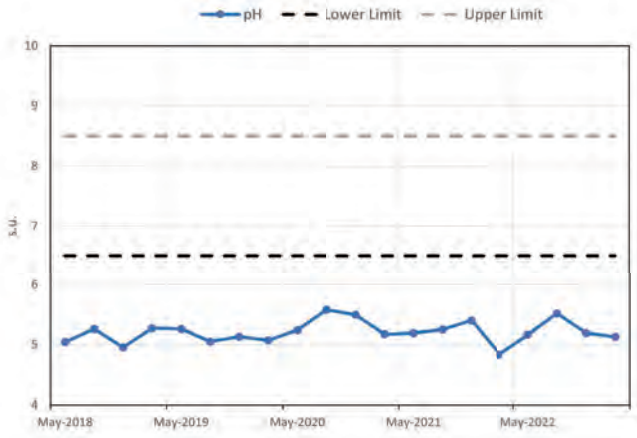

Copper
AWQS
ug/L
3.5
3
2.5
2
1.5
1
0.5
0
May-2018
Jul-2019
Sep-2020
Nov-2021

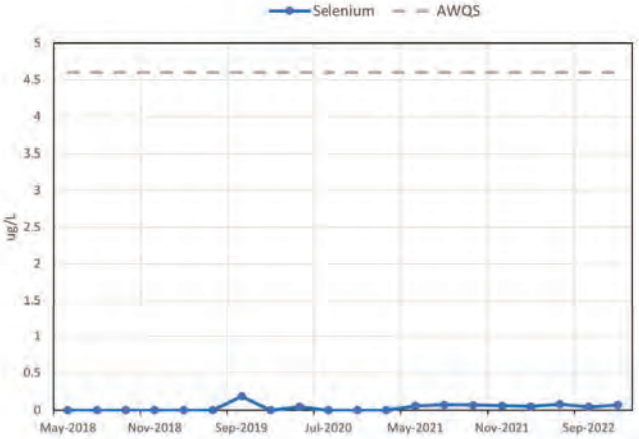

Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
0
May-2018
Jul-2019
Sep-2020
Nov-2021

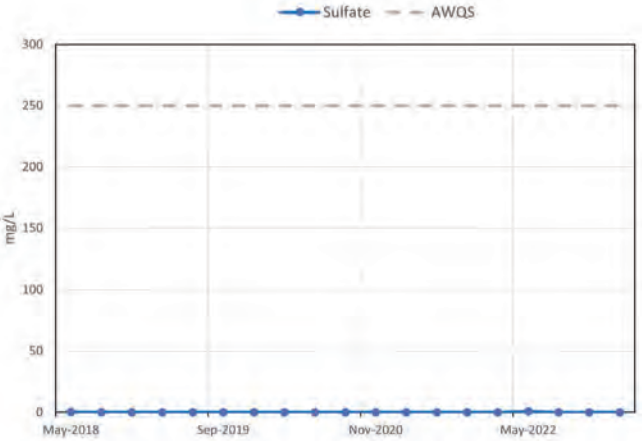
Site 29

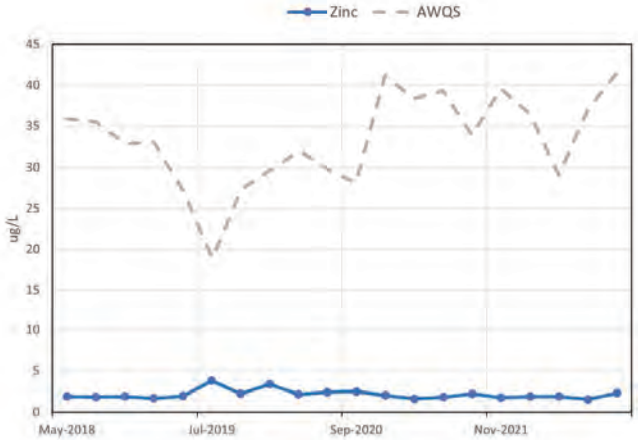

Nickel
AWQS
ug/L
20
18
16
14
12
10
8
6
4
2
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

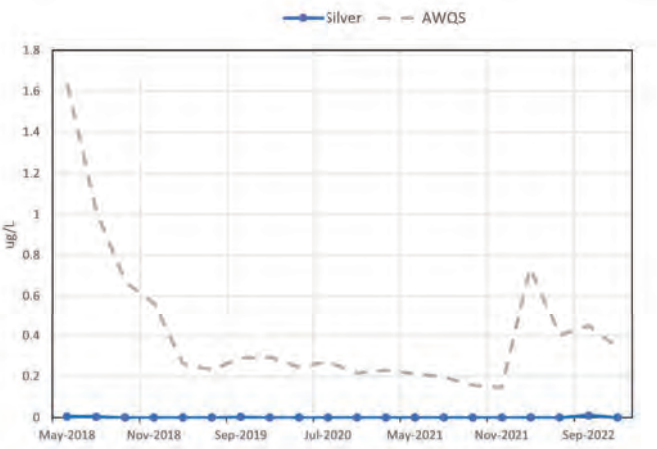

Lead
AWQS
ug/L
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
May-2018
Jul-2019
Sep-2020
Nov-2021

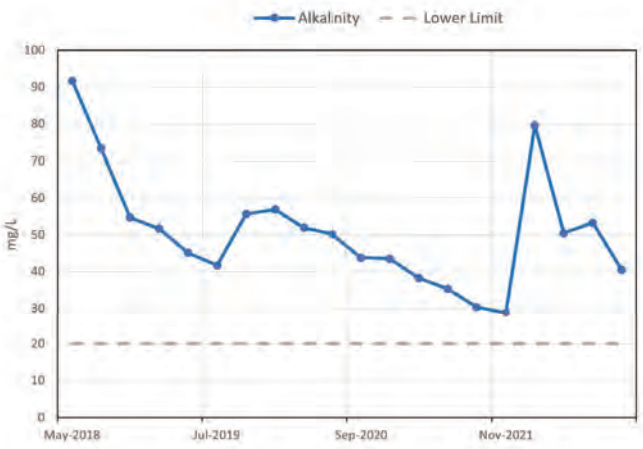

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
May-2018
May-2019
May-2020
May-2021
May-2022

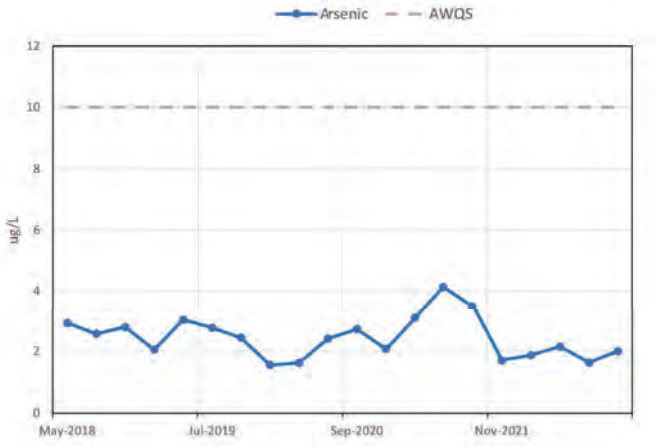

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

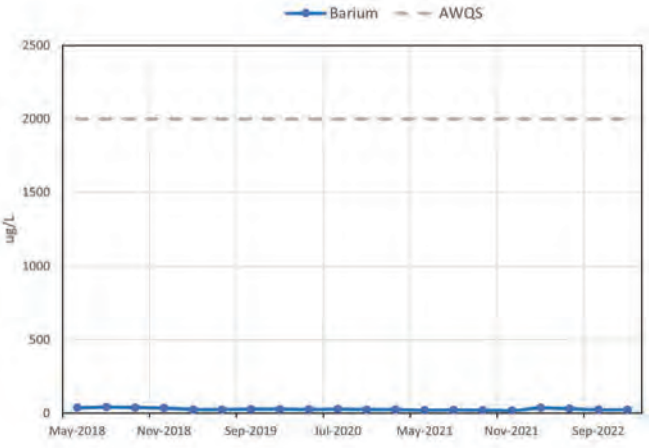

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
May-2018
Sep-2019
Nov-2020
May-2022

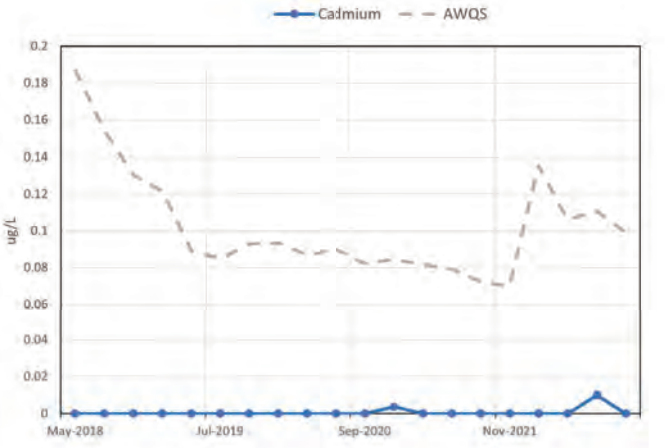

Zinc
AWQS
ug/L
45
40
35
30
25
20
15
10
5
0
May-2018
Jul-2019
Sep-2020
Nov-2021

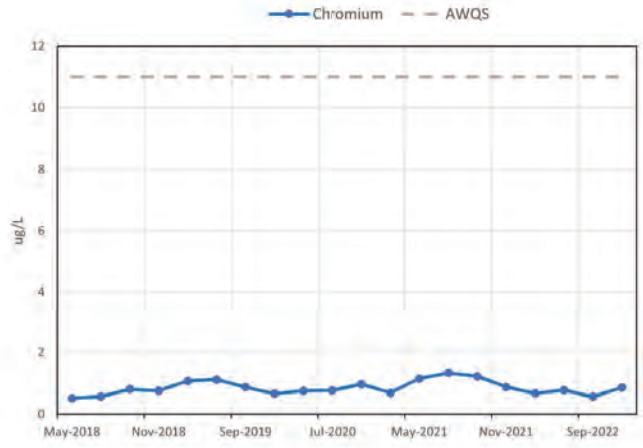

Silver
AWQS
ug/L
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

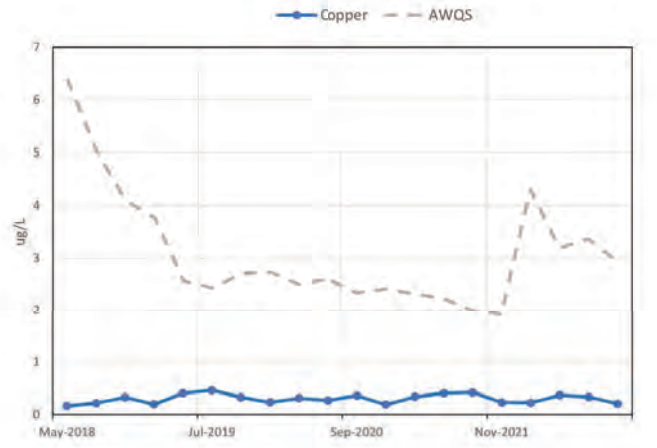

Alkalinity
Lower Limit
mg/L
100
90
80
70
60
50
40
30
20
10
0
May-2018
Jul-2019
Sep-2020
Nov-2021

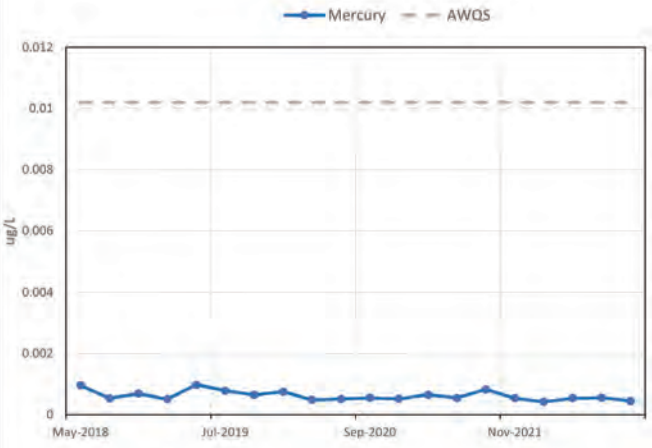

Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
May-2018
Jul-2019
Sep-2020
Nov-2021


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

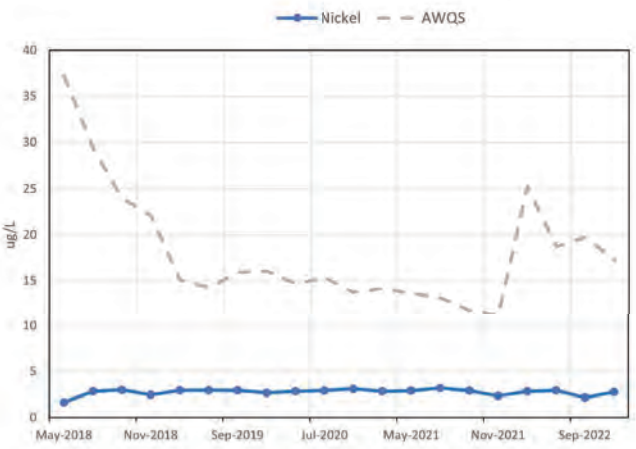

Cadmium
AWQS
ug/L
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
May-2018
Jul-2019
Sep-2020
Nov-2021

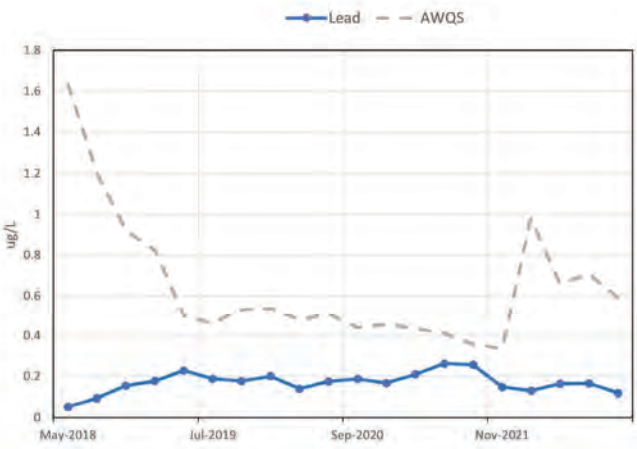

Chromium
AWQS
ug/L
12
10
8
6
4
2
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

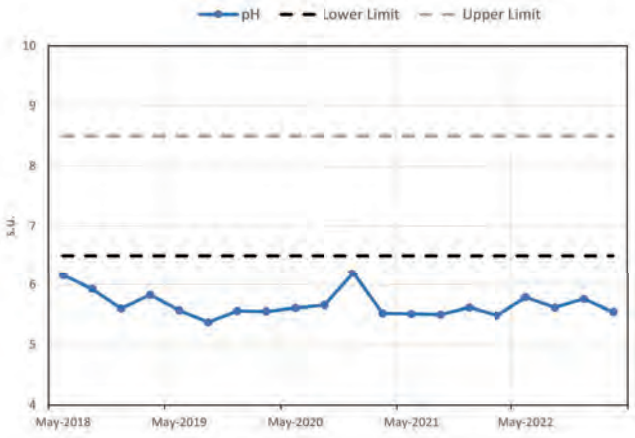

Copper
AWQS
ug/L
7
6
5
4
3
2
1
0
May-2018
Jul-2019
Sep-2020
Nov-2021

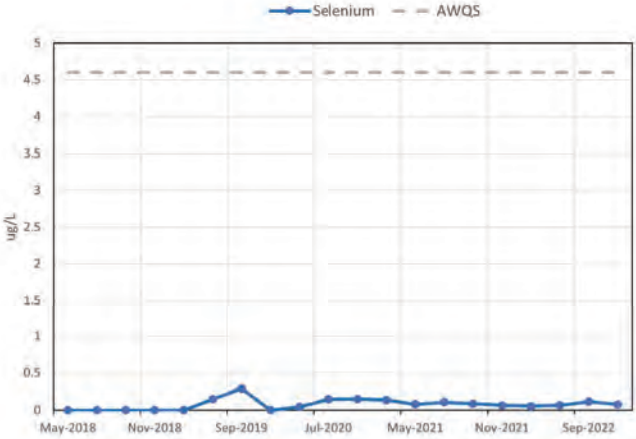

Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
0
May-2018
Jul-2019
Sep-2020
Nov-2021

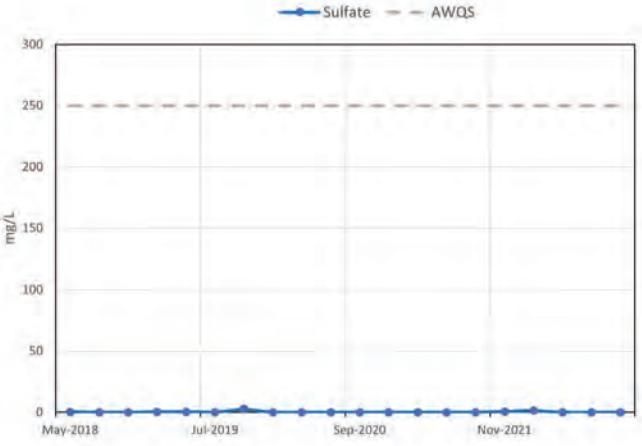
Site 32

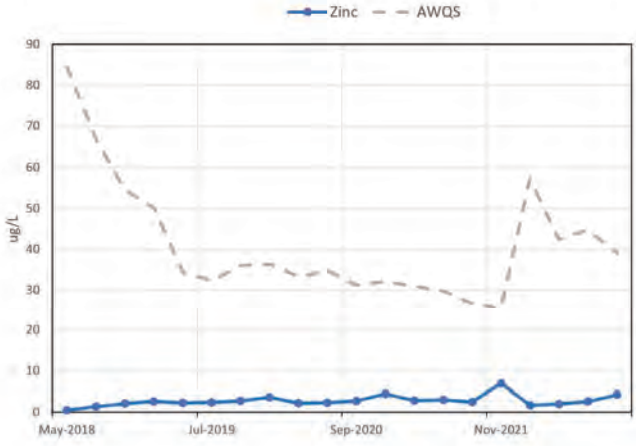

Nickel
AWQS
ug/L
40
35
30
25
20
15
10
5
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022


Lead
AWQS
ug/L
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
May-2018
Jul-2019
Sep-2020
Nov-2021

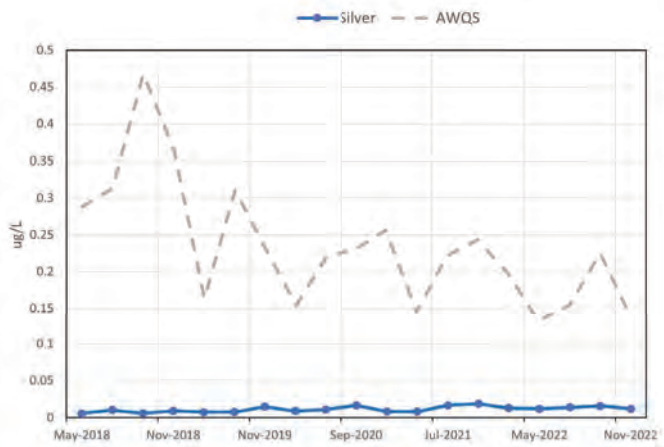

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
May-2018
May-2019
May-2020
May-2021
May-2022

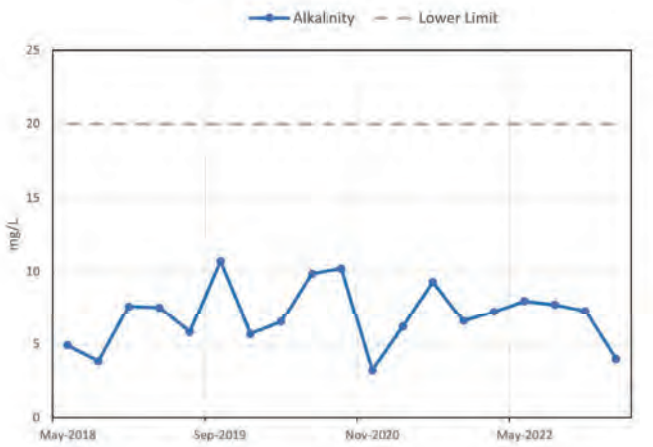

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

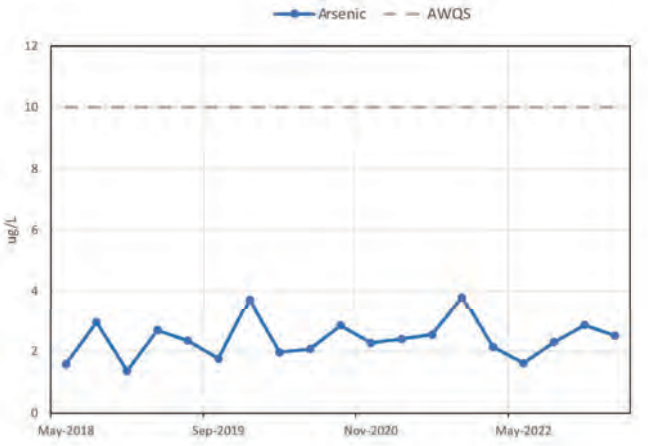

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
May-2018
Jul-2019
Sep-2020
Nov-2021

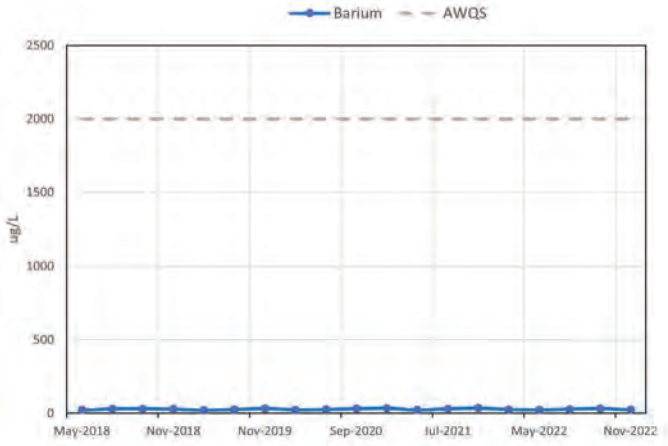

Zinc
AWQS
ug/L
90
80
70
60
50
40
30
20
10
0
May-2018
Jul-2019
Sep-2020
Nov-2021

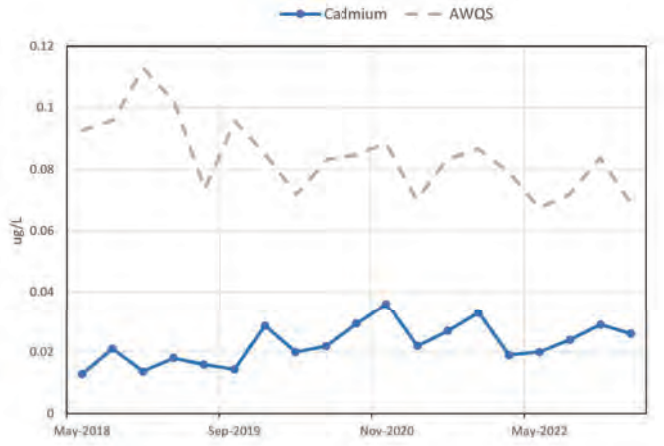
Site 60

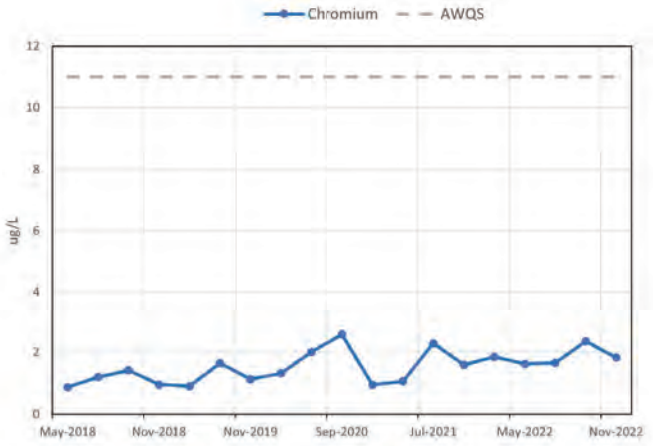

Silver
AWQS
ug/L
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
May-2018
Nov-2018
Nov-2019
Sep-2020
Jul-2021
May-2022
Nov-2022

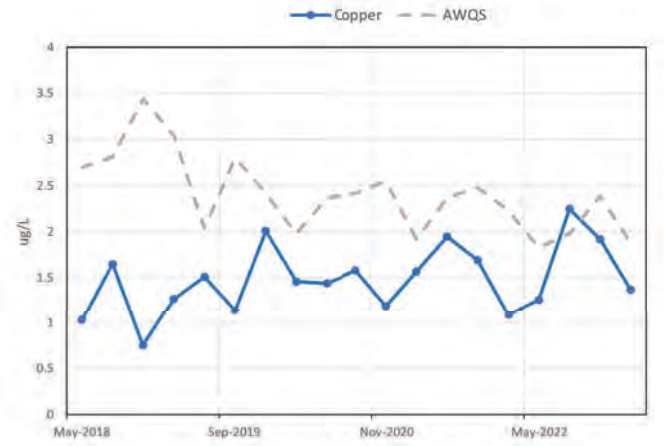

Alkalinity
Lower Limit
mg/L
25
20
15
10
5
0
May-2018
Sep-2019
Nov-2020
May-2022

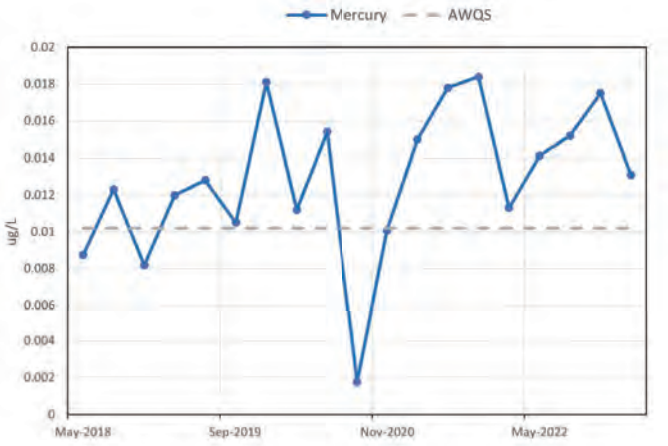

Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
May-2018
Sep-2019
Nov-2020
May-2022


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
May-2018
Nov-2018
Nov-2019
Sep-2020
Jul-2021
May-2022
Nov-2022

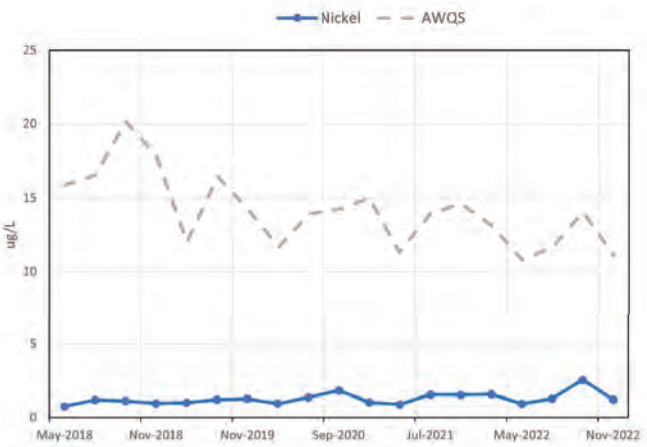

Cadmium
AWQS
ug/L
0.12
0.1
0.08
0.06
0.04
0.02
0
May-2018
Sep-2019
Nov-2020
May-2022

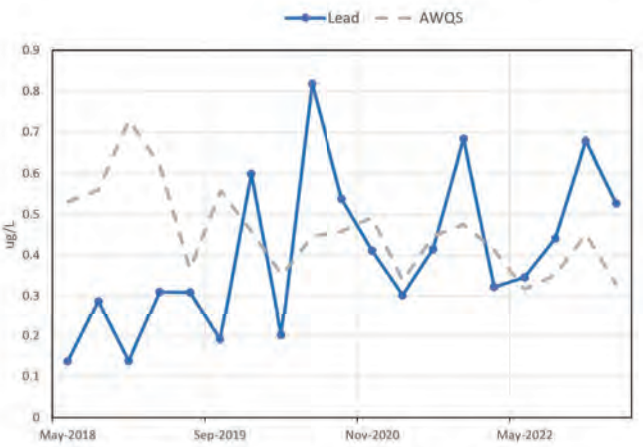

Chromium
AWQS
ug/L
12
10
8
6
4
2
0
May-2018
Nov-2018
Nov-2019
Sep-2020
Jul-2021
May-2022
Nov-2022

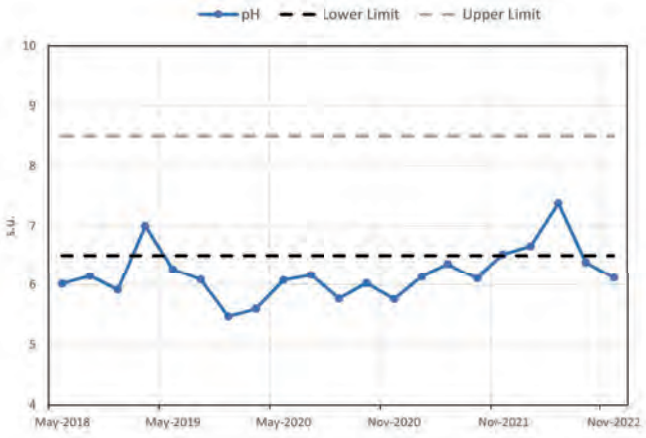

Copper
AWQS
ug/L
4
3.5
3
2.5
2
1.5
1
0.5
0
May-2018
Sep-2019
Nov-2020
May-2022

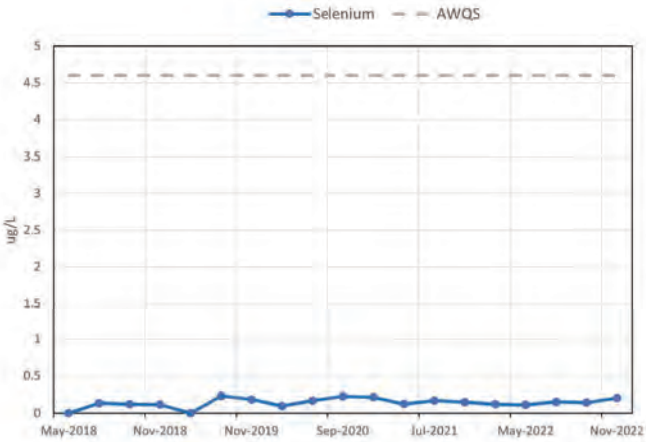

Mercury
AWQS
ug/L
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
May-2018
Sep-2019
Nov-2020
May-2022

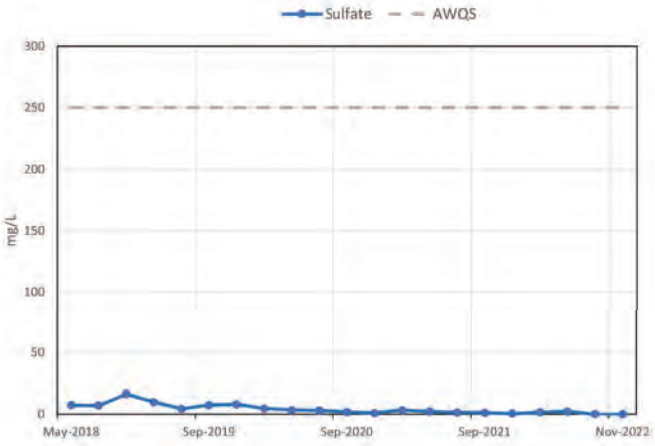
Site 60

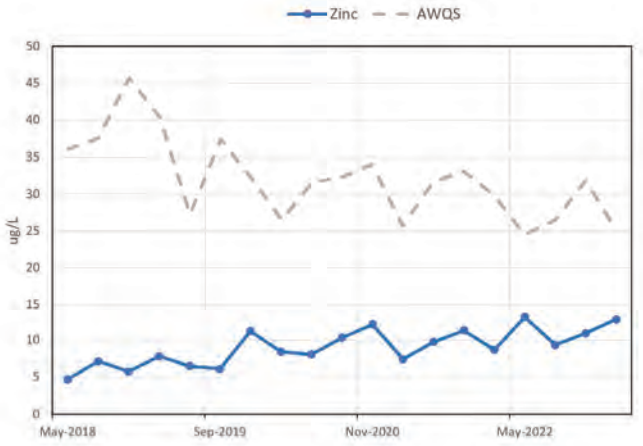

Nickel
AWQS
ug/L
25
20
15
10
5
0
May-2018
Nov-2018
Nov-2019
Sep-2020
Jul-2021
May-2022
Nov-2022


Lead
AWQS
ug/L
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
May-2018
Sep-2019
Nov-2020
May-2022

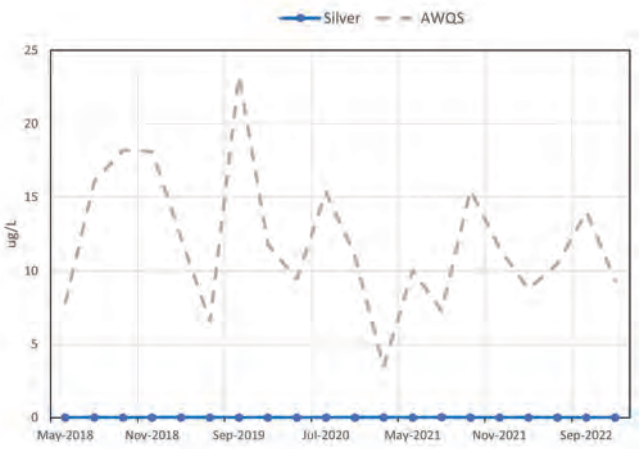

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
May-2018
May-2019
May-2020
Nov-2020
Nov-2021
Nov-2022

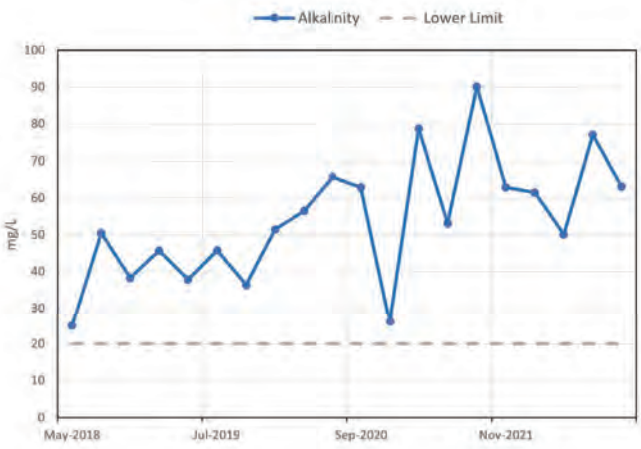

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
May-2018
Nov-2018
Nov-2019
Sep-2020
Jul-2021
May-2022
Nov-2022

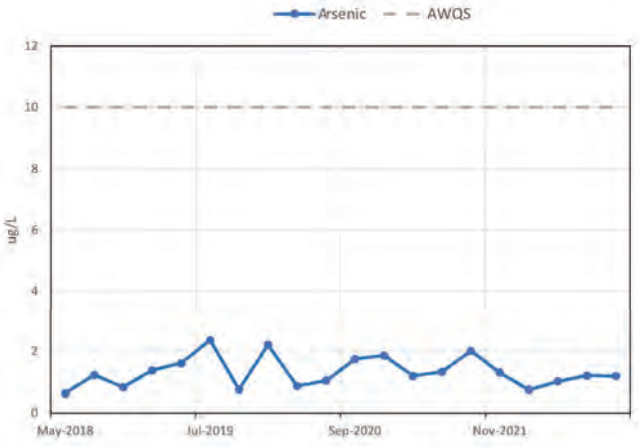

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
May-2018
Sep-2019
Sep-2020
Sep-2021
Nov-2022

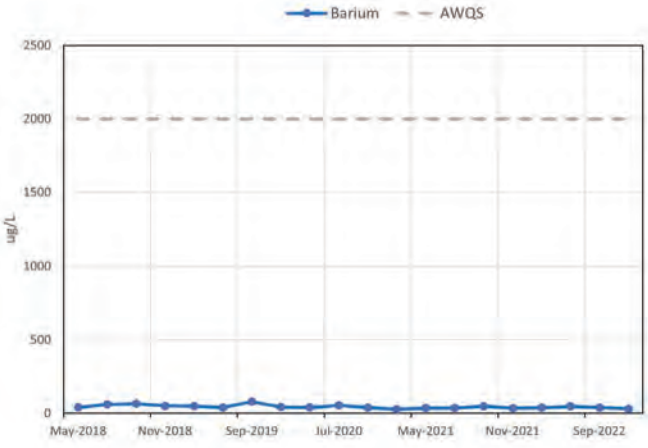

Zinc
AWQS
ug/L
50
45
40
35
30
25
20
15
10
5
0
May-2018
Sep-2019
Nov-2020
May-2022

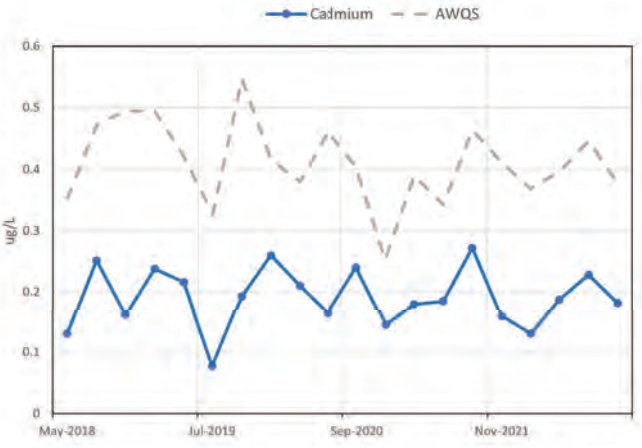
Site 609

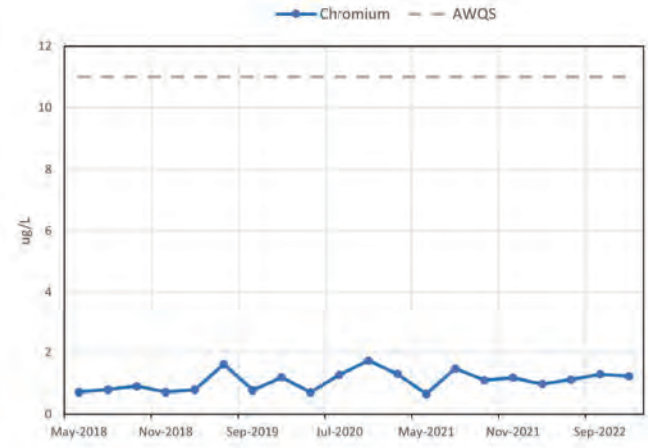

Silver
AWQS
ug/L
25
20
15
10
5
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

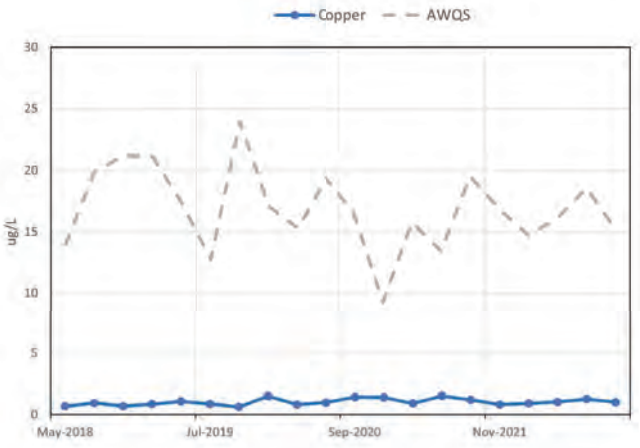

Alkalinity
Lower Limit
mg/L
100
90
80
70
60
50
40
30
20
10
0
May-2018
Jul-2019
Sep-2020
Nov-2021

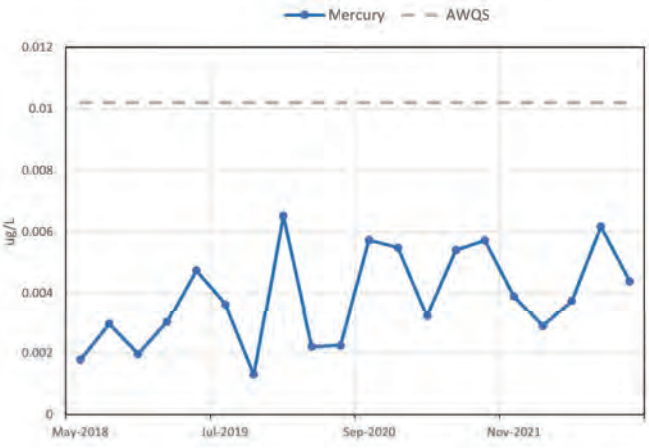

Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
May-2018
Jul-2019
Sep-2020
Nov-2021


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

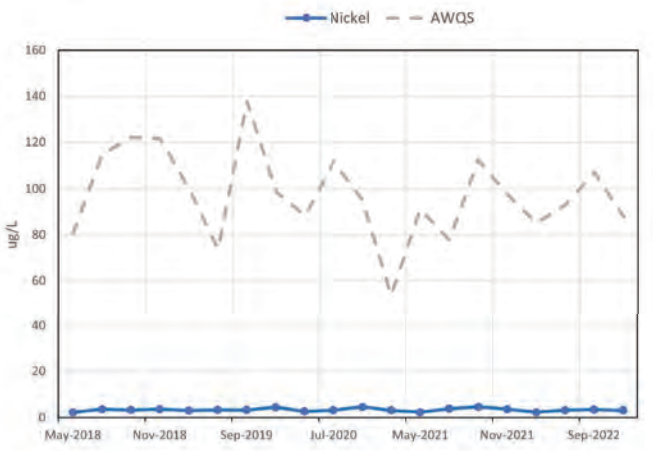

Cadmium
AWQS
ug/L
0.6
0.5
0.4
0.3
0.2
0.1
0
May-2018
Jul-2019
Sep-2020
Nov-2021

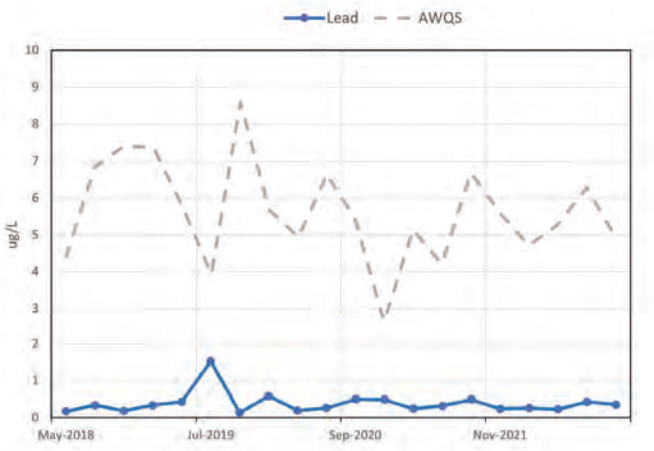

Chromium
AWQS
ug/L
12
10
8
6
4
2
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

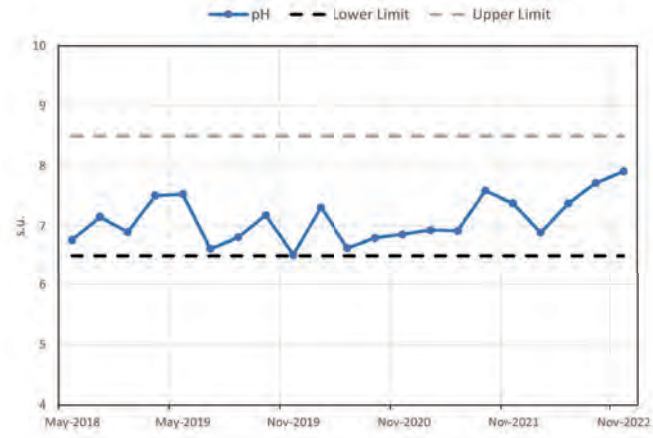

Copper
AWQS
ug/L
30
25
20
15
10
5
0
May-2018
Jul-2019
Sep-2020
Nov-2021

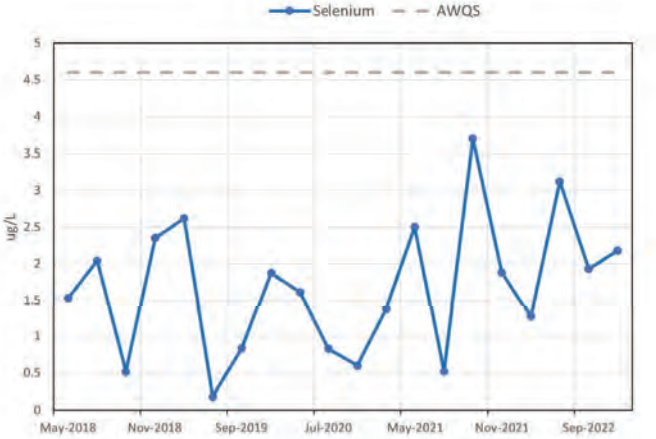

Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
0
May-2018
Jul-2019
Sep-2020
Nov-2021

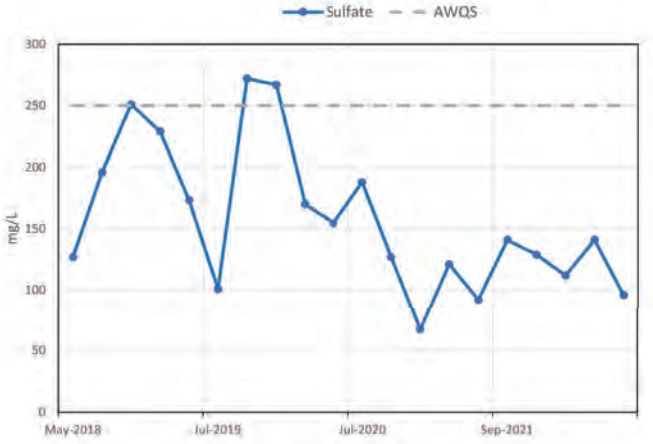
Site 609

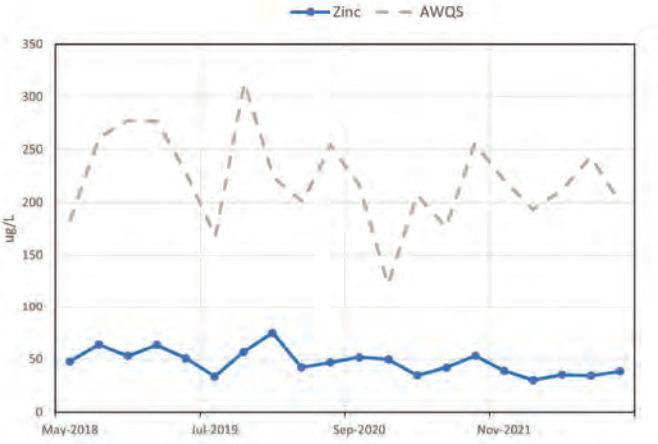

Nickel
AWQS
ug/L
160
140
120
100
80
60
40
20
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022


Lead
AWQS
ug/L
10
9
8
7
6
5
4
3
2
1
0
May-2018
Jul-2019
Sep-2020
Nov-2021

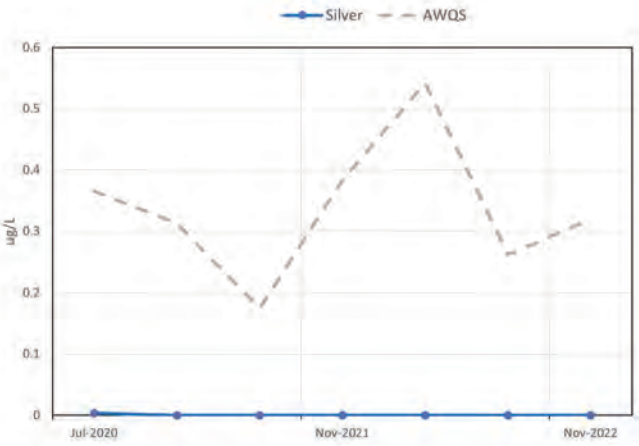

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
May-2018
May-2019
Nov-2019
Nov-2020
Nov-2021
Nov-2022

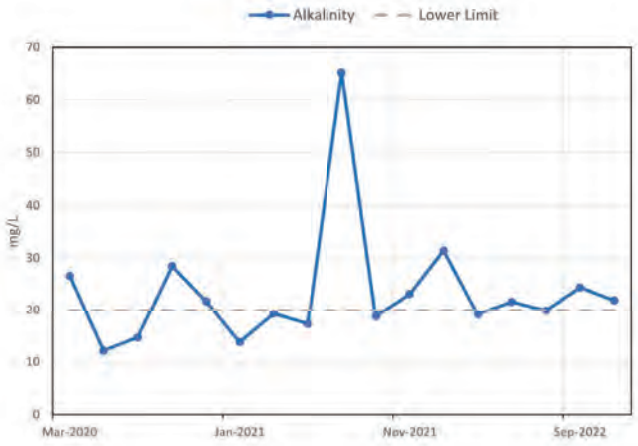

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
May-2018
Nov-2018
Sep-2019
Jul-2020
May-2021
Nov-2021
Sep-2022

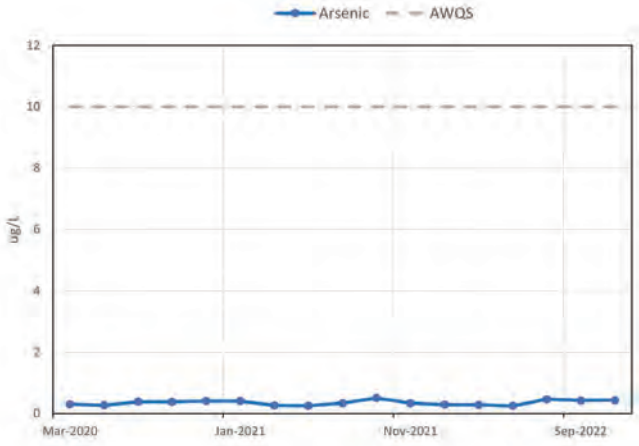

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
May-2018
Jul-2019
Jul-2020
Sep-2021

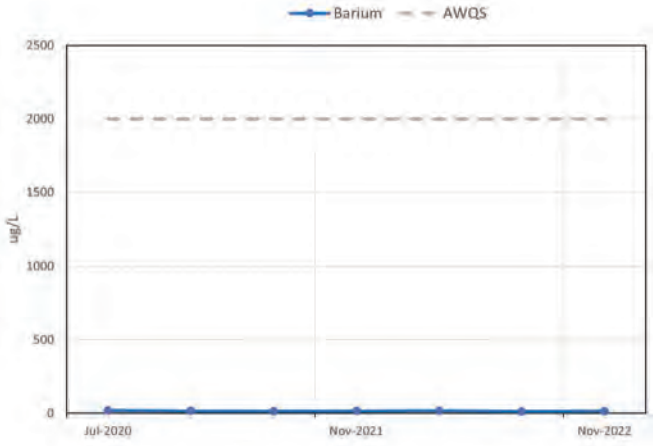

Zinc
AWQS
ug/L
350
300
250
200
150
100
50
0
May-2018
Jul-2019
Sep-2020
Nov-2021

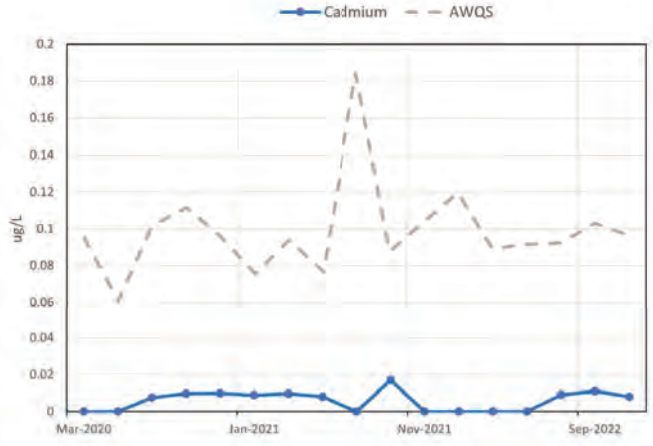
Site 37

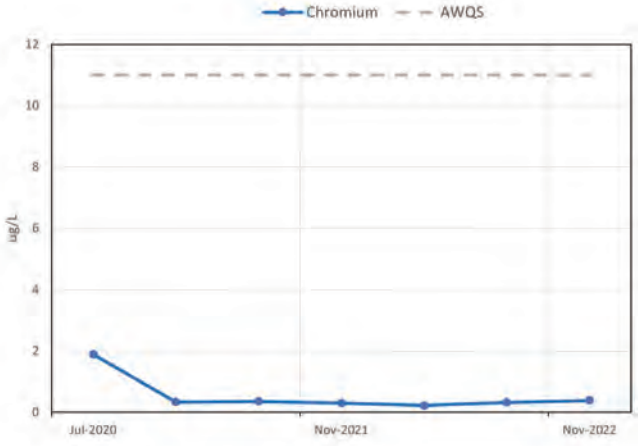

Silver
AWQS
ug/L
0.6
0.5
0.4
0.3
0.2
0.1
0
Jul-2020
Nov-2021
Nov-2022

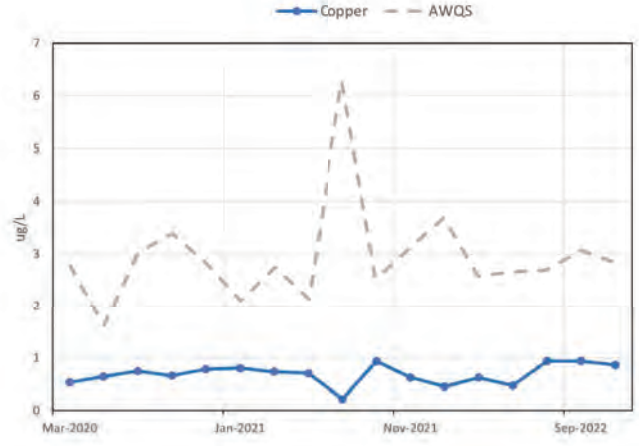

Alkalinity
Lower Limit
mg/L
70
60
50
40
30
20
10
0
Mar-2020
Jan-2021
Nov-2021
Sep-2022

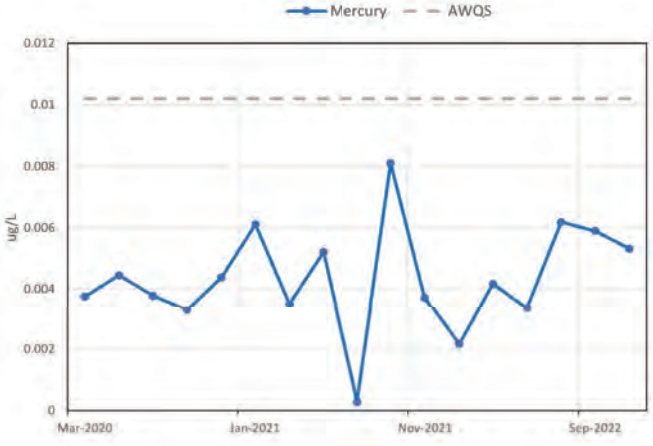

Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
Mar-2020
Jan-2021
Nov-2021
Sep-2022


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
Jul-2020
Nov-2021
Nov-2022

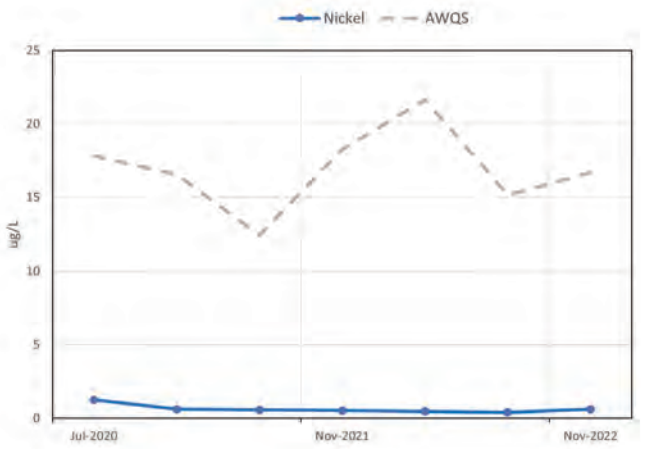

Cadmium
AWQS
ug/L
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Mar-2020
Jan-2021
Nov-2021
Sep-2022

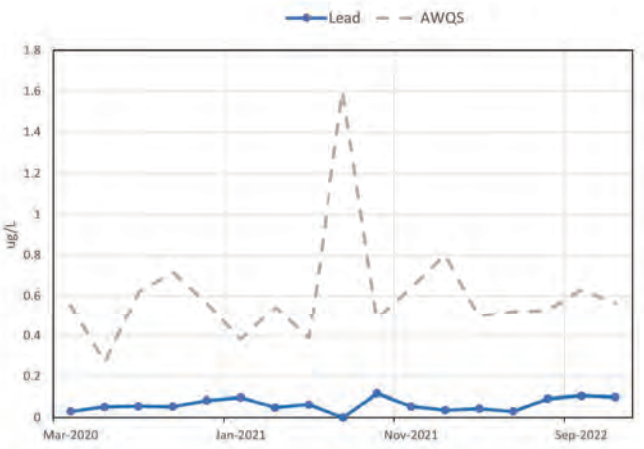

Chromium
AWQS
ug/L
12
10
8
6
4
2
0
Jul-2020
Nov-2021
Nov-2022

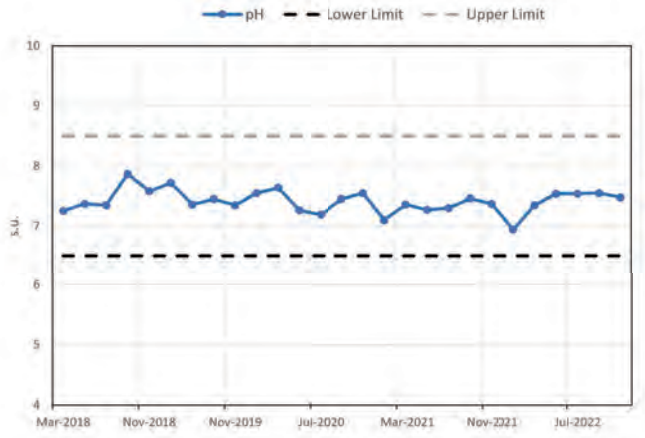

Copper
AWQS
ug/L
7
6
5
4
3
2
1
0
Mar-2020
Jan-2021
Nov-2021
Sep-2022

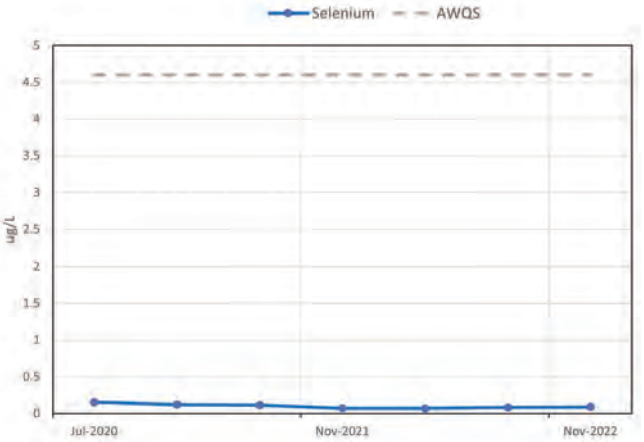

Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
0
Mar-2020
Jan-2021
Nov-2021
Sep-2022

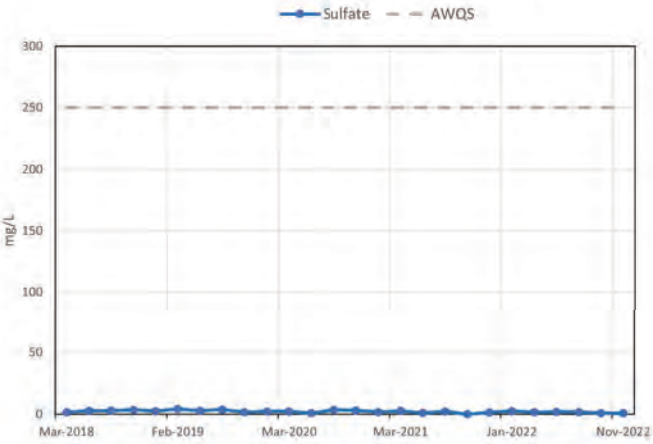
Site 37

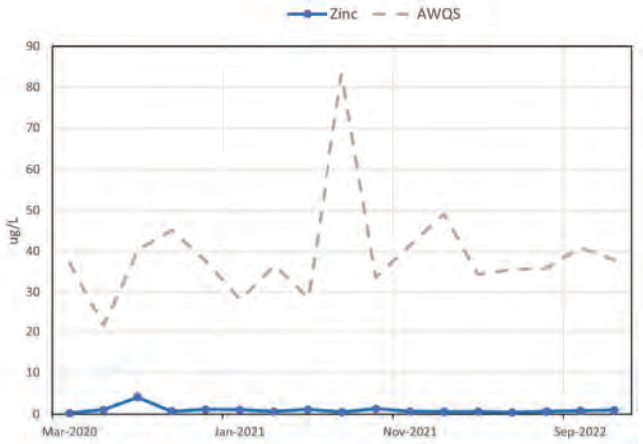

Nickel
AWQS
ug/L
25
20
15
10
5
0
Jul-2020
Nov-2021
Nov-2022


Lead
AWQS
ug/L
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Mar-2020
Jan-2021
Nov-2021
Sep-2022

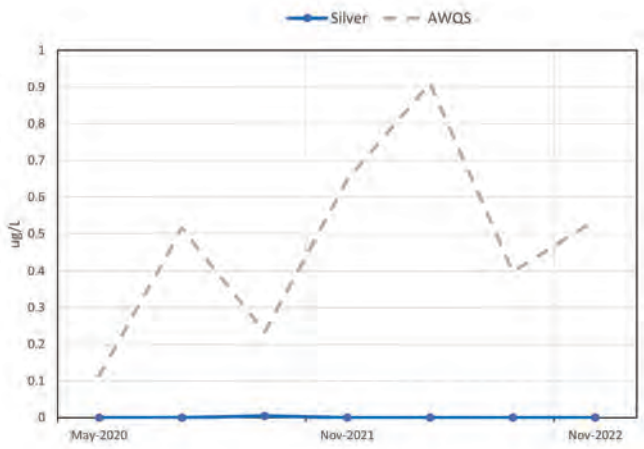

pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
Mar-2018
Nov-2018
Nov-2019
Jul-2020
Mar-2021
Nov-2021
Jul-2022

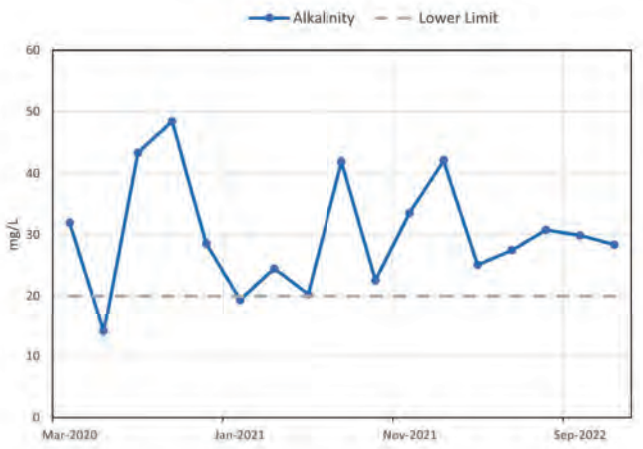

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Jul-2020
Nov-2021
Nov-2022

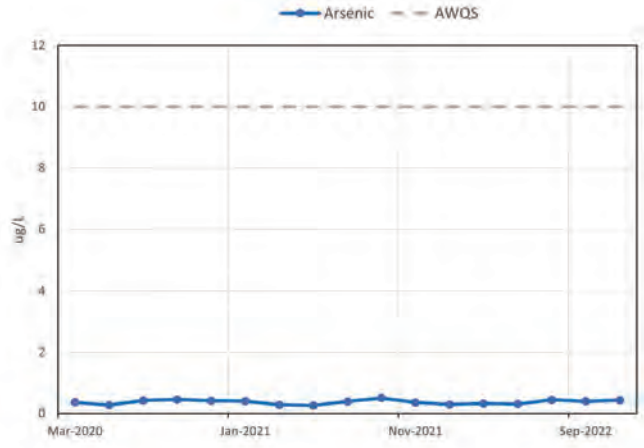

Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
Mar-2018
Feb-2019
Mar-2020
Mar-2021
Jan-2022
Nov-2022

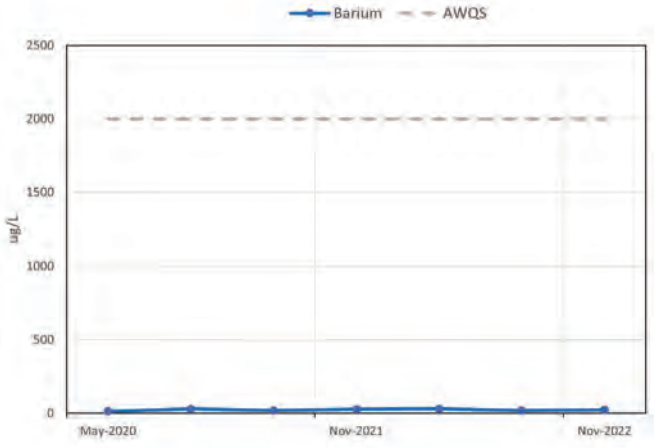

Zinc
AWQS
ug/L
90
80
70
60
50
40
30
20
10
0
Mar-2020
Jan-2021
Nov-2021
Sep-2022

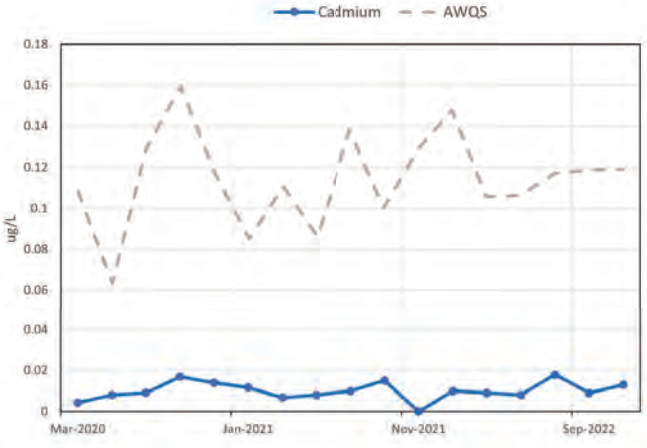
Site 1923

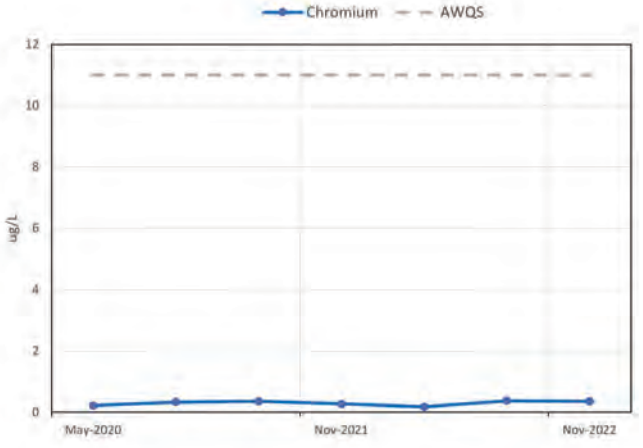

Silver
AWQS
ug/L
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
May-2020
Nov-2021
Nov-2022

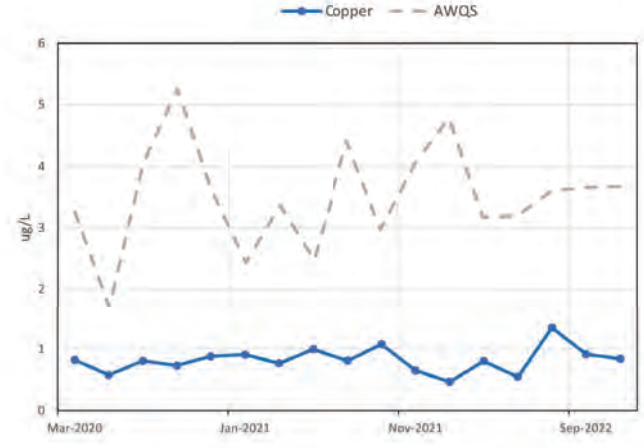

Alkalinity
Lower Limit
mg/L
60
50
40
30
20
10
0
Mar-2020
Jan-2021
Nov-2021
Sep-2022

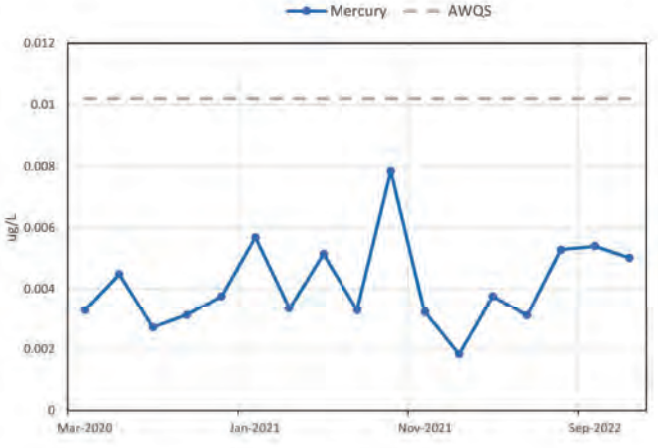

Arsenic
AWQS
ug/L
12
10
8
6
4
2
0
Mar-2020
Jan-2021
Nov-2021
Sep-2022


Barium
AWQS
ug/L
2500
2000
1500
1000
500
0
May-2020
Nov-2021
Nov-2022

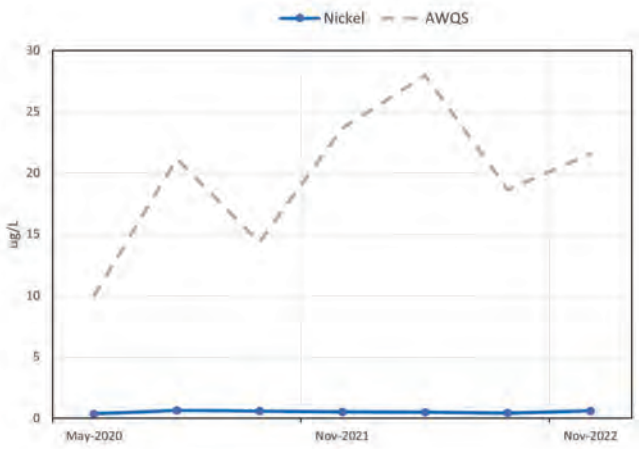

Cadmium
AWQS
ug/L
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Mar-2020
Jan-2021
Nov-2021
Sep-2022

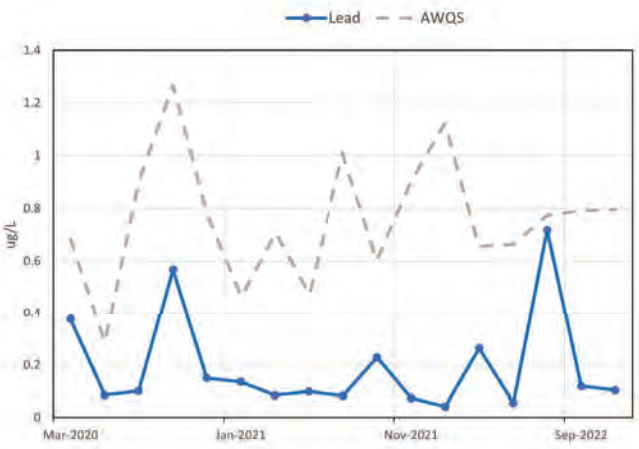

Chromium
AWQS
ug/L
12
10
8
6
4
2
0
May-2020
Nov-2021
Nov-2022

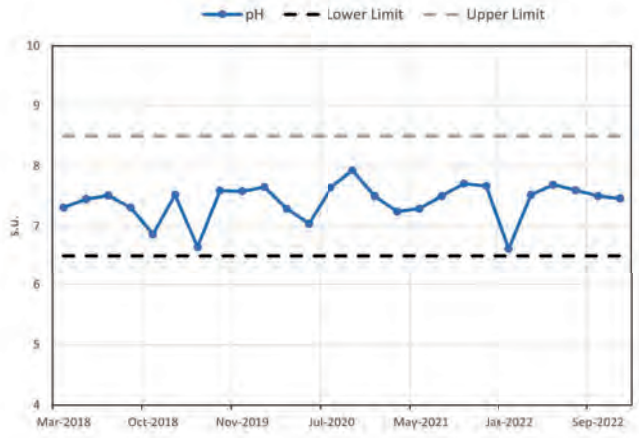

Copper
AWQS
ug/L
6
5
4
3
2
1
0
Mar-2020
Jan-2021
Nov-2021
Sep-2022

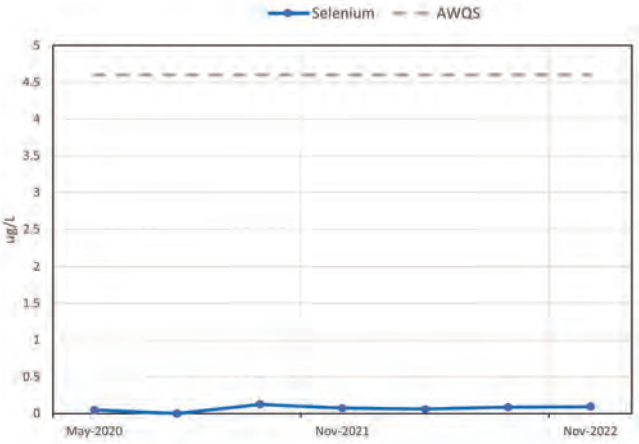

Mercury
AWQS
ug/L
0.012
0.01
0.008
0.006
0.004
0.002
0
Mar-2020
Jan-2021
Nov-2021
Sep-2022

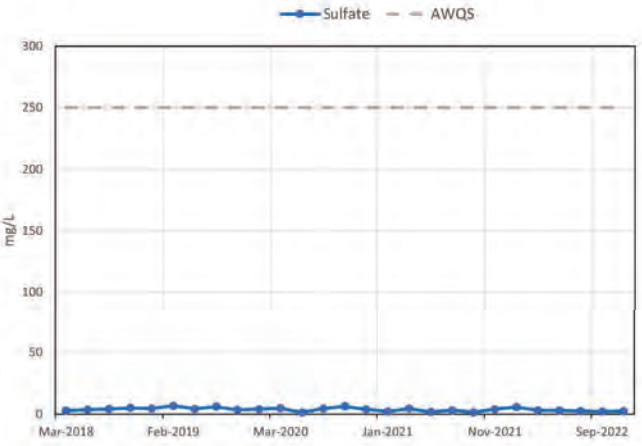
Site 1923

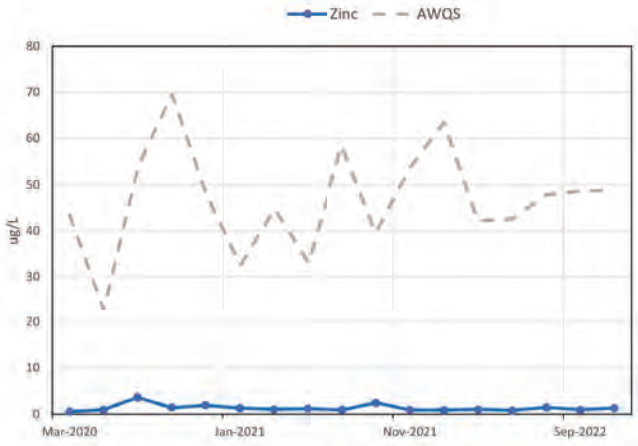

Nickel
AWQS
ug/L
30
25
20
15
10
5
0
May-2020
Nov-2021
Nov-2022


Lead
AWQS
ug/L
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Mar-2020
Jan-2021
Nov-2021
Sep-2022


pH
Lower Limit
Upper Limit
s.u.
10
9
8
7
6
5
4
Mar-2018
Oct-2018
Nov-2019
Jul-2020
May-2021
Jan-2022
Sep-2022

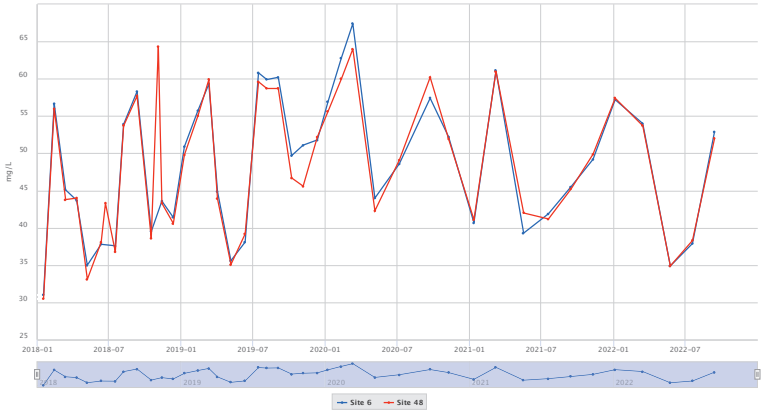

Selenium
AWQS
ug/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
May-2020
Nov-2021
Nov-2022


Sulfate
AWQS
mg/L
300
250
200
150
100
50
0
Mar-2018
Feb-2019
Mar-2020
Jan-2021
Nov-2021
Sep-2022

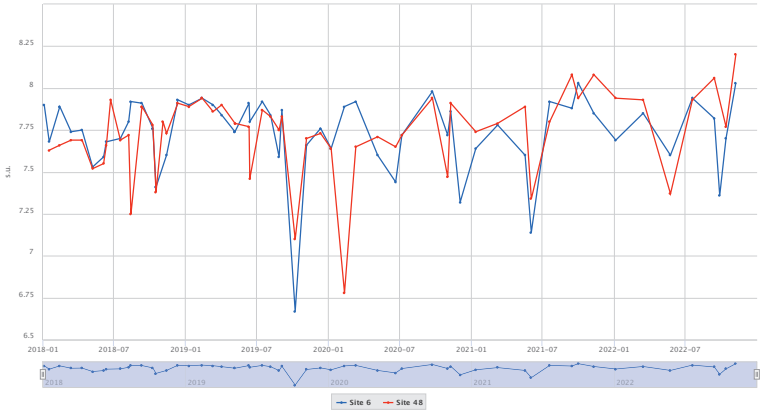

Zinc
AWQS
ug/L
80
70
60
50
40
30
20
10
0
Mar-2020
Jan-2021
Nov-2021
Sep-2022

Attachment Q: FWMP Comparison Charts

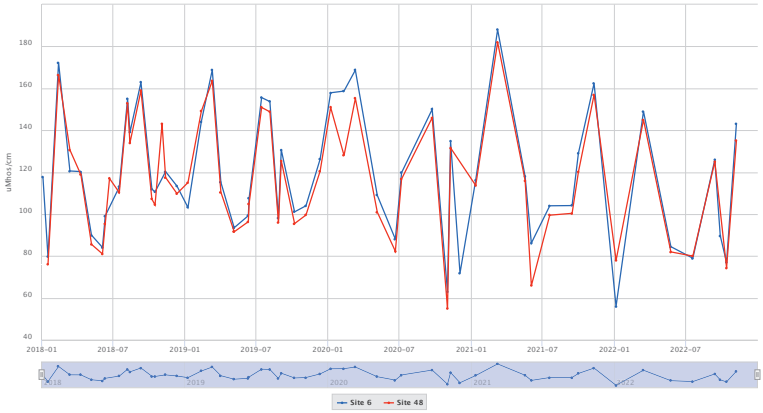
Alkalinity, Total



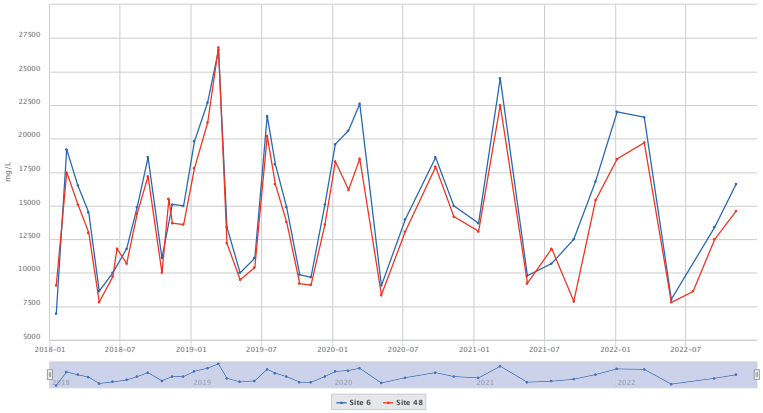
pH



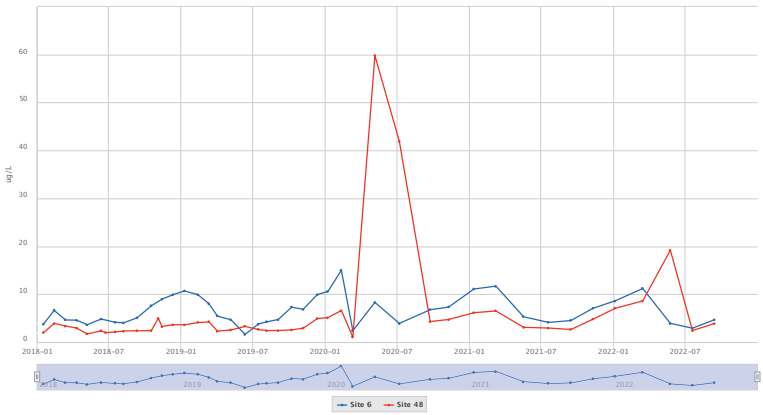
Conductivity



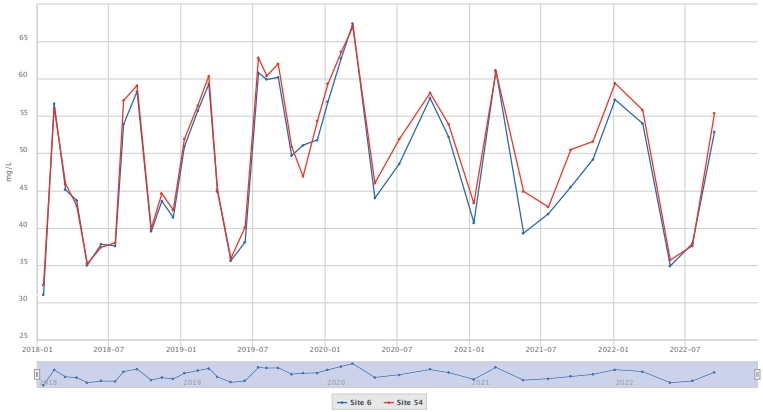
Sulfate, Total



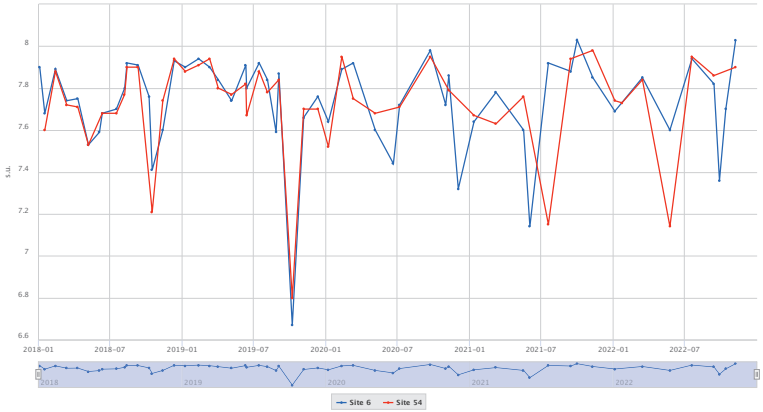
Zinc, Dissolved



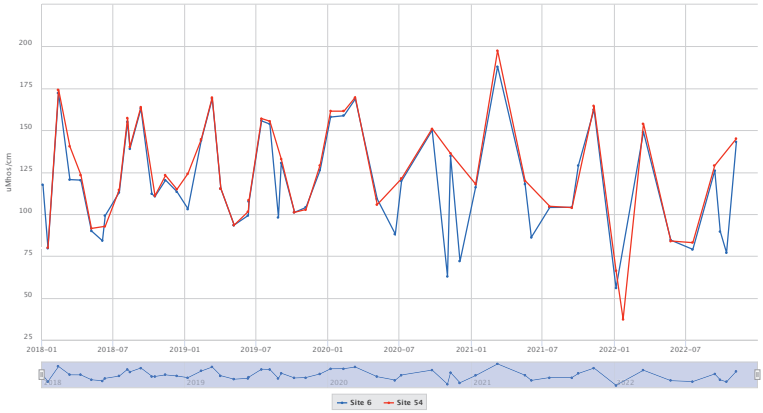
Alkalinity, Total



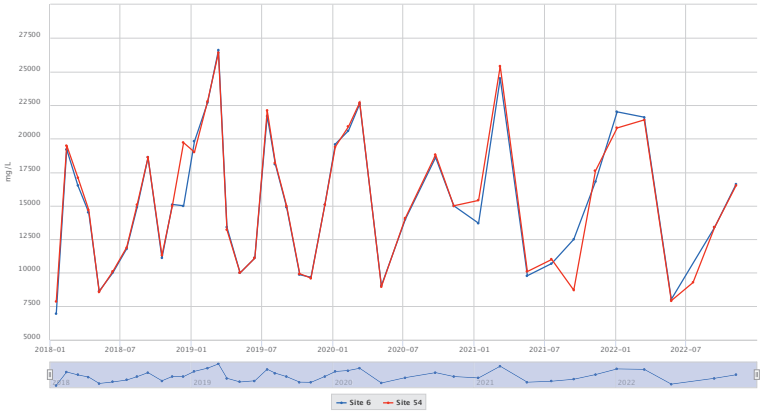
pH



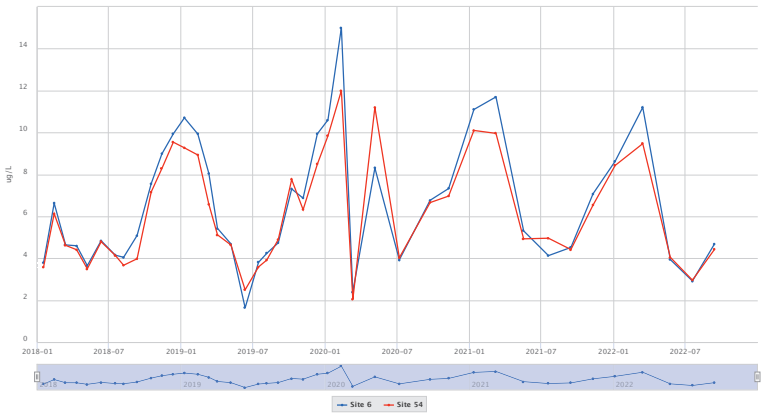
Conductivity



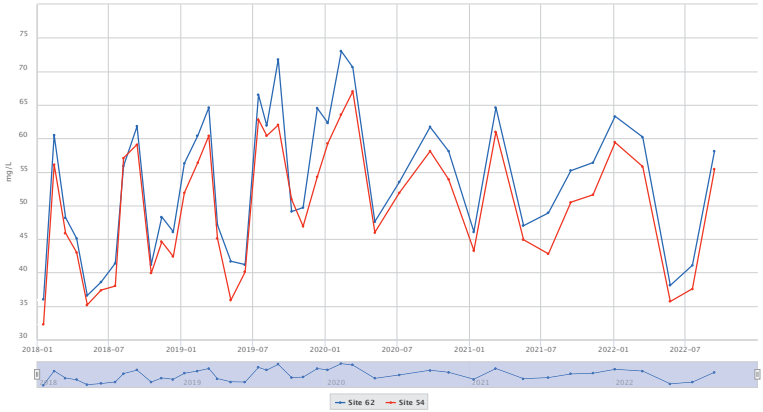
Sulfate, Total



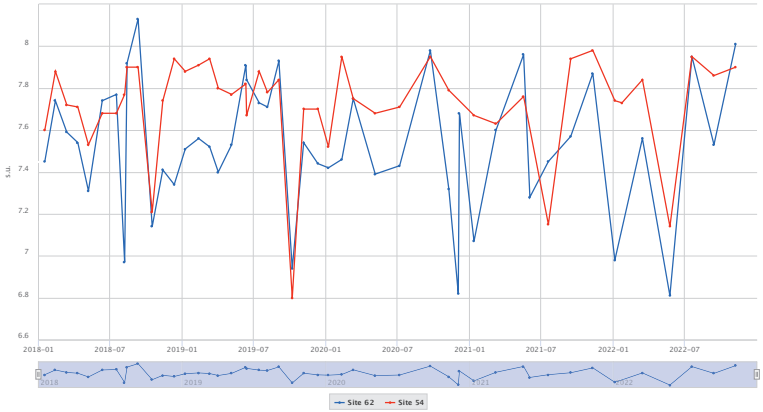
Zinc, Dissolved



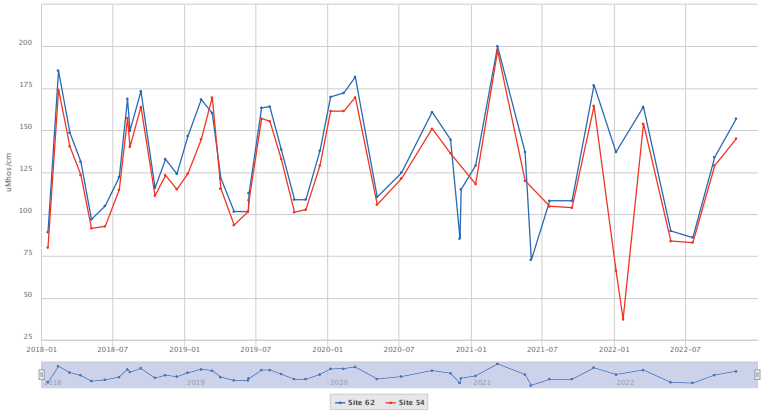
Alkalinity, Total



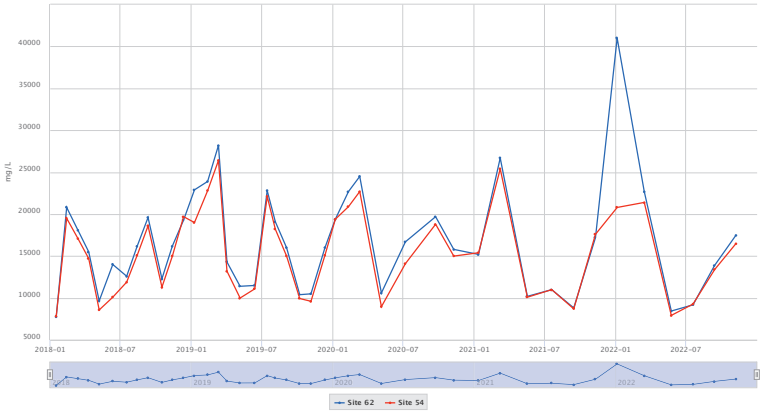
pH



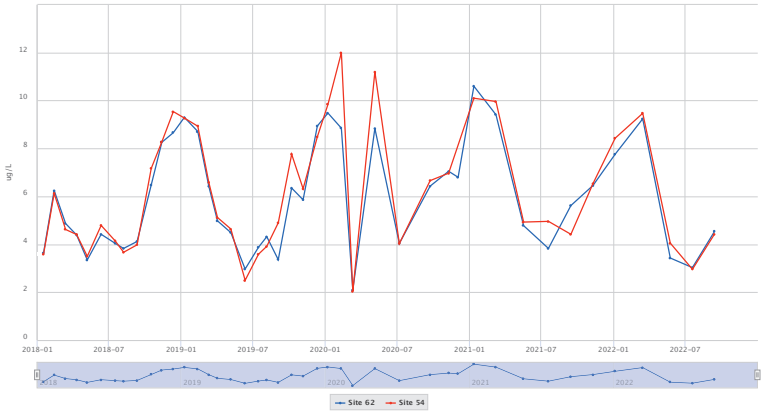
Conductivity



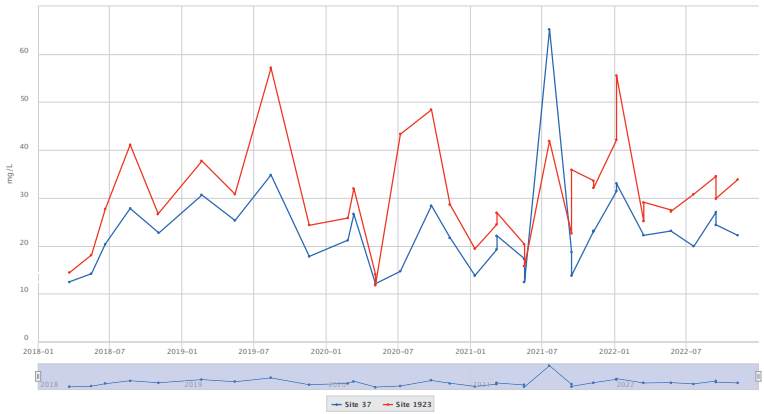
Sulfate, Total



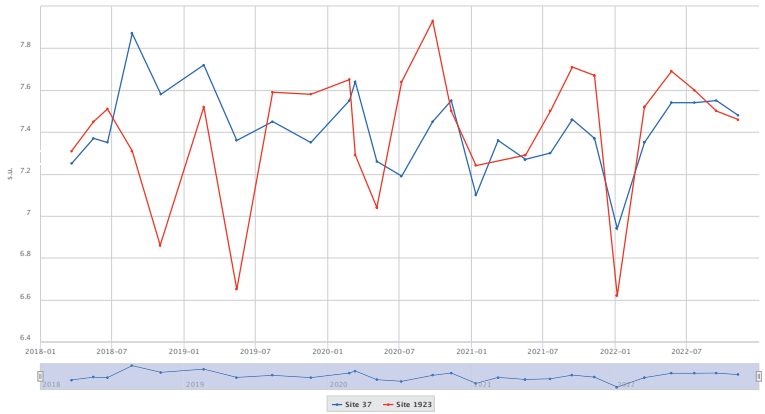
Zinc, Dissolved



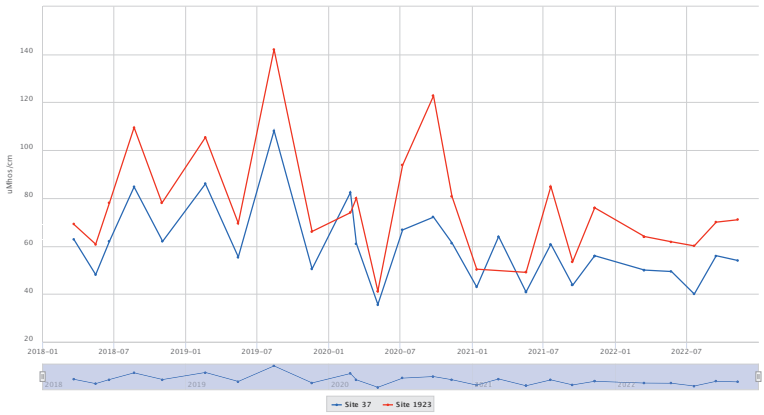
Alkalinity, Total



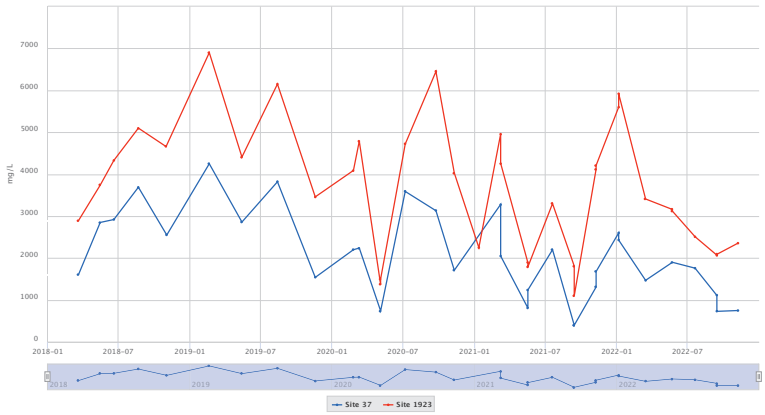
pH



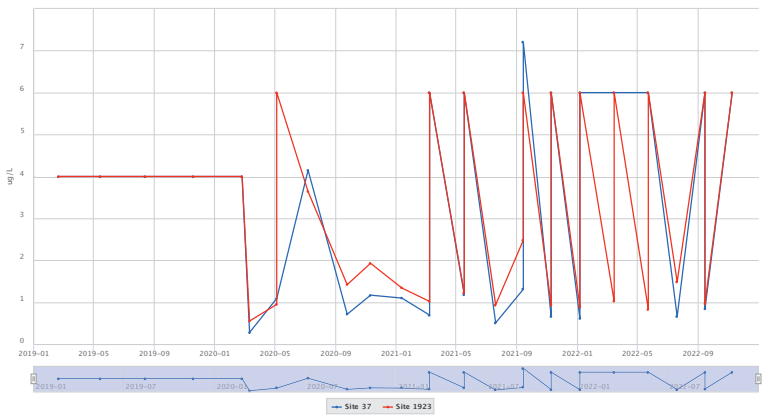
Conductivity



Sulfate, Total



Zinc, Dissolved



Attachment R: FWMP Qualified Data by QA Reviewer

Site No.	Sample Date	Parameter	Value	Qualifier	Reason for Qualifier
006FMS	04-Jan-2022	Diss. Cd-ICP/MS	0.05 µg/L	J	Below Quantitative Range
		Diss. Cr-ICP/MS	0.07 µg/L	J	Below Quantitative Range
		Diss. Hg-CVAF	0.000455 µg/L	J	Below Quantitative Range
		Diss. Ni-ICP/MS	0.37 µg/L	J	Below Quantitative Range
		Diss. Pb-ICP/MS	0.008 µg/L	J	Below Quantitative Range
	15-Mar-2022	Diss. Cr-ICP/MS	0.11 µg/L	J	Below Quantitative Range
		Diss. Ni-ICP/MS	0.44 µg/L	U	Field Blank Contamination
		Diss. Pb-ICP/MS	0.008 µg/L	J	Below Quantitative Range
		Diss. Zn-ICP/MS	11.2 µg/L	J	MS/MSD Duplicate Precision
	24-May-2022	Diss. Cr-ICP/MS	0.15 ug/L	U	Method Blank Contamination
		Diss. Pb-ICP/MS	0.01 ug/L	U	Field Blank Contamination
	19-Jul-2022	Diss. Cu-ICP/MS	0.26 µg/L	U	Field Blank Contamination
		Diss. Pb-ICP/MS	0.03 µg/L	U	Field Blank Contamination
	13-Sep-2022	Sulfate	13.4 mg/L	J	Sample Reciept Temperature
	07-Nov-2022	Sulfate	16.6 mg/L	J	Hold Time Violation
009FMS	05-Jan-2022	Diss. Ag-ICP/MS	0.009 µg/L	J	Below Quantitative Range
		Diss. Cd-ICP/MS	0.02 µg/L	J	Below Quantitative Range
		Diss. Se-ICP/MS	0.08 µg/L	J	Below Quantitative Range
	15-Mar-2022	Diss. Ag-ICP/MS	0.009 µg/L	J	Below Quantitative Range
		Diss. Cd-ICP/MS	0.01 µg/L	J	Below Quantitative Range
		Diss. Zn-ICP/MS	3.08 µg/L	J	MS/MSD Duplicate Precision
	23-May-2022	Diss. Ag-ICP/MS	0.01 ug/L	J	Below Quantitative Range
	19-Jul-2022	Diss. Ag-ICP/MS	0.01 ug/L	J	Below Quantitative Range
	14-Sep-2022	Diss. Ag-ICP/MS	0.01 ug/L	J	Below Quantitative Range
		Diss. Cu-ICP/MS	2.2 ug/L	J	Matrix Spike Recovery
		Sulfate	7.65 mg/L	J	Holding Time Violation, Sample Reciept Temperature
	07-Nov-2022	Diss. Ag-ICP/MS	0.01 µg/L	J	Below Quantitative Range
		Sulfate	6.41 mg/L	J	Hold Time Violation
013FMS	24-May-2022	Diss. Cr-ICP/MS	0.18 ug/L	U	Method Blank Contamination
		Diss. Pb-ICP/MS	0.07 ug/L	U	Field Blank Contamination
	20-Jul-2022	Diss. Cr-ICP/MS	0.09 ug/L	J	Below Quantitative Range
		Diss. Pb-ICP/MS	0.01 ug/L	U	Field Blank Contamination
	13-Sep-2022	Sulfate	16.9 mg/L	J	Sample Reciept Temperature
	07-Nov-2022	Diss. Cr-ICP/MS	0.16 µg/L	U	Field Blank Contamination
		Sulfate	16.6 mg/L	J	Hold Time Violation
027FMG	23-May-2022	Diss. Cr-ICP/MS	0.3 ug/L	U	Method Blank Contamination
		Diss. Cu-ICP/MS	0.06 ug/L	U	Field Blank Contamination
		Diss. Ni-ICP/MS	0.16 ug/L	U	Field Blank Contamination
		Diss. Pb-ICP/MS	0.03 ug/L	U	Field Blank Contamination
	20-Jul-2022	Diss. Cu-ICP/MS	0.18 ug/L	U	Field Blank Contamination
		Diss. Ni-ICP/MS	0.25 ug/L	U	Method Blank Contamination
		Diss. Zn-ICP/MS	0.37 ug/L	J	Below Quantitative Range
	14-Sep-2022	Sulfate	1.84 mg/L	J	Holding Time Violation, Sample Reciept Temperature
	08-Nov-2022	Diss. Ni-ICP/MS	0.27 µg/L	U	Method Blank Contamination
		Diss. Zn-ICP/MS	0.86 µg/L	U	Method Blank Contamination

Site No.	Sample Date	Parameter	Value	Qualifier	Reason for Qualifier
029FMG	23-May-2022	Diss. Cu-ICP/MS	0.1 ug/L	U	Field Blank Contamination
		Diss. Se-ICP/MS	0.05 ug/L	J	Below Quantitative Range
		Sulfate	0.72 mg/L	J	Below Quantitative Range
	20-Jul-2022	Diss. Cu-ICP/MS	0.17 ug/L	U	Field Blank Contamination
	14-Sep-2022	Alkalinity	6.92 mg/L	U	Method Blank Contamination
		Diss. Se-ICP/MS	0.04 ug/L	J	Below Quantitative Range
		Sulfate	-0.4 mg/L	UJ	Holding Time Violation, Sample Reciept Temperature
032FMG	14-Sep-2022	Diss. Ag-ICP/MS	0.01 ug/L	J	Below Quantitative Range
		Diss. Cd-ICP/MS	0.01 ug/L	J	Below Quantitative Range
		Sulfate	-0.4 mg/L	UJ	Holding Time Violation, Sample Reciept Temperature
037FMS	05-Jan-2022	Diss. Cr-ICP/MS	0.22 µg/L	J	Below Quantitative Range
		Diss. Ni-ICP/MS	0.46 µg/L	J	Below Quantitative Range
		Diss. Pb-ICP/MS	0.03 µg/L	J	Below Quantitative Range
		Diss. Se-ICP/MS	0.07 µg/L	J	Below Quantitative Range
		Diss. Zn-ICP/MS	0.61 µg/L	J	Below Quantitative Range
	15-Mar-2022	Diss. Ni-ICP/MS	0.4 µg/L	U	Field Blank Contamination
		Diss. Zn-ICP/MS	0.63 µg/L	J	Below Quantitative Range, MS/MSD Duplicate Precision
	23-May-2022	Diss. Pb-ICP/MS	0.03 ug/L	U	Field Blank Contamination
		Diss. Zn-ICP/MS	0.45 ug/L	J	Below Quantitative Range
	20-Jul-2022	Diss. Cd-ICP/MS	0.009 µg/L	J	Below Quantitative Range
		Diss. Pb-ICP/MS	0.09 ug/L	U	Field Blank Contamination
		Diss. Zn-ICP/MS	0.66 ug/L	J	Below Quantitative Range
	14-Sep-2022	Diss. Cd-ICP/MS	0.01 ug/L	J	Below Quantitative Range
		Diss. Zn-ICP/MS	0.84 ug/L	U	Field Blank Contamination
		Sulfate	0.73 mg/L	J	Below Quantitative Range, Holding Time Violation, Sample Reciept Temperature
	08-Nov-2022	Diss. Cd-ICP/MS	0.008 µg/L	J	Below Quantitative Range
		Diss. Zn-ICP/MS	1.02 µg/L	U	Method Blank Contamination
046FMS	24-May-2022	Diss. Cd-ICP/MS	0.01 ug/L	J	Below Quantitative Range
		Diss. Cr-ICP/MS	0.3 ug/L	U	Method Blank Contamination
		Diss. Pb-ICP/MS	0.04 ug/L	U	Field Blank Contamination
	13-Sep-2022	Diss. Pb-ICP/MS	0.01 ug/L	J	Below Quantitative Range
		Diss. Zn-ICP/MS	1.33 ug/L	U	Field Blank Contamination
		Sulfate	9.18 mg/L	J	Sample Reciept Temperature
	07-Nov-2022	Diss. Cr-ICP/MS	0.21 µg/L	U	Field Blank Contamination
		Diss. Zn-ICP/MS	1.45 µg/L	U	Method Blank Contamination
		Sulfate	9.63 mg/L	J	Hold Time Violation

Site No.	Sample Date	Parameter	Value		Qualifier	Reason for Qualifier
048FMS	05-Jan-2022	Diss. Cd-ICP/MS	0.04	µg/L	J	Below Quantitative Range
		Diss. Hg-CVAF	0.000492	µg/L	J	Below Quantitative Range
		Diss. Ni-ICP/MS	0.41	µg/L	J	Below Quantitative Range
		Diss. Pb-ICP/MS	0.01	µg/L	J	Below Quantitative Range
	15-Mar-2022	Diss. Cr-ICP/MS	0.1	µg/L	J	Below Quantitative Range
		Diss. Ni-ICP/MS	0.37	µg/L	U	Field Blank Contamination
		Diss. Pb-ICP/MS	0.006	µg/L	J	Below Quantitative Range
		Diss. Zn-ICP/MS	8.62	µg/L	J	MS/MSD Duplicate Precision
	24-May-2022	Diss. Cr-ICP/MS	0.16	ug/L	U	Method Blank Contamination
		Diss. Pb-ICP/MS	0.03	ug/L	U	Field Blank Contamination
	19-Jul-2022	Diss. Pb-ICP/MS	0.01	ug/L	U	Field Blank Contamination
	13-Sep-2022	Diss. Hg-CVAF	0.000245	ug/L	J	Below Quantitative Range
		Sulfate	12.5	mg/L	J	Sample Reciept Temperature
	07-Nov-2022	Diss. Pb-ICP/MS	0.009	µg/L	J	Below Quantitative Range
		Sulfate	14.6	mg/L	J	Hold Time Violation
049FMS	04-Jan-2022	Diss. Cd-ICP/MS	0.02	µg/L	J	Below Quantitative Range
		Diss. Cr-ICP/MS	0.17	µg/L	J	Below Quantitative Range
		Diss. Hg-CVAF	0.000885	µg/L	J	Below Quantitative Range
		Diss. Pb-ICP/MS	0.01	µg/L	J	Below Quantitative Range
		Diss. Zn-ICP/MS	1.3	µg/L	J	Below Quantitative Range
	24-May-2022	Diss. Cr-ICP/MS	0.23	ug/L	U	Method Blank Contamination
		Diss. Cu-ICP/MS	0.09	ug/L	U	Field Blank Contamination
		Diss. Pb-ICP/MS	0.02	ug/L	U	Field Blank Contamination
	13-Sep-2022	Diss. Pb-ICP/MS	0.007	ug/L	J	Below Quantitative Range
		Sulfate	9.31	mg/L	J	Sample Reciept Temperature
	07-Nov-2022	Diss. Cr-ICP/MS	0.21	µg/L	U	Field Blank Contamination
		Diss. Pb-ICP/MS	0.009	µg/L	J	Below Quantitative Range
		Diss. Zn-ICP/MS	1.65	µg/L	U	Method Blank Contamination
		Sulfate	9.88	mg/L	J	Hold Time Violation
054FMS	04-Jan-2022	Diss. Cd-ICP/MS	0.04	µg/L	J	Below Quantitative Range
		Diss. Cr-ICP/MS	0.11	µg/L	J	Below Quantitative Range
		Diss. Hg-CVAF	0.00048	µg/L	J	Below Quantitative Range
		Diss. Pb-ICP/MS	0.01	µg/L	J	Below Quantitative Range
	15-Mar-2022	Diss. Cr-ICP/MS	0.11	µg/L	J	Below Quantitative Range
		Diss. Ni-ICP/MS	0.38	µg/L	U	Field Blank Contamination
		Diss. Pb-ICP/MS	0.007	µg/L	J	Below Quantitative Range
		Diss. Zn-ICP/MS	9.47	µg/L	J	MS/MSD Duplicate Precision
	24-May-2022	Diss. Cr-ICP/MS	0.23	ug/L	U	Method Blank Contamination
		Diss. Pb-ICP/MS	0.02	ug/L	U	Field Blank Contamination
	19-Jul-2022	Diss. Pb-ICP/MS	0.006	ug/L	U	Field Blank Contamination
	13-Sep-2022	Diss. Pb-ICP/MS	0.01	ug/L	J	Below Quantitative Range
		Sulfate	13.4	mg/L	J	Sample Reciept Temperature
	07-Nov-2022	Sulfate	16.5	mg/L	J	Hold Time Violation

Site No.	Sample Date	Parameter	Value	Qualifier	Reason for Qualifier
057FMG	05-Jan-2022	Diss. Cr-ICP/MS	0.19 µg/L	J	Below Quantitative Range
		Diss. Cu-ICP/MS	0.1 µg/L	U	Field Blank Contamination
		Diss. Ni-ICP/MS	0.15 µg/L	U	Field Blank Contamination
		Diss. Se-ICP/MS	0.15 µg/L	J	Below Quantitative Range
		Diss. Zn-ICP/MS	0.6 µg/L	J	Below Quantitative Range
	24-May-2022	Diss. Cr-ICP/MS	0.35 ug/L	U	Method Blank Contamination
		Diss. Cu-ICP/MS	0.11 ug/L	U	Field Blank Contamination
		Diss. Hg-CVAF	0.00014 ug/L	J	Below Quantitative Range
		Diss. Ni-ICP/MS	0.21 ug/L	U	Field Blank Contamination
		Diss. Pb-ICP/MS	0.04 ug/L	U	Field Blank Contamination
	13-Sep-2022	Diss. Cu-ICP/MS	0.07 ug/L	U	Method Blank Contamination
		Diss. Hg-CVAF	0.000229 ug/L	J	Below Quantitative Range
		Sulfate	39.1 mg/L	J	Sample Reciept Temperature
	07-Nov-2022	Diss. Cu-ICP/MS	0.05 µg/L	U	Field Blank Contamination
		Diss. Ni-ICP/MS	0.26 µg/L	U	Method Blank Contamination
		Diss. Zn-ICP/MS	1.68 µg/L	U	Method Blank Contamination
		Diss. Hg-CVAF	0.000335 µg/L	J	Below Quantitative Range
		Sulfate	40.2 mg/L	J	Hold Time Violation
060FMS	23-May-2022	Diss. Ag-ICP/MS	0.01 ug/L	J	Below Quantitative Range
		Diss. Cd-ICP/MS	0.02 ug/L	J	Below Quantitative Range
	20-Jul-2022	Diss. Ag-ICP/MS	0.01 ug/L	J	Below Quantitative Range
	14-Sep-2022	Alkalinity	7.28 mg/L	U	Method Blank Contamination
		Diss. Ag-ICP/MS	0.01 ug/L	J	Below Quantitative Range
		Diss. Ba-ICP/MS	32.3 ug/L	J	Matrix Spike Recovery
		Sulfate	-0.4 mg/L	UJ	Holding Time Violation, Sample Reciept Temperature
	08-Nov-2022	Alkalinity	3.96 mg/L	U	Method Blank Contamination
		Diss. Ag-ICP/MS	0.01 µg/L	J	Below Quantitative Range
062FMS	04-Jan-2022	Diss. Cd-ICP/MS	0.05 µg/L	J	Below Quantitative Range
		Diss. Cr-ICP/MS	0.11 µg/L	J	Below Quantitative Range
		Diss. Hg-CVAF	0.000446 µg/L	J	Below Quantitative Range
		Diss. Ni-ICP/MS	0.43 µg/L	J	Below Quantitative Range
		Diss. Pb-ICP/MS	0.03 µg/L	J	Below Quantitative Range
	15-Mar-2022	Diss. Ni-ICP/MS	0.45 µg/L	U	Field Blank Contamination
		Diss. Zn-ICP/MS	9.24 µg/L	J	MS/MSD Duplicate Precision
	24-May-2022	Diss. Cr-ICP/MS	0.15 ug/L	U	Method Blank Contamination
		Diss. Ni-ICP/MS	0.3 ug/L	U	Field Blank Contamination
		Diss. Pb-ICP/MS	0.01 ug/L	U	Field Blank Contamination
	19-Jul-2022	Diss. Pb-ICP/MS	0.01 µg/L	U	Field Blank Contamination
	13-Sep-2022	Sulfate	13.9 mg/L	J	Sample Reciept Temperature
	07-Nov-2022	Sulfate	17.5 mg/L	J	Hold Time Violation

Site No.	Sample Date	Parameter	Value	Qualifier	Reason for Qualifier
1923FMS	05-Jan-2022	Diss. Cd-ICP/MS	0.01 µg/L	J	Below Quantitative Range
		Diss. Cr-ICP/MS	0.17 µg/L	J	Below Quantitative Range
		Diss. Ni-ICP/MS	0.49 µg/L	J	Below Quantitative Range
		Diss. Pb-ICP/MS	0.04 µg/L	J	Below Quantitative Range
		Diss. Se-ICP/MS	0.06 µg/L	J	Below Quantitative Range
		Diss. Zn-ICP/MS	0.89 µg/L	J	Below Quantitative Range
	15-Mar-2022	Diss. Cd-ICP/MS	0.009 µg/L	J	Below Quantitative Range
		Diss. Ni-ICP/MS	0.42 µg/L	U	Field Blank Contamination
		Diss. Zn-ICP/MS	1.02 µg/L	J	MS/MSD Duplicate Precision
	23-May-2022	Diss. Cd-ICP/MS	0.008 ug/L	J	Below Quantitative Range
		Diss. Pb-ICP/MS	0.05 ug/L	U	Field Blank Contamination
	20-Jul-2022	Diss. Cd-ICP/MS	0.01 µg/L	J	Below Quantitative Range
	14-Sep-2022	Diss. Cd-ICP/MS	0.009 ug/L	J	Below Quantitative Range
		Diss. Zn-ICP/MS	0.97 ug/L	U	Field Blank Contamination
		Sulfate	2.09 mg/L	J	Holding Time Violation, Sample Reciept Temperature
	08-Nov-2022	Diss. Cd-ICP/MS	0.01 µg/L	J	Below Quantitative Range
		Diss. Zn-ICP/MS	1.32 µg/L	U	Method Blank Contamination
609FMS	23-May-2022	Diss. Ag-ICP/MS	0.01 ug/L	J	Below Quantitative Range
	14-Sep-2022	Sulfate	141 mg/L	J	Sample Reciept Temperature
711FMS	24-May-2022	Diss. Cr-ICP/MS	0.21 ug/L	U	Method Blank Contamination
		Diss. Pb-ICP/MS	0.01 ug/L	U	Field Blank Contamination
	12-Sep-2022	Diss. Cr-ICP/MS	0.13 ug/L	J	Below Quantitative Range
		Sulfate	13.6 mg/L	J	Sample Reciept Temperature
712FMS	24-May-2022	Diss. Cr-ICP/MS	0.23 ug/L	U	Method Blank Contamination
		Diss. Pb-ICP/MS	0.01 ug/L	U	Field Blank Contamination
	12-Sep-2022	Diss. Cr-ICP/MS	0.13 ug/L	J	Below Quantitative Range
		Sulfate	26.1 mg/L	J	Holding Time Violation, Sample Reciept Temperature

Qualifier	Description
J	Positively Identified - Approximate Concentration
N	Presumptive Evidence for Tentative Identification
NJ	Tentatively Identified - Approximate Concentration
U	Not Detected Above Quantitation Limit
UJ	Not Detected Above Approximate Quantitation Limit

Attachment S: FWMP Statistical Calculation

006FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

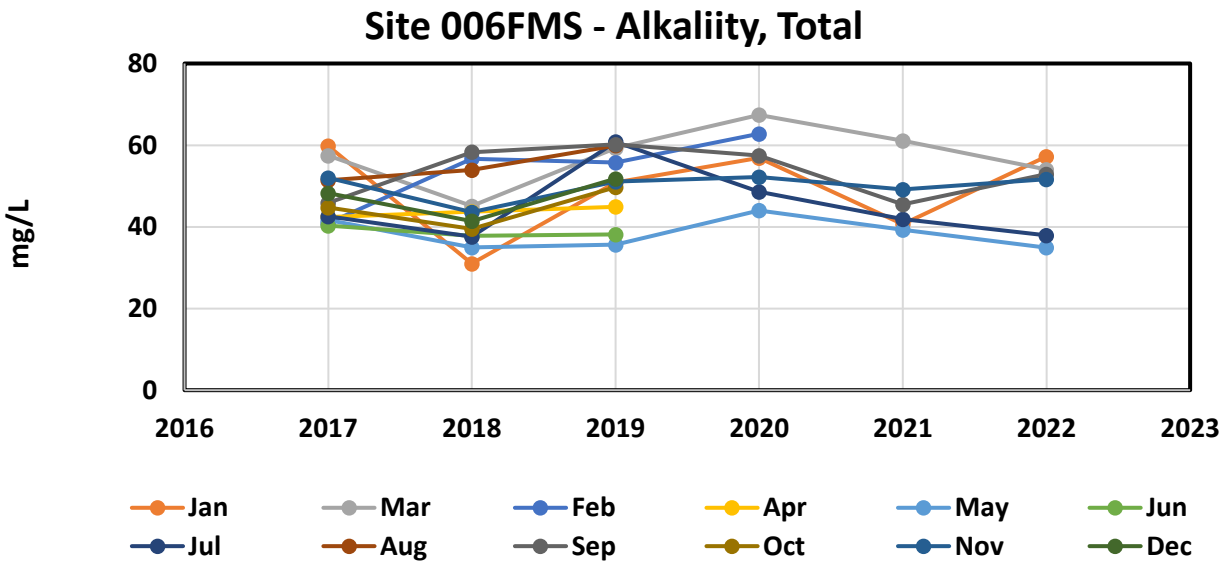
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	59.8	40.9	57.4	42.4	41.7	40.3	42.6	51.4	45.9	44.7	52	48.2
b	**2017/2018**	31	56.7	45.1	43.7	35	37.8	37.6	53.9	58.3	39.5	43.6	41.4
c	**2018/2019**	50.9	55.7	59.3	44.9	35.6	38.1	60.8	59.9	60.2	49.7	51.1	51.8
d	**2019/2020**	56.9	62.8	67.4		44		48.6		57.4		52.2	
e	**2020/2021**	40.7		61.1		39.3		41.9		45.5		49.2	
f	**2021/2022**	57.2		54		34.9		37.9		52.9		51.7	
	n	6	4	6	3	6	3	6	3	6	3	6	3
	t_1	6	4	6	3	6	3	6	3	6	3	6	3
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	-1	1	-1	-1	-1	1	1	-1	-1	-1
	c-a	-1	1	1	1	-1	-1	1	1	1	1	-1	1
	d-a	-1	1	1		1		1		1		1	
	e-a	-1		1		-1		-1		-1		-1	
	f-a	-1		-1		-1		-1		1		-1	
	c-b	1	-1	1	1	1	1	1	1	1	1	1	1
	d-b	1	1	1		1		1		-1		1	
	e-b	1		1		1		1		-1		1	
	f-b	1		1		-1		1		-1		1	
	d-c	1	1	1		1		-1		-1		1	
	e-c	-1		1		1		-1		-1		-1	
	f-c	1		-1		-1		-1		-1		1	
	e-d	-1		-1		-1		-1		-1		-1	
	f-d	1		-1		-1		-1		-1		-1	
	f-e	1		-1		-1		-1		1		1	
	S_k	1	4	3	3	-3	-1	-3	3	-3	1	1	1
	σ^2_S=	28.33	8.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	0.19	1.36	0.56	1.57	-0.56	-0.52	-0.56	1.57	-0.56	0.52	0.19	0.52
	Z^2_k	0.04	1.85	0.32	2.45	0.32	0.27	0.32	2.45	0.32	0.27	0.04	0.27

ΣZ_k= 4.26
ΣZ^2_k= 8.91
Z-bar=$\Sigma Z_k/K$= 0.36

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	55	0	0	0	0

Σn 55
ΣS_k 7

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	7.40		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.766**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	0.43	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
197.00	**p**	**0.665**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.95	**0.200**	1.86
0.050	-0.52		1.40
0.100	-0.35		1.22
0.200	-0.13		0.94

006FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

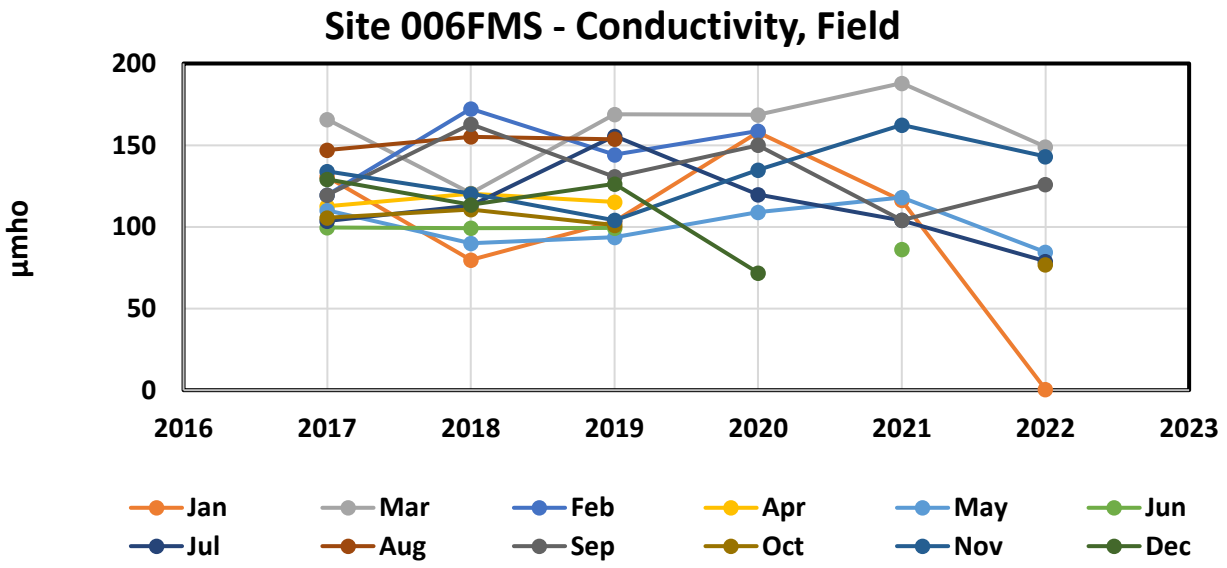
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	130.7	119.5	165.7	112.6	110	99.6	103.6	147	119.6	105.6	134	129.1
b	**2017/2018**	79.7	172.3	120.6	120.3	90	99.19	113	155.1	162.9	110.6	120.3	113.4
c	**2018/2019**	103.2	144.1	168.8	115.2	93.53	99.28	155.6	153.7	130.7	101.1	104	126.2
d	**2019/2020**	157.9	158.7	168.7		109		119.8		150		134.7	71.86
e	**2020/2021**	116.2		188		118	86.2	104		104.1		162.4	
f	**2021/2022**	0.56		149		84.5		79		126	77	143	
	n	6	4	6	3	6	4	6	3	6	4	6	4
	t_1	6	4	6	3	6	4	6	3	6	4	6	4
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	-1	1	-1	-1	1	1	1	1	-1	-1
	c-a	-1	1	1	1	-1	-1	1	1	1	-1	-1	-1
	d-a	1	1	1		-1		1		1		1	-1
	e-a	-1		1		1	-1	1		-1		1	
	f-a	-1		-1		-1		-1		1	-1	1	
	c-b	1	-1	1	-1	1	1	1	-1	-1	-1	-1	1
	d-b	1	-1	1		1		1		-1		1	-1
	e-b	1		1		1	-1	-1		-1		1	
	f-b	-1		1		-1		-1		-1	-1	1	
	d-c	1	1	-1		1		-1		1		1	-1
	e-c	1		1		1	-1	-1		-1		1	
	f-c	-1		-1		-1		-1		-1	-1	1	
	e-d	-1		1		1		-1		-1		1	
	f-d	-1		-1		-1		-1		-1		1	
	f-e	-1		-1		-1		-1		1		-1	
	S_k	-3	2	3	1	-1	-4	-3	1	-3	-4	7	-4
	σ^2_S=	28.33	8.67	28.33	3.67	28.33	8.67	28.33	3.67	28.33	8.67	28.33	8.67
	$Z_k = S_k/\sigma_S$	-0.56	0.68	0.56	0.52	-0.19	-1.36	-0.56	0.52	-0.56	-1.36	1.32	-1.36
	Z^2_k	0.32	0.46	0.32	0.27	0.04	1.85	0.32	0.27	0.32	1.85	1.73	1.85

ΣZ_k= -2.35
ΣZ^2_k= 9.58
Z-bar=$\Sigma Z_k/K$= -0.20

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	58	0	0	0	0

Σn 58
ΣS_k -8

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	9.12		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.611**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.48	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
212.00	**p**	**0.315**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-6.53	**-0.892**	4.11
0.050	-4.91		1.79
0.100	-3.71		1.29
0.200	-3.05		0.12

006FMS Seasonal Kendall analysis for pH, Field (su)

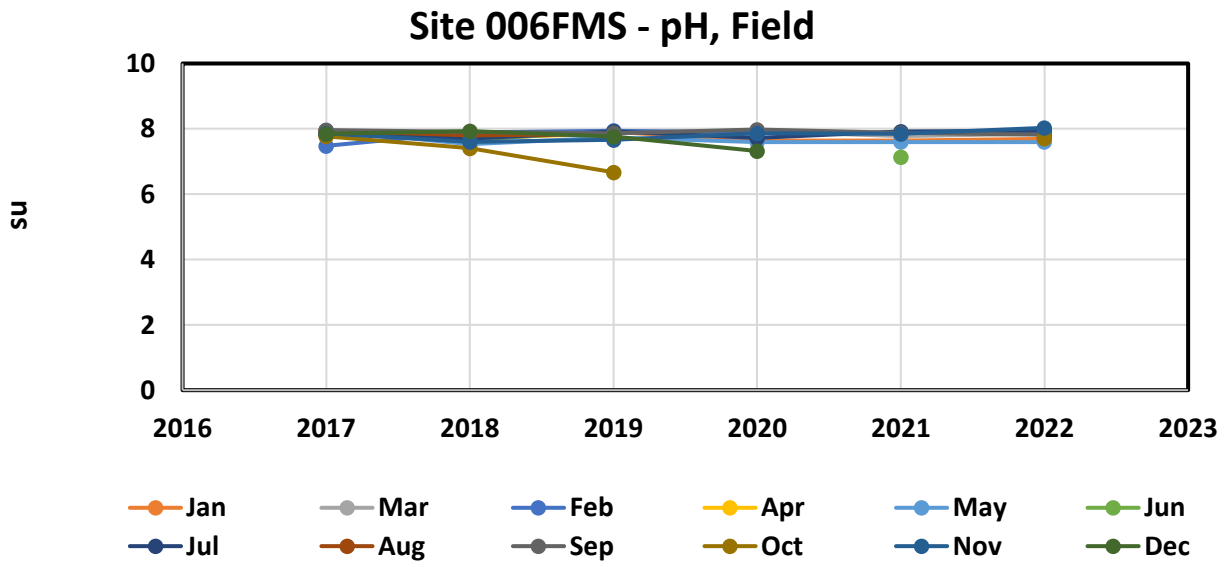
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	7.94	7.48	7.79	7.94	7.96	7.87	7.85	7.94	7.96	7.77	7.86	7.85
b	**2017/2018**	7.68	7.89	7.74	7.75	7.53	7.68	7.7	7.8	7.91	7.41	7.6	7.93
c	**2018/2019**	7.9	7.94	7.9	7.84	7.74	7.91	7.92	7.84	7.87	6.67	7.66	7.76
d	**2019/2020**	7.64	7.89	7.92		7.6		7.72		7.98		7.86	7.32
e	**2020/2021**	7.64		7.78		7.6	7.14	7.92		7.88		7.85	
f	**2021/2022**	7.69		7.85		7.6		7.94		7.82	7.7	8.03	
	n	6	4	6	3	6	4	6	3	6	4	6	4
	t_1	4	2	6	3	3	4	4	3	6	4	4	4
	t_2	1	1	0	0	0	0	1	0	0	0	1	0
	t_3	0	0	0	0	1	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1
	c-a	-1	1	1	-1	-1	1	1	-1	-1	-1	-1	-1
	d-a	-1	1	1		-1		-1		1		0	-1
	e-a	-1		-1		-1	-1	1		-1		-1	
	f-a	-1		1		-1		1		-1	-1	1	
	c-b	1	1	1	1	1	1	1	1	-1	-1	1	-1
	d-b	-1	0	1		1		1		1		1	-1
	e-b	-1		1		1	-1	1		-1		1	
	f-b	1		1		1		1		-1	1	1	
	d-c	-1	-1	1		-1		-1		1		1	-1
	e-c	-1		-1		-1	-1	0		1		1	
	f-c	-1		-1		-1		1		-1	1	1	
	e-d	0		-1		0		1		-1		-1	
	f-d	1		-1		0		1		-1		1	
	f-e	1		1		0		1		-1		1	
	S_k	-6	3	3	-1	-4	-2	8	-1	-7	-2	6	-4
	σ^2_S=	27.33	7.67	28.33	3.67	24.67	8.67	27.33	3.67	28.33	8.67	27.33	8.67
	$Z_k = S_k/\sigma_S$	-1.15	1.08	0.56	-0.52	-0.81	-0.68	1.53	-0.52	-1.32	-0.68	1.15	-1.36
	Z^2_k	1.32	1.17	0.32	0.27	0.65	0.46	2.34	0.27	1.73	0.46	1.32	1.85

ΣZ_k= -2.71
ΣZ^2_k= 12.16
Z-bar=$\Sigma Z_k/K$= -0.23

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	47	4	1	0	0

Σn 58
ΣS_k -7

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	11.55		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.398**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.42	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
204.33	**p**	**0.337**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.04	**-0.001**	0.02
0.050	-0.03		0.01
0.100	-0.02		0.01
0.200	-0.02		0.00

006FMS Seasonal Kendall analysis for SO4, Total (mg/L)

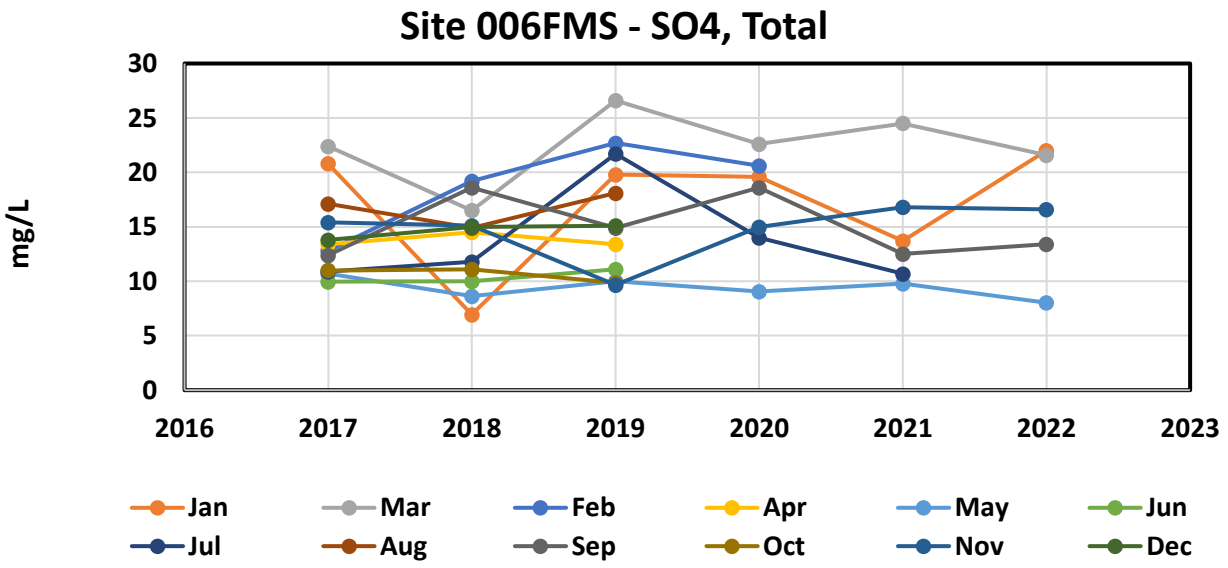
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	20.8	12.8	22.4	13.4	10.7	9.97	10.9	17.1	12.4	11	15.4	13.8
b	**2017/2018**	6.95	19.2	16.5	14.5	8.64	10	11.8	14.9	18.6	11.1	15.1	15
c	**2018/2019**	19.8	22.7	26.6	13.4	10	11.1	21.7	18.1	14.9	9.86	9.67	15.1
d	**2019/2020**	19.6	20.6	22.6		9.05		14		18.6		15	
e	**2020/2021**	13.7		24.5		9.79		10.7		12.5		16.8	
f	**2021/2022**	22		21.6		8.03				13.4		16.6	
	n	6	4	6	3	6	3	5	3	6	3	6	3
	t_1	6	4	6	1	6	3	5	3	4	3	6	3
	t_2	0	0	0	1	0	0	0	0	1	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	-1	1	-1	1	1	-1	1	1	-1	1
	c-a	-1	1	1	0	-1	1	1	1	1	-1	-1	1
	d-a	-1	1	1		-1		1		1		-1	
	e-a	-1		1		-1		-1		1		1	
	f-a	1		-1		-1				1		1	
	c-b	1	1	1	-1	1	1	1	1	-1	-1	-1	1
	d-b	1	1	1		1		1		0		-1	
	e-b	1		1		1		-1		-1		1	
	f-b	1		1		-1				-1		1	
	d-c	-1	-1	-1		-1		-1		1		1	
	e-c	-1		-1		-1		-1		-1		1	
	f-c	1		-1		-1				-1		1	
	e-d	-1		1		1		-1		-1		1	
	f-d	1		-1		-1				-1		1	
	f-e	1		-1		-1				1		-1	
	S_k	1	4	1	0	-7	3	0	1	0	-1	3	3
	σ^2_S=	28.33	8.67	28.33	2.67	28.33	3.67	16.67	3.67	27.33	3.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	0.19	1.36	0.19	0.00	-1.32	1.57	0.00	0.52	0.00	-0.52	0.56	1.57
	Z^2_k	0.04	1.85	0.04	0.00	1.73	2.45	0.00	0.27	0.00	0.27	0.32	2.45

ΣZ_k= 4.12
ΣZ^2_k= 9.42
Z-bar=$\Sigma Z_k/K$= 0.34

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	50	2	0	0	0

Σn 54
ΣS_k 8

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	8.01	@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p **0.713**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 0.52	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
183.33	**p** **0.697**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.36	**0.083**	0.72
0.050	-0.20		0.53
0.100	-0.15		0.38
0.200	-0.05		0.24

006FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

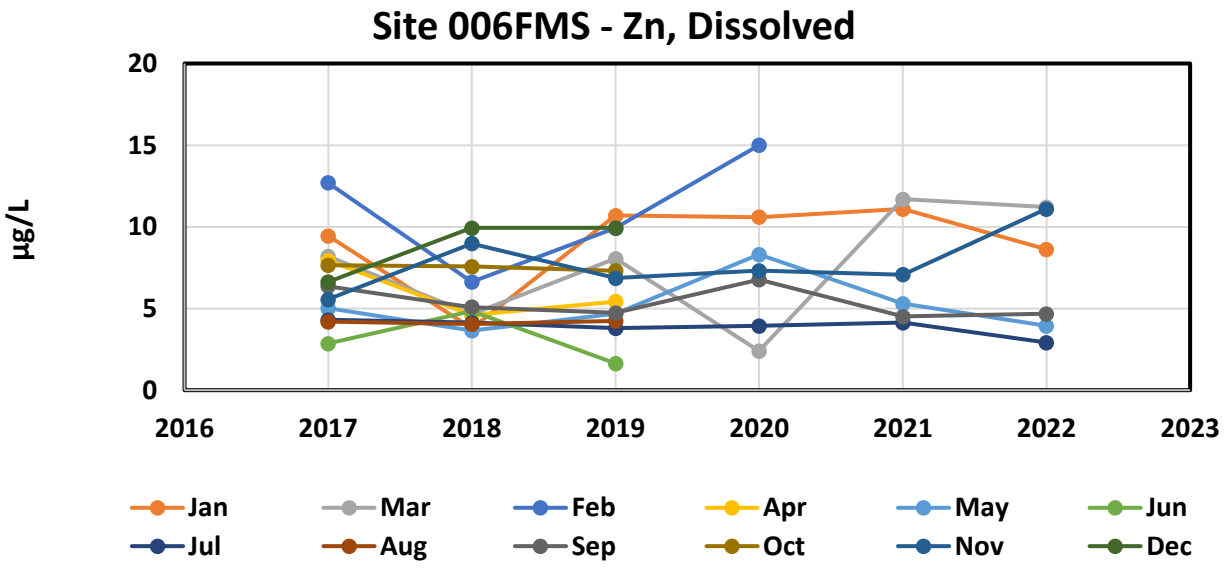
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	9.46	12.7	8.2	7.95	5.02	2.87	4.31	4.2	6.37	7.65	5.57	6.63
b	**2017/2018**	3.79	6.63	4.64	4.6	3.65	4.84	4.15	4.05	5.09	7.57	8.98	9.94
c	**2018/2019**	10.7	9.93	8.05	5.43	4.69	1.64	3.81	4.24	4.74	7.31	6.87	9.94
d	**2019/2020**	10.6	15	2.4		8.31		3.93		6.77		7.33	
e	**2020/2021**	11.1		11.7		5.31		4.13		4.52		7.08	
f	**2021/2022**	8.63		11.2		3.94		2.92		4.69		11.1	
	n	6	4	6	3	6	3	6	3	6	3	6	3
	t_1	6	4	6	3	6	3	6	3	6	3	6	1
	t_2	0	0	0	0	0	0	0	0	0	0	0	1
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	-1	-1	-1	-1	1	-1	-1	-1	-1	1	1
	c-a	1	-1	-1	-1	-1	-1	-1	1	-1	-1	1	1
	d-a	1	1	-1		1		-1		1		1	
	e-a	1		1		1		-1		-1		1	
	f-a	-1		1		-1		-1		-1		1	
	c-b	1	1	1	1	1	-1	-1	1	-1	-1	-1	0
	d-b	1	1	-1		1		-1		1		-1	
	e-b	1		1		1		-1		-1		-1	
	f-b	1		1		1		-1		-1		1	
	d-c	-1	1	-1		1		1		1		1	
	e-c	1		1		1		1		-1		1	
	f-c	-1		1		-1		-1		-1		1	
	e-d	1		1		-1		1		-1		-1	
	f-d	-1		1		-1		-1		-1		1	
	f-e	-1		-1		-1		-1		1		1	
	S_k	3	2	3	-1	1	-1	-9	1	-7	-3	7	2
	σ^2_S=	28.33	8.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	2.67
	$Z_k = S_k/\sigma_S$	0.56	0.68	0.56	-0.52	0.19	-0.52	-1.69	0.52	-1.32	-1.57	1.32	1.22
	Z^2_k	0.32	0.46	0.32	0.27	0.04	0.27	2.86	0.27	1.73	2.45	1.73	1.50

ΣZ_k= -0.56
ΣZ^2_k= 12.22
Z-bar=$\Sigma Z_k/K$= -0.05

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	53	1	0	0	0

Σn 55
ΣS_k -2

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	12.20		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.349**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.07	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
196.00	**p**	**0.472**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.24	**-0.007**	0.40
0.050	-0.17		0.20
0.100	-0.14		0.16
0.200	-0.10		0.11

009FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

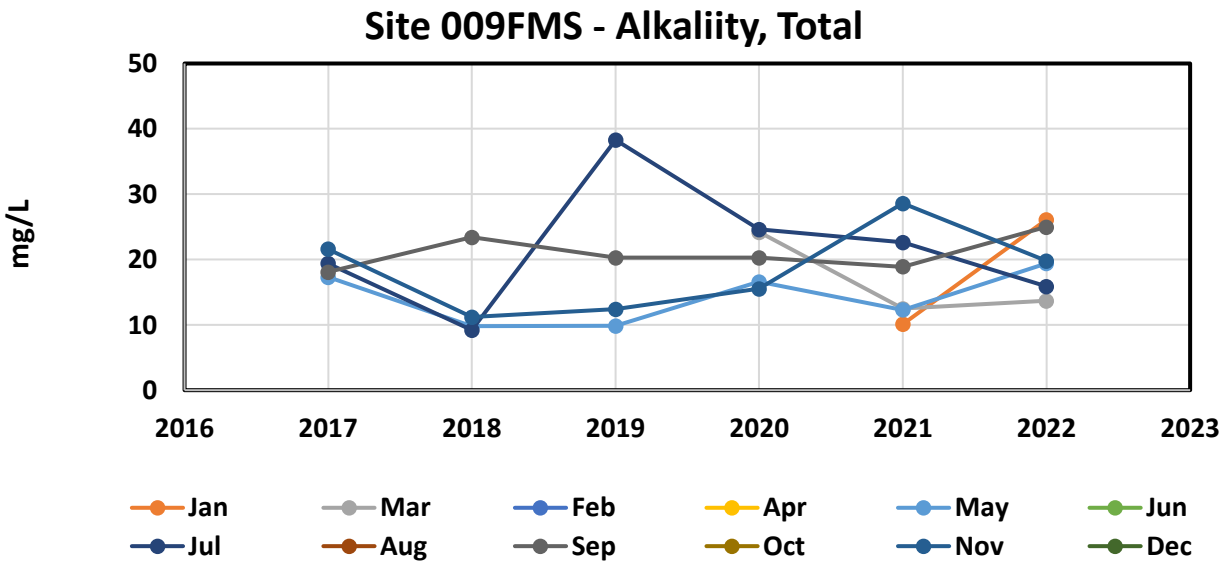
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					17.3		19.4		18.1		21.6	
b	**2017/2018**					9.8		9.2		23.4		11.2	
c	**2018/2019**					9.83		38.3		20.3		12.4	
d	**2019/2020**			24.2		16.6		24.6		20.3		15.5	
e	**2020/2021**	10.1		12.5		12.3		22.6		18.9		28.6	
f	**2021/2022**	26.1		13.7		19.4		15.9		25		19.8	
	n	2	0	3	0	6	0	6	0	6	0	6	0
	t_1	2	0	3	0	6	0	6	0	4	0	6	0
	t_2	0	0	0	0	0	0	0	0	1	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		1		-1	
	c-a					-1		1		1		-1	
	d-a					-1		1		1		-1	
	e-a					-1		1		1		1	
	f-a					1		-1		1		-1	
	c-b					1		1		-1		1	
	d-b					1		1		-1		1	
	e-b					1		1		-1		1	
	f-b					1		1		1		1	
	d-c					1		-1		0		1	
	e-c					1		-1		-1		1	
	f-c					1		-1		1		1	
	e-d			-1		-1		-1		-1		1	
	f-d			-1		1		-1		1		1	
	f-e	1		1		1		-1		1		-1	
	S_k	1	0	-1	0	5	0	-1	0	4	0	5	0
	σ^2_S=	1.00		3.67		28.33		28.33		27.33		28.33	
	$Z_k = S_k/\sigma_S$	1.00		-0.52		0.94		-0.19		0.77		0.94	
	Z^2_k	1.00		0.27		0.88		0.04		0.59		0.88	

ΣZ_k= 2.93
ΣZ^2_k= 3.66
Z-bar=$\Sigma Z_k/K$= 0.49

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	27	1	0	0	0

Σn 29
ΣS_k 13

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	2.22	@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p **0.817**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 1.11	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
117.00	**p** **0.866**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-1.46	**0.817**	2.15
0.050	-0.66		1.66
0.100	-0.22		1.40
0.200	0.11		1.22

009FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

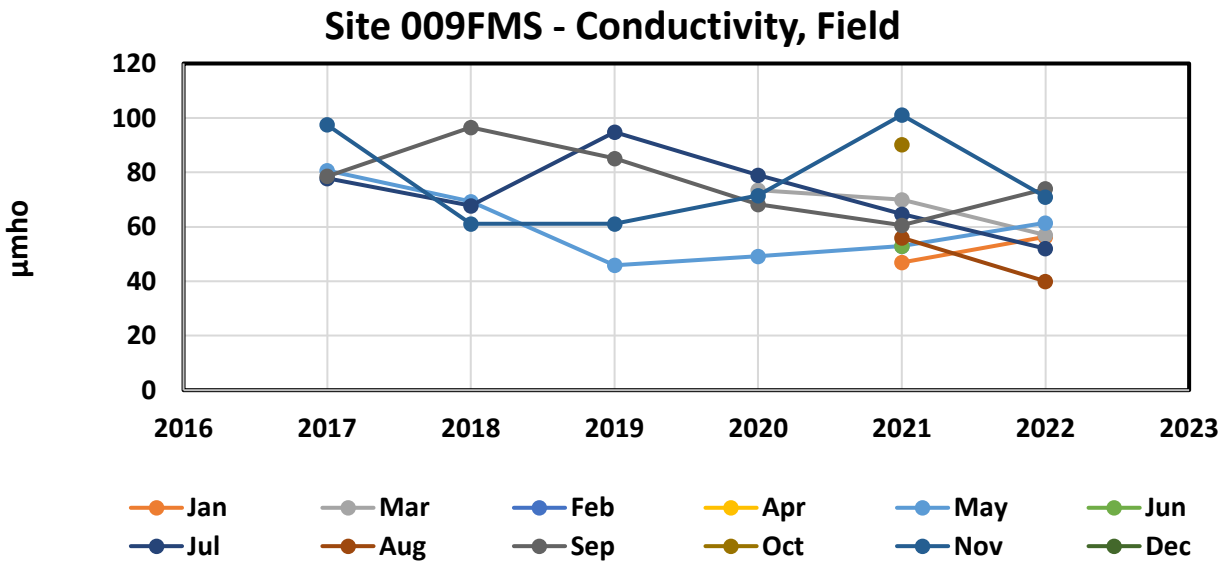
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					80.7		77.85		78.6		97.5	
b	**2017/2018**					69.25		67.8		96.54		61.13	
c	**2018/2019**					45.88		94.8		85.19		61.19	
d	**2019/2020**			73.47		49.24		78.98		68.3		71.49	
e	**2020/2021**	46.91		70		52.89	53	64.7	56	60.6	90.2	101.1	
f	**2021/2022**	56.34		57		61.5		52	40	74		71	
	n	2	0	3	0	6	1	6	2	6	1	6	0
	t_1	2	0	3	0	6	1	6	2	6	1	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		1		-1	
	c-a					-1		1		1		-1	
	d-a					-1		1		-1		-1	
	e-a					-1		-1		-1		1	
	f-a					-1		-1		-1		-1	
	c-b					-1		1		-1		1	
	d-b					-1		1		-1		1	
	e-b					-1		-1		-1		1	
	f-b					-1		-1		-1		1	
	d-c					1		-1		-1		1	
	e-c					1		-1		-1		1	
	f-c					1		-1		-1		1	
	e-d			-1		1		-1		-1		1	
	f-d			-1		1		-1		1		-1	
	f-e	1		-1		1		-1	-1	1		-1	
	S_k	1	0	-3	0	-3	0	-7	-1	-7	0	3	0
	σ^2_S=	1.00		3.67		28.33		28.33	1.00	28.33		28.33	
	$Z_k = S_k/\sigma_S$	1.00		-1.57		-0.56		-1.32	-1.00	-1.32		0.56	
	Z^2_k	1.00		2.45		0.32		1.73	1.00	1.73		0.32	

ΣZ_k= -4.20
ΣZ^2_k= 8.55
Z-bar=$\Sigma Z_k/K$= -0.60

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	33	0	0	0	0

Σn 33
ΣS_k -17

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	6.03		@a=5% c2(K-1)=	12.59	Test for station homogeneity
	p	**0.420**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-1.47	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
119.00	**p**	**0.071**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-10.65	**-3.840**	2.54
0.050	-8.44		-0.10
0.100	-7.32		-0.98
0.200	-5.47		-3.17

009FMS Seasonal Kendall analysis for pH, Field (su)

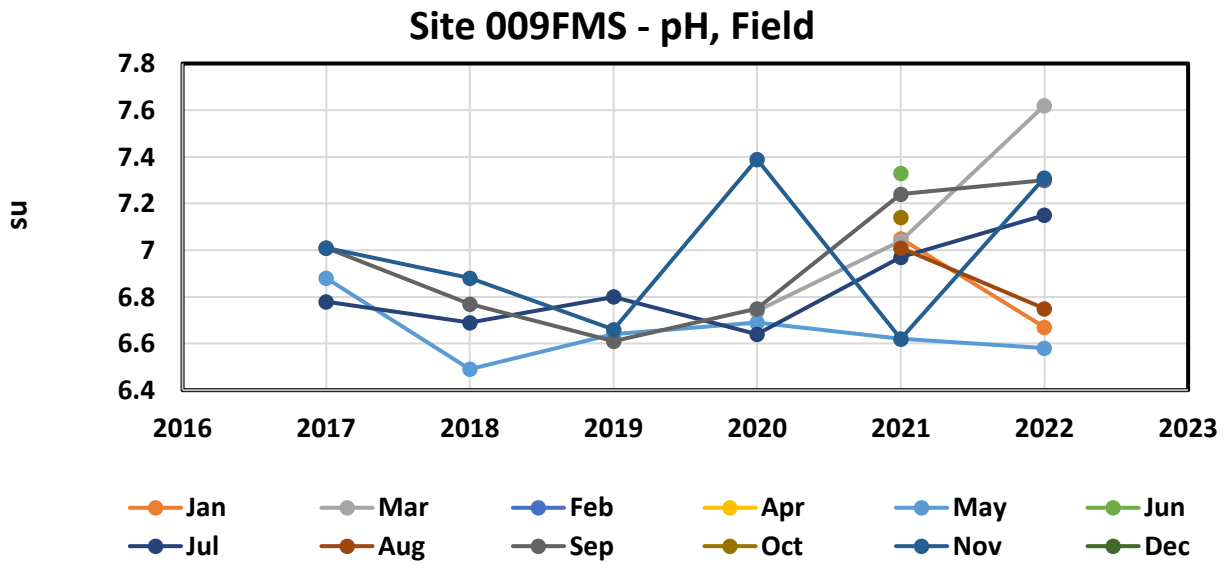
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					6.88		6.78		7.01		7.01	
b	**2017/2018**					6.49		6.69		6.77		6.88	
c	**2018/2019**					6.64		6.8		6.61		6.66	
d	**2019/2020**			6.74		6.69		6.64		6.75		7.39	
e	**2020/2021**	7.05		7.04		6.62	7.33	6.97	7.01	7.24	7.14	6.62	
f	**2021/2022**	6.67		7.62		6.58		7.15	6.75	7.3		7.31	
	n	2	0	3	0	6	1	6	2	6	1	6	0
	t_1	2	0	3	0	6	1	6	2	6	1	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		-1		-1	
	c-a					-1		1		-1		-1	
	d-a					-1		-1		-1		1	
	e-a					-1		1		1		-1	
	f-a					-1		1		1		1	
	c-b					1		1		-1		-1	
	d-b					1		-1		-1		1	
	e-b					1		1		1		-1	
	f-b					1		1		1		1	
	d-c					1		-1		1		1	
	e-c					-1		1		1		-1	
	f-c					-1		1		1		1	
	e-d			1		-1		1		1		-1	
	f-d			1		-1		1		1		-1	
	f-e	-1		1		-1		1	-1	1		1	
	S_k	-1	0	3	0	-5	0	7	-1	5	0	-1	0
	σ^2_S=	1.00		3.67		28.33		28.33	1.00	28.33		28.33	
	$Z_k = S_k/\sigma_S$	-1.00		1.57		-0.94		1.32	-1.00	0.94		-0.19	
	Z^2_k	1.00		2.45		0.88		1.73	1.00	0.88		0.04	

ΣZ_k= 0.69
ΣZ^2_k= 7.98
Z-bar=$\Sigma Z_k/K$= 0.10

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	33	0	0	0	0

Σn 33
ΣS_k 7

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	7.92	@a=5% c2(K-1)=	12.59	Test for station homogeneity
	p **0.244**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 0.55	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
119.00	**p** **0.709**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.06	**0.047**	0.12
0.050	-0.04		0.10
0.100	-0.02		0.08
0.200	-0.01		0.06

009FMS Seasonal Kendall analysis for SO4, Total (mg/L)

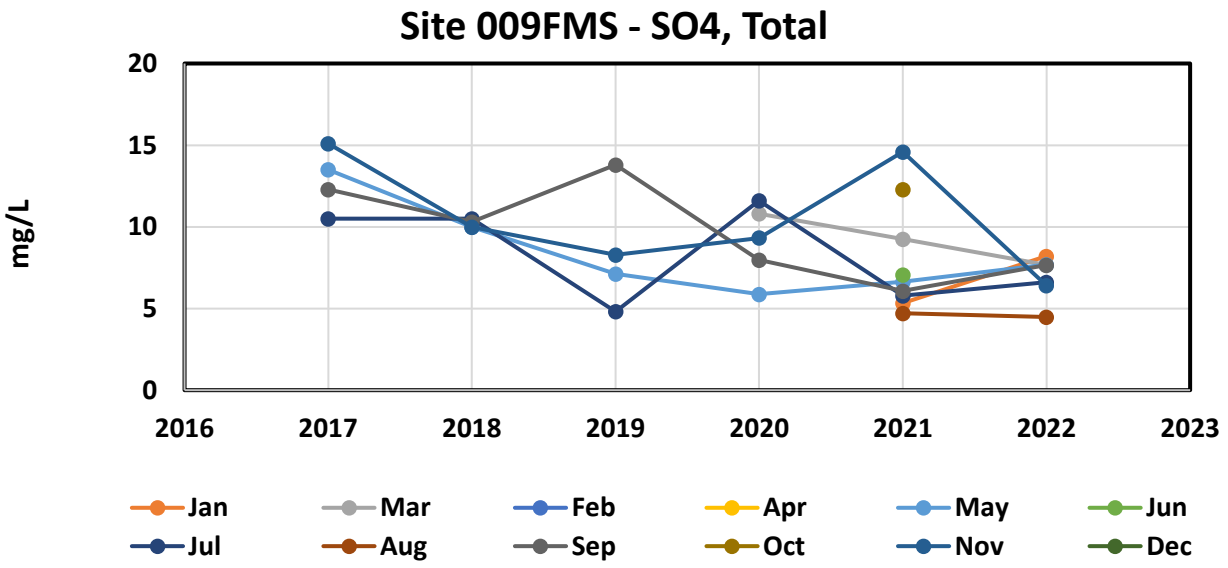
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					13.5		10.5		12.3		15.1	
b	**2017/2018**					10		10.5		10.3		10	
c	**2018/2019**					7.13		4.81		13.8		8.29	
d	**2019/2020**			10.8		5.88		11.6		7.97		9.32	
e	**2020/2021**	5.33		9.24		6.63	7.05	5.78	4.71	6.08	12.3	14.6	
f	**2021/2022**	8.21		7.67		7.69		6.62	4.48	7.65		6.41	
	n	2	0	3	0	6	1	6	2	6	1	6	0
	t_1	2	0	3	0	6	1	4	2	6	1	6	0
	t_2	0	0	0	0	0	0	1	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		0		-1		-1	
	c-a					-1		-1		1		-1	
	d-a					-1		1		-1		-1	
	e-a					-1		-1		-1		-1	
	f-a					-1		-1		-1		-1	
	c-b					-1		-1		1		-1	
	d-b					-1		1		-1		-1	
	e-b					-1		-1		-1		1	
	f-b					-1		-1		-1		-1	
	d-c					-1		1		-1		1	
	e-c					-1		1		-1		1	
	f-c					1		1		-1		-1	
	e-d			-1		1		-1		-1		1	
	f-d			-1		1		-1		-1		-1	
	f-e	1		-1		1		1	-1	1		-1	
	S_k	1	0	-3	0	-7	0	-2	-1	-9	0	-7	0
	σ^2_S=	1.00		3.67		28.33		27.33	1.00	28.33		28.33	
	$Z_k = S_k/\sigma_S$	1.00		-1.57		-1.32		-0.38	-1.00	-1.69		-1.32	
	Z^2_k	1.00		2.45		1.73		0.15	1.00	2.86		1.73	

ΣZ_k= -6.27
ΣZ^2_k= 10.92
Z-bar=$\Sigma Z_k/K$= -0.90

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	31	1	0	0	0

Σn 33
ΣS_k -28

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	5.30	@a=5% c2(K-1)=	12.59	Test for station homogeneity
	p **0.506**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} -2.49	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
118.00	**p** **0.006**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-1.72	**-1.162**	-0.16
0.050	-1.57		-0.47
0.100	-1.56		-0.65
0.200	-1.44		-0.89

009FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

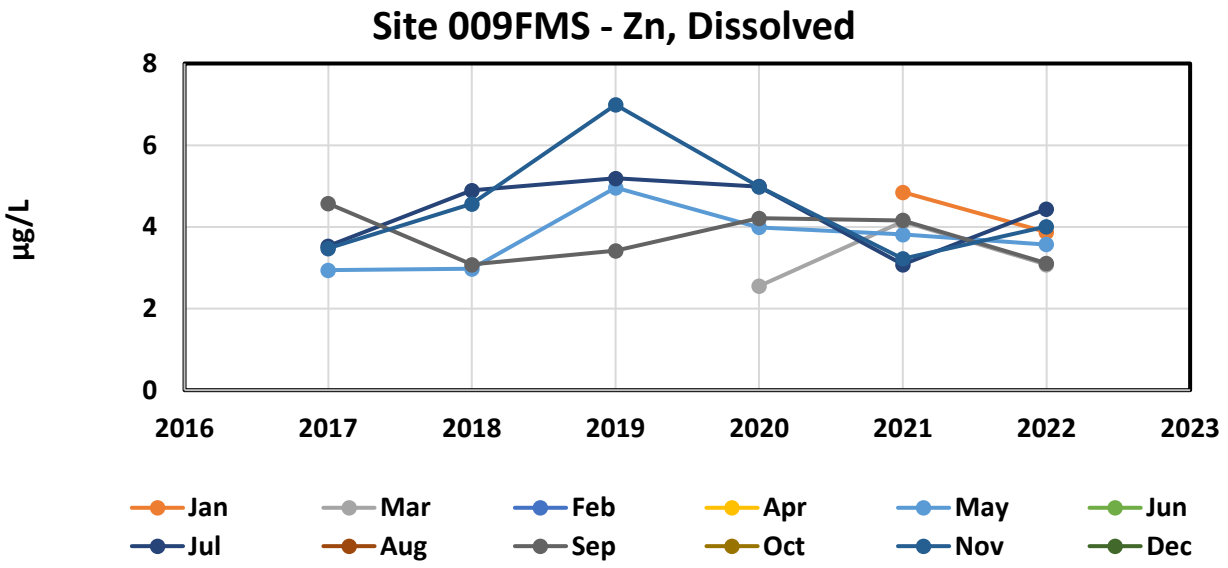
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					2.94		3.53		4.57		3.47	
b	**2017/2018**					2.97		4.89		3.08		4.56	
c	**2018/2019**					4.96		5.19		3.42		6.99	
d	**2019/2020**			2.55		3.99		4.99		4.21		4.98	
e	**2020/2021**	4.85		4.13		3.81		3.08		4.16		3.22	
f	**2021/2022**	3.87		3.08		3.57		4.44		3.11		4.01	
	n	2	0	3	0	6	0	6	0	6	0	6	0
	t_1	2	0	3	0	6	0	6	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					1		1		-1		1	
	c-a					1		1		-1		1	
	d-a					1		1		-1		1	
	e-a					1		-1		-1		-1	
	f-a					1		1		-1		1	
	c-b					1		1		1		1	
	d-b					1		1		1		1	
	e-b					1		-1		1		-1	
	f-b					1		-1		1		-1	
	d-c					-1		-1		1		-1	
	e-c					-1		-1		1		-1	
	f-c					-1		-1		-1		-1	
	e-d			1		-1		-1		-1		-1	
	f-d			1		-1		-1		-1		-1	
	f-e	-1		-1		-1		1		-1		1	
	S_k	-1	0	1	0	3	0	-1	0	-3	0	-1	0
	σ^2_S=	1.00		3.67		28.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$	-1.00		0.52		0.56		-0.19		-0.56		-0.19	
	Z^2_k	1.00		0.27		0.32		0.04		0.32		0.04	

ΣZ_k= -0.85
ΣZ^2_k= 1.98
Z-bar=$\Sigma Z_k/K$= -0.14

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	29	0	0	0	0

Σn 29
ΣS_k -2

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	1.86		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.869**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.09	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
118.00	**p**	**0.463**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.29	**-0.056**	0.29
0.050	-0.21		0.21
0.100	-0.18		0.15
0.200	-0.12		0.08

013FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

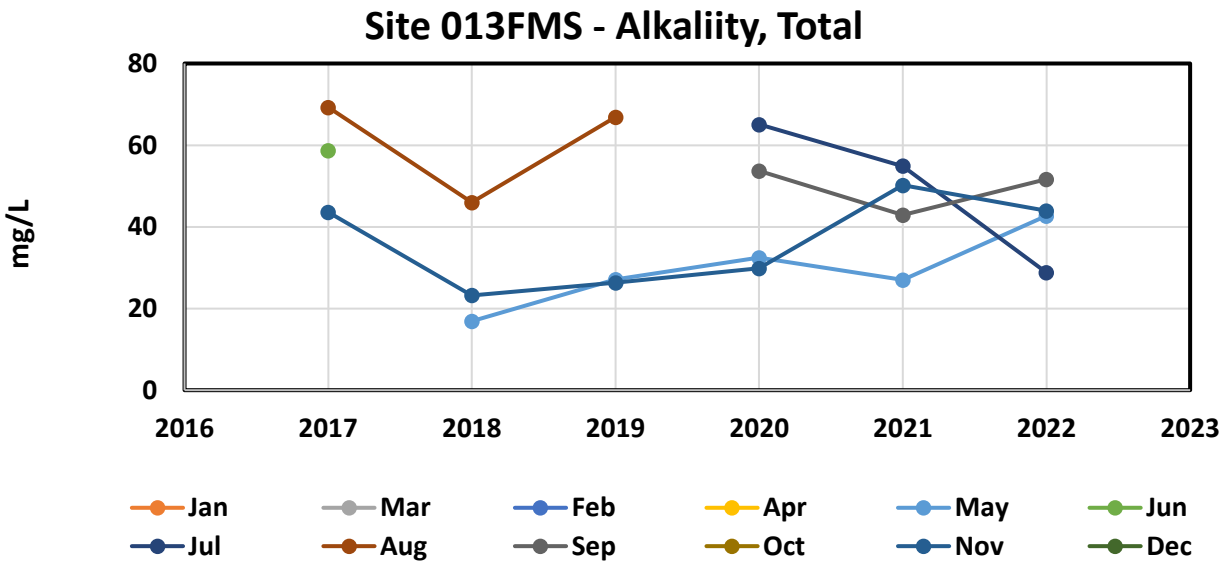
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						58.7		69.3			43.6	
b	**2017/2018**					16.9			46			23.2	
c	**2018/2019**					27.1			66.9			26.3	
d	**2019/2020**					32.5		65.1		53.7		29.8	
e	**2020/2021**					27		54.9		42.9		50.2	
f	**2021/2022**					42.7		28.8		51.7		43.9	
	n	0	0	0	0	5	1	3	3	3	0	6	0
	t_1	0	0	0	0	5	1	3	3	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a								-1			-1	
	c-a								-1			-1	
	d-a											-1	
	e-a											1	
	f-a											1	
	c-b					1			1			1	
	d-b					1						1	
	e-b					1						1	
	f-b					1						1	
	d-c					1						1	
	e-c					-1						1	
	f-c					1						1	
	e-d					-1		-1		-1		1	
	f-d					1		-1		-1		1	
	f-e					1		-1		1		-1	
	S_k	0	0	0	0	6	0	-3	-1	-1	0	7	0
	σ^2_S=					16.67		3.67	3.67	3.67		28.33	
	$Z_k = S_k/\sigma_S$					1.47		-1.57	-0.52	-0.52		1.32	
	Z^2_k					2.16		2.45	0.27	0.27		1.73	

ΣZ_k= 0.17
ΣZ^2_k= 6.89
Z-bar=$\Sigma Z_k/K$= 0.03

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	21	0	0	0	0

Σn 21
ΣS_k 8

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	6.88	@a=5% c2(K-1)=	9.49	Test for station homogeneity
	p **0.142**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 0.94	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
56.00	**p** **0.825**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-6.06	**3.333**	6.87
0.050	-1.73		5.47
0.100	-0.81		5.19
0.200	0.04		5.11

013FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

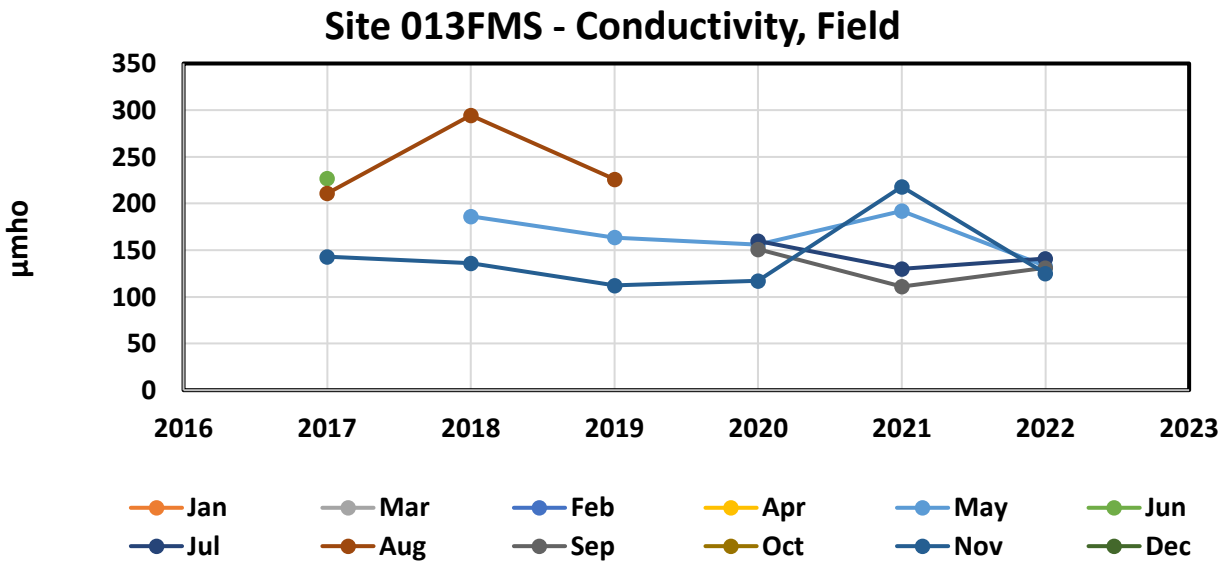
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						226.7		210.8			143	
b	**2017/2018**					186.2			294.5			136.1	
c	**2018/2019**					163.6			225.8			112.3	
d	**2019/2020**					156.1		159.8		151		117.3	
e	**2020/2021**					192		130		111		218	
f	**2021/2022**					133		141		131		125	
	n	0	0	0	0	5	1	3	3	3	0	6	0
	t_1	0	0	0	0	5	1	3	3	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a								1			-1	
	c-a								1			-1	
	d-a											-1	
	e-a											1	
	f-a											-1	
	c-b					-1			-1			-1	
	d-b					-1						-1	
	e-b					1						1	
	f-b					-1						-1	
	d-c					-1						1	
	e-c					1						1	
	f-c					-1						1	
	e-d					1		-1		-1		1	
	f-d					-1		-1		-1		1	
	f-e					-1		1		1		-1	
	S_k	0	0	0	0	-4	0	-1	1	-1	0	-1	0
	σ^2_S=					16.67		3.67	3.67	3.67		28.33	
	$Z_k = S_k/\sigma_S$					-0.98		-0.52	0.52	-0.52		-0.19	
	Z^2_k					0.96		0.27	0.27	0.27		0.04	

ΣZ_k= -1.69
ΣZ^2_k= 1.81
Z-bar=$\Sigma Z_k/K$= -0.34

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	21	0	0	0	0

Σn 21
ΣS_k -6

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	1.24		@a=5% c2(K-1)=	9.49	Test for station homogeneity
	p	**0.871**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.67	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
56.00	**p**	**0.252**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-15.26	**-7.200**	9.97
0.050	-11.82		4.35
0.100	-10.16		3.46
0.200	-9.49		-2.07

013FMS Seasonal Kendall analysis for pH, Field (su)

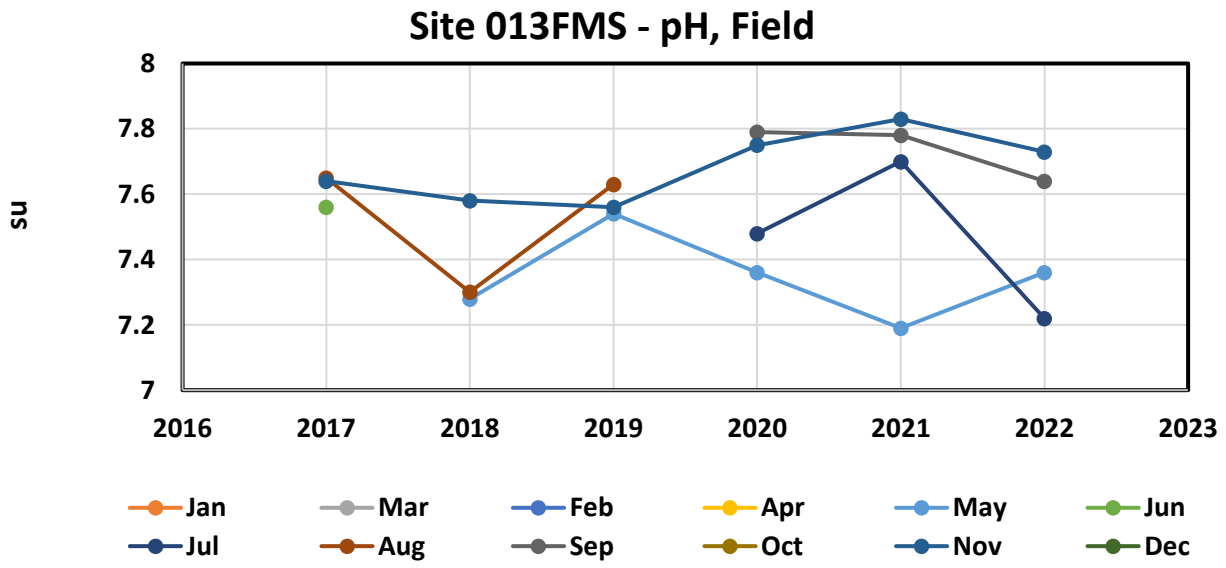
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						7.56		7.65			7.64	
b	**2017/2018**					7.28			7.3			7.58	
c	**2018/2019**					7.54			7.63			7.56	
d	**2019/2020**					7.36		7.48		7.79		7.75	
e	**2020/2021**					7.19		7.7		7.78		7.83	
f	**2021/2022**					7.36		7.22		7.64		7.73	
	n	0	0	0	0	5	1	3	3	3	0	6	0
	t_1	0	0	0	0	3	1	3	3	3	0	6	0
	t_2	0	0	0	0	1	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a								-1			-1	
	c-a								-1			-1	
	d-a											1	
	e-a											1	
	f-a											1	
	c-b					1			1			-1	
	d-b					1						1	
	e-b					-1						1	
	f-b					1						1	
	d-c					-1						1	
	e-c					-1						1	
	f-c					-1						1	
	e-d					-1		1		-1		1	
	f-d					0		-1		-1		-1	
	f-e					1		-1		-1		-1	
	S_k	0	0	0	0	-1	0	-1	-1	-3	0	5	0
	σ^2_S=					15.67		3.67	3.67	3.67		28.33	
	$Z_k = S_k/\sigma_S$					-0.25		-0.52	-0.52	-1.57		0.94	
	Z^2_k					0.06		0.27	0.27	2.45		0.88	

ΣZ_k= -1.92
ΣZ^2_k= 3.95
Z-bar=$\Sigma Z_k/K$= -0.38

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	19	1	0	0	0

Σn 21
ΣS_k -1

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	3.21	@a=5% c2(K-1)=	9.49	Test for station homogeneity
	p **0.524**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 0.00	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
55.00	**p** **0.500**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

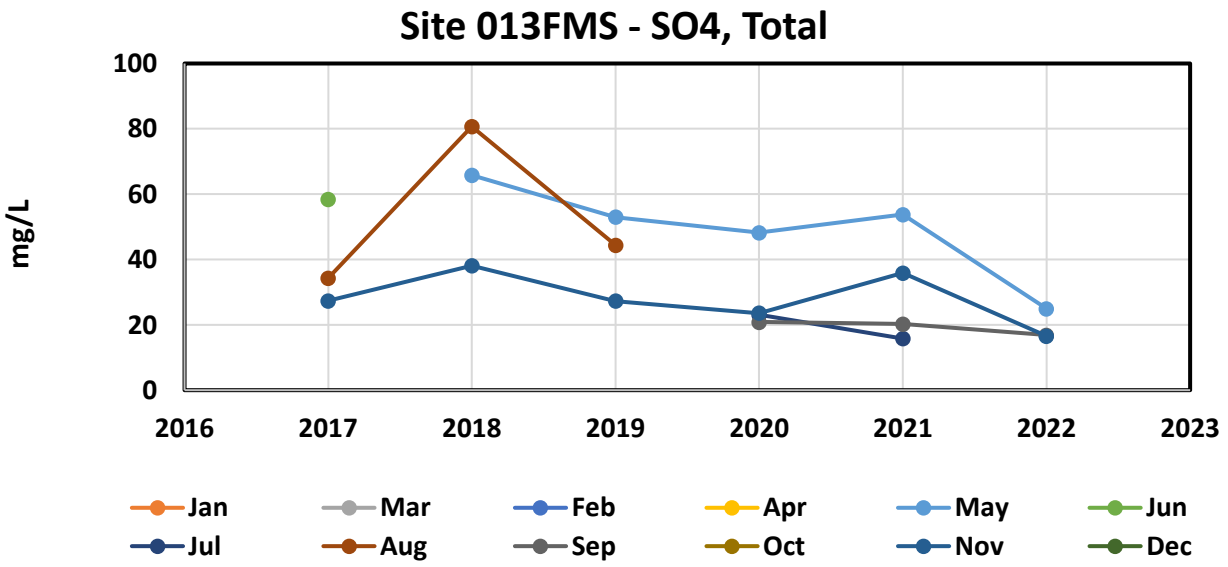
α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.09	**-0.005**	0.07
0.050	-0.06		0.04
0.100	-0.04		0.04
0.200	-0.02		0.02

013FMS Seasonal Kendall analysis for SO4, Total (mg/L)

Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						58.5		34.3			27.4	
b	**2017/2018**					65.8			80.7			38.1	
c	**2018/2019**					53			44.4			27.3	
d	**2019/2020**					48.2		23.1		20.9		23.6	
e	**2020/2021**					53.8		15.8		20.3		35.9	
f	**2021/2022**					25				16.9		16.6	
	n	0	0	0	0	5	1	2	3	3	0	6	0
	t_1	0	0	0	0	5	1	2	3	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a								1			1	
	c-a								1			-1	
	d-a											-1	
	e-a											1	
	f-a											-1	
	c-b					-1			-1			-1	
	d-b					-1						-1	
	e-b					-1						-1	
	f-b					-1						-1	
	d-c					-1						-1	
	e-c					1						1	
	f-c					-1						-1	
	e-d					1		-1		-1		1	
	f-d					-1				-1		-1	
	f-e					-1				-1		-1	
	S_k	0	0	0	0	-6	0	-1	1	-3	0	-7	0
	σ^2_S=					16.67		1.00	3.67	3.67		28.33	
	$Z_k = S_k/\sigma_S$					-1.47		-1.00	0.52	-1.57		-1.32	
	Z^2_k					2.16		1.00	0.27	2.45		1.73	

ΣZ_k=	-4.83	Tie Extent	t_1	t_2	t_3	t_4	t_5	Σn	20
ΣZ^2_k=	7.62	Count	20	0	0	0	0	ΣS_k	-16
Z-bar=$\Sigma Z_k/K$=	-0.97								

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2$=	2.95		@a=5% c2(K-1)=	9.49	Test for station homogeneity
	p	**0.566**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-2.05	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
53.33	**p**	**0.020**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-9.76	**-3.533**	0.17
0.050	-7.31		-0.73
0.100	-6.65		-1.50
0.200	-4.84		-2.15

013FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

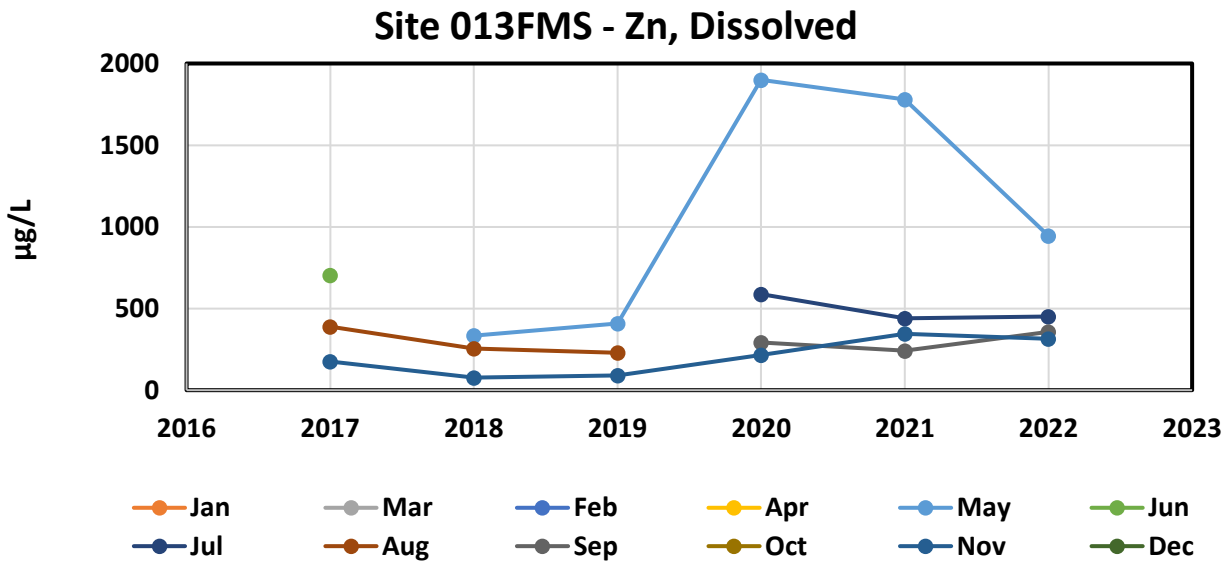
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						702		389			176	
b	**2017/2018**					334			255			77.2	
c	**2018/2019**					409			229			89.2	
d	**2019/2020**					1900		588		291		216	
e	**2020/2021**					1780		440		242		345	
f	**2021/2022**					945		452		357		315	
	n	0	0	0	0	5	1	3	3	3	0	6	0
	t_1	0	0	0	0	5	1	3	3	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a								-1			-1	
	c-a								-1			-1	
	d-a											1	
	e-a											1	
	f-a											1	
	c-b					1			-1			1	
	d-b					1						1	
	e-b					1						1	
	f-b					1						1	
	d-c					1						1	
	e-c					1						1	
	f-c					1						1	
	e-d					-1		-1		-1		1	
	f-d					-1		-1		1		1	
	f-e					-1		1		1		-1	
	S_k	0	0	0	0	4	0	-1	-3	1	0	9	0
	σ^2_S=					16.67		3.67	3.67	3.67		28.33	
	$Z_k = S_k/\sigma_S$					0.98		-0.52	-1.57	0.52		1.69	
	Z^2_k					0.96		0.27	2.45	0.27		2.86	

ΣZ_k= 1.10
ΣZ^2_k= 6.82
Z-bar=$\Sigma Z_k/K$= 0.22

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	21	0	0	0	0

Σn 21
ΣS_k 10

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	6.58	@a=5% c2(K-1)=	9.49	Test for station homogeneity
	p **0.160**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 1.20	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
56.00	**p** **0.885**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-62.38	**37.625**	123.31
0.050	-32.07		77.43
0.100	-18.21		73.85
0.200	12.00		60.93

027FMG Seasonal Kendall analysis for Alkaliity, Total (mg/L)

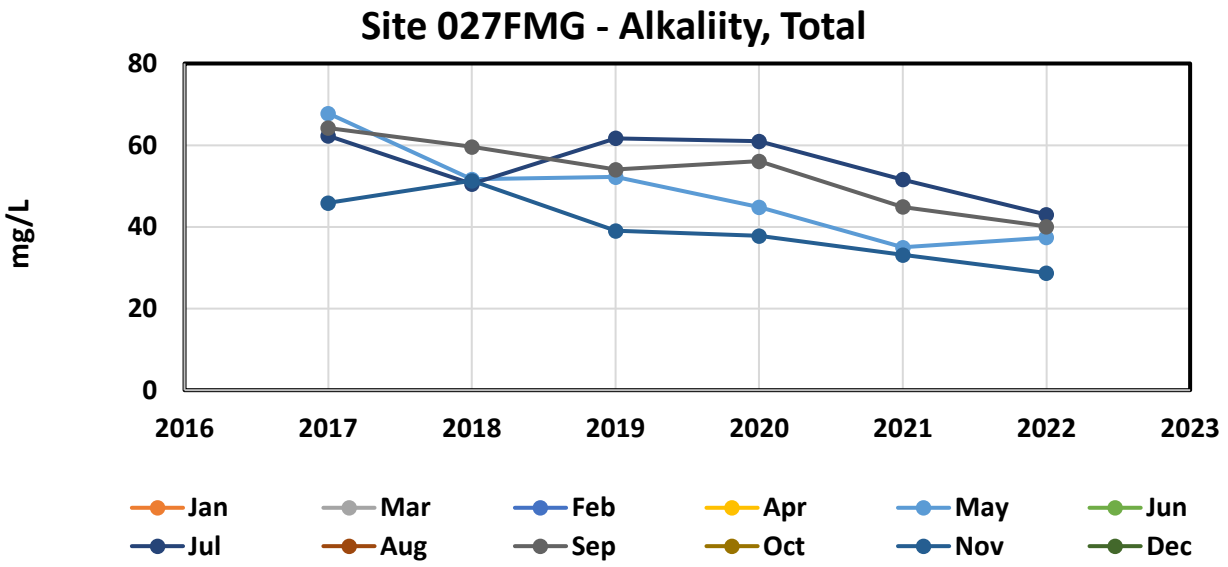
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					67.8		62.3		64.2		45.9	
b	**2017/2018**					51.7		50.5		59.6		51.3	
c	**2018/2019**					52.2		61.7		54		39	
d	**2019/2020**					44.8		61		56.1		37.8	
e	**2020/2021**					35		51.6		44.9		33.1	
f	**2021/2022**					37.4		43		40.1		28.7	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		-1		1	
	c-a					-1		-1		-1		-1	
	d-a					-1		-1		-1		-1	
	e-a					-1		-1		-1		-1	
	f-a					-1		-1		-1		-1	
	c-b					1		1		-1		-1	
	d-b					-1		1		-1		-1	
	e-b					-1		1		-1		-1	
	f-b					-1		-1		-1		-1	
	d-c					-1		-1		1		-1	
	e-c					-1		-1		-1		-1	
	f-c					-1		-1		-1		-1	
	e-d					-1		-1		-1		-1	
	f-d					-1		-1		-1		-1	
	f-e					1		-1		-1		-1	
	S_k	0	0	0	0	-11	0	-9	0	-13	0	-13	0
	σ^2_S=					28.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					-2.07		-1.69		-2.44		-2.44	
	Z^2_k					4.27		2.86		5.96		5.96	

ΣZ_k=	-8.64
ΣZ^2_k=	19.06
Z-bar=$\Sigma Z_k/K$=	-2.16

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn	24
ΣS_k	-46

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	0.39		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.943**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-4.23	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
113.33	**p**	**0.000**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-6.07	**-4.667**	-3.34
0.050	-5.45		-3.48
0.100	-5.03		-3.73
0.200	-4.89		-4.48

027FMG Seasonal Kendall analysis for Conductivity, Field (µmho)

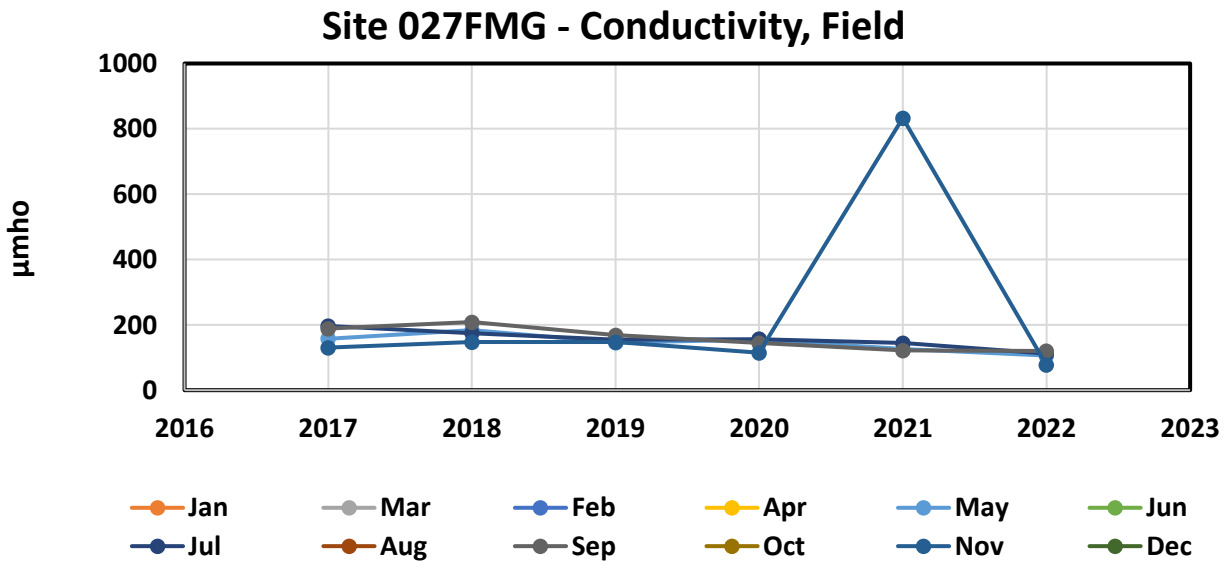
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					158		196.4		188.6		130	
b	**2017/2018**					183.9		175		208.6		147.3	
c	**2018/2019**					146.4		154.5		168.9		147.7	
d	**2019/2020**					155.1		156.6		145		114.3	
e	**2020/2021**					125.6		144		121.5		833	
f	**2021/2022**					106		112		120		77	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					1		-1		1		1	
	c-a					-1		-1		-1		1	
	d-a					-1		-1		-1		-1	
	e-a					-1		-1		-1		1	
	f-a					-1		-1		-1		-1	
	c-b					-1		-1		-1		1	
	d-b					-1		-1		-1		-1	
	e-b					-1		-1		-1		1	
	f-b					-1		-1		-1		-1	
	d-c					1		1		-1		-1	
	e-c					-1		-1		-1		1	
	f-c					-1		-1		-1		-1	
	e-d					-1		-1		-1		1	
	f-d					-1		-1		-1		-1	
	f-e					-1		-1		-1		-1	
	S_k	0	0	0	0	-11	0	-13	0	-13	0	-1	0
	σ^2_S=					28.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					-2.07		-2.44		-2.44		-0.19	
	Z^2_k					4.27		5.96		5.96		0.04	

ΣZ_k= -7.14
ΣZ^2_k= 16.24
Z-bar=$\Sigma Z_k/K$= -1.78

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k -38

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	3.49		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.322**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-3.48	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
113.33	**p**	**0.000**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

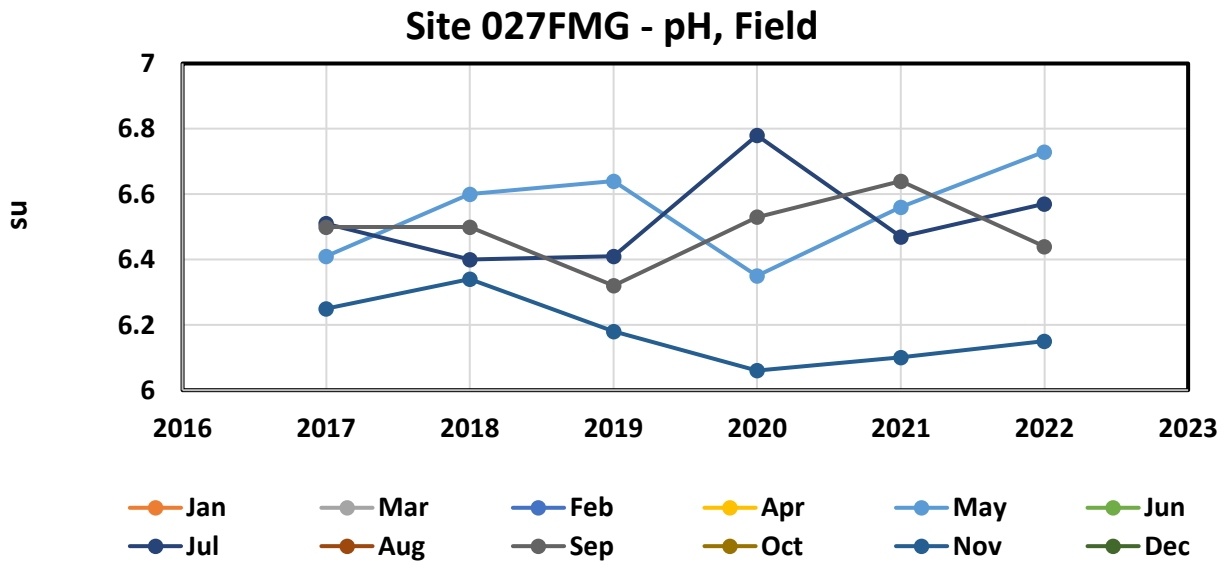
α	Lower Limit	Sen's Slope	Upper Limit
0.010	-20.67	**-14.283**	-9.60
0.050	-19.24		-10.45
0.100	-17.45		-12.52
0.200	-16.63		-13.19

027FMG Seasonal Kendall analysis for pH, Field (su)

Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					6.41		6.51		6.5		6.25	
b	**2017/2018**					6.6		6.4		6.5		6.34	
c	**2018/2019**					6.64		6.41		6.32		6.18	
d	**2019/2020**					6.35		6.78		6.53		6.06	
e	**2020/2021**					6.56		6.47		6.64		6.1	
f	**2021/2022**					6.73		6.57		6.44		6.15	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	4	0	6	0
	t_2	0	0	0	0	0	0	0	0	1	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					1		-1		0		1	
	c-a					1		-1		-1		-1	
	d-a					-1		1		1		-1	
	e-a					1		-1		1		-1	
	f-a					1		1		-1		-1	
	c-b					1		1		-1		-1	
	d-b					-1		1		1		-1	
	e-b					-1		1		1		-1	
	f-b					1		1		-1		-1	
	d-c					-1		1		1		-1	
	e-c					-1		1		1		-1	
	f-c					1		1		1		-1	
	e-d					1		-1		1		1	
	f-d					1		-1		-1		1	
	f-e					1		1		-1		1	
	S_k	0	0	0	0	5	0	5	0	2	0	-7	0
	σ^2_S=					28.33		28.33		27.33		28.33	
	$Z_k = S_k/\sigma_S$					0.94		0.94		0.38		-1.32	
	Z^2_k					0.88		0.88		0.15		1.73	

ΣZ_k=	0.95	Tie Extent	t_1	t_2	t_3	t_4	t_5	Σn 24
ΣZ^2_k=	3.64	Count	22	1	0	0	0	ΣS_k 5
Z-bar=ΣZ_k/K=	0.24							

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2$=	3.42		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.332**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
ΣVAR(S_k)	Z_{calc}	0.38	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
112.33	**p**	**0.647**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.04		0.04
0.050	-0.02	**0.011**	0.04
0.100	-0.01		0.03
0.200	-0.01		0.03

027FMG Seasonal Kendall analysis for SO4, Total (mg/L)

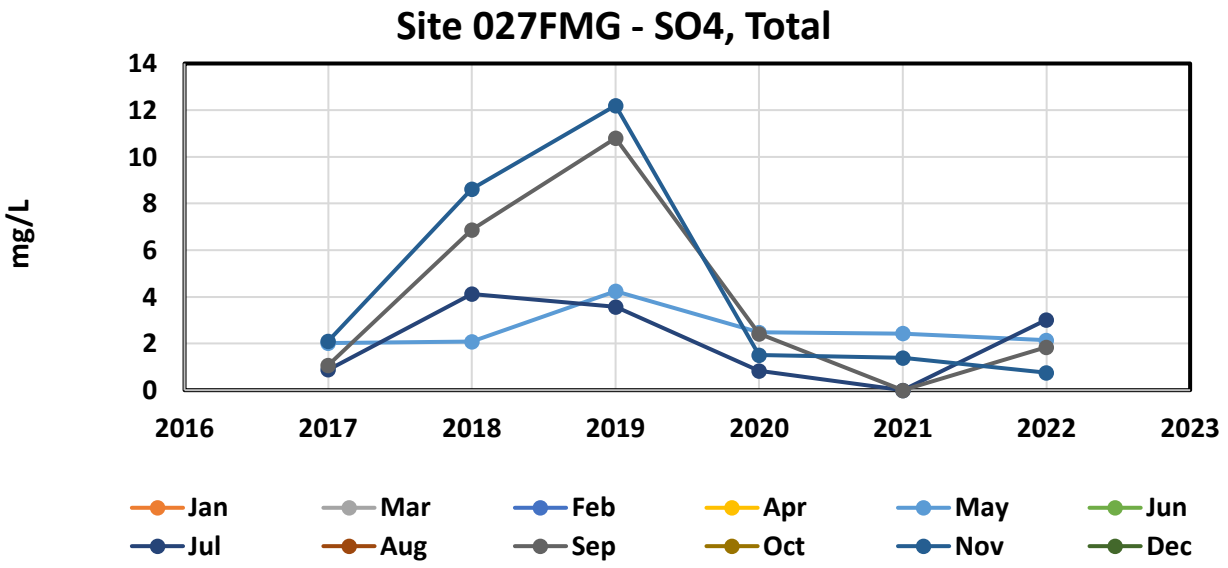
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					2.02		0.88		1.07		2.1	
b	**2017/2018**					2.09		4.12		6.88		8.62	
c	**2018/2019**					4.24		3.57		10.8		12.2	
d	**2019/2020**					2.48		0.83		2.42		1.5	
e	**2020/2021**					2.43		0		0		1.38	
f	**2021/2022**					2.15		3.02		1.84		0.75	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					1		1		1		1	
	c-a					1		1		1		1	
	d-a					1		-1		1		-1	
	e-a					1		-1		-1		-1	
	f-a					1		1		1		-1	
	c-b					1		-1		1		1	
	d-b					1		-1		-1		-1	
	e-b					1		-1		-1		-1	
	f-b					1		-1		-1		-1	
	d-c					-1		-1		-1		-1	
	e-c					-1		-1		-1		-1	
	f-c					-1		-1		-1		-1	
	e-d					-1		-1		-1		-1	
	f-d					-1		1		-1		-1	
	f-e					-1		1		1		-1	
	S_k	0	0	0	0	3	0	-5	0	-3	0	-9	0
	σ^2_S=					28.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					0.56		-0.94		-0.56		-1.69	
	Z^2_k					0.32		0.88		0.32		2.86	

ΣZ_k= -2.63
ΣZ^2_k= 4.38
Z-bar=$\Sigma Z_k/K$= -0.66

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k -14

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	2.65		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.449**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-1.22	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
113.33	**p**	**0.111**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

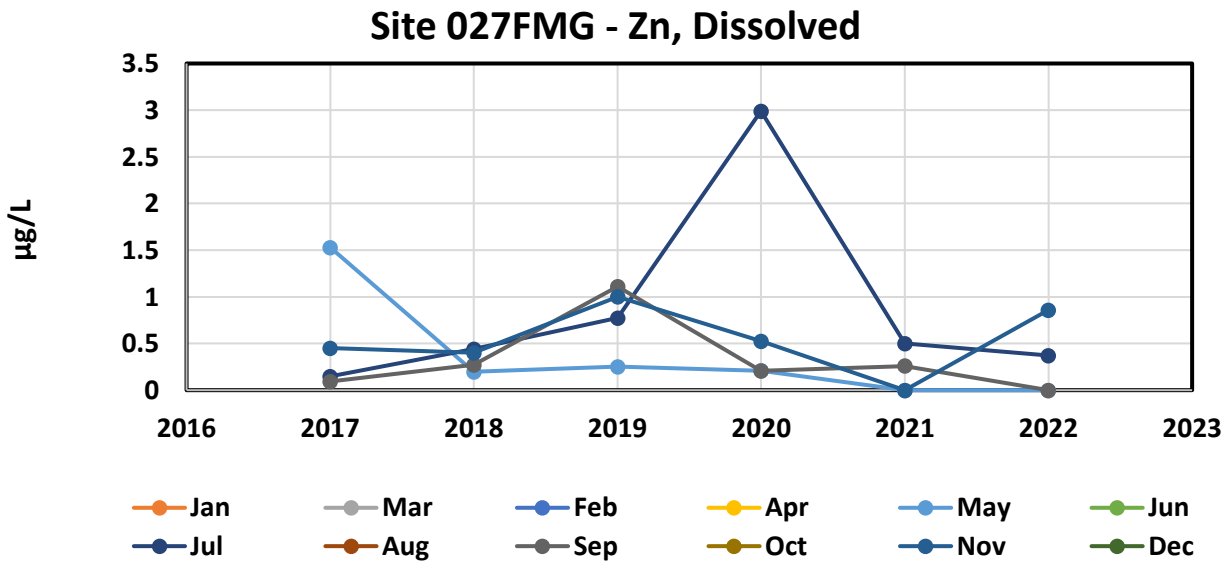
α	Lower Limit	Sen's Slope	Upper Limit
0.010	-1.30	**-0.210**	0.13
0.050	-0.68		0.02
0.100	-0.52		-0.02
0.200	-0.28		-0.14

027FMG Seasonal Kendall analysis for Zn, Dissolved (µg/L)

Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					1.53		0.148		0.0954		0.451	
b	**2017/2018**					0.198		0.439		0.273		0.403	
c	**2018/2019**					0.254		0.776		1.11		1	
d	**2019/2020**					0.21		2.99		0.209		0.525	
e	**2020/2021**					0		0.5		0.26		0	
f	**2021/2022**					0		0.37		0		0.86	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	4	0	6	0	6	0	6	0
	t_2	0	0	0	0	1	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		1		1		-1	
	c-a					-1		1		1		1	
	d-a					-1		1		1		1	
	e-a					-1		1		1		-1	
	f-a					-1		1		-1		1	
	c-b					1		1		1		1	
	d-b					1		1		-1		1	
	e-b					-1		1		-1		-1	
	f-b					-1		-1		-1		1	
	d-c					-1		1		-1		-1	
	e-c					-1		-1		-1		-1	
	f-c					-1		-1		-1		-1	
	e-d					-1		-1		1		-1	
	f-d					-1		-1		-1		1	
	f-e					0		-1		-1		1	
	S_k	0	0	0	0	-10	0	3	0	-3	0	1	0
	σ^2_S=					27.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					-1.91		0.56		-0.56		0.19	
	Z^2_k					3.66		0.32		0.32		0.04	

ΣZ_k=	-1.72	Tie Extent	t_1	t_2	t_3	t_4	t_5	Σn 24
ΣZ^2_k=	4.33	Count	22	1	0	0	0	ΣS_k -9
Z-bar=$\Sigma Z_k/K$=	-0.43							

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2$=	3.59		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.310**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.75	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
112.33	**p**	**0.225**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.13	**-0.038**	0.05
0.050	-0.11		0.03
0.100	-0.10		0.02
0.200	-0.07		0.00

029FMG Seasonal Kendall analysis for Alkaliity, Total (mg/L)

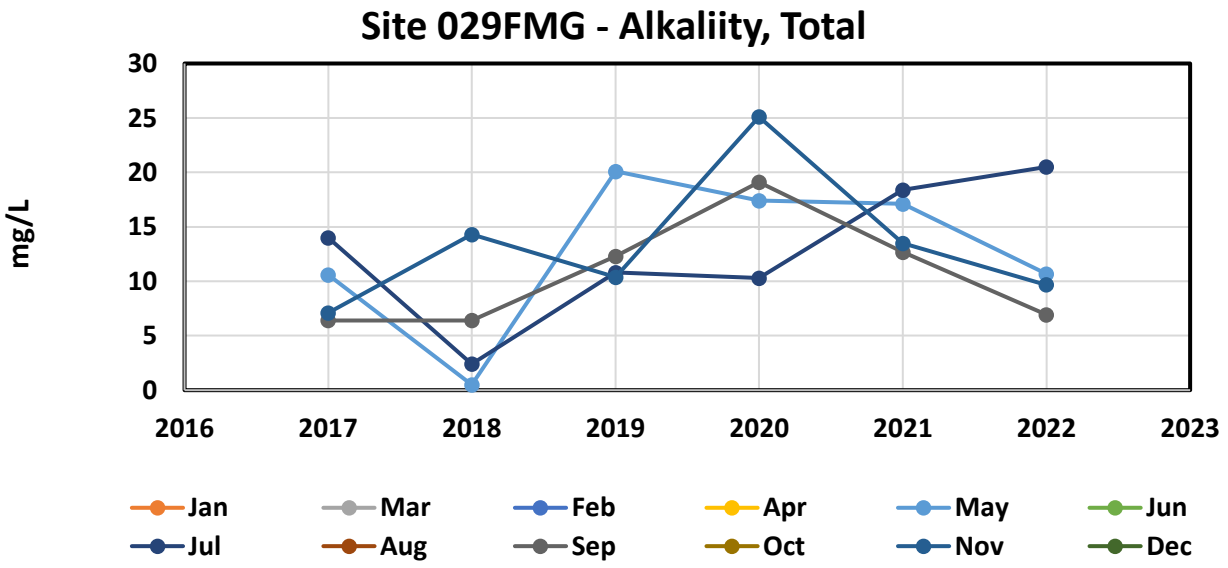
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					10.6		14		6.4		7.1	
b	**2017/2018**					-1		2.4		6.4		14.3	
c	**2018/2019**					20.1		10.8		12.3		10.4	
d	**2019/2020**					17.4		10.3		19.1		25.1	
e	**2020/2021**					17.1		18.4		12.7		13.5	
f	**2021/2022**					10.7		20.5		6.92		9.68	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	4	0	6	0
	t_2	0	0	0	0	0	0	0	0	1	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		0		1	
	c-a					1		-1		1		1	
	d-a					1		-1		1		1	
	e-a					1		1		1		1	
	f-a					1		1		1		1	
	c-b					1		1		1		-1	
	d-b					1		1		1		1	
	e-b					1		1		1		-1	
	f-b					1		1		1		-1	
	d-c					-1		-1		1		1	
	e-c					-1		1		1		1	
	f-c					-1		1		-1		-1	
	e-d					-1		1		-1		-1	
	f-d					-1		1		-1		-1	
	f-e					-1		1		-1		-1	
	S_k	0	0	0	0	1	0	7	0	6	0	1	0
	σ^2_S=					28.33		28.33		27.33		28.33	
	$Z_k = S_k/\sigma_S$					0.19		1.32		1.15		0.19	
	Z^2_k					0.04		1.73		1.32		0.04	

ΣZ_k= 2.84
ΣZ^2_k= 3.12
Z-bar=$\Sigma Z_k/K$= 0.71

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	22	1	0	0	0

Σn 24
ΣS_k 15

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	1.10	@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p **0.776**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 1.32	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
112.33	**p** **0.907**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

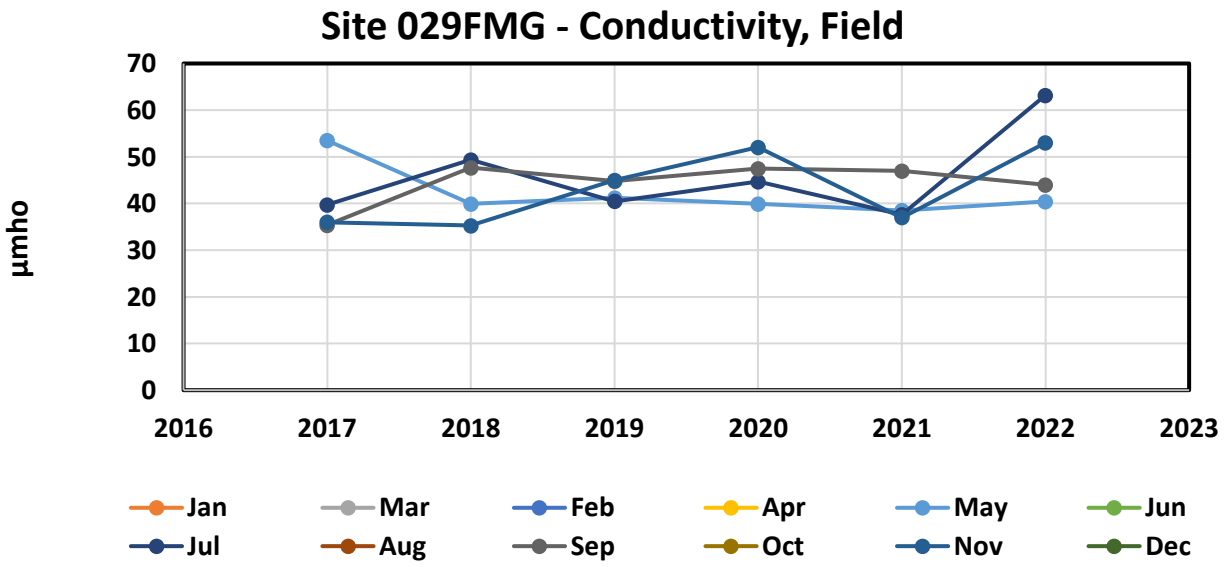
α	Lower Limit	Sen's Slope	Upper Limit
0.010	-1.18	**1.425**	3.85
0.050	-0.26		2.74
0.100	0.00		2.10
0.200	0.12		1.64

029FMG Seasonal Kendall analysis for Conductivity, Field (µmho)

Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					53.5		39.72		35.4		36	
b	**2017/2018**					39.96		49.4		47.69		35.3	
c	**2018/2019**					41.26		40.48		44.76		45	
d	**2019/2020**					39.9		44.72		47.5		52.06	
e	**2020/2021**					38.5		37.6		47		37	
f	**2021/2022**					40.4		63.2		44		53	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		1		1		-1	
	c-a					-1		1		1		1	
	d-a					-1		1		1		1	
	e-a					-1		-1		1		1	
	f-a					-1		1		1		1	
	c-b					1		-1		-1		1	
	d-b					-1		-1		-1		1	
	e-b					-1		-1		-1		1	
	f-b					1		1		-1		1	
	d-c					-1		1		1		1	
	e-c					-1		-1		1		-1	
	f-c					-1		1		-1		1	
	e-d					-1		-1		-1		-1	
	f-d					1		1		-1		1	
	f-e					1		1		-1		1	
	S_k	0	0	0	0	-7	0	3	0	-1	0	9	0
	σ^2_S=					28.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					-1.32		0.56		-0.19		1.69	
	Z^2_k					1.73		0.32		0.04		2.86	

ΣZ_k=	0.75	Tie Extent	t_1	t_2	t_3	t_4	t_5	Σn 24
ΣZ^2_k=	4.94	Count	24	0	0	0	0	ΣS_k 4
Z-bar=$\Sigma Z_k/K$=	0.19							

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2$=	4.80		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.187**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	0.28	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
113.33	**p**	**0.611**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-1.37	**0.250**	3.09
0.050	-0.52		1.86
0.100	-0.45		1.60
0.200	-0.24		0.83

029FMG Seasonal Kendall analysis for pH, Field (su)

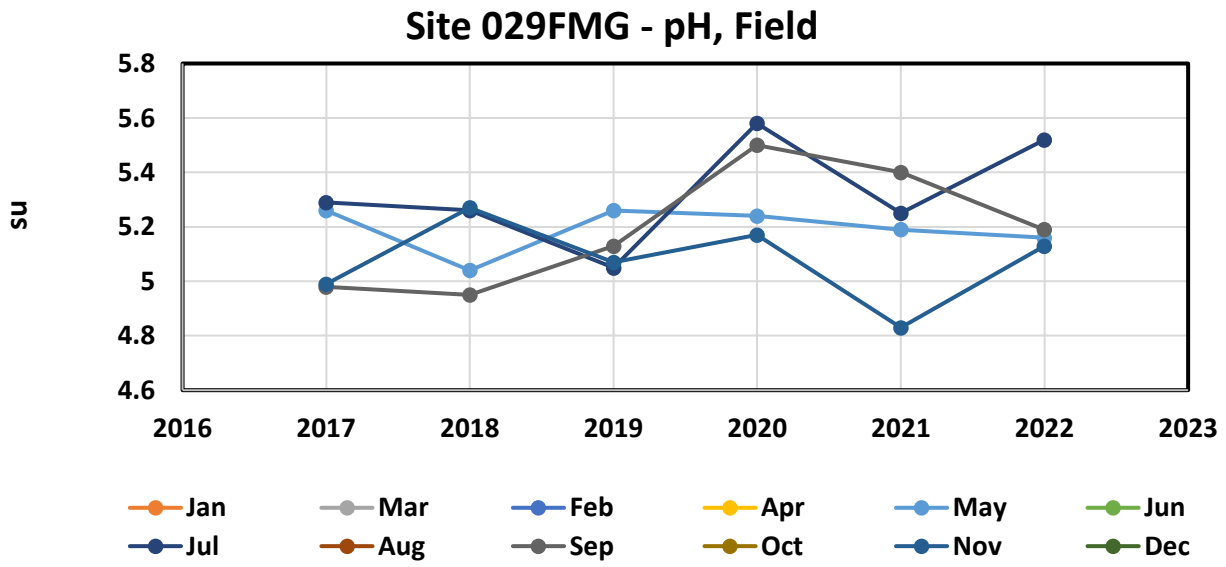
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					5.26		5.29		4.98		4.99	
b	**2017/2018**					5.04		5.26		4.95		5.27	
c	**2018/2019**					5.26		5.05		5.13		5.07	
d	**2019/2020**					5.24		5.58		5.5		5.17	
e	**2020/2021**					5.19		5.25		5.4		4.83	
f	**2021/2022**					5.16		5.52		5.19		5.13	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	4	0	6	0	6	0	6	0
	t_2	0	0	0	0	1	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		-1		1	
	c-a					0		-1		1		1	
	d-a					-1		1		1		1	
	e-a					-1		-1		1		-1	
	f-a					-1		1		1		1	
	c-b					1		-1		1		-1	
	d-b					1		1		1		-1	
	e-b					1		-1		1		-1	
	f-b					1		1		1		-1	
	d-c					-1		1		1		1	
	e-c					-1		1		1		-1	
	f-c					-1		1		1		1	
	e-d					-1		-1		-1		-1	
	f-d					-1		-1		-1		-1	
	f-e					-1		1		-1		1	
	S_k	0	0	0	0	-6	0	1	0	7	0	-1	0
	σ^2_S=					27.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					-1.15		0.19		1.32		-0.19	
	Z^2_k					1.32		0.04		1.73		0.04	

ΣZ_k= 0.17
ΣZ^2_k= 3.12
Z-bar=$\Sigma Z_k/K$= 0.04

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	22	1	0	0	0

Σn 24
ΣS_k 1

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	3.11	@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p **0.375**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 0.00	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
112.33	**p** **0.500**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.03	**0.010**	0.08
0.050	-0.03		0.06
0.100	-0.02		0.05
0.200	-0.02		0.03

029FMG Seasonal Kendall analysis for SO4, Total (mg/L)

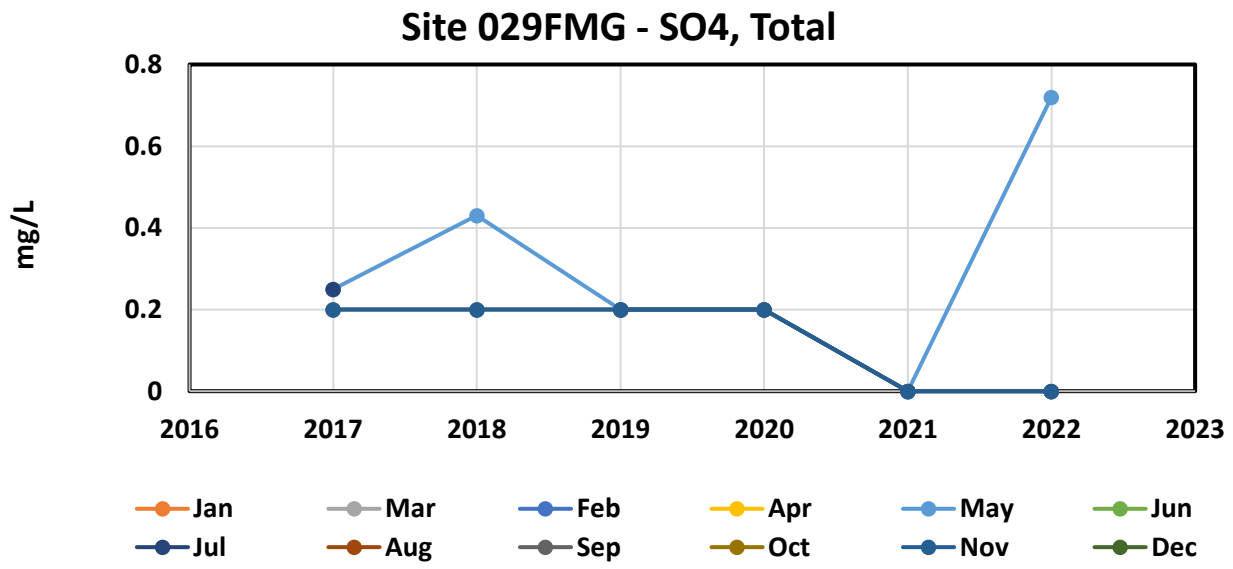
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					-0.5		-0.5		-0.4		-0.4	
b	**2017/2018**					0.43				-0.4		-0.4	
c	**2018/2019**					-0.4		-0.4		-0.4		-0.4	
d	**2019/2020**					-0.4		-0.4		-0.4		-0.4	
e	**2020/2021**					0		0		0		0	
f	**2021/2022**					0.72		0		0		0	
	n	0	0	0	0	6	0	5	0	6	0	6	0
	t_1	0	0	0	0	4	0	1	0	0	0	0	0
	t_2	0	0	0	0	1	0	2	0	1	0	1	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	1	0	1	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					1				0		0	
	c-a					1		1		0		0	
	d-a					1		1		0		0	
	e-a					1		1		1		1	
	f-a					1		1		1		1	
	c-b					-1				0		0	
	d-b					-1				0		0	
	e-b					-1				1		1	
	f-b					1				1		1	
	d-c					0		0		0		0	
	e-c					1		1		1		1	
	f-c					1		1		1		1	
	e-d					1		1		1		1	
	f-d					1		1		1		1	
	f-e					1		0		0		0	
	S_k	0	0	0	0	8	0	8	0	8	0	8	0
	σ^2_S=					27.33		14.67		18.67		18.67	
	$Z_k = S_k/\sigma_S$					1.53		2.09		1.85		1.85	
	Z^2_k					2.34		4.36		3.43		3.43	

ΣZ_k= 7.32
ΣZ^2_k= 13.56
Z-bar=$\Sigma Z_k/K$= 1.83

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	5	5	0	2	0

Σn 23
ΣS_k 32

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	0.16		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.984**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	3.48	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
79.33	**p**	**1.000**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	0.00		0.13
0.050	0.01	**0.100**	0.13
0.100	0.03		0.13
0.200	0.05		0.10

029FMG Seasonal Kendall analysis for Zn, Dissolved (µg/L)

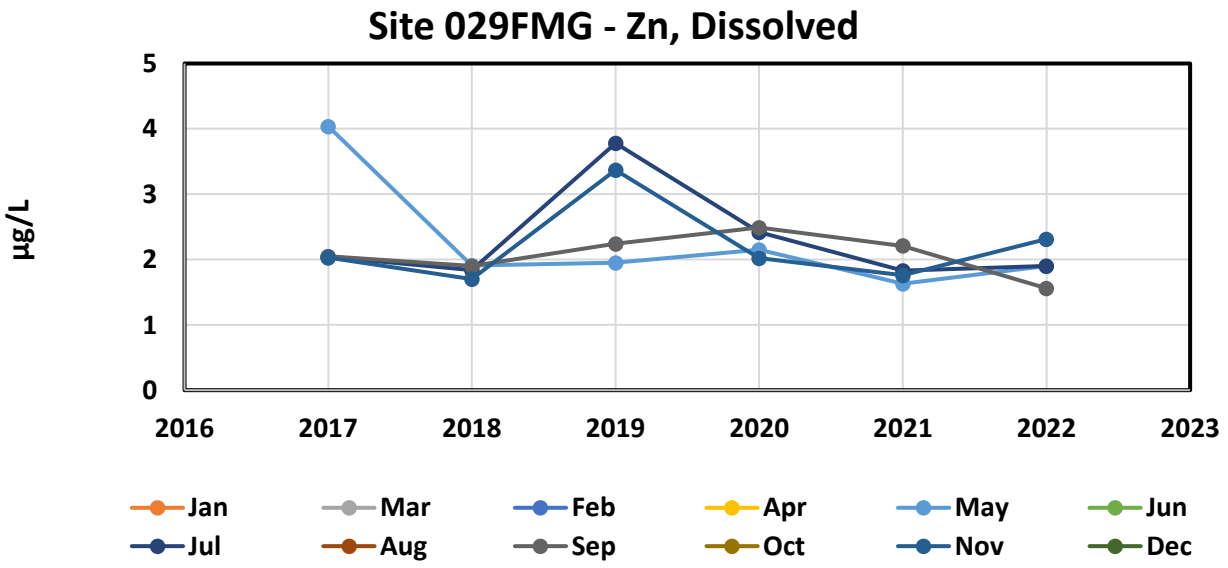
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					4.04		2.04		2.05		2.03	
b	**2017/2018**					1.91		1.84		1.9		1.7	
c	**2018/2019**					1.95		3.78		2.24		3.37	
d	**2019/2020**					2.15		2.42		2.49		2.02	
e	**2020/2021**					1.63		1.83		2.21		1.76	
f	**2021/2022**					1.9		1.9		1.56		2.31	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		-1		-1	
	c-a					-1		1		1		1	
	d-a					-1		1		1		-1	
	e-a					-1		-1		1		-1	
	f-a					-1		-1		-1		1	
	c-b					1		1		1		1	
	d-b					1		1		1		1	
	e-b					-1		-1		1		1	
	f-b					-1		1		-1		1	
	d-c					1		-1		1		-1	
	e-c					-1		-1		-1		-1	
	f-c					-1		-1		-1		-1	
	e-d					-1		-1		-1		-1	
	f-d					-1		-1		-1		1	
	f-e					1		1		-1		1	
	S_k	0	0	0	0	-7	0	-3	0	-1	0	1	0
	σ^2_S=					28.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					-1.32		-0.56		-0.19		0.19	
	Z^2_k					1.73		0.32		0.04		0.04	

ΣZ_k= -1.88
ΣZ^2_k= 2.12
Z-bar=$\Sigma Z_k/K$= -0.47

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k -10

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	1.24		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.745**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.85	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
113.33	**p**	**0.199**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

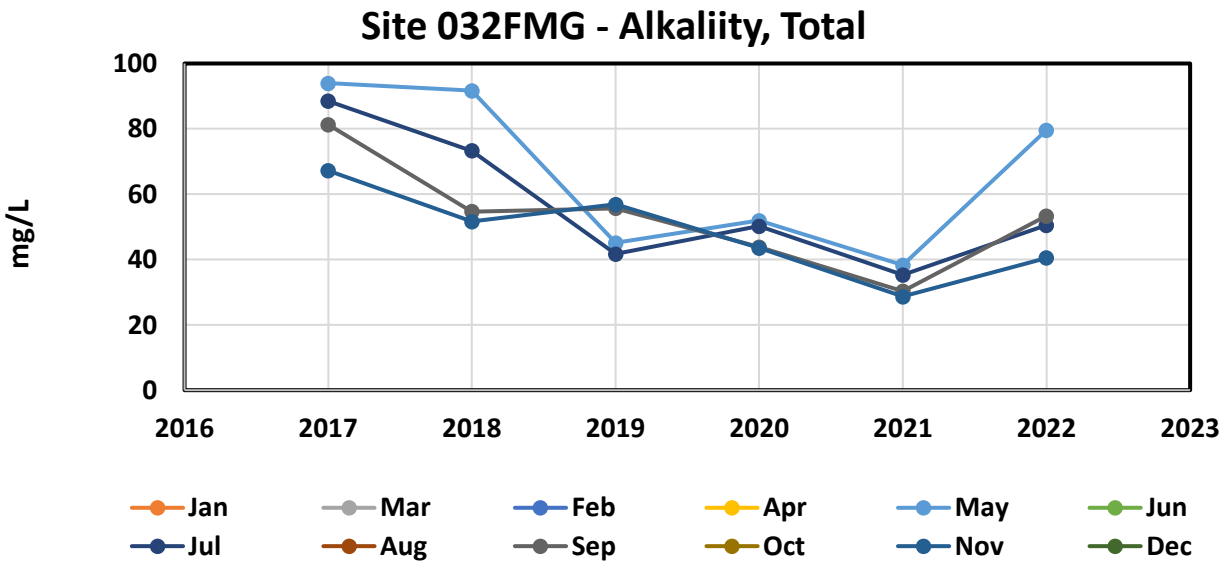
α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.27	**-0.022**	0.10
0.050	-0.19		0.04
0.100	-0.15		0.02
0.200	-0.10		0.00

032FMG Seasonal Kendall analysis for Alkaliity, Total (mg/L)

Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					94		88.5		81.3		67.2	
b	**2017/2018**					91.7		73.3		54.7		51.7	
c	**2018/2019**					45.1		41.7		55.7		56.9	
d	**2019/2020**					51.9		50.2		43.8		43.5	
e	**2020/2021**					38.3		35.3		30.3		28.7	
f	**2021/2022**					79.6		50.5		53.3		40.5	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		-1		-1	
	c-a					-1		-1		-1		-1	
	d-a					-1		-1		-1		-1	
	e-a					-1		-1		-1		-1	
	f-a					-1		-1		-1		-1	
	c-b					-1		-1		1		1	
	d-b					-1		-1		-1		-1	
	e-b					-1		-1		-1		-1	
	f-b					-1		-1		-1		-1	
	d-c					1		1		-1		-1	
	e-c					-1		-1		-1		-1	
	f-c					1		1		-1		-1	
	e-d					-1		-1		-1		-1	
	f-d					1		1		1		-1	
	f-e					1		1		1		1	
	S_k	0	0	0	0	-7	0	-7	0	-9	0	-11	0
	σ^2_S=					28.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					-1.32		-1.32		-1.69		-2.07	
	Z^2_k					1.73		1.73		2.86		4.27	

ΣZ_k=	-6.39	Tie Extent	t_1	t_2	t_3	t_4	t_5	Σn 24
ΣZ^2_k=	10.59	Count	24	0	0	0	0	ΣS_k -34
Z-bar=$\Sigma Z_k/K$=	-1.60							

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2$=	0.39		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.943**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-3.10	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
113.33	**p**	**0.001**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-13.34	**-7.633**	-2.85
0.050	-12.74		-3.57
0.100	-12.64		-5.18
0.200	-11.72		-5.46

032FMG Seasonal Kendall analysis for Conductivity, Field (µmho)

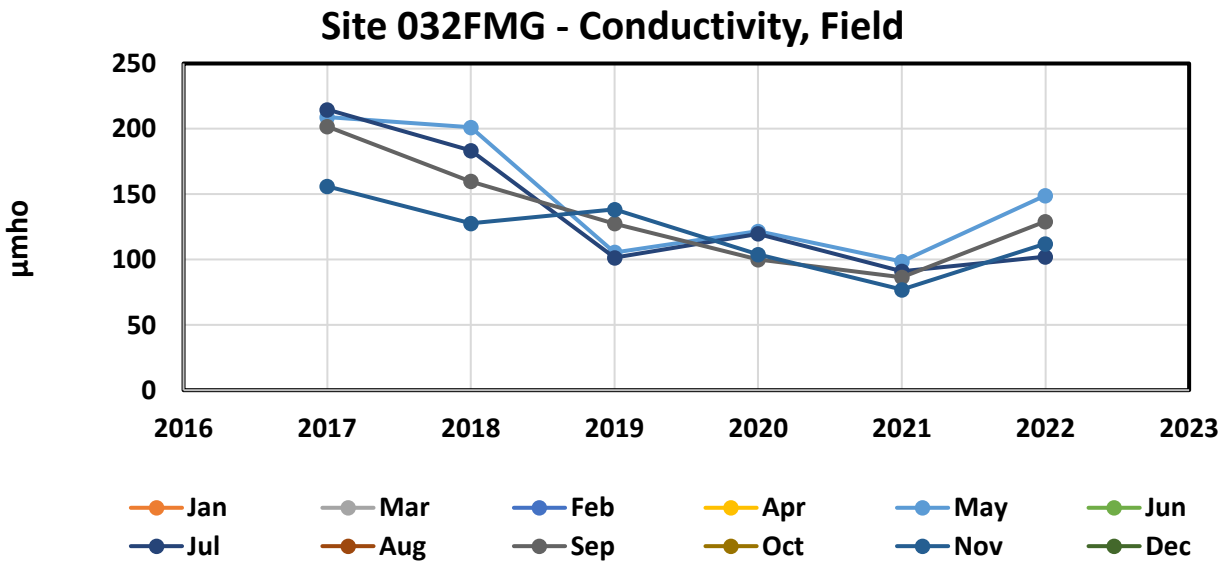
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					209		214.8		201.8		156	
b	**2017/2018**					201.1		183.4		159.8		127.7	
c	**2018/2019**					105.5		101.5		127.5		138.5	
d	**2019/2020**					121.6		119.7		100		103.9	
e	**2020/2021**					98.45		91		86.4		77	
f	**2021/2022**					149		102		129		112	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		-1		-1	
	c-a					-1		-1		-1		-1	
	d-a					-1		-1		-1		-1	
	e-a					-1		-1		-1		-1	
	f-a					-1		-1		-1		-1	
	c-b					-1		-1		-1		1	
	d-b					-1		-1		-1		-1	
	e-b					-1		-1		-1		-1	
	f-b					-1		-1		-1		-1	
	d-c					1		1		-1		-1	
	e-c					-1		-1		-1		-1	
	f-c					1		1		1		-1	
	e-d					-1		-1		-1		-1	
	f-d					1		-1		1		1	
	f-e					1		1		1		1	
	S_k	0	0	0	0	-7	0	-9	0	-9	0	-9	0
	σ^2_S=					28.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					-1.32		-1.69		-1.69		-1.69	
	Z^2_k					1.73		2.86		2.86		2.86	

ΣZ_k= -6.39
ΣZ^2_k= 10.31
Z-bar=$\Sigma Z_k/K$= -1.60

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k -34

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	0.11	@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p **0.991**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} -3.10	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
113.33	**p** **0.001**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-30.23	**-20.050**	-8.42
0.050	-28.60		-9.60
0.100	-27.61		-12.18
0.200	-25.63		-14.10

032FMG Seasonal Kendall analysis for pH, Field (su)

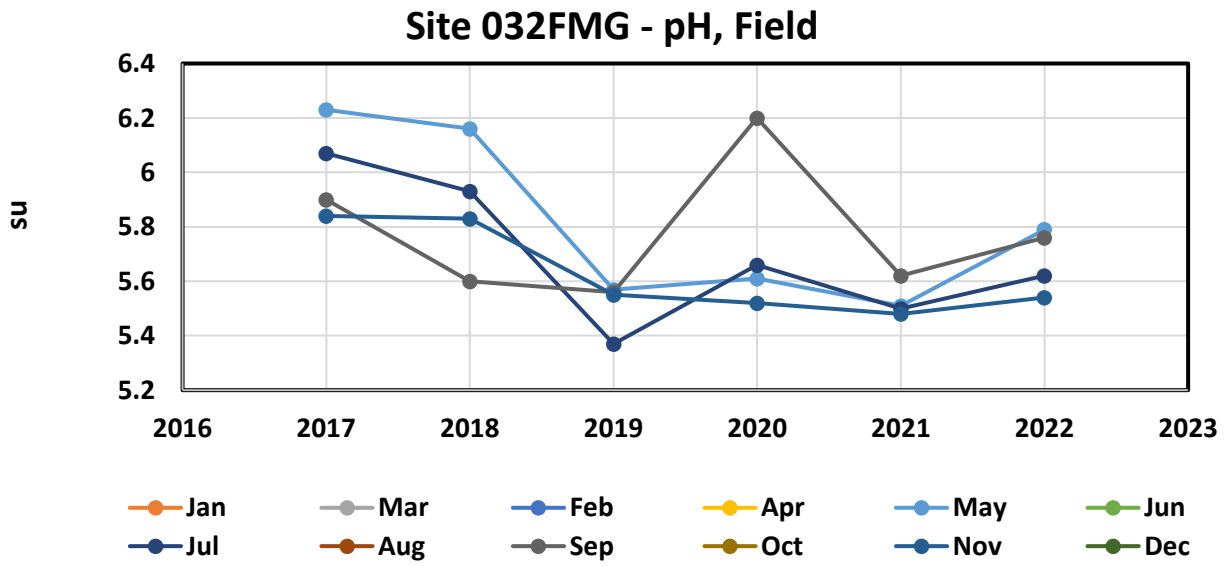
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					6.23		6.07		5.9		5.84	
b	**2017/2018**					6.16		5.93		5.6		5.83	
c	**2018/2019**					5.57		5.37		5.56		5.55	
d	**2019/2020**					5.61		5.66		6.2		5.52	
e	**2020/2021**					5.51		5.5		5.62		5.48	
f	**2021/2022**					5.79		5.62		5.76		5.54	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		-1		-1	
	c-a					-1		-1		-1		-1	
	d-a					-1		-1		1		-1	
	e-a					-1		-1		-1		-1	
	f-a					-1		-1		-1		-1	
	c-b					-1		-1		-1		-1	
	d-b					-1		-1		1		-1	
	e-b					-1		-1		1		-1	
	f-b					-1		-1		1		-1	
	d-c					1		1		1		-1	
	e-c					-1		1		1		-1	
	f-c					1		1		1		-1	
	e-d					-1		-1		-1		-1	
	f-d					1		-1		-1		1	
	f-e					1		1		1		1	
	S_k	0	0	0	0	-7	0	-7	0	1	0	-11	0
	σ^2_S=					28.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					-1.32		-1.32		0.19		-2.07	
	Z^2_k					1.73		1.73		0.04		4.27	

ΣZ_k= -4.51
ΣZ^2_k= 7.76
Z-bar=$\Sigma Z_k/K$= -1.13

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k -24

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	2.68		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.443**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-2.16	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
113.33	**p**	**0.015**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.14	**-0.071**	0.00
0.050	-0.13		-0.03
0.100	-0.11		-0.03
0.200	-0.09		-0.04

032FMG Seasonal Kendall analysis for SO4, Total (mg/L)

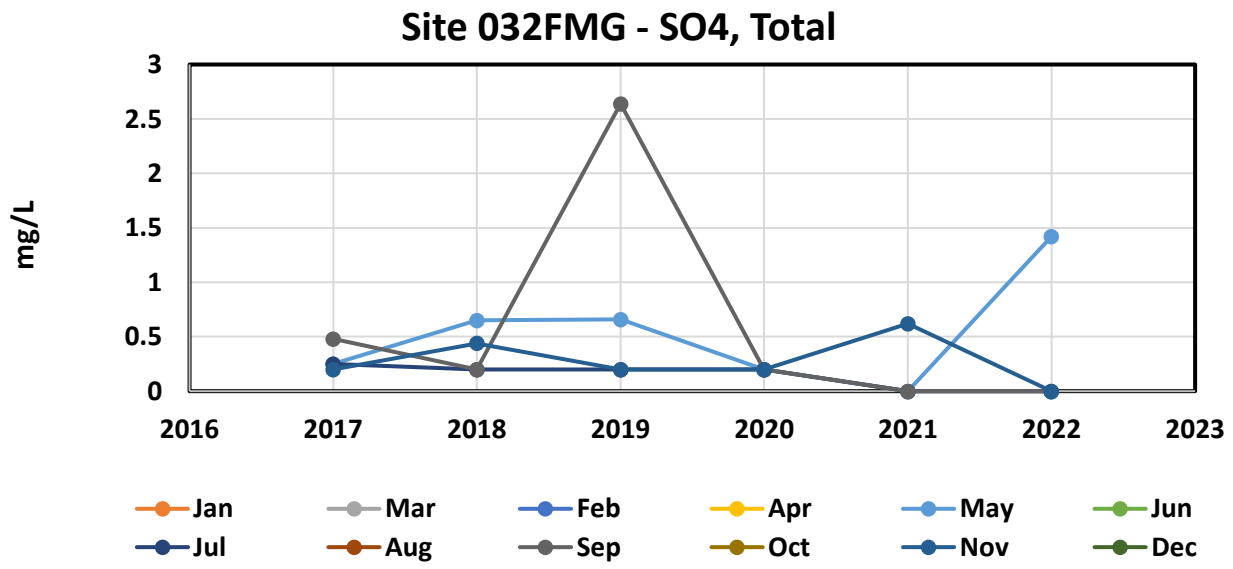
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					-0.5		-0.5		0.48		-0.4	
b	**2017/2018**					0.65		-0.4		-0.4		0.44	
c	**2018/2019**					0.66		-0.4		2.64		-0.4	
d	**2019/2020**					-0.4		-0.4		-0.4		-0.4	
e	**2020/2021**					0		0		0		0.62	
f	**2021/2022**					1.42		0		0		0	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	1	0	2	0	3	0
	t_2	0	0	0	0	0	0	1	0	2	0	0	0
	t_3	0	0	0	0	0	0	1	0	0	0	1	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					1		1		-1		1	
	c-a					1		1		1		0	
	d-a					1		1		-1		0	
	e-a					1		1		-1		1	
	f-a					1		1		-1		1	
	c-b					1		0		1		-1	
	d-b					-1		0		0		-1	
	e-b					-1		1		1		1	
	f-b					1		1		1		-1	
	d-c					-1		0		-1		0	
	e-c					-1		1		-1		1	
	f-c					1		1		-1		1	
	e-d					1		1		1		1	
	f-d					1		1		1		1	
	f-e					1		0		0		-1	
	S_k	0	0	0	0	7	0	11	0	-1	0	4	0
	σ^2_S=					28.33		23.67		26.33		24.67	
	$Z_k = S_k/\sigma_S$					1.32		2.26		-0.19		0.81	
	Z^2_k					1.73		5.11		0.04		0.65	

ΣZ_k= 4.19
ΣZ^2_k= 7.53
Z-bar=$\Sigma Z_k/K$= 1.05

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	12	3	2	0	0

Σn 24
ΣS_k 21

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	3.15	@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p **0.370**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 1.97	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
103.00	**p** **0.976**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	0.00	**0.090**	0.20
0.050	0.00		0.13
0.100	0.00		0.13
0.200	0.03		0.11

032FMG Seasonal Kendall analysis for Zn, Dissolved (µg/L)

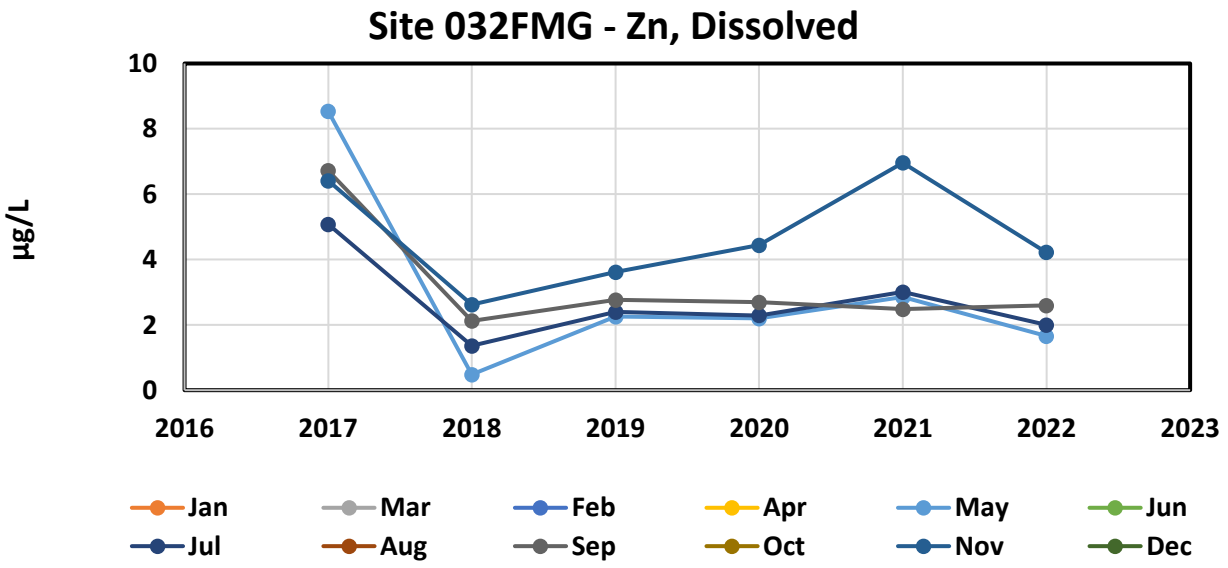
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					8.54		5.08		6.72		6.42	
b	**2017/2018**					0.48		1.36		2.12		2.62	
c	**2018/2019**					2.25		2.4		2.77		3.62	
d	**2019/2020**					2.2		2.29		2.7		4.44	
e	**2020/2021**					2.85		3.01		2.48		6.96	
f	**2021/2022**					1.66		2		2.6		4.22	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		-1		-1	
	c-a					-1		-1		-1		-1	
	d-a					-1		-1		-1		-1	
	e-a					-1		-1		-1		1	
	f-a					-1		-1		-1		-1	
	c-b					1		1		1		1	
	d-b					1		1		1		1	
	e-b					1		1		1		1	
	f-b					1		1		1		1	
	d-c					-1		-1		-1		1	
	e-c					1		1		-1		1	
	f-c					-1		-1		-1		1	
	e-d					1		1		-1		1	
	f-d					-1		-1		-1		-1	
	f-e					-1		-1		1		-1	
	S_k	0	0	0	0	-3	0	-3	0	-5	0	3	0
	σ^2_S=					28.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					-0.56		-0.56		-0.94		0.56	
	Z^2_k					0.32		0.32		0.88		0.32	

ΣZ_k= -1.50
ΣZ^2_k= 1.84
Z-bar=$\Sigma Z_k/K$= -0.38

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k -8

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	1.27		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.736**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.66	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
113.33	**p**	**0.255**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.86	**-0.090**	0.30
0.050	-0.50		0.15
0.100	-0.26		0.12
0.200	-0.17		0.03

037FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

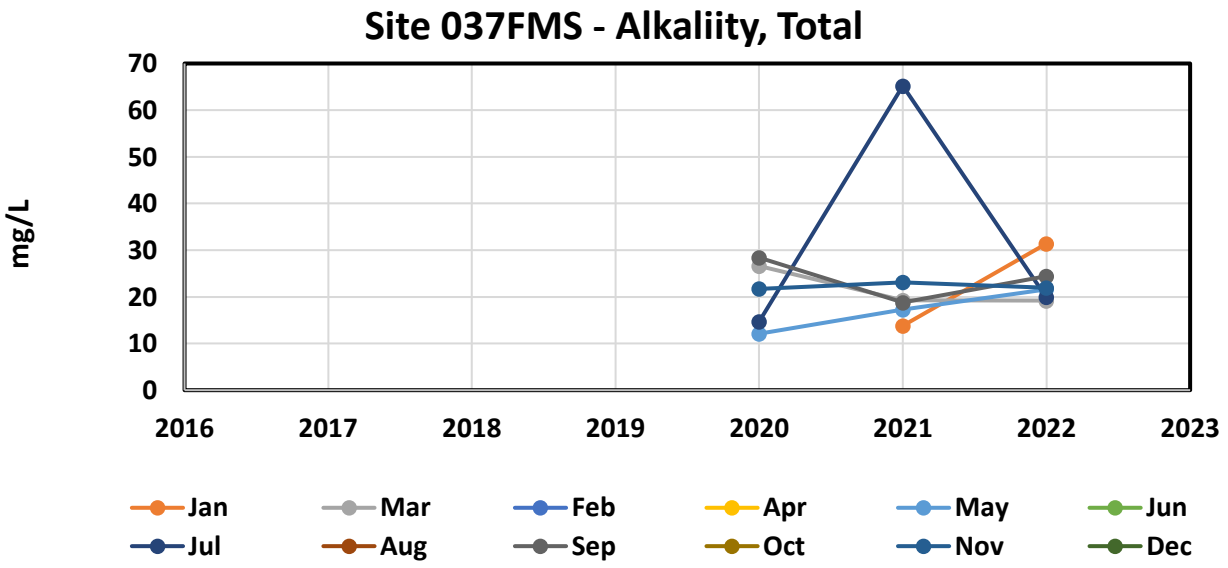
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**												
b	**2017/2018**												
c	**2018/2019**												
d	**2019/2020**			26.6		12.1		14.7		28.4		21.7	
e	**2020/2021**	13.8		19.3		17.3		65.2		18.8		23.1	
f	**2021/2022**	31.4		19.2		21.6		19.9		24.4		21.9	
	n	2	0	3	0	3	0	3	0	3	0	3	0
	t_1	2	0	3	0	3	0	3	0	3	0	3	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a												
	c-a												
	d-a												
	e-a												
	f-a												
	c-b												
	d-b												
	e-b												
	f-b												
	d-c												
	e-c												
	f-c												
	e-d			-1		1		1		-1		1	
	f-d			-1		1		1		-1		1	
	f-e	1		-1		1		-1		1		-1	
	S_k	1	0	-3	0	3	0	1	0	-1	0	1	0
	σ^2_S=	1.00		3.67		3.67		3.67		3.67		3.67	
	$Z_k = S_k/\sigma_S$	1.00		-1.57		1.57		0.52		-0.52		0.52	
	Z^2_k	1.00		2.45		2.45		0.27		0.27		0.27	

ΣZ_k= 1.52
ΣZ^2_k= 6.73
Z-bar=$\Sigma Z_k/K$= 0.25

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	17	0	0	0	0

Σn 17
ΣS_k 2

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	6.34		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.274**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	0.23	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
19.33	**p**	**0.590**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-7.56	**0.750**	5.25
0.050	-3.05		4.58
0.100	-1.85		3.99
0.200	-1.04		2.42

037FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

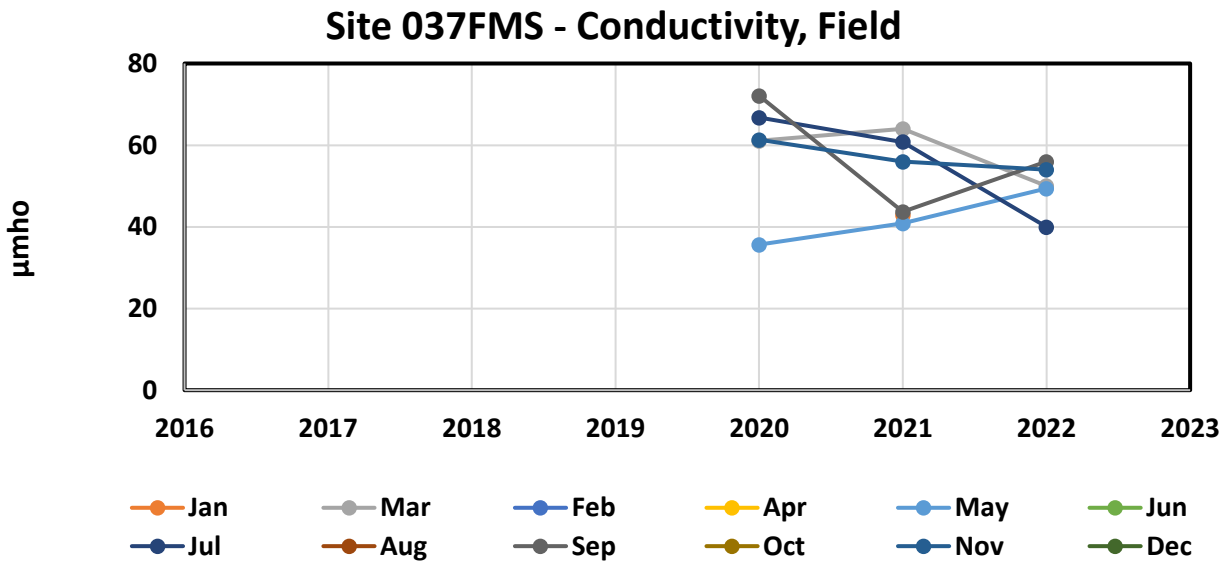
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**												
b	**2017/2018**												
c	**2018/2019**												
d	**2019/2020**			61.06		35.65		66.77		72.1		61.34	
e	**2020/2021**	42.93		64		40.85		60.8		43.7		56	
f	**2021/2022**			50		49.4		40		56		54	
	n	1	0	3	0	3	0	3	0	3	0	3	0
	t_1	1	0	3	0	3	0	3	0	3	0	3	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a												
	c-a												
	d-a												
	e-a												
	f-a												
	c-b												
	d-b												
	e-b												
	f-b												
	d-c												
	e-c												
	f-c												
	e-d			1		1		-1		-1		-1	
	f-d			-1		1		-1		-1		-1	
	f-e			-1		1		-1		1		-1	
	S_k	0	0	-1	0	3	0	-3	0	-1	0	-3	0
	σ^2_S=			3.67		3.67		3.67		3.67		3.67	
	$Z_k = S_k/\sigma_S$			-0.52		1.57		-1.57		-0.52		-1.57	
	Z^2_k			0.27		2.45		2.45		0.27		2.45	

ΣZ_k= -2.61
ΣZ^2_k= 7.91
Z-bar=$\Sigma Z_k/K$= -0.52

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	16	0	0	0	0

Σn 16
ΣS_k -5

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	6.55		@a=5% c2(K-1)=	9.49	Test for station homogeneity
	p	**0.162**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.93	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
18.33	**p**	**0.175**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-17.27	**-5.340**	6.00
0.050	-13.40		2.99
0.100	-9.35		-0.80
0.200	-6.60		-3.17

037FMS Seasonal Kendall analysis for pH, Field (su)

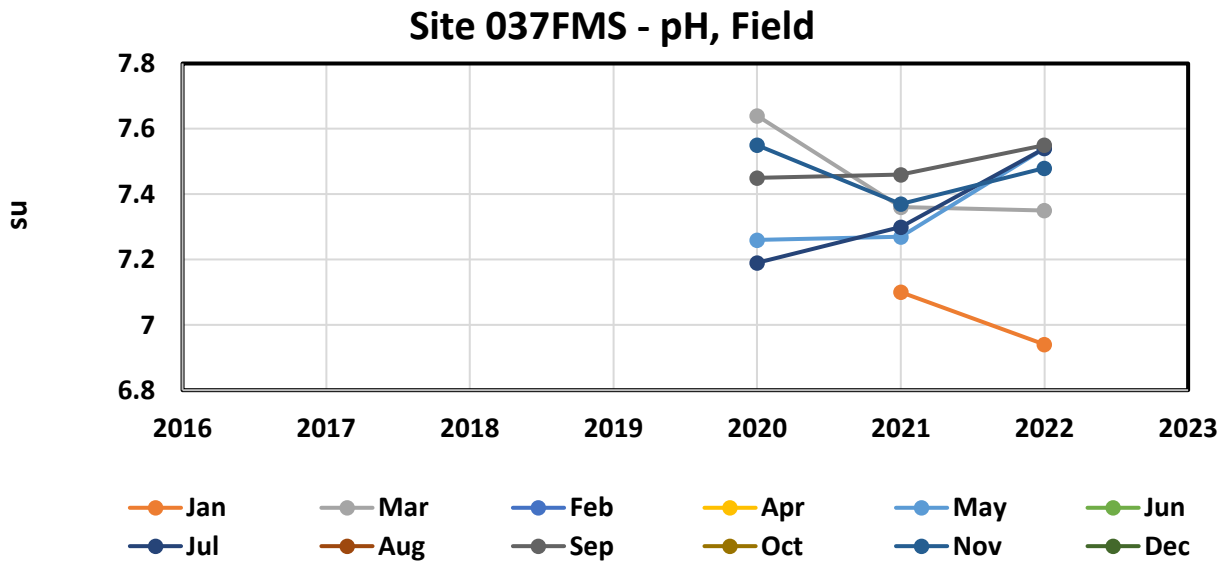
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**												
b	**2017/2018**												
c	**2018/2019**												
d	**2019/2020**			7.64		7.26		7.19		7.45		7.55	
e	**2020/2021**	7.1		7.36		7.27		7.3		7.46		7.37	
f	**2021/2022**	6.94		7.35		7.54		7.54		7.55		7.48	
	n	2	0	3	0	3	0	3	0	3	0	3	0
	t_1	2	0	3	0	3	0	3	0	3	0	3	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a												
	c-a												
	d-a												
	e-a												
	f-a												
	c-b												
	d-b												
	e-b												
	f-b												
	d-c												
	e-c												
	f-c												
	e-d			-1		1		1		1		-1	
	f-d			-1		1		1		1		-1	
	f-e	-1		-1		1		1		1		1	
	S_k	-1	0	-3	0	3	0	3	0	3	0	-1	0
	σ^2_S=	1.00		3.67		3.67		3.67		3.67		3.67	
	$Z_k = S_k/\sigma_S$	-1.00		-1.57		1.57		1.57		1.57		-0.52	
	Z^2_k	1.00		2.45		2.45		2.45		2.45		0.27	

ΣZ_k= 1.61
ΣZ^2_k= 11.09
Z-bar=$\Sigma Z_k/K$= 0.27

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	17	0	0	0	0

Σn 17
ΣS_k 4

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	10.66		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.059**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	0.68	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
19.33	**p**	**0.752**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.16	**0.030**	0.14
0.050	-0.10		0.11
0.100	-0.03		0.11
0.200	-0.01		0.08

037FMS Seasonal Kendall analysis for SO4, Total (mg/L)

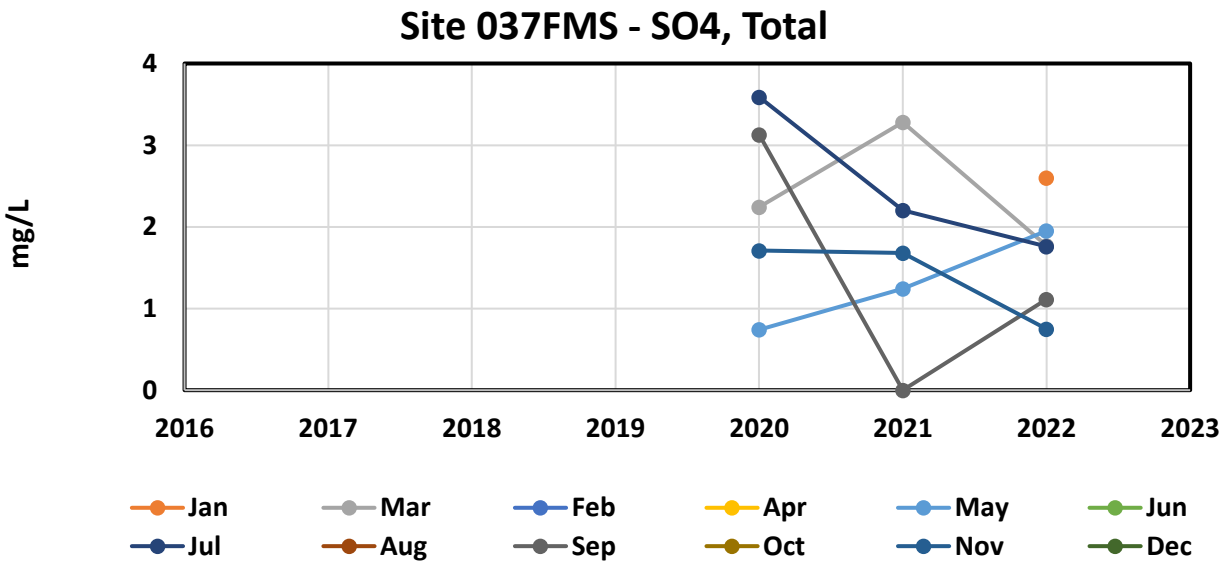
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**												
b	**2017/2018**												
c	**2018/2019**												
d	**2019/2020**			2.24		0.74		3.59		3.13		1.71	
e	**2020/2021**			3.28		1.24		2.2		0		1.68	
f	**2021/2022**	2.6		1.77		1.95		1.76		1.11		0.75	
	n	1	0	3	0	3	0	3	0	3	0	3	0
	t_1	1	0	3	0	3	0	3	0	3	0	3	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a												
	c-a												
	d-a												
	e-a												
	f-a												
	c-b												
	d-b												
	e-b												
	f-b												
	d-c												
	e-c												
	f-c												
	e-d			1		1		-1		-1		-1	
	f-d			-1		1		-1		-1		-1	
	f-e			-1		1		-1		1		-1	
	S_k	0	0	-1	0	3	0	-3	0	-1	0	-3	0
	σ^2_S=			3.67		3.67		3.67		3.67		3.67	
	$Z_k = S_k/\sigma_S$			-0.52		1.57		-1.57		-0.52		-1.57	
	Z^2_k			0.27		2.45		2.45		0.27		2.45	

ΣZ_k= -2.61
ΣZ^2_k= 7.91
Z-bar=$\Sigma Z_k/K$= -0.52

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	16	0	0	0	0

Σn 16
ΣS_k -5

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	6.55		@a=5% c2(K-1)=	9.49	Test for station homogeneity
	p	**0.162**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.93	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
18.33	**p**	**0.175**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-1.45	**-0.440**	0.66
0.050	-1.02		0.50
0.100	-0.95		0.10
0.200	-0.92		-0.17

037FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

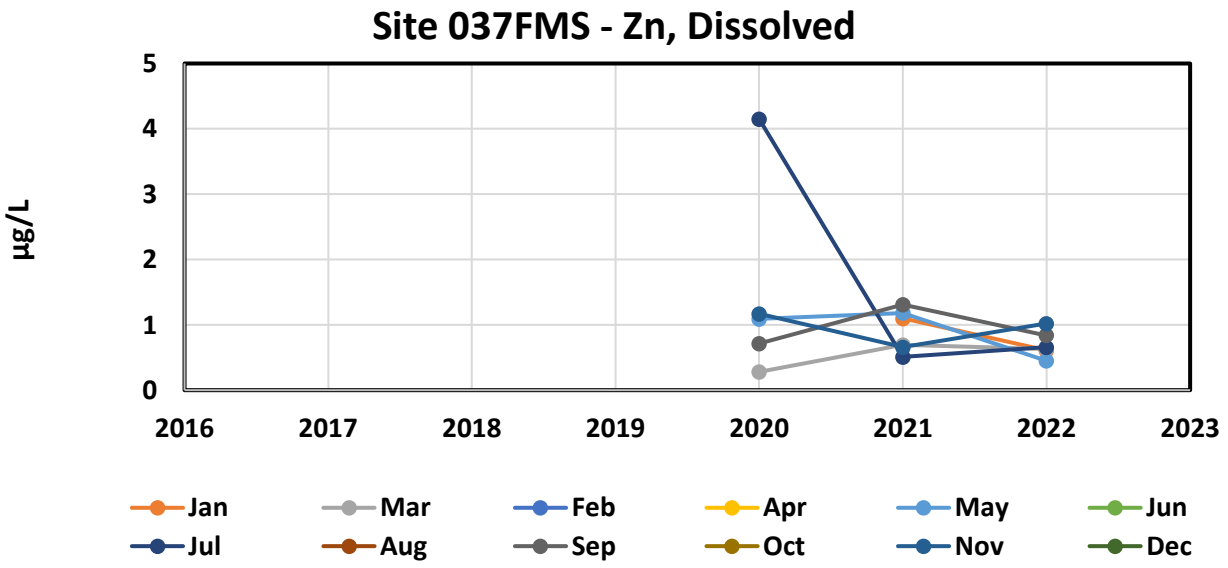
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**												
b	**2017/2018**												
c	**2018/2019**												
d	**2019/2020**			0.28		1.09		4.15		0.714		1.17	
e	**2020/2021**	1.1		0.694		1.18		0.51		1.31		0.66	
f	**2021/2022**	0.61		0.63		0.45		0.66		0.84		1.02	
	n	2	0	3	0	3	0	3	0	3	0	3	0
	t_1	2	0	3	0	3	0	3	0	3	0	3	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a												
	c-a												
	d-a												
	e-a												
	f-a												
	c-b												
	d-b												
	e-b												
	f-b												
	d-c												
	e-c												
	f-c												
	e-d			1		1		-1		1		-1	
	f-d			1		-1		-1		1		-1	
	f-e	-1		-1		-1		1		-1		1	
	S_k	-1	0	1	0	-1	0	-1	0	1	0	-1	0
	σ^2_S=	1.00		3.67		3.67		3.67		3.67		3.67	
	$Z_k = S_k/\sigma_S$	-1.00		0.52		-0.52		-0.52		0.52		-0.52	
	Z^2_k	1.00		0.27		0.27		0.27		0.27		0.27	

ΣZ_k= -1.52
ΣZ^2_k= 2.36
Z-bar=$\Sigma Z_k/K$= -0.25

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	17	0	0	0	0

Σn 17
ΣS_k -2

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	1.98		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.852**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.23	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
19.33	**p**	**0.410**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.85	**-0.070**	0.20
0.050	-0.50		0.13
0.100	-0.49		0.09
0.200	-0.45		0.04

046FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

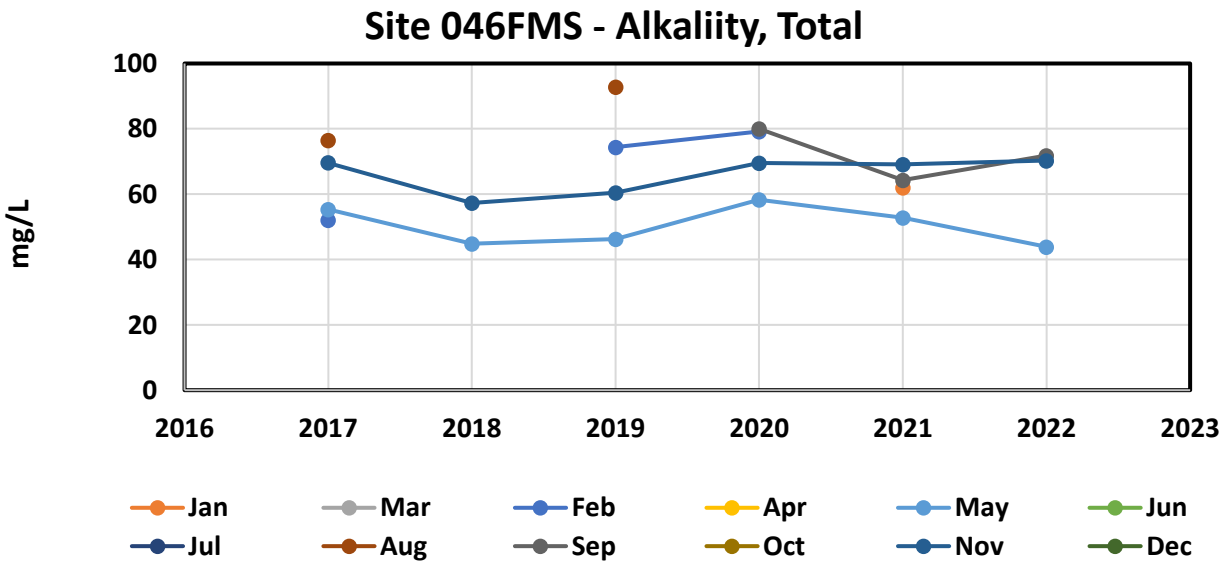
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		52.1			55.4			76.5			69.6	
b	**2017/2018**					44.8						57.3	
c	**2018/2019**		74.4			46.3			92.8			60.4	
d	**2019/2020**		79.2			58.3				80		69.5	
e	**2020/2021**	62				52.8				64.3		69.1	
f	**2021/2022**					43.9				71.8		70.3	
	n	1	3	0	0	6	0	0	2	3	0	6	0
	t_1	1	3	0	0	6	0	0	2	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1						-1	
	c-a		1			-1			1			-1	
	d-a		1			1						-1	
	e-a					-1						-1	
	f-a					-1						1	
	c-b					1						1	
	d-b					1						1	
	e-b					1						1	
	f-b					-1						1	
	d-c		1			1						1	
	e-c					1						1	
	f-c					-1						1	
	e-d					-1				-1		-1	
	f-d					-1				-1		1	
	f-e					-1				1		1	
	S_k	0	3	0	0	-3	0	0	1	-1	0	5	0
	σ^2_S=		3.67			28.33			1.00	3.67		28.33	
	$Z_k = S_k/\sigma_S$		1.57			-0.56			1.00	-0.52		0.94	
	Z^2_k		2.45			0.32			1.00	0.27		0.88	

ΣZ_k=	2.42
ΣZ^2_k=	4.93
Z-bar=$\Sigma Z_k/K$=	0.48

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	21	0	0	0	0

Σn	21
ΣS_k	5

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	3.76	@a=5% c2(K-1)=	9.49	Test for station homogeneity
	p **0.440**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 0.50	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
65.00	**p** **0.690**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-3.88	**0.967**	4.30
0.050	-0.67		3.26
0.100	-0.34		3.20
0.200	-0.12		2.54

046FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

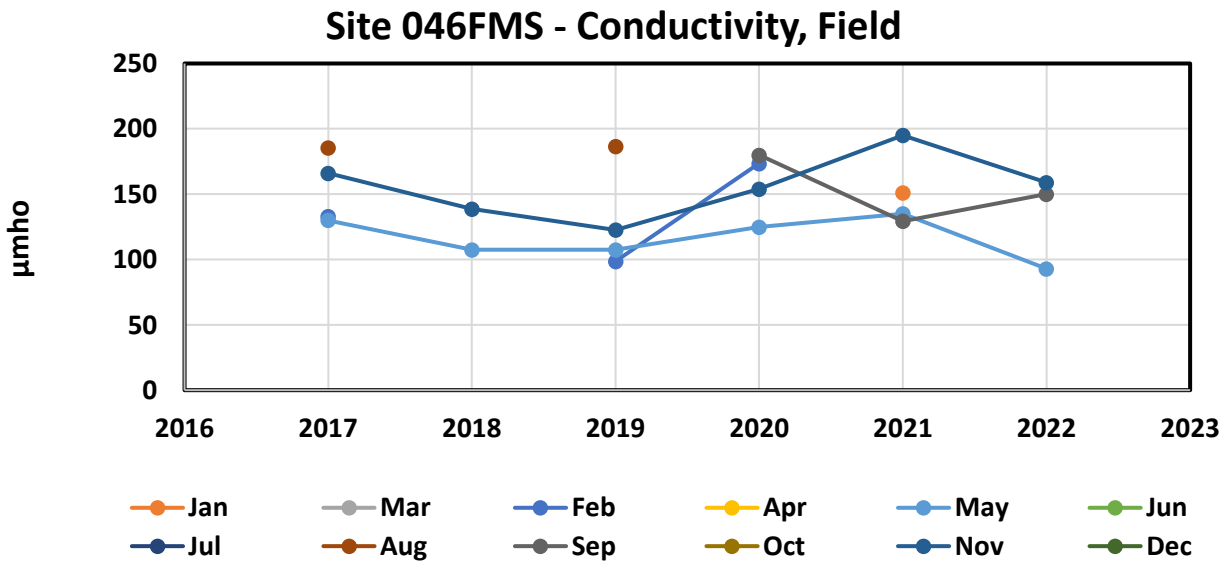
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		132.9			130			185.6			166	
b	**2017/2018**					107.4						138.6	
c	**2018/2019**		98.64			107.5			186.5			122.6	
d	**2019/2020**		173.6			124.9				180		153.9	
e	**2020/2021**	151.2				135				129.3		195	
f	**2021/2022**					93				150		159	
	n	1	3	0	0	6	0	0	2	3	0	6	0
	t_1	1	3	0	0	6	0	0	2	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1						-1	
	c-a		-1			-1			1			-1	
	d-a		1			-1						-1	
	e-a					1						1	
	f-a					-1						-1	
	c-b					1						-1	
	d-b					1						1	
	e-b					1						1	
	f-b					-1						1	
	d-c		1			1						1	
	e-c					1						1	
	f-c					-1						1	
	e-d					1				-1		1	
	f-d					-1				-1		1	
	f-e					-1				1		-1	
	S_k	0	1	0	0	-1	0	0	1	-1	0	3	0
	σ^2_S=		3.67			28.33			1.00	3.67		28.33	
	$Z_k = S_k/\sigma_S$		0.52			-0.19			1.00	-0.52		0.56	
	Z^2_k		0.27			0.04			1.00	0.27		0.32	

ΣZ_k= 1.38
ΣZ^2_k= 1.90
Z-bar=$\Sigma Z_k/K$= 0.28

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	21	0	0	0	0

Σn 21
ΣS_k 3

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	1.52		@a=5% c2(K-1)=	9.49	Test for station homogeneity
	p	**0.823**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	0.25	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
65.00	**p**	**0.598**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-15.83	**0.450**	11.88
0.050	-7.90		8.81
0.100	-4.57		7.52
0.200	-3.40		4.83

046FMS Seasonal Kendall analysis for pH, Field (su)

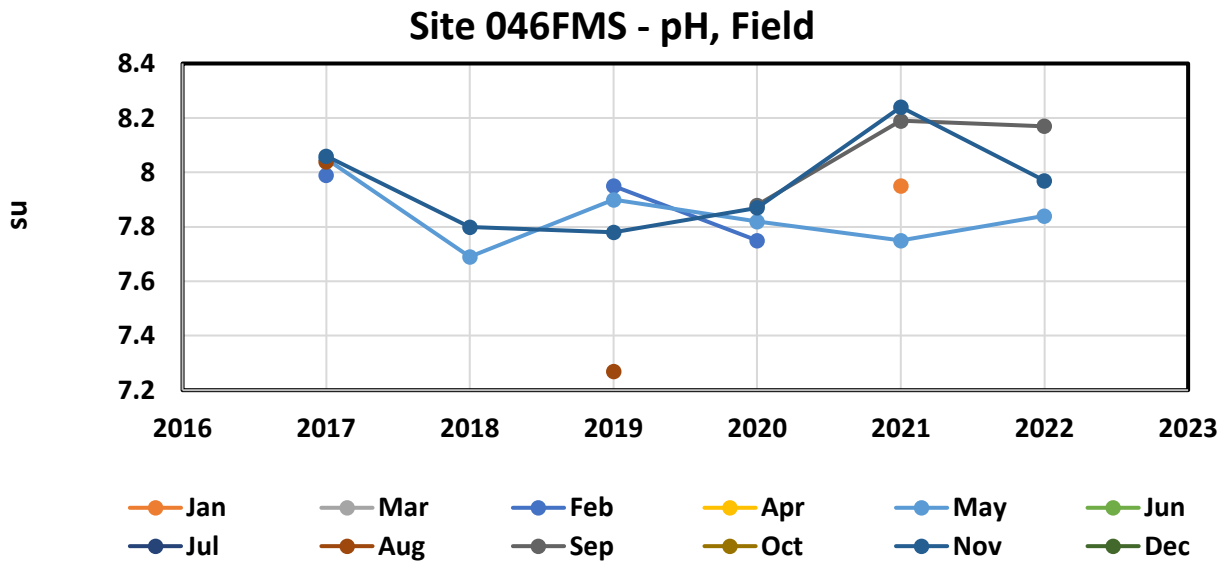
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		7.99			8.05			8.04			8.06	
b	**2017/2018**					7.69						7.8	
c	**2018/2019**		7.95			7.9			7.27			7.78	
d	**2019/2020**		7.75			7.82				7.88		7.87	
e	**2020/2021**	7.95				7.75				8.19		8.24	
f	**2021/2022**					7.84				8.17		7.97	
	n	1	3	0	0	6	0	0	2	3	0	6	0
	t_1	1	3	0	0	6	0	0	2	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1						-1	
	c-a		-1			-1			-1			-1	
	d-a		-1			-1						-1	
	e-a					-1						1	
	f-a					-1						-1	
	c-b					1						-1	
	d-b					1						1	
	e-b					1						1	
	f-b					1						1	
	d-c		-1			-1						1	
	e-c					-1						1	
	f-c					-1						1	
	e-d					-1				1		1	
	f-d					1				1		1	
	f-e					1				-1		-1	
	S_k	0	-3	0	0	-3	0	0	-1	1	0	3	0
	σ^2_S=		3.67			28.33			1.00	3.67		28.33	
	$Z_k = S_k/\sigma_S$		-1.57			-0.56			-1.00	0.52		0.56	
	Z^2_k		2.45			0.32			1.00	0.27		0.32	

ΣZ_k= -2.04
ΣZ^2_k= 4.36
Z-bar=$\Sigma Z_k/K$= -0.41

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	21	0	0	0	0

Σn 21
ΣS_k -3

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	3.53		@a=5% c2(K-1)=	9.49	Test for station homogeneity
	p	**0.474**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.25	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
65.00	**p**	**0.402**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.08		0.06
0.050	-0.08	**-0.020**	0.04
0.100	-0.07		0.04
0.200	-0.04		0.02

046FMS Seasonal Kendall analysis for SO4, Total (mg/L)

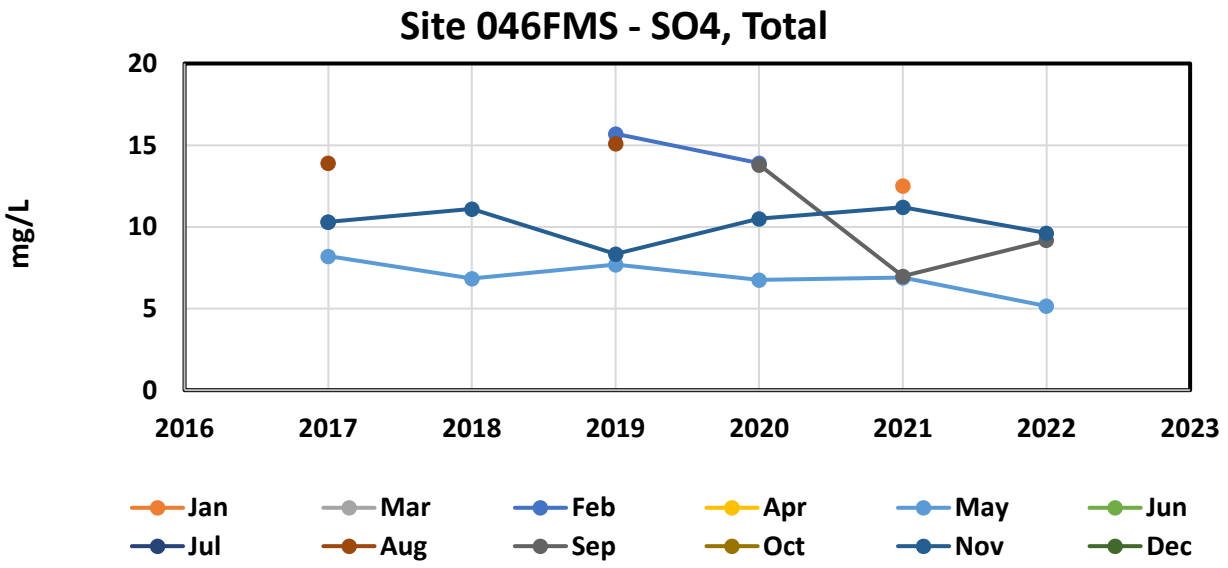
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		10.3			8.21			13.9			10.3	
b	**2017/2018**					6.83						11.1	
c	**2018/2019**		15.7			7.68			15.1			8.34	
d	**2019/2020**		13.9			6.75				13.8		10.5	
e	**2020/2021**	12.5				6.89				6.98		11.2	
f	**2021/2022**					5.15				9.18		9.63	
	n	1	3	0	0	6	0	0	2	3	0	6	0
	t_1	1	3	0	0	6	0	0	2	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1						1	
	c-a		1			-1			1			-1	
	d-a		1			-1						1	
	e-a					-1						1	
	f-a					-1						-1	
	c-b					1						-1	
	d-b					-1						-1	
	e-b					1						1	
	f-b					-1						-1	
	d-c		-1			-1						1	
	e-c					-1						1	
	f-c					-1						1	
	e-d					1				-1		1	
	f-d					-1				-1		-1	
	f-e					-1				1		-1	
	S_k	0	1	0	0	-9	0	0	1	-1	0	1	0
	σ^2_S=		3.67			28.33			1.00	3.67		28.33	
	$Z_k = S_k/\sigma_S$		0.52			-1.69			1.00	-0.52		0.19	
	Z^2_k		0.27			2.86			1.00	0.27		0.04	

ΣZ_k=	-0.50
ΣZ^2_k=	4.44
Z-bar=$\Sigma Z_k/K$=	-0.10

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	21	0	0	0	0

Σn	21
ΣS_k	-7

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2$=	4.39	@a=5% c2(K-1)=	9.49	Test for station homogeneity
	p **0.356**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} -0.74	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
65.00	**p** **0.228**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

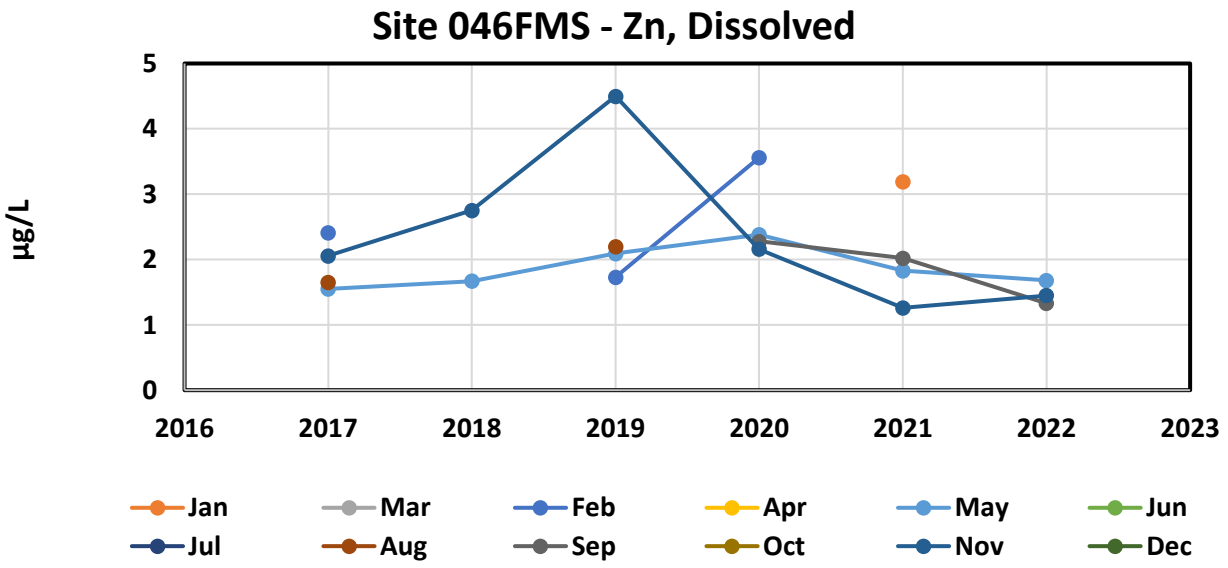
α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.92	**-0.300**	0.40
0.050	-0.64		0.08
0.100	-0.47		0.03
0.200	-0.42		-0.05

046FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		2.41			1.55			1.65			2.06	
b	**2017/2018**					1.67						2.75	
c	**2018/2019**		1.73			2.09			2.2			4.5	
d	**2019/2020**		3.56			2.38				2.28		2.16	
e	**2020/2021**	3.19				1.83				2.02		1.26	
f	**2021/2022**					1.68				1.33		1.45	
	n	1	3	0	0	6	0	0	2	3	0	6	0
	t_1	1	3	0	0	6	0	0	2	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					1						1	
	c-a		-1			1			1			1	
	d-a		1			1						1	
	e-a					1						-1	
	f-a					1						-1	
	c-b					1						1	
	d-b					1						-1	
	e-b					1						-1	
	f-b					1						-1	
	d-c		1			1						-1	
	e-c					-1						-1	
	f-c					-1						-1	
	e-d					-1				-1		-1	
	f-d					-1				-1		-1	
	f-e					-1				-1		1	
	S_k	0	1	0	0	5	0	0	1	-3	0	-5	0
	σ^2_S=		3.67			28.33			1.00	3.67		28.33	
	$Z_k = S_k/\sigma_S$		0.52			0.94			1.00	-1.57		-0.94	
	Z^2_k		0.27			0.88			1.00	2.45		0.88	

ΣZ_k=	-0.04	Tie Extent	t_1	t_2	t_3	t_4	t_5	Σn 21
ΣZ^2_k=	5.49	Count	21	0	0	0	0	ΣS_k -1
Z-bar=$\Sigma Z_k/K$=	-0.01							

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2$=	5.49	@a=5% c2(K-1)=	9.49	Test for station homogeneity	
	p **0.240**			$\chi^2_h<\chi^2_{(K-1)}$	ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 0.00	@a/2=2.5% Z=	1.96	**H_0** (No trend)	ACCEPT
65.00	**p** **0.500**			**H_A** (± trend)	REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.35	**-0.122**	0.27
0.050	-0.33		0.13
0.100	-0.28		0.06
0.200	-0.19		0.03

048FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

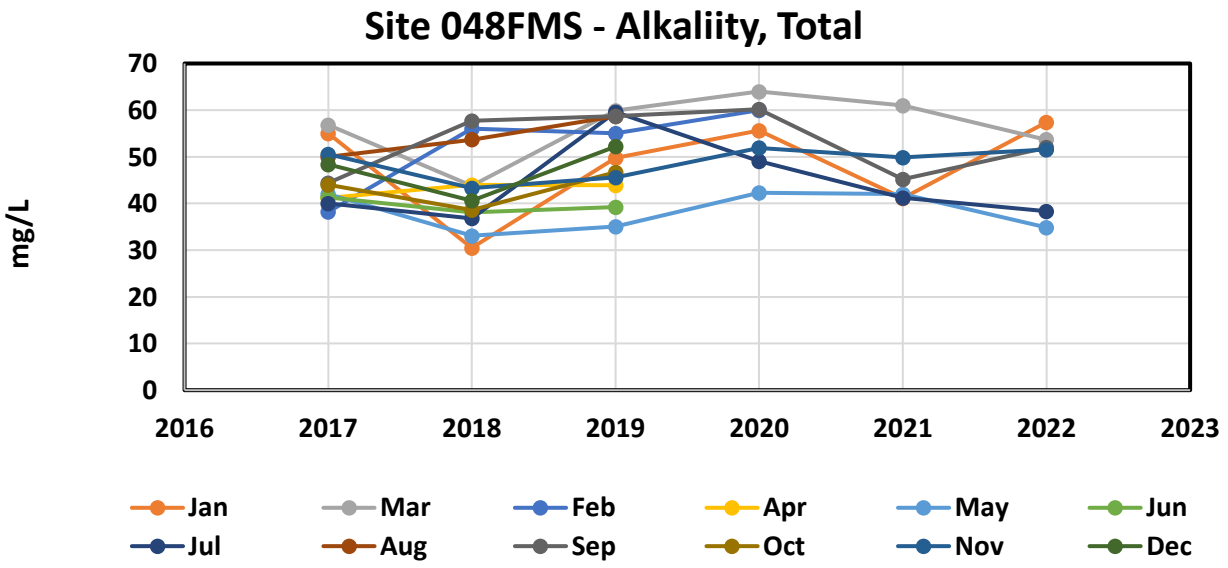
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	55	38.2	56.8	41.2	42	41.3	40	50	44.4	44	50.6	48.4
b	**2017/2018**	30.5	56	43.8	44	33.1	38.1	36.8	53.7	57.7	38.6	43.3	40.6
c	**2018/2019**	49.8	55	59.9	43.9	35.1	39.2	59.6	58.7	58.7	46.7	45.6	52.2
d	**2019/2020**	55.6	60	64		42.3		49.1		60.2		51.9	
e	**2020/2021**	41.1		61		42		41.2		45.2		49.9	
f	**2021/2022**	57.4		53.7		34.9		38.3		52		51.6	
	n	6	4	6	3	6	3	6	3	6	3	6	3
	t_1	6	4	6	3	4	3	6	3	6	3	6	3
	t_2	0	0	0	0	1	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	-1	1	-1	-1	-1	1	1	-1	-1	-1
	c-a	-1	1	1	1	-1	-1	1	1	1	1	-1	1
	d-a	1	1	1		1		1		1		1	
	e-a	-1		1		0		1		1		-1	
	f-a	1		-1		-1		-1		1		1	
	c-b	1	-1	1	-1	1	1	1	1	1	1	1	1
	d-b	1	1	1		1		1		1		1	
	e-b	1		1		1		1		-1		1	
	f-b	1		1		1		1		-1		1	
	d-c	1	1	1		1		-1		1		1	
	e-c	-1		1		1		-1		-1		1	
	f-c	1		-1		-1		-1		-1		1	
	e-d	-1		-1		-1		-1		-1		-1	
	f-d	1		-1		-1		-1		-1		-1	
	f-e	1		-1		-1		-1		1		1	
	S_k	5	4	3	1	0	-1	-1	3	3	1	5	1
	σ^2_S=	28.33	8.67	28.33	3.67	27.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	0.94	1.36	0.56	0.52	0.00	-0.52	-0.19	1.57	0.56	0.52	0.94	0.52
	Z^2_k	0.88	1.85	0.32	0.27	0.00	0.27	0.04	2.45	0.32	0.27	0.88	0.27

ΣZ_k= 6.79
ΣZ^2_k= 7.83
Z-bar=$\Sigma Z_k/K$= 0.57

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	53	1	0	0	0

Σn 55
ΣS_k 24

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	3.99	@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p **0.970**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 1.64	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
196.00	**p** **0.950**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.27	**1.000**	2.13
0.050	0.00		1.90
0.100	0.20		1.53
0.200	0.35		1.40

048FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

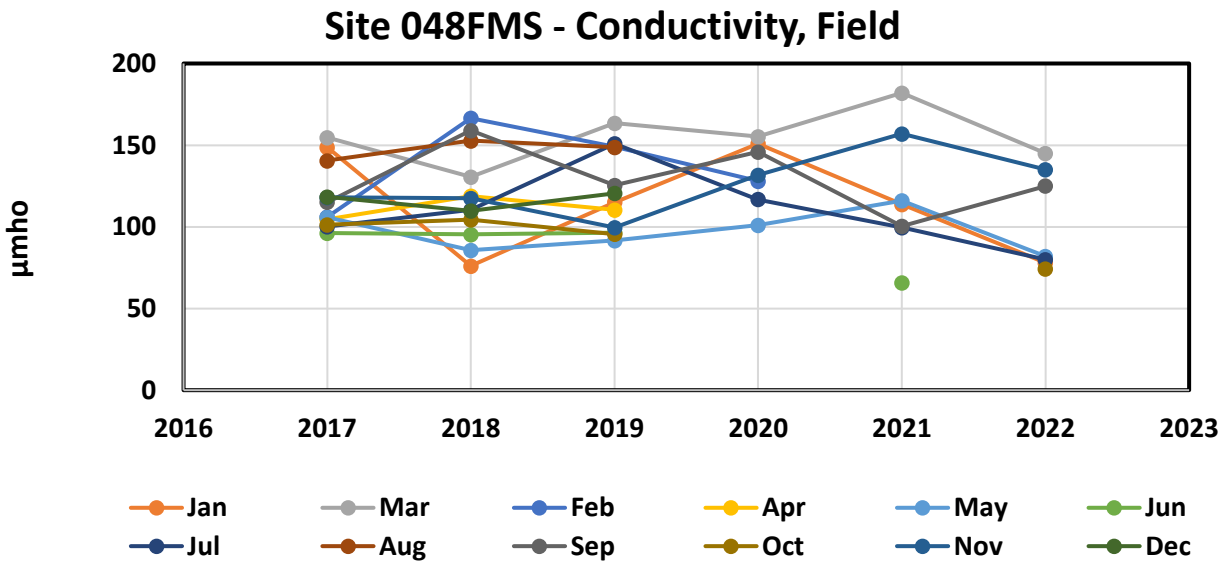
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	148.8	106	154.6	104.6	105.8	96.2	100.2	140.6	115.1	101.2	118	118.3
b	**2017/2018**	76.1	166.5	130.6	118.8	85.6	95.43	110.3	152.8	159	104.4	117.5	109.8
c	**2018/2019**	115.1	149.1	163.6	110.5	91.6	96.42	150.9	148.8	125.5	95.51	99.6	120.5
d	**2019/2020**	150.9	128	155.2		101		116.8		146		131.6	
e	**2020/2021**	113.7		182		116	65.9	99.52		100.4		157	
f	**2021/2022**	78		145		82		80		125	74.4	135	
	n	6	4	6	3	6	4	6	3	6	4	6	3
	t_1	6	4	6	3	6	4	6	3	6	4	6	3
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	-1	1	-1	-1	1	1	1	1	-1	-1
	c-a	-1	1	1	1	-1	1	1	1	1	-1	-1	1
	d-a	1	1	1		-1		1		1		1	
	e-a	-1		1		1	-1	-1		-1		1	
	f-a	-1		-1		-1		-1		1	-1	1	
	c-b	1	-1	1	-1	1	1	1	-1	-1	-1	-1	1
	d-b	1	-1	1		1		1		-1		1	
	e-b	1		1		1	-1	-1		-1		1	
	f-b	1		1		-1		-1		-1	-1	1	
	d-c	1	-1	-1		1		-1		1		1	
	e-c	-1		1		1	-1	-1		-1		1	
	f-c	-1		-1		-1		-1		-1	-1	1	
	e-d	-1		1		1		-1		-1		1	
	f-d	-1		-1		-1		-1		-1		1	
	f-e	-1		-1		-1		-1		1		-1	
	S_k	-3	0	3	1	-1	-2	-5	1	-3	-4	7	1
	σ^2_S=	28.33	8.67	28.33	3.67	28.33	8.67	28.33	3.67	28.33	8.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	-0.56	0.00	0.56	0.52	-0.19	-0.68	-0.94	0.52	-0.56	-1.36	1.32	0.52
	Z^2_k	0.32	0.00	0.32	0.27	0.04	0.46	0.88	0.27	0.32	1.85	1.73	0.27

ΣZ_k= -0.85
ΣZ^2_k= 6.73
Z-bar=$\Sigma Z_k/K$= -0.07

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	57	0	0	0	0

Σn 57
ΣS_k -5

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	6.67		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.825**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.28	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
207.00	**p**	**0.390**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-7.05	**-0.500**	3.72
0.050	-4.87		2.68
0.100	-3.91		1.53
0.200	-3.04		0.60

048FMS Seasonal Kendall analysis for pH, Field (su)

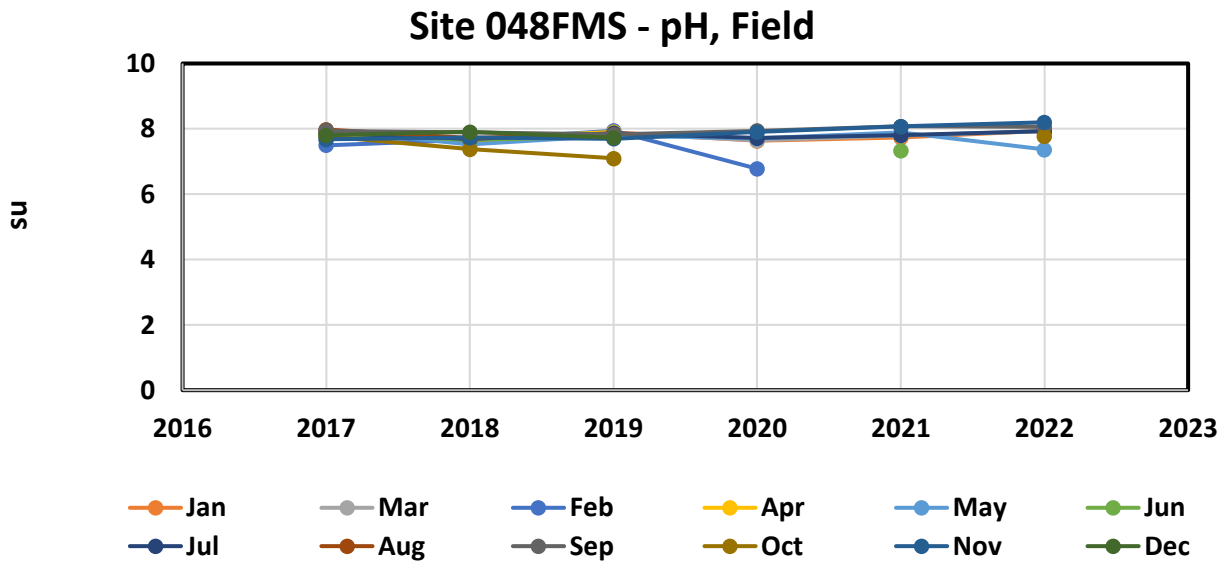
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	7.87	7.5	7.72	7.91	7.97	7.86	7.88	7.98	7.94	7.77	7.68	7.81
b	**2017/2018**	7.63	7.66	7.69	7.69	7.52	7.66	7.69	7.72	7.89	7.38	7.73	7.91
c	**2018/2019**	7.89	7.94	7.86	7.9	7.79	7.77	7.87	7.83	7.83	7.1	7.7	7.73
d	**2019/2020**	7.64	6.78	7.65		7.71		7.72		7.94		7.91	
e	**2020/2021**	7.74		7.79		7.89	7.34	7.8		8.08		8.08	
f	**2021/2022**	7.94		7.93		7.37		7.93		8.06	7.77	8.2	
	n	6	4	6	3	6	4	6	3	6	4	6	3
	t_1	6	4	6	3	6	4	6	3	4	2	6	3
	t_2	0	0	0	0	0	0	0	0	1	1	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1
	c-a	1	1	1	-1	-1	-1	-1	-1	-1	-1	1	-1
	d-a	-1	-1	-1		-1		-1		0		1	
	e-a	-1		1		-1	-1	-1		1		1	
	f-a	1		1		-1		1		1	0	1	
	c-b	1	1	1	1	1	1	1	1	-1	-1	-1	-1
	d-b	1	-1	-1		1		1		1		1	
	e-b	1		1		1	-1	1		1		1	
	f-b	1		1		-1		1		1	1	1	
	d-c	-1	-1	-1		-1		-1		1		1	
	e-c	-1		-1		1	-1	-1		1		1	
	f-c	1		1		-1		1		1	1	1	
	e-d	1		1		1		1		1		1	
	f-d	1		1		-1		1		1		1	
	f-e	1		1		-1		1		-1		1	
	S_k	5	0	5	-1	-5	-4	3	-1	6	-1	13	-1
	σ^2_S=	28.33	8.67	28.33	3.67	28.33	8.67	28.33	3.67	27.33	7.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	0.94	0.00	0.94	-0.52	-0.94	-1.36	0.56	-0.52	1.15	-0.36	2.44	-0.52
	Z^2_k	0.88	0.00	0.88	0.27	0.88	1.85	0.32	0.27	1.32	0.13	5.96	0.27

ΣZ_k= 1.81
ΣZ^2_k= 13.04
Z-bar=$\Sigma Z_k/K$= 0.15

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	53	2	0	0	0

Σn 57
ΣS_k 19

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	12.77	@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p **0.309**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 1.26	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
205.00	**p** **0.896**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.02	**0.020**	0.07
0.050	-0.01		0.05
0.100	0.00		0.04
0.200	0.01		0.04

048FMS Seasonal Kendall analysis for SO4, Total (mg/L)

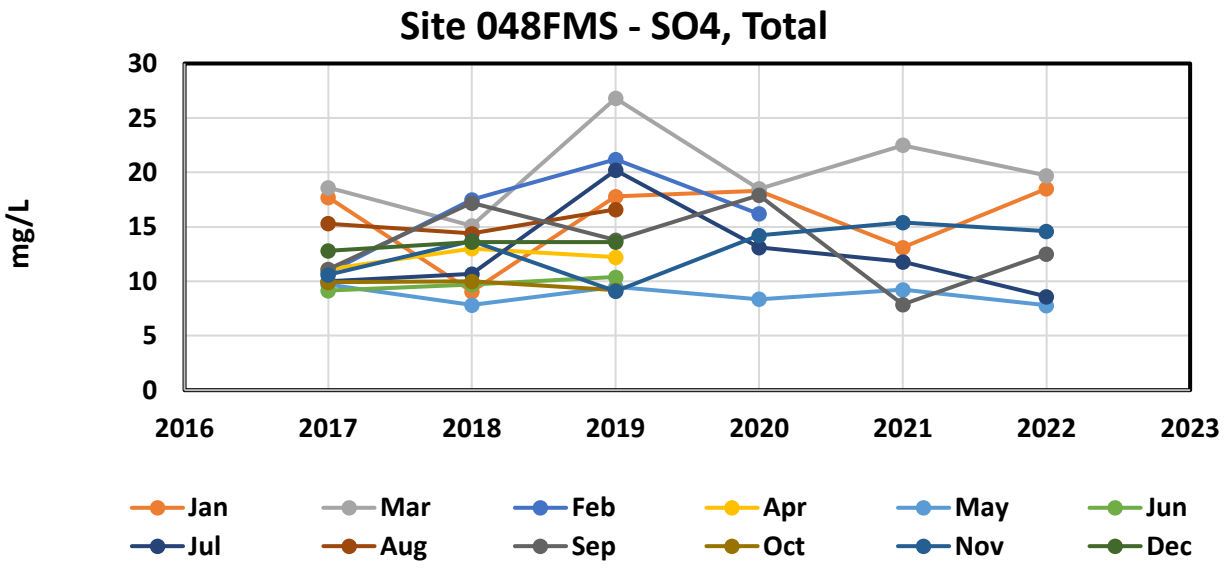
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	17.7	10.8	18.6	11.1	9.7	9.15	9.99	15.3	11.1	9.9	10.6	12.8
b	**2017/2018**	9.06	17.5	15.1	13	7.83	9.71	10.7	14.4	17.2	10	13.7	13.6
c	**2018/2019**	17.8	21.2	26.8	12.2	9.48	10.4	20.2	16.6	13.8	9.19	9.09	13.6
d	**2019/2020**	18.3	16.2	18.5		8.36		13.1		17.9		14.2	
e	**2020/2021**	13.1		22.5		9.23		11.8		7.88		15.4	
f	**2021/2022**	18.5		19.7		7.8		8.61		12.5		14.6	
	n	6	4	6	3	6	3	6	3	6	3	6	3
	t_1	6	4	6	3	6	3	6	3	6	3	6	1
	t_2	0	0	0	0	0	0	0	0	0	0	0	1
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	-1	1	-1	1	1	-1	1	1	1	1
	c-a	1	1	1	1	-1	1	1	1	1	-1	-1	1
	d-a	1	1	-1		-1		1		1		1	
	e-a	-1		1		-1		1		-1		1	
	f-a	1		1		-1		-1		1		1	
	c-b	1	1	1	-1	1	1	1	1	-1	-1	-1	0
	d-b	1	-1	1		1		1		1		1	
	e-b	1		1		1		1		-1		1	
	f-b	1		1		-1		-1		-1		1	
	d-c	1	-1	-1		-1		-1		1		1	
	e-c	-1		-1		-1		-1		-1		1	
	f-c	1		-1		-1		-1		-1		1	
	e-d	-1		1		1		-1		-1		1	
	f-d	1		1		-1		-1		-1		1	
	f-e	1		-1		-1		-1		1		-1	
	S_k	7	2	3	1	-7	3	-1	1	-1	-1	9	2
	σ^2_S=	28.33	8.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	2.67
	$Z_k = S_k/\sigma_S$	1.32	0.68	0.56	0.52	-1.32	1.57	-0.19	0.52	-0.19	-0.52	1.69	1.22
	Z^2_k	1.73	0.46	0.32	0.27	1.73	2.45	0.04	0.27	0.04	0.27	2.86	1.50

ΣZ_k= 5.87
ΣZ^2_k= 11.94
Z-bar=$\Sigma Z_k/K$= 0.49

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	53	1	0	0	0

Σn 55
ΣS_k 18

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	9.07		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.616**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	1.21	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
196.00	**p**	**0.888**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.34	**0.233**	0.68
0.050	-0.11		0.56
0.100	0.00		0.48
0.200	0.10		0.38

048FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

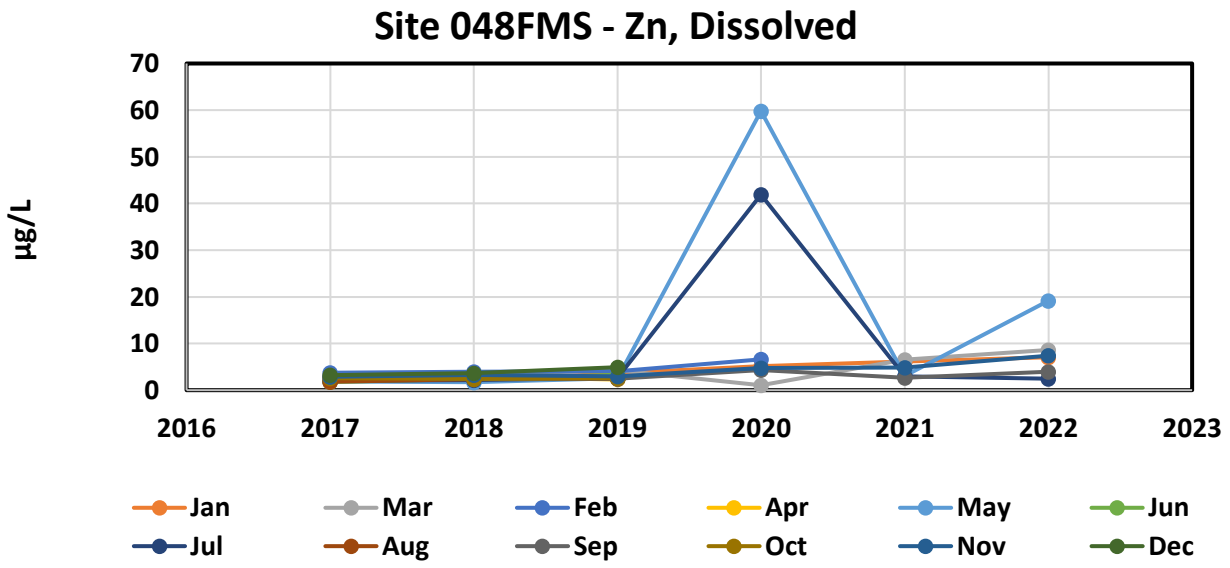
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	2.29	3.74	2.63	2.21	1.92	1.76	2.01	1.81	3	2.55	2.88	3.22
b	**2017/2018**	1.98	3.93	3.38	2.95	1.71	2.38	2.13	2.34	2.38	2.4	3.27	3.66
c	**2018/2019**	3.62	4.1	4.23	2.31	2.55	3.3	2.63	2.42	2.44	2.57	2.92	4.93
d	**2019/2020**	5.15	6.61	1.06		59.8		41.9		4.31		4.74	
e	**2020/2021**	6.16		6.51		3.1		2.96		2.65		4.82	
f	**2021/2022**	7.06		8.62		19.2		2.43		3.91		7.39	
	n	6	4	6	3	6	3	6	3	6	3	6	3
	t_1	6	4	6	3	6	3	6	3	6	3	6	3
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	1	1	-1	1	1	1	-1	-1	1	1
	c-a	1	1	1	1	1	1	1	1	-1	1	1	1
	d-a	1	1	-1		1		1		1		1	
	e-a	1		1		1		1		-1		1	
	f-a	1		1		1		1		1		1	
	c-b	1	1	1	-1	1	1	1	1	1	1	-1	1
	d-b	1	1	-1		1		1		1		1	
	e-b	1		1		1		1		1		1	
	f-b	1		1		1		1		1		1	
	d-c	1	1	-1		1		1		1		1	
	e-c	1		1		1		1		1		1	
	f-c	1		1		1		-1		1		1	
	e-d	1		1		-1		-1		-1		1	
	f-d	1		1		-1		-1		-1		1	
	f-e	1		1		1		-1		1		1	
	S_k	13	6	9	1	9	3	7	3	5	1	13	3
	σ^2_S=	28.33	8.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	2.44	2.04	1.69	0.52	1.69	1.57	1.32	1.57	0.94	0.52	2.44	1.57
	Z^2_k	5.96	4.15	2.86	0.27	2.86	2.45	1.73	2.45	0.88	0.27	5.96	2.45

ΣZ_k= 18.30
ΣZ^2_k= 32.32
Z-bar=$\Sigma Z_k/K$= 1.53

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	55	0	0	0	0

Σn 55
ΣS_k 73

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	4.40	@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p **0.957**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 5.13	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
197.00	**p** **1.000**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

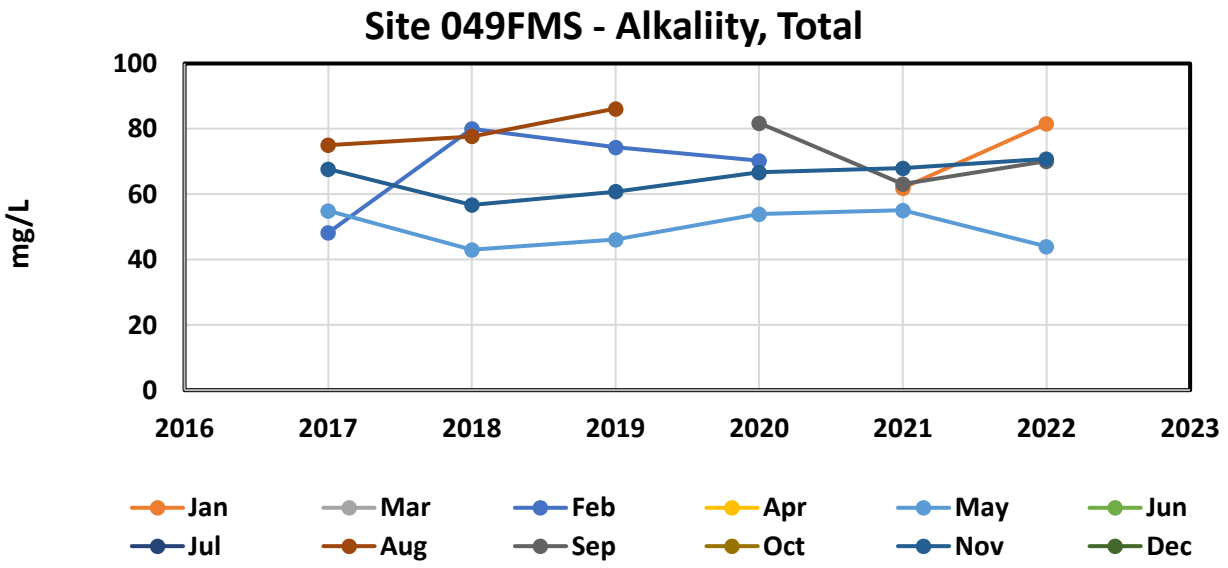
α	Lower Limit	Sen's Slope	Upper Limit
0.010	0.28	**0.665**	0.96
0.050	0.38		0.92
0.100	0.44		0.88
0.200	0.49		0.82

049FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		48.2			54.9			75			67.7	
b	**2017/2018**		80			43			77.7			56.7	
c	**2018/2019**		74.4			46.1			86.2			60.8	
d	**2019/2020**		70.2			53.9				81.8		66.7	
e	**2020/2021**	61.9				55.1				63.1		68	
f	**2021/2022**	81.6				44				70.1		70.8	
	n	2	4	0	0	6	0	0	3	3	0	6	0
	t_1	2	4	0	0	6	0	0	3	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		1			-1			1			-1	
	c-a		1			-1			1			-1	
	d-a		1			-1						-1	
	e-a					1						1	
	f-a					-1						1	
	c-b		-1			1			1			1	
	d-b		-1			1						1	
	e-b					1						1	
	f-b					1						1	
	d-c		-1			1						1	
	e-c					1						1	
	f-c					-1						1	
	e-d					1				-1		1	
	f-d					-1				-1		1	
	f-e	1				-1				1		1	
	S_k	1	0	0	0	1	0	0	3	-1	0	9	0
	σ^2_S=	1.00	8.67			28.33			3.67	3.67		28.33	
	$Z_k = S_k/\sigma_S$	1.00	0.00			0.19			1.57	-0.52		1.69	
	Z^2_k	1.00	0.00			0.04			2.45	0.27		2.86	

ΣZ_k=	3.92	Tie Extent	t_1	t_2	t_3	t_4	t_5	Σn	24
ΣZ^2_k=	6.62	Count	24	0	0	0	0	ΣS_k	13
Z-bar=ΣZ_k/K=	0.65								

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2$=	4.06	@a=5% c2(K-1)=	11.07	Test for station homogeneity	
	p **0.541**			$\chi^2_h<\chi^2_{(K-1)}$	ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 1.40	@a/2=2.5% Z=	1.96	**H_0** (No trend)	ACCEPT
73.67	**p** **0.919**			**H_A** (± trend)	REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-2.79	**2.050**	4.29
0.050	-0.33		3.69
0.100	0.05		3.52
0.200	0.23		3.13

049FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

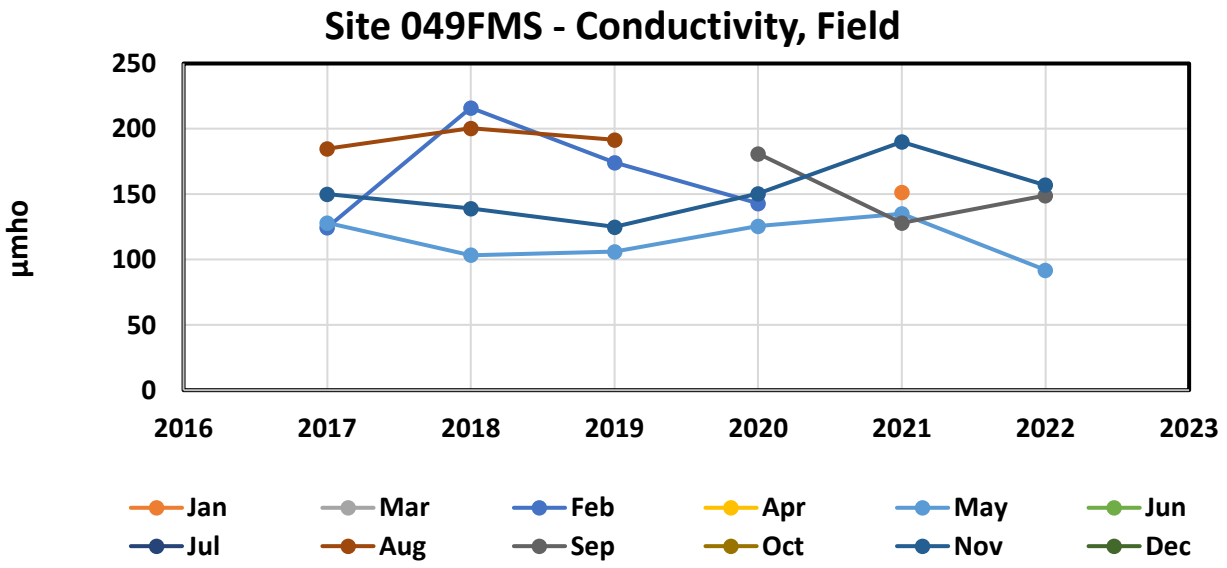
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		124.5			128			184.8			150	
b	**2017/2018**		216.1			103.4			200.5			139	
c	**2018/2019**		174.2			106			191.6			125	
d	**2019/2020**		143			125.7				181		150.3	
e	**2020/2021**	151.3				135				128		190	
f	**2021/2022**					92				149		157	
	n	1	4	0	0	6	0	0	3	3	0	6	0
	t_1	1	4	0	0	6	0	0	3	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		1			-1			1			-1	
	c-a		1			-1			1			-1	
	d-a		1			-1						1	
	e-a					1						1	
	f-a					-1						1	
	c-b		-1			1			-1			-1	
	d-b		-1			1						1	
	e-b					1						1	
	f-b					-1						1	
	d-c		-1			1						1	
	e-c					1						1	
	f-c					-1						1	
	e-d					1				-1		1	
	f-d					-1				-1		1	
	f-e					-1				1		-1	
	S_k	0	0	0	0	-1	0	0	1	-1	0	7	0
	σ^2_S=		8.67			28.33			3.67	3.67		28.33	
	$Z_k = S_k/\sigma_S$		0.00			-0.19			0.52	-0.52		1.32	
	Z^2_k		0.00			0.04			0.27	0.27		1.73	

ΣZ_k= 1.13
ΣZ^2_k= 2.31
Z-bar=$\Sigma Z_k/K$= 0.23

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	23	0	0	0	0

Σn 23
ΣS_k 6

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	2.06		@a=5% c2(K-1)=	9.49	Test for station homogeneity
	p	**0.725**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	0.59	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
72.67	**p**	**0.721**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-12.37	**2.175**	10.66
0.050	-8.92		9.31
0.100	-5.84		5.89
0.200	-1.99		4.05

049FMS Seasonal Kendall analysis for pH, Field (su)

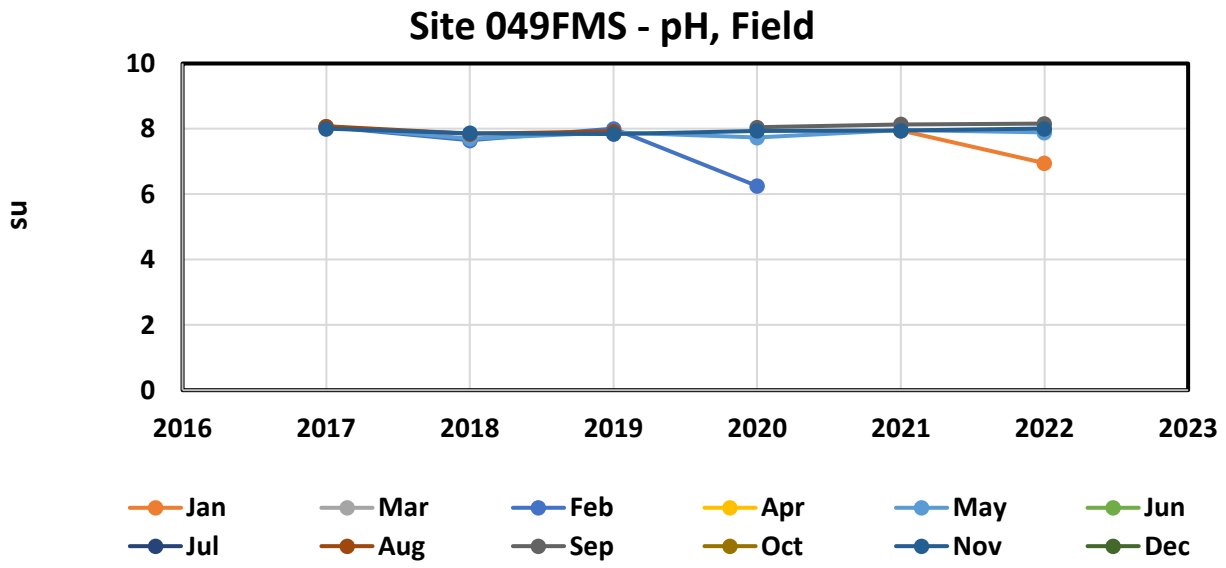
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		8.06			8.08			8.08			8	
b	**2017/2018**		7.65			7.7			7.85			7.87	
c	**2018/2019**		8			7.89			7.92			7.84	
d	**2019/2020**		6.25			7.73				8.05		7.94	
e	**2020/2021**	7.95				7.96				8.14		7.95	
f	**2021/2022**	6.95				7.89				8.16		8.01	
	n	2	4	0	0	6	0	0	3	3	0	6	0
	t_1	2	4	0	0	4	0	0	3	3	0	6	0
	t_2	0	0	0	0	1	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		-1			-1			-1			-1	
	c-a		-1			-1			-1			-1	
	d-a		-1			-1						-1	
	e-a					-1						-1	
	f-a					-1						1	
	c-b		1			1			1			-1	
	d-b		-1			1						1	
	e-b					1						1	
	f-b					1						1	
	d-c		-1			-1						1	
	e-c					1						1	
	f-c					0						1	
	e-d					1				1		1	
	f-d					1				1		1	
	f-e	-1				-1				1		1	
	S_k	-1	-4	0	0	0	0	0	-1	3	0	5	0
	σ^2_S=	1.00	8.67			27.33			3.67	3.67		28.33	
	$Z_k = S_k/\sigma_S$	-1.00	-1.36			0.00			-0.52	1.57		0.94	
	Z^2_k	1.00	1.85			0.00			0.27	2.45		0.88	

ΣZ_k= -0.37
ΣZ^2_k= 6.46
Z-bar=$\Sigma Z_k/K$= -0.06

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	22	1	0	0	0

Σn 24
ΣS_k 2

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	6.43	@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p **0.266**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 0.12	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
72.67	**p** **0.547**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.09	**0.002**	0.05
0.050	-0.05		0.04
0.100	-0.03		0.03
0.200	-0.03		0.02

049FMS Seasonal Kendall analysis for SO4, Total (mg/L)

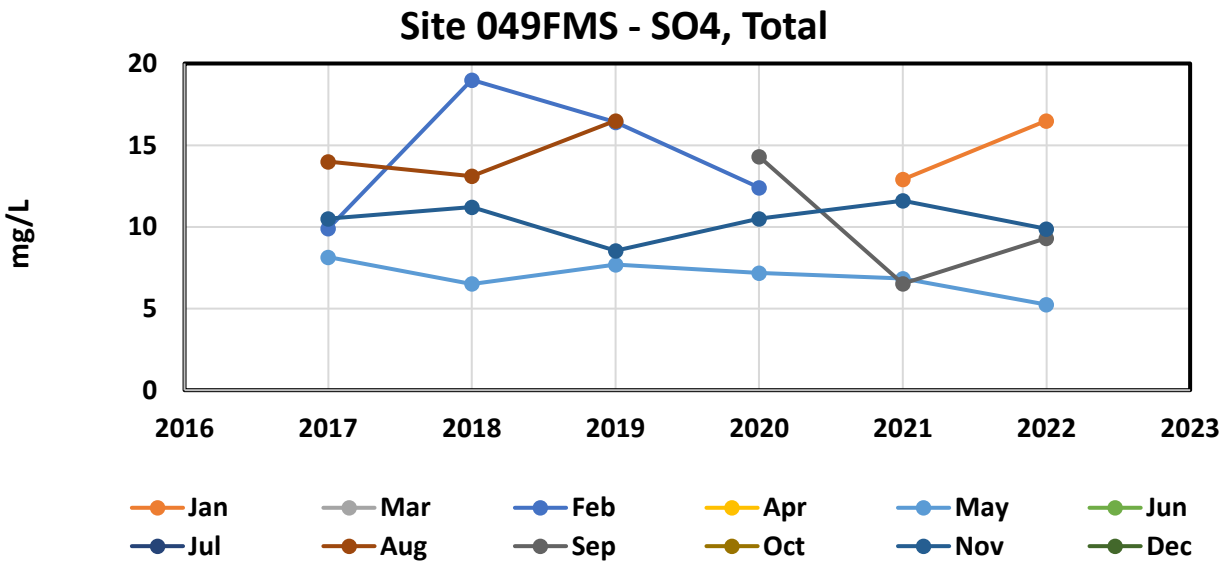
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		9.89			8.15			14			10.5	
b	**2017/2018**		19			6.51			13.1			11.2	
c	**2018/2019**		16.4			7.69			16.5			8.54	
d	**2019/2020**		12.4			7.18				14.3		10.5	
e	**2020/2021**	12.9				6.84				6.52		11.6	
f	**2021/2022**	16.5				5.24				9.31		9.88	
	n	2	4	0	0	6	0	0	3	3	0	6	0
	t_1	2	4	0	0	6	0	0	3	3	0	4	0
	t_2	0	0	0	0	0	0	0	0	0	0	1	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		1			-1			-1			1	
	c-a		1			-1			1			-1	
	d-a		1			-1						0	
	e-a					-1						1	
	f-a					-1						-1	
	c-b		-1			1			1			-1	
	d-b		-1			1						-1	
	e-b					1						1	
	f-b					-1						-1	
	d-c		-1			-1						1	
	e-c					-1						1	
	f-c					-1						1	
	e-d					-1				-1		1	
	f-d					-1				-1		-1	
	f-e	1				-1				1		-1	
	S_k	1	0	0	0	-9	0	0	1	-1	0	0	0
	σ^2_S=	1.00	8.67			28.33			3.67	3.67		27.33	
	$Z_k = S_k/\sigma_S$	1.00	0.00			-1.69			0.52	-0.52		0.00	
	Z^2_k	1.00	0.00			2.86			0.27	0.27		0.00	

ΣZ_k= -0.69
ΣZ^2_k= 4.40
Z-bar=$\Sigma Z_k/K$= -0.12

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	22	1	0	0	0

Σn 24
ΣS_k -8

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	4.32		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.504**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.82	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
72.67	**p**	**0.206**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.93	**-0.318**	0.55
0.050	-0.55		0.21
0.100	-0.42		0.11
0.200	-0.34		-0.11

049FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

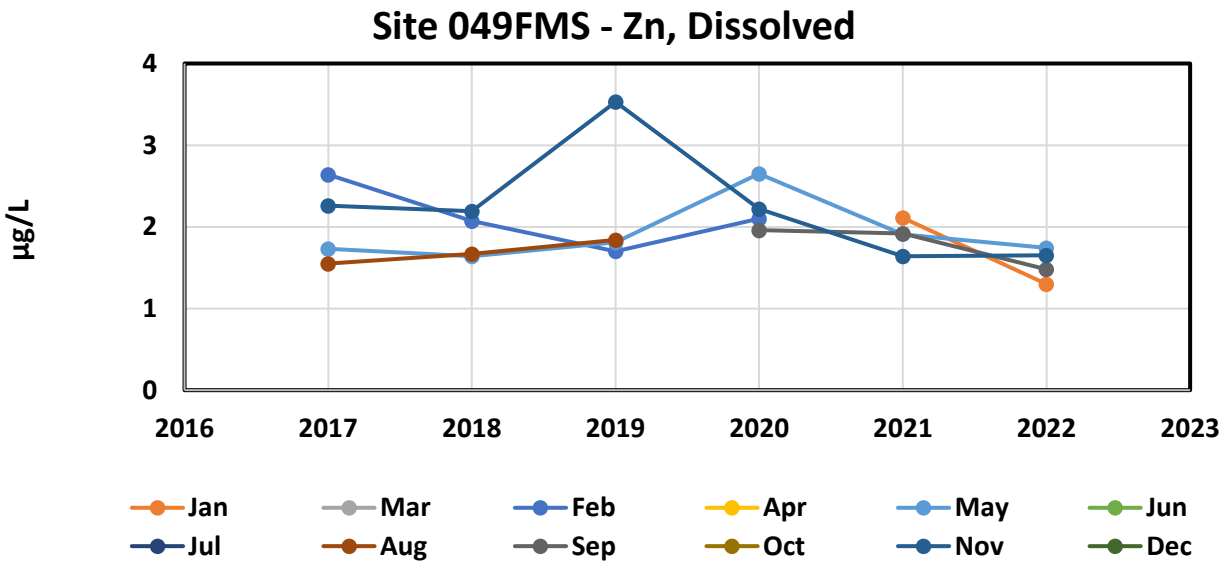
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		2.64			1.73			1.55			2.26	
b	**2017/2018**		2.07			1.64			1.67			2.19	
c	**2018/2019**		1.7			1.81			1.84			3.53	
d	**2019/2020**		2.1			2.65				1.96		2.22	
e	**2020/2021**	2.11				1.91				1.92		1.64	
f	**2021/2022**	1.3				1.74				1.48		1.65	
	n	2	4	0	0	6	0	0	3	3	0	6	0
	t_1	2	4	0	0	6	0	0	3	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		-1			-1			1			-1	
	c-a		-1			1			1			1	
	d-a		-1			1						-1	
	e-a					1						-1	
	f-a					1						-1	
	c-b		-1			1			1			1	
	d-b		1			1						1	
	e-b					1						-1	
	f-b					1						-1	
	d-c		1			1						-1	
	e-c					1						-1	
	f-c					-1						-1	
	e-d					-1				-1		-1	
	f-d					-1				-1		-1	
	f-e	-1				-1				-1		1	
	S_k	-1	-2	0	0	5	0	0	3	-3	0	-7	0
	σ^2_S=	1.00	8.67			28.33			3.67	3.67		28.33	
	$Z_k = S_k/\sigma_S$	-1.00	-0.68			0.94			1.57	-1.57		-1.32	
	Z^2_k	1.00	0.46			0.88			2.45	2.45		1.73	

ΣZ_k= -2.06
ΣZ^2_k= 8.98
Z-bar=$\Sigma Z_k/K$= -0.34

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k -5

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	8.28	@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p **0.142**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} -0.47	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
73.67	**p** **0.321**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.33	**-0.040**	0.05
0.050	-0.18		0.02
0.100	-0.17		0.01
0.200	-0.14		0.00

054FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

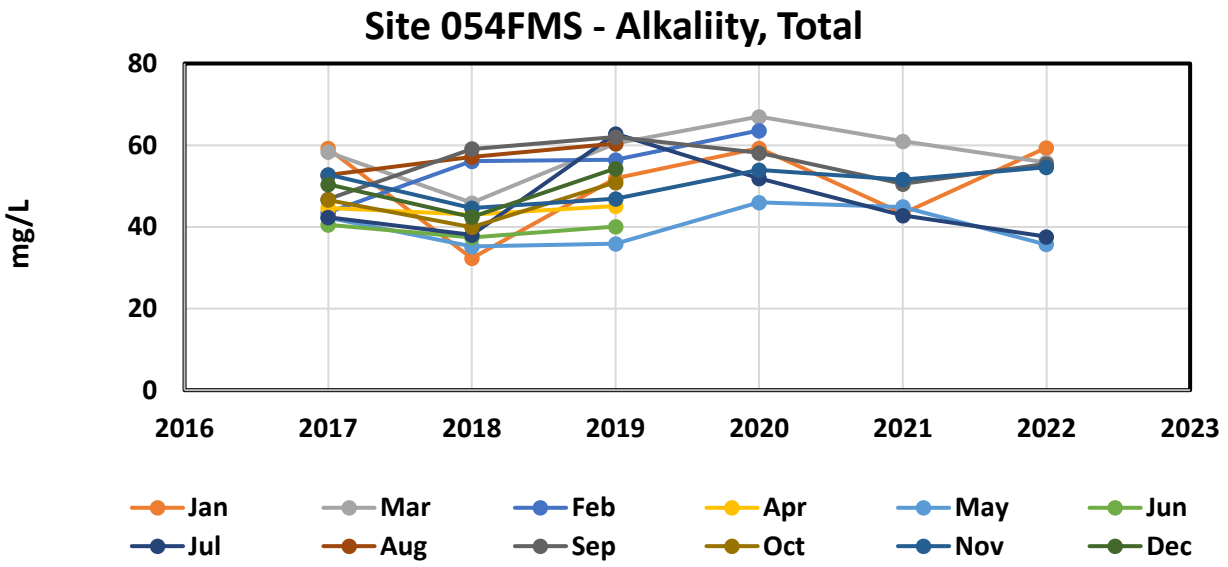
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	59.2	43.5	58.3	44.6	42.2	40.5	42.3	52.7	46.8	46.6	52.8	50.4
b	**2017/2018**	32.3	56.1	45.9	43	35.2	37.4	38	57.1	59.1	39.9	44.6	42.4
c	**2018/2019**	51.9	56.4	60.4	45.1	35.9	40.1	62.8	60.4	62	50.9	46.9	54.3
d	**2019/2020**	59.3	63.6	67		46		51.9		58.1		53.9	
e	**2020/2021**	43.3		61		44.9		42.8		50.5		51.6	
f	**2021/2022**	59.4		55.8		35.7		37.6		55.4		54.6	
	n	6	4	6	3	6	3	6	3	6	3	6	3
	t_1	6	4	6	3	6	3	6	3	6	3	6	3
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	-1	-1	-1	-1	-1	1	1	-1	-1	-1
	c-a	-1	1	1	1	-1	-1	1	1	1	1	-1	1
	d-a	1	1	1		1		1		1		1	
	e-a	-1		1		1		1		1		-1	
	f-a	1		-1		-1		-1		1		1	
	c-b	1	1	1	1	1	1	1	1	1	1	1	1
	d-b	1	1	1		1		1		-1		1	
	e-b	1		1		1		1		-1		1	
	f-b	1		1		1		-1		-1		1	
	d-c	1	1	1		1		-1		-1		1	
	e-c	-1		1		1		-1		-1		1	
	f-c	1		-1		-1		-1		-1		1	
	e-d	-1		-1		-1		-1		-1		-1	
	f-d	1		-1		-1		-1		-1		1	
	f-e	1		-1		-1		-1		1		1	
	S_k	5	6	3	1	1	-1	-3	3	-1	1	7	1
	σ^2_S=	28.33	8.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	0.94	2.04	0.56	0.52	0.19	-0.52	-0.56	1.57	-0.19	0.52	1.32	0.52
	Z^2_k	0.88	4.15	0.32	0.27	0.04	0.27	0.32	2.45	0.04	0.27	1.73	0.27

ΣZ_k= 6.90
ΣZ^2_k= 11.02
Z-bar=$\Sigma Z_k/K$= 0.58

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	55	0	0	0	0

Σn 55
ΣS_k 23

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	7.05		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.795**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	1.57	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
197.00	**p**	**0.941**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.50	**0.675**	2.50
0.050	-0.07		2.30
0.100	0.05		2.02
0.200	0.20		1.40

054FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

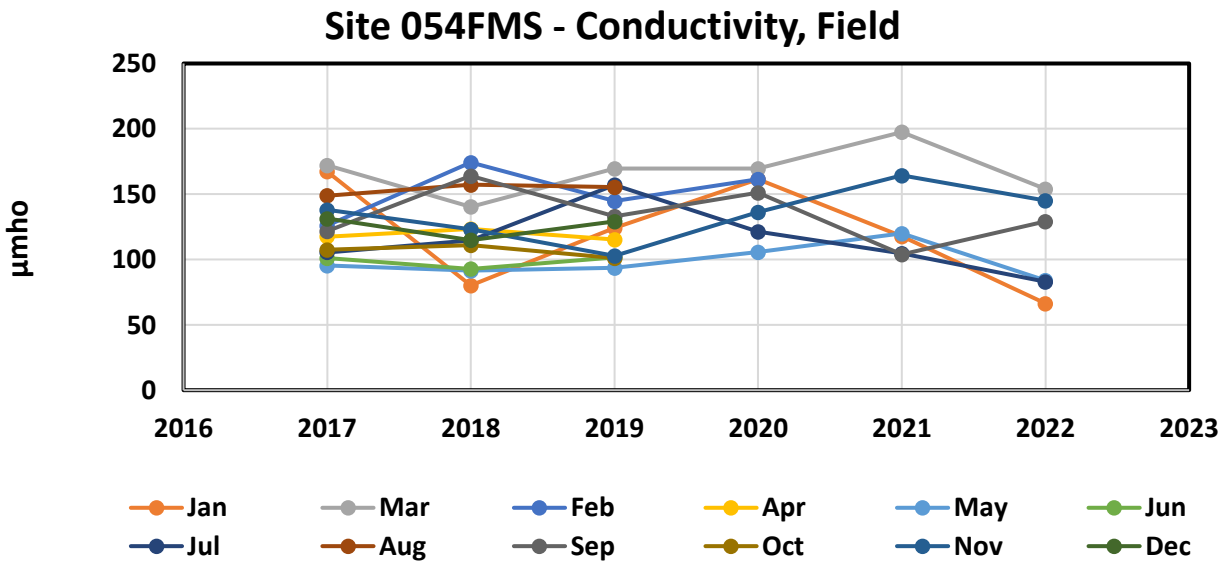
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	167.3	126	172	117.6	95.5	101.1	105.5	148.8	121.6	107.4	138	131.4
b	**2017/2018**	80.2	174.3	140.3	123.4	91.5	92.77	114.6	157.3	164	111	123.1	114.8
c	**2018/2019**	124.2	144.6	169.7	115.3	93.51	101.6	157	155.4	132.9	101.1	102.8	129.2
d	**2019/2020**	161.4	161.4	169.7		105.7		121.2		151		136.2	
e	**2020/2021**	117.9		197.5		120		104.7		103.9		164.4	
f	**2021/2022**	66.4		154		84		83		129		145	
	n	6	4	6	3	6	3	6	3	6	3	6	3
	t_1	6	4	4	3	6	3	6	3	6	3	6	3
	t_2	0	0	1	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	-1	1	-1	-1	1	1	1	1	-1	-1
	c-a	-1	1	-1	-1	-1	1	1	1	1	-1	-1	-1
	d-a	-1	1	-1		1		1		1		-1	
	e-a	-1		1		1		-1		-1		1	
	f-a	-1		-1		-1		-1		1		1	
	c-b	1	-1	1	-1	1	1	1	-1	-1	-1	-1	1
	d-b	1	-1	1		1		1		-1		1	
	e-b	1		1		1		-1		-1		1	
	f-b	-1		1		-1		-1		-1		1	
	d-c	1	1	0		1		-1		1		1	
	e-c	-1		1		1		-1		-1		1	
	f-c	-1		-1		-1		-1		-1		1	
	e-d	-1		1		1		-1		-1		1	
	f-d	-1		-1		-1		-1		-1		1	
	f-e	-1		-1		-1		-1		1		-1	
	S_k	-7	2	0	-1	1	1	-5	1	-3	-1	5	-1
	σ^2_S=	28.33	8.67	27.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	-1.32	0.68	0.00	-0.52	0.19	0.52	-0.94	0.52	-0.56	-0.52	0.94	-0.52
	Z^2_k	1.73	0.46	0.00	0.27	0.04	0.27	0.88	0.27	0.32	0.27	0.88	0.27

ΣZ_k= -1.53
ΣZ^2_k= 5.67
Z-bar=$\Sigma Z_k/K$= -0.13

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	53	1	0	0	0

Σn 55
ΣS_k -8

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	5.48		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.906**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.50	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
196.00	**p**	**0.309**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-4.48	**-0.995**	5.42
0.050	-3.30		3.40
0.100	-3.15		2.62
0.200	-1.93		0.70

054FMS Seasonal Kendall analysis for pH, Field (su)

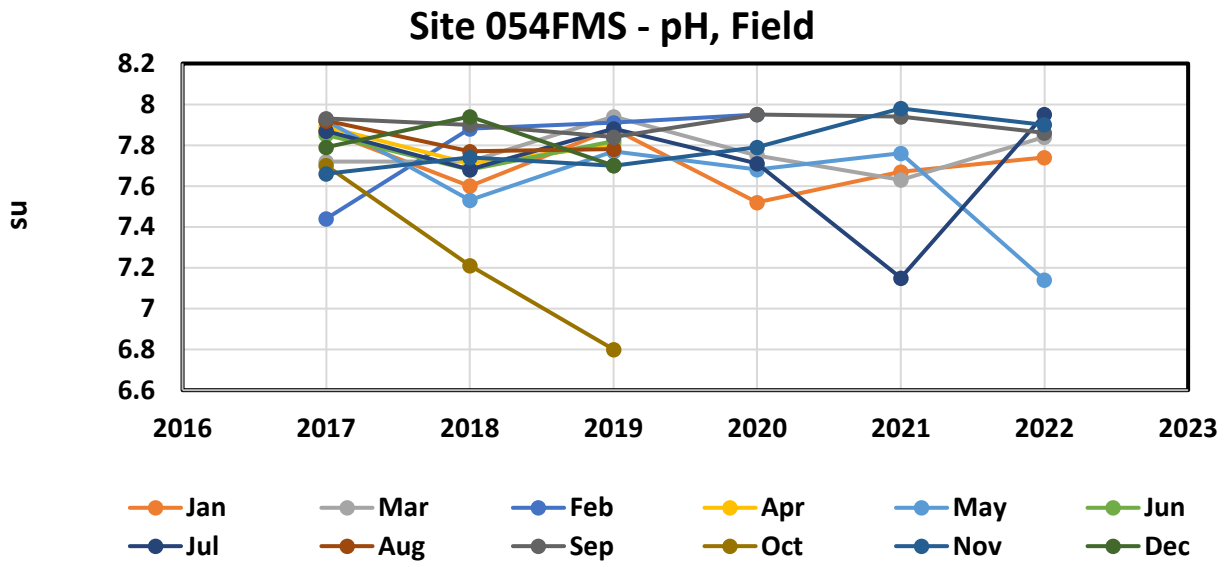
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	7.87	7.44	7.72	7.89	7.92	7.85	7.87	7.92	7.93	7.7	7.66	7.79
b	**2017/2018**	7.6	7.88	7.72	7.71	7.53	7.68	7.68	7.77	7.9	7.21	7.74	7.94
c	**2018/2019**	7.88	7.91	7.94	7.8	7.77	7.82	7.88	7.78	7.84	6.8	7.7	7.7
d	**2019/2020**	7.52	7.95	7.75		7.68		7.71		7.95		7.79	
e	**2020/2021**	7.67		7.63		7.76		7.15		7.94		7.98	
f	**2021/2022**	7.74		7.84		7.14		7.95		7.86		7.9	
	n	6	4	6	3	6	3	6	3	6	3	6	3
	t_1	6	4	4	3	6	3	6	3	6	3	6	3
	t_2	0	0	1	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	0	-1	-1	-1	-1	-1	-1	-1	1	1
	c-a	1	1	1	-1	-1	-1	1	-1	-1	-1	1	-1
	d-a	-1	1	1		-1		-1		1		1	
	e-a	-1		-1		-1		-1		1		1	
	f-a	-1		1		-1		1		-1		1	
	c-b	1	1	1	1	1	1	1	1	-1	-1	-1	-1
	d-b	-1	1	1		1		1		1		1	
	e-b	1		-1		1		-1		1		1	
	f-b	1		1		-1		1		-1		1	
	d-c	-1	1	-1		-1		-1		1		1	
	e-c	-1		-1		-1		-1		1		1	
	f-c	-1		-1		-1		1		1		1	
	e-d	1		-1		1		-1		-1		1	
	f-d	1		1		-1		1		-1		1	
	f-e	1		1		-1		1		-1		-1	
	S_k	-1	6	2	-1	-7	-1	1	-1	-1	-3	11	-1
	σ^2_S=	28.33	8.67	27.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	-0.19	2.04	0.38	-0.52	-1.32	-0.52	0.19	-0.52	-0.19	-1.57	2.07	-0.52
	Z^2_k	0.04	4.15	0.15	0.27	1.73	0.27	0.04	0.27	0.04	2.45	4.27	0.27

ΣZ_k= -0.67
ΣZ^2_k= 13.95
Z-bar=$\Sigma Z_k/K$= -0.06

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	53	1	0	0	0

Σn 55
ΣS_k 4

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	13.91		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.238**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	0.21	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
196.00	**p**	**0.585**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.04	**0.005**	0.03
0.050	-0.03		0.02
0.100	-0.03		0.02
0.200	-0.01		0.01

054FMS Seasonal Kendall analysis for SO4, Total (mg/L)

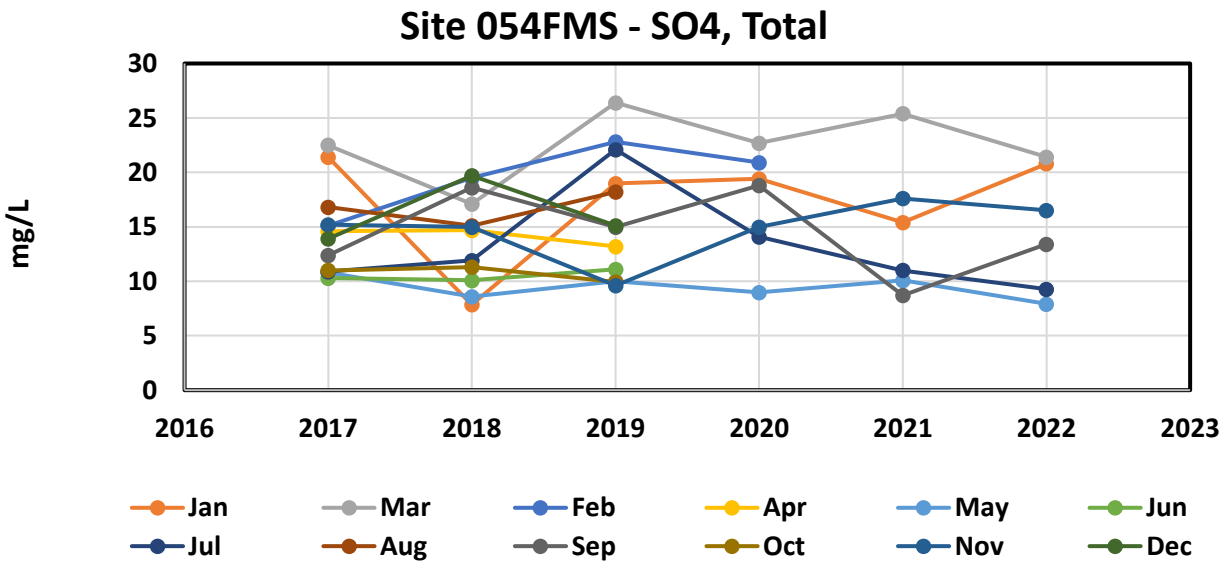
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	21.4	15.1	22.5	14.6	10.8	10.3	10.9	16.8	12.4	11	15.2	13.9
b	**2017/2018**	7.85	19.5	17.1	14.7	8.58	10.1	11.9	15.1	18.6	11.3	15	19.7
c	**2018/2019**	19	22.8	26.4	13.2	10	11.1	22.1	18.2	15	9.94	9.61	15.1
d	**2019/2020**	19.4	20.9	22.7		8.97		14.1		18.8		15	
e	**2020/2021**	15.4		25.4		10.1		11		8.71		17.6	
f	**2021/2022**	20.8		21.4		7.93		9.28		13.4		16.5	
	n	6	4	6	3	6	3	6	3	6	3	6	3
	t_1	6	4	6	3	6	3	6	3	6	3	4	3
	t_2	0	0	0	0	0	0	0	0	0	0	1	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	-1	1	-1	-1	1	-1	1	1	-1	1
	c-a	-1	1	1	-1	-1	1	1	1	1	-1	-1	1
	d-a	-1	1	1		-1		1		1		-1	
	e-a	-1		1		-1		1		-1		1	
	f-a	-1		-1		-1		-1		1		1	
	c-b	1	1	1	-1	1	1	1	1	-1	-1	-1	-1
	d-b	1	1	1		1		1		1		0	
	e-b	1		1		1		-1		-1		1	
	f-b	1		1		-1		-1		-1		1	
	d-c	1	-1	-1		-1		-1		1		1	
	e-c	-1		-1		1		-1		-1		1	
	f-c	1		-1		-1		-1		-1		1	
	e-d	-1		1		1		-1		-1		1	
	f-d	1		-1		-1		-1		-1		1	
	f-e	1		-1		-1		-1		1		-1	
	S_k	1	4	1	-1	-5	1	-3	1	-1	-1	4	1
	σ^2_S=	28.33	8.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67	27.33	3.67
	$Z_k = S_k/\sigma_S$	0.19	1.36	0.19	-0.52	-0.94	0.52	-0.56	0.52	-0.19	-0.52	0.77	0.52
	Z^2_k	0.04	1.85	0.04	0.27	0.88	0.27	0.32	0.27	0.04	0.27	0.59	0.27

ΣZ_k= 1.33
ΣZ^2_k= 5.10
Z-bar=$\Sigma Z_k/K$= 0.11

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	53	1	0	0	0

Σn 55
ΣS_k 2

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	4.95		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.933**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	0.07	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
196.00	**p**	**0.528**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.60	**0.025**	0.68
0.050	-0.50		0.40
0.100	-0.31		0.34
0.200	-0.20		0.20

054FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

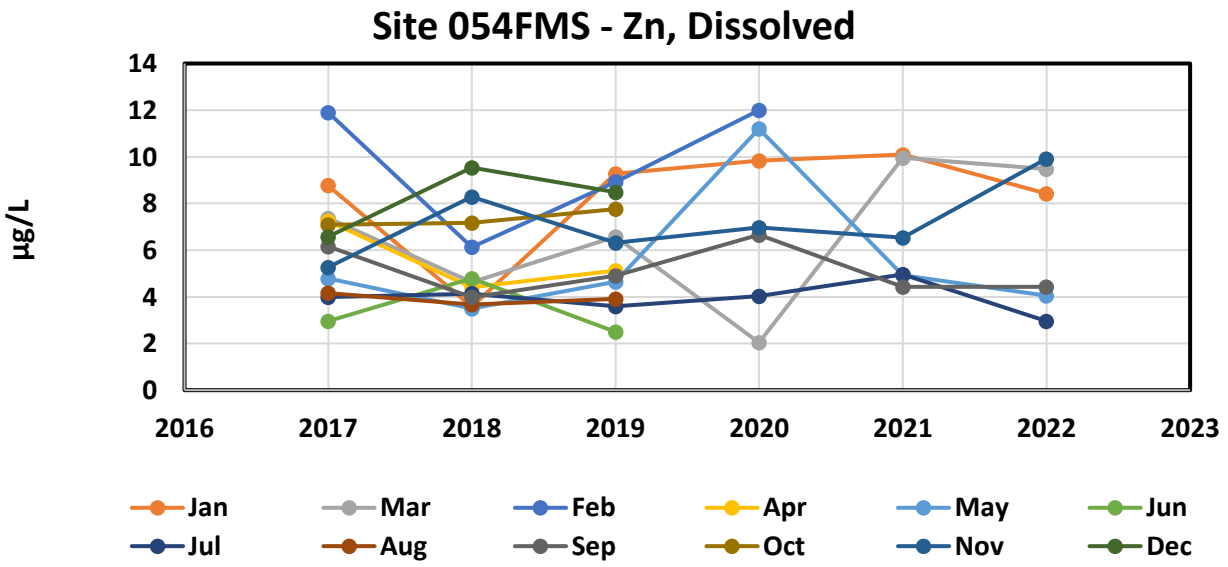
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	8.77	11.9	7.37	7.25	4.78	2.96	3.99	4.16	6.16	7.09	5.27	6.58
b	**2017/2018**	3.58	6.13	4.62	4.41	3.5	4.79	4.14	3.67	3.98	7.17	8.28	9.54
c	**2018/2019**	9.27	8.93	6.58	5.12	4.64	2.5	3.59	3.92	4.9	7.76	6.32	8.49
d	**2019/2020**	9.84	12	2.04		11.2		4.03		6.66		6.97	
e	**2020/2021**	10.1		9.96		4.93		4.96		4.42		6.54	
f	**2021/2022**	8.43		9.47		4.05		2.96		4.43		9.92	
	n	6	4	6	3	6	3	6	3	6	3	6	3
	t_1	6	4	6	3	6	3	6	3	6	3	6	3
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	-1	-1	-1	-1	1	1	-1	-1	1	1	1
	c-a	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1
	d-a	1	1	-1		1		1		1		1	
	e-a	1		1		1		1		-1		1	
	f-a	-1		1		-1		-1		-1		1	
	c-b	1	1	1	1	1	-1	-1	1	1	1	-1	-1
	d-b	1	1	-1		1		-1		1		-1	
	e-b	1		1		1		1		1		-1	
	f-b	1		1		1		-1		1		1	
	d-c	1	1	-1		1		1		1		1	
	e-c	1		1		1		1		-1		1	
	f-c	-1		1		-1		-1		-1		1	
	e-d	1		1		-1		1		-1		-1	
	f-d	-1		1		-1		-1		-1		1	
	f-e	-1		-1		-1		-1		1		1	
	S_k	5	2	3	-1	1	-1	-1	-1	-1	3	7	1
	σ^2_S=	28.33	8.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	0.94	0.68	0.56	-0.52	0.19	-0.52	-0.19	-0.52	-0.19	1.57	1.32	0.52
	Z^2_k	0.88	0.46	0.32	0.27	0.04	0.27	0.04	0.27	0.04	2.45	1.73	0.27

ΣZ_k= 3.83
ΣZ^2_k= 7.04
Z-bar=$\Sigma Z_k/K$= 0.32

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	55	0	0	0	0

Σn 55
ΣS_k 17

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	5.82		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.885**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	1.14	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
197.00	**p**	**0.873**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.20	**0.145**	0.44
0.050	-0.12		0.34
0.100	-0.06		0.30
0.200	0.03		0.25

057FMG Seasonal Kendall analysis for Alkaliity, Total (mg/L)

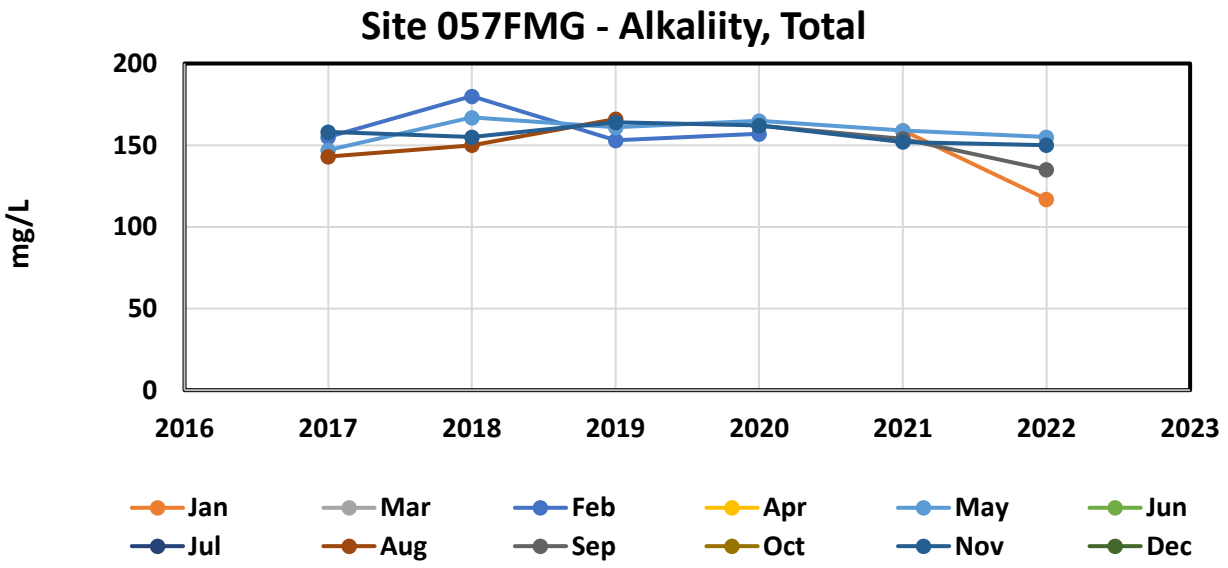
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		155			147			143			158	
b	**2017/2018**		180			167			150			155	
c	**2018/2019**		153			161			166			164	
d	**2019/2020**		157			165				162		162	
e	**2020/2021**	159				159				154		152	
f	**2021/2022**	117				155				135		150	
	n	2	4	0	0	6	0	0	3	3	0	6	0
	t_1	2	4	0	0	6	0	0	3	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		1			1			1			-1	
	c-a		-1			1			1			1	
	d-a		1			1						1	
	e-a					1						-1	
	f-a					1						-1	
	c-b		-1			-1			1			1	
	d-b		-1			-1						1	
	e-b					-1						-1	
	f-b					-1						-1	
	d-c		1			1						-1	
	e-c					-1						-1	
	f-c					-1						-1	
	e-d					-1				-1		-1	
	f-d					-1				-1		-1	
	f-e	-1				-1				-1		-1	
	S_k	-1	0	0	0	-3	0	0	3	-3	0	-7	0
	σ^2_S=	1.00	8.67			28.33			3.67	3.67		28.33	
	$Z_k = S_k/\sigma_S$	-1.00	0.00			-0.56			1.57	-1.57		-1.32	
	Z^2_k	1.00	0.00			0.32			2.45	2.45		1.73	

ΣZ_k= -2.88
ΣZ^2_k= 7.96
Z-bar=$\Sigma Z_k/K$= -0.48

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k -11

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	6.58		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.254**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-1.17	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
73.67	**p**	**0.122**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-5.48	**-1.500**	3.00
0.050	-3.56		1.04
0.100	-3.00		-1.00
0.200	-2.07		-1.00

057FMG Seasonal Kendall analysis for Conductivity, Field (µmho)

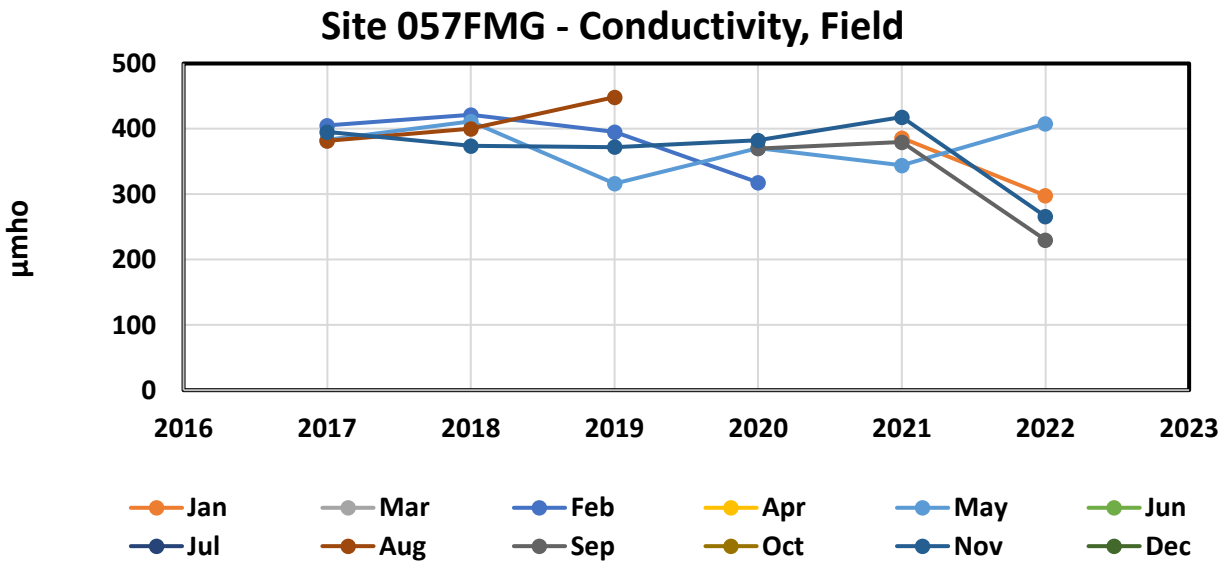
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		405			383			381.6			395	
b	**2017/2018**		421.5			411.4			400			374.1	
c	**2018/2019**		395.4			316.2			448.5			372.2	
d	**2019/2020**		318			370.6				370		382.5	
e	**2020/2021**	386.1				344				379.9		418	
f	**2021/2022**	298				408				230		266	
	n	2	4	0	0	6	0	0	3	3	0	6	0
	t_1	2	4	0	0	6	0	0	3	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		1			1			1			-1	
	c-a		-1			-1			1			-1	
	d-a		-1			-1						-1	
	e-a					-1						1	
	f-a					1						-1	
	c-b		-1			-1			1			-1	
	d-b		-1			-1						1	
	e-b					-1						1	
	f-b					-1						-1	
	d-c		-1			1						1	
	e-c					1						1	
	f-c					1						-1	
	e-d					-1				1		1	
	f-d					1				-1		-1	
	f-e	-1				1				-1		-1	
	S_k	-1	-4	0	0	-1	0	0	3	-1	0	-3	0
	σ^2_S=	1.00	8.67			28.33			3.67	3.67		28.33	
	$Z_k = S_k/\sigma_S$	-1.00	-1.36			-0.19			1.57	-0.52		-0.56	
	Z^2_k	1.00	1.85			0.04			2.45	0.27		0.32	

ΣZ_k= -2.07
ΣZ^2_k= 5.93
Z-bar=$\Sigma Z_k/K$= -0.34

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k -7

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	5.22		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.390**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.70	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
73.67	**p**	**0.242**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-27.98	**-4.167**	14.25
0.050	-25.97		8.07
0.100	-22.47		5.00
0.200	-20.46		-0.29

057FMG Seasonal Kendall analysis for pH, Field (su)

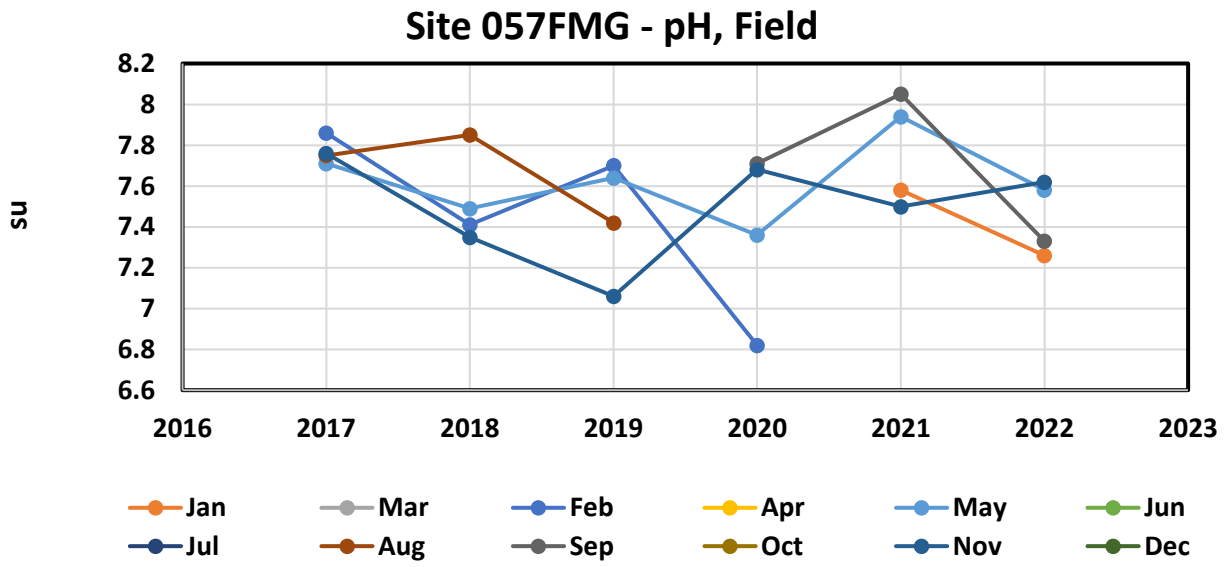
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		7.86			7.71			7.75			7.76	
b	**2017/2018**		7.41			7.49			7.85			7.35	
c	**2018/2019**		7.7			7.64			7.42			7.06	
d	**2019/2020**		6.82			7.36				7.71		7.68	
e	**2020/2021**	7.58				7.94				8.05		7.5	
f	**2021/2022**	7.26				7.58				7.33		7.62	
	n	2	4	0	0	6	0	0	3	3	0	6	0
	t_1	2	4	0	0	6	0	0	3	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		-1			-1			1			-1	
	c-a		-1			-1			-1			-1	
	d-a		-1			-1						-1	
	e-a					1						-1	
	f-a					-1						-1	
	c-b		1			1			-1			-1	
	d-b		-1			-1						1	
	e-b					1						1	
	f-b					1						1	
	d-c		-1			-1						1	
	e-c					1						1	
	f-c					-1						1	
	e-d					1				1		-1	
	f-d					1				-1		-1	
	f-e	-1				-1				-1		1	
	S_k	-1	-4	0	0	-1	0	0	-1	-1	0	-1	0
	σ^2_S=	1.00	8.67			28.33			3.67	3.67		28.33	
	$Z_k = S_k/\sigma_S$	-1.00	-1.36			-0.19			-0.52	-0.52		-0.19	
	Z^2_k	1.00	1.85			0.04			0.27	0.27		0.04	

ΣZ_k= -3.78
ΣZ^2_k= 3.46
Z-bar=$\Sigma Z_k/K$= -0.63

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k -9

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	1.08		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.956**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.93	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
73.67	**p**	**0.176**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.28		0.10
0.050	-0.19	**-0.030**	0.05
0.100	-0.16		0.02
0.200	-0.08		-0.03

057FMG Seasonal Kendall analysis for SO4, Total (mg/L)

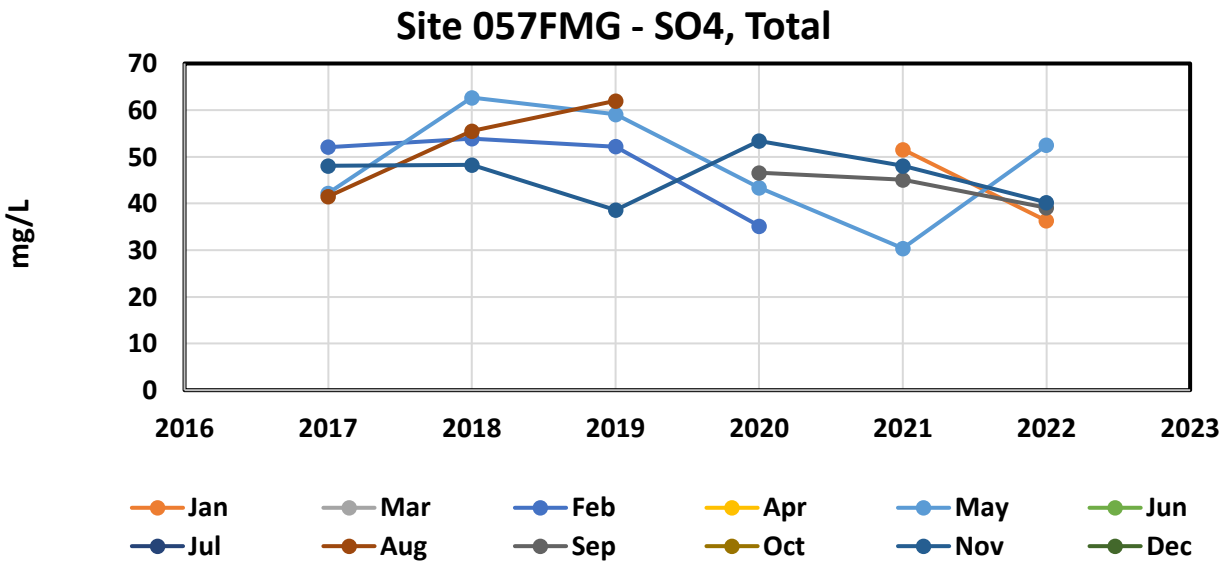
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		52.1			42.2			41.5			48.1	
b	**2017/2018**		53.9			62.7			55.5			48.3	
c	**2018/2019**		52.2			59.1			62			38.6	
d	**2019/2020**		35.2			43.4				46.6		53.4	
e	**2020/2021**	51.6				30.4				45.1		48.1	
f	**2021/2022**	36.3				52.5				39.1		40.2	
	n	2	4	0	0	6	0	0	3	3	0	6	0
	t_1	2	4	0	0	6	0	0	3	3	0	4	0
	t_2	0	0	0	0	0	0	0	0	0	0	1	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		1			1			1			1	
	c-a		1			1			1			-1	
	d-a		-1			1						1	
	e-a					-1						0	
	f-a					1						-1	
	c-b		-1			-1			1			-1	
	d-b		-1			-1						1	
	e-b					-1						-1	
	f-b					-1						-1	
	d-c		-1			-1						1	
	e-c					-1						1	
	f-c					-1						1	
	e-d					-1				-1		-1	
	f-d					1				-1		-1	
	f-e	-1				1				-1		-1	
	S_k	-1	-2	0	0	-3	0	0	3	-3	0	-2	0
	σ^2_S=	1.00	8.67			28.33			3.67	3.67		27.33	
	$Z_k = S_k/\sigma_S$	-1.00	-0.68			-0.56			1.57	-1.57		-0.38	
	Z^2_k	1.00	0.46			0.32			2.45	2.45		0.15	

ΣZ_k= -2.63
ΣZ^2_k= 6.83
Z-bar=$\Sigma Z_k/K$= -0.44

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	22	1	0	0	0

Σn 24
ΣS_k -8

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	5.69		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.338**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.82	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
72.67	**p**	**0.206**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-6.25		1.78
0.050	-5.03	**-1.700**	0.30
0.100	-3.74		0.05
0.200	-3.01		-0.06

057FMG Seasonal Kendall analysis for Zn, Dissolved (µg/L)

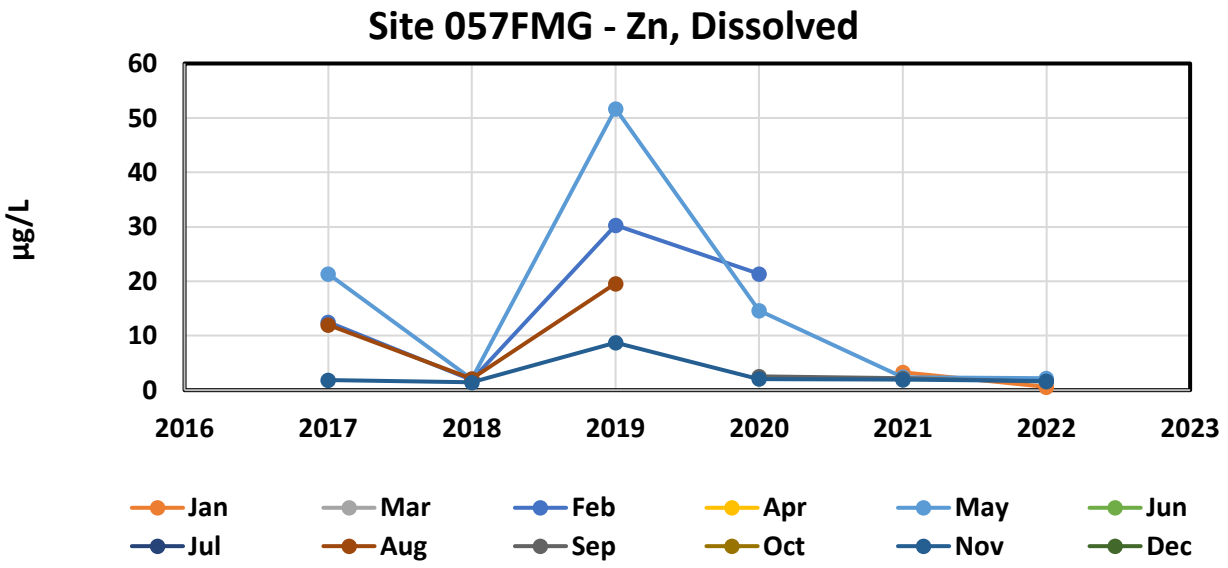
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		12.5			21.4			12			1.87	
b	**2017/2018**		1.88			2.05			2.11			1.45	
c	**2018/2019**		30.3			51.7			19.6			8.73	
d	**2019/2020**		21.4			14.6				2.54		2.07	
e	**2020/2021**	3.28				2.41				2.17		1.96	
f	**2021/2022**	0.6				2.23				1.57		1.68	
	n	2	4	0	0	6	0	0	3	3	0	6	0
	t_1	2	4	0	0	6	0	0	3	3	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		-1			-1			-1			-1	
	c-a		1			1			1			1	
	d-a		1			-1						1	
	e-a					-1						1	
	f-a					-1						-1	
	c-b		1			1			1			1	
	d-b		1			1						1	
	e-b					1						1	
	f-b					1						1	
	d-c		-1			-1						-1	
	e-c					-1						-1	
	f-c					-1						-1	
	e-d					-1				-1		-1	
	f-d					-1				-1		-1	
	f-e	-1				-1				-1		-1	
	S_k	-1	2	0	0	-5	0	0	1	-3	0	-1	0
	σ^2_S=	1.00	8.67			28.33			3.67	3.67		28.33	
	$Z_k = S_k/\sigma_S$	-1.00	0.68			-0.94			0.52	-1.57		-0.19	
	Z^2_k	1.00	0.46			0.88			0.27	2.45		0.04	

ΣZ_k= -2.49
ΣZ^2_k= 5.11
Z-bar=$\Sigma Z_k/K$= -0.42

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k -7

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	4.07		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.539**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.70	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
73.67	**p**	**0.242**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-4.28	**-0.195**	0.24
0.050	-2.53		0.06
0.100	-2.27		0.04
0.200	-0.50		-0.03

060FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

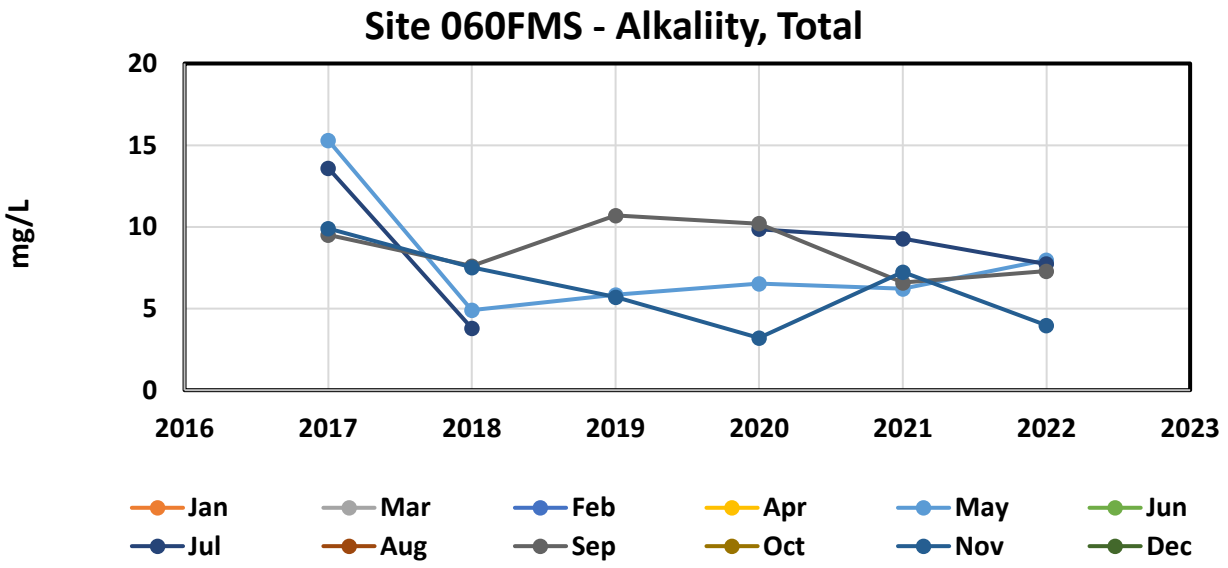
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					15.3		13.6		9.5		9.9	
b	**2017/2018**					4.9		3.8		7.6		7.53	
c	**2018/2019**					5.84				10.7		5.71	
d	**2019/2020**					6.53		9.86		10.2		3.2	
e	**2020/2021**					6.2		9.29		6.59		7.23	
f	**2021/2022**					7.98		7.73		7.28		3.96	
	n	0	0	0	0	6	0	5	0	6	0	6	0
	t_1	0	0	0	0	6	0	5	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		-1		-1	
	c-a					-1				1		-1	
	d-a					-1		-1		1		-1	
	e-a					-1		-1		-1		-1	
	f-a					-1		-1		-1		-1	
	c-b					1				1		-1	
	d-b					1		1		1		-1	
	e-b					1		1		-1		-1	
	f-b					1		1		-1		-1	
	d-c					1				-1		-1	
	e-c					1				-1		1	
	f-c					1				-1		-1	
	e-d					-1		-1		-1		1	
	f-d					1		-1		-1		1	
	f-e					1		-1		1		-1	
	S_k	0	0	0	0	3	0	-4	0	-5	0	-9	0
	σ^2_S=					28.33		16.67		28.33		28.33	
	$Z_k = S_k/\sigma_S$					0.56		-0.98		-0.94		-1.69	
	Z^2_k					0.32		0.96		0.88		2.86	

ΣZ_k= -3.05
ΣZ^2_k= 5.02
Z-bar=$\Sigma Z_k/K$= -0.76

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	23	0	0	0	0

Σn 23
ΣS_k -15

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	2.70	@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p **0.440**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} -1.39	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
101.67	**p** **0.082**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-1.62	**-0.583**	0.47
0.050	-1.23		0.13
0.100	-1.17		-0.11
0.200	-1.07		-0.36

060FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

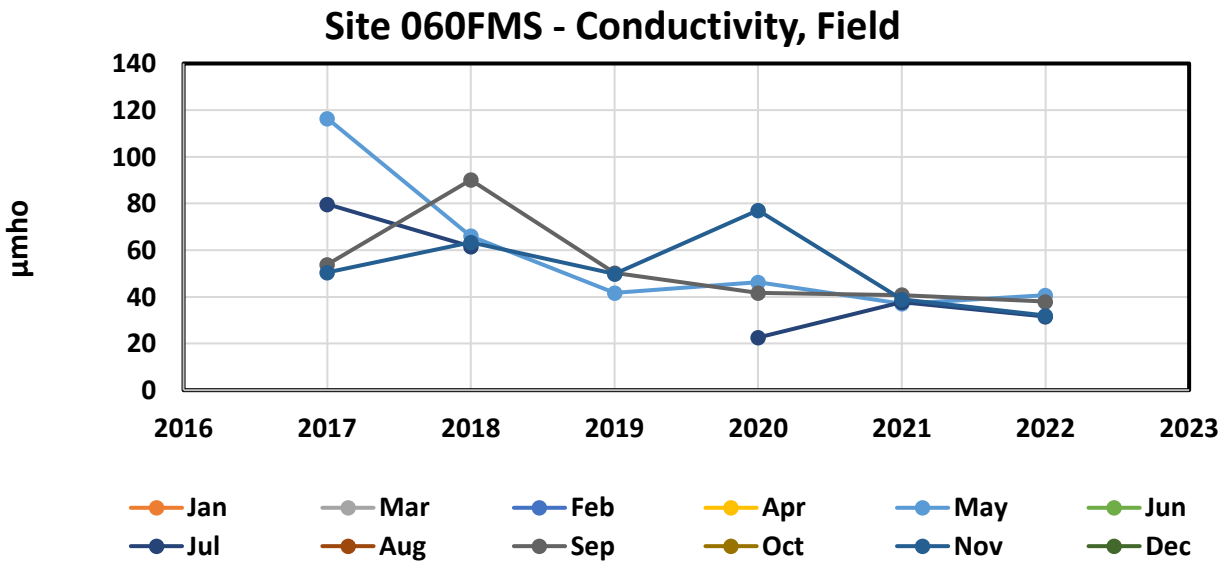
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					116.5		79.73		53.8		50.4	
b	**2017/2018**					66.04		61.5		90.09		63.36	
c	**2018/2019**					41.62				50.17		49.78	
d	**2019/2020**					46.32		22.54		41.7		77.1	
e	**2020/2021**					37.06		37.8		40.8		39	
f	**2021/2022**					40.7		31.6		38		32	
	n	0	0	0	0	6	0	5	0	6	0	6	0
	t_1	0	0	0	0	6	0	5	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		1		1	
	c-a					-1				-1		-1	
	d-a					-1		-1		-1		1	
	e-a					-1		-1		-1		-1	
	f-a					-1		-1		-1		-1	
	c-b					-1				-1		-1	
	d-b					-1		-1		-1		1	
	e-b					-1		-1		-1		-1	
	f-b					-1		-1		-1		-1	
	d-c					1				-1		1	
	e-c					-1				-1		-1	
	f-c					-1				-1		-1	
	e-d					-1		1		-1		-1	
	f-d					-1		1		-1		-1	
	f-e					1		-1		-1		-1	
	S_k	0	0	0	0	-11	0	-6	0	-13	0	-7	0
	σ^2_S=					28.33		16.67		28.33		28.33	
	$Z_k = S_k/\sigma_S$					-2.07		-1.47		-2.44		-1.32	
	Z^2_k					4.27		2.16		5.96		1.73	

ΣZ_k= -7.29
ΣZ^2_k= 14.12
Z-bar=$\Sigma Z_k/K$= -1.82

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	23	0	0	0	0

Σn 23
ΣS_k -37

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	0.83		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.843**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-3.57	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
101.67	**p**	**0.000**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-13.15	**-6.335**	-2.81
0.050	-9.65		-3.34
0.100	-9.23		-4.03
0.200	-8.06		-4.87

060FMS Seasonal Kendall analysis for pH, Field (su)

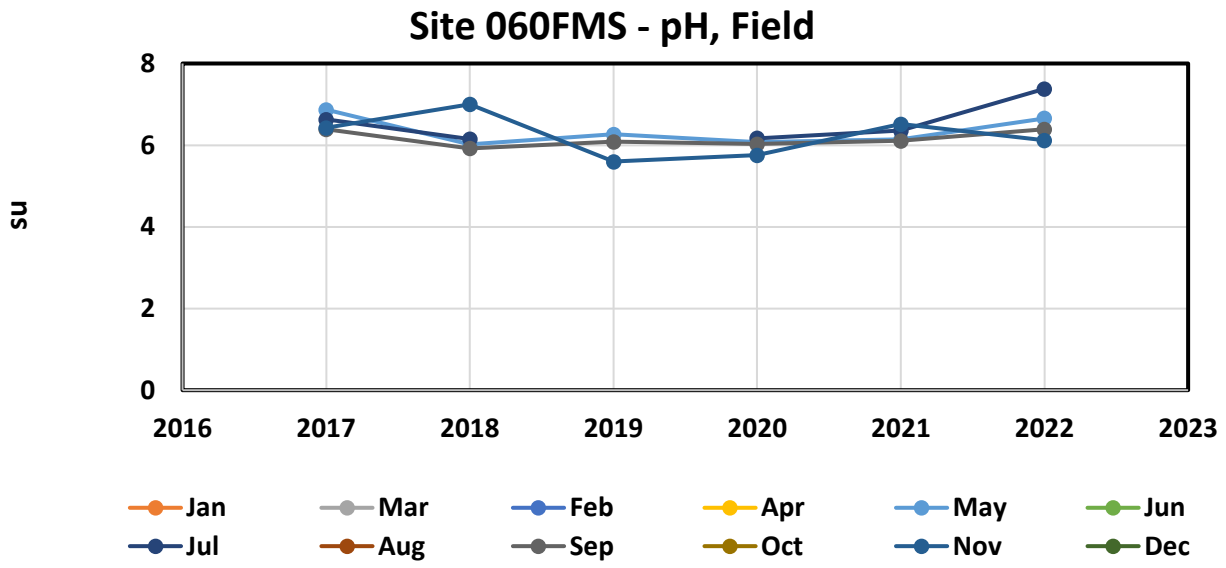
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					6.87		6.63		6.39		6.43	
b	**2017/2018**					6.02		6.15		5.92		7	
c	**2018/2019**					6.27				6.09		5.6	
d	**2019/2020**					6.08		6.17		6.03		5.76	
e	**2020/2021**					6.14		6.36		6.11		6.52	
f	**2021/2022**					6.66		7.38		6.39		6.12	
	n	0	0	0	0	6	0	5	0	6	0	6	0
	t_1	0	0	0	0	6	0	5	0	4	0	6	0
	t_2	0	0	0	0	0	0	0	0	1	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		-1		1	
	c-a					-1				-1		-1	
	d-a					-1		-1		-1		-1	
	e-a					-1		-1		-1		1	
	f-a					-1		1		0		-1	
	c-b					1				1		-1	
	d-b					1		1		1		-1	
	e-b					1		1		1		-1	
	f-b					1		1		1		-1	
	d-c					-1				-1		1	
	e-c					-1				1		1	
	f-c					1				1		1	
	e-d					1		1		1		1	
	f-d					1		1		1		1	
	f-e					1		1		1		-1	
	S_k	0	0	0	0	1	0	4	0	4	0	-1	0
	σ^2_S=					28.33		16.67		27.33		28.33	
	$Z_k = S_k/\sigma_S$					0.19		0.98		0.77		-0.19	
	Z^2_k					0.04		0.96		0.59		0.04	

ΣZ_k= 1.74
ΣZ^2_k= 1.62
Z-bar=$\Sigma Z_k/K$= 0.44

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	21	1	0	0	0

Σn 23
ΣS_k 8

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	0.85	@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p **0.836**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 0.70	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
100.67	**p** **0.757**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.15	**0.030**	0.16
0.050	-0.07		0.11
0.100	-0.06		0.08
0.200	-0.03		0.06

060FMS Seasonal Kendall analysis for SO4, Total (mg/L)

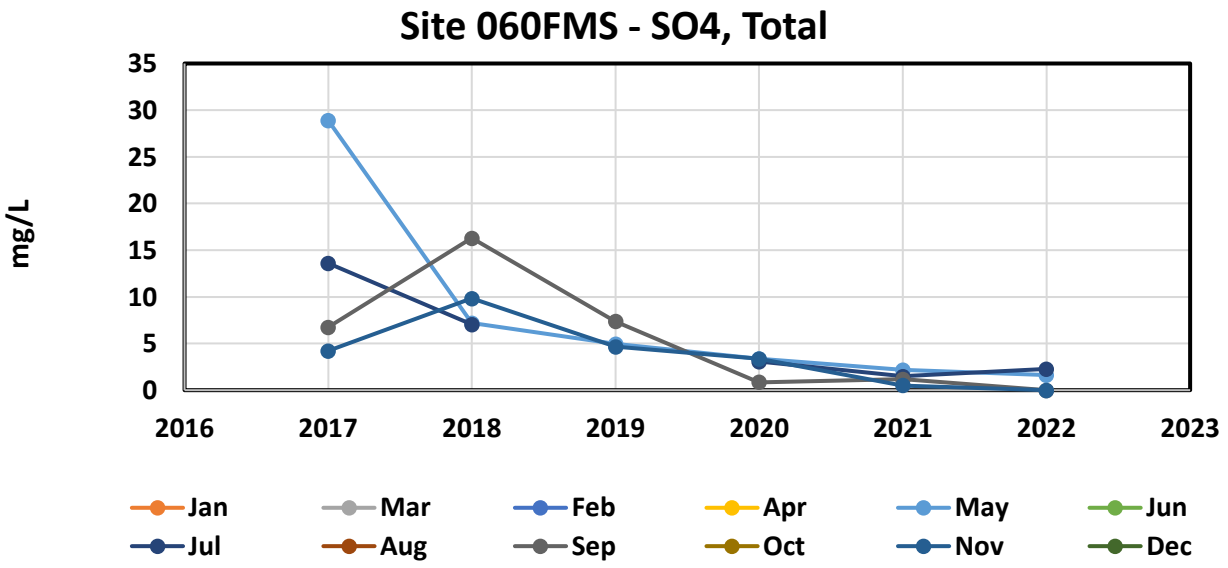
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					28.9		13.6		6.75		4.2	
b	**2017/2018**					7.19		7.03		16.3		9.84	
c	**2018/2019**					4.94				7.37		4.65	
d	**2019/2020**					3.35		3.09		0.86		3.36	
e	**2020/2021**					2.18		1.5		1.19		0.51	
f	**2021/2022**					1.62		2.26		0		0	
	n	0	0	0	0	6	0	5	0	6	0	6	0
	t_1	0	0	0	0	6	0	5	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		-1		1		1	
	c-a					-1				1		1	
	d-a					-1		-1		-1		-1	
	e-a					-1		-1		-1		-1	
	f-a					-1		-1		-1		-1	
	c-b					-1				-1		-1	
	d-b					-1		-1		-1		-1	
	e-b					-1		-1		-1		-1	
	f-b					-1		-1		-1		-1	
	d-c					-1				-1		-1	
	e-c					-1				-1		-1	
	f-c					-1				-1		-1	
	e-d					-1		-1		1		-1	
	f-d					-1		-1		-1		-1	
	f-e					-1		1		-1		-1	
	S_k	0	0	0	0	-15	0	-8	0	-9	0	-11	0
	σ^2_S=					28.33		16.67		28.33		28.33	
	$Z_k = S_k/\sigma_S$					-2.82		-1.96		-1.69		-2.07	
	Z^2_k					7.94		3.84		2.86		4.27	

ΣZ_k= -8.53
ΣZ^2_k= 18.91
Z-bar=$\Sigma Z_k/K$= -2.13

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	23	0	0	0	0

Σn 23
ΣS_k -43

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	0.70		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.873**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-4.17	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
101.67	**p**	**0.000**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-3.09	**-1.680**	-1.19
0.050	-2.46		-1.36
0.100	-2.27		-1.39
0.200	-2.04		-1.56

060FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

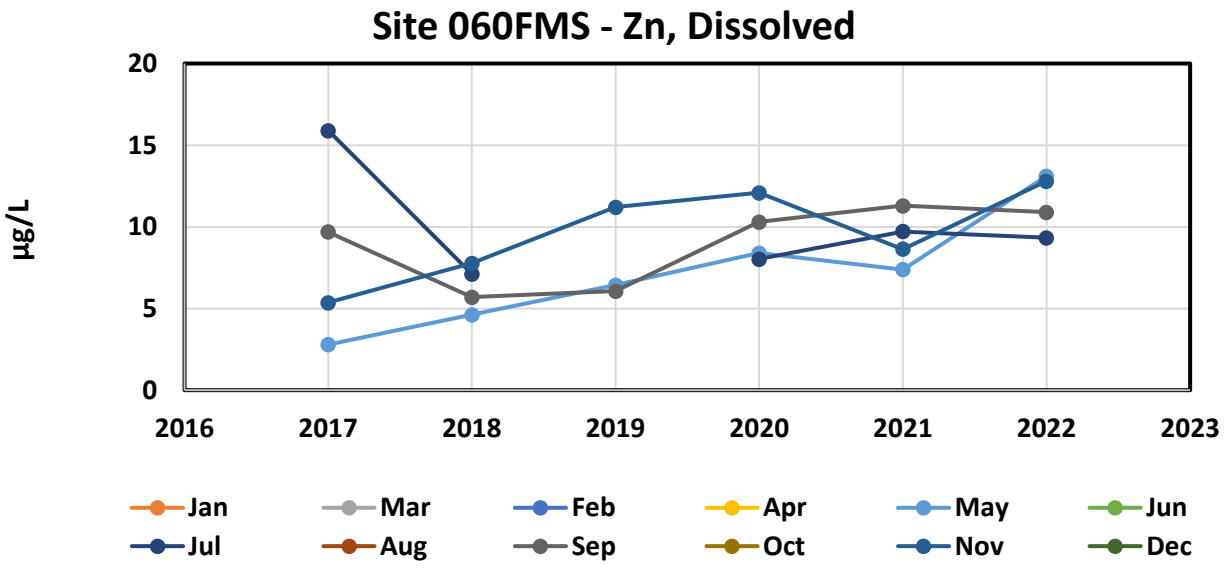
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					2.79		15.9		9.69		5.37	
b	**2017/2018**					4.62		7.12		5.7		7.78	
c	**2018/2019**					6.45				6.08		11.2	
d	**2019/2020**					8.4		8.04		10.3		12.1	
e	**2020/2021**					7.39		9.72		11.3		8.64	
f	**2021/2022**					13.1		9.33		10.9		12.8	
	n	0	0	0	0	6	0	5	0	6	0	6	0
	t_1	0	0	0	0	6	0	5	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					1		-1		-1		1	
	c-a					1				-1		1	
	d-a					1		-1		1		1	
	e-a					1		-1		1		1	
	f-a					1		-1		1		1	
	c-b					1				1		1	
	d-b					1		1		1		1	
	e-b					1		1		1		1	
	f-b					1		1		1		1	
	d-c					1				1		1	
	e-c					1				1		-1	
	f-c					1				1		1	
	e-d					-1		1		1		-1	
	f-d					1		1		1		1	
	f-e					1		-1		-1		1	
	S_k	0	0	0	0	13	0	0	0	9	0	11	0
	σ^2_S=					28.33		16.67		28.33		28.33	
	$Z_k = S_k/\sigma_S$					2.44		0.00		1.69		2.07	
	Z^2_k					5.96		0.00		2.86		4.27	

ΣZ_k= 6.20
ΣZ^2_k= 13.09
Z-bar=$\Sigma Z_k/K$= 1.55

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	23	0	0	0	0

Σn 23
ΣS_k 33

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	3.49	@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p **0.323**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 3.17	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
101.67	**p** **0.999**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	0.34	**1.000**	1.87
0.050	0.46		1.83
0.100	0.53		1.68
0.200	0.69		1.44

061FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

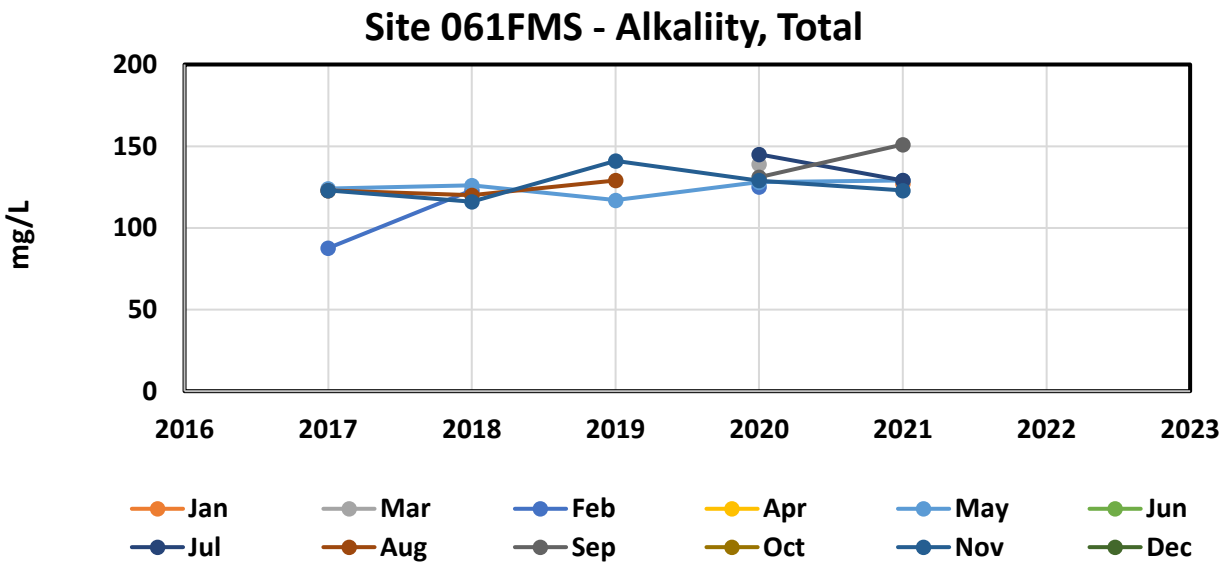
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		87.6			124			123			123	
b	**2017/2018**		123			126			120			116	
c	**2018/2019**					117			129			141	
d	**2019/2020**		125	139		128		145		131		129	
e	**2020/2021**	127				129		129		151		123	
f	**2021/2022**												
	n	1	3	1	0	5	0	2	3	2	0	5	0
	t_1	1	3	1	0	5	0	2	3	2	0	3	0
	t_2	0	0	0	0	0	0	0	0	0	0	1	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		1			1			-1			-1	
	c-a					-1			1			1	
	d-a		1			1						1	
	e-a					1						0	
	f-a												
	c-b					-1			1			1	
	d-b		1			1						1	
	e-b					1						1	
	f-b												
	d-c					1						-1	
	e-c					1						-1	
	f-c												
	e-d					1		-1		1		-1	
	f-d												
	f-e												
	S_k	0	3	0	0	6	0	-1	1	1	0	1	0
	σ^2_S=		3.67			16.67		1.00	3.67	1.00		15.67	
	$Z_k = S_k/\sigma_S$		1.57			1.47		-1.00	0.52	1.00		0.25	
	Z^2_k		2.45			2.16		1.00	0.27	1.00		0.06	

ΣZ_k= 3.81
ΣZ^2_k= 6.95
Z-bar=$\Sigma Z_k/K$= 0.64

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	20	1	0	0	0

Σn 22
ΣS_k 11

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	4.53	@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p **0.476**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 1.55	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
41.67	**p** **0.939**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

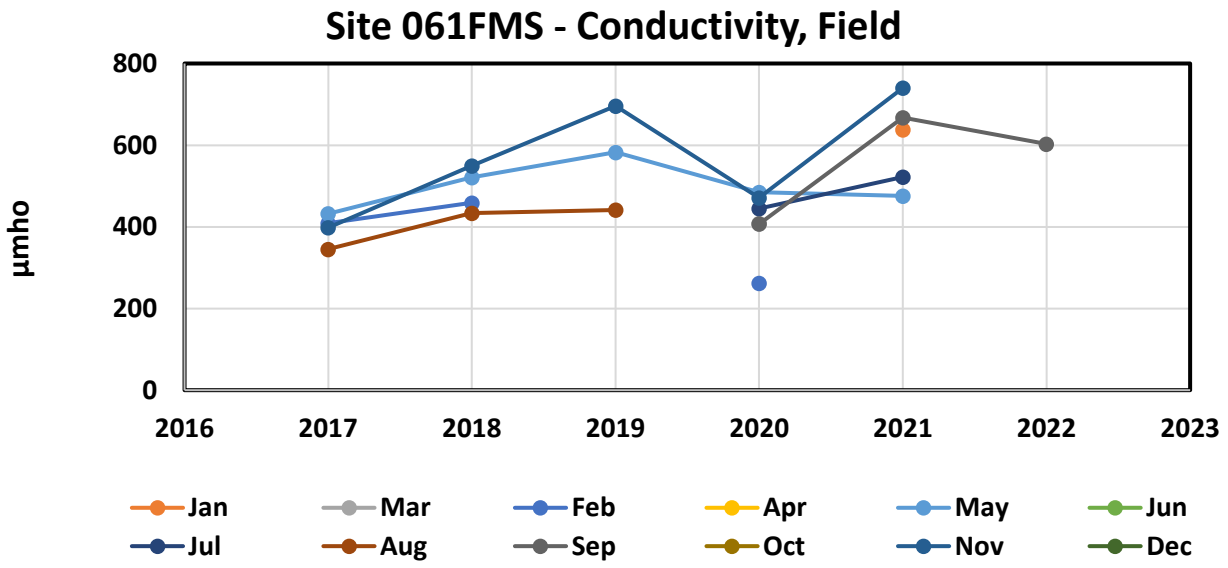
α	Lower Limit	Sen's Slope	Upper Limit
0.010	-4.77	**1.292**	7.77
0.050	-0.93		3.93
0.100	0.86		2.42
0.200	1.00		2.00

061FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		409			432			345.5			398	
b	**2017/2018**		459			521.2			433.5			549.9	
c	**2018/2019**					582.8			441.2			695.8	
d	**2019/2020**		262.1	408.7		484.6		444.8		407		471.1	
e	**2020/2021**	637.7				476		522		667.5		740	
f	**2021/2022**									603			
	n	1	3	1	0	5	0	2	3	3	0	5	0
	t_1	1	3	1	0	5	0	2	3	3	0	5	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		1			1			1			1	
	c-a					1			1			1	
	d-a		-1			1						1	
	e-a					1						1	
	f-a												
	c-b					1			1			1	
	d-b		-1			-1						-1	
	e-b					-1						1	
	f-b												
	d-c					-1						-1	
	e-c					-1						1	
	f-c												
	e-d					-1		1		1		1	
	f-d									1			
	f-e									-1			
	S_k	0	-1	0	0	0	0	1	3	1	0	6	0
	σ^2_S=		3.67			16.67		1.00	3.67	3.67		16.67	
	$Z_k = S_k/\sigma_S$		-0.52			0.00		1.00	1.57	0.52		1.47	
	Z^2_k		0.27			0.00		1.00	2.45	0.27		2.16	

ΣZ_k=	4.04	Tie Extent	t_1	t_2	t_3	t_4	t_5	Σn	23
ΣZ^2_k=	6.16	Count	23	0	0	0	0	ΣS_k	10
Z-bar=$\Sigma Z_k/K$=	0.67								

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2$=	3.44		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.632**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	1.34	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
45.33	**p**	**0.909**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-35.85	**36.108**	87.58
0.050	-12.08		76.37
0.100	2.58		67.15
0.200	12.09		59.67

061FMS Seasonal Kendall analysis for pH, Field (su)

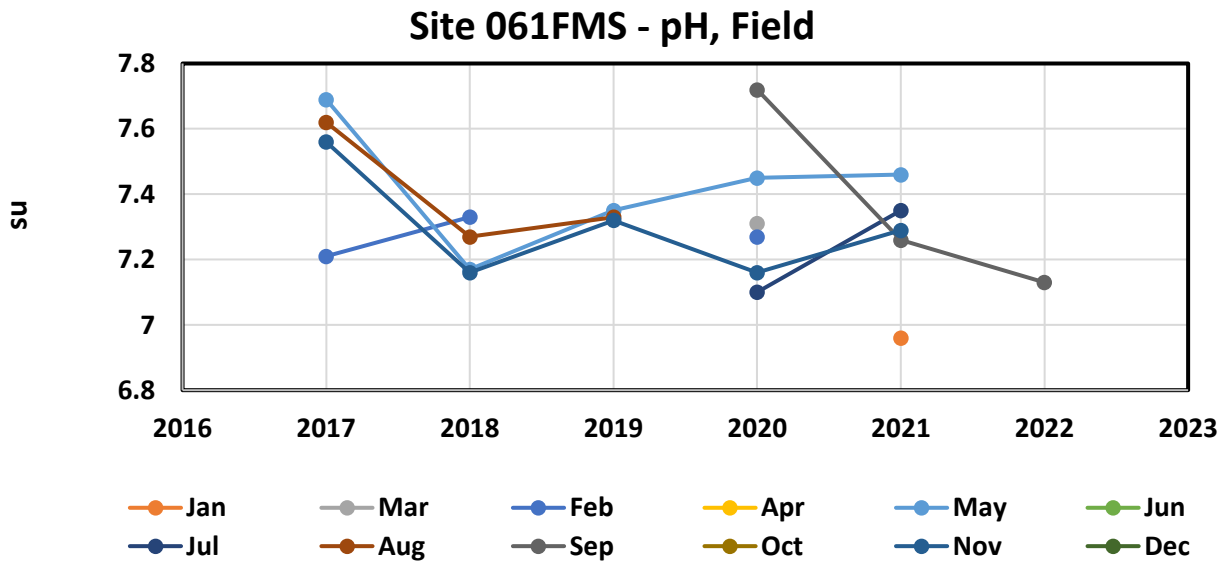
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		7.21			7.69			7.62			7.56	
b	**2017/2018**		7.33			7.17			7.27			7.16	
c	**2018/2019**					7.35			7.33			7.32	
d	**2019/2020**		7.27	7.31		7.45		7.1		7.72		7.16	
e	**2020/2021**	6.96				7.46		7.35		7.26		7.29	
f	**2021/2022**									7.13			
	n	1	3	1	0	5	0	2	3	3	0	5	0
	t_1	1	3	1	0	5	0	2	3	3	0	3	0
	t_2	0	0	0	0	0	0	0	0	0	0	1	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		1			-1			-1			-1	
	c-a					-1			-1			-1	
	d-a		1			-1						-1	
	e-a					-1						-1	
	f-a												
	c-b					1			1			1	
	d-b		-1			1						0	
	e-b					1						1	
	f-b												
	d-c					1						-1	
	e-c					1						-1	
	f-c												
	e-d					1		1		-1		1	
	f-d									-1			
	f-e									-1			
	S_k	0	1	0	0	2	0	1	-1	-3	0	-3	0
	σ^2_S=		3.67			16.67		1.00	3.67	3.67		15.67	
	$Z_k = S_k/\sigma_S$		0.52			0.49		1.00	-0.52	-1.57		-0.76	
	Z^2_k		0.27			0.24		1.00	0.27	2.45		0.57	

ΣZ_k= -0.83
ΣZ^2_k= 4.81
Z-bar=$\Sigma Z_k/K$= -0.14

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	21	1	0	0	0

Σn 23
ΣS_k -3

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	4.70		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.454**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.30	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
44.33	**p**	**0.382**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.16	**-0.023**	0.09
0.050	-0.13		0.05
0.100	-0.12		0.03
0.200	-0.08		0.01

061FMS Seasonal Kendall analysis for SO4, Total (mg/L)

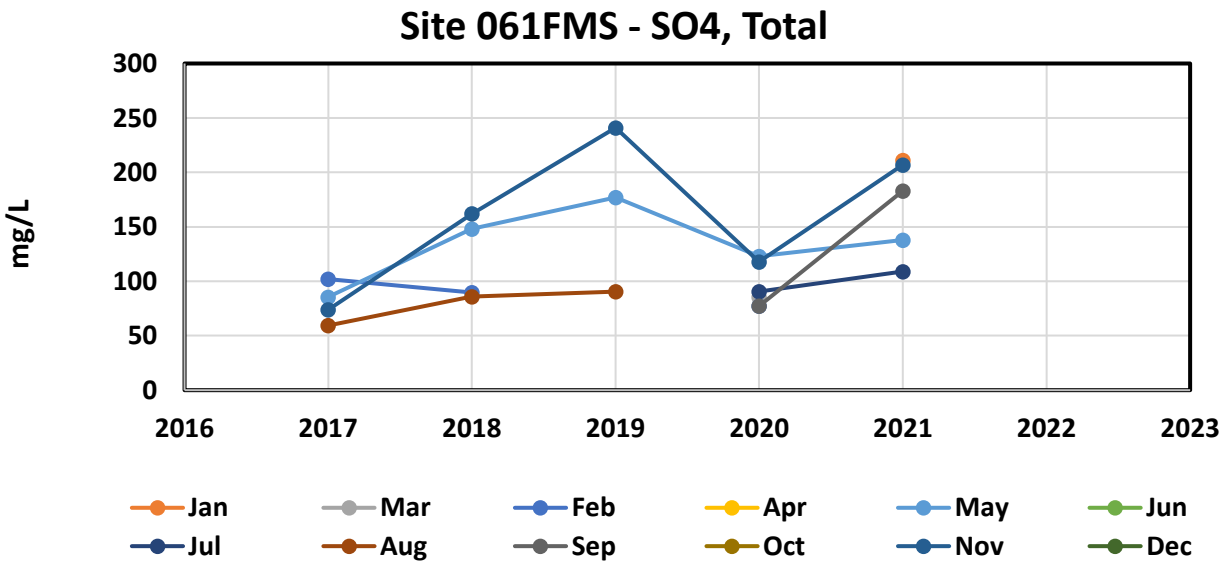
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		102			85.6			59.4			73.9	
b	**2017/2018**		89.7			148			85.9			162	
c	**2018/2019**					177			90.5			241	
d	**2019/2020**		77.5	85.3		123		90.6		77.3		118	
e	**2020/2021**	211				138		109		183		207	
f	**2021/2022**												
	n	1	3	1	0	5	0	2	3	2	0	5	0
	t_1	1	3	1	0	5	0	2	3	2	0	5	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		-1			1			1			1	
	c-a					1			1			1	
	d-a		-1			1						1	
	e-a					1						1	
	f-a												
	c-b					1			1			1	
	d-b		-1			-1						-1	
	e-b					-1						1	
	f-b												
	d-c					-1						-1	
	e-c					-1						-1	
	f-c												
	e-d					1		1		1		1	
	f-d												
	f-e												
	S_k	0	-3	0	0	2	0	1	3	1	0	4	0
	σ^2_S=		3.67			16.67		1.00	3.67	1.00		16.67	
	$Z_k = S_k/\sigma_S$		-1.57			0.49		1.00	1.57	1.00		0.98	
	Z^2_k		2.45			0.24		1.00	2.45	1.00		0.96	

ΣZ_k= 3.47
ΣZ^2_k= 8.11
Z-bar=$\Sigma Z_k/K$= 0.58

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	22	0	0	0	0

Σn 22
ΣS_k 8

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	6.10		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.296**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	1.07	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
42.67	**p**	**0.858**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-12.42	**14.850**	40.70
0.050	-6.87		27.43
0.100	-3.85		19.90
0.200	6.58		15.41

061FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

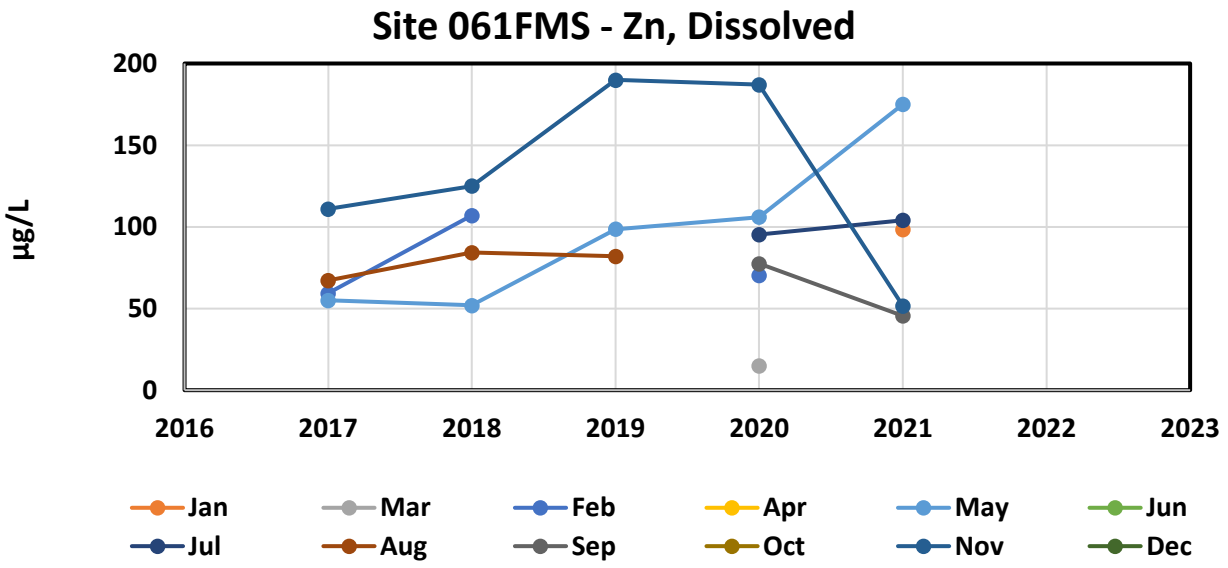
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**		59.4			54.9			67.2			111	
b	**2017/2018**		107			52			84.3			125	
c	**2018/2019**					98.6			81.9			190	
d	**2019/2020**		70.2	14.9		106		95.3		77.5		187	
e	**2020/2021**	98.4				175		104		45.5		51.7	
f	**2021/2022**												
	n	1	3	1	0	5	0	2	3	2	0	5	0
	t_1	1	3	1	0	5	0	2	3	2	0	5	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a		1			-1			1			1	
	c-a					1			1			1	
	d-a		1			1						1	
	e-a					1						-1	
	f-a												
	c-b					1			-1			1	
	d-b		-1			1						1	
	e-b					1						-1	
	f-b												
	d-c					1						-1	
	e-c					1						-1	
	f-c												
	e-d					1		1		-1		-1	
	f-d												
	f-e												
	S_k	0	1	0	0	8	0	1	1	-1	0	0	0
	σ^2_S=		3.67			16.67		1.00	3.67	1.00		16.67	
	$Z_k = S_k/\sigma_S$		0.52			1.96		1.00	0.52	-1.00		0.00	
	Z^2_k		0.27			3.84		1.00	0.27	1.00		0.00	

ΣZ_k= 3.00
ΣZ^2_k= 6.39
Z-bar=$\Sigma Z_k/K$= 0.50

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	22	0	0	0	0

Σn 22
ΣS_k 10

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	4.88		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.431**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	1.38	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
42.67	**p**	**0.916**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-10.07	**15.517**	35.30
0.050	-2.59		28.13
0.100	2.49		25.64
0.200	7.36		20.66

062FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

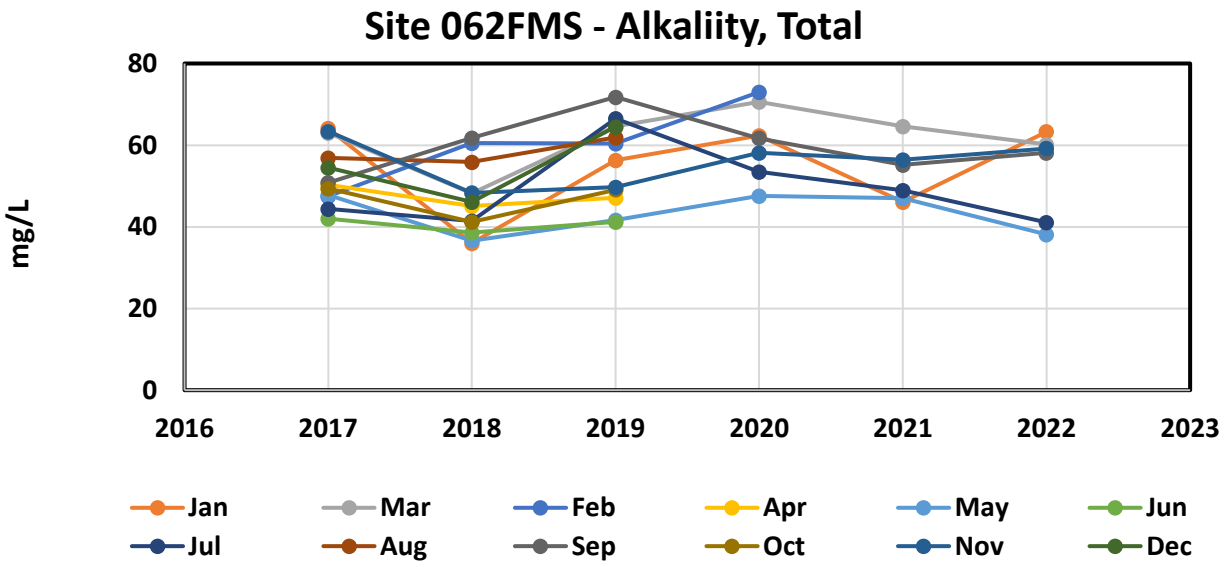
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	64.1	47.5	63	50.3	47.8	42	44.4	56.9	50.8	49.4	63.4	54.5
b	**2017/2018**	36	60.5	48.2	45.1	36.6	38.6	41.4	55.9	61.8	41.2	48.3	46.1
c	**2018/2019**	56.3	60.4	64.6	47.1	41.7	41.2	66.5	61.9	71.8	49.1	49.7	64.5
d	**2019/2020**	62.3	73	70.6		47.6		53.5		61.7		58.1	
e	**2020/2021**	46.1		64.6		47		48.9		55.2		56.4	
f	**2021/2022**	63.3		60.2		38.1		41.1		58.1		59.2	
	n	6	4	6	3	6	3	6	3	6	3	6	3
	t_1	6	4	4	3	6	3	6	3	6	3	6	3
	t_2	0	0	1	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	-1	-1	-1	-1	-1	-1	1	-1	-1	-1
	c-a	-1	1	1	-1	-1	-1	1	1	1	-1	-1	1
	d-a	-1	1	1		-1		1		1		-1	
	e-a	-1		1		-1		1		1		-1	
	f-a	-1		-1		-1		-1		1		-1	
	c-b	1	-1	1	1	1	1	1	1	1	1	1	1
	d-b	1	1	1		1		1		-1		1	
	e-b	1		1		1		1		-1		1	
	f-b	1		1		1		-1		-1		1	
	d-c	1	1	1		1		-1		-1		1	
	e-c	-1		0		1		-1		-1		1	
	f-c	1		-1		-1		-1		-1		1	
	e-d	-1		-1		-1		-1		-1		-1	
	f-d	1		-1		-1		-1		-1		1	
	f-e	1		-1		-1		-1		1		1	
	S_k	1	4	2	-1	-3	-1	-3	1	-1	-1	3	1
	σ^2_S=	28.33	8.67	27.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	0.19	1.36	0.38	-0.52	-0.56	-0.52	-0.56	0.52	-0.19	-0.52	0.56	0.52
	Z^2_k	0.04	1.85	0.15	0.27	0.32	0.27	0.32	0.27	0.04	0.27	0.32	0.27

ΣZ_k= 0.66
ΣZ^2_k= 4.38
Z-bar=$\Sigma Z_k/K$= 0.05

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	53	1	0	0	0

Σn 55
ΣS_k 2

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	4.34		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.959**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	0.07	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
196.00	**p**	**0.528**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-1.16	**0.375**	2.69
0.050	-0.60		2.50
0.100	-0.48		1.71
0.200	-0.15		1.11

062FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

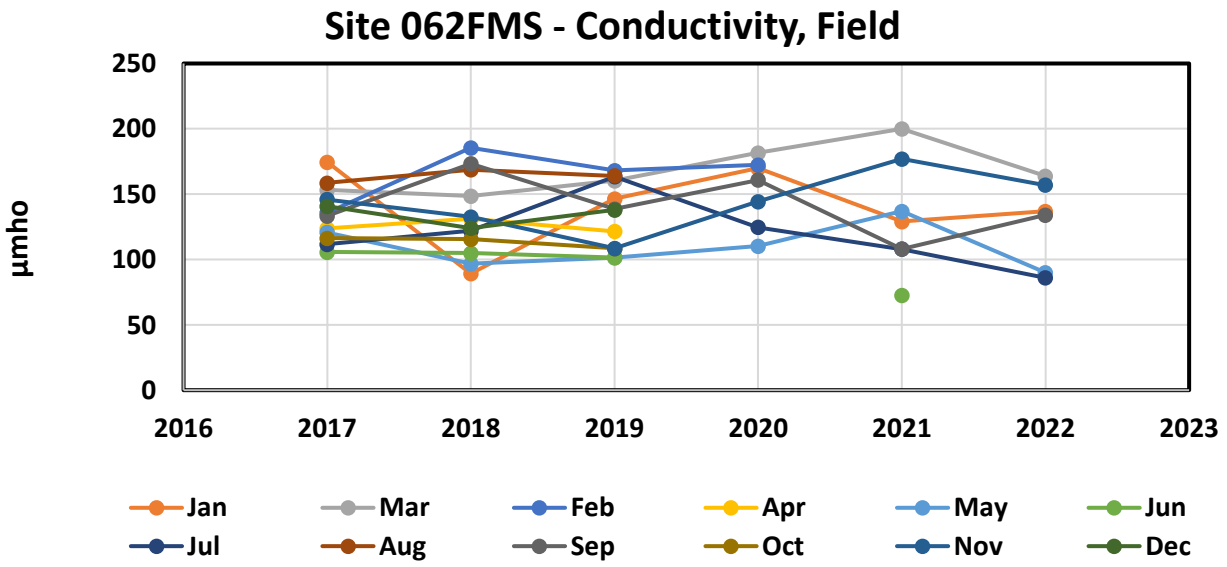
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	174.7	135.7	153.3	123.7	120.8	105.8	111.8	158.7	133.4	116.4	146	140.8
b	**2017/2018**	89.2	185.5	148.6	131.2	96.9	104.9	122.1	168.7	173.3	115.6	132.7	124
c	**2018/2019**	146.5	168.3	160.3	121.5	101.6	101.5	163.4	164.1	138.7	108.6	108.6	138
d	**2019/2020**	169.9	172.3	181.8		110.2		124.7		160.9		144.5	
e	**2020/2021**	129		200		137	72.7	108		108		177	
f	**2021/2022**	137		164		90		86		134		157	
	n	6	4	6	3	6	4	6	3	6	3	6	3
	t_1	6	4	6	3	6	4	6	3	6	3	6	3
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	-1	1	-1	-1	1	1	1	-1	-1	-1
	c-a	-1	1	1	-1	-1	-1	1	1	1	-1	-1	-1
	d-a	-1	1	1		-1		1		1		-1	
	e-a	-1		1		1	-1	-1		-1		1	
	f-a	-1		1		-1		-1		1		1	
	c-b	1	-1	1	-1	1	-1	1	-1	-1	-1	-1	1
	d-b	1	-1	1		1		1		-1		1	
	e-b	1		1		1	-1	-1		-1		1	
	f-b	1		1		-1		-1		-1		1	
	d-c	1	1	1		1		-1		1		1	
	e-c	-1		1		1	-1	-1		-1		1	
	f-c	-1		1		-1		-1		-1		1	
	e-d	-1		1		1		-1		-1		1	
	f-d	-1		-1		-1		-1		-1		1	
	f-e	1		-1		-1		-1		1		-1	
	S_k	-3	2	9	-1	-1	-6	-5	1	-3	-3	5	-1
	σ^2_S=	28.33	8.67	28.33	3.67	28.33	8.67	28.33	3.67	28.33	3.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	-0.56	0.68	1.69	-0.52	-0.19	-2.04	-0.94	0.52	-0.56	-1.57	0.94	-0.52
	Z^2_k	0.32	0.46	2.86	0.27	0.04	4.15	0.88	0.27	0.32	2.45	0.88	0.27

ΣZ_k= -3.07
ΣZ^2_k= 13.18
Z-bar=$\Sigma Z_k/K$= -0.26

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	56	0	0	0	0

Σn 56
ΣS_k -6

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	12.40		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.335**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.35	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
202.00	**p**	**0.362**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-6.18	**-0.925**	5.34
0.050	-4.38		3.74
0.100	-3.57		2.66
0.200	-2.14		1.30

062FMS Seasonal Kendall analysis for pH, Field (su)

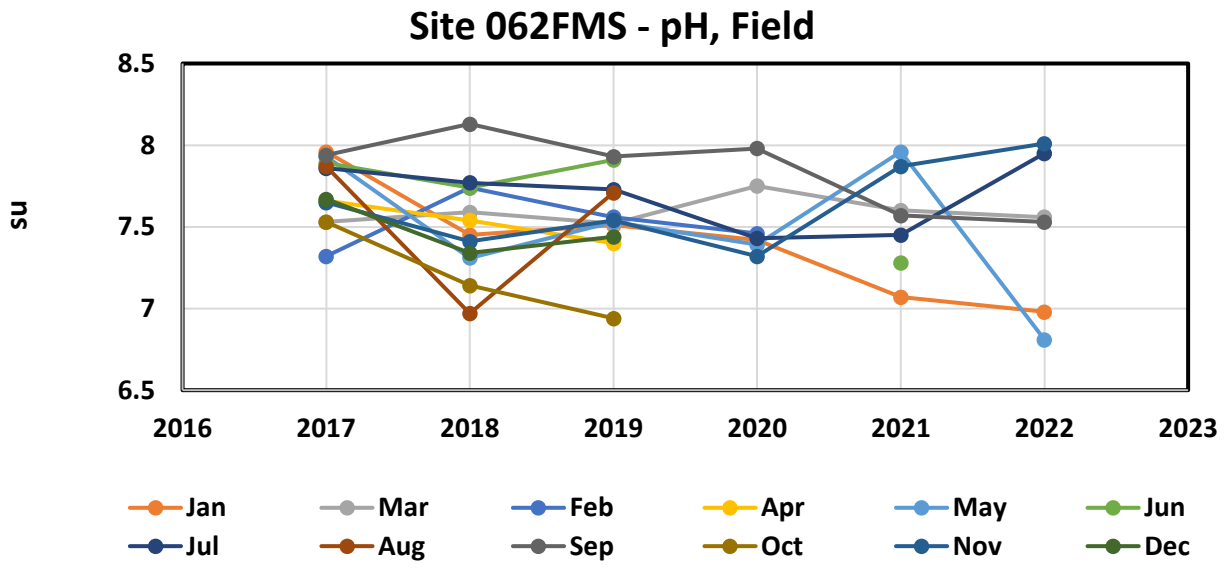
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	7.96	7.32	7.53	7.66	7.93	7.89	7.86	7.87	7.94	7.53	7.65	7.67
b	**2017/2018**	7.45	7.74	7.59	7.54	7.31	7.74	7.77	6.97	8.13	7.14	7.41	7.34
c	**2018/2019**	7.51	7.56	7.52	7.4	7.53	7.91	7.73	7.71	7.93	6.94	7.54	7.44
d	**2019/2020**	7.42	7.46	7.75		7.39		7.43		7.98		7.32	
e	**2020/2021**	7.07		7.6		7.96	7.28	7.45		7.57		7.87	
f	**2021/2022**	6.98		7.56		6.81		7.95		7.53		8.01	
	n	6	4	6	3	6	4	6	3	6	3	6	3
	t_1	6	4	6	3	6	4	6	3	6	3	6	3
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	1	-1	-1	-1	-1	-1	1	-1	-1	-1
	c-a	-1	1	-1	-1	-1	1	-1	-1	-1	-1	-1	-1
	d-a	-1	1	1		-1		-1		1		-1	
	e-a	-1		1		1	-1	-1		-1		1	
	f-a	-1		1		-1		1		-1		1	
	c-b	1	-1	-1	-1	1	1	-1	1	-1	-1	1	1
	d-b	-1	-1	1		1		-1		-1		-1	
	e-b	-1		1		1	-1	-1		-1		1	
	f-b	-1		-1		-1		1		-1		1	
	d-c	-1	-1	1		-1		-1		1		-1	
	e-c	-1		1		1	-1	-1		-1		1	
	f-c	-1		1		-1		1		-1		1	
	e-d	-1		-1		1		1		-1		1	
	f-d	-1		-1		-1		1		-1		1	
	f-e	-1		-1		-1		1		-1		1	
	S_k	-13	0	3	-3	-3	-2	-3	-1	-9	-3	5	-1
	σ^2_S=	28.33	8.67	28.33	3.67	28.33	8.67	28.33	3.67	28.33	3.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	-2.44	0.00	0.56	-1.57	-0.56	-0.68	-0.56	-0.52	-1.69	-1.57	0.94	-0.52
	Z^2_k	5.96	0.00	0.32	2.45	0.32	0.46	0.32	0.27	2.86	2.45	0.88	0.27

ΣZ_k= -8.61
ΣZ^2_k= 16.57
Z-bar=$\Sigma Z_k/K$= -0.72

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	56	0	0	0	0

Σn 56
ΣS_k -30

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	10.39		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.496**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-2.04	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
202.00	**p**	**0.021**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.14	**-0.090**	0.00
0.050	-0.13		-0.02
0.100	-0.12		-0.04
0.200	-0.11		-0.07

062FMS Seasonal Kendall analysis for SO4, Total (mg/L)

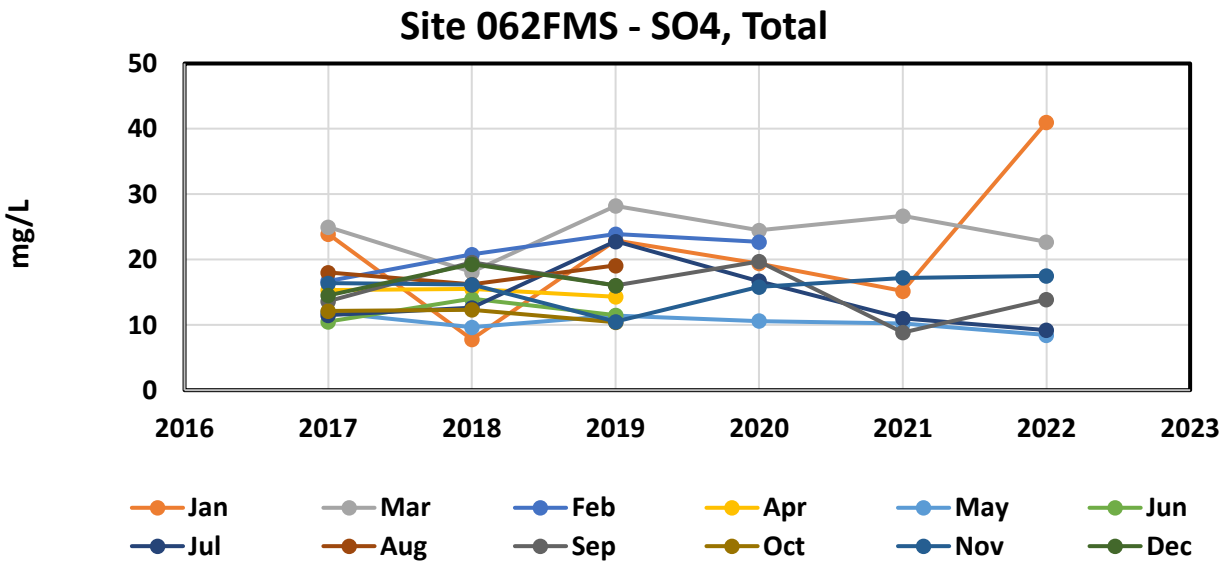
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	23.9	16.7	25	15.3	11.9	10.5	11.5	18	13.6	12.1	16.4	14.5
b	**2017/2018**	7.79	20.8	18.1	15.5	9.66	14	12.6	16.2	19.6	12.3	16.2	19.3
c	**2018/2019**	22.9	23.9	28.2	14.3	11.4	11.5	22.8	19.1	16	10.4	10.5	16
d	**2019/2020**	19.4	22.7	24.5		10.6		16.7		19.7		15.8	
e	**2020/2021**	15.2		26.7		10.2		11		8.82		17.2	
f	**2021/2022**	41		22.7		8.45		9.19		13.9		17.5	
	n	6	4	6	3	6	3	6	3	6	3	6	3
	t_1	6	4	6	3	6	3	6	3	6	3	6	3
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	1	-1	1	-1	1	1	-1	1	1	-1	1
	c-a	-1	1	1	-1	-1	1	1	1	1	-1	-1	1
	d-a	-1	1	-1		-1		1		1		-1	
	e-a	-1		1		-1		-1		-1		1	
	f-a	1		-1		-1		-1		1		1	
	c-b	1	1	1	-1	1	-1	1	1	-1	-1	-1	-1
	d-b	1	1	1		1		1		1		-1	
	e-b	1		1		1		-1		-1		1	
	f-b	1		1		-1		-1		-1		1	
	d-c	-1	-1	-1		-1		-1		1		1	
	e-c	-1		-1		-1		-1		-1		1	
	f-c	1		-1		-1		-1		-1		1	
	e-d	-1		1		-1		-1		-1		1	
	f-d	1		-1		-1		-1		-1		1	
	f-e	1		-1		-1		-1		1		1	
	S_k	1	4	-1	-1	-9	1	-5	1	-1	-1	5	1
	σ^2_S=	28.33	8.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	0.19	1.36	-0.19	-0.52	-1.69	0.52	-0.94	0.52	-0.19	-0.52	0.94	0.52
	Z^2_k	0.04	1.85	0.04	0.27	2.86	0.27	0.88	0.27	0.04	0.27	0.88	0.27

ΣZ_k= 0.00
ΣZ^2_k= 7.94
Z-bar=$\Sigma Z_k/K$= 0.00

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	55	0	0	0	0

Σn 55
ΣS_k -5

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	7.94		@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p	**0.719**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.28	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
197.00	**p**	**0.388**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.79	**-0.200**	0.54
0.050	-0.54		0.33
0.100	-0.48		0.21
0.200	-0.43		0.19

062FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

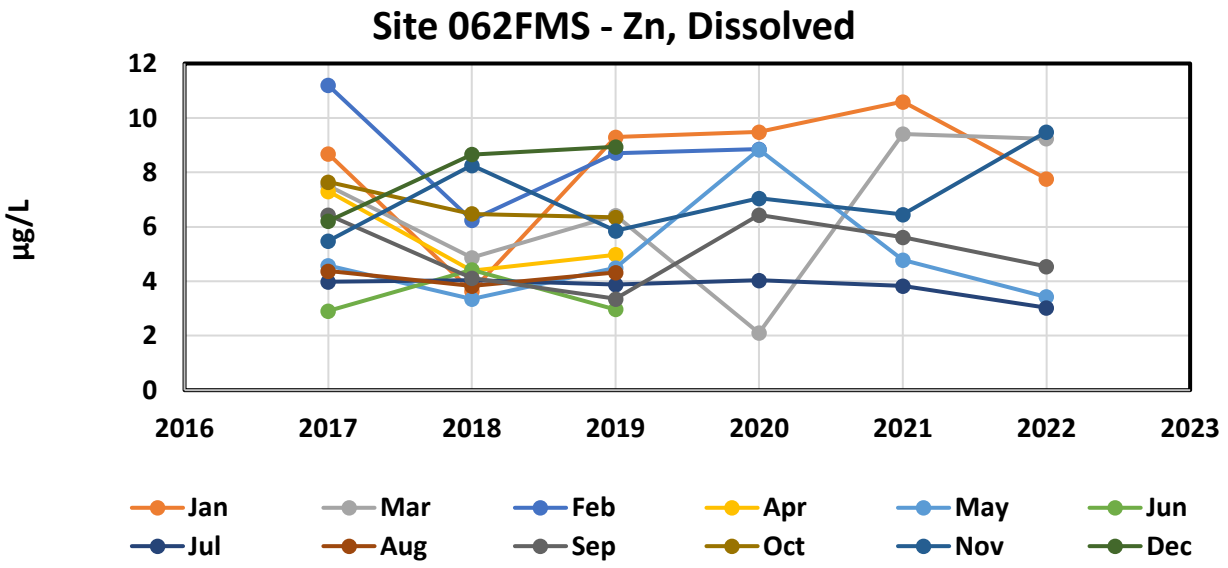
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**	8.69	11.2	7.51	7.31	4.58	2.91	3.98	4.38	6.44	7.65	5.48	6.21
b	**2017/2018**	3.64	6.25	4.87	4.39	3.35	4.42	4.04	3.83	4.12	6.48	8.26	8.66
c	**2018/2019**	9.3	8.71	6.42	4.98	4.49	2.97	3.88	4.32	3.36	6.35	5.86	8.94
d	**2019/2020**	9.48	8.85	2.1		8.84		4.04		6.43		7.05	
e	**2020/2021**	10.6		9.41		4.78		3.83		5.62		6.46	
f	**2021/2022**	7.76		9.24		3.43		3.03		4.54		9.49	
	n	6	4	6	3	6	3	6	3	6	3	6	3
	t_1	6	4	6	3	6	3	4	3	6	3	6	3
	t_2	0	0	0	0	0	0	1	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a	-1	-1	-1	-1	-1	1	1	-1	-1	-1	1	1
	c-a	1	-1	-1	-1	-1	1	-1	-1	-1	-1	1	1
	d-a	1	-1	-1		1		1		-1		1	
	e-a	1		1		1		-1		-1		1	
	f-a	-1		1		-1		-1		-1		1	
	c-b	1	1	1	1	1	-1	-1	1	-1	-1	-1	1
	d-b	1	1	-1		1		0		1		-1	
	e-b	1		1		1		-1		1		-1	
	f-b	1		1		1		-1		1		1	
	d-c	1	1	-1		1		1		1		1	
	e-c	1		1		1		-1		1		1	
	f-c	-1		1		-1		-1		1		1	
	e-d	1		1		-1		-1		-1		-1	
	f-d	-1		1		-1		-1		-1		1	
	f-e	-1		-1		-1		-1		-1		1	
	S_k	5	0	3	-1	1	1	-8	-1	-3	-3	7	3
	σ^2_S=	28.33	8.67	28.33	3.67	28.33	3.67	27.33	3.67	28.33	3.67	28.33	3.67
	$Z_k = S_k/\sigma_S$	0.94	0.00	0.56	-0.52	0.19	0.52	-1.53	-0.52	-0.56	-1.57	1.32	1.57
	Z^2_k	0.88	0.00	0.32	0.27	0.04	0.27	2.34	0.27	0.32	2.45	1.73	2.45

ΣZ_k= 0.39
ΣZ^2_k= 11.35
Z-bar=$\Sigma Z_k/K$= 0.03

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	53	1	0	0	0

Σn 55
ΣS_k 4

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	11.34	@a=5% c2(K-1)=	19.68	Test for station homogeneity
	p **0.415**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 0.21	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
196.00	**p** **0.585**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.23	**0.020**	0.34
0.050	-0.17		0.26
0.100	-0.10		0.18
0.200	-0.04		0.14

609FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

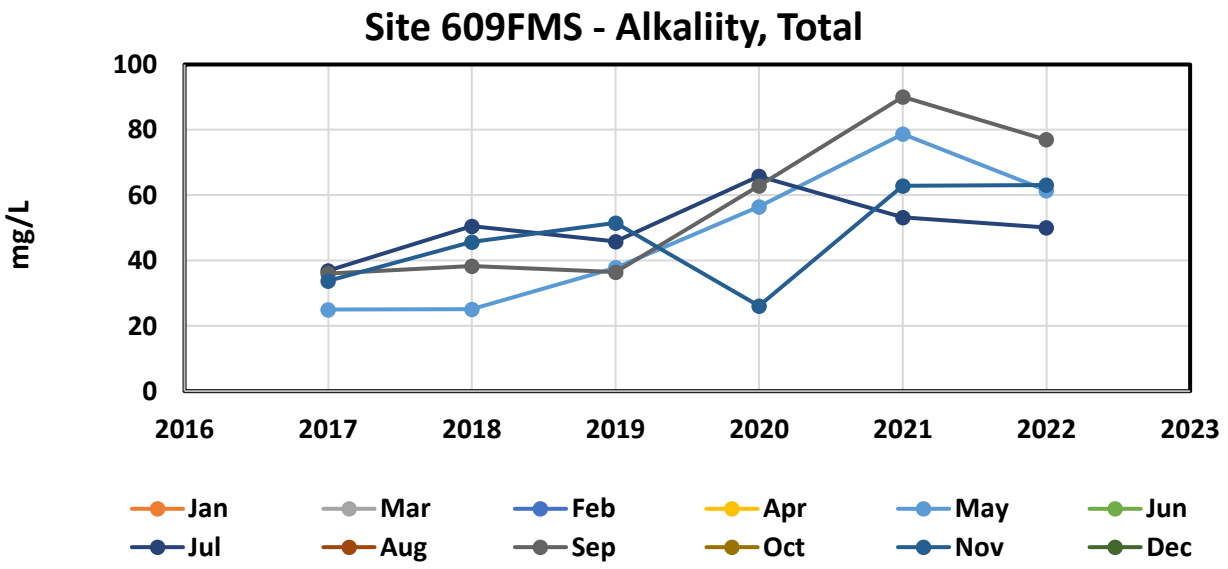
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					25		36.9		36		33.7	
b	**2017/2018**					25.1		50.5		38.3		45.7	
c	**2018/2019**					37.8		45.8		36.4		51.5	
d	**2019/2020**					56.5		65.8		62.9		26.1	
e	**2020/2021**					78.7		53.2		90.1		62.9	
f	**2021/2022**					61.5		50.1		77		63.1	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					1		1		1		1	
	c-a					1		1		1		1	
	d-a					1		1		1		-1	
	e-a					1		1		1		1	
	f-a					1		1		1		1	
	c-b					1		-1		-1		1	
	d-b					1		1		1		-1	
	e-b					1		1		1		1	
	f-b					1		-1		1		1	
	d-c					1		1		1		-1	
	e-c					1		1		1		1	
	f-c					1		1		1		1	
	e-d					1		-1		1		1	
	f-d					1		-1		1		1	
	f-e					-1		-1		-1		1	
	S_k	0	0	0	0	13	0	5	0	11	0	9	0
	σ^2_S=					28.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					2.44		0.94		2.07		1.69	
	Z^2_k					5.96		0.88		4.27		2.86	

ΣZ_k= 7.14
ΣZ^2_k= 13.98
Z-bar=$\Sigma Z_k/K$= 1.78

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k 38

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	1.24	@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p **0.745**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 3.48	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
113.33	**p** **1.000**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	2.42	**7.175**	12.11
0.050	3.92		9.50
0.100	4.37		8.95
0.200	5.72		8.04

609FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

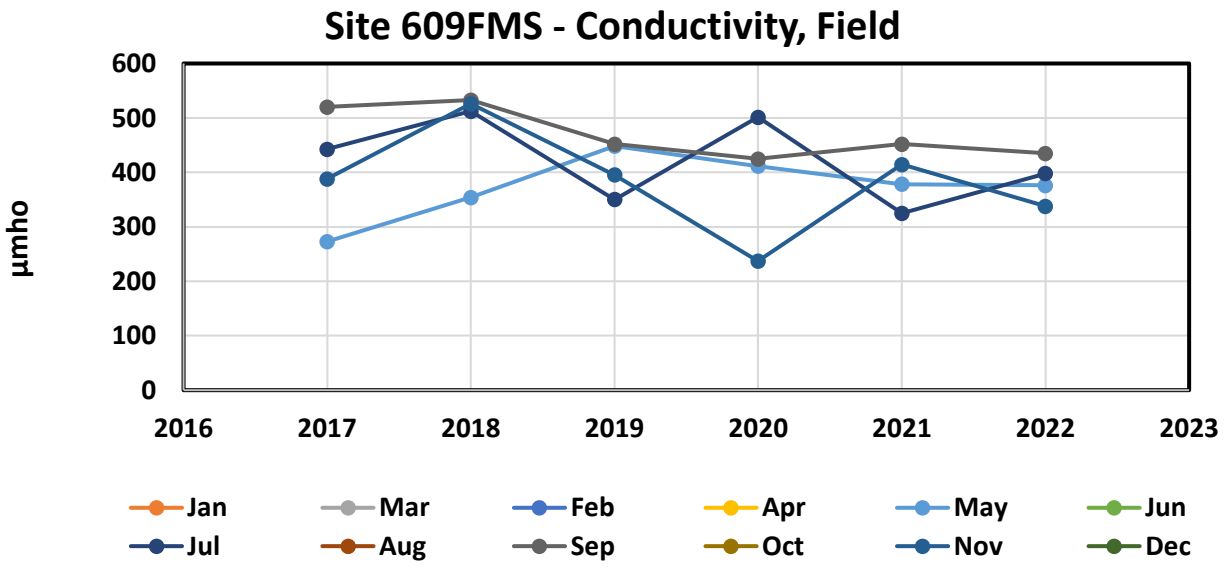
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					273		443		520		388	
b	**2017/2018**					354.4		512.5		532.9		526.1	
c	**2018/2019**					448.3		350.4		451.9		395.5	
d	**2019/2020**					411.7		501.3		425		237.1	
e	**2020/2021**					378.5		325		452		415	
f	**2021/2022**					376		398		435		338	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					1		1		1		1	
	c-a					1		-1		-1		1	
	d-a					1		1		-1		-1	
	e-a					1		-1		-1		1	
	f-a					1		-1		-1		-1	
	c-b					1		-1		-1		-1	
	d-b					1		-1		-1		-1	
	e-b					1		-1		-1		-1	
	f-b					1		-1		-1		-1	
	d-c					-1		1		-1		-1	
	e-c					-1		-1		1		1	
	f-c					-1		1		-1		-1	
	e-d					-1		-1		1		1	
	f-d					-1		-1		1		1	
	f-e					-1		1		-1		-1	
	S_k	0	0	0	0	3	0	-5	0	-7	0	-3	0
	σ^2_S=					28.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					0.56		-0.94		-1.32		-0.56	
	Z^2_k					0.32		0.88		1.73		0.32	

ΣZ_k= -2.25
ΣZ^2_k= 3.25
Z-bar=$\Sigma Z_k/K$= -0.56

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k -12

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	1.98		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.577**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-1.03	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
113.33	**p**	**0.151**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-33.53	**-14.850**	8.69
0.050	-28.22		4.69
0.100	-26.47		-0.40
0.200	-21.53		-5.62

609FMS Seasonal Kendall analysis for pH, Field (su)

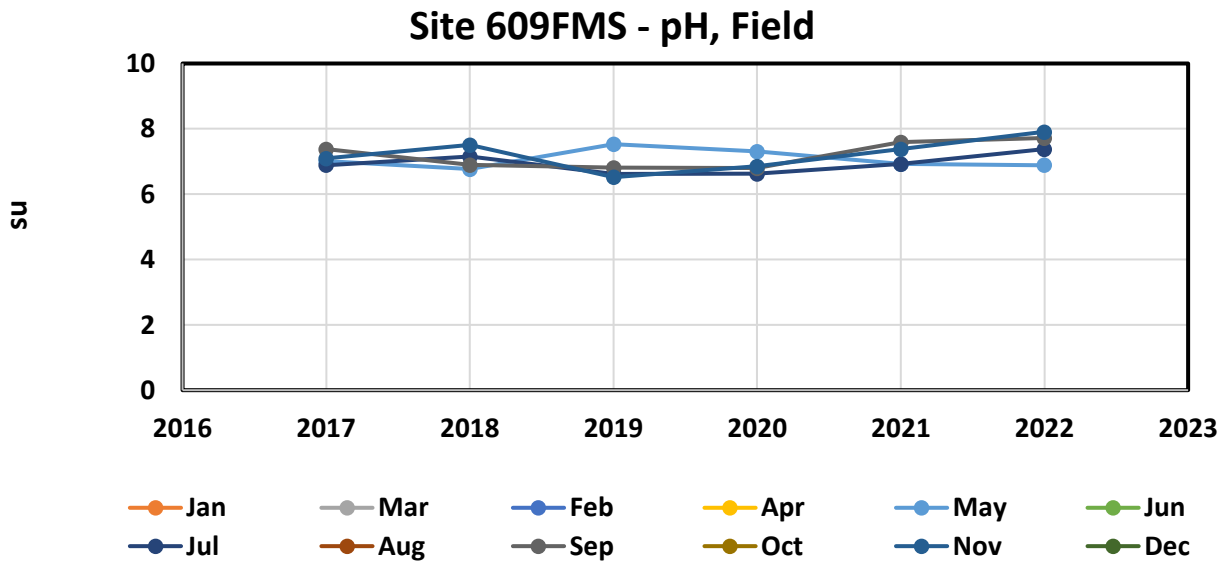
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					7.01		6.89		7.38		7.09	
b	**2017/2018**					6.77		7.15		6.9		7.51	
c	**2018/2019**					7.53		6.62		6.81		6.52	
d	**2019/2020**					7.31		6.63		6.8		6.86	
e	**2020/2021**					6.93		6.92		7.59		7.38	
f	**2021/2022**					6.89		7.38		7.72		7.91	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		1		-1		1	
	c-a					1		-1		-1		-1	
	d-a					1		-1		-1		-1	
	e-a					-1		1		1		1	
	f-a					-1		1		1		1	
	c-b					1		-1		-1		-1	
	d-b					1		-1		-1		-1	
	e-b					1		-1		1		-1	
	f-b					1		1		1		1	
	d-c					-1		1		-1		1	
	e-c					-1		1		1		1	
	f-c					-1		1		1		1	
	e-d					-1		1		1		1	
	f-d					-1		1		1		1	
	f-e					-1		1		1		1	
	S_k	0	0	0	0	-3	0	5	0	3	0	5	0
	σ^2_S=					28.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					-0.56		0.94		0.56		0.94	
	Z^2_k					0.32		0.88		0.32		0.88	

ΣZ_k= 1.88
ΣZ^2_k= 2.40
Z-bar=$\Sigma Z_k/K$= 0.47

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k 10

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	1.52		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.678**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	0.85	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
113.33	**p**	**0.801**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.08	**0.055**	0.26
0.050	-0.04		0.16
0.100	-0.02		0.12
0.200	0.00		0.10

609FMS Seasonal Kendall analysis for SO4, Total (mg/L)

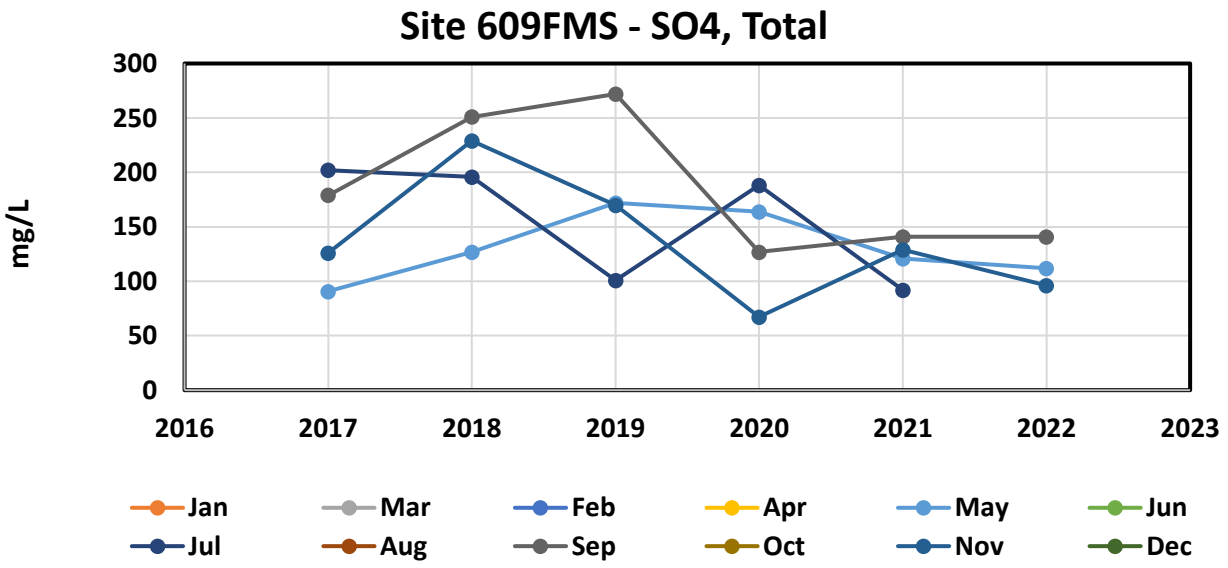
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					90.8		202		179		126	
b	**2017/2018**					127		196		251		229	
c	**2018/2019**					172		101		272		170	
d	**2019/2020**					164		188		127		67.3	
e	**2020/2021**					121		92		141		129	
f	**2021/2022**					112				141		96	
	n	0	0	0	0	6	0	5	0	6	0	6	0
	t_1	0	0	0	0	6	0	5	0	4	0	6	0
	t_2	0	0	0	0	0	0	0	0	1	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					1		-1		1		1	
	c-a					1		-1		1		1	
	d-a					1		-1		-1		-1	
	e-a					1		-1		-1		1	
	f-a					1				-1		-1	
	c-b					1		-1		1		-1	
	d-b					1		-1		-1		-1	
	e-b					-1		-1		-1		-1	
	f-b					-1				-1		-1	
	d-c					-1		1		-1		-1	
	e-c					-1		-1		-1		-1	
	f-c					-1				-1		-1	
	e-d					-1		-1		1		1	
	f-d					-1				1		1	
	f-e					-1				0		-1	
	S_k	0	0	0	0	-1	0	-8	0	-4	0	-5	0
	σ^2_S=					28.33		16.67		27.33		28.33	
	$Z_k = S_k/\sigma_S$					-0.19		-1.96		-0.77		-0.94	
	Z^2_k					0.04		3.84		0.59		0.88	

ΣZ_k= -3.85
ΣZ^2_k= 5.34
Z-bar=$\Sigma Z_k/K$= -0.96

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	21	1	0	0	0

Σn 23
ΣS_k -18

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	1.63		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.652**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-1.69	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
100.67	**p**	**0.045**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-33.04	**-8.000**	4.71
0.050	-25.88		-2.43
0.100	-24.37		-4.04
0.200	-19.88		-5.04

609FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

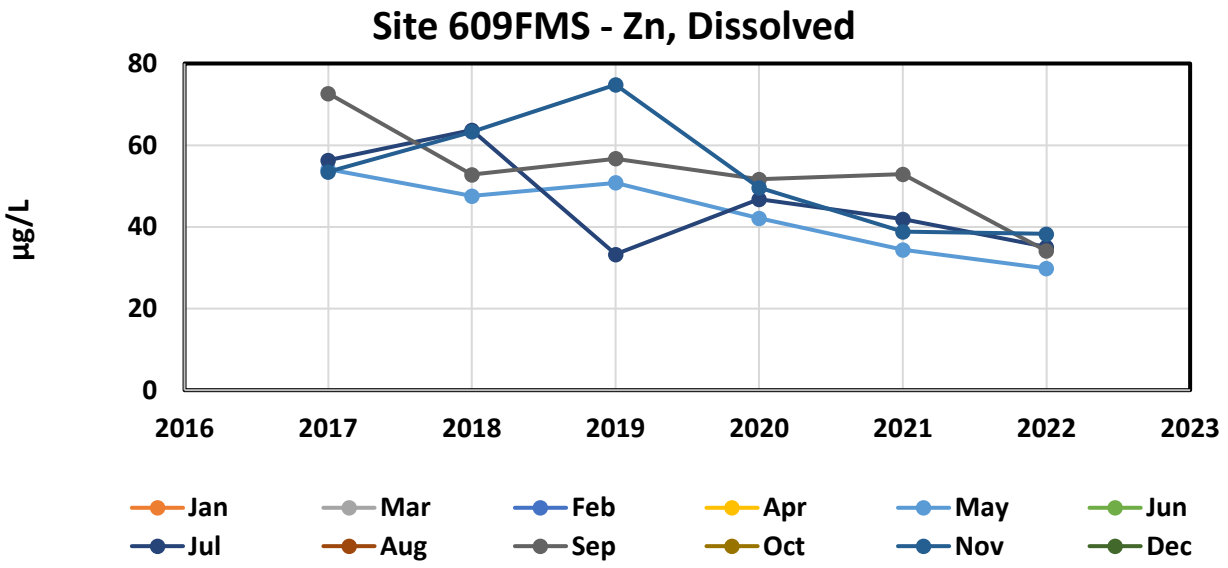
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**					54.1		56.3		72.7		53.5	
b	**2017/2018**					47.6		63.7		52.8		63.3	
c	**2018/2019**					50.8		33.3		56.7		74.8	
d	**2019/2020**					42.1		46.8		51.7		49.6	
e	**2020/2021**					34.4		41.9		52.9		38.8	
f	**2021/2022**					29.8		35.1		34.1		38.3	
	n	0	0	0	0	6	0	6	0	6	0	6	0
	t_1	0	0	0	0	6	0	6	0	6	0	6	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a					-1		1		-1		1	
	c-a					-1		-1		-1		1	
	d-a					-1		-1		-1		-1	
	e-a					-1		-1		-1		-1	
	f-a					-1		-1		-1		-1	
	c-b					1		-1		1		1	
	d-b					-1		-1		-1		-1	
	e-b					-1		-1		1		-1	
	f-b					-1		-1		-1		-1	
	d-c					-1		1		-1		-1	
	e-c					-1		1		-1		-1	
	f-c					-1		1		-1		-1	
	e-d					-1		-1		1		-1	
	f-d					-1		-1		-1		-1	
	f-e					-1		-1		-1		-1	
	S_k	0	0	0	0	-13	0	-7	0	-9	0	-9	0
	σ^2_S=					28.33		28.33		28.33		28.33	
	$Z_k = S_k/\sigma_S$					-2.44		-1.32		-1.69		-1.69	
	Z^2_k					5.96		1.73		2.86		2.86	

ΣZ_k= -7.14
ΣZ^2_k= 13.41
Z-bar=$\Sigma Z_k/K$= -1.78

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	24	0	0	0	0

Σn 24
ΣS_k -38

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	0.67		@a=5% c2(K-1)=	7.81	Test for station homogeneity
	p	**0.880**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-3.48	@a/2=2.5% Z=	1.96	**H_0** (No trend) REJECT
113.33	**p**	**0.000**			**H_A** (± trend) ACCEPT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-7.37	**-4.938**	-3.12
0.050	-6.96		-4.06
0.100	-6.75		-4.41
0.200	-6.20		-4.64

711FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

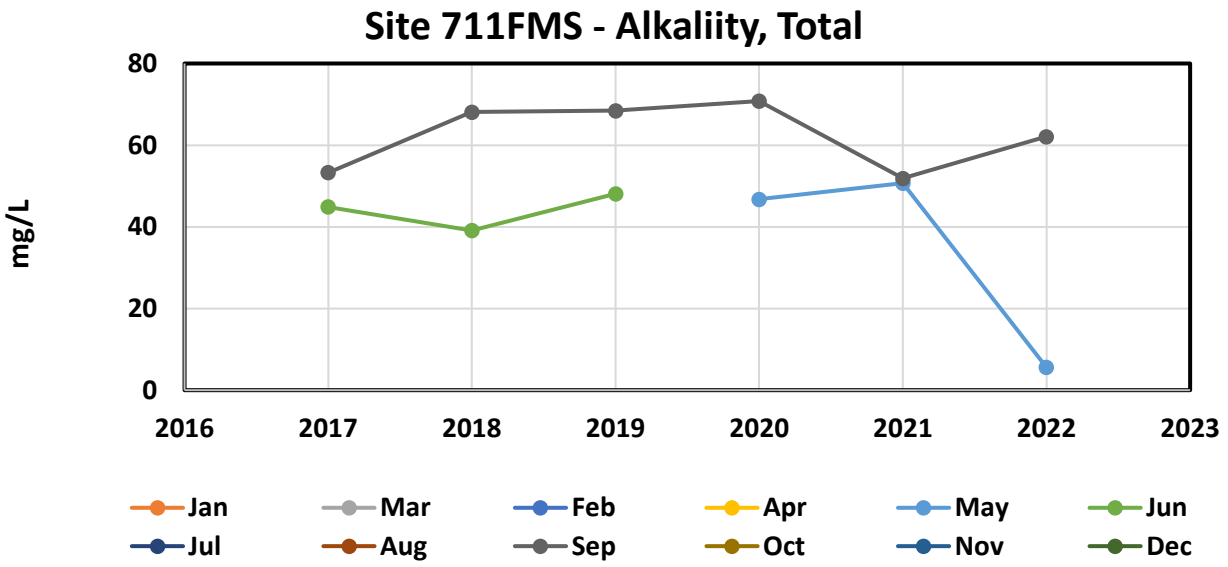
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						44.9			53.3			
b	**2017/2018**						39.1			68.1			
c	**2018/2019**						48.1			68.5			
d	**2019/2020**					46.8				70.8			
e	**2020/2021**					50.7				51.9			
f	**2021/2022**					5.6				62.1			
	n	0	0	0	0	3	3	0	0	6	0	0	0
	t_1	0	0	0	0	3	3	0	0	6	0	0	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a						-1			1			
	c-a						1			1			
	d-a									1			
	e-a									-1			
	f-a									1			
	c-b							1		1			
	d-b									1			
	e-b									-1			
	f-b									-1			
	d-c									1			
	e-c									-1			
	f-c									-1			
	e-d					1				-1			
	f-d					-1				-1			
	f-e					-1				1			
	S_k	0	0	0	0	-1	1	0	0	1	0	0	0
	σ^2_S=					3.67	3.67			28.33			
	$Z_k = S_k/\sigma_S$					-0.52	0.52			0.19			
	Z^2_k					0.27	0.27			0.04			

ΣZ_k= 0.19
ΣZ^2_k= 0.58
Z-bar=$\Sigma Z_k/K$= 0.06

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	12	0	0	0	0

Σn 12
ΣS_k 1

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	0.57		@a=5% c2(K-1)=	5.99	Test for station homogeneity
	p	**0.752**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	0.00	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
35.67	**p**	**0.500**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-13.03	**0.400**	6.62
0.050	-5.56		2.96
0.100	-4.69		1.94
0.200	-2.16		1.60

711FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

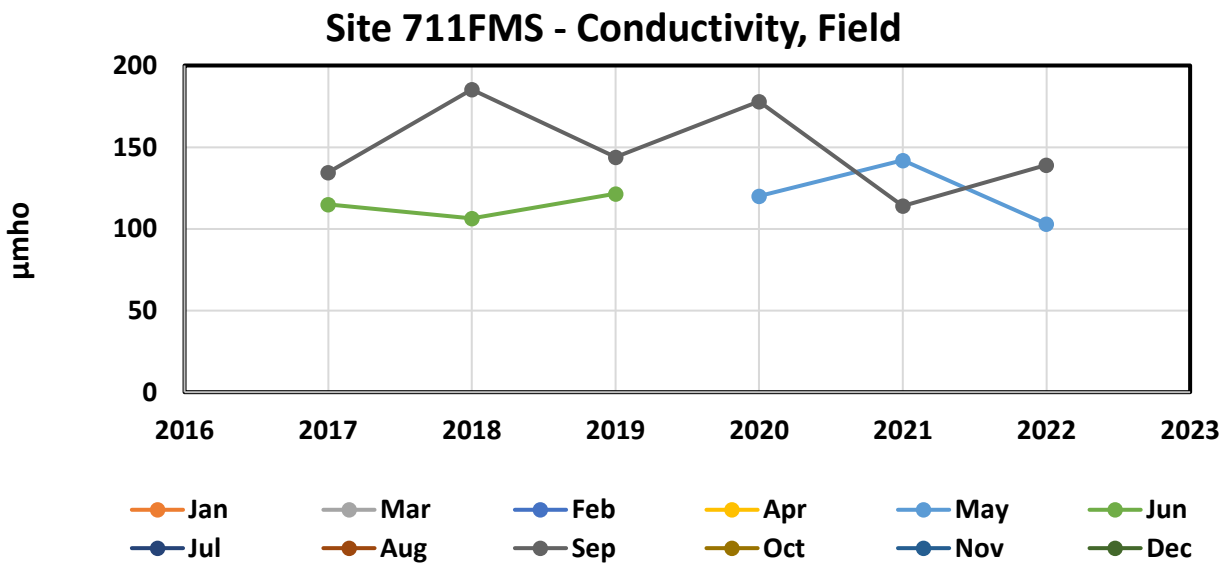
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						114.9			134.6			
b	**2017/2018**						106.4			185.3			
c	**2018/2019**						121.5			144			
d	**2019/2020**					120.1				178			
e	**2020/2021**					142				114			
f	**2021/2022**					103				139			
	n	0	0	0	0	3	3	0	0	6	0	0	0
	t_1	0	0	0	0	3	3	0	0	6	0	0	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a						-1			1			
	c-a						1			1			
	d-a									1			
	e-a									-1			
	f-a									1			
	c-b							1		-1			
	d-b									-1			
	e-b									-1			
	f-b									-1			
	d-c									1			
	e-c									-1			
	f-c									-1			
	e-d					1				-1			
	f-d					-1				-1			
	f-e					-1				1			
	S_k	0	0	0	0	-1	1	0	0	-3	0	0	0
	σ^2_S=					3.67	3.67			28.33			
	$Z_k = S_k/\sigma_S$					-0.52	0.52			-0.56			
	Z^2_k					0.27	0.27			0.32			

ΣZ_k= -0.56
ΣZ^2_k= 0.86
Z-bar=$\Sigma Z_k/K$= -0.19

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	12	0	0	0	0

Σn 12
ΣS_k -3

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	0.76		@a=5% c2(K-1)=	5.99	Test for station homogeneity
	p	**0.685**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.33	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
35.67	**p**	**0.369**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-30.57	**-3.650**	18.14
0.050	-16.85		8.72
0.100	-12.69		3.76
0.200	-8.59		0.91

711FMS Seasonal Kendall analysis for pH, Field (su)

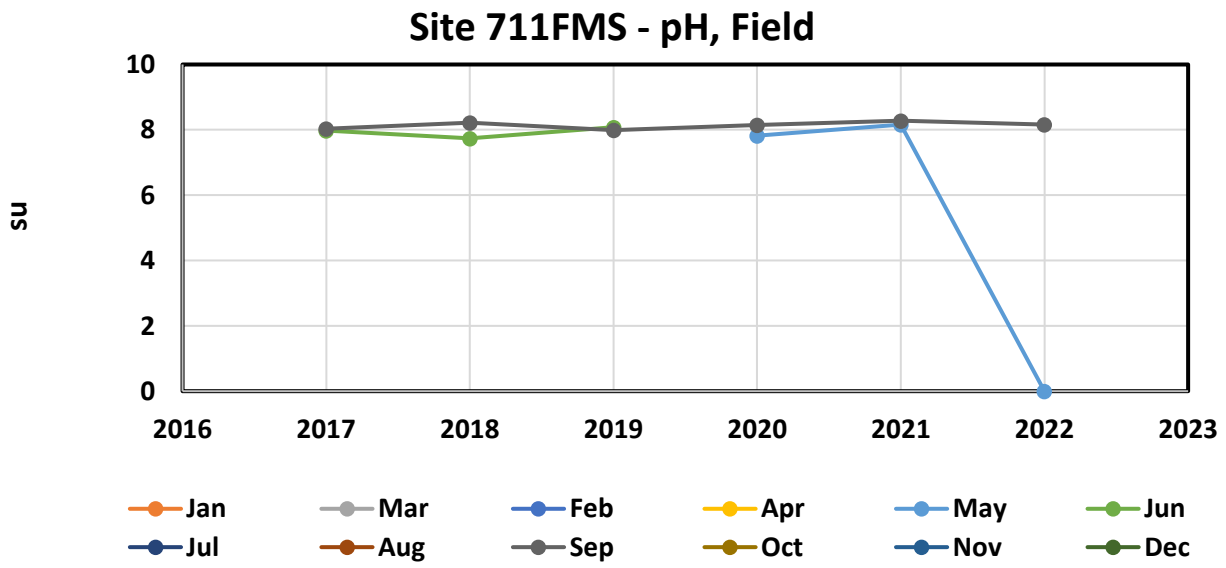
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						7.98			8.03			
b	**2017/2018**						7.74			8.22			
c	**2018/2019**						8.08			7.99			
d	**2019/2020**					7.82				8.15			
e	**2020/2021**					8.16				8.28			
f	**2021/2022**					0.00064				8.16			
	n	0	0	0	0	3	3	0	0	6	0	0	0
	t_1	0	0	0	0	3	3	0	0	6	0	0	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a						-1			1			
	c-a						1			-1			
	d-a									1			
	e-a									1			
	f-a									1			
	c-b						1			-1			
	d-b									-1			
	e-b									1			
	f-b									-1			
	d-c									1			
	e-c									1			
	f-c									1			
	e-d					1				1			
	f-d					-1				1			
	f-e					-1				-1			
	S_k	0	0	0	0	-1	1	0	0	5	0	0	0
	σ^2_S=					3.67	3.67			28.33			
	$Z_k = S_k/\sigma_S$					-0.52	0.52			0.94			
	Z^2_k					0.27	0.27			0.88			

ΣZ_k=	0.94
ΣZ^2_k=	1.43
Z-bar=$\Sigma Z_k/K$=	0.31

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	12	0	0	0	0

Σn	12
ΣS_k	5

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2$=	1.13	@a=5% c2(K-1)=	5.99	Test for station homogeneity
	p **0.567**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} 0.67	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
35.67	**p** **0.748**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.23	**0.026**	0.15
0.050	-0.07		0.09
0.100	-0.02		0.06
0.200	-0.02		0.05

711FMS Seasonal Kendall analysis for SO4, Total (mg/L)

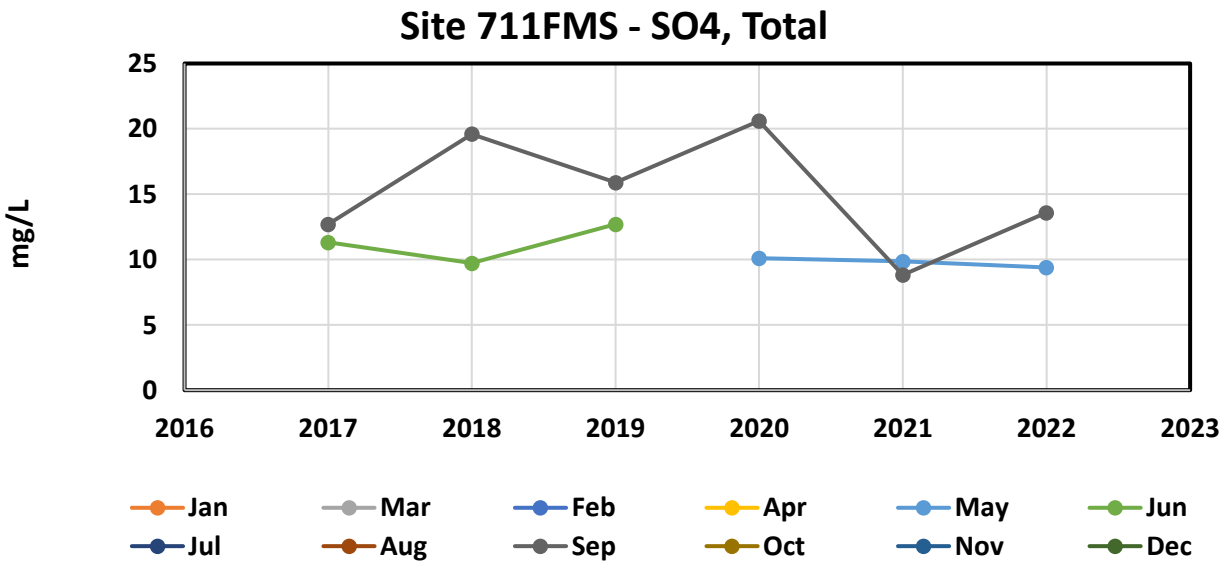
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						11.3			12.7			
b	**2017/2018**						9.73			19.6			
c	**2018/2019**						12.7			15.9			
d	**2019/2020**					10.1				20.6			
e	**2020/2021**					9.87				8.82			
f	**2021/2022**					9.39				13.6			
	n	0	0	0	0	3	3	0	0	6	0	0	0
	t_1	0	0	0	0	3	3	0	0	6	0	0	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a						-1			1			
	c-a						1			1			
	d-a									1			
	e-a									-1			
	f-a									1			
	c-b							1		-1			
	d-b									1			
	e-b									-1			
	f-b									-1			
	d-c									1			
	e-c									-1			
	f-c									-1			
	e-d					-1				-1			
	f-d					-1				-1			
	f-e					-1				1			
	S_k	0	0	0	0	-3	1	0	0	-1	0	0	0
	σ^2_S=					3.67	3.67			28.33			
	$Z_k = S_k/\sigma_S$					-1.57	0.52			-0.19			
	Z^2_k					2.45	0.27			0.04			

ΣZ_k= -1.23
ΣZ^2_k= 2.76
Z-bar=$\Sigma Z_k/K$= -0.41

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	12	0	0	0	0

Σn 12
ΣS_k -3

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	2.26		@a=5% c2(K-1)=	5.99	Test for station homogeneity
	p	**0.324**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.33	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
35.67	**p**	**0.369**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-3.56	**-0.355**	2.78
0.050	-2.36		1.07
0.100	-1.52		0.57
0.200	-0.98		0.18

711FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

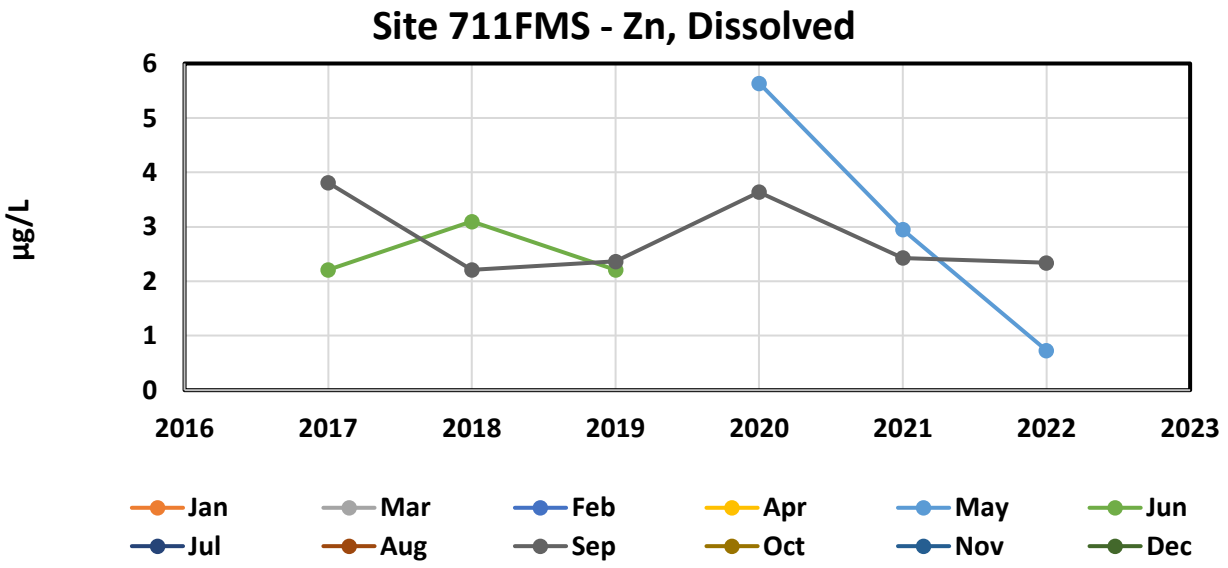
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						2.21			3.81			
b	**2017/2018**						3.1			2.21			
c	**2018/2019**						2.21			2.37			
d	**2019/2020**					5.64				3.64			
e	**2020/2021**					2.95				2.43			
f	**2021/2022**					0.731				2.34			
	n	0	0	0	0	3	3	0	0	6	0	0	0
	t_1	0	0	0	0	3	1	0	0	6	0	0	0
	t_2	0	0	0	0	0	1	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a						1			-1			
	c-a						0			-1			
	d-a									-1			
	e-a									-1			
	f-a									-1			
	c-b						-1			1			
	d-b									1			
	e-b									1			
	f-b									1			
	d-c									1			
	e-c									1			
	f-c									-1			
	e-d					-1				-1			
	f-d					-1				-1			
	f-e					-1				-1			
	S_k	0	0	0	0	-3	0	0	0	-3	0	0	0
	σ^2_S=					3.67	2.67			28.33			
	$Z_k = S_k/\sigma_S$					-1.57	0.00			-0.56			
	Z^2_k					2.45	0.00			0.32			

ΣZ_k= -2.13
ΣZ^2_k= 2.77
Z-bar=$\Sigma Z_k/K$= -0.71

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	10	1	0	0	0

Σn 12
ΣS_k -6

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2$=	1.26	@a=5% c2(K-1)=	5.99	Test for station homogeneity
	p **0.533**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc} -0.85	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
34.67	**p** **0.198**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-1.82	**-0.090**	0.10
0.050	-1.00		0.03
0.100	-0.77		0.01
0.200	-0.64		-0.01

712FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

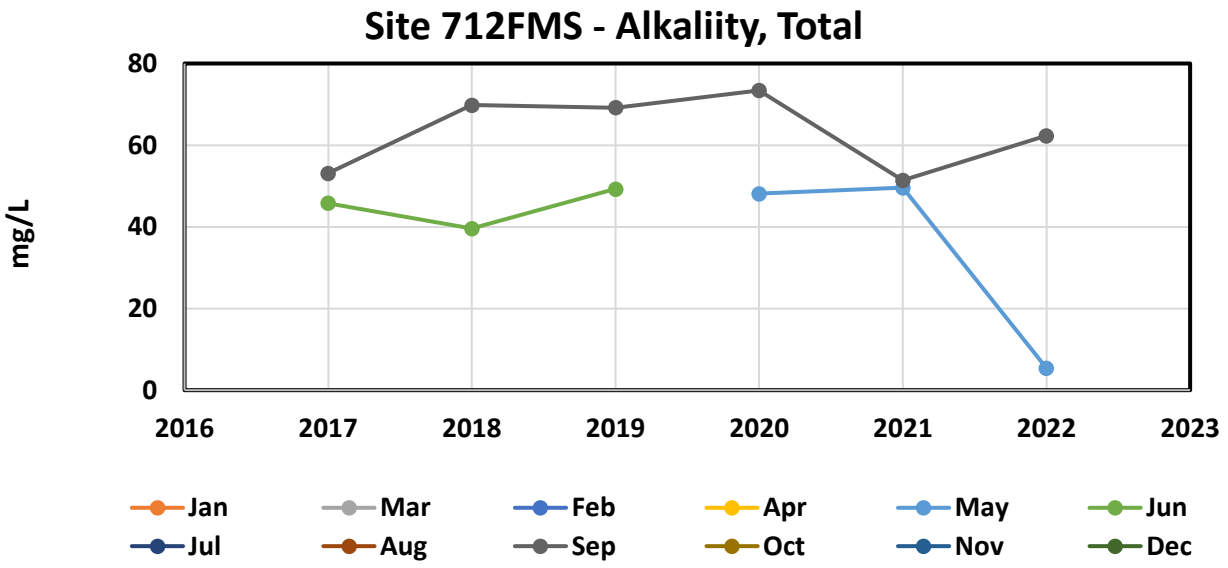
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						45.8			53.1			
b	**2017/2018**						39.6			69.8			
c	**2018/2019**						49.3			69.2			
d	**2019/2020**					48.1				73.4			
e	**2020/2021**					49.6				51.4			
f	**2021/2022**					5.4				62.3			
	n	0	0	0	0	3	3	0	0	6	0	0	0
	t_1	0	0	0	0	3	3	0	0	6	0	0	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a						-1			1			
	c-a						1			1			
	d-a									1			
	e-a									-1			
	f-a									1			
	c-b						1			-1			
	d-b									1			
	e-b									-1			
	f-b									-1			
	d-c									1			
	e-c									-1			
	f-c									-1			
	e-d					1				-1			
	f-d					-1				-1			
	f-e					-1				1			
	S_k	0	0	0	0	-1	1	0	0	-1	0	0	0
	σ^2_S=					3.67	3.67			28.33			
	$Z_k = S_k/\sigma_S$					-0.52	0.52			-0.19			
	Z^2_k					0.27	0.27			0.04			

ΣZ_k= -0.19
ΣZ^2_k= 0.58
Z-bar=$\Sigma Z_k/K$= -0.06

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	12	0	0	0	0

Σn 12
ΣS_k -1

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	0.57		@a=5% c2(K-1)=	5.99	Test for station homogeneity
	p	**0.752**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	0.00	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
35.67	**p**	**0.500**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-14.46	**-0.425**	7.34
0.050	-6.16		2.81
0.100	-5.74		1.81
0.200	-2.34		1.75

712FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

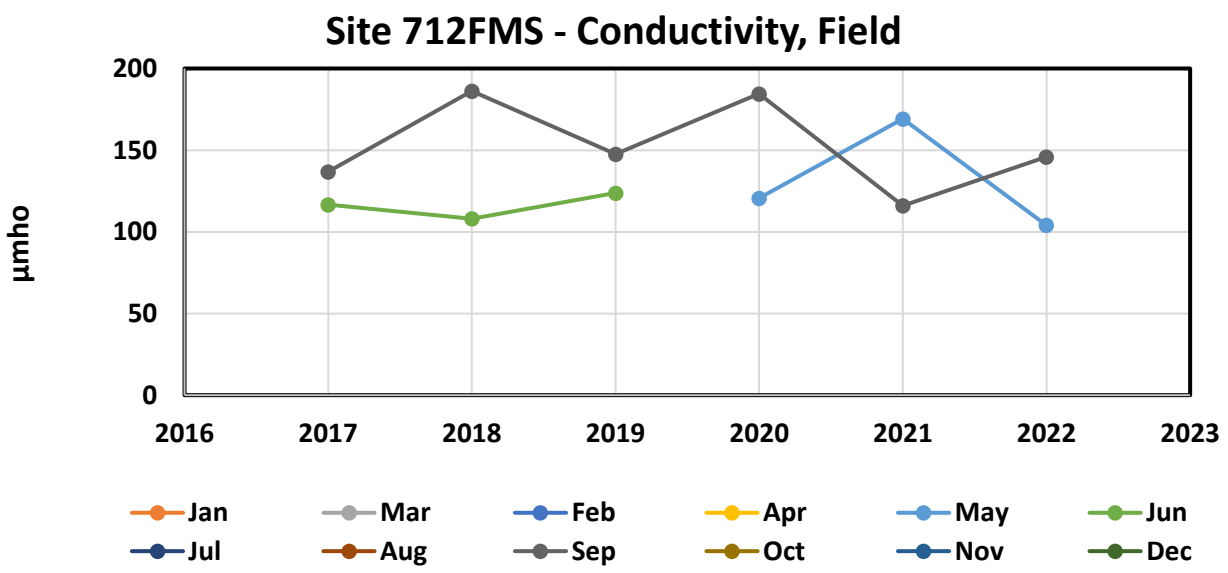
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						116.6			136.8			
b	**2017/2018**						108			186.2			
c	**2018/2019**						123.8			147.6			
d	**2019/2020**					120.6				184.4			
e	**2020/2021**					169.2				116			
f	**2021/2022**					104				146			
	n	0	0	0	0	3	3	0	0	6	0	0	0
	t_1	0	0	0	0	3	3	0	0	6	0	0	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a						-1			1			
	c-a						1			1			
	d-a									1			
	e-a									-1			
	f-a									1			
	c-b							1		-1			
	d-b									-1			
	e-b									-1			
	f-b									-1			
	d-c									1			
	e-c									-1			
	f-c									-1			
	e-d					1				-1			
	f-d					-1				-1			
	f-e					-1				1			
	S_k	0	0	0	0	-1	1	0	0	-3	0	0	0
	σ^2_S=					3.67	3.67			28.33			
	$Z_k = S_k/\sigma_S$					-0.52	0.52			-0.56			
	Z^2_k					0.27	0.27			0.32			

ΣZ_k= -0.56
ΣZ^2_k= 0.86
Z-bar=$\Sigma Z_k/K$= -0.19

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	12	0	0	0	0

Σn 12
ΣS_k -3

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	0.76		@a=5% c2(K-1)=	5.99	Test for station homogeneity
	p	**0.685**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.33	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
35.67	**p**	**0.369**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

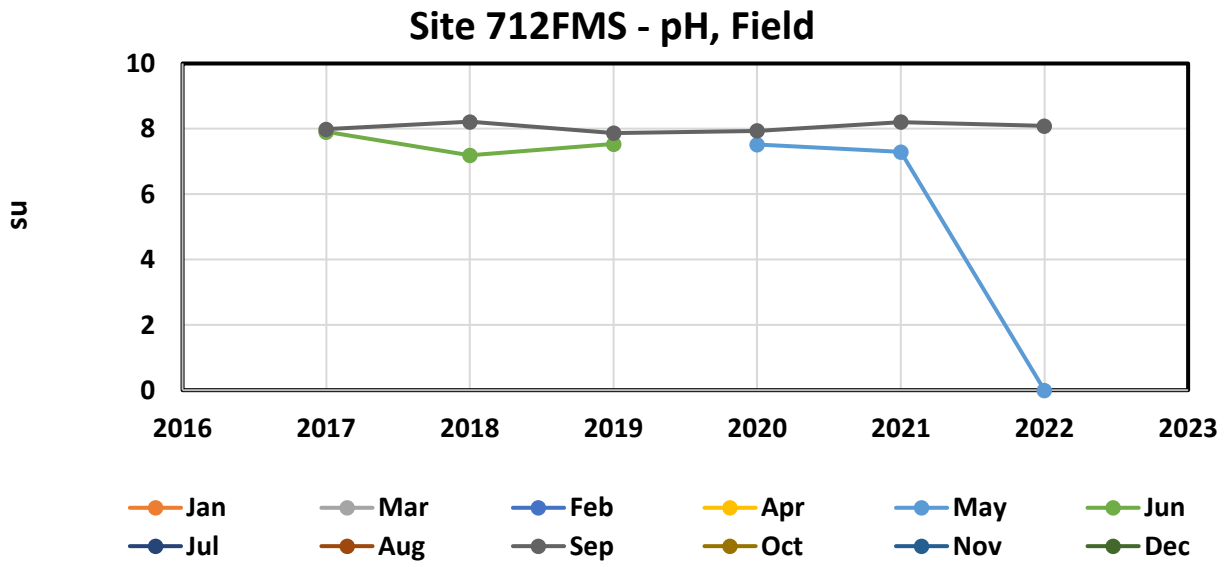
α	Lower Limit	Sen's Slope	Upper Limit
0.010	-30.19	**-0.900**	22.18
0.050	-17.20		9.68
0.100	-11.93		4.19
0.200	-8.62		1.86

712FMS Seasonal Kendall analysis for pH, Field (su)

Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						7.91			7.99			
b	**2017/2018**						7.19			8.22			
c	**2018/2019**						7.54			7.87			
d	**2019/2020**					7.52				7.94			
e	**2020/2021**					7.3				8.21			
f	**2021/2022**					0.00067				8.09			
	n	0	0	0	0	3	3	0	0	6	0	0	0
	t_1	0	0	0	0	3	3	0	0	6	0	0	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a						-1			1			
	c-a						-1			-1			
	d-a									-1			
	e-a									1			
	f-a									1			
	c-b						1			-1			
	d-b									-1			
	e-b									-1			
	f-b									-1			
	d-c									1			
	e-c									1			
	f-c									1			
	e-d					-1				1			
	f-d					-1				1			
	f-e					-1				-1			
	S_k	0	0	0	0	-3	-1	0	0	1	0	0	0
	σ^2_S=					3.67	3.67			28.33			
	$Z_k = S_k/\sigma_S$					-1.57	-0.52			0.19			
	Z^2_k					2.45	0.27			0.04			

ΣZ_k=	-1.90	Tie Extent	t_1	t_2	t_3	t_4	t_5	Σn 12
ΣZ^2_k=	2.76	Count	12	0	0	0	0	ΣS_k -3
Z-bar=$\Sigma Z_k/K$=	-0.63							

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2$=	1.56		@a=5% c2(K-1)=	5.99	Test for station homogeneity
	p	**0.459**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.33	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
35.67	**p**	**0.369**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.52	**-0.017**	0.12
0.050	-0.20		0.07
0.100	-0.15		0.06
0.200	-0.12		0.02

712FMS Seasonal Kendall analysis for SO4, Total (mg/L)

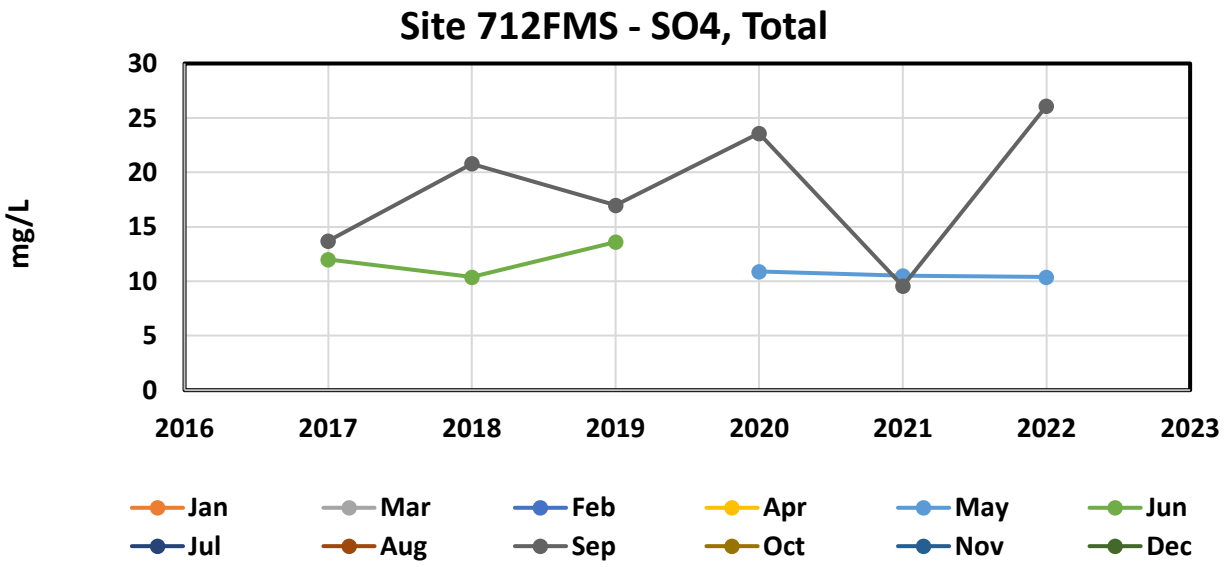
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						12			13.7			
b	**2017/2018**						10.4			20.8			
c	**2018/2019**						13.6			17			
d	**2019/2020**					10.9				23.6			
e	**2020/2021**					10.5				9.56			
f	**2021/2022**					10.4				26.1			
	n	0	0	0	0	3	3	0	0	6	0	0	0
	t_1	0	0	0	0	3	3	0	0	6	0	0	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a						-1			1			
	c-a						1			1			
	d-a									1			
	e-a									-1			
	f-a									1			
	c-b							1		-1			
	d-b									1			
	e-b									-1			
	f-b									1			
	d-c									1			
	e-c									-1			
	f-c									1			
	e-d					-1				-1			
	f-d					-1				1			
	f-e					-1				1			
	S_k	0	0	0	0	-3	1	0	0	5	0	0	0
	σ^2_S=					3.67	3.67			28.33			
	$Z_k = S_k/\sigma_S$					-1.57	0.52			0.94			
	Z^2_k					2.45	0.27			0.88			

ΣZ_k= -0.11
ΣZ^2_k= 3.61
Z-bar=$\Sigma Z_k/K$= -0.04

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	12	0	0	0	0

Σn 12
ΣS_k 3

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	3.61		@a=5% c2(K-1)=	5.99	Test for station homogeneity
	p	**0.165**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	0.33	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
35.67	**p**	**0.631**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-3.73	**1.250**	3.24
0.050	-1.27		2.71
0.100	-0.61		1.92
0.200	-0.25		1.40

712FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

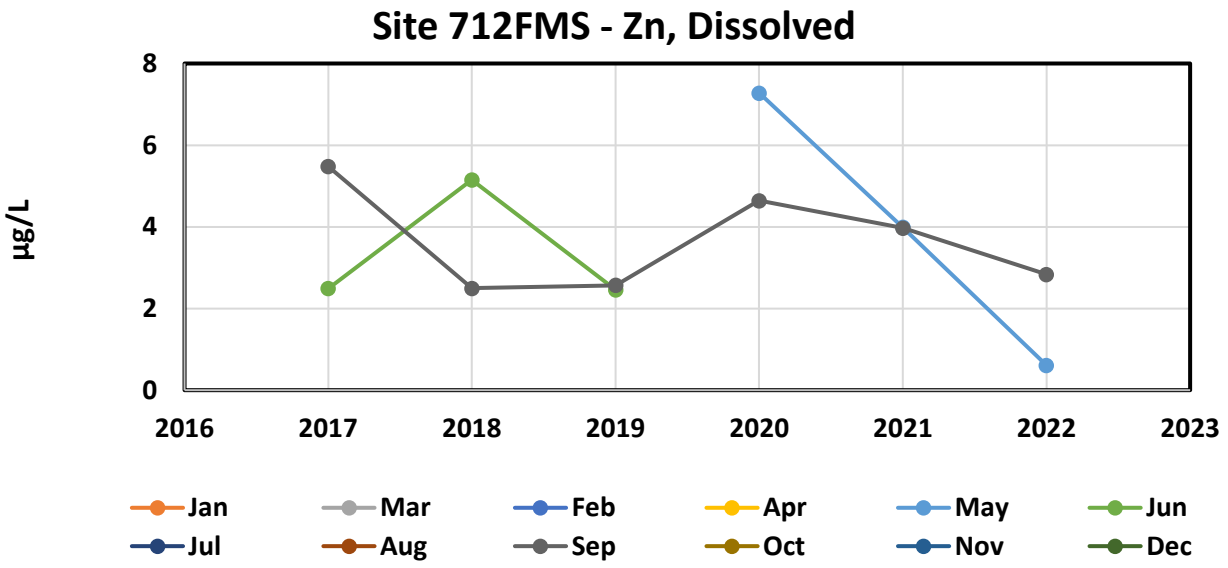
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**						2.49			5.48			
b	**2017/2018**						5.15			2.5			
c	**2018/2019**						2.46			2.57			
d	**2019/2020**					7.28				4.64			
e	**2020/2021**					3.99				3.97			
f	**2021/2022**					0.611				2.84			
	n	0	0	0	0	3	3	0	0	6	0	0	0
	t_1	0	0	0	0	3	3	0	0	6	0	0	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a						1			-1			
	c-a						-1			-1			
	d-a									-1			
	e-a									-1			
	f-a									-1			
	c-b						-1			1			
	d-b									1			
	e-b									1			
	f-b									1			
	d-c									1			
	e-c									1			
	f-c									1			
	e-d					-1				-1			
	f-d					-1				-1			
	f-e					-1				-1			
	S_k	0	0	0	0	-3	-1	0	0	-1	0	0	0
	σ^2_S=					3.67	3.67			28.33			
	$Z_k = S_k/\sigma_S$					-1.57	-0.52			-0.19			
	Z^2_k					2.45	0.27			0.04			

ΣZ_k= -2.28
ΣZ^2_k= 2.76
Z-bar=$\Sigma Z_k/K$= -0.76

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	12	0	0	0	0

Σn 12
ΣS_k -5

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	1.03		@a=5% c2(K-1)=	5.99	Test for station homogeneity
	p	**0.596**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.67	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
35.67	**p**	**0.252**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-3.12	**-0.378**	0.58
0.050	-1.96		0.09
0.100	-1.24		0.07
0.200	-0.90		-0.01

1923FMS Seasonal Kendall analysis for Alkaliity, Total (mg/L)

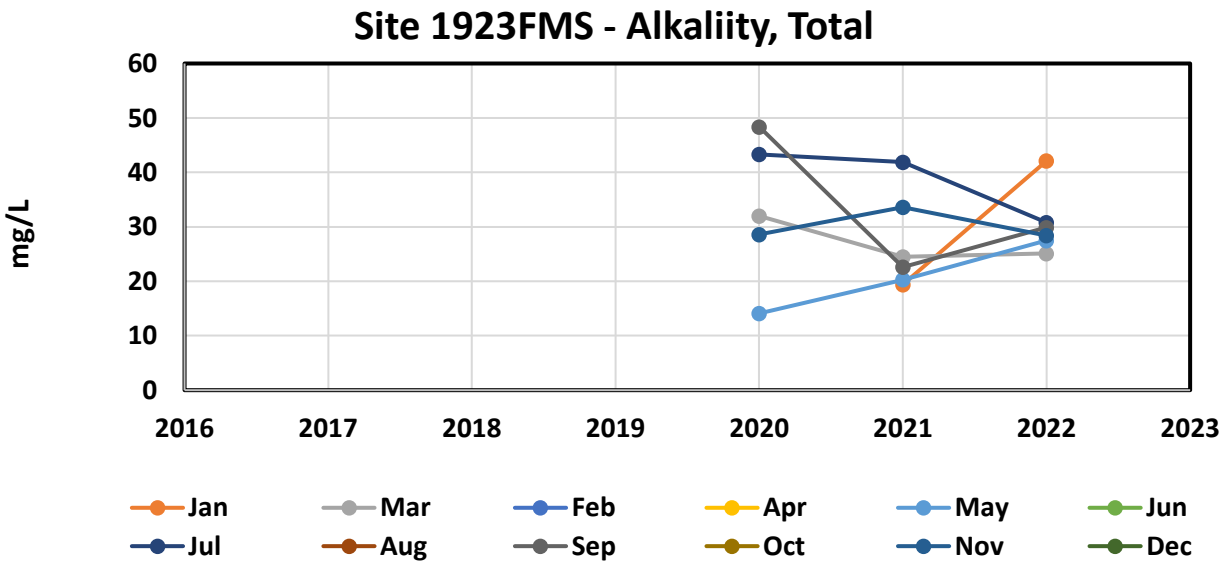
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**												
b	**2017/2018**												
c	**2018/2019**												
d	**2019/2020**			32		14.1		43.3		48.4		28.6	
e	**2020/2021**	19.4		24.5		20.3		41.9		22.6		33.6	
f	**2021/2022**	42.1		25.1		27.5		30.8		29.9		28.4	
	n	2	0	3	0	3	0	3	0	3	0	3	0
	t_1	2	0	3	0	3	0	3	0	3	0	3	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a												
	c-a												
	d-a												
	e-a												
	f-a												
	c-b												
	d-b												
	e-b												
	f-b												
	d-c												
	e-c												
	f-c												
	e-d			-1		1		-1		-1		1	
	f-d			-1		1		-1		-1		-1	
	f-e	1		1		1		-1		1		-1	
	S_k	1	0	-1	0	3	0	-3	0	-1	0	-1	0
	σ^2_S=	1.00		3.67		3.67		3.67		3.67		3.67	
	$Z_k = S_k/\sigma_S$	1.00		-0.52		1.57		-1.57		-0.52		-0.52	
	Z^2_k	1.00		0.27		2.45		2.45		0.27		0.27	

ΣZ_k= -0.57
ΣZ^2_k= 6.73
Z-bar=$\Sigma Z_k/K$= -0.09

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	17	0	0	0	0

Σn 17
ΣS_k -2

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	6.67		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.246**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.23	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
19.33	**p**	**0.410**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-9.46		6.76
0.050	-7.02	**-0.750**	5.74
0.100	-6.06		4.20
0.200	-4.94		0.50

1923FMS Seasonal Kendall analysis for Conductivity, Field (µmho)

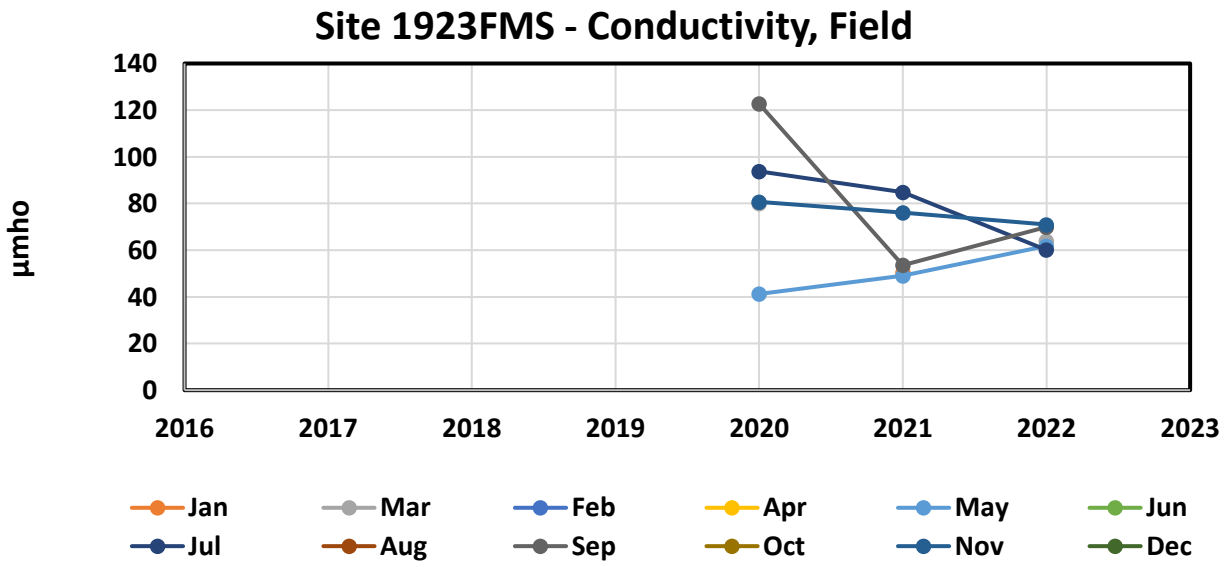
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**												
b	**2017/2018**												
c	**2018/2019**												
d	**2019/2020**			80.06		41.24		93.77		122.7		80.7	
e	**2020/2021**	50.38				49.05		84.9		53.56		76	
f	**2021/2022**			64		61.8		60.1		70		71	
	n	1	0	2	0	3	0	3	0	3	0	3	0
	t_1	1	0	2	0	3	0	3	0	3	0	3	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a												
	c-a												
	d-a												
	e-a												
	f-a												
	c-b												
	d-b												
	e-b												
	f-b												
	d-c												
	e-c												
	f-c												
	e-d					1		-1		-1		-1	
	f-d			-1		1		-1		-1		-1	
	f-e					1		-1		1		-1	
	S_k	0	0	-1	0	3	0	-3	0	-1	0	-3	0
	σ^2_S=			1.00		3.67		3.67		3.67		3.67	
	$Z_k = S_k/\sigma_S$			-1.00		1.57		-1.57		-0.52		-1.57	
	Z^2_k			1.00		2.45		2.45		0.27		2.45	

ΣZ_k= -3.09
ΣZ^2_k= 8.64
Z-bar=$\Sigma Z_k/K$= -0.62

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	15	0	0	0	0

Σn 15
ΣS_k -5

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	6.73		@a=5% c2(K-1)=	9.49	Test for station homogeneity
	p	**0.151**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-1.01	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
15.67	**p**	**0.156**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-30.80	**-5.000**	10.54
0.050	-22.85		4.75
0.100	-17.12		-4.25
0.200	-10.19		-4.83

1923FMS Seasonal Kendall analysis for pH, Field (su)

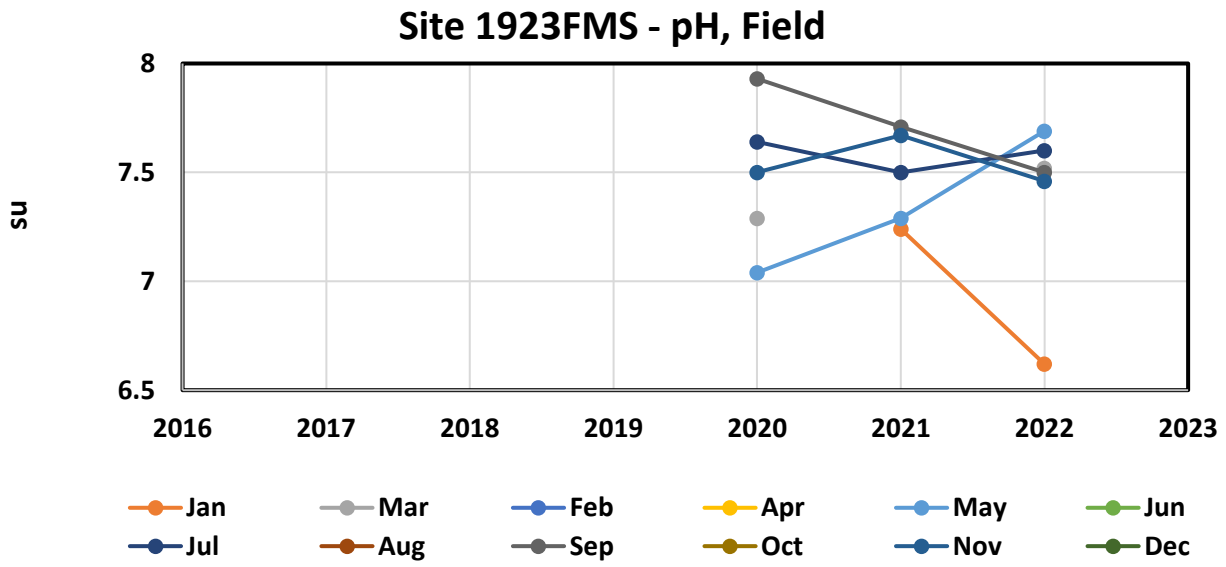
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**												
b	**2017/2018**												
c	**2018/2019**												
d	**2019/2020**			7.29		7.04		7.64		7.93		7.5	
e	**2020/2021**	7.24				7.29		7.5		7.71		7.67	
f	**2021/2022**	6.62		7.52		7.69		7.6		7.5		7.46	
	n	2	0	2	0	3	0	3	0	3	0	3	0
	t_1	2	0	2	0	3	0	3	0	3	0	3	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a												
	c-a												
	d-a												
	e-a												
	f-a												
	c-b												
	d-b												
	e-b												
	f-b												
	d-c												
	e-c												
	f-c												
	e-d					1		-1		-1		1	
	f-d			1		1		-1		-1		-1	
	f-e	-1				1		1		-1		-1	
	S_k	-1	0	1	0	3	0	-1	0	-3	0	-1	0
	σ^2_S=	1.00		1.00		3.67		3.67		3.67		3.67	
	$Z_k = S_k/\sigma_S$	-1.00		1.00		1.57		-0.52		-1.57		-0.52	
	Z^2_k	1.00		1.00		2.45		0.27		2.45		0.27	

ΣZ_k= -1.04
ΣZ^2_k= 7.45
Z-bar=$\Sigma Z_k/K$= -0.17

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	16	0	0	0	0

Σn 16
ΣS_k -2

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	7.27		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.201**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.24	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
16.67	**p**	**0.403**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-0.22	**-0.020**	0.23
0.050	-0.21		0.13
0.100	-0.21		0.11
0.200	-0.19		0.07

1923FMS Seasonal Kendall analysis for SO4, Total (mg/L)

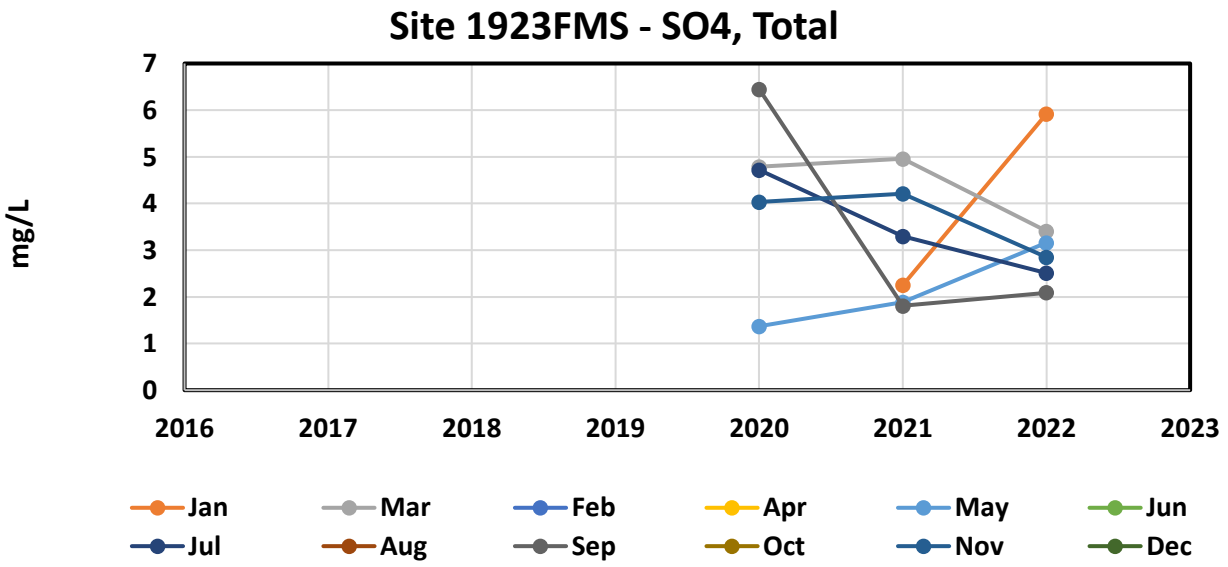
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**												
b	**2017/2018**												
c	**2018/2019**												
d	**2019/2020**			4.79		1.37		4.72		6.45		4.03	
e	**2020/2021**	2.25		4.96		1.89		3.3		1.81		4.21	
f	**2021/2022**	5.92		3.41		3.16		2.51		2.09		2.85	
	n	2	0	3	0	3	0	3	0	3	0	3	0
	t_1	2	0	3	0	3	0	3	0	3	0	3	0
	t_2	0	0	0	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a												
	c-a												
	d-a												
	e-a												
	f-a												
	c-b												
	d-b												
	e-b												
	f-b												
	d-c												
	e-c												
	f-c												
	e-d			1		1		-1		-1		1	
	f-d			-1		1		-1		-1		-1	
	f-e	1		-1		1		-1		1		-1	
	S_k	1	0	-1	0	3	0	-3	0	-1	0	-1	0
	σ^2_S=	1.00		3.67		3.67		3.67		3.67		3.67	
	$Z_k = S_k/\sigma_S$	1.00		-0.52		1.57		-1.57		-0.52		-0.52	
	Z^2_k	1.00		0.27		2.45		2.45		0.27		0.27	

ΣZ_k= -0.57
ΣZ^2_k= 6.73
Z-bar=$\Sigma Z_k/K$= -0.09

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	17	0	0	0	0

Σn 17
ΣS_k -2

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	6.67		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.246**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.23	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
19.33	**p**	**0.410**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-1.62	**-0.640**	0.56
0.050	-1.40		0.24
0.100	-1.31		0.18
0.200	-1.06		0.06

1923FMS Seasonal Kendall analysis for Zn, Dissolved (µg/L)

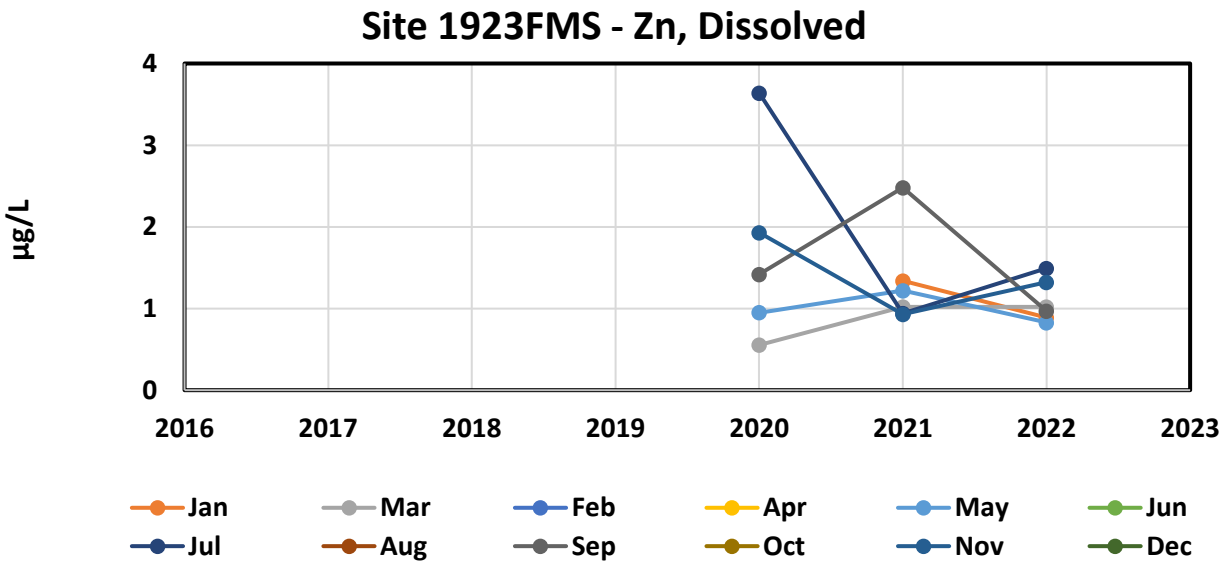
Row	Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	**2016/2017**												
b	**2017/2018**												
c	**2018/2019**												
d	**2019/2020**			0.553		0.95		3.64		1.42		1.93	
e	**2020/2021**	1.34		1.02		1.22		0.94		2.48		0.93	
f	**2021/2022**	0.89		1.02		0.83		1.49		0.97		1.32	
	n	2	0	3	0	3	0	3	0	3	0	3	0
	t_1	2	0	1	0	3	0	3	0	3	0	3	0
	t_2	0	0	1	0	0	0	0	0	0	0	0	0
	t_3	0	0	0	0	0	0	0	0	0	0	0	0
	t_4	0	0	0	0	0	0	0	0	0	0	0	0
	t_5	0	0	0	0	0	0	0	0	0	0	0	0
	b-a												
	c-a												
	d-a												
	e-a												
	f-a												
	c-b												
	d-b												
	e-b												
	f-b												
	d-c												
	e-c												
	f-c												
	e-d			1		1		-1		1		-1	
	f-d			1		-1		-1		-1		-1	
	f-e	-1		0		-1		1		-1		1	
	S_k	-1	0	2	0	-1	0	-1	0	-1	0	-1	0
	σ^2_S=	1.00		2.67		3.67		3.67		3.67		3.67	
	$Z_k = S_k/\sigma_S$	-1.00		1.22		-0.52		-0.52		-0.52		-0.52	
	Z^2_k	1.00		1.50		0.27		0.27		0.27		0.27	

ΣZ_k= -1.86
ΣZ^2_k= 3.59
Z-bar=$\Sigma Z_k/K$= -0.31

Tie Extent	t_1	t_2	t_3	t_4	t_5
Count	15	1	0	0	0

Σn 17
ΣS_k -3

$\eta=\Sigma Z2\kappa-K(Z-\beta\alpha\rho)2=$	3.01		@a=5% c2(K-1)=	11.07	Test for station homogeneity
	p	**0.698**			$\chi^2_h<\chi^2_{(K-1)}$ ACCEPT
$\Sigma VAR(S_k)$	Z_{calc}	-0.47	@a/2=2.5% Z=	1.96	**H_0** (No trend) ACCEPT
18.33	**p**	**0.320**			**H_A** (± trend) REJECT



Seasonal-Kendall Slope Confidence Intervals

α	Lower Limit	Sen's Slope	Upper Limit
0.010	-1.07	**-0.143**	0.39
0.050	-0.74		0.25
0.100	-0.43		0.17
0.200	-0.37		-0.01

Wilcoxon-signed-ranks test

Exact Form

Variable: Alk Tot, mg/l

	X	Y			
Site	006FMS	054FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	57.2	59.4	-2.20	2.20	-4
Feb 2022					
Mar 2022	54	55.8	-1.80	1.80	-3
Apr 2022					
May 2022	34.9	35.7	-0.80	0.80	-2
Jun 2022					
Jul 2022	37.9	37.6	0.30	0.30	1
Aug 2022					
Sep 2022	52.9	55.4	-2.50	2.50	-5
Oct 2022					
Nov 2022	51.7	54.6	-2.90	2.90	-6
Dec 2022					
Median	52.30	55.00	-2.00	2.00	

n	**m**
6	6

N= 6

ΣR= -19

α
0.05
W'α,n
2

W^+=
1
p-test
0.031

H_0	median [D]=0	
H_1	median [D]<0	**ACCEPT**

Wilcoxon-signed-ranks test

Exact Form

Variable: Cond Fld, umho

	X	Y			
Site	006FMS	054FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	0.56	66.4	-65.84	65.84	-6
Feb 2022					
Mar 2022	149	154	-5.00	5.00	-5
Apr 2022					
May 2022	84.5	84	0.50	0.50	1
Jun 2022					
Jul 2022	79	83	-4.00	4.00	-4
Aug 2022					
Sep 2022	126	129	-3.00	3.00	-3
Oct 2022	77				
Nov 2022	143	145	-2.00	2.00	-2
Dec 2022					
Median	84.50	106.50	-3.50	3.50	

n	**m**
6	6

N= 6

ΣR= -19

α
0.05
W'α,n
2

W^+=
1
p-test
0.031

H_0	median [D]=0	
H_1	median [D]<0	**ACCEPT**

Wilcoxon-signed-ranks test

Exact Form

Variable: pH Field, su

	X	Y			
Site	006FMS	054FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	7.69	7.74	-0.05	0.05	-4
Feb 2022					
Mar 2022	7.85	7.84	0.01	0.01	1
Apr 2022					
May 2022	7.6	7.14	0.46	0.46	6
Jun 2022					
Jul 2022	7.94	7.95	-0.01	0.01	-2
Aug 2022					
Sep 2022	7.82	7.86	-0.04	0.04	-3
Oct 2022	7.7				
Nov 2022	8.03	7.9	0.13	0.13	5
Dec 2022					
Median	7.82	7.85	0.00	0.05	

n	**m**
6	6

N= 6

ΣR= 3

α
0.05
W'α,n
2

W^+=
9
p-test
0.422

H_0	median [D]=0	ACCEPT
H_1	median [D]<0	

Wilcoxon-signed-ranks test

Exact Form

Variable: SO4 Tot, mg/l

	X	Y			
Site	006FMS	054FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	22	20.8	1.20	1.20	4
Feb 2022					
Mar 2022	21.6	21.4	0.20	0.20	3
Apr 2022					
May 2022	8.03	7.93	0.10	0.10	1
Jun 2022					
Jul 2022		9.28			
Aug 2022					
Sep 2022	13.4	13.4	0.00		
Oct 2022					
Nov 2022	16.6	16.5	0.10	0.10	2
Dec 2022					
Median	16.60	14.95	0.10	0.15	

n	**m**
5	4

N= 4

ΣR= 10

α
0.05
W'α,n
#N/A

W^+=
0
p-test
0.000

H_0	median [D]=0	
H_1	median [D]<0	**ACCEPT**

Wilcoxon-signed-ranks test

Exact Form

Variable: Zn Diss, ug/l

	X	Y			
Site	006FMS	054FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	8.63	8.43	0.20	0.20	3
Feb 2022					
Mar 2022	11.2	9.47	1.73	1.73	6
Apr 2022					
May 2022	3.94	4.05	-0.11	0.11	-2
Jun 2022					
Jul 2022	2.92	2.96	-0.04	0.04	-1
Aug 2022					
Sep 2022	4.69	4.43	0.26	0.26	4
Oct 2022					
Nov 2022	11.1	9.92	1.18	1.18	5
Dec 2022					
Median	6.66	6.43	0.23	0.23	

n	**m**
6	6

N= 6

ΣR= 15

α
0.05
W'α,n
2

W^+=
3
p-test
0.078

H_0	median [D]=0	ACCEPT
H_1	median [D]<0	

Wilcoxon-signed-ranks test

Exact Form

Variable: Alk Tot, mg/l

	X	Y			
Site	048FMS	006FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	57.4	57.2	0.20	0.20	2
Feb 2022					
Mar 2022	53.7	54	-0.30	0.30	-3
Apr 2022					
May 2022	34.9	34.9	0.00		
Jun 2022					
Jul 2022	38.3	37.9	0.40	0.40	4
Aug 2022					
Sep 2022	52	52.9	-0.90	0.90	-5
Oct 2022					
Nov 2022	51.6	51.7	-0.10	0.10	-1
Dec 2022					
Median	51.80	52.30	-0.05	0.30	

n	**m**
6	5

N= 5

ΣR= -3

α
0.05
W'α,n
#N/A

W^+=
6
p-test
0.406

H_0	median [D]=0	ACCEPT
H_1	median [D]<0	

Wilcoxon-signed-ranks test

Exact Form

Variable: Cond Fld, umho

	X	Y			
Site	048FMS	006FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	78	0.56	77.44	77.44	7
Feb 2022					
Mar 2022	145	149	-4.00	4.00	-5
Apr 2022					
May 2022	82	84.5	-2.50	2.50	-3
Jun 2022					
Jul 2022	80	79	1.00	1.00	1.5
Aug 2022					
Sep 2022	125	126	-1.00	1.00	-1.5
Oct 2022	74.4	77	-2.60	2.60	-4
Nov 2022	135	143	-8.00	8.00	-6
Dec 2022					
Median	82.00	84.50	-2.50	2.60	

n	**m**
7	7

N= 7

ΣR= -11

α
0.05
W'α,n
3

W^+=
8.5
p-test
0.188

H_0	median [D]=0	ACCEPT
H_1	median [D]<0	

Wilcoxon-signed-ranks test

Exact Form

Variable: pH Field, su

	X	Y			
Site	048FMS	006FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	7.94	7.69	0.25	0.25	7
Feb 2022					
Mar 2022	7.93	7.85	0.08	0.08	3
Apr 2022					
May 2022	7.37	7.6	-0.23	0.23	-5
Jun 2022					
Jul 2022	7.93	7.94	-0.01	0.01	-1
Aug 2022					
Sep 2022	8.06	7.82	0.24	0.24	6
Oct 2022	7.77	7.7	0.07	0.07	2
Nov 2022	8.2	8.03	0.17	0.17	4
Dec 2022					
Median	7.93	7.82	0.08	0.17	

n	**m**
7	7

N= 7

ΣR= 16

α
0.05
W'α,n
3

W^+=
6
p-test
0.109

H_0	median [D]=0	ACCEPT
H_1	median [D]<0	

Wilcoxon-signed-ranks test

Exact Form

Variable: SO4 Tot, mg/l

	X	Y			
Site	048FMS	006FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	18.5	22	-3.50	3.50	-5
Feb 2022					
Mar 2022	19.7	21.6	-1.90	1.90	-3
Apr 2022					
May 2022	7.8	8.03	-0.23	0.23	-1
Jun 2022					
Jul 2022	8.61				
Aug 2022					
Sep 2022	12.5	13.4	-0.90	0.90	-2
Oct 2022					
Nov 2022	14.6	16.6	-2.00	2.00	-4
Dec 2022					
Median	13.55	16.60	-1.90	1.90	

n	**m**
5	5

N= 5

ΣR= -15

α
0.05
W'α,n
#N/A

W^+=
0
p-test
0.031

H_0	median [D]=0	
H_1	median [D]<0	**ACCEPT**

Wilcoxon-signed-ranks test

Exact Form

Variable: Zn Diss, ug/l

	X	Y			
Site	048FMS	006FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	7.06	8.63	-1.57	1.57	-3
Feb 2022					
Mar 2022	8.62	11.2	-2.58	2.58	-4
Apr 2022					
May 2022	19.2	3.94	15.26	15.26	6
Jun 2022					
Jul 2022	2.43	2.92	-0.49	0.49	-1
Aug 2022					
Sep 2022	3.91	4.69	-0.78	0.78	-2
Oct 2022					
Nov 2022	7.39	11.1	-3.71	3.71	-5
Dec 2022					
Median	7.23	6.66	-1.18	2.08	

n	**m**
6	6

N= 6

ΣR= -9

α
0.05
W'α,n
2

W^+=
6
p-test
0.219

H_0	median [D]=0	ACCEPT
H_1	median [D]<0	

Wilcoxon-signed-ranks test

Exact Form

Variable: Alk Tot, mg/l

	X	Y			
Site	054FMS	062FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	59.4	63.3	-3.90	3.90	-4
Feb 2022					
Mar 2022	55.8	60.2	-4.40	4.40	-5
Apr 2022					
May 2022	35.7	38.1	-2.40	2.40	-1
Jun 2022					
Jul 2022	37.6	41.1	-3.50	3.50	-3
Aug 2022					
Sep 2022	55.4	58.1	-2.70	2.70	-2
Oct 2022					
Nov 2022	54.6	59.2	-4.60	4.60	-6
Dec 2022					
Median	55.00	58.65	-3.70	3.70	

n	**m**
6	6

N= 6

ΣR= -21

α
0.05
W'α,n
2

W^+=
0
p-test
0.016

H_0	median [D]=0	
H_1	median [D]<0	**ACCEPT**

Wilcoxon-signed-ranks test

Exact Form

Variable: Cond Fld, umho

	X	Y			
Site	054FMS	062FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	66.4	137	-70.60	70.60	-6
Feb 2022					
Mar 2022	154	164	-10.00	10.00	-4
Apr 2022					
May 2022	84	90	-6.00	6.00	-3
Jun 2022					
Jul 2022	83	86	-3.00	3.00	-1
Aug 2022					
Sep 2022	129	134	-5.00	5.00	-2
Oct 2022					
Nov 2022	145	157	-12.00	12.00	-5
Dec 2022					
Median	106.50	135.50	-8.00	8.00	

n	**m**
6	6

N= 6

ΣR= -21

α
0.05
W'α,n
2

W^+=
0
p-test
0.016

H_0	median [D]=0	
H_1	median [D]<0	**ACCEPT**

Wilcoxon-signed-ranks test

Exact Form

Variable: pH Field, su

	X	Y			
Site	054FMS	062FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	7.74	6.98	0.76	0.76	5
Feb 2022					
Mar 2022	7.84	7.56	0.28	0.28	2
Apr 2022					
May 2022	7.14	6.81	0.33	0.33	3.5
Jun 2022					
Jul 2022	7.95	7.95	0.00		
Aug 2022					
Sep 2022	7.86	7.53	0.33	0.33	3.5
Oct 2022					
Nov 2022	7.9	8.01	-0.11	0.11	-1
Dec 2022					
Median	7.85	7.55	0.31	0.33	

n	**m**
6	5

N= 5

ΣR= 13

α
0.05
W'α,n
#N/A

W^+=
1
p-test
0.063

H_0	median [D]=0	ACCEPT
H_1	median [D]<0	

Wilcoxon-signed-ranks test

Exact Form

Variable: SO4 Tot, mg/l

	X	Y			
Site	054FMS	062FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	20.8	41	-20.20	20.20	-6
Feb 2022					
Mar 2022	21.4	22.7	-1.30	1.30	-5
Apr 2022					
May 2022	7.93	8.45	-0.52	0.52	-3
Jun 2022					
Jul 2022	9.28	9.19	0.09	0.09	1
Aug 2022					
Sep 2022	13.4	13.9	-0.50	0.50	-2
Oct 2022					
Nov 2022	16.5	17.5	-1.00	1.00	-4
Dec 2022					
Median	14.95	15.70	-0.76	0.76	

n	**m**
6	6

N= 6

ΣR= -19

α
0.05
W'α,n
2

W^+=
1
p-test
0.031

H_0	median [D]=0	
H_1	median [D]<0	**ACCEPT**

Wilcoxon-signed-ranks test

Exact Form

Variable: Zn Diss, ug/l

	X	Y			
Site	054FMS	062FMS	Differences		
Date			**D**	**|D|**	**Rank**
Jan 2022	8.43	7.76	0.67	0.67	6
Feb 2022					
Mar 2022	9.47	9.24	0.23	0.23	3
Apr 2022					
May 2022	4.05	3.43	0.62	0.62	5
Jun 2022					
Jul 2022	2.96	3.03	-0.07	0.07	-1
Aug 2022					
Sep 2022	4.43	4.54	-0.11	0.11	-2
Oct 2022					
Nov 2022	9.92	9.49	0.43	0.43	4
Dec 2022					
Median	6.43	6.15	0.33	0.33	

n	**m**
6	6

N= 6

ΣR= 15

α
0.05
W'α,n
2

W^+=
3
p-test
0.078

H_0	median [D]=0	ACCEPT
H_1	median [D]<0	