Eagle Mine
a subsidiary of lundin mining

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Friday, March 15, 2019

Ms. Melanie Humphrey
Michigan Department of Environmental Quality
1504 W. Washington St.
Marquette, MI 49855

Subject: Annual Mining and Reclamation Report, Eagle Mine, LLC
Nonferrous Metallic Mineral Mining Permit (MP 01 2007), Eagle Mine

Dear Ms. Humphrey:

Eagle Mine, LLC has an approved Mining Permit (MP 01 2007) dated December 14, 2007. General Permit Condition G2 states, "The permittee shall file with the MMU supervisor a Mining and Reclamation Report on or before March 15 of each year, both during milling operations and post closure monitoring as required by Section 324.63213 and R 425.501. The report shall include a description of the status of mining and reclamation operations, an update of the contingency plan, monitoring results from the preceding calendar year, tonnage totals of material mined, and amount of metallic product by weight."

Please find enclosed, the 2018 Annual Mining and Reclamation Report for the Eagle Mine.

Should you have any questions about this report, please do not hesitate to contact me at 906-339-7076.

Sincerely,

Amanda Zeidler
HSE & Permitting Manager

Cc: Michigamme Township

enclosure

Eagle Mine
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2018 Annual Mining and Reclamation Report
Mine Permit MP 01 2007

March 15, 2019

Contents

Appendices

Acronyms and Abbreviations

AEM	Advanced Ecological Management
COSA	Coarse Ore Storage Area
CRF	Cemented Rock Fill
CWB	Contact Water Basin
DO	dissolved oxygen
Eagle	Eagle Mine LLC.
gal	gallon
gpd	gallons per day
gpm	gallons per minute
KME	King and MacGregor Environmental
m	meter
m^3	cubic meters
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
µg/L	micrograms per liter
µS/cm	micro-Siemens per centimeter
mg/L	milligrams per liter
MNFI	Michigan Natural Features Inventory
MRR	Mining and Reclamation Report
NCWIB	Non-contact Water Infiltration Basin
NJC	North Jackson Company
NLG	Narrow-Leaved Gentian
NREPA	Natural Resources & Environmental Protection Act
ORP	Oxidation Reduction Potential
Q1	Quarter 1
SESC	Soil Erosion and Sedimentation Control
SU	standard units
t	metric ton (tonne)
TDRSA	Temporary Development Rock Storage Area
TDS	total dissolved solids
TWIS	Treated Water Infiltration System
VOC	Volatile Organic Compound
WTP	Water Treatment Plant

1. Document Preparers and Qualifications

This Mining and Reclamation Report (MRR) was prepared by the Eagle Mine Environmental Department and incorporates information prepared by other qualified professionals. Table 1 provides a listing of the individuals and organizations who were responsible for the preparation of this MRR as well as those who contributed information for inclusion in the report.

Table 1. Document Preparation – List of Contributors

Organization	Name	Title
Individuals responsible for the preparation of the report		
Eagle Mine LLC	Amanda Zeidler	HSE & Permitting Manager
Eagle Mine LLC	Corey Brochu	HSE Compliance Supervisor
Report contributors		
Advanced Ecological Management, LLC.	Doug Workman	Aquatic Scientist
Eagle Mine LLC	David Bertucci	Environmental Analyst
Eagle Mine LLC	Josh Lam	Senior Mining Engineer/Project Superintendent
Eagle Mine LLC	Cedric de Chermont	Mining Engineer
Eagle Mine LLC	Wilhelm Greuer	Geotechnical Mining Engineer
Eagle Mine LLC	Todd Macco	Water Treatment Plant Supervisor
Eagle Mine LLC	Jennifer Nutini	Senior Environmental Engineer
Eagle Mine LLC	Alexxa Young	HSE Data Analyst
Eagle Mine LLC	Matthew Taylor	Surface Supervisor
Eagle Mine LLC	Jonathan Dale	Surface Supervisor
King & MacGregor Environmental, Inc.	Matt MacGregor	Wetland Scientist/Biologist
North Jackson Company	Dan Wiitala	Professional Geologist

2. Introduction

Surface construction of the Eagle Mine, an underground nickel and copper mine in Michigamme Township, began in May 2010, followed by the start of underground development in September 2011. Upon commencement of underground operations, per Michigan's Nonferrous Metallic Mining Regulations and the Eagle Mine Part 632 Mining Permit (MP 01 2007), Eagle Mine is required to submit an annual Mining and Reclamation Report.

The MRR is required to provide a description of mining and reclamation activities, updated contingency plan, monitoring results, tonnage of material mined, and a list of incident reports that created, or may create a threat to the environment, natural resources, or public health and safety at the Eagle Mine Site. In addition, this update will serve to memorialize all that has been completed and the decisions and/or modifications that have been approved throughout the process.

3. Site Modifications and Amendments

Table 3 below lists the notifications and required submittals and approvals that were provided to the Department in 2018 as required under the Part 632 Mining Permit. A copy of the current site map is provided in Appendix A.

Table 3. Submittals and Approvals Required Under Part 632

Date	Description	Approval
1/8/18	Notification for building construction (electrical wire storage, ambulance garage addition)	1/11/18
2/26/18	Notification to change recycle water source for truck wash from potable water well to utility water well	2/27/18
3/15/18	2017 Annual Mining and Reclamation Report	N/A
4/18/18	Provided responses to questions on the financial assurance estimate submitted with annual report	N/A
5/14/18	Submitted correction to annual report – Appendix N	N/A
5/17/18	Q1 groundwater and surface water monitoring data	N/A
7/12/18	Notification that contact area asphalt was disposed underground prior to approval from the Department	N/A
7/13/18	Notification for building construction (re-purpose electrical wire storage building and add addition to manage underground exploration core drilling)	7/23/18
7/21/18	Q2 groundwater and surface water monitoring data	N/A
7/22/18	Notification for exploration drift development	9/11/18
9/5/18	Request to dispose of asphalt and concrete from the contact area underground	9/10/18
11/12/18	Q3 groundwater and surface water monitoring data	N/A
2/10/19	Q4 groundwater and surface water monitoring data	N/A

4. Mining Activities and Data Report

Underground activities began in September 2011, with drilling operations in preparation for blasting. On September 22, 2011, blasting at the Eagle Mine commenced and the project was officially "mining." The commencement of mining activities initiated all monitoring programs per the Part 632 Mining Permit. A description of the monitoring activities can be found in Section 5 of this MRR.

4.1. Underground Operations

2018 marked the fourth year of production mining which is being conducted by underground mining contractor, Cementation. The mining method being utilized at the Eagle Mine is longhole open stoping. The stopes are mined in an alternating sequence of primary and secondary stopes with cemented rock fill (CRF) being used in the primary and uncemented rock fill in the secondary stopes below the 327.5 meter MSL levels. Both primary and secondary stopes were mined and backfilled in 2018. All CRF is made onsite at the batch plant and is transported underground using underground haul trucks. The CRF is currently comprised of development rock or off-site aggregate, sand, cement, water, and a concrete admixture.

In accordance with special condition E-8 of the mining permit, an annual review of the rock stability was completed to ensure that the modeling provided in the permit application is still valid. A letter certifying the rock stability, signed by the Mine Manager can be found in Appendix B.

Subsidence monitoring was also conducted in 2018 as required by permit condition L-17. Eagle currently monitors the crown pillar area using multi-point bore hole extensometers (MPBXs); one installed at the surface and another underground MPBX array installed in the backs of the highest present elevation sill drives. In addition, the crown pillar is also monitored through the surveying of monuments within the crown pillar footprint.

The surface and underground MPBX's are grouted in vertical holes and have six anchor points with a potentiometer at each for monitoring displacement at incremental depth. Underground MPBX data loggers are tied into a radio telemetry system for on-demand data retrieval. The surface MPBX is monitored monthly with data manually downloaded using a handheld data logger. Crown pillar monitoring is supplemented with monument surveys at five stations on the crown pillar, where changes in elevation are measured in reference to a backsight location fixed to exposed bedrock. Surveys are completed on a monthly basis to detect vertical subsidence. Accuracy of these measurements is to within less than one millimeter of movement. All monitoring is conducted in accordance with Eagle's Subsidence Monitoring Plan and results did not indicate any deflection of the bedrock surface in 2018.

To ensure the safety of miners in the event of an emergency there were six, twelve-person and four, four-person, 36-hour self-contained Mine Arc refuge chambers stationed underground in 2018.

Mine Arc Refuge Chamber

4.1.1. Underground Development Progress

An additional 6,725 meters of development occurred in 2018 in Eagle and Eagle East. Eagle development included 1,683 meters of sill development which is required in order to access the stopes, 60 meters of vertical development for internal escape raises and 1,470 meters of general development. Eagle East development included 2,681 meters of lateral development, 752 meters for passing bays and muck bays, and 79 meters of vertical development. Table 4.1.1a below summarizes the total 2018 development meters by type completed in Eagle, and Table 4.1.1b breaks out the development completed in the Eagle East decline in 2018. A map showing 2018 Eagle East development progress can be found in Appendix C.

Table 4.1.1a 2018 Eagle Underground Development Totals

Eagle Mine Development	Meters
Sills	1,683
Vertical	60
General/Horizontal	1,470
Total	**3,213**

Source: Mine Engineering Department – Dec. 2018 End of Month Report

Table 4.1.1b 2018 Eagle East Decline Meters of Development

Eagle East Decline Development	Meters
Passing Bays and Muck Bays	752
Vertical	79
General/Horizontal	2,681
Total	**3,512**

Source: Mine Engineering Department – Dec. 2018 End of Month Report

Haul Truck loaded with development rock for disposal on the TDRSA

4.1.2. Underground Ore Production – Stoping & Backfilling

A total of thirteen primary stopes were mined and backfilled in 2018. Primary stopes are backfilled with cemented rock fill after extraction of ore. In 2018, 180,546 tonnes of cemented rock backfill was produced at the onsite batch plant and returned to primary stopes by underground haul trucks. Twenty-two secondary stopes were mined and filled with development rock in 2018. Table 4.1.2a

summarizes the number of stopes that were mined and backfilled in 2018. In addition, the total tonnes of ore mined in 2018 is listed in Table 4.1.2b and is categorized as either sill or stope. A bulk adjustment is applied to the total ore mass based on COSA surveys and over-the-road truck scale readings. Ore categorized as sill is excavated using horizontal drill holes and is the material that is removed in order to access a stope. The stope is the main area of ore that is excavated using vertical drill holes and bench is the ore located between levels that cannot be removed using stoping methods. Appendix C illustrates the current configuration of each mining level and production mining progress through 2018.

Longhole drill, drilling a production stope in Eagle

Table 4.1.2a Number of Stopes Fully Mined & Backfilled in 2018

Stope Type	Total (number)
Secondary Stopes	22
Primary Stopes	13

Source: Mine Engineering Department

Table 4.1.2b Tonnes of Ore Mined in 2018

Ore Mined	Tonnage of ore mined (tonnes)
Sills	187,583
Stopes	601,667
Survey Actual Adjustment	-36,317
Total	**752,933**

Source: Mine Engineering Department – Dec. 2018 End of Month Report

4.1.3. Dewatering Volume and Quality

Water is required underground in order to complete drilling, bolting, dust suppression activities, and to knock down loose material that remains suspended after a stope blast. In 2018, the mine services well supplied all of the water needed to complete underground mining and development activities.

The lines supplying and removing water from the underground are equipped with totalizer meters. These flows are continuously tracked and stored within a database system that is reviewed by Environmental staff.

Average water use increased in 2018, with underground operations continuing throughout the entire year. The increased demand is likely attributed to the continued development of the dual declines occurring in Eagle East and working in multiple stopes in Eagle. The amount of water supplied for underground operations in 2018 ranged from an average of 71,359 gallons per day (gpd)/(50 gallons per minute (gpm)) in June, to 89,639 gpd (62 gpm) in August. The total water pumped from the mine to the surface, including water supplied to the underground and natural inflow into the mine, ranged from an average of 62,913 gpd (44 gpm) in March to 86,630 gpd (60 gpm) in September.

The dewatering volume is calculated by subtracting the volume of water provided to the underground from the volume of water pumped to the surface. The difference between the two numbers is indicative of the volume of groundwater that is naturally infiltrating the mine. Inspections of the underground found only a few areas in which groundwater infiltration is visible and is significantly less than was predicted during the permit application process. Similar to previous years, the overall calculated dewatering volume for the mine was negative during the majority of 2018. These negative values were likely the result of the relatively low groundwater infiltration rates coupled with the fact that a portion of the water supplied to the underground is retained in the fine particles in the roadways where dust suppression occurs and within the ore and development rock as piles are wetted before transporting to the surface to minimize dust. Table 4.1.3 below summarizes the average daily volume of water supplied and pumped to the surface for each month in 2018.

Table 4.1.3 Average Monthly Water Volume Provided to Underground and Dewatering Volume

Month	Average Water Supplied Underground (gpd)	Average Water Pumped from Underground (gpd)	Average Dewatering Volume*(gpd)	Average Dewatering Volume* (gpm)
January	84,698	68,440	-16,258	-11.29
February	87,294	63,540	-23,755	-16.50
March	88,273	62,913	-25,360	-17.61
April	87,790	67,696	-20,094	-13.95
May	76,996	68,481	-8,514	-5.91
June	71,359	62,994	-8,365	-5.81
July	73,010	70,010	-2,999	-2.08
August	89,639	83,661	-5,978	-4.15
September	87,996	86,630	-1,366	-0.95
October	79,121	66,491	-12,630	-8.77
November	87,129	79,287	-7,842	-5.45
December	82,294	73,614	-8,680	-6.03

* Dewatering volume is calculated by subtracting the volume of water provided to the mine from the volume of water removed from the mine. Dewatering volume is indicative of the amount of groundwater infiltration occurring.

4.2. Temporary Development Rock Storage Area (TDRSA)

Crushing of development rock for use in cemented rock fill continued on the TDRSA in 2018. Eagle contracted Associated Constructors to crush the development rock on the TDRSA to a size of three

inch minus using a portable crushing system. Approximately 265,084 tonnes of development rock was crushed in 2018.

TDRSA Development Rock Crushing, October 2018

4.2.1. Development Rock Storage Volume

In 2018, the total volume of development rock mined was 136,570 m^3, however only 78,875 m^3 of development rock was placed on the TDRSA from the underground. The remaining 57,695 m^3 was utilized as uncemented backfill in secondary stopes. Also, in 2018, 59,405 m^3 of development rock was removed from the TDRSA for use in cemented rock fill. The development rock volumes were derived from survey volumes and truck factors for development rock mined. The total TDRSA rock volume accounts for material mined from 2011 through 2018.

No limestone was added to the TDRSA in 2018. The effectiveness of limestone added in previous years continues to be verified through quarterly pH readings of the TDRSA contact water. Table 4.2.1 summarizes the surveyed volume of material stored in the TDRSA as well as the volumes of development rock and limestone added and/or removed for use in backfill in 2018.

Table 4.2.1 2018 TDRSA Volume Totals

Month	Volume of Waste Rock Added to TDRSA (m^3)	Swelled Volume of Waste Rock (m^3)	Limestone Delivered (m^3)	Development Rock Used for Backfill (m^3)	TDRSA Surveyed Volume 1/11/19 (m^3)
2018 Total*	78,875	102,538	0	59,405	284,275

*Note: Waste rock volumes added and removed from the TDRSA are estimated based on truck factors. The TDRSA surveyed volume represents the total volume of development rock stored on the TDRSA at the end of the year. The waste rock conversion factor was updated in 2016 to 2.8 t/m^3 based on current averages to date. The swell factor of 1.3 is an industry standard value for hard rock mining. Source: Mine Engineering Department

4.2.2. Mining Forecast

The 2019 mining forecast for the Eagle deposit calls for the continued development of extraction drifts and stope accesses for a total of 1,865 meters of lateral advance. Total ore tonnes produced for 2019 is forecasted to be approximately 745,000 tonnes. In 2019, fifty percent of the stopes mined will be secondary stopes and fifty percent primary stopes. Further advancement planned for the Eagle East decline in 2019 includes the development of approximately 7.0 meters per day based upon the current production schedule. Mining of ore from Eagle East is expected to occur in late 2019. All estimates are contingent upon the current production schedule and are subject to change.

4.2.3. TDRSA Sump Dewatering Volume and Quality

The TDRSA has two collection sumps; the contact water and leak detection. The contact water sump collects drainage from the primary TDRSA liner where the water is in contact with development rock. The purpose of the leak detection sump is to capture water within the secondary liner system in the event of a failure of the primary liner. The water currently in the leak detection sump is rain water that has been encapsulated in the secondary lining system since construction. Both sumps are continuously monitored through the use of pressure transducers.

The contact water pumping system is equipped with an automatic pump start and high water alarm to indicate when the water level is approaching the one foot maximum head level. The leak detection sump is manually pumped and sampled as necessary. Operational controls, which include operator training and control panel lockout, have been implemented to ensure the systems operate as designed and required sampling and volume collection occurs.

Primary Contact Water Sump Monitoring

Daily inspections of the TDRSA primary sump level are conducted by water treatment plant (WTP) operators and an additional weekly inspection by the Environmental Department. The water level is recorded in a compliance logbook that is kept onsite and available upon request. Results of the daily and weekly inspections indicate that water levels in the sump were maintained within the ranges specified by the Part 632 permit or returned to those ranges within seven days following a significant wet weather event (rain and/or snowmelt).

In 2018, approximately 6.1 million gallons of water was pumped from the TDRSA contact water sump to the contact water basins (CWBs) for eventual treatment in the WTP. Quarterly water quality monitoring of the contact water sump was conducted in March, June, September, and November 2018. The majority of results were consistent with those previously reported, with a few exceptions including specific conductance, sodium, chloride, nitrates, sulfate, magnesium, boron, manganese, and selenium all of which trended upward in 2018. The increase in specific conductance, sodium and chloride is likely due to the temporary storage of material on the TDRSA from Eagle East. Rock from Eagle East is known to be brinier in nature due the geologic formation in which it originates. A summary of the 2018 monitoring results can be found in Appendix D.

Leak Detection Sump Monitoring

Permit conditions require that the leak detection sump be purged and sampled as accumulation occurs. “Accumulation” was determined to be a volume of water significant enough to allow for three minutes of purging prior to sample collection. In addition to water quality analysis, the volume pumped is used to calculate the average daily rate of accumulation into the sump.

In 2018, four samples were collected and the accumulation rates calculated. The daily rate of accumulation was estimated throughout the year at 0.02 – 0.04 gal/acre/day and was well below the 25 gal/acre/day threshold indicated in the permit. Table 4.2.3 below summarizes the calculated flow rate for sampling events from the TDRSA leak detection sump for 2018. A total of approximately 50 gallons of water was purged from the leak detection sump in 2018, a smaller volume than 2017. These values are estimated as the flow did not consistently totalize on the flow meter. It was determined that the flow meter may seize from infrequent use or the flow rate was too low to register on the meter. The total volume of water purged to date is only a fraction of the estimated 26,000 gallons of rainfall that entered the secondary collection system during construction. In an effort to ensure that the flow rate is accurately tracked and mitigate the risk of pump failure, the

frequency of pumping to prevent the flow meter and pump from seizing has been increased since the October 2016 approval was received from the Department. A minimal volume of water was pumped in 2018 to keep the flow meter from seizing and still allow sufficient volume to continue quarterly sampling.

Samples were collected from the leak detection sump in March, June, September, and November 2018. Upon sample collection, the pH and specific conductance of the sample are immediately determined and the remaining sample aliquot is sent to an off-site laboratory for analysis. Although only pH and sulfate analysis is required by the permit, additional parameters (i.e. magnesium, sodium, chloride, nitrate, nitrite, and ammonia) are also collected in order to further understand the water quality of the leak detection sump. Once the sample is collected, the remaining water contained in the leak detection sump is purged to the contact water basins.

Table 4.2.3 below summarizes the TDRSA leak detection sump analytical results for 2018. The pH results were fairly consistent and ranged from a low of 7.2 to a high of 7.7 which is neutral to slightly basic in nature. Sulfate results fluctuated throughout the year, with levels generally increasing. Levels ranged from a maximum of 849 mg/L in June to a minimum of 726 mg/L in March. The sulfate concentrations for each of the samples collected in 2018 were above the 500 mg/L threshold identified in the permit.

As required, the MDEQ was notified of the elevated sulfate results in the quarterly benchmark summary letters. Comparison of the data from the TDRSA primary contact water and leak sumps identified clear differences in the concentrations of sulfate, magnesium, chloride, and nitrate between the two sumps. This indicates that the water in the leak detection sump was not from the primary contact sump and the integrity of the liner is intact. The source of sulfate was likely introduced during construction of the lining system. Results will continue to be reviewed and any potential trends documented. Any upward trending will be reported to the Department. A summary of the 2018 monitoring results and graphs comparing results from the TDRSA leak detection and contact water sump can be found in Appendix D.

Table 4.2.3 TDRSA Leak Detection Sump Results for 2018

Parameter	3/27/18	6/26/18	9/18/18	11/27/18
Magnesium (mg/L)	14.5	15.2	16.6	17.8
Sodium (mg/L)	446	453	484	515
Chloride (mg/L)	10.2	10.5	10.6	16.1
Sulfate (mg/L)	726	849	754	794
Nitrate (mg/L)	26.5	27.6	26.4	32.2
Nitrite (mg/L)	<0.05	<0.05	<0.05	<0.25
Ammonia (mg/L)	<0.05	<0.05	<0.05	<0.05
Average Daily Flow Rate (gal/acre/day)*	0.02	0.04	0.04	0.04
Purged Volume (gal)*	6	10	10	10
pH	7.7	7.2	7.3	7.6
Specific Conductivity (µS/cm)	2,321	2,371	2,472	1,885

*estimated volume, flow rate was too low to register on the flow meter.

4.3. Site Water Usage, Treatment, and Discharge

Site wide water management includes three separate sources for supplying water to surface and underground mining activities and three primary sources that supply water to the CWBs for eventual treatment in the water treatment plant. The WTP processes the water and provides a portion for recycle within the WTP itself and for discharge to the Treated Water Infiltration System (TWIS).

4.3.1. Supply Water Sources and Usage

Three separate sources supply water to the mine site to support various operational activities. These sources include the potable well, mine services well, and treated utility water from the WTP. Utilizing the detailed water use logs maintained on site, the following summary of average water use, from each source, has been compiled.

The domestic well (QALPSW001) is used to supply potable water to the surface facilities, the final rinse water in the truck wash, and fire water tank if necessary. During 2018, the approximate water use was 10,818 gpd (8 gpm). This was less than the average of 19,721 gpd (14 gpm) utilized in the previous year.

The mine services well (QAL011D) is primarily used to supply water for exploration drilling, replenishing the truck wash recycled water bay, underground operations, dust suppression, and the fire water tank which supplies water to the network of fire hydrants onsite. Approximately 101,608 gpd (71 gpm) of water was utilized in 2018 which is up from an average of 89,926 gpd (62 gpm) supplied in 2017. The increase is likely due to the utilization of additional equipment for the development of the Eagle East dual declines as well as an increased water demand associated with working in multiple stopes. A leak in the mine services water supply line was detected in March and repaired in June. This leak correlates with the highest water use rates reported in 2018 and accounts for a portion of the increase in water withdrawal in 2018.

The third source of water on the mine site is the treated utility water which is supplied by the WTP. This is water that is collected in the CWBs, treated through the first half of the treatment process and subsequently recycled within the WTP rather than being discharged to the TWIS. The utility water is required in various stages of the water treatment process including for cooling, dilution, backwash, and in various cleaning processes. In 2018, the total volume of utility water treated and recycled was approximately 712 gpd (0.5 gpm) which is down from 1.8 gpm reported in 2017.

4.3.2. Storm Water Control

The mine site storm water is either defined as non-contact storm water or contact storm water. The non-contact storm water is collected in non-contact water infiltration basins (NCWIBs) where it then infiltrates into the ground. This water does not require treatment because it is from areas of the site that have no contact with operations. The contact storm water is collected in two lined basins where it is held prior to treatment through the water treatment facility. Contact water is any water that may come into contact with material from the underground mine.

4.3.3. CWB Water Management and Water Quality

Three primary sources of site water are discharged to the CWBs prior to treatment in the WTP. These include dewatering from the underground mine, dewatering from the TDRSA, and precipitation and storm water that falls on the contact area. Additional intermittent sources include

dewatering from the sumps located in the Coarse Ore Storage Area (COSA), truck wash, fuel area, batch plant, boot wash, and truck shop.

CWB levels are continuously recorded and saved to a database maintained by WTP operators. This log is available on request. All rainfall and snow melt that occurred in 2018 was collected and managed within the capacity of the CWBs. A water management plan has been developed for the site and is available upon request.

The water quality of the CWBs is evaluated on a quarterly basis. This characterization provides the WTP operators with valuable data that may affect process control and also provides information to identify any parameter trending in water quality as mining progresses. Samples were collected from the influent sampling point at the WTP in March, June, September, and November 2018. The annual parameter list was collected during each quarter in 2018 in order to compare results to downgradient water quality. In addition to completing leak testing of the CWB liners, a results comparison is also completed to confirm the liners are intact and functioning as designed. Additional information on the CWB leak testing can be found in Section 5.4.5. Similar to previous years, the CWB monitoring results fluctuate from quarter to quarter and are dependent on the areas being mined underground and the amount of dilution occurring due to precipitation rates. pH results trended from neutral in 2017 to more basic in 2018. pH ranged from 8.8 SU in September to 9.8 in June. This shift is likely related to the washing of limestone, used to amend the development rock on the TDRSA, during rain events and changes in water chemistry observed in Eagle East. Results for nitrates, sodium, and chloride also increased from levels observed in 2017 and again are likely related to Eagle East as water is known to be “brinier” due to the geologic formation in which it originates. Results from the TDRSA contact water sump also experienced similar increases which correlates well since the water from the TDRSA reports to the CWBs. A summary of the results can be found in Appendix D.

4.3.4 Non-Contact Water Infiltration Basins (NCWIB)

There are three NCWIBs located in the main surface facility area and one NCWIB near the ventilation air raise. Inspections of the NCWIBs, following wet weather events, continue to indicate the basins are operating as expected with storm water readily infiltrating back into the ground. The only exception is following spring melt or excessive rain events in which water is present for a minimal period of time before infiltration occurs. The basins are monitored for excess silting that would prevent infiltration from occurring and not allow the basins to operate as designed.

In accordance with the mining permit, monitoring wells are required to be located down gradient of each NCWIB and must be sampled in the event of a surface discharge from the basin. Eagle Mine has chosen to sample these wells at least annually as surface discharge is not expected to occur. Monitoring wells, QAL070A and QAL073A, located down gradient of NCWIBs 2 & 3 are monitored on an annual basis. Monitoring wells QAL071A and QAL024A are located down gradient of NCWIB 1 and NCWIB 4 and are monitored on a quarterly basis as part of the overall mine monitoring well network.

The analytical results from these monitoring locations are compared to the established benchmarks calculated for each. Similar to 2017, 2018 results indicated a small number of cations and/or anions including alkalinity bicarbonate, sodium, chloride, nitrate, sulfate, calcium, magnesium, and hardness were outside of calculated benchmarks at one or more locations. The majority of the results were consistent with those reported in 2017 with the exception of alkalinity bicarbonate and sodium at location QAL070A that appear to be trending up and sodium at QAL071A that is starting to

trend down. Location QAL070A is located adjacent to the site's main access road which is graded in a manner in which run-off from the roadway could potentially impact the location. It is expected that the elevated levels of sodium and chloride at location QAL070A are likely due to a sand/salt mixture that is applied to the roadway during winter conditions. Results from QAL071A are further discussed in section 5.1 and all results are summarized in Appendix F of this report.

4.3.5. Water Treatment Plant Operations and Discharge

The WTP successfully treated and discharged over 53 million gallons of water in 2018. A summary of the monthly discharge rates can be found in Table 4.3.5 below.

Effluent discharges to the TWIS are regulated under Groundwater Discharge Permit GW1810162 with discharge volume and analytical results reported to the MDEQ on a monthly basis through the online MiWaters reporting system. In October 2017, Eagle submitted an application to the Water Resources Division via MiWaters for approval to continue discharge under the current permit. This is a routine application that is required to be completed every five years. At this time, the permit is still under review by the Department.

Table 4.3.5 Volume of Water Discharged in 2018

Month	Volume of Water Discharged (gallons)
January	3,859,488
February	2,543,711
March	3,831,406
April	5,347,902
May	5,445,160
June	4,559,796
July	4,021,454
August	3,902,619
September	6,232,946
October	5,720,609
November	4,706,303
December	2,850,884
Total	**53,022,278**

Source: WTP Operators log

The water treatment process generates two waste streams; filter press and crystallizer. The filter press waste stream is dewatered solids from the clarification treatment process and is primarily comprised of calcium and magnesium, while the crystallizer waste is essentially sodium chloride. Samples of the waste streams were sent to the laboratory as required by the disposal landfill. All results indicate that the wastes are non-hazardous. In 2018, 529 metric tonnes of crystallizer waste was disposed at a landfill and approximately 258 metric tonnes of filter press waste was disposed of at a landfill.

4.4. Materials Handling

4.4.1. Chemical Handling, Storage, and Reporting

It is the goal of Eagle Mine to create a culture of environmental awareness throughout the workforce. Therefore, all employees and subcontractors are trained to immediately respond and

report any spills that occur. In 2018, Eagle Mine had zero reportable spills under the Part 5 Rules of Part 31, Water Resources Protection of NREPA, 1994 PA 451 as amended (Spillage of Oil and Polluting Materials).

The Michigan SARA Title III Program requires reporting of onsite chemicals being stored above threshold quantities. Due to the volume of chemicals stored/used at the site, primarily in the WTP, a Tier II Report was submitted in February 2018 via the online Tier II Reporting System to the State Emergency Response Commission (SERC). Copies of the report were also mailed to the Marquette County Local Emergency Planning Committee (LEPC) and Powell Township Fire Department.

5. Monitoring Activities

5.1 Water Quality Monitoring

A significant amount of surface water and groundwater quality monitoring is required both on and surrounding the mine site. Following is a summary of the water quality monitoring activities.

5.1.1 Quarterly Groundwater Quality Monitoring

Groundwater quality is monitored through a network of monitoring wells located both inside and outside the mine site perimeter fence. A map of the well locations can be found in Appendix E.

Four rounds of quarterly sampling were completed in February, May, August, and November 2018. The Eagle Mine Permit prescribes both a long parameter list for annual monitoring events (conducted in Q2 2018) and a short list to be used quarterly (Q1, Q3, Q4 2018). In addition to the permit required sampling lists, locations QAL061A, QAL062A, and QAL067A are analyzed for volatile organic compounds (VOCs) on an annual basis in response to comments provided during the permit application process. VOC samples were collected in Q2 2018 and all results were found to be non-detect. Samples are collected in accordance with the Eagle Project Quality Assurance Project Plan and Standard Operating Procedures (North Jackson, 2004a and 2004b) and the results are summarized and compared to benchmarks in the tables found in Appendix F.

Two sets of benchmarks were calculated for all mine permit groundwater monitoring locations based on the guidance provided by the Mine Permit and Part 632, with the lower of the two being used for comparison. In late 2015, results were reviewed and those found to not be trending, based on statistical analysis, were used to update the benchmarks. These updated benchmarks were used for comparison in 2018.

Groundwater Monitoring Location QAL062A

Monitoring Results

Twenty-three monitoring well samples were collected during each of the four quarterly sampling events. Samples collected from two additional monitoring wells were collected on an annual basis and summarized in Section 4.3.4. Samples were collected using low-flow sampling techniques, and field parameters (dissolved oxygen (DO), oxidation reduction potential (ORP), pH, specific conductivity, temperature, turbidity) are collected and analyzed using a flow-through cell and YSI probe. All samples were shipped overnight to Pace Analytical in Grand Rapids, Michigan, for analysis.

The majority of parameters analyzed reported values below the analytical reporting limit and calculated benchmark, and are listed as non-detect. The greatest number of detections were reported for anion and cation parameters. A summary of wells that have had one or more parameters exceed a benchmark value can be found in Appendix F.

In accordance with Part 632, R426.406 (6) when a result is greater than a benchmark for two consecutive sampling events, at a compliance monitoring location, the permittee is required to notify the MDEQ and determine the potential source or cause resulting in the deviation from the benchmark. The following is a summary of the events that occurred in 2018:

- Location QAL024A reported benchmark deviations for the following anions/cations during 2018; chloride, nitrate, sodium, and alkalinity-bicarbonate. Elevated levels of sodium, chloride, and magnesium were first reported at this location in 2013 and resulted from the use of a sand/salt mixture to minimize ice build-up and subsequent storage of stockpiled snow near the monitoring well location. Since 2013, magnesium has returned to baseline levels and although still greater than the established benchmarks, sodium and chloride have both decreased by approximately 87% from peak levels observed in 2013. Results for sodium and chloride appear to have stabilized and have been consistent since 2017.

- pH and alkalinity-carbonate levels were above benchmarks at location QAL044B for all four sampling quarters in 2018. The pH results trended down from Q1–Q4 2018 and in Q4 pH was reported at 9.5 SU which is just above the benchmark of 9.3 SU. A review of nearby wells found the elevated pH levels to be isolated to this monitoring location. Alkalinity-carbonate results also trended down from Q1-Q4 2018 and are currently just above benchmark values established for this location.

- Nitrates were detected above benchmarks during all four sampling quarters in 2018 at monitoring locations QAL060A and QAL061A. In addition, alkalinity bicarbonate, calcium, and magnesium were also greater than benchmarks at QAL061A. Results reported in 2018 for all four parameters were consistent with those reported in 2017. Results were only slightly greater than established benchmarks and it is probable that the deviations being seen are consistent with natural groundwater variations.

- QAL062A, located on the eastern berm of the TDRSA, reported pH, alkalinity-bicarbonate, sodium, chloride, and nitrate results that were above calculated benchmarks for each sampling event in 2018. Calcium, magnesium, potassium, and hardness were also above benchmark levels for two consecutive Q2 sampling events. Although the monitoring well is located next to the TDRSA it is unlikely the source of the elevated results because the results from the TDRSA and monitoring well do not correlate. For example, metals are present in the contact water of the TDRSA but are not detected in QAL062A. The increases of many of the constituents present, above benchmark levels, is most likely the result of the chloride

plume that, as predicted, is slowly moving across the site. This plume is the result of historical salt use on the contact area.

The pH results at this location continued to be below the calculated benchmark range by at least 0.5 SU for more than two consecutive sampling quarters therefore meeting the action level for pH. Results for pH at surrounding locations, both upgradient and downgradient of QAL062A (i.e. QAL025, QAL026, QAL060A, QAL061A, and QAL067A) are within benchmark values and therefore do not indicate a site wide trend of decreasing pH values. This location will continue to be closely monitored.

- Alkalinity bicarbonate, chloride, sodium, and nitrate were above benchmark levels at QAL063A and pH levels were below benchmark levels throughout 2018. Calcium and magnesium were also above benchmark levels for two consecutive Q2 sampling events. Similar to other wells on or near the contact area, the elevated chloride and sodium levels are likely attributed to the chloride plume that is moving across the site from historical salt use to melt ice on the contact area. This monitoring well is located near the south west corner of the water treatment plan and side gradient of the CWBs. No correlation between QAL063A and the CWBs exists as metal levels present in the CWB water are not detected at QAL063A.

  pH values reported at location QAL063A in 2018 remained consistent with results reported in 2017 and ranged from 7.5 SU in Q3 to 7.8 SU in Q1. Although the values are outside of calculated benchmark range of 8.1-9.1 SU, the values themselves remain within the slightly basic range that was identified during baseline sampling.

- QAL066D reported results for iron and sodium that were above benchmark levels for at least two consecutive sampling quarters in 2018. Iron was above the benchmark for three consecutive sampling quarters in 2018 (Q2-Q4) but was trending down with each quarter. The elevated iron is likely the result of iron oxides or iron hydroxides in the soils (clay) within the formation in which this well is located. Sodium results remained fairly consistent throughout 2018 and were similar to results reported during both 2016 and 2017 indicating that the results are stable and not trending up from baseline levels.

- Location QAL067A, located on the southeast corner of the TDRSA, reported benchmark deviations for chloride, nitrate, sodium and alkalinity bicarbonate during each of the 2018 sampling quarters. Sulfate was also above benchmark levels in Q1-Q2 2018 but trended below benchmarks in Q3 and Q4. Additional parameters were detected above established benchmarks for one sampling event and are summarized in Appendix F. The sodium, chloride, and nitrate results trended down while alkalinity bicarbonate results remained fairly consistent, though increasing slightly from Q1 to Q4 2018. It is still believed that the elevated results at this location are associated with the extensive use of salt on the contact area as no additional changes have occurred in the area. As the chloride plume moves across site, it is expected that the results will continue to trend back towards baseline levels similar to what was observed in 2018.

- In 2018, QAL071A, located near the northwest corner of the septic drain field, reported detections of anions/cations that were outside of calculated benchmarks in each of the four 2018 sampling events. Results for calcium, chloride, hardness, magnesium, nitrate, and sodium all trended down in 2018 from levels reported in 2017. As noted in previous annual reports, it is still suspected that the elevated values are the result of the well's location near the septic drain field. In Q3 2014, the action level for nitrate was met at QAL071A requiring

Eagle to conduct supplementary sampling at location QAL074A located downgradient of the septic system and investigate the source of the elevated results. Results continue to meet the action level for nitrate and as such the investigation continued in 2018. Results from the investigation are summarized below.

- A review of upgradient wells, TDRSA and CWB results indicated that there is no correlation between the results and elevated levels of nitrates detected at QAL071A. In addition, activities that were identified as occurring near NCWIB 1 (i.e. snow storage) that could have potentially influenced QAL071A both occurred after the elevated nitrate results were initially reported, thus eliminating them as the potential source.
- Groundwater elevations for QAL071A and QAL074A indicate that there is a localized trend evident following spring snowmelt which is likely due to the influence of NCWIB 1 and the septic system. As such, the groundwater flow in the area is altered and would allow groundwater to flow in the direction of QAL071A, thus potentially exposing the monitoring location to septic tank effluent.
- Chloride, sodium, and nitrates are all present in human wastes and are considered to be good indicators of septic system waters. All three constituents are present in the groundwater at QAL071A and QAL074A.
- A review of monitoring results from locations downgradient of QAL071A and QAL074A, near the treated water infiltration system (TWIS), do not show any signs of elevated nitrate levels. At this time, there is no threat of elevated nitrate levels migrating offsite from monitoring location QAL071A.

Based on the review of data collected in 2018, the septic tank effluent still cannot be excluded as a source of the elevated nitrate levels reported at QAL071A.

As required by MP 01 2007 special condition N2, a statistical trend analysis has been conducted for all monitoring locations/parameters. Possible trends were identified for one or more parameters at fourteen compliance locations and eight background monitoring locations using data collected from baseline sampling events (2011) through December 2018. Sodium, alkalinity bicarbonate, sulfate, nitrate, magnesium, and chloride were the most frequently noted as possibly trending.

A trend analysis will continue to be conducted in 2018 and results reviewed to determine if the trends are attributable to mining operations. A table summarizing the potential groundwater trends can be found in Appendix G. For compliance monitoring locations in which results were outside of established benchmarks for at least two consecutive quarters and a potential trend was identified, the trend charts are also provided in Appendix G. A full report outlining groundwater trending results for all parameters and locations, including graphs, is available upon request.

As a component of the trend analysis review, Piper Diagrams were utilized to classify the water types and determine if any changes in water chemistry have occurred over time. Piper Diagrams were created for select monitoring locations that have exhibited possible trends in one or more chemical parameters. Monitoring locations QAL025A, QAL026A, QAL044B, QAL060A, QAL061A, QAL064D, QAL068A, QAL071A, and QAL073A are all classified as having a calcium bicarbonate water chemistry and have shown no signs of a change in water chemistry over time.

The following monitoring locations did exhibit a change in water chemistry and are further explained below:

- QAL024A – Water chemistry data from seven samples collected during Q2, 2012 – 2018 were plotted. The water type was originally classified as calcium bicarbonate in 2012, then drifted into the sodium chloride classification in 2013. From 2014 through 2018 the water chemistry was classified as mixed-cation chloride but has started to migrate back towards the classification of calcium bicarbonate. The change in chemistry from 2013 to present may have been associated with the previous construction of the vent raise as well as salt use and snow storage practices near monitoring well QAL024A. Future quarterly sampling will increase understanding of the water chemistry at this location.
- QAL062A & QAL063A – Water chemistry data from these locations were originally classified as calcium bicarbonate in 2011 but have slowly shifted towards sodium chloride chemistry within the last two years. This shift is indicative of historic road salt use that occurred on the contact area and corresponding chloride plume that is slowly moving across site.
- QAL066D – Water chemistry data from eight samples collected from 2011-2018 were plotted. Samples prior to 2016 were classified as calcium bicarbonate and then shifted towards sodium bicarbonate in 2016-2017 and then back to calcium bicarbonate in 2018. Results at this location have fluctuated and are believed to be attributed to fine grained sediment that is present in the well resulting from improper grouting during installation. This well requires aggressive purging on a routine basis to remove the accumulating sediment in order to achieve an accurate assessment of water quality.
- QAL067A – Water chemistry data from eight samples collected during 2011 – 2018 were plotted. All samples prior to May 2014 were classified as having a water type of calcium bicarbonate. In May 2014, the water chemistry began to change and has been classified as sodium chloride since November 2014. This change in water chemistry is indicative of an external source of contamination and is likely due to contact area salt use as discussed above.
- QAL069A – Water chemistry from this location was classified as calcium bicarbonate until 2018 when it shifted towards mixed-cation chloride classification. This well is located near the security building and site access road where salt is used as a deicer.
- QAL070A – Water chemistry from seven samples collected during 2011 – 2018 were plotted. All samples collected prior to May 2015 were classified as having a water type of calcium bicarbonate which is indicative of shallow fresh groundwater. In May 2015, a shift in water chemistry occurred and continued into 2018 in which the water is now classified as mixed-cation chloride waters. This monitoring location is also found near the site access road where salt is used a deicer and drainage from the roadway is routed in close proximity to this well.

Piper Diagrams for each of the monitoring locations referenced above can be found in Appendix H.

5.1.2 Quarterly Surface Water Quality Monitoring

Surface water sampling was conducted on a quarterly basis in 2018 at eleven locations; nine on the Salmon-Trout River and one each on the Yellow Dog River and Cedar Creek. The samples collected represent winter base flow, spring snowmelt/runoff, summer base flow, and the fall rain season. Samples were collected in February, April, August, and October 2018. The spring runoff sample was collected in April in order to best represent the peak flow rates of the spring runoff. A map of the surface water sampling locations is found in Appendix I. Samples are collected in accordance with the Eagle Project Quality Assurance Project Plan and Standard Operating Procedures (North Jackson,

2004a and 2004b) and the results are summarized and compared to benchmarks in Appendix J. In 2015, all surface water benchmarks were reviewed and updated using results that were not determined to be trending based on statistical analysis. These updated benchmarks were used for comparison in 2018.

Surface Water Monitoring Location STRM005

Monitoring Results

Grab samples were collected from each location during the quarterly sampling events completed in February, April, August, and October 2018. The Eagle Mine Permit prescribes a long parameter list for annual monitoring events (completed in Q2 2018) and a short list to be used quarterly (Q1, Q3, and Q4 2018). In addition to the grab samples, field measurements (DO, pH, specific conductivity, temperature) were collected and determined through the use of a YSI probe. The stream stage and flow measurements were obtained using a wading rod and current meter. All water quality samples were shipped overnight to Pace Analytical, in Grand Rapids, Michigan, for analysis. Following is a summary of the 2018 events that occurred.

- At compliance monitoring location STRM005, the results for iron were detected above the established benchmark for two consecutive Q1 sampling events. Iron was also detected in reference stream CDRM004 in Q1 2018 indicating that the increase in iron is likely not the result of mining activities but a regional change. This location is the most northern surface water monitoring point and is well outside of the direct influence of the mine site.
- Compliance location STRE001 reported results for iron above the established benchmark for two consecutive Q3 sampling events, decreasing in Q3 2018. Results for iron for the remaining sampling quarters were within established benchmarks as were iron results at nearby monitoring locations STRE009 and STRE010 indicating the results at STRE001 are likely due to seasonal variation and unrelated to mining activities.
- Compliance location YDRM002 reported results for pH that were outside of the calculated benchmarks for two consecutive Q4 sampling events. The result for pH was 6.4 SU in Q4 2018 which is just outside of the established benchmark of 6.6 SU. The pH results for the remainder of the sampling quarters were well within established benchmarks in 2018 indicating the change may have been the result of seasonal variation. Heavy rainfall occurred during the months of September and October 2018 and may be responsible for the small variations in pH from baseline levels. pH will continue to be closely monitored at this location.

A trend analysis was also conducted for the surface water monitoring locations. The same statistical analysis as groundwater was utilized with the exception that each parameter was also analyzed for each quarter, rather than just parameter and location, in order to take into account seasonal variations.

Possible trends were identified for one or more parameters at all eleven monitoring locations using data collected from baseline sampling events (2011) through October 2018. Sulfate, mercury, and total dissolved solids (TDS) were the most frequently noted as possibly trending. The largest number of the trends identified occurred in Q2 and Q3. The longer parameter list is analyzed in Q2 which correlates with the larger list of parameters identified as possibly trending in Q2. In addition, the Q2 event captures spring snowmelt where runoff from surrounding areas have historically resulted in temporary deviations from baseline. It should be noted that the elevated results and associated trends return to baseline levels in subsequent quarters showing that the results are likely due to seasonal variation.

A trend analysis will continue to be conducted in 2019 and results reviewed to determine if the trends are attributable to mining operations. A table summarizing the potential surface water trends can be found in Appendix K. For compliance monitoring locations in which results were outside of established benchmarks for at least two consecutive seasonal quarters and a potential trend was identified, the trend charts are also provided in Appendix K. A full report outlining groundwater trending results for all parameters and locations, including graphs, is available upon request.

5.2 Regional Hydrologic Monitoring

5.2.1 Continuous, Daily and Monthly Groundwater Elevations

Monitoring wells QAL023B, QAL024A, QAL044B, QAL064D, QAL065D, QAL066D and wetland locations WLD022, WLD023, WLD025, WLD026, WLD027, and WLD028 are instrumented with continuous water level meters. Water level meters were connected to a telemetry network in 2018 which allows for real-time data review and analysis rather than monthly downloads as was previously the practice. A map of these locations can be found in Appendix L.

Continuous groundwater monitoring locations are reported by water year (October 1 – September 30). Calculated background water levels and monthly water level results are based on mean daily values and summarized in Appendix N. The following is a summary of the findings:

- QAL023B – The mean water level readings from October 2017 – September 2018 were a maximum of 1.7 feet below the calculated minimum background baseline level. The lowest reading was recorded in January.
- QAL044B - The mean water level readings from October 2017 – September 2018 were a maximum of 0.4 feet below the minimum baseline level calculated for this location. The lowest reading was recorded in September 2018.
- QAL065D - The mean water level readings from October 2017 – September 2018 were a maximum of 0.6 feet below the minimum baseline level calculated for this location in August.
- QAL066D - The mean water level readings in October 2017 - September 2018 were a maximum of 1.1 feet below the minimum baseline level calculated for this location.

Similar to 2017, the changes in groundwater levels observed in 2018 are most likely attributed to two main sources; pumping of the mine services well and groundwater infiltration into the mine. In addition, some of the short-lived fluctuations in groundwater levels may be attributed to blasting events. In a confined aquifer, the impacts of blasting may be observed due to increased pressure or changes in pressure. These changes are short-lived and water levels return to pre-blast levels shortly after the blasting cycle is complete.

Mine Services Well

As stated in section 4.3.1 above the mine services well (QAL011D) is used to supply water for underground operations, dust suppression, fire water, etc. A study completed in May 2016 found that when the mine services well is operating, monitoring location QAL004D shows drawdown of the water level which slowly rebounds when the well is not in use. Based on a review of hydrographs from area monitoring locations, it appears that there is some degree of influence from the use of the mine service well on water levels in the confined aquifer (B and D zones) that extends to the area above the orebody. The change in water levels is not reflected in either the A zone water table aquifer hydrographs or the wetland hydrographs. In addition, wetlands lying above the deeper aquifer and orebody do not currently show any hydrological response to mine service well or potable water supply well pumping.

Groundwater Infiltration

In 2018, development of ramps, sills, and drifts in the 352 and 381 levels were completed as part of the Phase 4 assessment for the crown pillar. This provided the ability to complete geotechnical mapping, core logging, and insitu stress testing of the area. During completion of this work, water inflow was measured on several occasions when mining through discrete geologic structures. Most notably in late April a water-bearing feature was breached which resulted in a maximum sustained flow of 10-12 gpm. Drawdown was observed in the bedrock piezometers and quaternary wells following this event; the wetlands were not impacted as a confining layer separates the two aquifers. Although some recovery of the groundwater levels did occur during 2018, generally following a rain event, the overall water levels at locations QAL023B, QAL044B, QAL065D, and QAL066D did not fully rebound to pre-April levels by the end of the water year (September 30th). All instances in which drawdown was observed in the wells or bedrock piezometers could be correlated to an underground event in which water was encountered while drilling. In an effort to better understand this drawdown, additional information is being collected by the mining crews. Information collected includes depth in which water is intercepted, flow rates, and the collection of water quality samples as warranted. In addition, water levels from bedrock piezometers, quaternary wells, and wetland piezometers are available “real-time” through the use of a wireless radio telemetry network. This allows for instantaneous review and correlation of water level data when infiltration events occur and allows for quicker response actions to be initiated if necessary in the future.

Water levels at the wetland locations did not fall more than six inches below pre-mining baseline levels in accordance with permit condition L4c. Location WLD022-4.5 reported a water level one-tenth of a foot below the baseline minimum in August 2018 and WLD-25-9.5 was one-tenth of a foot below the baseline minimum in February 2018. Levels returned to baseline ranges by the next monitoring event. Precipitation is one of the main contributors to the wetland and during the 2018 water year, several large rain events occurred which helped to sustain the water levels within the wetlands. Hydrographs of each groundwater and wetland monitoring location can be found in Appendix O.

In addition to continuous monitoring, Eagle Mine implemented a regional hydrologic monitoring program to assess potential groundwater elevation changes due to mine dewatering. The regional monitoring wells cover an area of approximately 14 square miles. Discrete water elevations are measured on a quarterly basis at 120 locations. During Q1 several wetland locations were unable to be monitored due to frozen or unsafe conditions.

A map of the hydrologic monitoring locations can be found in Appendix L and a map of the A and D zone groundwater contour maps for each sampling quarter can be found in Appendix M. A review of the results determined the following:

- No significant changes or shifts in calculated GW contours were reported for calendar year 2018.
- Regionally, the overall water levels have been increasing since the fall of 2013 with many monitoring locations near record high levels in 2018. The exception, as described above, remains in the D zone water levels in monitoring wells located above the ore body and near the mine services well (QAL011D) extraction area.
    - QAL004 is located within the direct influence of the mine services well and water levels fluctuate based on the use of the well.
    - Changes in water level in the monitoring wells located within the vicinity of the orebody are most likely attributed to water withdrawal from the mine services well and/or infiltration of water encountered during mine development activities.
- Although below baseline levels, water levels at monitoring locations above the orebody (i.e. QAL023B, QAL044B, QAL064D, QAL065D, QAL066D) did increase slightly over levels reported in 2017.
- Wetland water levels above the orebody are well within baseline levels with seasonal highs near record levels.
- There were several new maximum water levels reported in one or more sampling quarters in 2018. The majority of the “highs” were reported in Q3 and Q4 2018 which correlates with the above average rainfall events that occurred mid-June to October.

A summary of discrete water elevation results from Q1-Q4 2018 are summarized in Appendix P.

5.2.2 Continuous Surface Water Monitoring

Locations STRE002, STRM004, STRM005, and YDRM002 are each instrumented with meters that continuously monitor for temperature, conductivity, and flow rate. The meters were originally installed in 2004 and are downloaded quarterly by North Jackson Company field technicians.

As with the continuous groundwater monitoring locations, the results for surface water locations are also being reported by water year (October 1 – September 30). Continuous readings during the 2018 water year were averaged over each month of operation from October 1, 2017 thru September 30, 2018 and are based on mean daily values. Background levels are based on data collected from September 2004 through August 2011 for all locations. Monthly temperature, flow, and specific conductivity are summarized in Appendix Q. The following is a summary of the findings:

- Due to ice build-up, continuous flow readings were not collected from location STRE002 and STRM004 from December 2017 – March 2018; STRM005 from December 2017 – April 2018; and YDRM002 from October 2017 – March 2018.
- Specific conductance measurements were not reported in February – April and August-September at location STRE002; January – April at STRM004; December 2017 – April 2018 at location STRM005; and January 2017 – March 2018 at location YDRM002. This is due to missing values or data that failed to meet quality control requirements.
- Temperature was not recorded from December 2017 – February 2018 at location STRM005 as data did not meet quality control requirements.
- With the exception of the specific conductance reading at location STRE002 in November 2017, all temperature, flow, and specific conductance measurements, when collected, were found to be within historical minimum and maximum value readings at locations STRE002, STRM004, STRM005 and YDRM002.
- Location STRE002 mean specific conductivity was slightly below the background maximum levels in November 2017. Specific conductivity returned to background range in the following months at this location.

Hydrographs for each location are found in Appendix R and show a correlation between the flow rate and specific conductivity readings. As flow rates increase specific conductivity readings begin to decrease.

Aerial view of the Salmon-Trout River

5.3 Biological Monitoring

Biological monitoring events conducted in 2018 included flora and fauna surveys, wetland monitoring, fish and macro invertebrate surveys, and a narrow-leaved gentian survey. Results from each survey have been compiled into annual reports which are available upon request. A brief summary of each survey is provided below.

5.3.1 Flora and Fauna/Wetland Monitoring Report

The 2018 flora, fauna, and wetland vegetation surveys were conducted by King & MacGregor Environmental, Inc. (KME). Table 5.3.1 below summarizes the type and duration of the surveys that were completed in 2018. A map of the survey locations is available in Appendix S.

Table 5.3.1 Type and Duration of 2018 Flora, Fauna, and Wetland Surveying Events

Survey Type	Survey Date
Bird	June 13-14, September 18-19
Small Mammals	September 18-20
Large Mammals	May 1, 30, Jun 12-14, 28, Aug 14-15, Sept 18-20
Toads/Frogs	May 1, 30, June 28
Wetland Vegetative Monitoring	June 13-14
Upland Vegetative Monitoring	June 12-13, August 14-15
Narrow-Leaved Gentian	August 15

The wildlife and plant species identified during the 2018 surveys within the Study Area are similar to those identified during previous KME surveys. Following is a summary of the survey results:

- A combined total of 776 birds representing forty-nine species, none of which are threatened or endangered, were observed during the bird surveys. The number of birds increased from 2017 survey when 692 birds were observed. Consistent with previous studies, the Nashville warbler was the most abundant bird observed during the June survey and Canada goose was the most abundant recorded during the September surveys. Overall, the bird species identified during the 2018 bird surveys are similar to those bird species identified in previous surveys conducted within the Study Area and are consistent with the bird species expected to be found in the habitats present.
- Twenty-four small mammals representing six species were collected during the September survey period. The most common small mammal identified during the survey was the least chipmunk. No threatened, endangered, or special concern small mammals were observed during any of the surveys. The small mammals encountered within the Study Area during the 2018 surveys are typical of those expected in the habitats present and are generally consistent with previous survey results. Small mammals appear to be distributed throughout wooded and open areas, in both upland and wetland habitats.
- Whitetail deer was the only large mammal species directly observed during the 2018 surveys. Deer were seen infrequently throughout the Study Area during the course of the ecological surveys. Similar to previous years, fresh scat and tracks of American black bear, moose and coyote were observed occasionally throughout the Study Area.
- Four frog species were heard during the survey; none of which are threatened or endangered. All three of the sampling points exhibited use by frogs for breeding. The northern spring peeper exhibited the highest Call Index Values. The frog species identified are typical of those expected in the habitats present in the Study Area and results are consistent with observations made during previous surveys.
- Vegetative sampling plots in both wetland and upland communities identified plant species common to this region. The overall richness and distribution of wetland and upland vegetation in 2018 was found to be very similar to previous years. No threatened or endangered plant species were encountered within the vegetative survey plots. The population of narrow-leaved gentian (NLG) observed within the study area remains robust. All of the wildlife and plant species identified within the Study Area are typically associated with vegetative communities that are relatively common within the region.

Upland Vegetation Survey Plot, August 2018

Wetland Vegetation Survey Plot 1W, June 2018

5.3.2 Threatened and Endangered Species

The Michigan Natural Features Inventory (MNFI) maintains a database of rare plants and animals in Michigan. KME requested a Rare Species Review to determine if any protected species had been found in or near the Study Area. MNFI lists the NLG as a threatened species in Michigan. In accordance with Michigan Department of Natural Resources (MDNR) guidelines (MDNR 2001), KME surveyed for any MNFI listed species and their habitats during the appropriate season.

Similar to previous years, Kirtland's warbler was not detected at any time during any of the 2018 ecological surveys. Spruce grouse is a state special concern species; this species was again occasionally observed during the 2018 ecological surveys near the Salmon-Trout River. Scat and tracks of moose (State Special Concern) were observed occasionally in 2018 throughout the Study Area. No evidence of the gray wolf was observed.

5.3.3 Narrow-Leaved Gentian (NLG)

The methods used to conduct the 2018 NLG field investigation were consistent with the previous NLG studies. Photographic and Global Positioning System documentation was collected on August 15, 2018. In addition, the local climate changes and overall health of the NLG colonies were assessed relative to previous years.

According to National Oceanic and Atmospheric Administration data, mean precipitation totals were between 8-12 inches above average for the area during the 2018 water year. Mean monthly temperatures were above average for April and September, near average for January, February, June, July, August, September, and October; and below average for April, May, and November. Flow in the Salmon Trout River and Yellow Dog River appeared somewhat lower in August. However, the necessary hydrology to support the NLG population was present in 2018.

The NLG colonies continued to appear healthy in 2018 relative to previous observances. As in previous years, flowering NLG were found in abundance (hundreds of individual plants) both along the Salmon Trout River and in the area north of the Yellow Dog River.

Narrow-leaved Gentian in roadway east of Salmon Trout River, August 2018

5.3.4 Fisheries and Macro Invertebrate Report

The 2018 fisheries and macro-invertebrate annual surveys were conducted by Advanced Ecological Management (AEM). A total of ten stations were surveyed during the summer of 2018, including one station in the Yellow Dog River, one station in Cedar Creek, five stations in the Main Branch of the Salmon Trout River, and three stations in tributaries of the East Branch of the Salmon Trout River. A map of the aquatic sampling locations is available in Appendix T.

A total of 217 fish were collected from all stations in 2018, with 48% of the total being captured at Station 6 located on the main branch of the Salmon Trout River. Although there were seven fewer fish collected in 2018 compared to 2017, the number of species remained consistent between years at seven. Northern redbelly dace (*Phoxinus eos*), brook sticklebacks (Culaea inconstans), and brook trout (*Salvelinus fontinalis*), were the most frequently collected species. No Michigan Natural Features Inventory (MNFI) listed threatened or endangered fish species were identified in the stations investigated in 2018. A total of 105 fish were collected from Station 6 in 2018, which was 14 more than collected in 2017. The total number of fish collected from Station 6 has fluctuated annually, and has been attributed to a reduction in shallow-water habitat for minnows resulting from a declining water level throughout the station. The declining water level was attributed to the degradation of a beaver dam located downstream of the sample station.

Using the State of Michigan P-51 survey protocol, a total of 2,626 macro-invertebrates were collected from all ten stations that were investigated in 2018, which was 221 more specimens than the total number collected in 2017. Due to beaver dams in the vicinity of Stations 6 and 7, the P-51 measurement protocols could not be applied to those areas. The macro-invertebrate communities within the Salmon Trout River have been scored by AEM as excellent or acceptable communities.

The aquatic and stream habitat at stations sampled during 2018 were rated as “Good” or “Excellent” habitat quality. Station 9 habitat changed from an “Excellent” rating in previous years to a “Good” rating, which has remained since 2014. The change in the habitat rating of Station 9 was due to sand moving into the station from upstream and filling the pools. The 2018 P-51 habitat ratings for all other stations has remained consistent with previous surveys.

A copy of the full report is available upon request.

Aquatic Monitoring Location Station 7, June 2018

5.3.5 Fish Tissue Survey

No fish tissue survey was conducted in 2018. Surveys are only required once every three years, with the next survey scheduled for 2020.

5.4 Miscellaneous Monitoring

5.4.1. Soil Erosion Control Measures (SESC)

There were no SESC measures in place on site in 2018. If areas are identified that need SESC measures in the future, the measures will be installed and maintained in compliance with the requirements of Part 91 (NREPA, 1994 PA 451, as amended).

5.4.2 Berms, Embankments and Basins

All containment berms and embankments of the TDRSA, CWB, NCWIBs, and facility perimeter are inspected on a monthly basis, or after a 0.5" rain event, to ensure cracking, settlement, or erosion is not affecting the integrity of the berms. Inspections were completed as required in 2018 with observations and/or repair recommendations recorded in the surface inspection log stored in the compliance binder at the mine site. Issues identified are immediately reported and corrected by onsite staff. A follow-up inspection is completed to ensure that repairs have been made.

In 2018, the stormwater conveyance to NCWIB 3 required repair due to the erosion along the side of the NCWIB and the storm water conveyance to the basin. Riprap was added to the northwest corner of NCWIB 3, where stormwater flows to the basin, in May to eliminate further erosion.

NCWIB 3 prior to repair being completed, April 2018

NCWIB 3 after repair was completed, May 2018

5.4.3 Impermeable Surface Inspections

The impermeable surfaces monitoring plan outlines the requirements of integrity monitoring of surfaces exposed to contact storm water. Areas inspected in 2018 include the WTP, truck wash, truck shop floors, sumps, trench drains, the contact area, and travel ways comprised of concrete or asphalt.

The WTP, truck wash and truck shop floors, sumps, and drains were inspected monthly from January through December 2018. Inspections of the contact area and travel ways were completed during the months of April through October. Per the monitoring plan, inspections of the contact area and travel ways are suspended during the months when snow covers much of the surface and winter weather prevents effective patching efforts.

All inspection results are recorded on the impermeable surface inspection form, stored in the compliance binder at the Eagle Mine Site. Any issues identified during the inspections are immediately reported and fixed by onsite staff. Follow-up inspections are completed to ensure the repairs were made.

Inspections of the contact area in 2018 identified areas that required additional sealing to help ensure the impermeability of the contact area. In October 2018, 984 linear feet of joint or crack sealing was completed near the fuel area, CWBs, the COSA exit.

COSA Exit Repairs Made to Worn Asphalt, Oct. 2018

Fuel Area Repairs Made to Concrete, Oct. 2018

5.4.4 Geochemistry Program

In 2018, the ongoing geochemistry program was comprised of two parts; the water quality of the underground as it is representative of ore and sampling of development rock from the Eagle East decline.

Four underground water quality samples were collected in March, June, September, and November 2018 from Jump Tank 1 located in the main decline underground. Water from the lower levels of the mine are pumped to Jump Tank 1 which then pumps the water to the CWBs. Samples were analyzed for the annual parameter list in Q3 and quarterly list in Q1, Q2, and Q4. Results to date have been within predicted levels and can be readily treated and removed by the WTP. A summary table and graph of the results and are available in Appendix D.

The reinstated development rock sampling program began in September 2016 and includes geochemical characterization (i.e. static testing program). Samples are logged at a rate of one sample per fifty meters of decline development and are visually characterized and percentage of sulfides noted in a comprehensive spreadsheet. Rock types identified in the Eagle East decline have been consistent with those observed in Eagle with Siltstone being the most prevalent followed by Hornsfel. On average, 1-2% sulfides have been visually observed along the bedding in both the Siltstone and Hornsfel rock types which is similar to observations reported in the Eagle decline. After observations are recorded, the samples are sent to SGS Laboratories for analysis. As sample results are received from the laboratory, they will be reviewed to determine if the metal content is consistent with baseline values.

5.4.5 NCWIB & CWB Sediment Accumulation Measurements

Sediment accumulation is monitored and measured at both the contact and non-contact water basins. This requirement is in place as sediment accumulation in the NCWIBs could result in diminished infiltration capacities and decreased water storage capacity in the CWBs.

Non-Contact Water Infiltration Basins

As required by the mining permit, sediment accumulation measurements are conducted on an annual basis for the NCWIBs. Each of the four NCWIBs were inspected in 2018. Visible sediment accumulations were observed at NCWIB 2, located near the cold storage warehouse, and NCWIB 3, located near security. Approximately two feet of sand has started to accumulate in the northwest corner of NCWIB 2 due to snow that is stored there in the winter. When the snow melts the sand is left behind. The sediment that accumulated in NCWIB 3 was from stormwater erosion that was repaired in May 2018. The sand that is currently present in the basins has not impacted infiltration, but will continue to be monitored and removed if necessary. Minimal vegetation was observed at NCWIBs 1, 2, 3, and 4 and will continue to be monitored in 2019. If the vegetation persists it may require removal if it begins to impact infiltration rates.

Contact Water Basins

Two sediment thickness measurements were completed in CWB 1 and 2 utilizing a boat and Sludge Judge to measure the accumulation. The first inspection was conducted on August 7th, and the second sediment thickness measurements were completed on October 4th 2018.

The average sediment accumulation in CWB 2 was just over five inches, with three locations measuring over one foot. The highest sediment accumulations were in the north end of the basin. The WTP outfall is located in the northwest corner of CWB 2 and is likely the cause of sediment

accumulation. This outfall is the point in which recycled or off-spec water from the WTP is deposited back into the basins prior to re-treatment. The north end of CWB 2 will continue to be monitored for sediment accumulation. CWB 2 sediment measurements in 2018 were similar to previous years.

The average sediment accumulation on CWB 1 was just over twenty-three inches, with locations over forty inches on the south end of the water basin, where the underground water is pumped into the basin. The south side of the basin will continue to be monitored for sediment accumulation from the underground sump system.

A geo-membrane leak detection survey was performed in September 2018, in CWB 1, using a shallow water survey method. The leak detection survey was completed by wading through the basin scanning the submerged geomembrane liner using an electrical probe to locate any leaks. No leaks were detected in the survey conducted in 2018. Due to sediment buildup in the basin, a partial survey was completed in CWB 1. Approximately half of the floor liner was not surveyed due to accumulated sediment. The basin liner that was unable to be surveyed is not expected to have a leak, as there was minimal activity in CWB 1 in 2018. The next leak location survey is scheduled to occur in 2019.

Contact Water Basins, October 2018

6. Reclamation Activities

No reclamation activities occurred in 2018 and there are currently no plans to conduct any reclamation activities in 2019. The Department will be notified, in advance, if any activities do commence in 2019.

Closure planning continued in 2018 and included detailed planning and commencement of technical studies needed to support closure planning for the facility. This process was initiated in 2017 due of the Lundin corporate requirement to have a written closure plan in place five years in advance of anticipated closure. The closure plan will remain flexible to support change or growth within the business.

7. Contingency Plan Update

One element of the contingency plan is to test the effectiveness on an annual basis. Testing is comprised of two components. The first component is participation in adequate training programs

for individuals involved in responding to emergencies and the second component is a mock field test.

In accordance with Mine Safety Health Administration (MSHA) regulations, Eagle Mine is required to have a Mine Rescue team that is routinely and adequately trained to respond to underground emergency situations. The Mine Rescue team has nineteen members and is comprised of three teams that train approximately ten hours per month. At least two hours of training is "under air" using the Draeger BG-4 closed-circuit breathing apparatus (CCBA). In 2018, training included exploration in smoke (theatrical), basic first aid, CPR, firefighting, and operation and maintenance of both the BG4 CCBA and MX6 gas instruments. In addition, the team assessed ventilation with the use of anemometers and smoke tubes.

In addition to the Mine Rescue team, security personnel are EMTs and paramedics who are trained in accordance with state and federal regulations. Eagle Mine also maintains a state licensed ALS ambulance onsite for immediate response to emergency situations.

A mock field test was conducted in May 2018 and was a desktop exercise which tested the emergency response measures of the contingency plan and crisis management plan in place at Eagle Mine. With the assistance of Eagle Mine employees, a third-party consultant developed an emergency scenario. The scenario generally involves a situation in which both safety and environmental risks are considered and in 2018 the emergency was related to fires, and associated emissions, in the concentrator building at the mill and equipment fire underground at the mine. The crisis management team was aware that a test would occur but were unaware of the nature of the emergency. Two rooms were utilized during the exercise, the first contained the crisis management team and the second contained the "actors" playing roles of employees, regulators, local politicians, media outlets, and concerned citizens and family members. The actors had a loose script developed by the consultant which ensured that certain elements were included and that the scenario progressed at a pre-determined pace. During the crisis management exercise, the third-party consultant observed the activity to identify strengths, weaknesses and opportunities for improvement. Once the exercise was complete, the consultant and crisis management team held a debrief session to capture feedback from each participant. Following this session, the consultant captured the overall feedback and prepared a report with actions for improvement. Throughout the following 12-month period, the crisis management team meets on a quarterly basis to review and update the status on those actions in preparation for the annual exercise.

An updated contingency plan can be found in Appendix U. This plan will also be submitted to the Local Emergency Management Coordinator.

8. Financial Assurance Update

A detailed review of closure costs was completed in 2018 with the information used to update the financial assurance cost estimate. Updated reclamation costs can be found in Appendix V. It is understood that the MDEQ will notify Eagle if these updated costs require re-negotiation of the current bond for financial assurance.

9. Organizational Information

An updated organization report can be found in Appendix W.

Appendix A

Eagle Mine

Site Map

Eagle Mine LLC Mine Monitoring Map

Legend

- 1 - Main Ventilation Air Raise
- 2 - Air Intake / Alimak Emergency Egress
- 3 - Non-Contact Water Basin #4
- 4 - Treated Water Infiltration System
- 5 - Water Treatment Plant
- 6 - Contact Water Basins
- 7 - Temporary Development Rock Storage Area
- 8 - Coarse Ore Storage Area
- 9 - Aggregate Storage and Batch Plant
- 10 - Truck Wash
- 11 - Truck Shop
- 12 - Administration Building and Mine Drys
- 13 - Non-Contact Water Basin #1
- 14 - Non-Contact Water Basin #2
- 15 - Non-Contact Water Basin #3
- 16 - Warehouse
- 17 - Powerhouse
- 18 - Guardhouse
- 19 - Ambulance Garage
- 20 - Explosives Magazine
- 21 - Fuel Storage Area
- 22 - Portal
- 23 - Compressor Building

- Ground Water Discharge Permit Wells
- Part 632 Mining Permit Wells
- Mine Septic Field
- Contact Area

Date: 4/17/2015

0 0.0375 0.075 0.15 0.225 0.3 0.375 Miles

N W E S

Appendix B

Eagle Mine

Rock Stability Certification

Eagle Mine
a subsidiary of lundin mining

Eagle Mine
4547 County Road 601
Champion, MI 49814, USA
Phone: (906) 339-7000
Fax: (906) 339-7005
www.eaglemine.com

Friday, February 08, 2019

Ms. Melanie Humphrey
Michigan Department of Environmental Quality
1504 W. Washington St.
Marquette, MI 49855

Subject: Rock Stability Certification – Eagle Mine, Marquette County Michigan
Mining Permit (MP 01 2007)

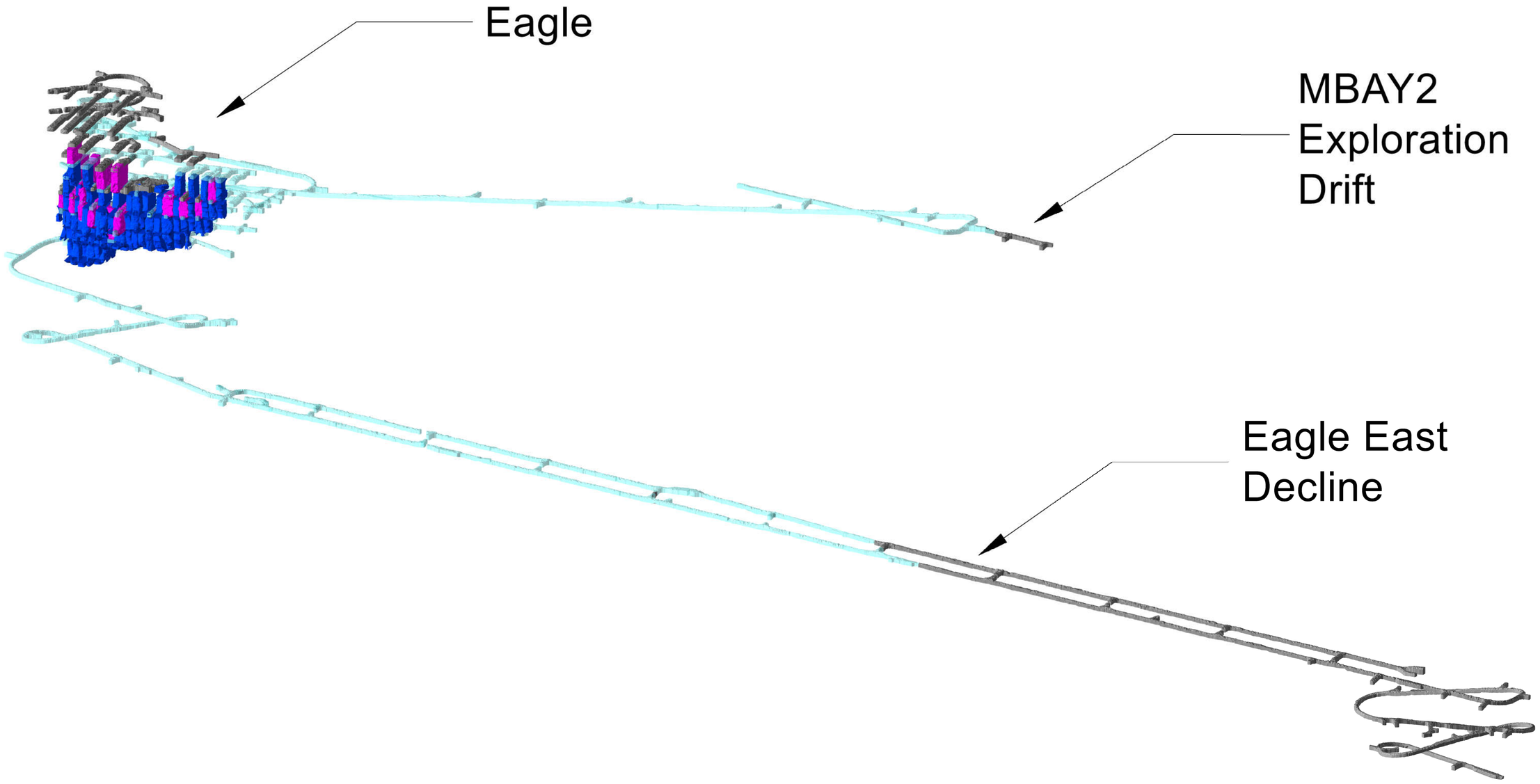
In accordance with condition E-8 of mining permit MP 01 2007, I certify that the rock stability modelling provided in the mine permit application is still valid. This was verified through a review of a coupled geologic/hydrologic stress and mining sequence model which did not indicate any changes in rock mass conditions through 2018. In addition, daily visual inspections are also conducted by Eagle Mine representatives and/or contractor mining personnel to verify ground stability.

Sincerely,

Jeff Murray
Mine Manager
Eagle Mine, LLC.

Appendix C

Eagle Mine
Map of Eagle East Development
and
Eagle Production Mining Progress



2018 STOPES
PRE 2018 STOPES
2018 DEVELOPMENT
PRE 2018 DEVELOPMENT

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Drawing Title:

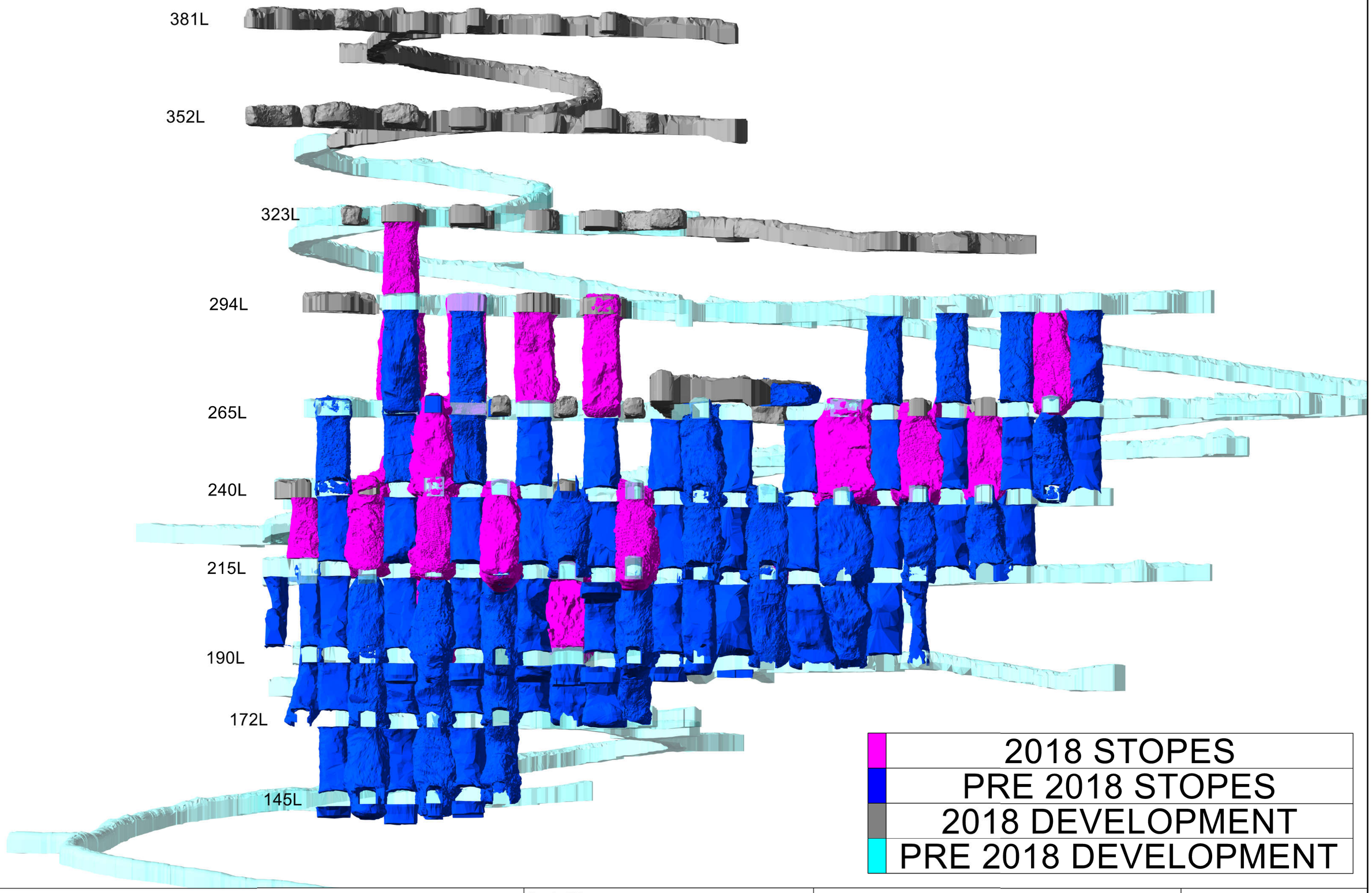
2018 MINING

Author: Cedric.DeChermont

Date: 3/11/2019

Scale: 1:4000

Eagle Mine



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Drawing Title:

2018 MINING

Author: Cedric.DeChermont

Date: 3/11/2019

Scale: 1:750

Eagle Mine

Appendix D

Eagle Mine

Facilities Water Quality Monitoring Results

2018
Mine Permit Water Quality Monitoring Data
Contact Water Basins
Eagle Mine

		Q1 2018	Q2 2018	Q3 2018	Q4 2018
Parameter	**Unit**	**3/27/2018**	**6/26/2018**	**9/18/2018**	**11/27/2018**
Field					
pH	SU	**9.5**	**9.8**	**8.8**	**9.0**
Specific Conductivity	µS/cm	**3514**	**2700**	**4667**	**1156**
Metals					
Aluminum, Total	µg/L	**209**	**123**	**111**	**358**
Antimony, Total	µg/L	**15**	**5.4**	**9.4**	**22**
Arsenic, Total	µg/L	**1.6**	<1.0	**1.8**	**2.6**
Barium, Total	µg/L	**18**	**21**	**55**	**38**
Beryllium, Total	µg/L	<1.0	<1.0	<1.0	<1.0
Boron, Total	µg/L	**763**	**1470**	**930**	**1770**
Cadmium, Total	µg/L	**0.22**	**0.62**	**0.69**	**0.76**
Chromium, Total	µg/L	**4.2**	**1.2**	**3.0**	**12**
Cobalt, Total	µg/L	**3.3**	**24**	**21**	**31**
Copper, Total	µg/L	**14**	**10**	**4.3**	**14**
Iron, Total	µg/L	**392**	**186**	**183**	**770**
Lead, Total	µg/L	<1.0	<1.0	<1.0	<1.0
Lithium, Total	µg/L	**17**	**15**	**33**	**58**
Manganese, Total	µg/L	**42**	**98**	**71**	**175**
Mercury, Total	µg/L	**0.0039**	**0.0010**	**0.0009**	**0.0018**
Molybdenum, Total	µg/L	**55**	**21**	**46**	**105**
Nickel, Total	µg/L	**80**	**511**	**374**	**568**
Selenium, Total	µg/L	**11**	**7.7**	**18**	**46**
Silver, Total	µg/L	<0.20	<0.20	<0.20	<0.20
Strontium, Total	µg/L	**656**	**807**	**2410**	**1900**
Thallium, Total	µg/L	<1.0	<1.0	<0.20	**0.22**
Vanadium, Total	µg/L	<4.0	<4.0	<4.0	**4.0**
Zinc, Total	µg/L	**13**	**64**	**21**	**43**
Major Anions					
Alkalinity, Bicarbonate	mg/L	<20	<20	**34**	**240**
Alkalinity, Carbonate	mg/L	**48**	<20	<20	<20
Chloride	mg/L	**424**	**274**	**686**	**1950**
Fluoride	mg/L	—	<1.0	**0.13**	**0.25**
Nitrogen, Nitrate	mg/L	**89**	**100**	**116**	**359**
Sulfate	mg/L	**663**	**498**	**848**	**2130**
Major Cations					
Calcium, Total	mg/L	**38**	**96**	**161**	**143**
Magnesium, Total	mg/L	**27**	**50**	**69**	**82**
Potassium, Total	µg/L	**54900**	**32600**	**59900**	**151000**
Sodium, Total	mg/L	**636**	**376**	**685**	**2490**

— Analyte not included in the quarterly parameter list.

2018
Mine Permit Water Quality Monitoring Data
TDRSA Contact Water Sump
Eagle Mine

		Q1 2018	Q2 2018	Q3 2018	Q4 2018
Parameter	**Unit**	**3/27/2018**	**6/26/2018**	**9/18/2018**	**11/27/2018**
Field					
pH	SU	**7.2**	**6.3**	**6.7**	**6.5**
Specific Conductivity	µS/cm	**4869**	**5870**	**7600**	**8263**
Metals					
Aluminum, Total	mg/L	—	—	**0.21**	—
Antimony, Total	µg/L	—	—	<2.0	—
Arsenic, Total	µg/L	<1.0	<1.0	<1.0	<1.0
Barium, Total	µg/L	—	—	**59**	—
Beryllium, Total	µg/L	—	—	<1.0	—
Boron, Total	µg/L	**1020**	**1040**	**1280**	**1410**
Cadmium, Total	µg/L	—	—	**4.8**	—
Chromium, Total	µg/L	—	—	<1.0	—
Cobalt, Total	µg/L	—	—	**270**	—
Copper, Total	µg/L	**1.5**	**6.2**	**4.8**	**4.2**
Iron, Total	µg/L	**98**	**115**	**156**	**137**
Lead, Total	µg/L	—	—	<1.0	—
Lithium, Total	µg/L	—	—	**11**	—
Manganese, Total	µg/L	**572**	**1460**	**1510**	**1670**
Mercury, Total	µg/L	**0.0012**	**0.0017**	**0.0016**	**0.0015**
Molybdenum, Total	µg/L	—	—	**22**	—
Nickel, Total	µg/L	**833**	**5320**	**6850**	**3900**
Selenium, Total	µg/L	**16**	**32**	**51**	**61**
Silver, Total	µg/L	—	—	<0.20	—
Strontium, Total	µg/L	—	—	**4890**	—
Thallium, Total	µg/L	—	—	**0.24**	—
Vanadium, Total	µg/L	—	—	<4.0	—
Zinc, Total	µg/L	**115**	**1050**	**776**	**770**
Major Anions					
Alkalinity, Bicarbonate	mg/L	**44**	<20	**31**	**37**
Alkalinity, Carbonate	mg/L	<20	<20	<20	<20
Chloride	mg/L	**226**	**445**	**629**	**737**
Fluoride	µg/L	—	—	<100	—
Nitrogen, Ammonia	mg/L	<0.05	**1.3**	**2.0**	**0.47**
Nitrogen, Nitrate	mg/L	**282**	**298**	**393**	**454**
Nitrogen, Nitrite	mg/L	<0.05	**0.20**	<0.05	<0.25
Sulfate	mg/L	**1620**	**1820**	**2400**	**2530**
Major Cations					
Calcium, Total	mg/L	—	—	**526**	—
Magnesium, Total	mg/L	**229**	**286**	**369**	**386**
Potassium, Total	µg/L	—	—	**77600**	—
Sodium, Total	mg/L	**395**	**492**	**736**	**864**

— Analyte not included in the quarterly parameter list.

2018
Mine Permit Water Quality Monitoring Data
TDRSA Leak Detection Sump
Eagle Mine

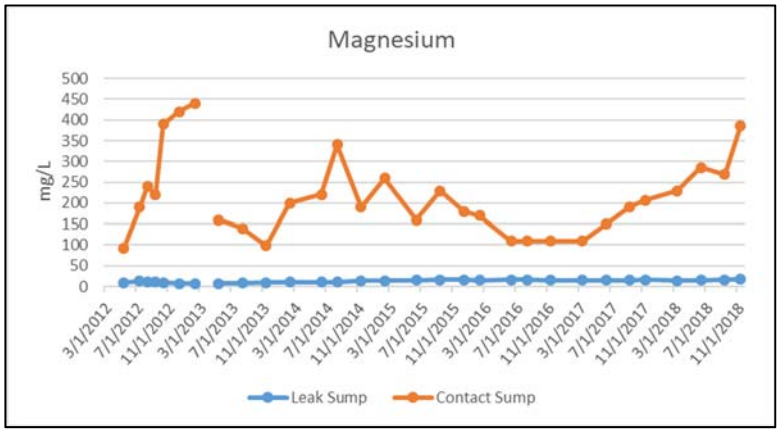
		Q1 2018	Q2 2018	Q3 2018	Q4 2018
Parameter	**Unit**	**3/27/2018**	**6/26/2018**	**9/18/2018**	**11/27/2018**
Field					
pH	SU	**7.7**	**7.2**	**7.3**	**7.6**
Specific Conductivity	µS/cm	**2321**	**2371**	**2472**	**1885**
Major Anions					
Chloride	mg/L	**10**	**11**	**11**	**16**
Nitrogen, Ammonia	mg/L	<0.05	<0.05	<0.05	<0.05
Nitrogen, Nitrate	mg/L	**27**	**28**	**26**	**32**
Nitrogen, Nitrite	mg/L	<0.05	<0.05	<0.05	<0.25
Sulfate	mg/L	**726**	**849**	**754**	**794**
Major Cations					
Magnesium, Total	mg/L	**15**	**15**	**17**	**18**
Sodium, Total	mg/L	**446**	**453**	**484**	**515**

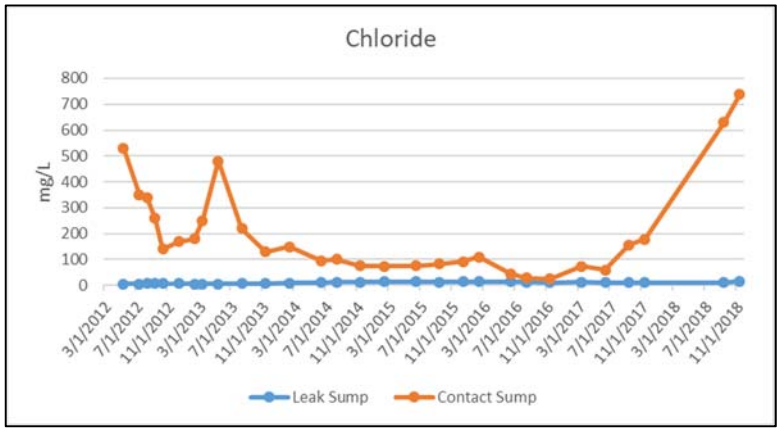
2018
Mine Permit Water Quality Monitoring Data
Underground Influent
Eagle Mine

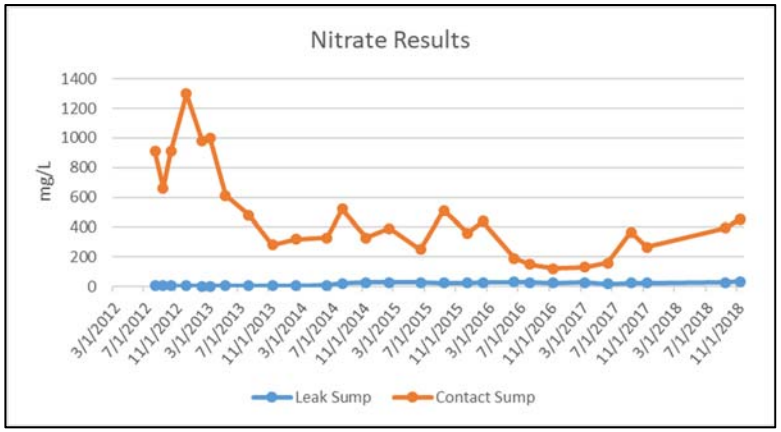
		Q1 2018	Q2 2018	Q3 2018	Q4 2018
Parameter	**Unit**	**3/27/2018**	**6/26/2018**	**9/18/2018**	**11/27/2018**
Field					
pH	SU	**8.8**	**8.9**	**8.3**	**8.5**
Specific Conductivity	µS/cm	**2529**	**4601**	**3695**	**1490**
Metals					
Aluminum, Total	mg/L	—	—	**14**	—
Antimony, Total	µg/L	—	—	**6.7**	—
Arsenic, Total	µg/L	**109**	**4.7**	**7.0**	**17**
Barium, Total	µg/L	—	—	**153**	—
Beryllium, Total	µg/L	—	—	<1.0	—
Boron, Total	µg/L	**640**	**975**	**694**	**466**
Cadmium, Total	µg/L	—	—	**1.2**	—
Chromium, Total	µg/L	—	—	**108**	—
Cobalt, Total	µg/L	—	—	**82**	—
Copper, Total	µg/L	**6880**	**1500**	**2070**	**336**
Iron, Total	µg/L	**174000**	**13500**	**38900**	**53300**
Lead, Total	µg/L	—	—	**30**	—
Lithium, Total	µg/L	—	—	**64**	—
Manganese, Total	µg/L	**3190**	**160**	**326**	**451**
Mercury, Total	µg/L	**0.2880**	**0.0610**	**0.0809**	**0.2090**
Molybdenum, Total	µg/L	—	—	**38**	—
Nickel, Total	µg/L	**7220**	**1500**	**2710**	**655**
Selenium, Total	µg/L	**17**	**56**	**16**	**10**
Silver, Total	µg/L	—	—	**1.6**	—
Strontium, Total	µg/L	—	—	**4490**	—
Thallium, Total	µg/L	—	—	**0.25**	—
Vanadium, Total	µg/L	—	—	**29**	—
Zinc, Total	µg/L	**3260**	**57**	**128**	**183**
Major Anions					
Alkalinity, Bicarbonate	mg/L	**26**	<20	**61**	**69**
Alkalinity, Carbonate	mg/L	<20	<20	<20	<20
Chloride	mg/L	**191**	**289**	**714**	**176**
Fluoride	µg/L	—	—	**190**	—
Nitrogen, Nitrate	mg/L	<0.05	**113**	**84**	**35**
Nitrogen, Nitrite	mg/L	—	—	—	—
Sulfate	mg/L	**491**	**1700**	**237**	**254**
Major Cations					
Calcium, Total	mg/L	—	—	**165**	—
Magnesium, Total	mg/L	—	—	**67**	—
Potassium, Total	µg/L	—	—	**48400**	—
Sodium, Total	mg/L	—	—	**394**	—

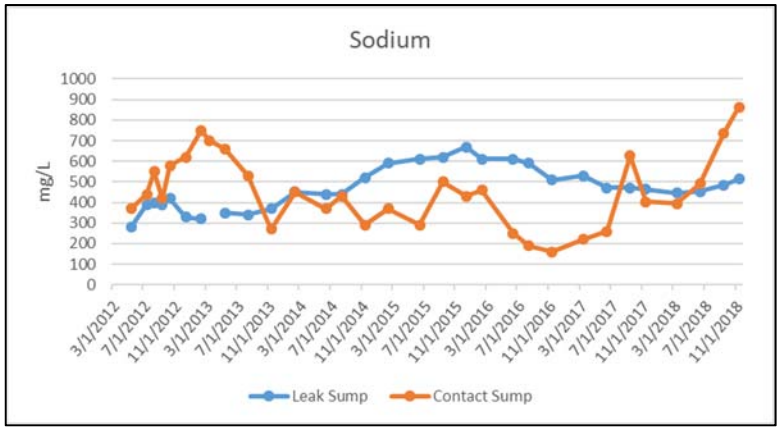
— Analyte not included in the quarterly parameter list.

2018
Mine Permit Water Quality Monitoring Data
TDRSA Contact Water & Leak Sump
Eagle Mine

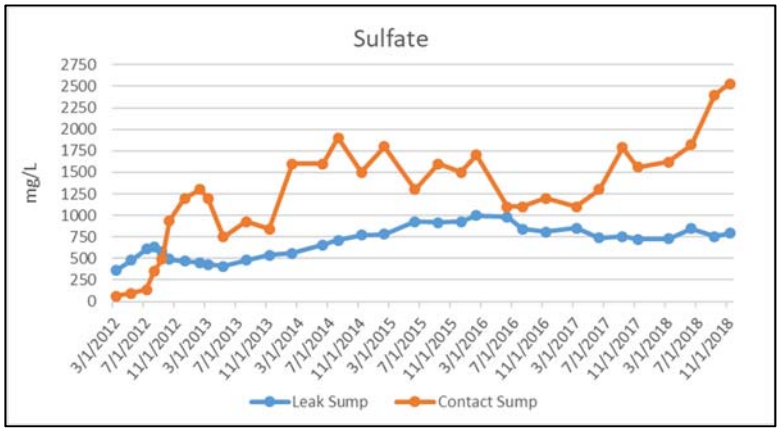


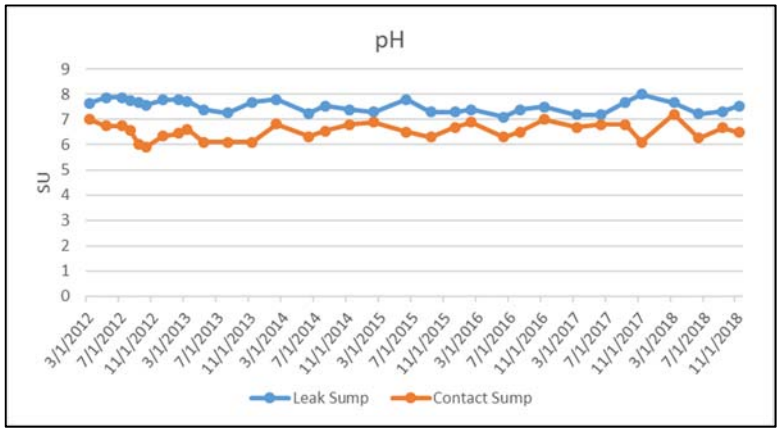




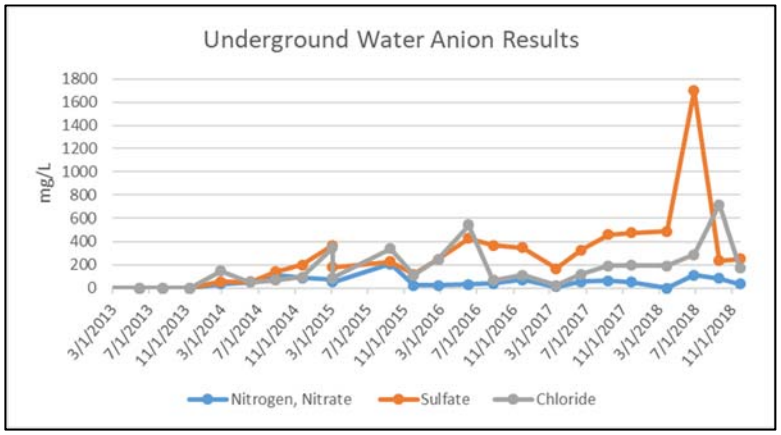


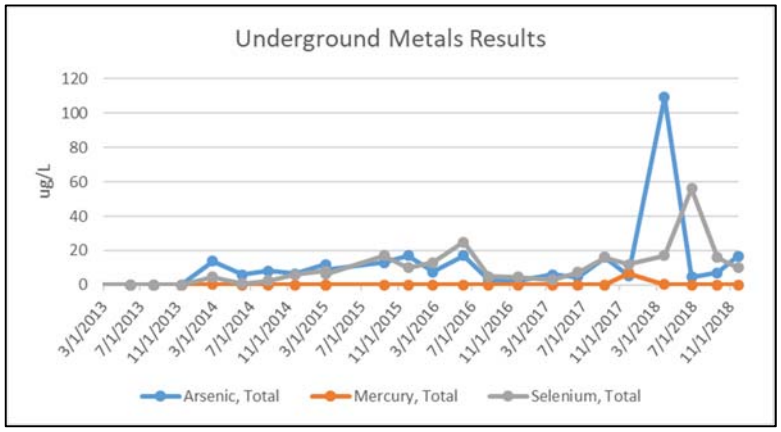
2018
Mine Permit Water Quality Monitoring Data
TDRSA Contact Water & Leak Sump
Eagle Mine

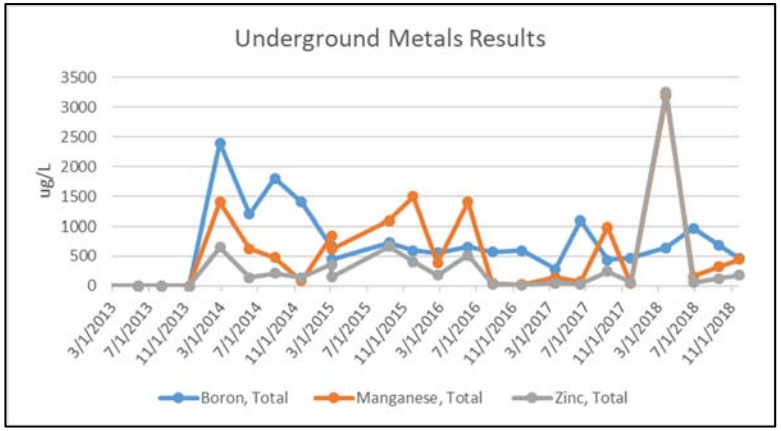


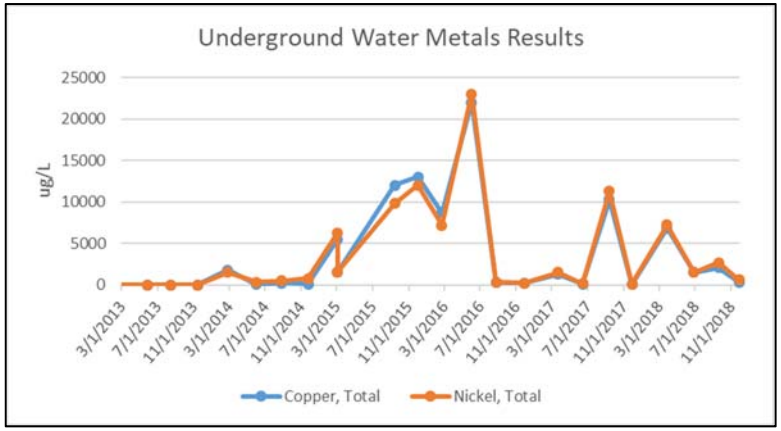


2018
Mine Permit Water Quality Monitoring Data
Underground Influent
Eagle Mine







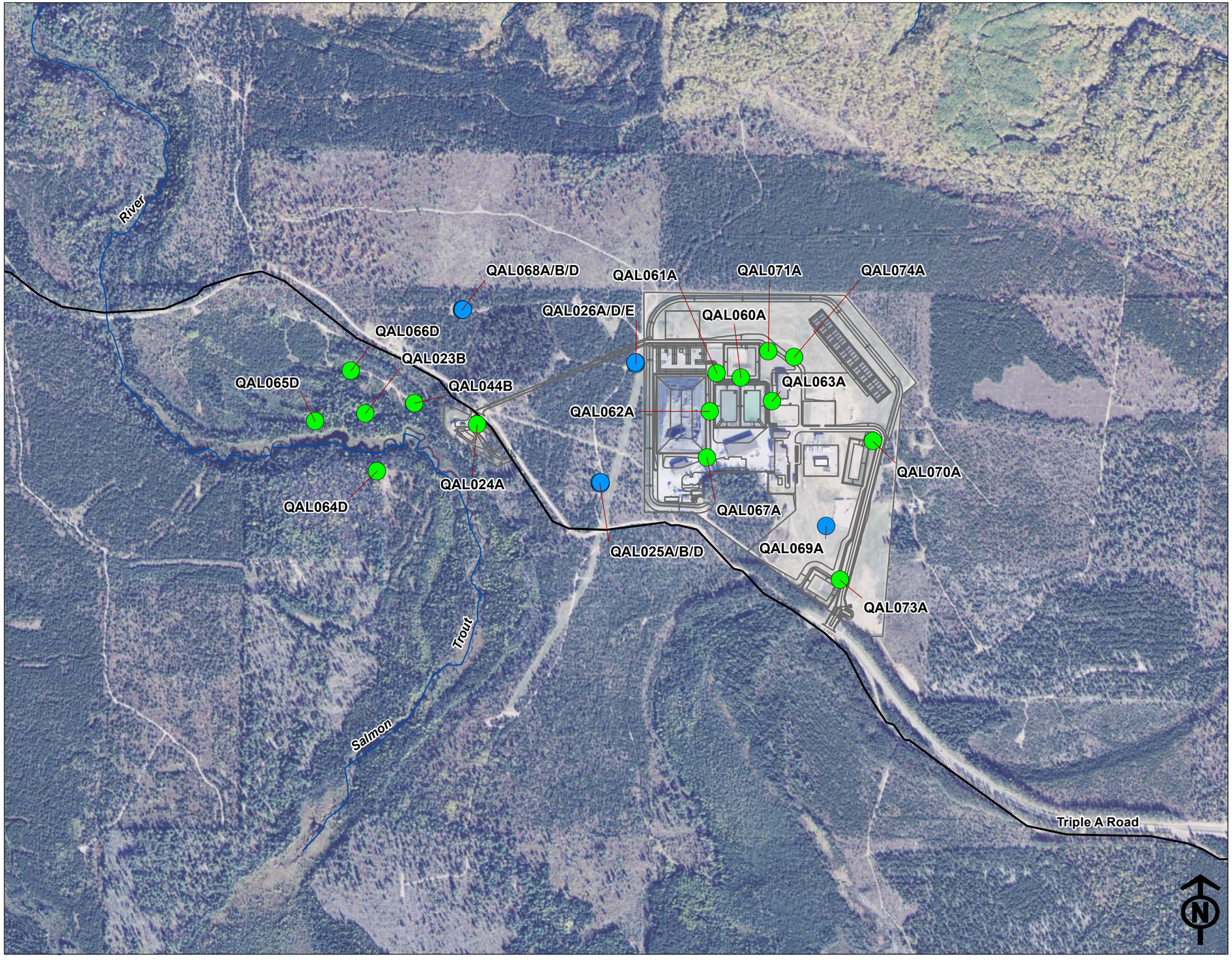


Appendix E

Eagle Mine

Groundwater Monitoring Well Location Map

MINE PERMIT GROUNDWATER QUALITY MONITORING LOCATIONS Project View



- COMPLIANCE WATER QUALITY
- BACKGROUND WATER QUALITY
- ROAD
- HYDROGRAPHY
- MINE FACILITY

Reference

Data provided by: Eagle Mine and North Jackson Company

Projection & Datum: UTM NAD 83 Zone 16N

0 — 2,000 Feet

Scale: 1:12,000

Eagle Mine
a subsidiary of hudbay mining

North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Appendix F

Eagle Mine

Groundwater Monitoring Well Results

and

Benchmark Summary Table

Eagle Mine
2018 Mine Permit Groundwater Monitoring
Benchmark Comparison Summary

Location	Location Classification	Q1	Q2	Q3	Q4
QAL023B	Compliance		pH		
QAL024A	Compliance	**alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**	**alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**	**alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**	**alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**
QAL025A	Background				
QAL025B	Background				
QAL025D	Background		**vanadium**, magnesium	**vanadium**	**vanadium**
QAL026A	Background	pH, **nitrogen nitrate**	**nitrogen nitrate**		
QAL026D	Background		**alkalinity bicarbonate**	pH, **alkalinity bicarbonate**	
QAL026E	Background		potassium	arsenic	
QAL044B	Compliance	**pH, alkalinity bicarbonate**	**pH, alkalinity bicarbonate**	**pH, alkalinity bicarbonate**	**pH, alkalinity bicarbonate,** sodium
QAL060A	Compliance	alkalinity bicarbonate, **nitrogen nitrate**	**nitrogen nitrate**	**nitrogen nitrate**	**nitrogen nitrate**
QAL061A	Compliance	**alkalinity bicarbonate, nitrogen nitrate**	**alkalinity bicarbonate**, **nitrogen nitrate,** calcium, magnesium, hardness	**alkalinity bicarbonate, nitrogen nitrate**	**alkalinity bicarbonate, nitrogen nitrate**
QAL062A	Compliance	**pH**, **alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**	**pH**, **alkalinity bicarbonate, chloride**, **nitrogen nitrate**, calcium, magnesium, potassium, **sodium**, hardness	**pH**, **alkalinity bicarbonate, chloride**, **nitrogen nitrate, sodium**	**pH, alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**
QAL063A	Compliance	**pH, alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**	**pH**, **alkalinity bicarbonate, chloride, nitrogen nitrate,** calcium, magnesium, **sodium**, hardness	**pH, alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**	**pH**, **alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**
QAL064D	Compliance	**pH**	magnesium, hardness		pH
QAL065D	Compliance	pH			
QAL066D	Compliance	**pH**, **sodium**	**pH**, aluminum, **iron**, magnesium, **sodium**	**pH, iron, sodium**	arsenic, **iron**, alkalinity bicarbonate, **sodium**
QAL067A	Compliance	**alkalinity bicarbonate, chloride, nitrogen nitrate, sulfate**, **sodium**	**alkalinity bicarbonate, chloride, nitrogen nitrate, sulfate,** calcium, magnesium, potassium, **sodium**, hardness	**alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**	**alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**
QAL068A	Background		pH		
QAL068B	Background		alkalinity bicarbonate		
QAL068D	Background				
QAL069A	Background	**pH, mercury**, **alkalinity bicarbonate, chloride, nitrogen nitrate, sulfate, sodium**	**pH, alkalinity bicarbonate, chloride, nitrogen nitrate, sulfate, calcium,** potassium, **sodium**	**pH, alkalinity bicarbonate, chloride, nitrogen nitrate sulfate, sodium**	**pH,** iron, **mercury, alkalinity bicarbonate, chloride, nitrogen nitrate, sulfate, sodium**
QAL070A	Compliance	**chloride**, **nitrogen nitrate, calcium, magnesium, sodium, hardness**	**alkalinity bicarbonate, chloride**, **nitrogen nitrate, calcium, magnesium, sodium, hardness**	pH, **alkalinity bicarbonate, chloride, nitrogen nitrate, calcium, magnesium, potassium, sodium, hardness**	**alkalinity bicarbonate, chloride, nitrogen nitrate, calcium, magnesium, sodium**, **hardness**
QAL071A	Compliance	**pH, alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**	**pH, alkalinity bicarbonate, chloride, nitrogen nitrate,** calcium, magnesium, **sodium,** hardness	**pH, alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**	**pH, alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**
QAL073A	Compliance	**alkalinity bicarbonate, nitrogen nitrate, calcium, magnesium, hardness**	**alkalinity bicarbonate, nitrogen nitrate, sulfate, calcium, magnesium, sodium**, **hardness**	**alkalinity bicarbonate, nitrogen nitrate, sulfate, calcium, magnesium, sodium, hardness**	**alkalinity bicarbonate, nitrogen nitrate, sulfate, calcium, magnesium, sodium, hardness**
QAL074A	Compliance	iron, **alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**	**pH, alkalinity bicarbonate, chloride, nitrogen nitrate,** calcium, magnesium, **sodium**, hardness	**pH, alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**	**pH, alkalinity bicarbonate, chloride, nitrogen nitrate, sodium**

Parameters listed in this table had values reported that were equal to or greater than a site-specific benchmark. Parameters in BOLD are instances in which the Department was notified because benchmark deviations were identified at compliance monitoring locations for two consecutive quarters. If the location is classified as background, Department notification is not required for an exceedance.

2018
Mine Permit Groundwater Quality Monitoring Data
QAL023B (UMB)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/15/18[T]		Q2 2018 05/14/18[T]		Q3 2018 08/09/18[D]		Q4 2018 11/08/18[T]	
Field										
D.O.[1]	ppm	--	**0.10**		**0.10**		**0.30**		**0.10**	
ORP	mV	--	-398		-218		-166		-211	
pH	SU	**7.8-8.8**	**8.2**		**7.7**		**8.3**		**8.6**	
Specific Conductance	µS/cm @ 25°C	--	**117**		**123**		**126**		**121**	
Temperature	°C	--	**6.5**		**7.7**		**9.2**		**6.0**	
Turbidity	NTU	--	<1.0		<1.0		**5.0**		<1.0	
Water Elevation	ft MSL	--	**1415.47**		**1414.48**		**1414.71**		**1413.66**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.5**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**159**	**51**	e	**42**		**43**		**51**	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	**0.58**		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		**1.4**	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		<50		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**67**	**63**		**63**		**61**		**61**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	<1.0		<1.0		**1.4**		<1.0	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.20**	<0.05	a,e	<0.05		<0.05		<0.05	e
Sulfate	mg/L	**8.0**	**3.7**		**2.6**		**3.8**		**3.8**	e
Major Cations										
Calcium	mg/L	**16**	--		**14**		--		--	
Magnesium	mg/L	**3.7**	--		**3.3**		--		--	
Potassium	mg/L	**2.0**	--		<0.50		--		--	
Sodium	mg/L	**11**	**7.7**	e	**6.9**		**4.8**		**5.3**	
General										
Hardness	mg/L	**55**	--		**48**		--		--	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL024A (UMB)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/14/18[T]		Q2 2018 05/09/18[T]		Q3 2018 08/07/18[T]		Q4 2018 11/07/18[T]	
Field										
D.O.[1]	ppm	--	**11**		**12**		**11**		**11**	
ORP	mV	--	**58**		**102**		**120**		**102**	
pH	SU	**6.1-7.1**	**6.5**		**6.5**		**6.6**		**6.3**	
Specific Conductance	µS/cm @ 25°C	--	**232**		**251**		**276**		**211**	
Temperature	°C	--	**8.3**		**8.3**		**9.9**		**8.6**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<10	
Water Elevation	ft MSL	--	**1418.02**		**1417.69**		**1418.02**		**1418.12**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**86**	--		**31**		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**105**	**22**	e	**27**		<20		<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	**0.50**		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		**57**		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**24**	**59**		**44**		**51**		**38**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	**44**		**49**		**47**		**35**	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.20**	**0.80**	a,e	**0.92**		**0.81**		**0.81**	e
Sulfate	mg/L	**8.0**	**6.1**		**5.5**		**5.7**		**5.0**	e
Major Cations										
Calcium	mg/L	**48**	--		**19**		--		--	
Magnesium	mg/L	**8.1**	--		**3.4**		--		--	
Potassium	mg/L	**3.7**	--		**1.9**		--		--	
Sodium	mg/L	**2.0**	**20**	e	**23**		**29**		**24**	
General										
Hardness	mg/L	**153**	--		**62**		--		--	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL025A (Background)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/13/18[T]		Q2 2018 05/09/18[T]		Q3 2018 08/07/18[T]		Q4 2018 11/06/18[T]	
Field										
D.O.[1]	ppm	--	**11**		**11**		**12**		**12**	
ORP	mV	--	**79**		**112**		**91**		**159**	
pH	SU	**6.4-7.4**	**7.1**		**6.7**		**6.6**		**6.6**	
Specific Conductance	µS/cm @ 25°C	--	**50**		**49**		**50**		**52**	
Temperature	°C	--	**6.9**		**8.2**		**8.1**		**7.4**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1417.37**		**1417.27**		**1417.44**		**1416.97**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**126**	<20	e	<20		<20		<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		<50		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**25**	**23**		**22**		**22**		**23**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	<1.0		<1.0		**1.2**		<1.0	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**1.1**	**0.38**	a,e	**0.35**		**0.23**		**0.25**	e
Sulfate	mg/L	**8.0**	**2.0**		<2.0		<2.0		**2.2**	e
Major Cations										
Calcium	mg/L	**8.5**	--		**6.3**		--		--	
Magnesium	mg/L	**2.0**	--		**1.3**		--		--	
Potassium	mg/L	**2.0**	--		**0.72**		--		--	
Sodium	mg/L	**2.0**	**0.84**	e	**0.83**		**0.93**		**0.83**	
General										
Hardness	mg/L	**28**	--		**21**		--		--	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL025B (Background)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/13/18[T]		Q2 2018 05/09/18[T]		Q3 2018 08/07/18[T]		Q4 2018 11/06/18[T]	
Field										
D.O.[1]	ppm	--	**11**		**11**		**12**		**11**	
ORP	mV	--	**31**		**67**		**204**		**105**	
pH	SU	**8.5-9.5**	**9.1**		**8.7**		**8.9**		**9.0**	
Specific Conductance	µS/cm @ 25°C	--	**63**		**65**		**74**		**73**	
Temperature	°C	--	**6.9**		**7.4**		**7.6**		**7.2**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1417.26**		**1417.00**		**1417.47**		**1416.87**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**56**	**41**	e	<20		<20	e	<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		<50		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	**1.2**		**1.2**		<1.4		**1.2**	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**36**	**24**		<2.0		**16**	a	**26**	
Alkalinity, Carbonate	mg/L	**12**	**4.8**		<2.0		**10**		**4.0**	
Chloride	mg/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.20**	**0.13**	a,e	**0.13**		**0.14**	e	**0.15**	e
Sulfate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	e
Major Cations										
Calcium	mg/L	**10**	--		**8.9**		--		--	
Magnesium	mg/L	**2.0**	--		**1.6**		--		--	
Potassium	mg/L	**2.0**	--		<0.50		--		--	
Sodium	mg/L	**4.5**	**1.6**	e	**1.4**		**1.6**		**1.4**	
General										
Hardness	mg/L	**33**	--		**29**		--		--	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL025D (Background)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/06/18[T]		Q2 2018 05/03/18[T]		Q3 2018 08/07/18[T]		Q4 2018 11/05/18[T]	
Field										
D.O.[1]	ppm	--	**5.6**		**5.6**		**4.8**		**5.1**	
ORP	mV	--	**24**		**99**		**193**		**127**	
pH	SU	**8.2-9.2**	**8.7**		**8.5**		**8.3**		**8.7**	
Specific Conductance	µS/cm @ 25°C	--	**98**		**90**		**106**		**108**	
Temperature	°C	--	**7.3**		**7.2**		**7.5**		**7.1**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1412.76**		**1413.09**		**1413.38**		**1412.99**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.5**	**2.7**		**2.9**		**3.0**		**2.7**	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**137**	<20	e	**26**		**27**	e	<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		<50		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	**3.6**		**4.1**		**4.2**		**4.1**	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**52**	**38**		**45**		**44**	a	**45**	
Alkalinity, Carbonate	mg/L	**14**	**4.0**		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	**1.1**		<1.0		**1.3**		<1.0	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.20**	**0.13**	a,e	**0.16**		**0.13**	e	**0.10**	e
Sulfate	mg/L	**8.0**	**7.0**		**4.6**		**5.1**		**5.3**	e
Major Cations										
Calcium	mg/L	**12**	**--**		**12**		**--**		**--**	
Magnesium	mg/L	**2.7**	**--**		**2.7**		**--**		**--**	
Potassium	mg/L	**2.0**	**--**		**0.63**		**--**		**--**	
Sodium	mg/L	**12**	**3.3**	e	**3.4**		**3.2**		**3.5**	
General										
Hardness	mg/L	**42**	**--**		**41**		**--**		**--**	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL026A (Background)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/06/18[T]		Q2 2018 05/03/18[T]		Q3 2018 08/01/18[T]		Q4 2018 11/05/18[T]	
Field										
D.O.[1]	ppm	--	**11**		**11**		**9.7**		**11**	
ORP	mV	--	**167**		**107**		**119**		**167**	
pH	SU	**6.2-7.2**	**4.8**		**6.8**		**6.6**		**6.6**	
Specific Conductance	µS/cm @ 25°C	--	**118**		**147**		**101**		**159**	
Temperature	°C	--	**5.3**		**7.1**		--		**7.8**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1417.00**		**1416.76**		**1417.11**		**1416.66**	
Metals										
Aluminum	ug/L	**236**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**368**	**232**	e	**74**		**49**	e	**95**	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	**1.0**		<0.50	e	**0.54**		**0.70**	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		<50		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**114**	**58**		**112**		**53**	a	**74**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	**1.1**		<1.0		<1.0		<1.0	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.73**	**0.99**	a,e	**0.96**		**0.72**	e	**0.67**	e
Sulfate	mg/L	**8.0**	**2.3**		**3.7**		**2.1**		**3.2**	e
Major Cations										
Calcium	mg/L	**40**	--		**17**		**--**		**--**	
Magnesium	mg/L	**5.9**	--		**2.6**		**--**		**--**	
Potassium	mg/L	**2.0**	--		**1.1**		**--**		**--**	
Sodium	mg/L	**2.4**	**0.99**	e	**1.1**		**1.2**		**1.5**	
General										
Hardness	mg/L	**124**	--		**53**		**--**		**--**	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL026D (Background)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/06/18[T]		Q2 2018 05/03/18[T]		Q3 2018 08/01/18[T]		Q4 2018 11/05/18[T]	
Field										
D.O.[1]	ppm	--	**11**		**12**		**11**		**12**	
ORP	mV	--	**46**		**122**		**74**		**125**	
pH	SU	**8.4-9.4**	**8.7**		**8.8**		**7.8**		**8.8**	
Specific Conductance	µS/cm @ 25°C	--	**65**		**61**		**56**		**74**	
Temperature	°C	--	**7.0**		**7.3**		**7.5**		**7.2**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1409.60**		**1409.87**		**1410.15**		**1409.86**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**80**	<20	e	<20		<20	e	<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		<50		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**31**	**26**		**130**		**65**	a	**29**	
Alkalinity, Carbonate	mg/L	**8.0**	**4.0**		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	**1.1**		<1.0		**1.3**		<1.0	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.20**	**0.12**	a,e	**0.14**		**0.11**	e	**0.13**	e
Sulfate	mg/L	**8.0**	**2.1**		<2.0		<2.0		<2.0	e
Major Cations										
Calcium	mg/L	**13**	**--**		**9.9**		**--**		**--**	
Magnesium	mg/L	**2.4**	**--**		**1.5**		**--**		**--**	
Potassium	mg/L	**2.0**	--		<0.50		--		--	
Sodium	mg/L	**2.0**	**0.59**	e	**0.66**		**0.69**		**0.68**	
General										
Hardness	mg/L	**43**	**--**		**31**		**--**		**--**	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL026E (Background)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/13/18[T]		Q2 2018 05/08/18[T]		Q3 2018 08/07/18[T]		Q4 2018 11/06/18[T]	
Field										
D.O.[1]	ppm	--	<0.10		**0.20**		**0.30**		**0.60**	
ORP	mV	--	-138		-89		-74		-154	
pH	SU	**8.1-9.1**	**8.9**		**8.3**		**8.5**		**8.6**	
Specific Conductance	µS/cm @ 25°C	--	**116**		**115**		**130**		**130**	
Temperature	°C	--	**6.8**		**7.2**		**7.4**		**7.2**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1409.54**		**1409.88**		**1410.05**		**1409.88**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**7.8**	**7.2**		**7.3**		**7.8**		**7.5**	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**80**	<20	e	<20		<20	e	<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		**62**		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**91**	**55**		**58**		**58**	a	**54**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0		<2.0		<2.0		**2.0**	
Chloride	mg/L	**4.0**	<1.0		**1.0**		<1.0		<1.0	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.20**	<0.05	a,e	<0.05		<0.05	e	<0.05	e
Sulfate	mg/L	**8.6**	**7.6**		**7.2**		**7.8**		**7.7**	e
Major Cations										
Calcium	mg/L	**17**	--		**14**		--		--	
Magnesium	mg/L	**4.3**	--		**4.0**		--		--	
Potassium	mg/L	**2.0**	--		**2.0**		--		--	
Sodium	mg/L	**2.0**	**1.8**	e	**1.8**		**1.7**		**1.6**	
General										
Hardness	mg/L	**60**	--		**52**		--		--	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL044B (UMB)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/14/18[T]		Q2 2018 05/14/18[T]		Q3 2018 08/08/18[T]		Q4 2018 11/07/18[T]	
Field										
D.O.[1]	ppm	--	**0.10**		**0.80**		**0.60**		**1.4**	
ORP	mV	--	-563		-240		-263		-263	
pH	SU	**8.3-9.3**	**11**		**9.6**		**9.5**		**9.5**	
Specific Conductance	µS/cm @ 25°C	--	**79**		**84**		**78**		**88**	
Temperature	°C	--	**7.8**		**8.0**		**8.3**		**7.6**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1414.94**		**1414.98**		**1414.64**		**1414.56**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	**2.2**		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**80**	**47**	e	<20		<20	e	<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		**0.88**	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	**--**		<50		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**64**	**5.6**	s	**12**		**3.0**	a	**17**	
Alkalinity, Carbonate	mg/L	**8.0**	**22**		**16**		**18**		**10**	
Chloride	mg/L	**4.0**	**1.2**		<1.0		**1.2**		**1.4**	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.20**	<0.05	a,e	<0.05		<0.05	e	<0.05	e
Sulfate	mg/L	**24**	**7.6**		**6.2**		**6.8**		**6.0**	e
Major Cations										
Calcium	mg/L	**17**	**--**		**12**		**--**		**--**	
Magnesium	mg/L	**4.0**	**--**		**0.79**		**--**		**--**	
Potassium	mg/L	**2.0**	**--**		**1.2**		**--**		**--**	
Sodium	mg/L	**2.6**	**2.3**	e	**2.4**		**2.4**		**2.6**	
General										
Hardness	mg/L	**58**	**--**		**33**		**--**		**--**	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL060A (TDRSA-CWB)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/12/18[T]		Q2 2018 05/07/18[T]		Q3 2018 08/06/18[T]		Q4 2018 11/06/18[T]	
Field										
D.O.[1]	ppm	--	**11**		**11**		**11**		**11**	
ORP	mV	--	**31**		**70**		**84**		**41**	
pH	SU	**8.1-9.1**	**8.8**		**8.5**		**8.3**		**8.7**	
Specific Conductance	µS/cm @ 25°C	--	**80**		**86**		**90**		**89**	
Temperature	°C	--	**7.6**		**8.6**		**9.8**		**8.0**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<10	
Water Elevation	ft MSL	--	**1404.83**		**1405.41**		**1405.52**		**1405.42**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**7.2**	**4.4**		**4.0**		**4.2**		**4.2**	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**80**	<20	e	<20		<20	e	<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		<50		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	**1.2**		**1.2**		<1.4		**1.4**	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**62**	**30**		**43**		**43**	a	**42**	
Alkalinity, Carbonate	mg/L	**8.0**	**8.1**		<2.0		<2.0		**2.7**	
Chloride	mg/L	**4.0**	<1.0		<1.0		**1.2**		**1.5**	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.20**	**0.26**	a,e	**0.30**		**0.32**	e	**0.32**	e
Sulfate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	e
Major Cations										
Calcium	mg/L	**17**	--		**12**		--		--	
Magnesium	mg/L	**4.2**	--		**2.6**		--		--	
Potassium	mg/L	**2.0**	--		**0.73**		--		--	
Sodium	mg/L	**2.1**	**0.74**	e	**0.65**		**0.81**		**0.68**	
General										
Hardness	mg/L	**61**	--		**40**		--		--	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL061A (TDRSA-CWB)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/12/18[T]		Q2 2018 05/07/18[T]		Q3 2018 08/06/18[T]		Q4 2018 11/06/18[T]	
Field										
D.O.[1]	ppm	--	**11**		**11**		**11**		**11**	
ORP	mV	--	**45**		**63**		**73**		**41**	
pH	SU	**8.1-9.1**	**8.9**		**8.3**		**8.5**		**8.6**	
Specific Conductance	µS/cm @ 25°C	--	**108**		**116**		**116**		**113**	
Temperature	°C	--	**7.6**		**8.3**		**8.8**		**7.7**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1406.26**		**1406.75**		**1406.94**		**1406.77**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**80**	<20	e	<20		<20	e	<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		<50		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**40**	**55**		**119**		**59**	a	**49**	
Alkalinity, Carbonate	mg/L	**8.0**	**2.0**		<2.0		<2.0		**4.0**	
Chloride	mg/L	**4.0**	**1.2**		**1.2**		**1.0**		<1.0	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.27**	**0.33**	a,e	**0.36**		**0.36**	e	**0.37**	e
Sulfate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	e
Major Cations										
Calcium	mg/L	**15**	--		**18**		**--**		**--**	
Magnesium	mg/L	**2.2**	--		**3.2**		**--**		**--**	
Potassium	mg/L	**2.0**	--		**0.66**		**--**		**--**	
Sodium	mg/L	**2.0**	**0.82**	e	**0.75**		**0.88**		**0.77**	
General										
Hardness	mg/L	**37**	--		**58**		**--**		**--**	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL062A (TDRSA-CWB)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/12/18[T]		Q2 2018 05/07/18[T]		Q3 2018 08/06/18[T]		Q4 2018 11/06/18[T]	
Field										
D.O.[1]	ppm	--	**8.6**		**8.6**		**8.4**		**8.6**	
ORP	mV	--	**39**		**53**		**79**		**40**	
pH	SU	**8.3-9.3**	**8.0**		**7.6**		**7.5**		**7.5**	
Specific Conductance	µS/cm @ 25°C	--	**477**		**562**		**615**		**580**	
Temperature	°C	--	**7.9**		**8.4**		**8.3**		**7.8**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1407.59**		**1408.09**		**1408.31**		**1408.09**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	--		**29**		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**80**	<20	e	<20		**41**	e	<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		**79**		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**48**	**170**		**186**		**199**	a	**190**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	**59**		**68**		**74**		**70**	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.41**	**0.83**	a,e	**0.89**		**1.0**	e	**1.1**	e
Sulfate	mg/L	**8.0**	**2.3**		**2.2**		**2.4**		**2.5**	e
Major Cations										
Calcium	mg/L	**12**	--		**69**		--		--	
Magnesium	mg/L	**2.2**	--		**14**		--		--	
Potassium	mg/L	**2.0**	--		**2.3**		--		--	
Sodium	mg/L	**2.0**	**22**	e	**23**		**26**		**21**	
General										
Hardness	mg/L	**40**	--		**229**		--		--	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL063A (TDRSA-CWB)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/12/18[T]		Q2 2018 05/08/18[T]		Q3 2018 08/06/18[T]		Q4 2018 11/07/18[T]	
Field										
D.O.[1]	ppm	--	**8.1**		**10**		**8.8**		**9.4**	
ORP	mV	--	**77**		**83**		**87**		**87**	
pH	SU	**8.1-9.1**	**7.8**		**7.6**		**7.5**		**7.7**	
Specific Conductance	µS/cm @ 25°C	--	**486**		**443**		**522**		**579**	
Temperature	°C	--	**7.8**		**8.6**		**9.0**		**8.0**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1401.26**		**1401.91**		**1402.00**		**1401.58**	
Metals										
Aluminum	ug/L	**200**	**--**		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	--		**29**		**--**		**--**	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**80**	<20	e	<20		<20	e	<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	**--**		**85**		**--**		**--**	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**42**	**165**		**167**		**168**	a	**184**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	**43**		**50**		**61**		**70**	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.29**	**0.70**	a,e	**0.78**		**0.86**	e	**0.88**	e
Sulfate	mg/L	**8.0**	**2.3**		**2.2**		**2.1**		**2.4**	e
Major Cations										
Calcium	mg/L	**12**	--		**60**		**--**		**--**	
Magnesium	mg/L	**2.0**	--		**12**		**--**		**--**	
Potassium	mg/L	**2.0**	--		**1.9**		**--**		**--**	
Sodium	mg/L	**2.0**	**9.5**	e	**11**		**13**		**15**	
General										
Hardness	mg/L	**40**	--		**200**		**--**		**--**	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL064D (UMB)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/14/18[T]		Q2 2018 05/09/18[T]		Q3 2018 08/07/18[T]		Q4 2018 11/07/18[T]	
Field										
D.O.[1]	ppm	--	**0.10**		**0.10**		**0.20**		**0.20**	
ORP	mV	--	-520		-307		-302		-474	
pH	SU	**8.0-9.0**	**9.5**		**8.8**		**8.5**		**9.0**	
Specific Conductance	µS/cm @ 25°C	--	**141**		**146**		**153**		**149**	
Temperature	°C	--	**6.9**		**7.3**		**7.6**		**7.0**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1415.94**		**1415.53**		**1415.89**		**1416.20**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**80**	**26**	e	**26**		**26**	e	**26**	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		**102**		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**82**	**78**		**74**		**76**	a	**77**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.2**	**2.2**		**1.6**		**3.1**		**3.1**	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.20**	<0.05	a,e	<0.05		<0.05	e	<0.05	e
Sulfate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	e
Major Cations										
Calcium	mg/L	**22**	--		**19**		--		--	
Magnesium	mg/L	**3.3**	--		**4.0**		--		--	
Potassium	mg/L	**2.0**	--		**1.2**		--		--	
Sodium	mg/L	**6.9**	**3.8**	e	**3.7**		**4.1**		**3.7**	
General										
Hardness	mg/L	**51**	--		**64**		--		--	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL065D (UMB)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/15/18[T]		Q2 2018 05/14/18[T]		Q3 2018 08/09/18[T]		Q4 2018 11/08/18[T]	
Field										
D.O.[1]	ppm	--	<0.10		**0.30**		**0.20**		**0.10**	
ORP	mV	--	-353		-170		-152		-183	
pH	SU	**7.9-8.9**	**9.0**		**8.6**		**8.5**		**8.6**	
Specific Conductance	µS/cm @ 25°C	--	**145**		**146**		**150**		**150**	
Temperature	°C	--	**6.0**		**7.4**		**9.0**		**6.8**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1416.19**		**1416.02**		**1415.52**		**1415.83**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.6**	**3.2**		**3.9**		**3.4**		**3.3**	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**80**	**48**	e	**40**		**40**	e	**66**	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.00**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	**--**		**198**		**--**		**--**	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**86**	**82**		**78**		**77**	a	**80**	
Alkalinity, Carbonate	mg/L	**8.7**	<2.0		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	**1.1**		<1.0		**1.3**		<1.0	
Fluoride	mg/L	**0.40**	**--**		**0.13**		**--**		**--**	
Nitrogen, Nitrate	mg/L	**0.20**	<0.05	a,e	<0.05		<0.05	e	<0.05	e
Sulfate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	e
Major Cations										
Calcium	mg/L	**14**	--		**12**		**--**		**--**	
Magnesium	mg/L	**4.8**	--		**4.1**		**--**		**--**	
Potassium	mg/L	**3.0**	--		**2.5**		**--**		**--**	
Sodium	mg/L	**12**	**11**	e	**11**		**12**		**9.1**	
General										
Hardness	mg/L	**53**	--		**48**		**--**		**--**	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL066D (UMB)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/14/18[D]		Q2 2018 05/14/18[T]		Q3 2018 08/08/18[T]		Q4 2018 11/07/18[T]	
Field										
D.O.[1]	ppm	--	**2.6**		**2.2**		**2.4**		**2.4**	
ORP	mV	--	**22**		**10**		**125**		-66	
pH	SU	**8.7-9.7**	**8.7**		**8.6**		**8.7**		**8.8**	
Specific Conductance	µS/cm @ 25°C	--	**156**		**123**		**152**		**166**	
Temperature	°C	--	**6.1**		NM		**9.9**		**7.4**	
Turbidity	NTU	--	**47**		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1415.90**		**1415.81**		**1415.15**		**1415.25**	
Metals										
Aluminum	ug/L	**557**	--		**1320**		**--**		**--**	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**8.9**	**7.9**		**7.8**		**8.8**		**9.7**	
Barium	ug/L	**80**	--		**20**		**--**		**--**	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**288**	<20	e	**583**		**479**	e	**470**	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	**0.34**		**1.6**	e	**1.6**		**1.2**	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		**1.1**		<1.0		**1.2**	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**367**	**--**		**80**		**--**		**--**	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	**1.2**		**1.1**		<1.4		**2.0**	
Zinc	ug/L	40	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**61**	**56**		**60**		**46**	a	**67**	
Alkalinity, Carbonate	mg/L	**52**	**8.1**		**3.9**		**14**		**6.1**	
Chloride	mg/L	**4.0**	**1.2**		<1.0		**1.1**		**1.1**	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.20**	<0.05	a,e	<0.05		<0.05	e	<0.05	e
Sulfate	mg/L	**11**	**9.8**		**8.9**		**10**		**8.9**	e
Major Cations										
Calcium	mg/L	**58**	--		**15**		**--**		**--**	
Magnesium	mg/L	**2.9**	--		**3.0**		**--**		**--**	
Potassium	mg/L	**2.6**	--		**1.2**		**--**		**--**	
Sodium	mg/L	**8.0**	**14**	e	**9.6**		**16**		**18**	
General										
Hardness	mg/L	**146**	--		**49**		**--**		**--**	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL067A (TDRSA-CWB)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/12/18[T]		Q2 2018 05/07/18[T]		Q3 2018 08/06/18[T]		Q4 2018 11/07/18[T]	
Field										
D.O.[1]	ppm	--	**8.6**		**9.3**		**8.8**		**8.8**	
ORP	mV	--	**81**		**101**		**97**		**99**	
pH	SU	**5.6-6.6**	**6.3**		**6.1**		**6.2**		**6.3**	
Specific Conductance	µS/cm @ 25°C	--	**770**		**692**		**598**		**468**	
Temperature	°C	--	**7.6**		**8.8**		**9.0**		**7.9**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1414.99**		**1416.45**		**1415.80**		**1415.01**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	**--**		**53**		**--**		**--**	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**80**	<20	e	<20		<20	e	<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	**1.2**		**1.3**	e	**1.3**		**1.5**	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	**1.6**		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	**--**		**95**		**--**		**--**	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**51**	**61**		**66**		**68**	a	**61**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	**199**		**154**		**122**		**97**	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.25**	**2.1**	a,e	**1.6**		**1.5**	e	**0.54**	e
Sulfate	mg/L	**8.4**	**15**		**9.8**		**7.9**		**6.4**	e
Major Cations										
Calcium	mg/L	**8.2**	--		**16**		**--**		**--**	
Magnesium	mg/L	**2.0**	--		**7.2**		**--**		**--**	
Potassium	mg/L	**2.0**	--		**2.2**		**--**		**--**	
Sodium	mg/L	**2.0**	**132**	e	**102**		**89**		**68**	
General										
Hardness	mg/L	**26**	--		**70**		**--**		**--**	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL068A (Background)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/13/18[T]		Q2 2018 05/09/18[T]		Q3 2018 08/07/18[T]		Q4 2018 11/07/18[T]	
Field										
D.O.[1]	ppm	--	**11**		**13**		**12**		**13**	
ORP	mV	--	**151**		**166**		**172**		**153**	
pH	SU	**6.2-7.2**	**7.1**		**5.8**		**6.4**		**6.5**	
Specific Conductance	µS/cm @ 25°C	--	**36**		**34**		**44**		**46**	
Temperature	°C	--	**7.4**		**7.8**		**7.7**		**7.4**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1422.85**		**1419.38**		**1422.99**		**1422.38**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**80**	<20	e	**63**		<20	e	<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		<50		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		**1.1**	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**35**	**15**		**17**		**17**	a	**22**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.20**	<0.05	a,e	<0.05		<0.05	e	<0.05	e
Sulfate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	e
Major Cations										
Calcium	mg/L	**6.7**	--		**4.5**		--		--	
Magnesium	mg/L	**2.0**	--		**0.80**		--		--	
Potassium	mg/L	**2.0**	--		**0.81**		--		--	
Sodium	mg/L	**2.0**	**0.71**	e	**0.64**		**0.73**		**0.70**	
General										
Hardness	mg/L	**21**	--		**15**		--		--	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL068B (Background)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/13/18[T]		Q2 2018 05/09/18[T]		Q3 2018 08/07/18[T]		Q4 2018 11/07/18[T]	
Field										
D.O.[1]	ppm	--	**11**		**13**		**12**		**12**	
ORP	mV	--	**103**		**95**		**134**		**63**	
pH	SU	**8.4-9.4**	**8.5**		**8.8**		**8.9**		**9.1**	
Specific Conductance	µS/cm @ 25°C	--	**67**		**59**		**70**		**70**	
Temperature	°C	--	**7.1**		**7.6**		**7.9**		**7.3**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<10	
Water Elevation	ft MSL	--	**1412.64**		**1414.36**		**1414.34**		**1414.02**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**184**	<20	e	<20		<20	e	**30**	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		<50		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	**1.1**		**1.1**		<1.4		**1.8**	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**30**	**29**		**31**		**23**	a	**25**	
Alkalinity, Carbonate	mg/L	**9.9**	<2.0		<2.0		**4.0**		**4.1**	
Chloride	mg/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.20**	**0.05**	a,e	**0.05**		**0.06**	e	**0.06**	e
Sulfate	mg/L	**8.0**	**2.5**		**2.2**		<2.0		**2.2**	e
Major Cations										
Calcium	mg/L	**9.4**	--		**8.8**		**--**		**--**	
Magnesium	mg/L	**2.0**	--		**1.7**		**--**		**--**	
Potassium	mg/L	**2.0**	--		**0.54**		**--**		**--**	
Sodium	mg/L	**2.0**	**0.81**	e	**0.81**		**0.82**		**0.84**	
General										
Hardness	mg/L	**31**	--		**29**		**--**		**--**	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL068D (Background)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/13/18[T]		Q2 2018 05/09/18[T]		Q3 2018 08/07/18[T]		Q4 2018 11/07/18[T]	
Field										
D.O.[1]	ppm	--	**1.9**		**2.6**		**0.90**		**4.5**	
ORP	mV	--	**40**		-18		**61**		**40**	
pH	SU	**8.0-9.0**	**8.8**		**8.4**		**8.5**		**8.5**	
Specific Conductance	µS/cm @ 25°C	--	**131**		**112**		**127**		**128**	
Temperature	°C	--	**5.3**		**7.3**		**8.4**		**7.1**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1413.90**		**1414.19**		**1414.33**		**1414.07**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**7.2**	**5.0**		**4.7**		**5.7**		**5.8**	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**119**	<20	e	<20		**62**	e	<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.1**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		<50		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	**2.4**		**3.7**		**3.4**	J	**3.8**	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**67**	**56**		**58**		**57**	a	**60**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	<1.0		<1.0		<1.0		**1.2**	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.21**	<0.05	a,e	<0.05		<0.05	e	<0.05	e
Sulfate	mg/L	**10**	**5.5**		**5.2**		**5.2**		**5.2**	e
Major Cations										
Calcium	mg/L	**16**	--		**14**		**--**		**--**	
Magnesium	mg/L	**3.9**	--		**3.8**		**--**		**--**	
Potassium	mg/L	**2.0**	--		**1.3**		**--**		**--**	
Sodium	mg/L	**6.1**	**4.2**	e	**3.8**		**4.2**		**4.3**	
General										
Hardness	mg/L	**52**	--		**51**		**--**		**--**	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL069A (Background)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/14/18[T]		Q2 2018 05/07/18[T]		Q3 2018 08/06/18[T]		Q4 2018 11/08/18[T]	
Field										
D.O.[1]	ppm	--	5.0		6.8		7.1		7.2	
ORP	mV	--	105		103		59		68	
pH	SU	7.8-8.8	6.7		6.8		6.8		6.9	
Specific Conductance	µS/cm @ 25°C	--	728		589		471		612	
Temperature	°C	--	8.1		9.2		9.0		6.9	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	1383.26		1383.36		1383.69		1383.73	
Metals										
Aluminum	ug/L	200	--		<50		--		--	
Antimony	ug/L	5.5	--		<5.0		--		--	
Arsenic	ug/L	6.0	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	80	--		21		--		--	
Beryllium	ug/L	2.5	--		<1.0		--		--	
Boron	ug/L	400	<100		<100		<100		<100	
Cadmium	ug/L	2.0	--		<0.50		--		--	
Chromium	ug/L	20	--		6.7		--		--	
Cobalt	ug/L	40	--		<10		--		--	
Copper	ug/L	20	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	80	37	e	<20		28	e	295	
Lead	ug/L	4.0	--		<1.0		--		--	
Lithium	ug/L	32	--		<8.0		--		--	
Manganese	ug/L	80	<20	e	<20		<20		41	
Mercury	ng/L	2.0	2.3		1.8	e	1.0		11	
Molybdenum	ug/L	40	--		<10		--		--	
Nickel	ug/L	100	<25		<25		<25		<25	
Selenium	ug/L	4.0	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	0.80	--		<0.20		--		--	
Strontium	ug/L	200	--		<50		--		--	
Thallium	ug/L	2.0	--		<2.0		--		--	
Vanadium	ug/L	4.0	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	40	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	138	156		166		190	a	171	
Alkalinity, Carbonate	mg/L	8.0	<2.0		<2.0		<2.0		<2.0	
Chloride	mg/L	4.0	111		92		32		89	
Fluoride	mg/L	0.40	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.57	0.87	a,e	1.0		1.0	e	0.86	e
Sulfate	mg/L	8.0	9.8		10		10		9.2	e
Major Cations										
Calcium	mg/L	35	--		41		--		--	
Magnesium	mg/L	18	--		14		--		--	
Potassium	mg/L	2.0	--		2.1		--		--	
Sodium	mg/L	2.0	70	e	67		40		47	
General										
Hardness	mg/L	162	--		160		--		--	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL070A (NCWIB)
Eagle Mine

Parameter	Unit	Benchmark	Q2 2015 05/13/15[T]		Q2 2016 05/17/16[T]		Q2 2017 05/09/17[T]		Q2 2018 05/08/18[T]	
Field										
D.O.[1]	ppm	--	**11**		**10**		**10**		**13**	
ORP	mV	--	**167**		**55**		**182**		**74**	
pH	SU	**8.3-9.3**	**8.6**		**8.5**		**8.2**		**8.4**	
Specific Conductance	µS/cm @ 25°C	--	**188**		**440**		**524**		**499**	
Temperature	°C	--	**9.0**		**9.0**		**8.2**		**9.5**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1370.25**		**1369.67**		**1371.21**		**1372.25**	
Metals										
Aluminum	ug/L	**200**	<50		<50		<50		<50	
Antimony	ug/L	**5.5**	<5.0		<5.0		<5.0		<5.0	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	<20		**24**		**28**		**27**	
Beryllium	ug/L	**2.5**	<1.0		<1.0		<1.0		<1.0	
Boron	ug/L	**400**	<100		<100		<100	e	<100	
Cadmium	ug/L	**2.0**	<0.50		<0.50		<0.50		<0.50	
Chromium	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Cobalt	ug/L	**40**	<10		<10		<10		<10	
Copper	ug/L	**20**	<5.0		<5.0		<5.0	e	<5.0	
Iron	ug/L	**80**	<20		**75**		<20		<20	
Lead	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Lithium	ug/L	**32**	<8.0		<8.0		<8.0		<8.0	
Manganese	ug/L	**80**	<20		<20		<20		<20	
Mercury	ng/L	**2.0**	**0.68**	a,e	**0.54**		<0.50		<0.50	e
Molybdenum	ug/L	**40**	<10		<10		<10		<10	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0	e	<1.0		<1.0	
Silver	ug/L	**0.80**	<0.20		<0.20		<0.20		<0.20	
Strontium	ug/L	**200**	**59**		**77**		**74**		**74**	
Thallium	ug/L	**2.0**	<2.0		<2.0		<2.0		<2.0	
Vanadium	ug/L	**4.0**	<2.0		<1.0		<1.0		<1.0	
Zinc	ug/L	**40**	<10		<10		<10	e	<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**42**	**40**		**45**		**56**		**63**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0	e	<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	**58**		**120**		**120**	e	**110**	
Fluoride	mg/L	**0.40**	<0.10		<0.10		<0.10		<0.10	
Nitrogen, Nitrate	mg/L	**0.22**	**0.98**	e	**1.0**		**1.2**	e	**1.3**	
Sulfate	mg/L	**8.0**	**3.5**		**4.3**		**6.7**		**7.9**	
Major Cations										
Calcium	mg/L	**11**	**31**		**51**	e	**47**		**38**	
Magnesium	mg/L	**3.0**	**6.4**		**9.7**		**9.9**		**7.1**	
Potassium	mg/L	**2.0**	**1.2**		**1.8**		**2.0**	e	**1.8**	
Sodium	mg/L	**2.0**	**5.5**		**19**		**40**	e	**47**	
General										
Hardness	mg/L	**40**	**104**		**167**		**158**		**124**	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL071A (TDRSA-CWB)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/12/18[T]		Q2 2018 05/07/18[T]		Q3 2018 08/07/18[T]		Q4 2018 11/07/18[T]	
Field										
D.O.[1]	ppm	--	**9.5**		**11**		**11**		**11**	
ORP	mV	--	**102**		**83**		**98**		**90**	
pH	SU	**8.1-9.1**	**7.8**		**7.6**		**7.8**		**7.5**	
Specific Conductance	µS/cm @ 25°C	--	**550**		**508**		**524**		**572**	
Temperature	°C	--	**8.0**		**9.8**		**9.1**		**8.3**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1405.66**		**1405.80**		**1405.78**		**1405.92**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	--		**31**		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		<5.0		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**178**	<20	e	**30**		<20	e	<20	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	<25		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		**1.2**	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		**83**		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**44**	**140**		**125**		**137**	a	**149**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	**17**		**25**		**21**		**22**	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.31**	**27**	a,e	**29**		**23**	e	**29**	e
Sulfate	mg/L	**8.0**	**6.6**		**7.6**		**6.8**		**7.9**	e
Major Cations										
Calcium	mg/L	**12**	--		**70**		--		--	
Magnesium	mg/L	**2.0**	--		**11**		--		--	
Potassium	mg/L	**2.0**	--		**1.5**		--		--	
Sodium	mg/L	**2.0**	**14**	e	**16**		**14**		**10**	
General										
Hardness	mg/L	**38**	--		**222**		--		--	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL073A (NCWIB)
Eagle Mine

Parameter	Unit	Benchmark	Q2 2015 05/13/15[T]		Q2 2016 05/17/16[T]		Q2 2017 05/09/17[T]		Q2 2018 05/08/18[T]	
Field										
D.O.[1]	ppm	--	**11**		**11**		**10**		**12**	
ORP	mV	--	**167**		**102**		**210**		**132**	
pH	SU	**6.1-7.1**	**6.8**		**6.7**		**6.5**		**6.6**	
Specific Conductance	µS/cm @ 25°C	--	**160**		**207**		**217**		**189**	
Temperature	°C	--	**10**		**10**		**8.1**		**8.6**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1382.45**		**1381.68**		**1381.91**		**1383.41**	
Metals										
Aluminum	ug/L	**200**	**110**		<50		<50		<50	
Antimony	ug/L	**5.5**	<5.0		<5.0		<5.0		<5.0	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	<20		<20		<20		<20	
Beryllium	ug/L	**2.5**	<1.0		<1.0		<1.0		<1.0	
Boron	ug/L	**400**	<100		<100		<100	e	<100	
Cadmium	ug/L	**2.0**	<0.50		<0.50		<0.50		<0.50	
Chromium	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Cobalt	ug/L	**40**	<10		<10		<10		<10	
Copper	ug/L	**20**	<5.0		<5.0		<5.0	e	<5.0	
Iron	ug/L	**132**	**130**		**74**		<20		**41**	
Lead	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Lithium	ug/L	**32**	<8.0		<8.0		<8.0		<8.0	
Manganese	ug/L	**80**	<20		<20		<20		<20	
Mercury	ng/L	**2.0**	**0.94**	e	**0.63**		<0.50		**0.52**	e
Molybdenum	ug/L	**40**	<10		<10		<10		<10	
Nickel	ug/L	**100**	<25		<10		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0	e	<1.0		<1.0	
Silver	ug/L	**0.80**	<0.20		<0.20		<0.20		<0.20	
Strontium	ug/L	**200**	**94**		**98**		**90**		**99**	
Thallium	ug/L	**2.0**	<2.0		<2.0		<2.0		<2.0	
Vanadium	ug/L	**4.0**	<2.0		<1.0		<1.0		<1.0	
Zinc	ug/L	**40**	<10		<10		<10	e	<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**44**	**97**		**100**		**100**		**88**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0	e	<2.0		<2.0		<2.0	
Chloride	mg/L	**20**	**8.4**		**5.6**		**3.6**	e	**2.1**	
Fluoride	mg/L	**0.40**	<0.10		<0.10		<0.10		<0.10	
Nitrogen, Nitrate	mg/L	**0.60**	**2.0**	e	**1.6**		**1.5**	e	**1.2**	
Sulfate	mg/L	**8.0**	**7.9**		**9.4**		**9.2**		**9.0**	
Major Cations										
Calcium	mg/L	**9.2**	**32**		**34**	e	**32**		**26**	
Magnesium	mg/L	**2.5**	**7.0**		**7.5**		**7.1**		**5.6**	
Potassium	mg/L	**2.0**	**1.3**		**1.3**		**1.4**	e	**1.3**	
Sodium	mg/L	**2.0**	**1.8**		**2.8**		**3.0**	e	**2.5**	
General										
Hardness	mg/L	**33**	**109**		**116**		**109**		**88**	

2018
Mine Permit Groundwater Quality Monitoring Data
QAL074A (Septic & WWTP)
Eagle Mine

Parameter	Unit	Benchmark	Q1 2018 02/12/18[T]		Q2 2018 05/07/18[T]		Q3 2018 08/07/18[T]		Q4 2018 11/06/18[T]	
Field										
D.O.[1]	ppm	--	**8.8**		**10**		**11**		**10**	
ORP	mV	--	**55**		**100**		**102**		**74**	
pH	SU	**8.4-9.4**	**8.7**		**8.4**		**8.3**		**8.4**	
Specific Conductance	µS/cm @ 25°C	--	**304**		**314**		**318**		**309**	
Temperature	°C	--	**6.4**		**13.0**		**9.0**		**8.0**	
Turbidity	NTU	--	<1.0		<1.0		<1.0		<1.0	
Water Elevation	ft MSL	--	**1404.94**		**1403.51**		**1404.22**		**1404.73**	
Metals										
Aluminum	ug/L	**200**	--		<50		--		--	
Antimony	ug/L	**5.5**	--		<5.0		--		--	
Arsenic	ug/L	**6.0**	<2.0		<2.0		<2.0		<2.0	
Barium	ug/L	**80**	--		<20		--		--	
Beryllium	ug/L	**2.5**	--		<1.0		--		--	
Boron	ug/L	**400**	<100		<100		<100		<100	
Cadmium	ug/L	**2.0**	--		<0.50		--		--	
Chromium	ug/L	**20**	--		**15**		--		--	
Cobalt	ug/L	**40**	--		<10		--		--	
Copper	ug/L	**20**	<5.0		<5.0		<5.0		<5.0	
Iron	ug/L	**212**	**304**	e	**89**		**45**	e	**60**	
Lead	ug/L	**4.0**	--		<1.0		--		--	
Lithium	ug/L	**32**	--		<8.0		--		--	
Manganese	ug/L	**80**	<20	e	<20		<20		<20	
Mercury	ng/L	**2.0**	<0.50		<0.50	e	<0.50		<0.50	
Molybdenum	ug/L	**40**	--		<10		--		--	
Nickel	ug/L	**100**	**34**		<25		<25		<25	
Selenium	ug/L	**4.0**	<1.0		<1.0		<1.0		<1.0	
Silver	ug/L	**0.80**	--		<0.20		--		--	
Strontium	ug/L	**200**	--		<50		--		--	
Thallium	ug/L	**2.0**	--		<2.0		--		--	
Vanadium	ug/L	**4.0**	<1.0		<1.0		<1.4		<1.0	
Zinc	ug/L	**40**	<10		<10		<10		<10	
Major Anions										
Alkalinity, Bicarbonate	mg/L	**39**	**67**		**72**		**73**	a	**76**	
Alkalinity, Carbonate	mg/L	**8.0**	<2.0		<2.0		<2.0		<2.0	
Chloride	mg/L	**4.0**	**45**		**53**		**57**		**48**	
Fluoride	mg/L	**0.40**	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	**0.43**	**1.0**	a,e	**0.98**		**0.97**	e	**0.94**	e
Sulfate	mg/L	**8.0**	**7.3**		**7.3**		**7.8**		**7.6**	e
Major Cations										
Calcium	mg/L	**31**	--		**34**		--		--	
Magnesium	mg/L	**5.9**	--		**6.6**		--		--	
Potassium	mg/L	**2.0**	--		**1.3**		--		--	
Sodium	mg/L	**3.5**	**15**		**16**		**19**		**18**	
General										
Hardness	mg/L	**103**	--		**111**		--		--	

2018

Mine Permit Groundwater Quality Monitoring Data

Supplemental Volatile Organic Compounds Monitoring Results

QAL061A (TDRSA-CWB)

Eagle Mine

Parameter	Unit	Q4 2012 10/22/12[T]	Q2 2013 05/21/13[T]	Q2 2014 05/13/14[T]	Q2 2015 05/12/15[T]	Q2 2016 05/09/16[T]	Q2 2017 05/08/17[T]	Q2 2018 05/07/18[T]
Volatile Organic Compounds								
1,1,1-Trichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-Trichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromo-3-chloropropane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromoethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone (MEK)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Hexanone	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-pentanone (MIBK)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	ug/L	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon Disulfide	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,3-Dichloropropene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cyclohexane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dibromochloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Isopropylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl Acetate	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl tert-Butyl Ether	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylcyclohexane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methylene Chloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Styrene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl Chloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylene (Total)	ug/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

2018

Mine Permit Groundwater Quality Monitoring Data

Supplemental Volatile Organic Compounds Monitoring Results

QAL062A (TDRSA-CWB)

Eagle Mine

Parameter	Unit	Q4 2012 10/22/12[T]	Q2 2013 05/21/13[T]	Q2 2014 05/13/14[T]	Q2 2015 05/12/15[T]	Q2 2016 05/09/16[T]	Q2 2017 05/08/17[T]	Q2 2018 05/07/18[T]
Volatile Organic Compounds								
1,1,1-Trichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-Trichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromo-3-chloropropane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromoethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone (MEK)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Hexanone	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-pentanone (MIBK)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	ug/L	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon Disulfide	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,3-Dichloropropene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cyclohexane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dibromochloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Isopropylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl Acetate	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl tert-Butyl Ether	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylcyclohexane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methylene Chloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Styrene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl Chloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylene (Total)	ug/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

2018

Mine Permit Groundwater Quality Monitoring Data

Supplemental Volatile Organic Compounds Monitoring Results

QAL067A (TDRSA-CWB)

Eagle Mine

Parameter	Unit	Q4 2012 10/22/12[T]	Q2 2013 05/21/13[T]	Q2 2014 05/13/14[T]	Q2 2015 05/12/15[T]	Q2 2016 05/09/16[T]	Q2 2017 05/08/17[T]	Q2 2018 05/07/18[T]
Volatile Organic Compounds								
1,1,1-Trichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-Trichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromo-3-chloropropane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromoethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone (MEK)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Hexanone	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-pentanone (MIBK)	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	ug/L	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon Disulfide	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	ug/L	<1.0	<1.0	**16**	<1.0	<1.0	<1.0	<1.0
Chloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,3-Dichloropropene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cyclohexane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dibromochloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Isopropylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl Acetate	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl tert-Butyl Ether	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylcyclohexane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methylene Chloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Styrene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	**1.7**	**1.1**	<1.0
trans-1,2-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl Chloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylene (Total)	ug/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

2018
Mine Permit Groundwater Quality Monitoring Data
Explanation of Abbreviations & Data Qualifiers
Eagle Mine

Abbreviation or Data Qualifier	Explanation
[1]	Many D.O. values are elevated due to well screen configuration and aquifer characteristics and the low-flow sampling method. Super-saturated DO values are rejected (see R data qualifier) as not being representative of true conditions.
a	Estimated value. Duplicate precision for this parameter exceeded quality control limit.
b	Estimated value. Sample received after EPA established hold time expired.
BP	Below pump. Maximum water elevation is shown.
CWB	Contact Water Basin
D	Sample for metal and major cation parameters was filtered and values are dissolved concentrations.
e	Estimated value. The laboratory statement of data qualifications indicates that a quality control limit for this parameter was exceeded.
f	Value should be considered an estimate because field stabilization was not achieved of at least one parameter.
i	Insufficient water for collection of field parameters and/or sample.
J	Estimated value. Reported concentration is between the method detection limit and reporting limit.
NM	Not measured.
p	Pending. Some parameters/locations require additional baseline data to calculate a benchmark.
Q	Quarter.
R	Measured value was rejected based on quality control procedures.
RL	Laboratory reporting limit.
s	Potential false positive value. Compound present in blank sample.
t	Trending. Benchmarks are not proposed for baseline datasets that appear to be trending (using samples collected through Q4 2012) because the data do not represent a random distribution about the baseline mean. Trend analysis is recommended in place of benchmark screening for parameters that appear to be trending.
T	Sample was not filtered and all values are total concentrations.
TDRSA	Temporary Development Rock Storage Area
UMB	Underground Mine Boundary
	Value is equal to or above site-specific benchmark. An exceedance occurs if thre are 2 consecutive sampling events with a value equal to or greater than the benchmark at a compliance monitoring loctaion.

Appendix G

Eagle Mine

Groundwater Monitoring

Trend Analysis Summary & Trending Charts

Mine Permit Groundwater Trend Analysis
All Monitoring Locations
March 2011 to November 2018
Eagle Mine

Location	Classi-fication	Parameter	Unit	# Samples	# NDs	Non-detects handling	# used in Runs Test	Min	Max	Mean	St. Dev.	# Above Mean	# Below Mean	# Equal Mean	# Runs	Criti-cal value	Sig level	Trend?	Remarks
QAL023B	Compliance	Iron	ug/L	29	1	Included as RL	29	20	150	75	33.25	10	19	0	9	9	0.05	Y	
QAL023B	Compliance	Sodium	mg/L	29	0	No NDs	29	4.8	11.0	8.5	1.64	15	14	0	8	10	0.05	Y	
QAL023B	Compliance	Specific Conductance	µS/cm @ 25°C	29	0	No NDs	29	107	245	132	31.50	8	21	0	6	8	0.05	Y	
QAL023B	Compliance	Sulfate	mg/L	29	0	No NDs	29	2.2	5.8	4.4	0.93	15	14	0	6	10	0.05	Y	Non-unique RL in data
QAL024A	Compliance	Alkalinity, Bicarbonate	mg/L	29	0	No NDs	29	19.0	58.6	33.6	10.80	14	15	0	4	10	0.05	Y	
QAL024A	Compliance	Chloride	mg/L	29	2	Included as RL	29	1.0	340.0	76.2	69.52	14	15	0	7	10	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL024A	Compliance	Nitrogen, Nitrate	mg/L	29	3	Included as RL	29	0.050	2.80	0.78	0.64	14	15	0	6	10	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL024A	Compliance	Sodium	mg/L	29	0	No NDs	29	0.55	180.0	32.9	33.16	13	16	0	7	10	0.05	Y	
QAL024A	Compliance	Specific Conductance	µS/cm @ 25°C	29	0	No NDs	29	33	1127	318	217.30	14	15	0	9	10	0.05	Y	
QAL024A	Compliance	Sulfate	mg/L	29	0	No NDs	29	2.4	8.4	4.8	1.80	14	15	0	10	10	0.05	Y	Non-unique RL in data
QAL025A	Background	Alkalinity, Bicarbonate	mg/L	31	0	No NDs	31	16.0	35.0	25.6	4.00	16	15	0	9	11	0.05	Y	
QAL025A	Background	Nitrogen, Nitrate	mg/L	31	0	No NDs	31	0.230	1.10	0.64	0.23	15	16	0	10	11	0.05	Y	Non-unique RL in data
QAL025A	Background	Sodium	mg/L	31	0	No NDs	31	0.62	1.1	0.88	0.14	18	13	0	9	11	0.05	Y	
QAL025B	Background	Alkalinity, Bicarbonate	mg/L	31	1	Included as RL	31	2.0	37.0	27.7	6.03	20	11	0	10	10	0.05	Y	
QAL025B	Background	Iron	ug/L	31	21	Included as RL	31	20	53	24	7.95	7	24	0	7	8	0.05	Y	
QAL025B	Background	Mercury	ng/L	31	28	Included as RL	31	0.500	0.807	0.516	0.06	3	28	0	4	4	0.05	Y	
QAL025B	Background	Nitrogen, Nitrate	mg/L	31	0	No NDs	31	0.100	0.34	0.15	0.04	13	18	0	7	11	0.05	Y	
QAL025B	Background	Sodium	mg/L	31	0	No NDs	31	1.3	5.6	2.3	0.86	12	19	0	6	10	0.05	Y	
QAL025B	Background	Specific Conductance	µS/cm @ 25°C	31	0	No NDs	31	51	136	71	15.40	11	20	0	9	10	0.05	Y	
QAL025B	Background	Sulfate	mg/L	31	8	Included as RL	31	2.0	3.4	2.3	0.35	11	20	0	4	10	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL025B	Background	Vanadium	ug/L	19	7	Included as RL	19	1.0	10.0	3.0	3.70	4	15	0	2	4	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL025D	Background	Alkalinity, Bicarbonate	mg/L	31	0	No NDs	31	37.7	59.0	44.3	4.19	14	17	0	9	11	0.05	Y	
QAL025D	Background	Alkalinity, Carbonate	mg/L	31	8	Included as RL	31	2.0	16.0	4.37	3.18	11	20	0	6	10	0.05	Y	
QAL025D	Background	Iron	ug/L	31	7	Included as RL	31	20	100	46	20.00	16	15	0	9	11	0.05	Y	
QAL025D	Background	Magnesium	mg/L	8	0	No NDs	8	2.4	2.8	2.6	0.13	3	3	2	2	2	0.10	Y	
QAL025D	Background	Sodium	mg/L	31	0	No NDs	31	2.9	15.0	5.2	2.61	8	23	0	4	8	0.05	Y	
QAL025D	Background	Specific Conductance	µS/cm @ 25°C	31	0	No NDs	31	70	186	98	20.50	11	20	0	9	10	0.05	Y	
QAL025D	Background	Vanadium	ug/L	19	4	Included as RL	19	3.6	10.0	5.2	2.55	4	15	0	2	4	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL026A	Background	Chloride	mg/L	24	7	Included as RL	24	1.0	4.2	1.6	0.88	8	16	0	3	7	0.05	Y	
QAL026A	Background	Nitrogen, Nitrate	mg/L	24	0	No NDs	24	0.410	3.20	1.14	0.59	10	14	0	3	8	0.05	Y	Non-unique RL in data
QAL026A	Background	Sodium	mg/L	24	0	No NDs	24	0.92	2.4	1.4	0.37	12	12	0	8	8	0.05	Y	
QAL026D	Background	Vanadium	ug/L	18	17	Included as RL	18	1.0	10.0	2.6	3.41	3	15	0	2	3	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL026D	Background	Zinc	ug/L	29	26	Included as RL	29	10	56	12	8.50	3	26	0	3	4	0.05	Y	
QAL026E	Background	Sodium	mg/L	29	0	No NDs	29	1.4	2.2	1.7	0.17	17	12	0	10	10	0.05	Y	
QAL044B	Compliance	Alkalinity, Bicarbonate	mg/L	29	0	No NDs	29	3.0	62.0	33.6	17.60	16	13	0	4	10	0.05	Y	
QAL044B	Compliance	Alkalinity, Carbonate	mg/L	29	10	Included as RL	29	2.0	38.0	8.85	8.60	11	18	0	2	10	0.05	Y	
QAL044B	Compliance	Arsenic	ug/L	29	24	Included as RL	29	2.0	2.6	2.0	0.13	5	24	0	5	6	0.05	Y	
QAL044B	Compliance	Chloride	mg/L	29	4	Included as RL	29	1.0	3.2	1.5	0.57	8	21	0	7	8	0.05	Y	
QAL044B	Compliance	Magnesium	mg/L	7	0	No NDs	7	0.79	3.5	2.1	0.94	4	3	0	2	2	0.10	Y	
QAL044B	Compliance	pH	SU	29	0	No NDs	29	8.1	10.9	9.2	0.56	12	17	0	4	10	0.05	Y	
QAL044B	Compliance	Potassium	mg/L	7	3	Included as RL	7	0.50	1.2	0.71	0.33	2	5	0	2	2	0.10	Y	
QAL044B	Compliance	Sodium	mg/L	29	0	No NDs	29	2.1	5.9	2.8	0.87	8	21	0	3	8	0.05	Y	
QAL044B	Compliance	Specific Conductance	µS/cm @ 25°C	29	0	No NDs	29	63	240	105	41.10	11	18	0	7	10	0.05	Y	
QAL044B	Compliance	Sulfate	mg/L	29	0	No NDs	29	6.0	34.0	9.6	5.42	8	21	0	3	8	0.05	Y	Non-unique RL in data
QAL060A	Compliance	Alkalinity, Bicarbonate	mg/L	31	0	No NDs	31	29.6	56.0	42.2	7.90	11	20	0	4	10	0.05	Y	
QAL060A	Compliance	Arsenic	ug/L	31	0	No NDs	31	3.6	5.9	4.5	0.50	15	16	0	7	11	0.05	Y	
QAL060A	Compliance	Calcium	mg/L	9	0	No NDs	9	10.0	15.0	12.3	2.18	4	5	0	2	2	0.05	Y	
QAL060A	Compliance	Magnesium	mg/L	9	0	No NDs	9	2.4	3.7	2.9	0.53	4	5	0	2	2	0.05	Y	
QAL060A	Compliance	Nitrogen, Nitrate	mg/L	31	0	No NDs	31	0.063	0.48	0.18	0.09	12	19	0	10	10	0.05	Y	
QAL060A	Compliance	Potassium	mg/L	9	0	No NDs	9	0.69	1.1	0.92	0.16	4	5	0	2	2	0.05	Y	
QAL060A	Compliance	Sodium	mg/L	31	0	No NDs	31	0.65	2.2	1.2	0.54	13	18	0	4	11	0.05	Y	
QAL060A	Compliance	Specific Conductance	µS/cm @ 25°C	31	0	No NDs	31	68	176	91	22.80	10	21	0	2	10	0.05	Y	
QAL060A	Compliance	Strontium	ug/L	9	7	Included as RL	9	50.0	54.0	51.0	1.40	2	7	0	2	2	0.10	Y	
QAL060A	Compliance	Sulfate	mg/L	31	9	Included as RL	31	2.0	4.1	2.6	0.77	10	21	0	4	10	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL060A	Compliance	Vanadium	ug/L	20	7	Included as RL	20	1.1	10.0	3.5	3.87	5	15	0	2	5	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL061A	Compliance	Alkalinity, Bicarbonate	mg/L	31	0	No NDs	31	28.0	119.0	41.4	16.47	7	24	0	2	8	0.05	Y	
QAL061A	Compliance	Calcium	mg/L	9	0	No NDs	9	11.0	18.0	12.0	2.50	2	7	0	2	2	0.10	Y	
QAL061A	Compliance	Magnesium	mg/L	9	0	No NDs	9	1.9	3.2	2.2	0.46	2	7	0	2	2	0.10	Y	
QAL061A	Compliance	Nitrogen, Nitrate	mg/L	31	0	No NDs	31	0.100	0.37	0.23	0.09	18	13	0	4	11	0.05	Y	
QAL061A	Compliance	pH	SU	31	0	No NDs	31	8.2	9.1	8.7	0.25	17	14	0	9	11	0.05	Y	
QAL061A	Compliance	Specific Conductance	µS/cm @ 25°C	31	0	No NDs	31	64	146	85	19.70	10	21	0	4	10	0.05	Y	
QAL062A	Compliance	Alkalinity, Bicarbonate	mg/L	31	0	No NDs	31	29.0	199.0	87.5	54.80	14	17	0	2	11	0.05	Y	
QAL062A	Compliance	Alkalinity, Carbonate	mg/L	31	22	Included as RL	31	2.0	4.9	2.5	0.88	9	22	0	9	9	0.05	Y	
QAL062A	Compliance	Barium	ug/L	9	6	Included as RL	9	20.0	29.2	21.2	3.06	2	7	0	2	2	0.10	Y	
QAL062A	Compliance	Calcium	mg/L	9	0	No NDs	9	11.0	68.8	28.2	21.20	3	6	0	2	2	0.05	Y	
QAL062A	Compliance	Chloride	mg/L	31	4	Included as RL	31	1.0	74.2	23.6	25.90	13	18	0	2	11	0.05	Y	
QAL062A	Compliance	Magnesium	mg/L	9	0	No NDs	9	2.0	13.8	5.5	4.36	3	6	0	2	2	0.05	Y	

Mine Permit Groundwater Trend Analysis
All Monitoring Locations
March 2011 to November 2018
Eagle Mine

Location	Classi-fication	Parameter	Unit	# Samples	# NDs	Non-detects handling	# used in Runs Test	Min	Max	Mean	St. Dev.	# Above Mean	# Below Mean	# Equal Mean	# Runs	Criti-cal value	Sig level	Trend?	Remarks
QAL062A	Compliance	Nitrogen, Nitrate	mg/L	31	0	No NDs	31	0.210	1.10	0.44	0.24	9	22	0	2	9	0.05	Y	Non-unique RL in data
QAL062A	Compliance	pH	SU	31	0	No NDs	31	7.5	9.4	8.3	0.44	19	12	0	4	10	0.05	Y	
QAL062A	Compliance	Potassium	mg/L	9	0	No NDs	9	0.70	2.3	1.2	0.62	3	6	0	2	2	0.05	Y	
QAL062A	Compliance	Sodium	mg/L	31	0	No NDs	31	0.53	26.1	6.8	8.47	11	20	0	2	10	0.05	Y	
QAL062A	Compliance	Specific Conductance	µS/cm @ 25°C	31	0	No NDs	31	54	615	236	180.00	13	18	0	2	11	0.05	Y	
QAL062A	Compliance	Strontium	ug/L	9	6	Included as RL	9	50.0	78.8	56.2	10.30	3	6	0	2	2	0.05	Y	
QAL062A	Compliance	Sulfate	mg/L	31	6	Included as RL	31	1.9	6.4	2.3	0.78	5	26	0	6	6	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL063A	Compliance	Alkalinity, Bicarbonate	mg/L	31	0	No NDs	31	33.0	184.0	79	52.50	11	20	0	2	10	0.05	Y	
QAL063A	Compliance	Alkalinity, Carbonate	mg/L	31	20	Included as RL	31	2.0	5.5	2.5	0.97	9	22	0	7	9	0.05	Y	
QAL063A	Compliance	Calcium	mg/L	9	0	No NDs	9	11.0	60.1	24.6	19.90	3	6	0	2	2	0.05	Y	
QAL063A	Compliance	Chloride	mg/L	31	11	Included as RL	31	1.0	69.7	13.9	20.40	10	21	0	2	10	0.05	Y	
QAL063A	Compliance	Magnesium	mg/L	9	0	No NDs	9	1.9	12.1	4.5	3.93	3	6	0	2	2	0.05	Y	
QAL063A	Compliance	Nitrogen, Nitrate	mg/L	31	0	No NDs	31	0.140	0.88	0.37	0.22	11	20	0	2	10	0.05	Y	
QAL063A	Compliance	pH	SU	31	0	No NDs	31	7.5	8.8	8.3	0.43	19	12	0	6	10	0.05	Y	
QAL063A	Compliance	Potassium	mg/L	9	0	No NDs	9	0.62	1.9	0.97	0.47	3	6	0	2	2	0.05	Y	
QAL063A	Compliance	Sodium	mg/L	31	1	Included as RL	31	0.50	14.5	2.7	4.04	6	25	0	2	7	0.05	Y	
QAL063A	Compliance	Specific Conductance	µS/cm @ 25°C	31	0	No NDs	31	55	579	196	161.00	10	21	0	2	10	0.05	Y	
QAL063A	Compliance	Strontium	ug/L	9	7	Included as RL	9	50.0	84.5	55.7	12.20	2	7	0	2	2	0.10	Y	
QAL064D	Compliance	Alkalinity, Bicarbonate	mg/L	31	0	No NDs	31	65.0	89.0	72.9	5.46	17	14	0	4	11	0.05	Y	
QAL064D	Compliance	Chloride	mg/L	31	0	No NDs	31	1.6	4.5	2.7	0.60	12	19	0	7	10	0.05	Y	
QAL064D	Compliance	Fluoride	mg/L	8	6	Included as RL	8	0.10	0.19	0.12	0.03	2	6	0	2	2	0.10	Y	
QAL064D	Compliance	Iron	ug/L	31	6	Included as RL	31	20	44	26	6.61	9	22	0	9	9	0.05	Y	
QAL064D	Compliance	Magnesium	mg/L	8	0	No NDs	8	3.1	4.2	3.8	0.44	6	2	0	2	2	0.10	Y	
QAL064D	Compliance	Sodium	mg/L	31	0	No NDs	31	3.7	6.9	4.7	0.90	11	20	0	4	10	0.05	Y	
QAL064D	Compliance	Sulfate	mg/L	31	30	Included as RL	31	1.0	2.6	2.0	0.28	29	2	0	2	2	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL064D	Compliance	Vanadium	ug/L	19	18	Included as RL	19	1.0	10.0	3.0	3.74	4	15	0	2	4	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL066D	Compliance	Alkalinity, Bicarbonate	mg/L	31	5	Included as RL	31	2.0	67.3	40.3	20.60	19	12	0	4	10	0.05	Y	
QAL066D	Compliance	Alkalinity, Carbonate	mg/L	31	1	Included as RL	31	2.0	68.0	17.3	16.50	10	21	0	6	10	0.05	Y	
QAL066D	Compliance	Arsenic	ug/L	31	0	No NDs	31	5.6	12.0	8.3	1.67	16	15	0	8	11	0.05	Y	
QAL066D	Compliance	Fluoride	mg/L	8	6	Included as RL	8	0.10	0.13	0.11	0.01	2	6	0	2	2	0.10	Y	
QAL066D	Compliance	Iron	ug/L	31	12	Included as RL	31	20	1300	151	266.40	8	23	0	8	8	0.05	Y	
QAL066D	Compliance	Mercury	ng/L	31	6	Included as RL	31	0.343	12.0	1.95	2.78	7	24	0	7	8	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL066D	Compliance	pH	SU	31	0	No NDs	31	8.5	12.0	9.4	1.02	8	23	0	7	8	0.05	Y	
QAL066D	Compliance	Sodium	mg/L	31	0	No NDs	31	4.9	21.0	9.7	5.02	11	20	0	4	10	0.05	Y	
QAL066D	Compliance	Specific Conductance	µS/cm @ 25°C	31	0	No NDs	31	74	697	181	151.00	5	26	0	5	6	0.05	Y	
QAL066D	Compliance	Sulfate	mg/L	31	0	No NDs	31	6.5	23.0	10.5	3.62	10	21	0	7	10	0.05	Y	Non-unique RL in data
QAL066D	Compliance	Vanadium	ug/L	19	7	Included as RL	19	1.0	18.0	3.7	4.72	4	15	0	2	4	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL067A	Compliance	Alkalinity, Bicarbonate	mg/L	32	0	No NDs	32	9.1	67.7	34.8	20.00	15	17	0	4	11	0.05	Y	
QAL067A	Compliance	Chloride	mg/L	34	2	Included as RL	34	1.0	1600.0	391.4	470.74	13	21	0	5	12	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL067A	Compliance	Copper	ug/L	32	29	Included as RL	32	5.0	63.0	7.7	11.00	3	29	0	3	4	0.05	Y	
QAL067A	Compliance	Mercury	ng/L	32	12	Included as RL	32	0.500	4.03	1.52	1.06	14	18	0	3	11	0.05	Y	
QAL067A	Compliance	Nitrogen, Nitrate	mg/L	34	0	No NDs	34	0.067	2.40	1.09	0.84	16	18	0	5	12	0.05	Y	Non-unique RL in data
QAL067A	Compliance	Potassium	mg/L	10	0	No NDs	10	0.75	9.2	3.2	2.91	4	6	0	3	3	0.05	Y	
QAL067A	Compliance	Sodium	mg/L	34	0	No NDs	34	0.57	740.0	204.8	242.33	12	22	0	3	11	0.05	Y	Non-unique RL in data
QAL067A	Compliance	Specific Conductance	µS/cm @ 25°C	34	0	No NDs	34	27	4888	1273	1387.00	14	20	0	5	12	0.05	Y	
QAL067A	Compliance	Sulfate	mg/L	34	5	Included as RL	34	2.0	20.0	9.0	6.61	16	18	0	3	12	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL067A	Compliance	Vanadium	ug/L	20	18	Included as RL	20	1.0	10.0	3.3	3.96	5	15	0	2	5	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL068A	Background	Alkalinity, Bicarbonate	mg/L	31	0	No NDs	31	11.0	45.0	20.7	5.93	16	15	0	11	11	0.05	Y	
QAL068A	Background	Vanadium	ug/L	19	18	Included as RL	19	1.0	10.0	3.0	3.74	4	15	0	2	4	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL068B	Background	Iron	ug/L	31	24	Included as RL	31	20	170	27	27.02	5	26	0	6	6	0.05	Y	
QAL068B	Background	Nitrogen, Nitrate	mg/L	31	4	Included as RL	31	0.050	0.26	0.084	0.04	14	17	0	6	11	0.05	Y	
QAL068B	Background	Sodium	mg/L	31	0	No NDs	31	0.81	1.6	1.1	0.22	13	18	0	8	11	0.05	Y	
QAL068B	Background	Specific Conductance	µS/cm @ 25°C	31	0	No NDs	31	41	131	64	14.80	10	21	0	9	10	0.05	Y	
QAL068B	Background	Vanadium	ug/L	19	7	Included as RL	19	1.0	10.0	3.1	3.70	4	15	0	2	4	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL068D	Background	Alkalinity, Bicarbonate	mg/L	31	0	No NDs	31	32.0	68.3	56.5	5.62	18	13	0	8	11	0.05	Y	
QAL068D	Background	Arsenic	ug/L	31	0	No NDs	31	3.5	5.8	4.7	0.52	15	16	0	9	11	0.05	Y	
QAL068D	Background	Magnesium	mg/L	8	0	No NDs	8	3.3	4.1	3.7	0.26	4	4	0	2	2	0.05	Y	
QAL068D	Background	Mercury	ng/L	31	26	Included as RL	31	0.500	1.72	0.591	0.29	4	27	0	4	5	0.05	Y	
QAL068D	Background	Sulfate	mg/L	31	0	No NDs	31	4.9	12.0	6.0	1.43	7	24	0	4	8	0.05	Y	Non-unique RL in data
QAL068D	Background	Vanadium	ug/L	19	4	Included as RL	19	1.6	10.0	4.3	3.08	4	15	0	2	4	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL069A	Background	Alkalinity, Bicarbonate	mg/L	31	0	No NDs	31	49.0	260.0	176	58.80	19	12	0	7	10	0.05	Y	
QAL069A	Background	Calcium	mg/L	8	0	No NDs	8	9.5	55.0	40.0	15.90	6	2	0	2	2	0.10	Y	Non-unique RL in data
QAL069A	Background	Chloride	mg/L	31	2	Included as RL	31	1.0	277.0	40.4	58.57	8	23	0	8	8	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL069A	Background	Nitrogen, Nitrate	mg/L	31	0	No NDs	31	0.083	2.30	0.99	0.57	12	19	0	5	10	0.05	Y	Non-unique RL in data
QAL069A	Background	pH	SU	31	0	No NDs	31	6.4	8.7	7.3	0.60	12	19	0	8	10	0.05	Y	
QAL069A	Background	Potassium	mg/L	8	0	No NDs	8	0.55	2.1	1.4	0.52	4	4	0	2	2	0.05	Y	
QAL069A	Background	Sodium	mg/L	31	0	No NDs	31	0.71	99.3	18.7	24.46	11	20	0	4	10	0.05	Y	

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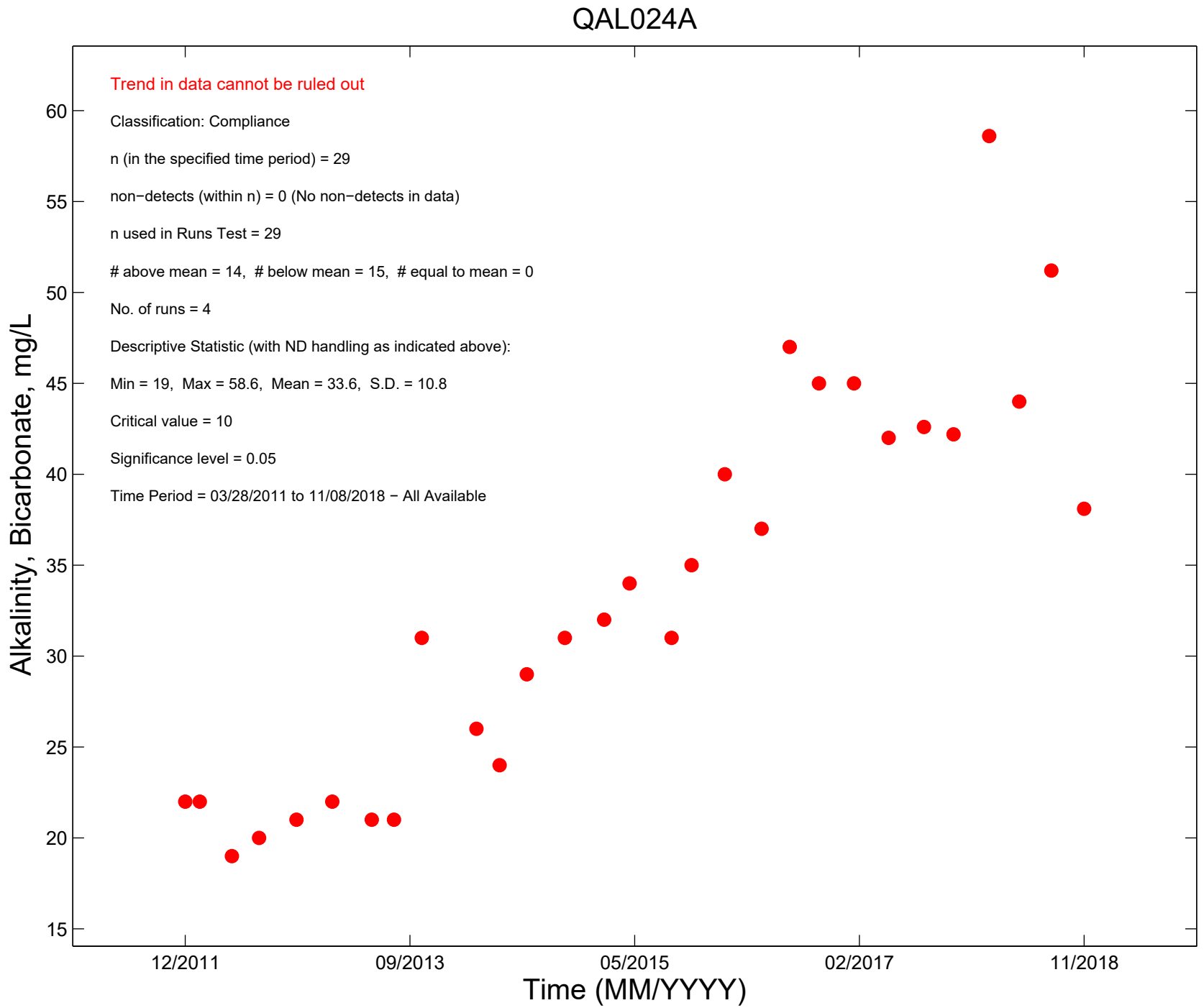
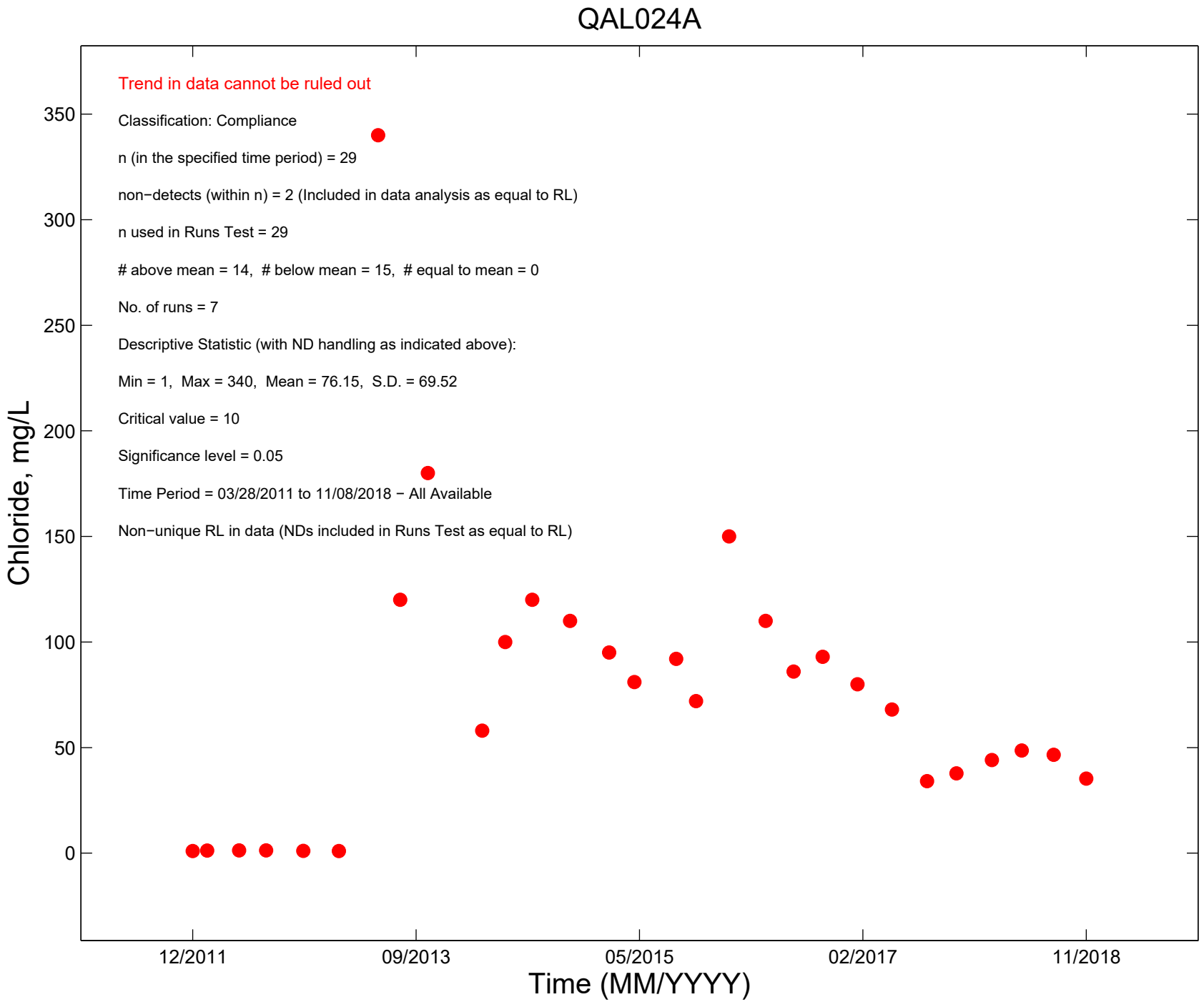
Location	Classi-fication	Parameter	Unit	# Samples	# NDs	Non-detects handling	# used in Runs Test	Min	Max	Mean	St. Dev.	# Above Mean	# Below Mean	# Equal Mean	# Runs	Criti-cal value	Sig level	Trend?	Remarks
QAL069A	Background	Sulfate	mg/L	31	1	Included as RL	31	2.0	10.8	6.1	2.56	14	17	0	4	11	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL070A	Compliance	Alkalinity, Bicarbonate	mg/L	9	0	No NDs	9	32.0	63.0	41	11.00	3	6	0	2	2	0.05	Y	
QAL070A	Compliance	Barium	ug/L	8	5	Included as RL	8	20.0	28.0	22.3	3.39	3	5	0	2	2	0.05	Y	
QAL070A	Compliance	Calcium	mg/L	8	0	No NDs	8	8.5	51.0	26.2	17.70	4	4	0	2	2	0.05	Y	
QAL070A	Compliance	Chloride	mg/L	9	0	No NDs	9	1.1	120.0	46.7	55.55	4	5	0	2	2	0.05	Y	Non-unique RL in data
QAL070A	Compliance	Magnesium	mg/L	8	0	No NDs	8	2.1	9.9	5.5	3.26	4	4	0	2	2	0.05	Y	
QAL070A	Compliance	Nitrogen, Nitrate	mg/L	9	0	No NDs	9	0.055	1.30	0.60	0.51	4	5	0	2	2	0.05	Y	Non-unique RL in data
QAL070A	Compliance	Potassium	mg/L	8	0	No NDs	8	0.54	2.0	1.2	0.63	4	4	0	2	2	0.05	Y	
QAL070A	Compliance	Sodium	mg/L	9	0	No NDs	9	0.85	46.8	12.9	18.33	3	6	0	2	2	0.05	Y	
QAL070A	Compliance	Specific Conductance	µS/cm @ 25°C	9	0	No NDs	9	61	524	227	201.00	3	6	0	2	2	0.05	Y	
QAL070A	Compliance	Strontium	ug/L	8	4	Included as RL	8	50.0	77.0	61.0	12.00	3	5	0	2	2	0.05	Y	
QAL070A	Compliance	Sulfate	mg/L	9	0	No NDs	9	1.9	7.9	3.7	2.20	3	6	0	2	2	0.05	Y	Non-unique RL in data
QAL071A	Compliance	Alkalinity, Bicarbonate	mg/L	32	0	No NDs	32	30.0	153.0	101	45.80	18	14	0	2	11	0.05	Y	
QAL071A	Compliance	Barium	ug/L	9	5	Included as RL	9	20.0	39.0	24.1	6.67	3	6	0	2	2	0.05	Y	
QAL071A	Compliance	Calcium	mg/L	10	0	No NDs	10	11.0	84.0	43.2	28.50	5	5	0	2	3	0.05	Y	
QAL071A	Compliance	Chloride	mg/L	34	1	Included as RL	34	1.0	44.0	16.3	12.00	20	14	0	2	12	0.05	Y	
QAL071A	Compliance	Copper	ug/L	32	26	Included as RL	32	5.0	9.8	5.5	1.33	4	28	0	3	5	0.05	Y	
QAL071A	Compliance	Magnesium	mg/L	10	0	No NDs	10	1.4	15.0	6.6	4.81	5	5	0	2	3	0.05	Y	
QAL071A	Compliance	Mercury	ng/L	32	26	Included as RL	32	0.500	1.37	0.546	0.16	5	27	0	5	6	0.05	Y	
QAL071A	Compliance	Nitrogen, Nitrate	mg/L	34	1	Included as RL	34	0.050	38.00	11.11	11.88	13	21	0	6	12	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL071A	Compliance	pH	SU	34	0	No NDs	34	7.3	8.8	8.1	0.45	15	19	0	8	12	0.05	Y	
QAL071A	Compliance	Potassium	mg/L	10	0	No NDs	10	0.70	1.7	1.1	0.38	5	5	0	2	3	0.05	Y	
QAL071A	Compliance	Sodium	mg/L	34	0	No NDs	34	0.87	25.0	7.6	7.11	17	17	0	4	12	0.05	Y	
QAL071A	Compliance	Specific Conductance	µS/cm @ 25°C	34	0	No NDs	34	53	622	332	188.00	18	16	0	6	12	0.05	Y	
QAL071A	Compliance	Strontium	ug/L	8	4	Included as RL	8	50.0	100.0	65.5	18.93	4	4	0	2	2	0.05	Y	
QAL071A	Compliance	Sulfate	mg/L	34	0	No NDs	34	2.0	9.3	5.4	2.43	19	15	0	2	12	0.05	Y	Non-unique RL in data
QAL073A	Compliance	Alkalinity, Bicarbonate	mg/L	9	0	No NDs	9	20.0	100.0	66.58	33.59	6	3	0	2	2	0.05	Y	
QAL073A	Compliance	Calcium	mg/L	8	0	No NDs	8	5.6	34.0	24.5	11.00	6	2	0	2	2	0.10	Y	
QAL073A	Compliance	Magnesium	mg/L	8	0	No NDs	8	1.1	7.5	5.3	2.50	6	2	0	2	2	0.10	Y	
QAL073A	Compliance	Specific Conductance	µS/cm @ 25°C	9	0	No NDs	9	50	219	151	71.80	6	3	0	2	2	0.05	Y	
QAL073A	Compliance	Sulfate	mg/L	9	0	No NDs	9	1.9	9.4	5.9	3.19	5	4	0	2	2	0.05	Y	Non-unique RL in data
QAL074A	Compliance	Alkalinity, Bicarbonate	mg/L	19	0	No NDs	19	27.0	75.8	49.6	16.80	9	10	0	2	6	0.05	Y	
QAL074A	Compliance	Calcium	mg/L	7	0	No NDs	7	9.1	33.7	22.9	10.30	4	3	0	2	2	0.10	Y	
QAL074A	Compliance	Chloride	mg/L	19	1	Included as RL	19	1.0	57.0	40.7	16.10	14	5	0	2	5	0.05	Y	
QAL074A	Compliance	Magnesium	mg/L	7	0	No NDs	7	1.7	6.6	4.5	2.10	4	3	0	2	2	0.10	Y	
QAL074A	Compliance	Nitrogen, Nitrate	mg/L	19	0	No NDs	19	0.390	2.40	1.19	0.52	7	12	0	3	6	0.05	Y	Non-unique RL in data
QAL074A	Compliance	pH	SU	19	0	No NDs	19	7.7	9.3	8.6	0.37	11	8	0	6	6	0.05	Y	
QAL074A	Compliance	Potassium	mg/L	7	0	No NDs	7	0.59	1.3	0.94	0.28	3	4	0	2	2	0.10	Y	
QAL074A	Compliance	Sodium	mg/L	19	0	No NDs	19	1.5	19.2	9.1	5.90	11	8	0	2	6	0.05	Y	
QAL074A	Compliance	Specific Conductance	µS/cm @ 25°C	19	0	No NDs	19	74	318	232	79.10	12	7	0	6	6	0.05	Y	
QAL074A	Compliance	Sulfate	mg/L	19	0	No NDs	19	3.5	7.8	6.5	1.40	14	5	0	2	5	0.05	Y	Non-unique RL in data

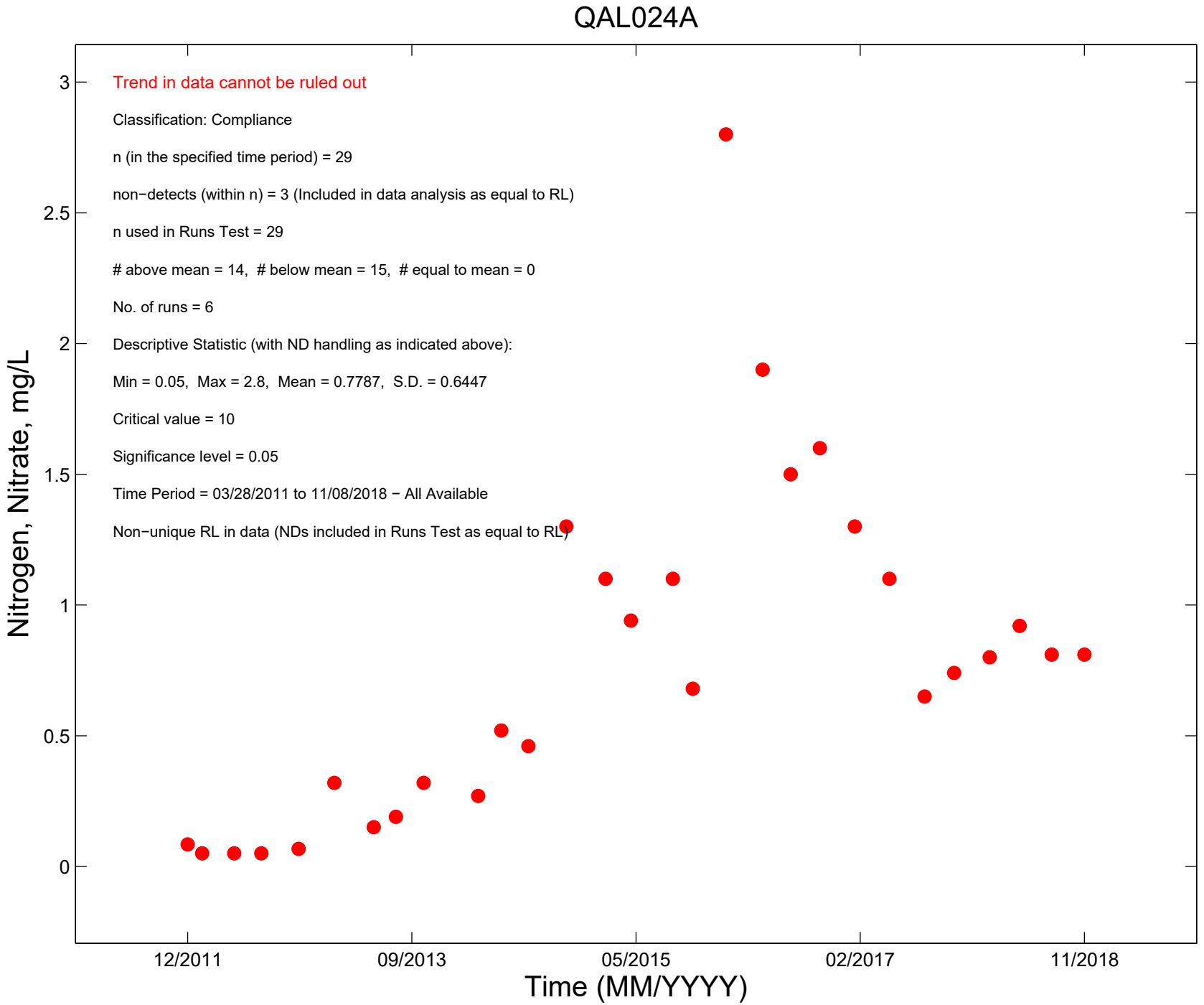
Mine Permit Groundwater Trend Analysis
Notes and Abbreviations Used in Statistical Summary Tables
Eagle Mine

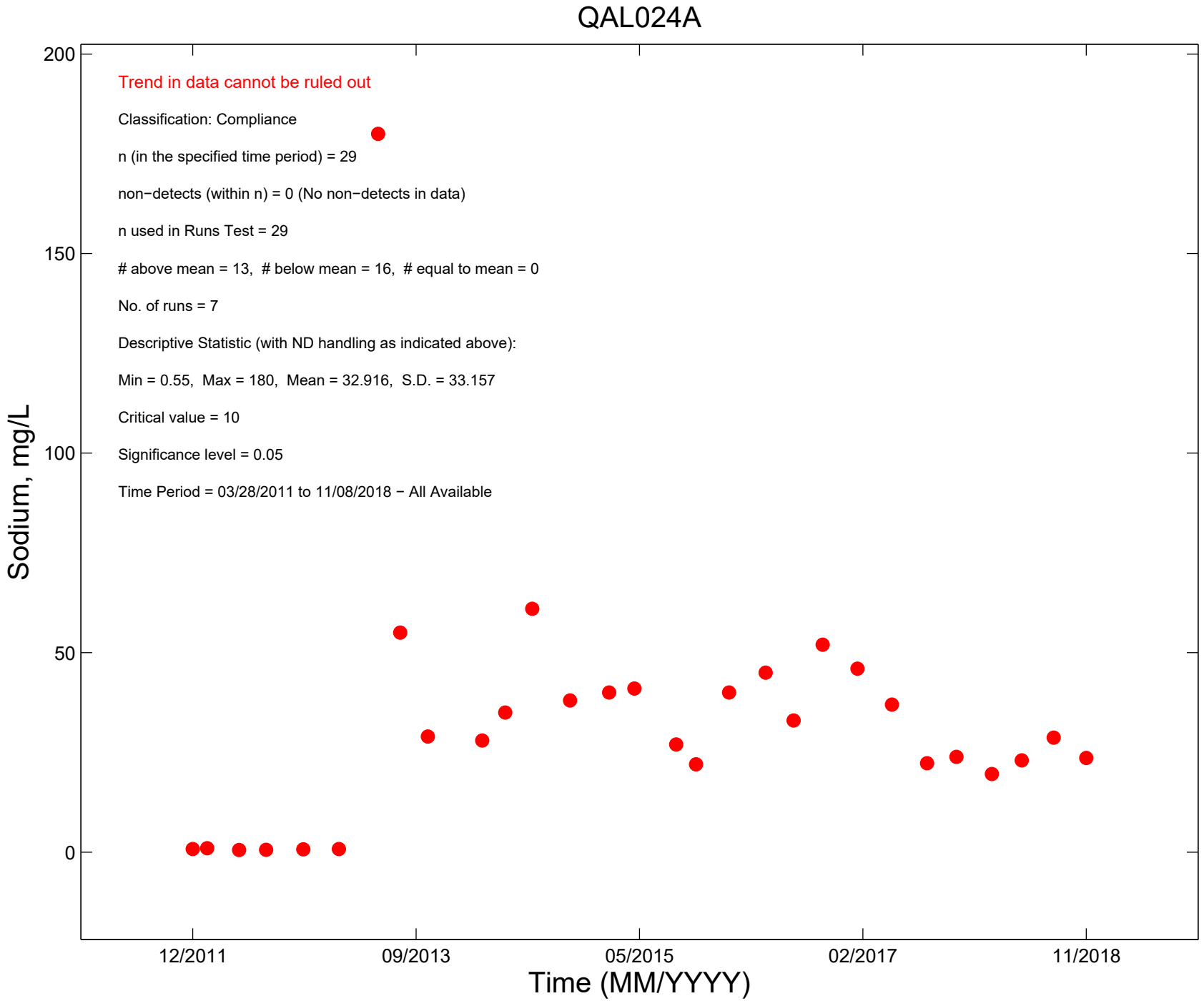
Abbreviation	Explanation
Y	Null Hypothesis that the sequence was produced in a random manner cannot be accepted at the indicated significance level (i.e. a trend in data cannot be ruled out)
N	Null Hypothesis that the sequence was produced in a random manner cannot be rejected at the indicated significance level (i.e. a trend in data not indicated)
ND	Non detect (reported concentration was below the analytical reporting limit).
RL	Reporting limit.
TF	Too few observations to run the test
TFA	Too few observations remaining after exclusion of values=mean
TFPN	Too few + or - values in the logic series (n1 or n2 = 1)
TS	Critical values lookup table falls short

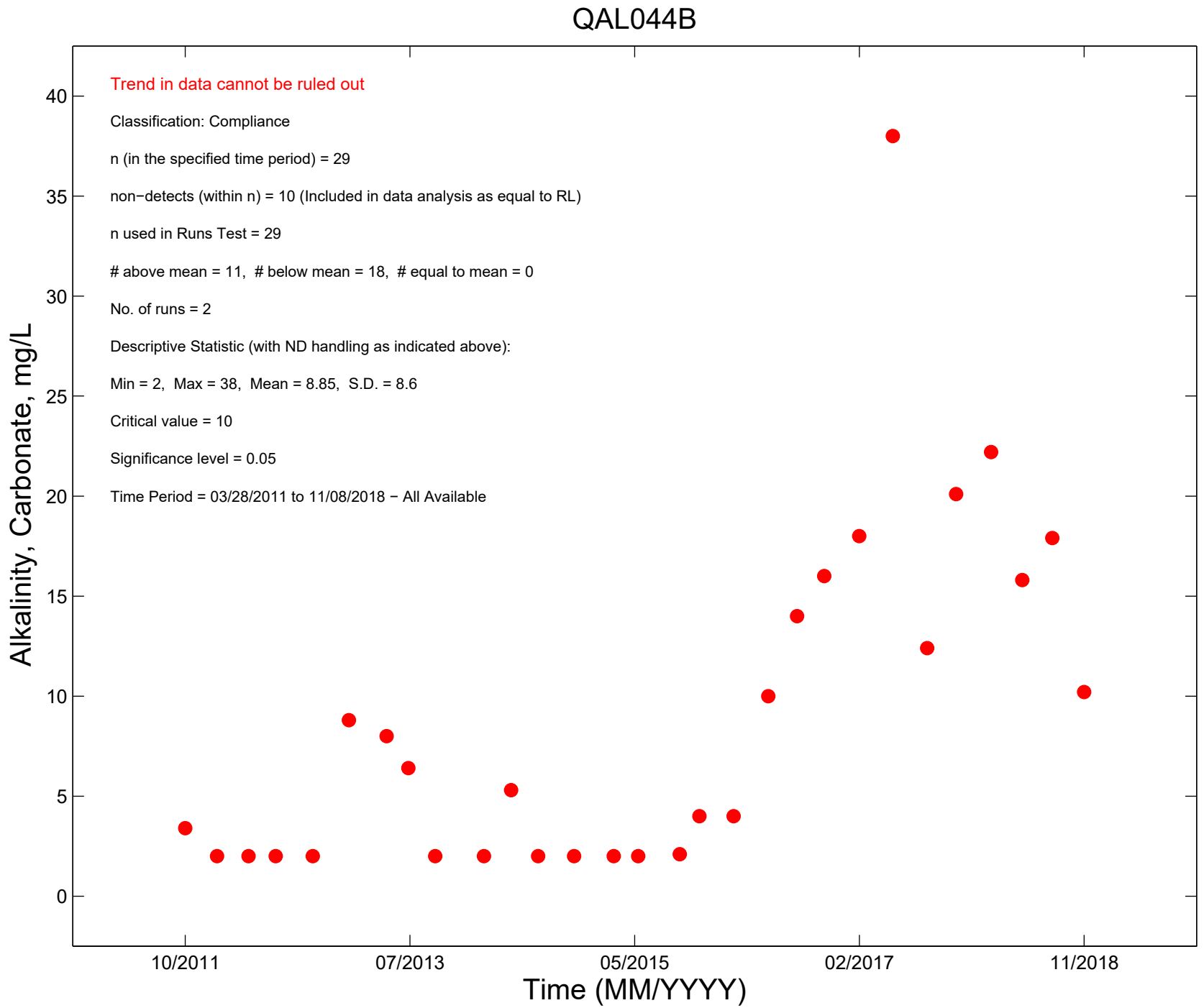
Notes: Trend analysis period is baseline through Q4 2018.

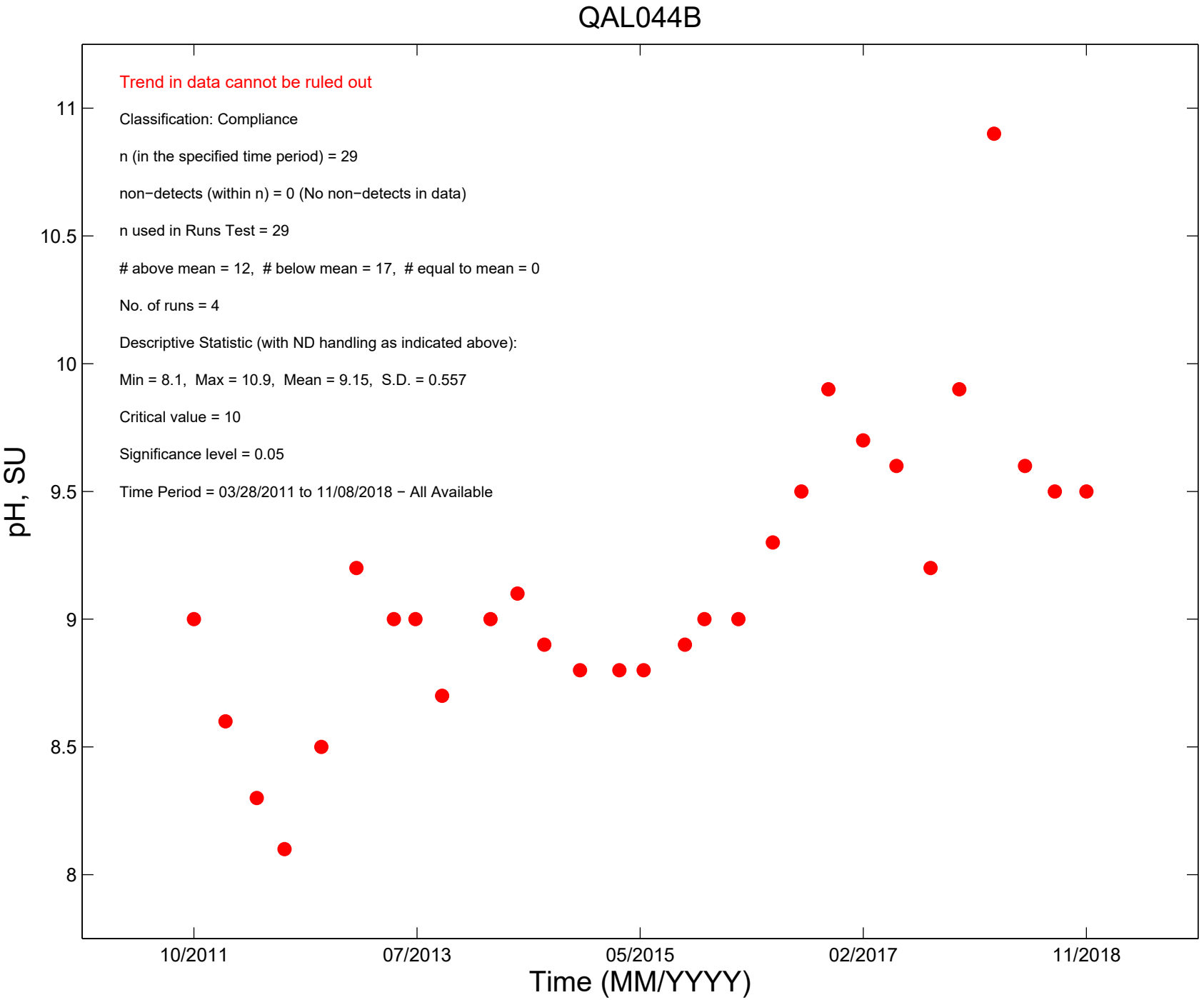

QAL024A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 29
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 29
above mean = 14, # below mean = 15, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 19, Max = 58.6, Mean = 33.6, S.D. = 10.8
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Alkalinity, Bicarbonate, mg/L
60
55
50
45
40
35
30
25
20
15
12/2011
09/2013
05/2015
02/2017
11/2018
Time (MM/YYYY)

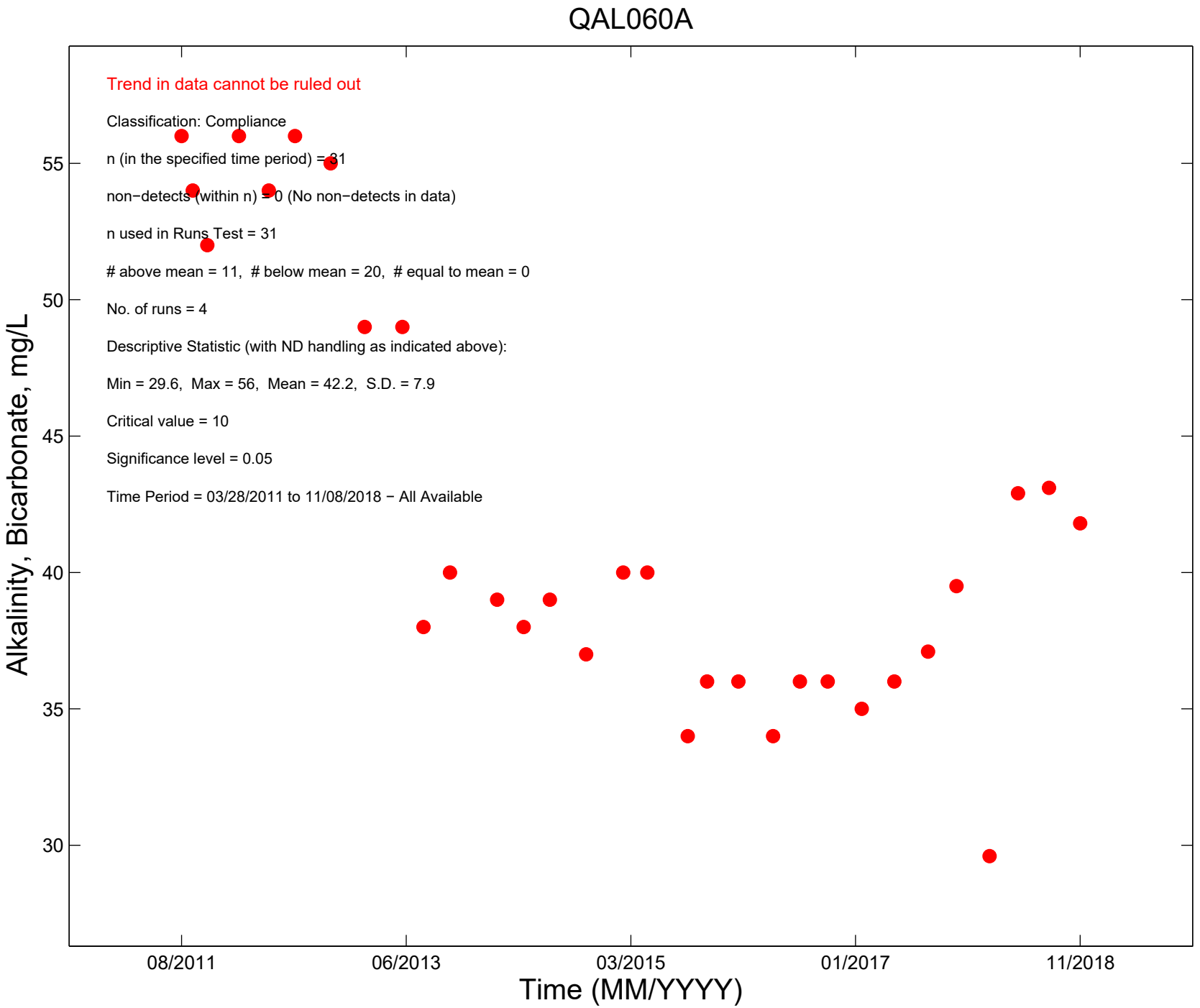

QAL024A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 29
non−detects (within n) = 2 (Included in data analysis as equal to RL)
n used in Runs Test = 29
above mean = 14, # below mean = 15, # equal to mean = 0
No. of runs = 7
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 340, Mean = 76.15, S.D. = 69.52
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Non−unique RL in data (NDs included in Runs Test as equal to RL)
Chloride, mg/L
350
300
250
200
150
100
50
0
12/2011
09/2013
05/2015
02/2017
11/2018
Time (MM/YYYY)

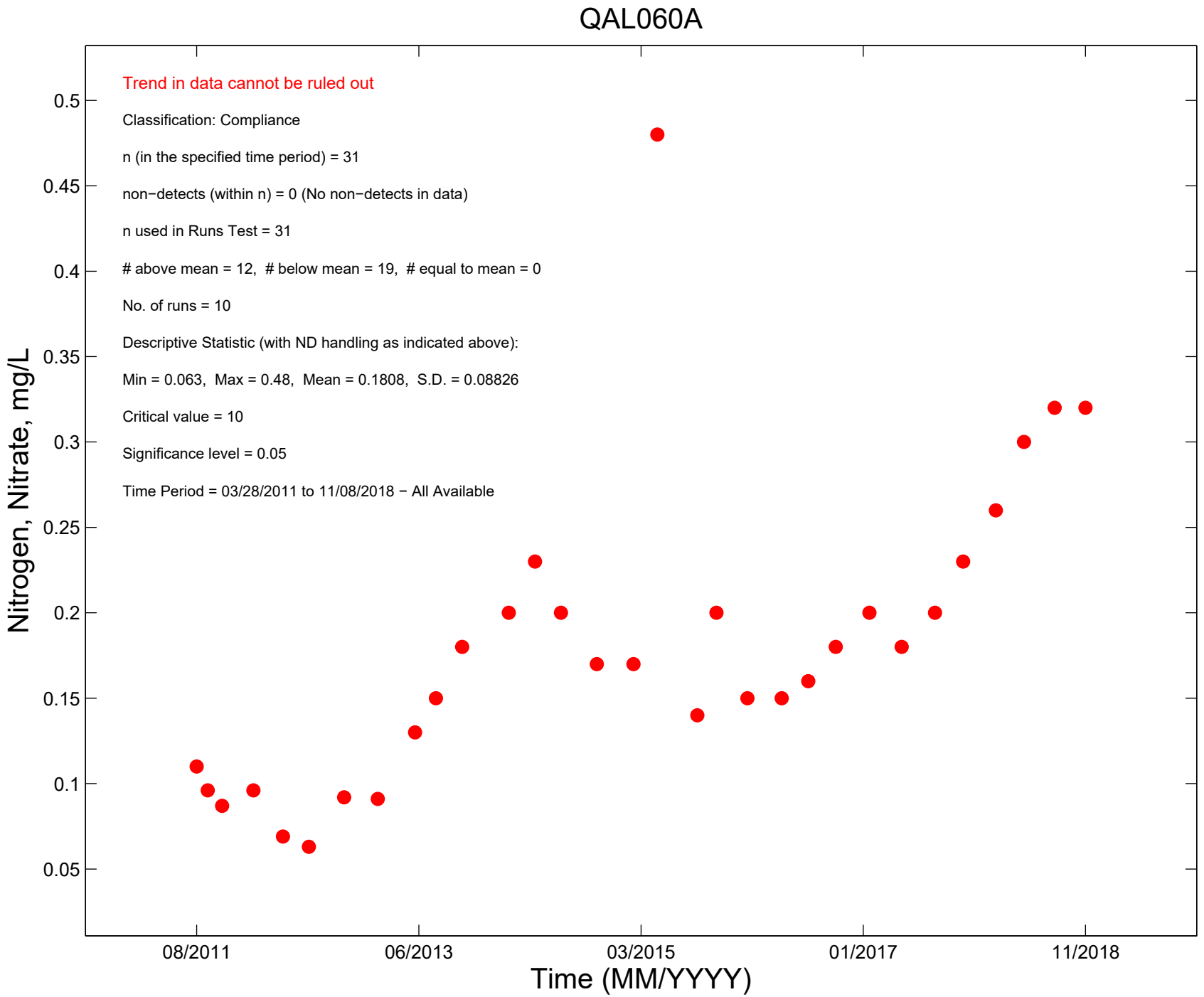

QAL024A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 29
non−detects (within n) = 3 (Included in data analysis as equal to RL)
n used in Runs Test = 29
above mean = 14, # below mean = 15, # equal to mean = 0
No. of runs = 6
Descriptive Statistic (with ND handling as indicated above):
Min = 0.05, Max = 2.8, Mean = 0.7787, S.D. = 0.6447
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Non−unique RL in data (NDs included in Runs Test as equal to RL)
Nitrogen, Nitrate, mg/L
3
2.5
2
1.5
1
0.5
0
12/2011
09/2013
05/2015
02/2017
11/2018
Time (MM/YYYY)

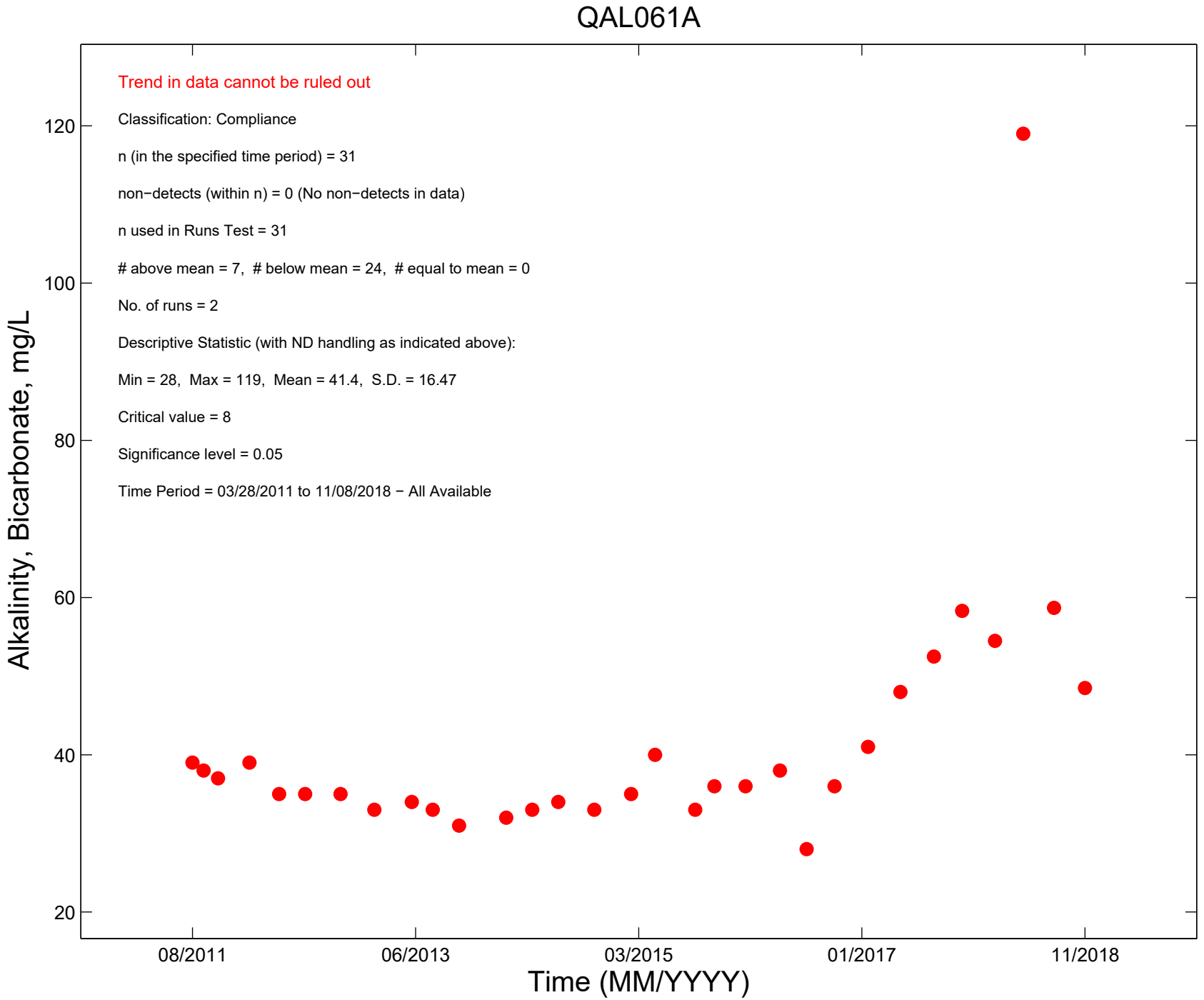

QAL024A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 29
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 29
above mean = 13, # below mean = 16, # equal to mean = 0
No. of runs = 7
Descriptive Statistic (with ND handling as indicated above):
Min = 0.55, Max = 180, Mean = 32.916, S.D. = 33.157
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Sodium, mg/L
200
150
100
50
0
12/2011
09/2013
05/2015
02/2017
11/2018
Time (MM/YYYY)

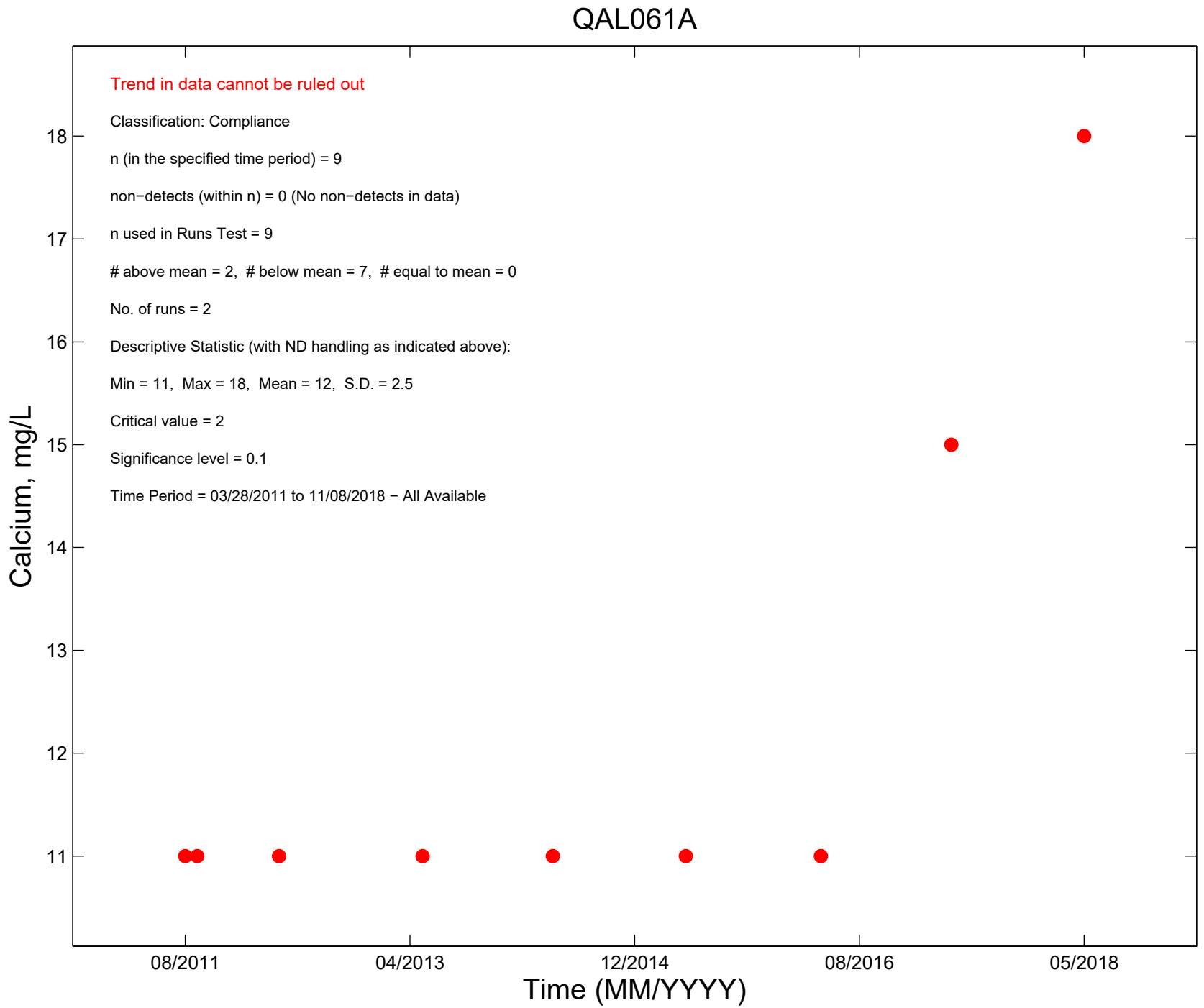

QAL044B
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 29
non−detects (within n) = 10 (Included in data analysis as equal to RL)
n used in Runs Test = 29
above mean = 11, # below mean = 18, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 2, Max = 38, Mean = 8.85, S.D. = 8.6
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Alkalinity, Carbonate, mg/L
0
5
10
15
20
25
30
35
40
10/2011
07/2013
05/2015
02/2017
11/2018
Time (MM/YYYY)

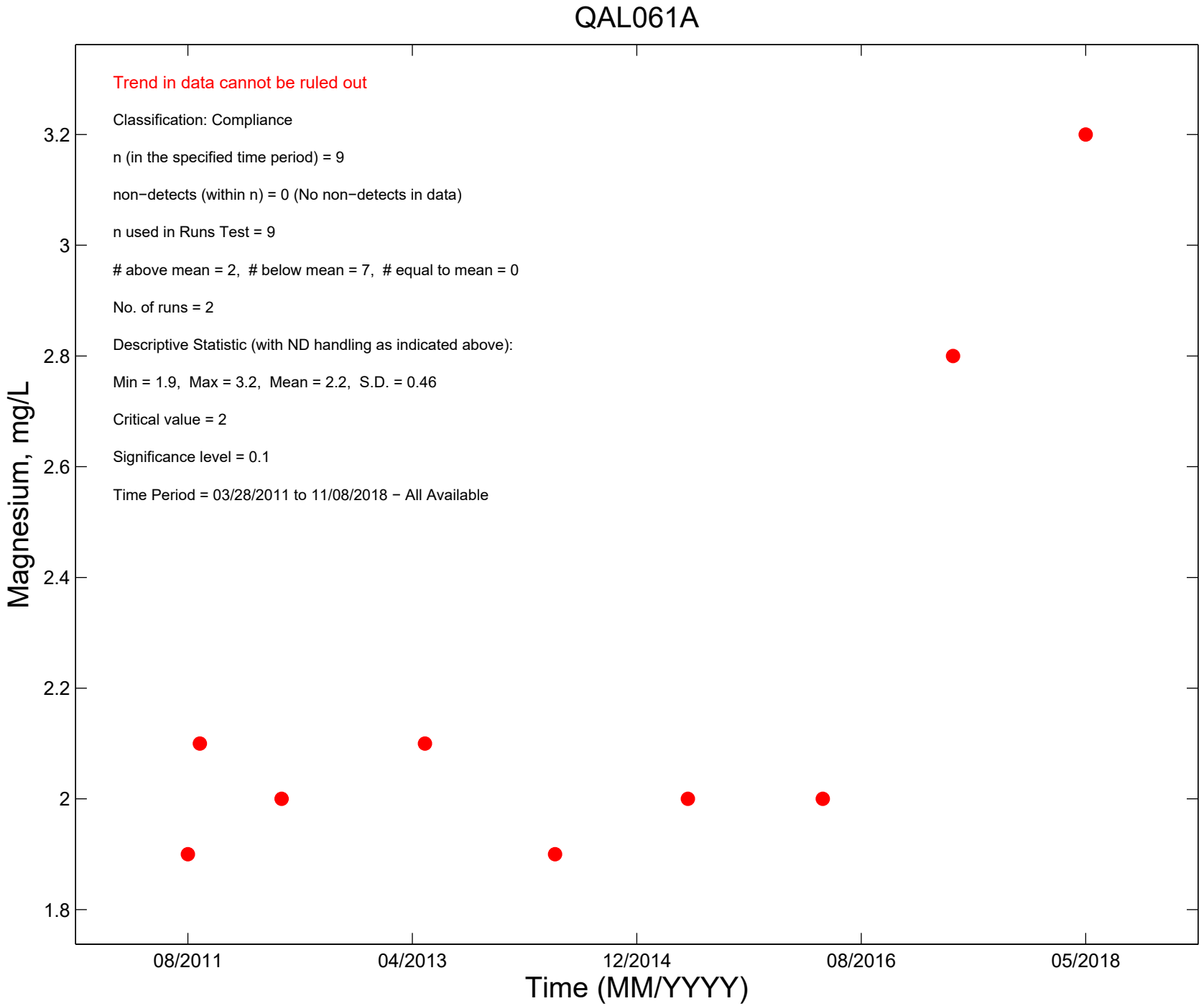

QAL044B
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 29
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 29
above mean = 12, # below mean = 17, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 8.1, Max = 10.9, Mean = 9.15, S.D. = 0.557
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
pH, SU
11
10.5
10
9.5
9
8.5
8
10/2011
07/2013
05/2015
02/2017
11/2018
Time (MM/YYYY)

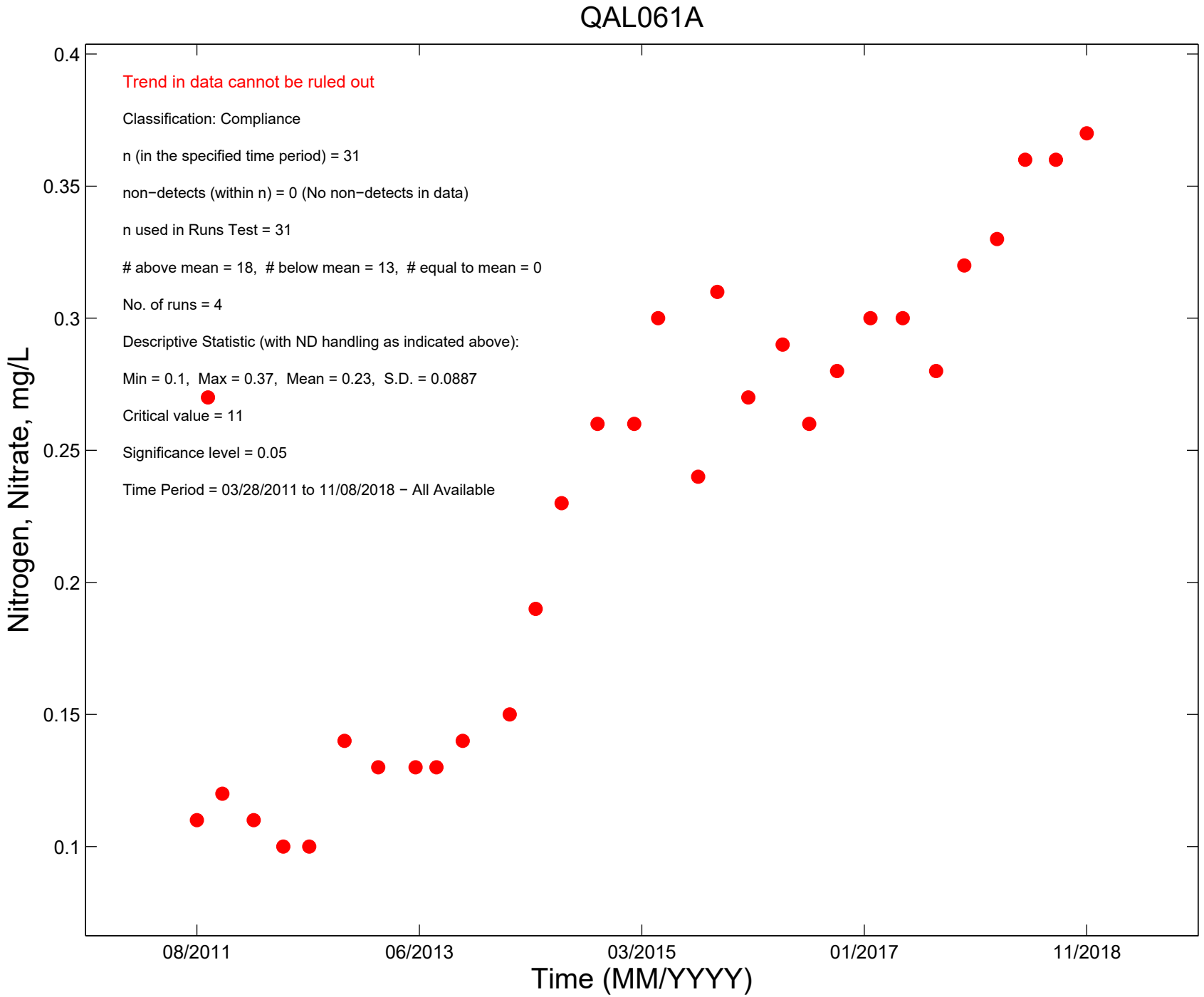

QAL060A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 31
above mean = 11, # below mean = 20, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 29.6, Max = 56, Mean = 42.2, S.D. = 7.9
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Alkalinity, Bicarbonate, mg/L
55
50
45
40
35
30
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

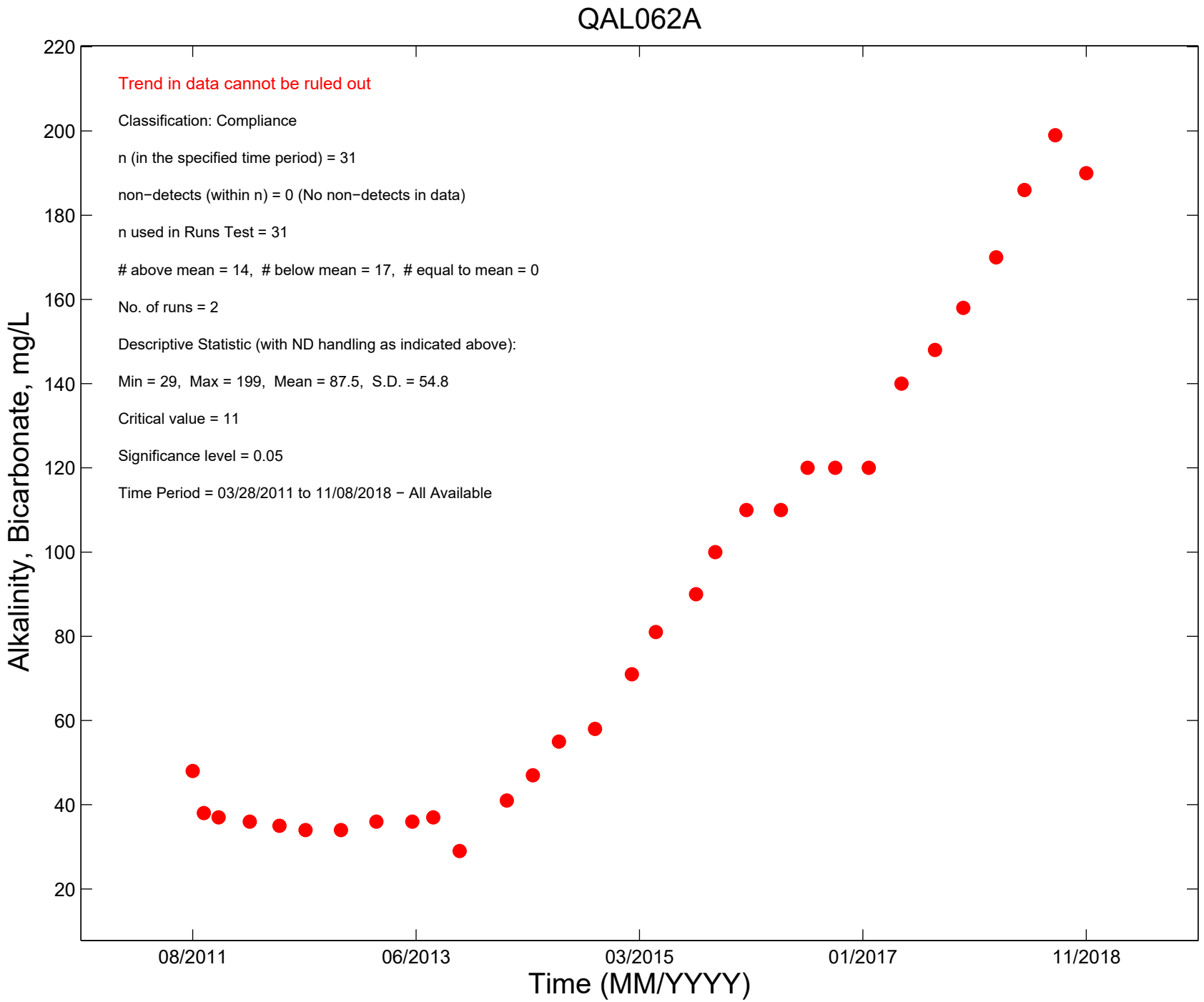

QAL060A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 31
above mean = 12, # below mean = 19, # equal to mean = 0
No. of runs = 10
Descriptive Statistic (with ND handling as indicated above):
Min = 0.063, Max = 0.48, Mean = 0.1808, S.D. = 0.08826
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Nitrogen, Nitrate, mg/L
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

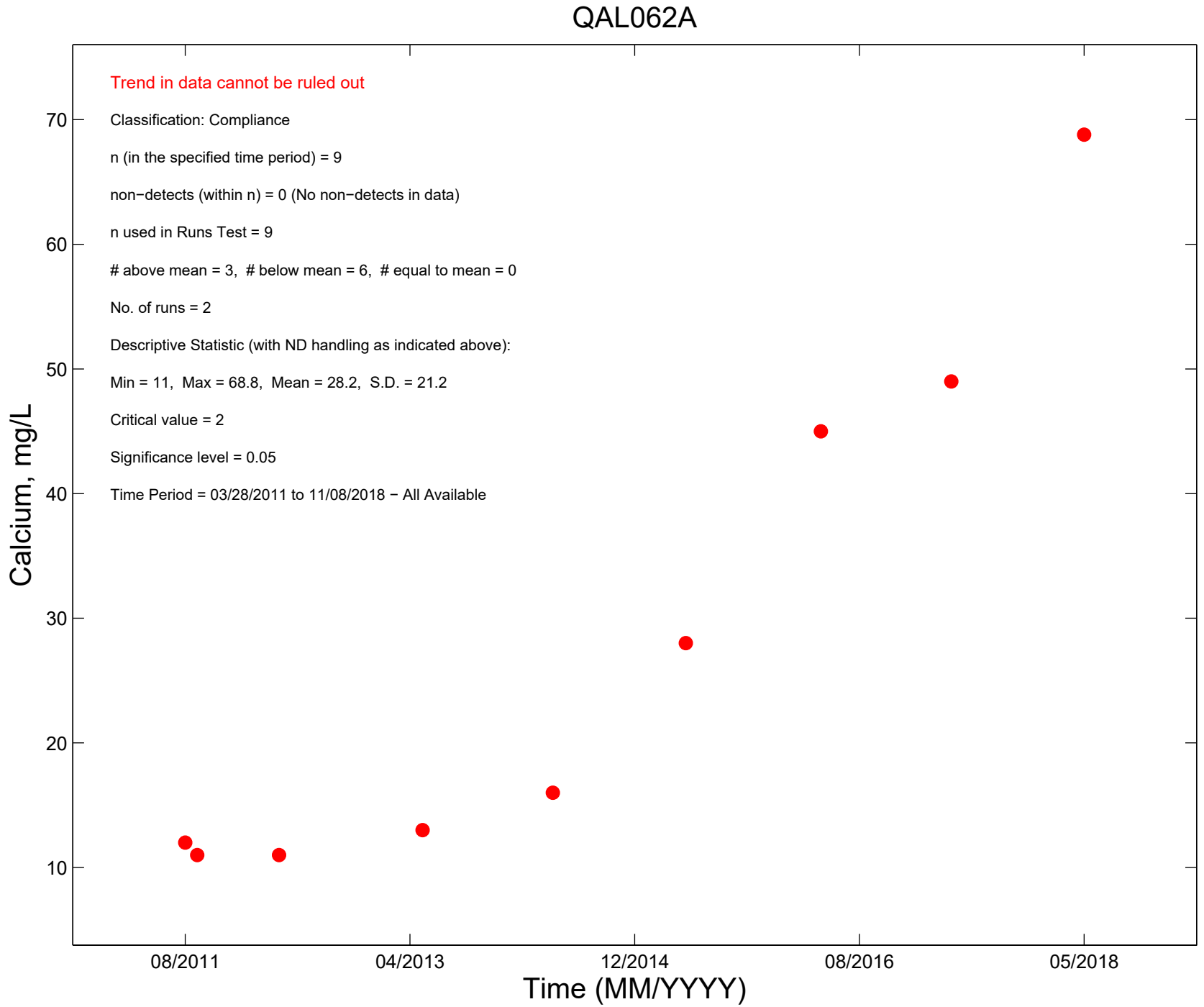

QAL061A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 31
above mean = 7, # below mean = 24, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 28, Max = 119, Mean = 41.4, S.D. = 16.47
Critical value = 8
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Alkalinity, Bicarbonate, mg/L
120
100
80
60
40
20
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

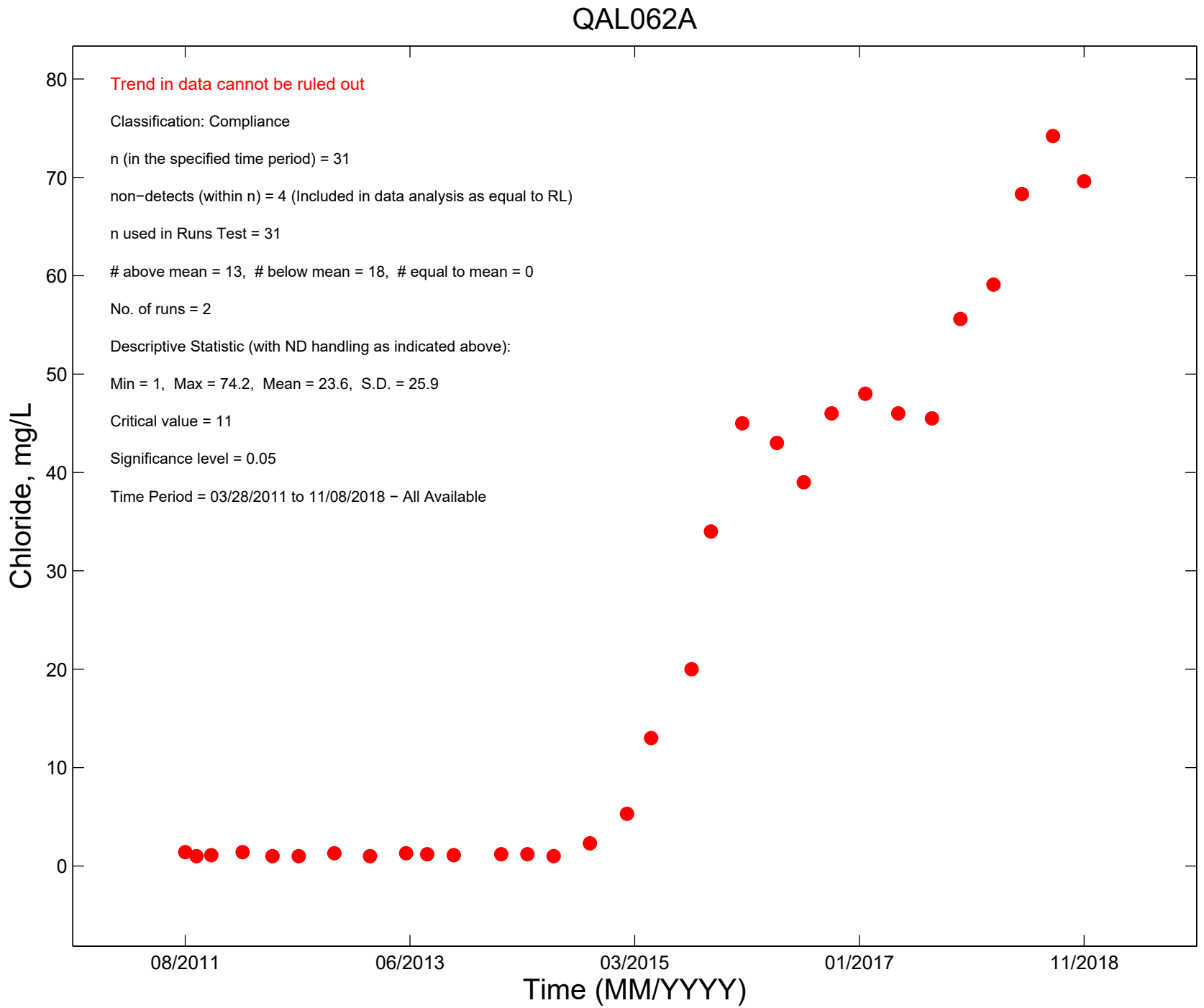

QAL061A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 2, # below mean = 7, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 11, Max = 18, Mean = 12, S.D. = 2.5
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/08/2018 − All Available
Calcium, mg/L
18
17
16
15
14
13
12
11
08/2011
04/2013
12/2014
08/2016
05/2018
Time (MM/YYYY)

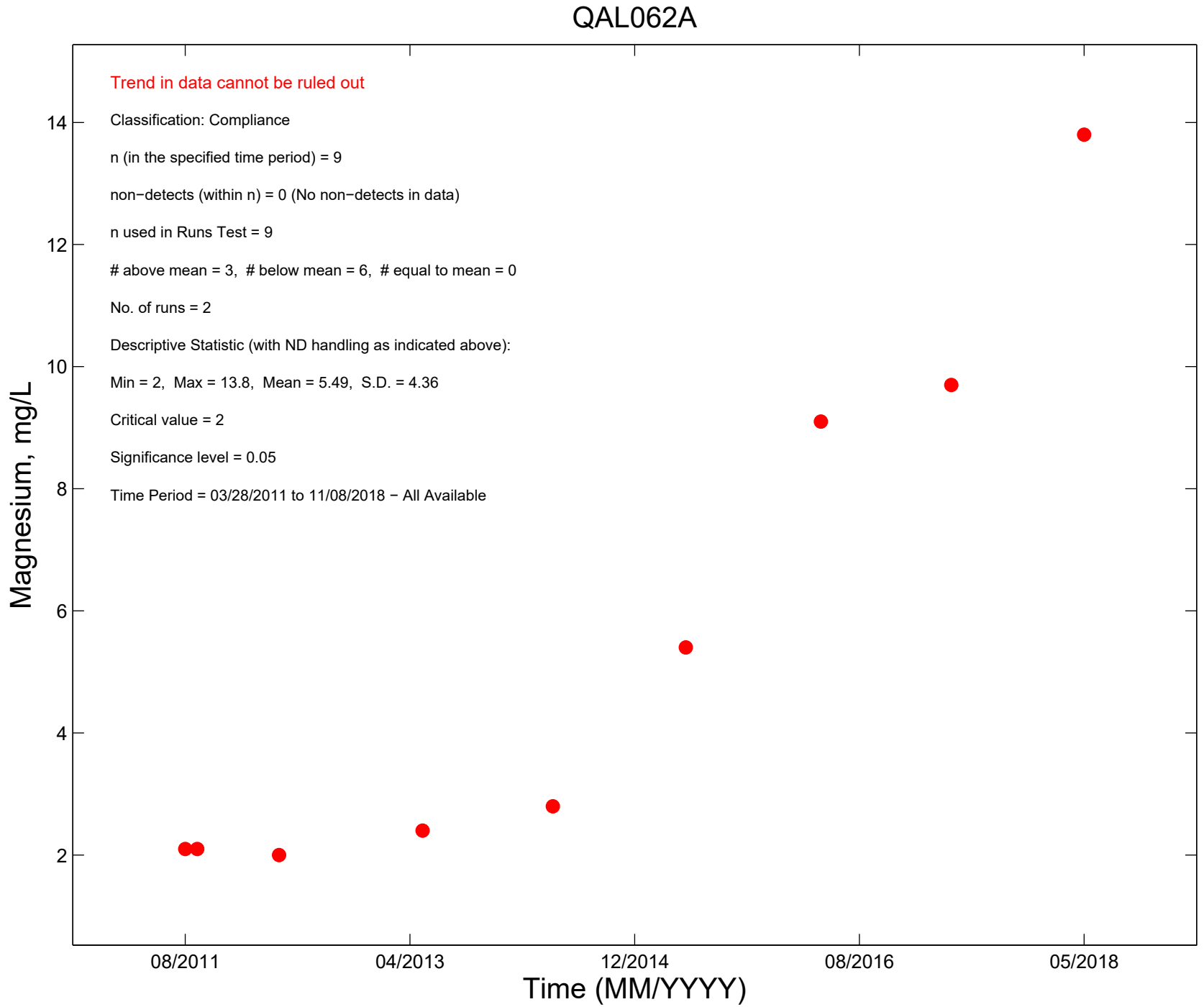

QAL061A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 2, # below mean = 7, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.9, Max = 3.2, Mean = 2.2, S.D. = 0.46
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/08/2018 − All Available
Magnesium, mg/L
3.2
3
2.8
2.6
2.4
2.2
2
1.8
08/2011
04/2013
12/2014
08/2016
05/2018
Time (MM/YYYY)

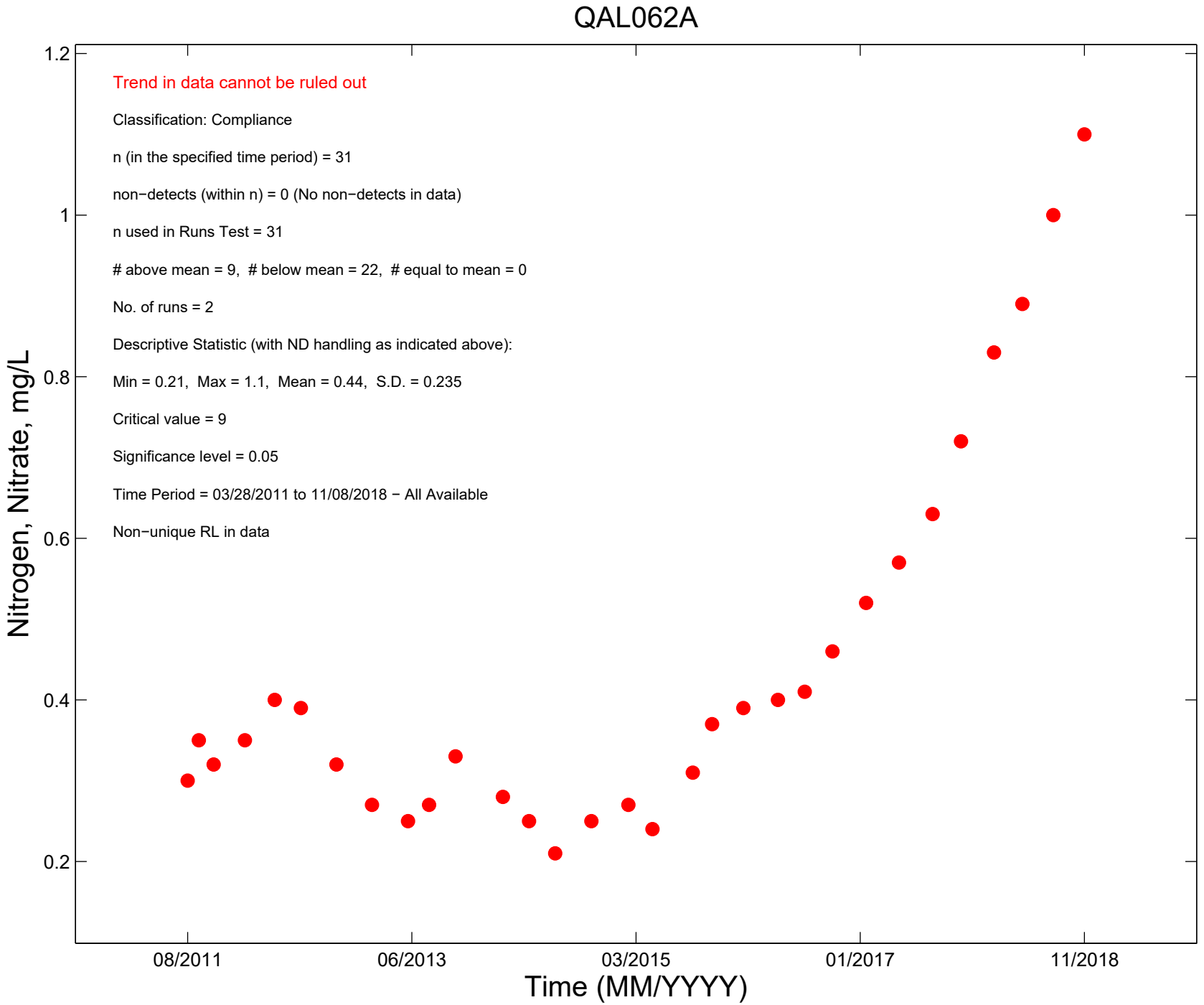

QAL061A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 31
above mean = 18, # below mean = 13, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 0.1, Max = 0.37, Mean = 0.23, S.D. = 0.0887
Critical value = 11
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Nitrogen, Nitrate, mg/L
0.4
0.35
0.3
0.25
0.2
0.15
0.1
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

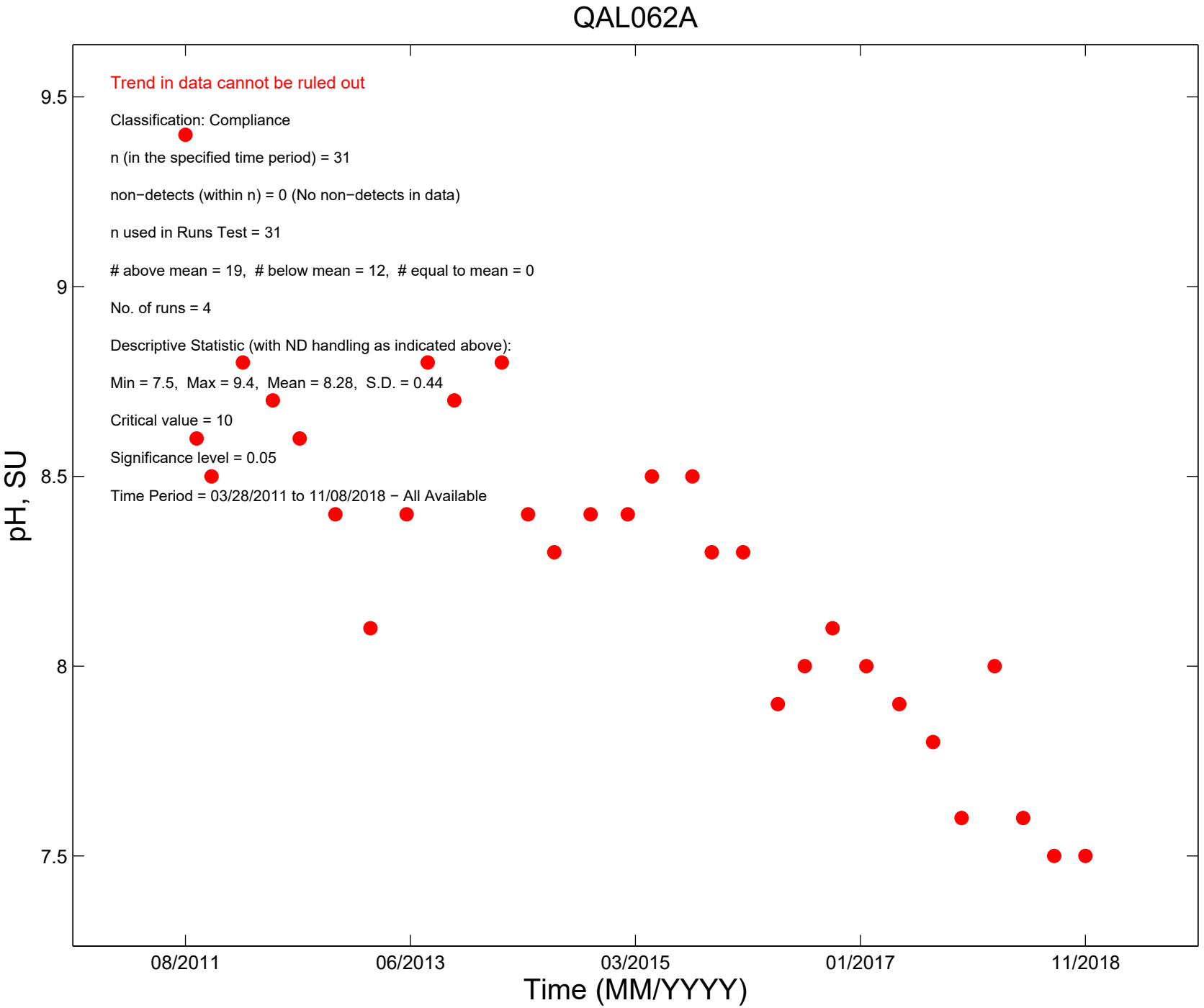

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 31
above mean = 14, # below mean = 17, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 29, Max = 199, Mean = 87.5, S.D. = 54.8
Critical value = 11
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Alkalinity, Bicarbonate, mg/L
220
200
180
160
140
120
100
80
60
40
20
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

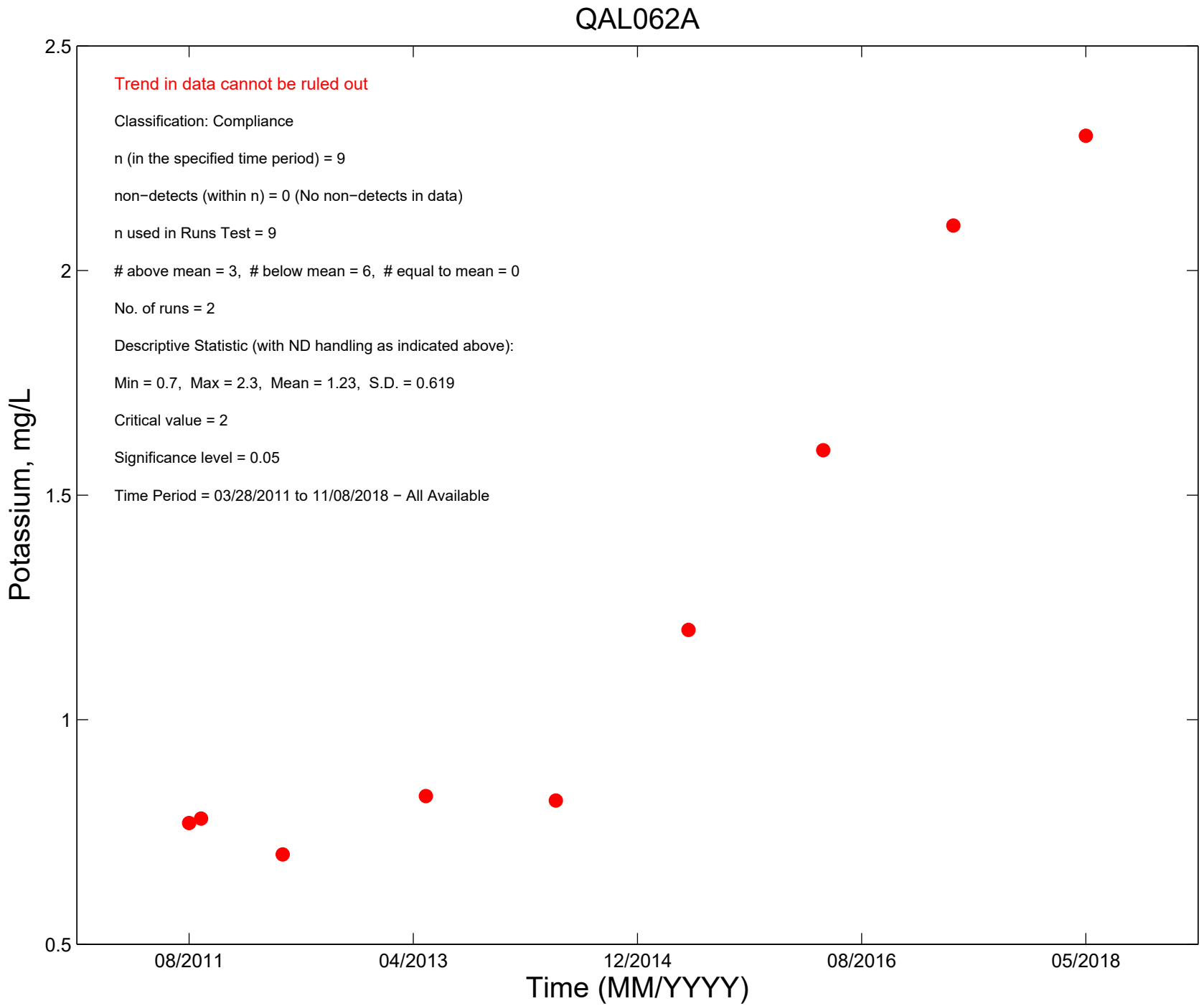

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 3, # below mean = 6, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 11, Max = 68.8, Mean = 28.2, S.D. = 21.2
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Calcium, mg/L
70
60
50
40
30
20
10
08/2011
04/2013
12/2014
08/2016
05/2018
Time (MM/YYYY)

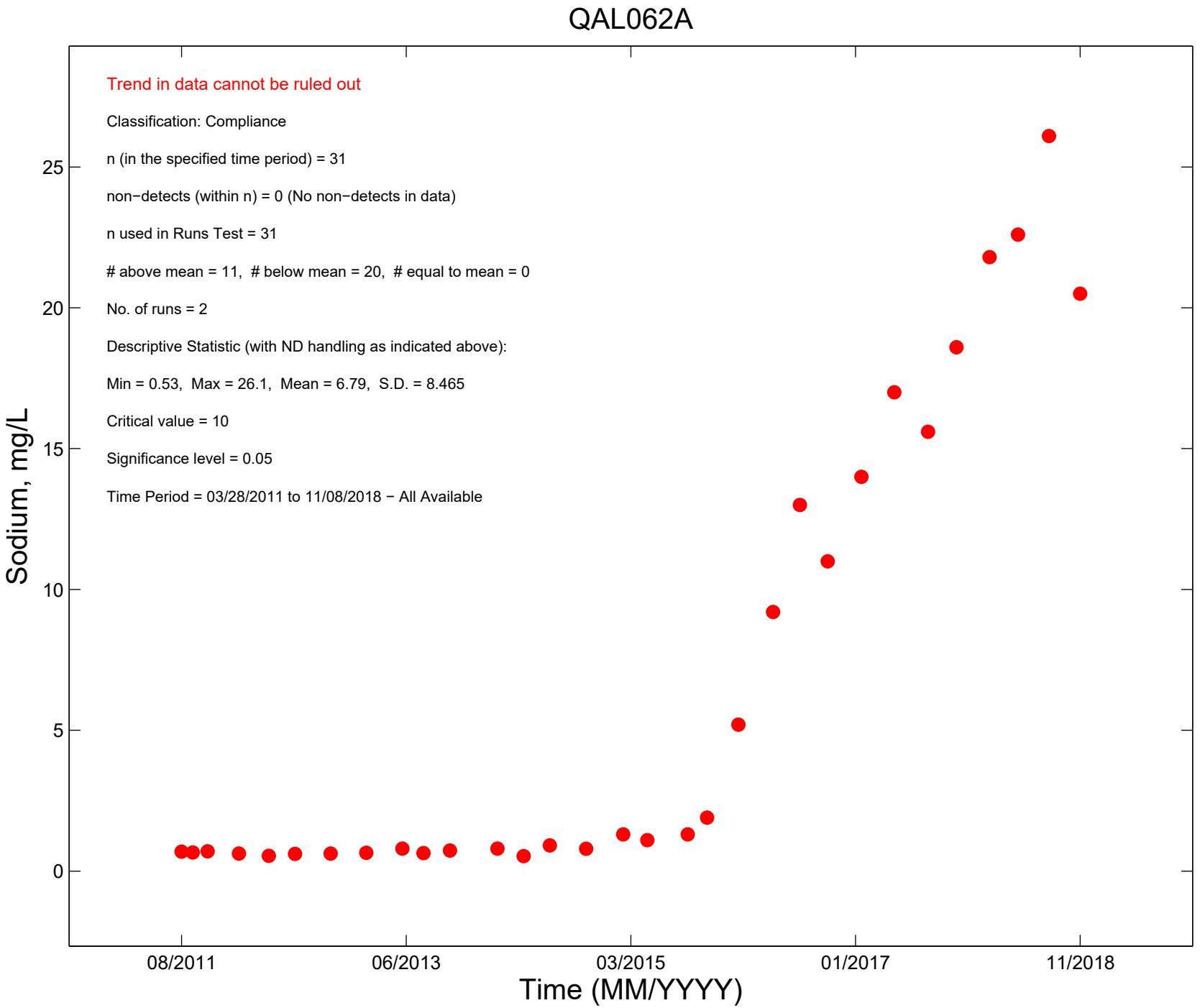

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 4 (Included in data analysis as equal to RL)
n used in Runs Test = 31
above mean = 13, # below mean = 18, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 74.2, Mean = 23.6, S.D. = 25.9
Critical value = 11
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Chloride, mg/L
80
70
60
50
40
30
20
10
0
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

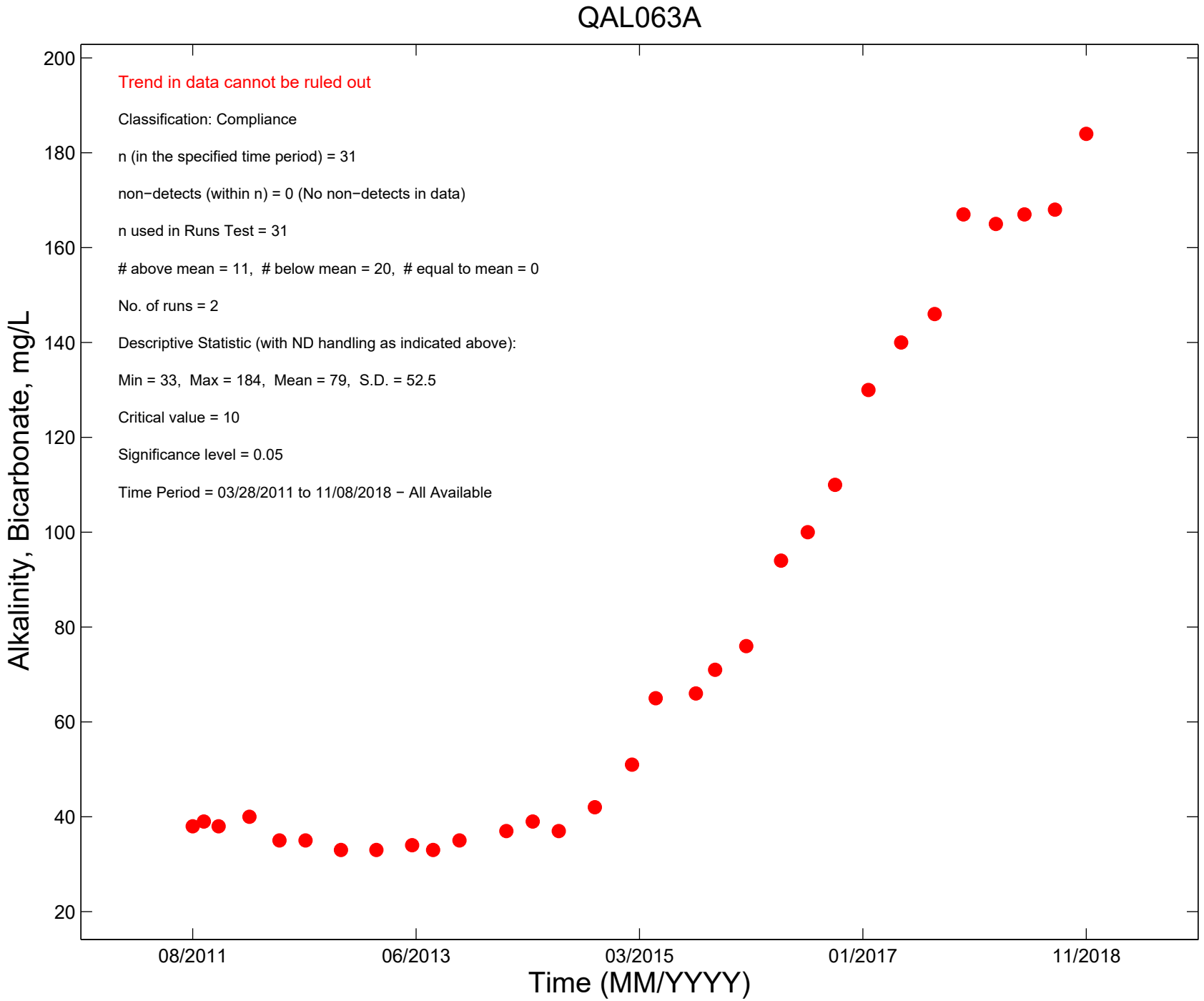

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 3, # below mean = 6, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 2, Max = 13.8, Mean = 5.49, S.D. = 4.36
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Magnesium, mg/L
14
12
10
8
6
4
2
08/2011
04/2013
12/2014
08/2016
05/2018
Time (MM/YYYY)

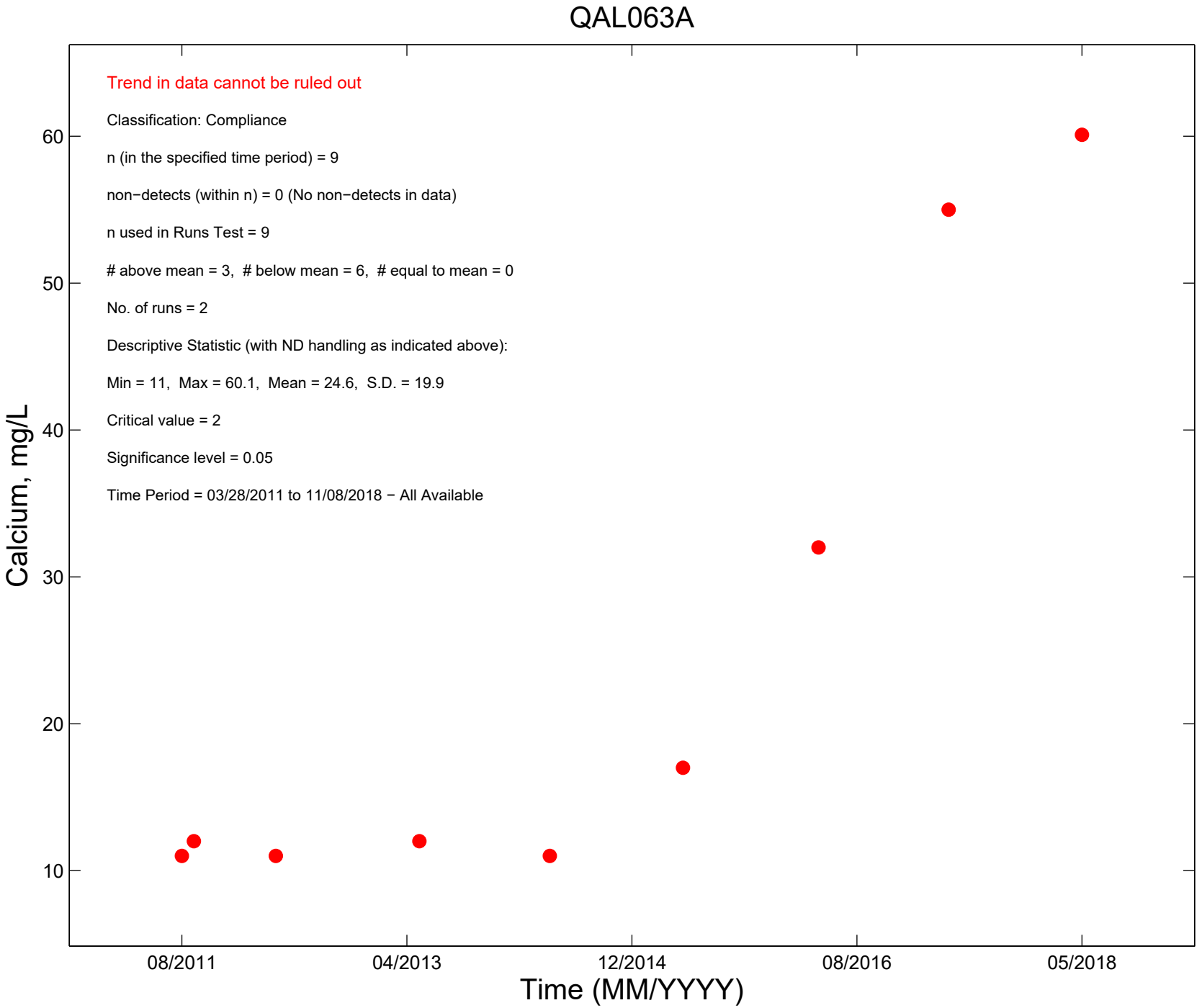

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 31
above mean = 9, # below mean = 22, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.21, Max = 1.1, Mean = 0.44, S.D. = 0.235
Critical value = 9
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Non−unique RL in data
Nitrogen, Nitrate, mg/L
1.2
1
0.8
0.6
0.4
0.2
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

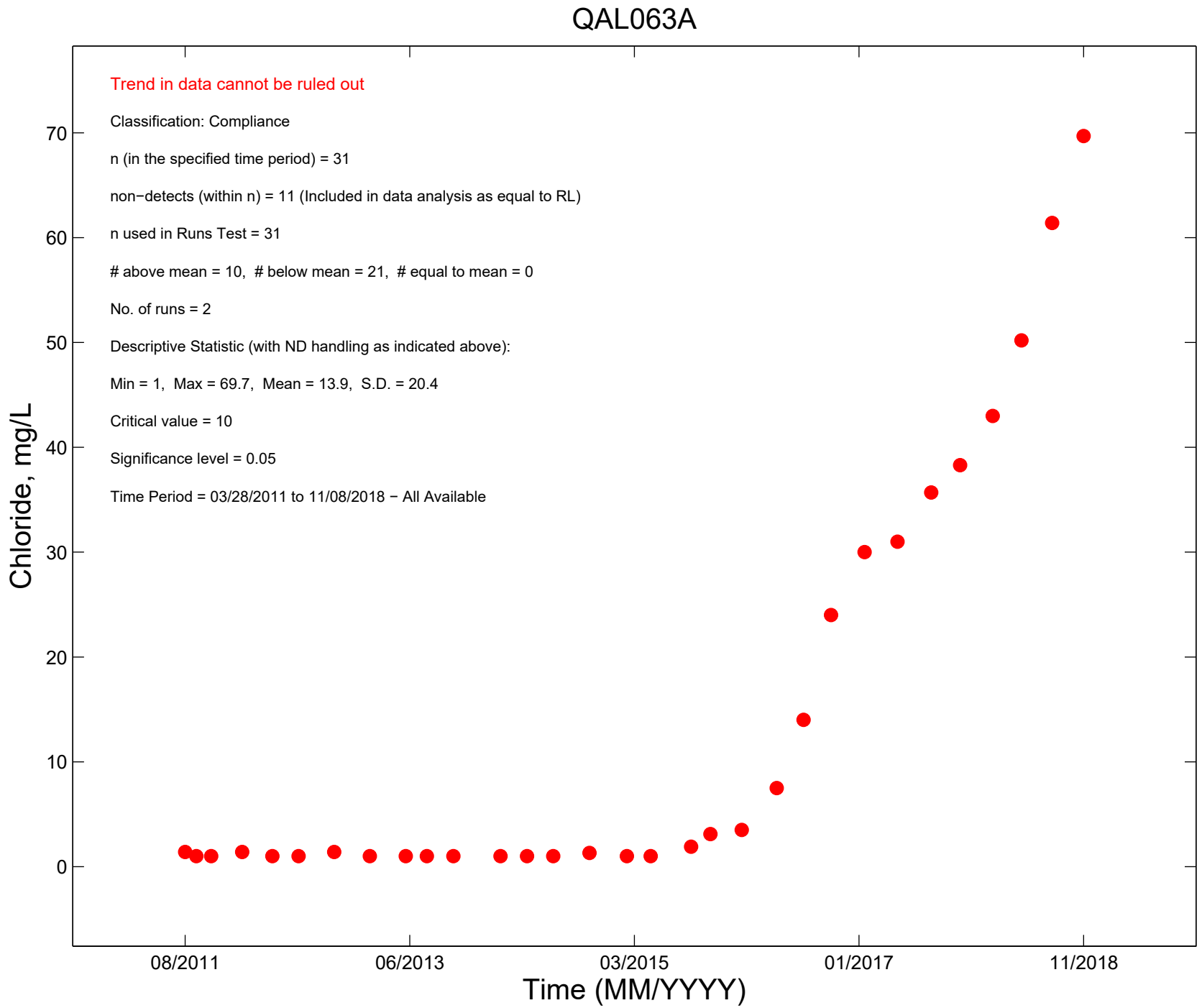

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 31
above mean = 19, # below mean = 12, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 7.5, Max = 9.4, Mean = 8.28, S.D. = 0.44
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
9.5
9
8.5
8
7.5
pH, SU
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

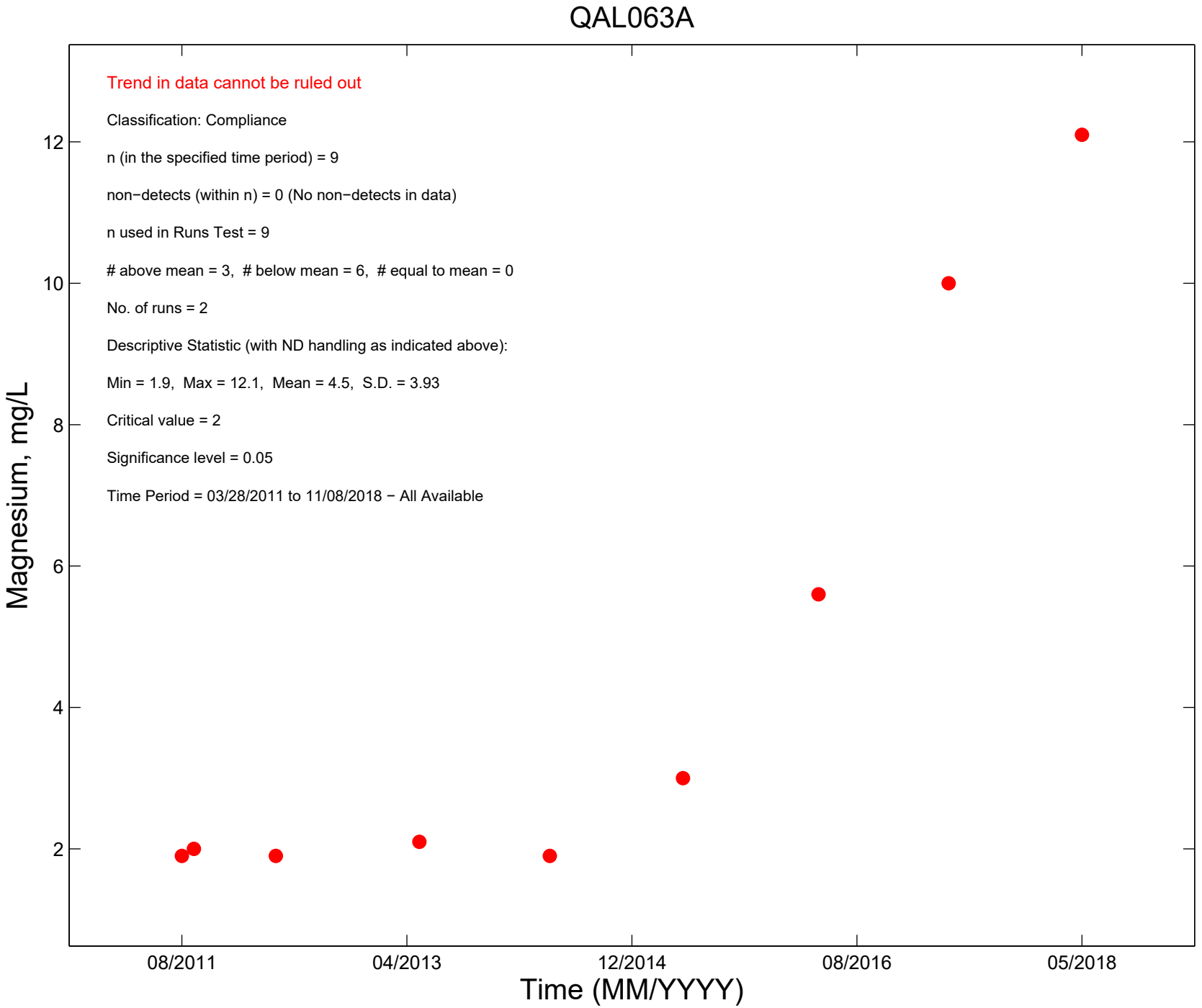

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 3, # below mean = 6, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.7, Max = 2.3, Mean = 1.23, S.D. = 0.619
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Potassium, mg/L
2.5
2
1.5
1
0.5
08/2011
04/2013
12/2014
08/2016
05/2018
Time (MM/YYYY)

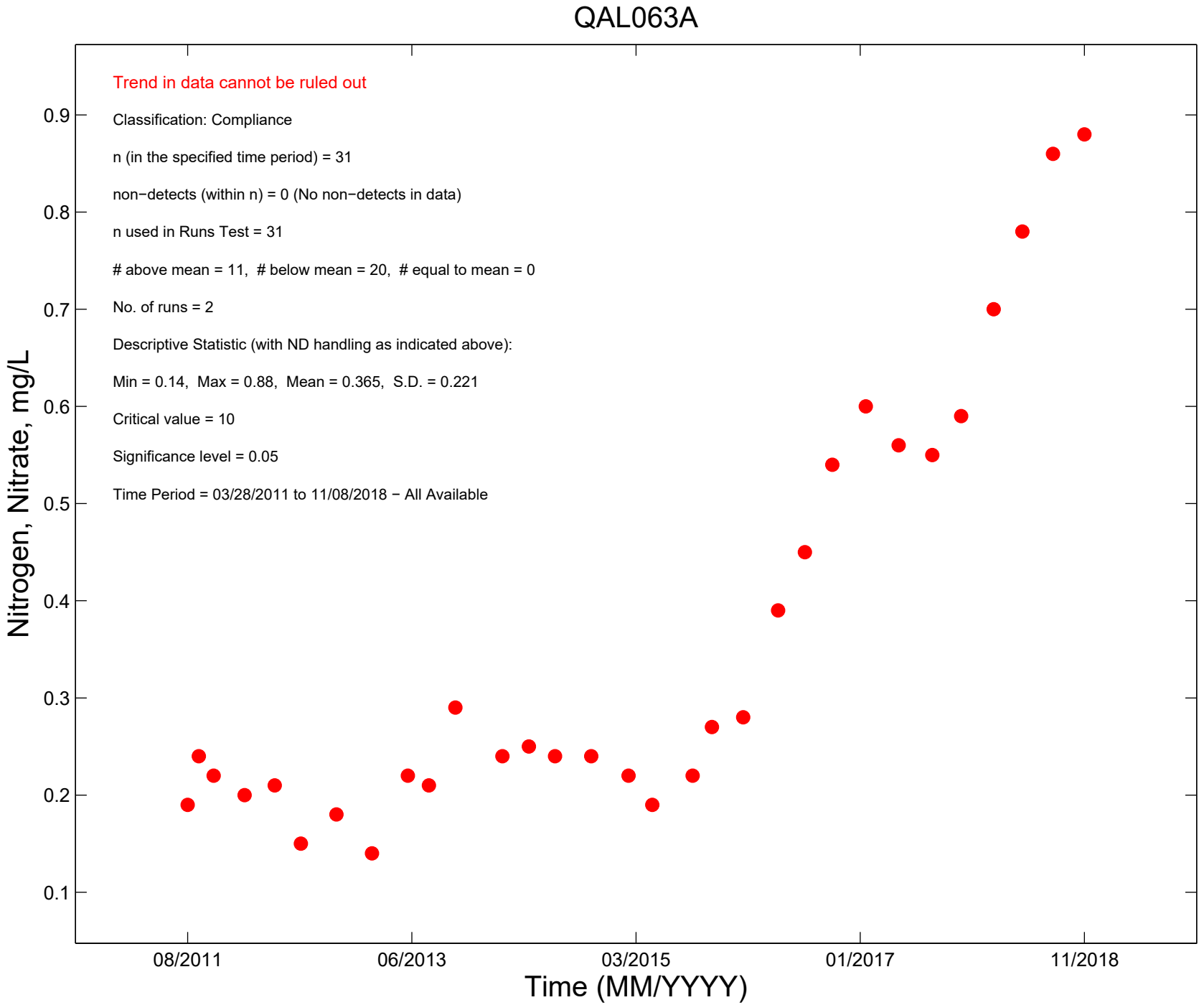

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 31
above mean = 11, # below mean = 20, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.53, Max = 26.1, Mean = 6.79, S.D. = 8.465
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Sodium, mg/L
0
5
10
15
20
25
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

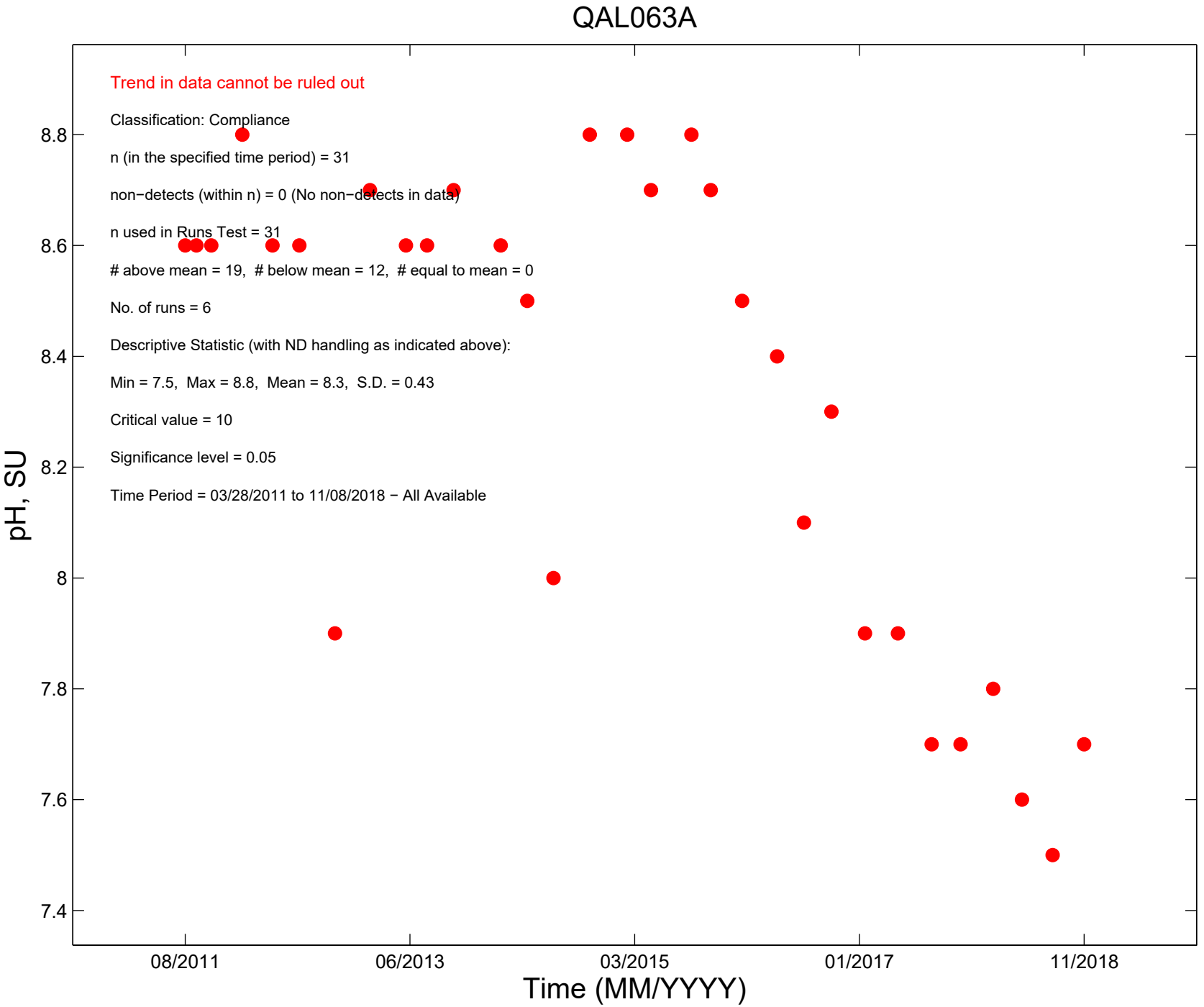

QAL063A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 31
above mean = 11, # below mean = 20, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 33, Max = 184, Mean = 79, S.D. = 52.5
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Alkalinity, Bicarbonate, mg/L
200
180
160
140
120
100
80
60
40
20
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

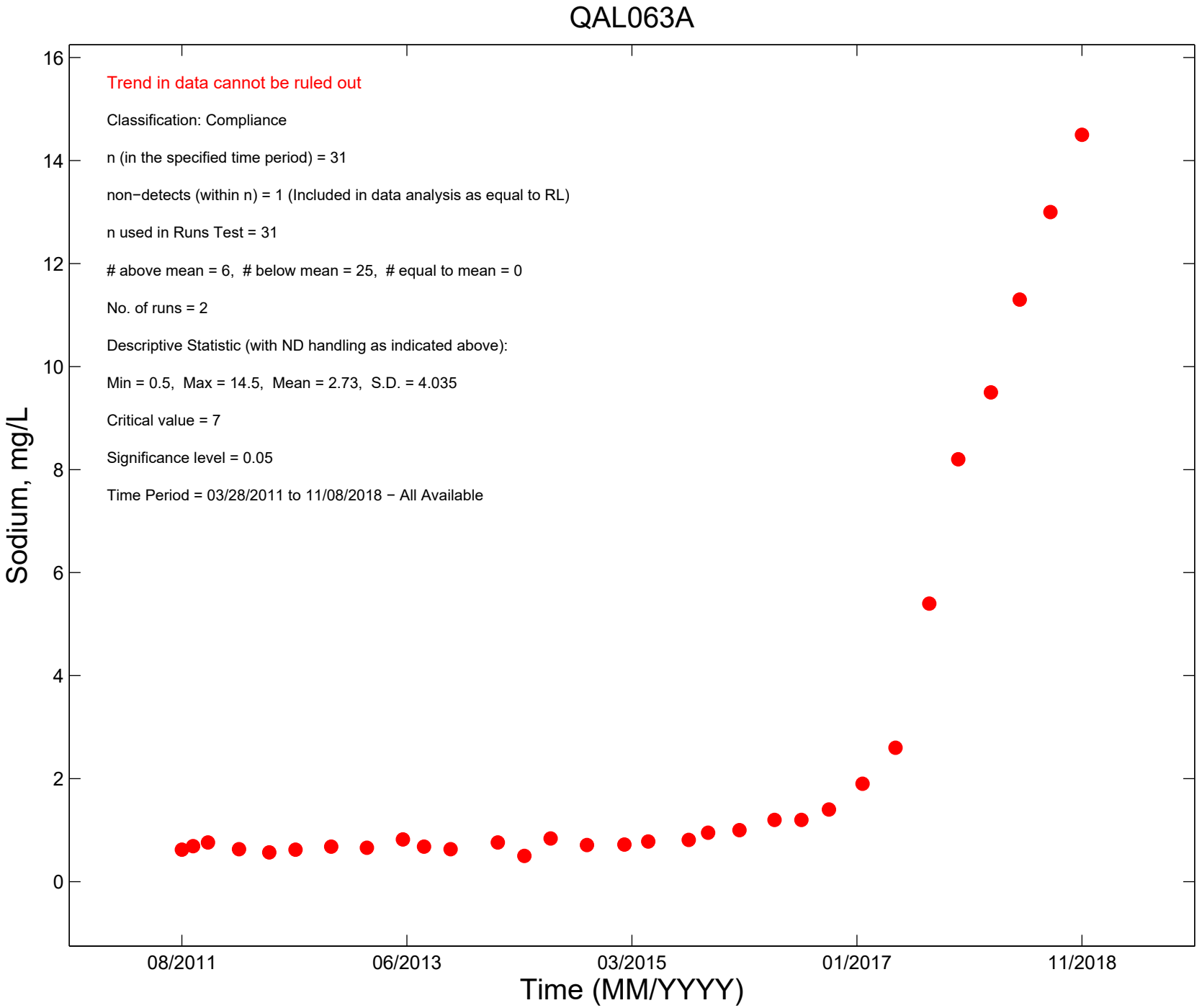

QAL063A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 3, # below mean = 6, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 11, Max = 60.1, Mean = 24.6, S.D. = 19.9
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Calcium, mg/L
60
50
40
30
20
10
08/2011
04/2013
12/2014
08/2016
05/2018
Time (MM/YYYY)

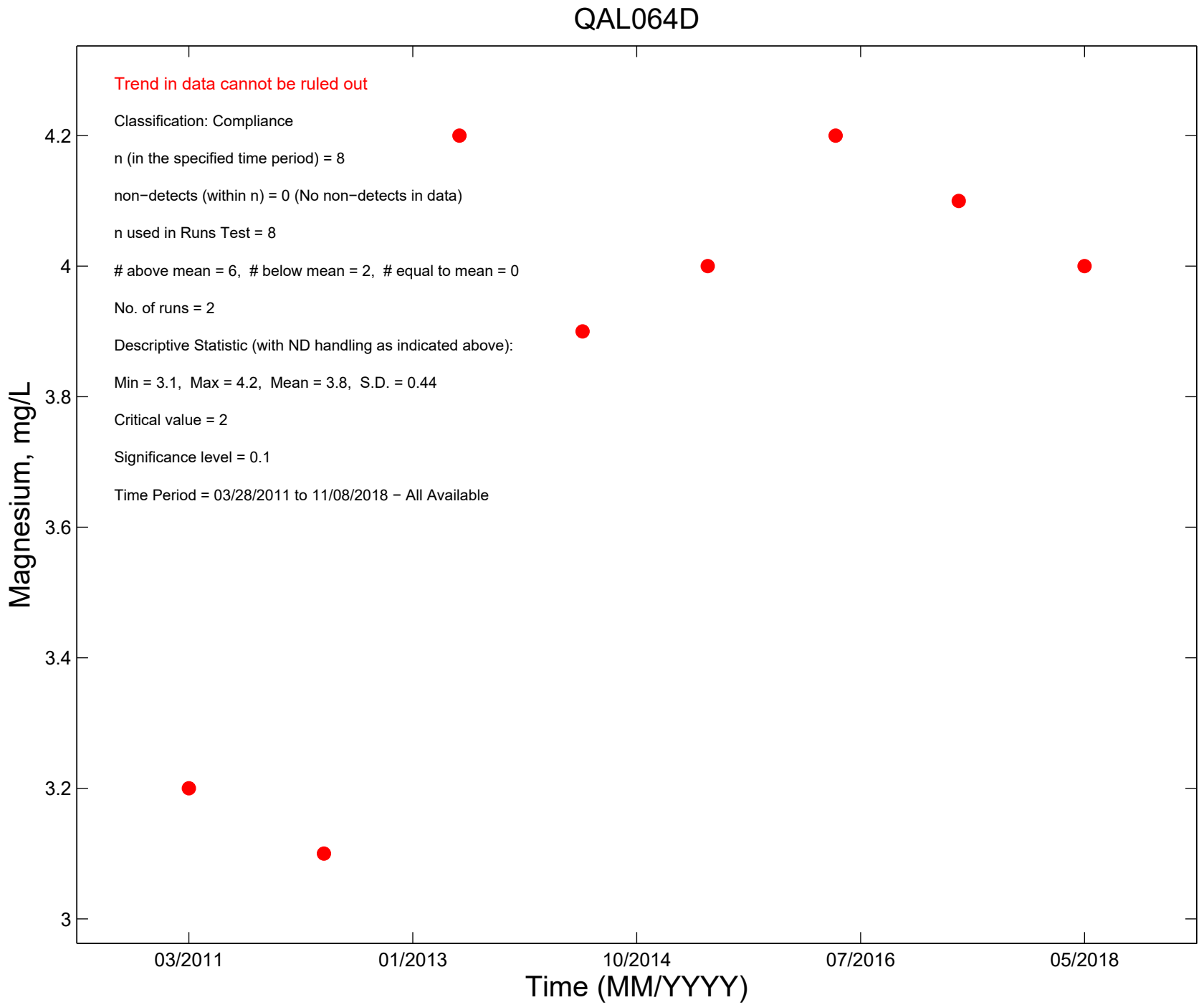

QAL063A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 11 (Included in data analysis as equal to RL)
n used in Runs Test = 31
above mean = 10, # below mean = 21, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 69.7, Mean = 13.9, S.D. = 20.4
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Chloride, mg/L
0
10
20
30
40
50
60
70
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

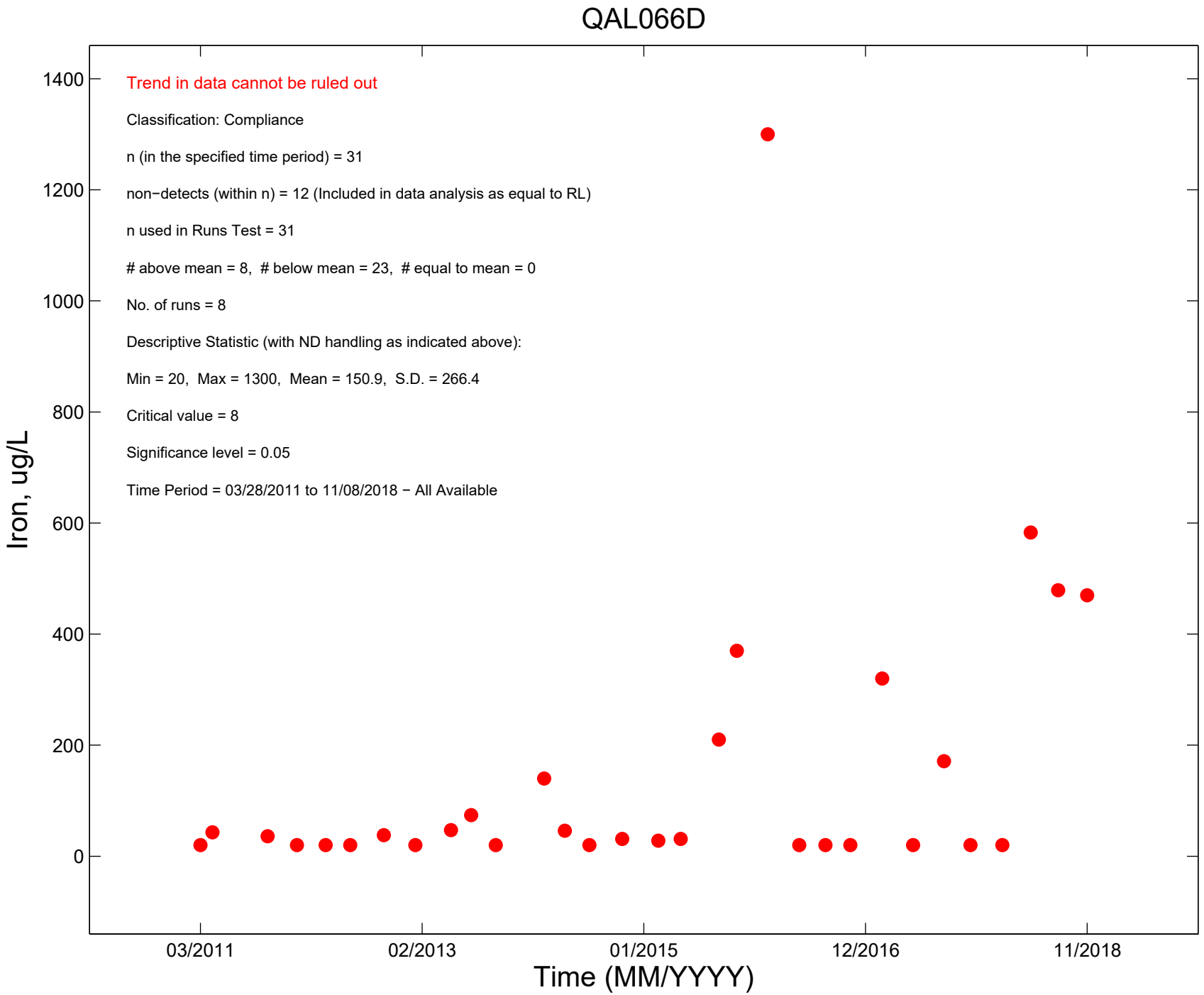

QAL063A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 3, # below mean = 6, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.9, Max = 12.1, Mean = 4.5, S.D. = 3.93
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Magnesium, mg/L
12
10
8
6
4
2
08/2011
04/2013
12/2014
08/2016
05/2018
Time (MM/YYYY)

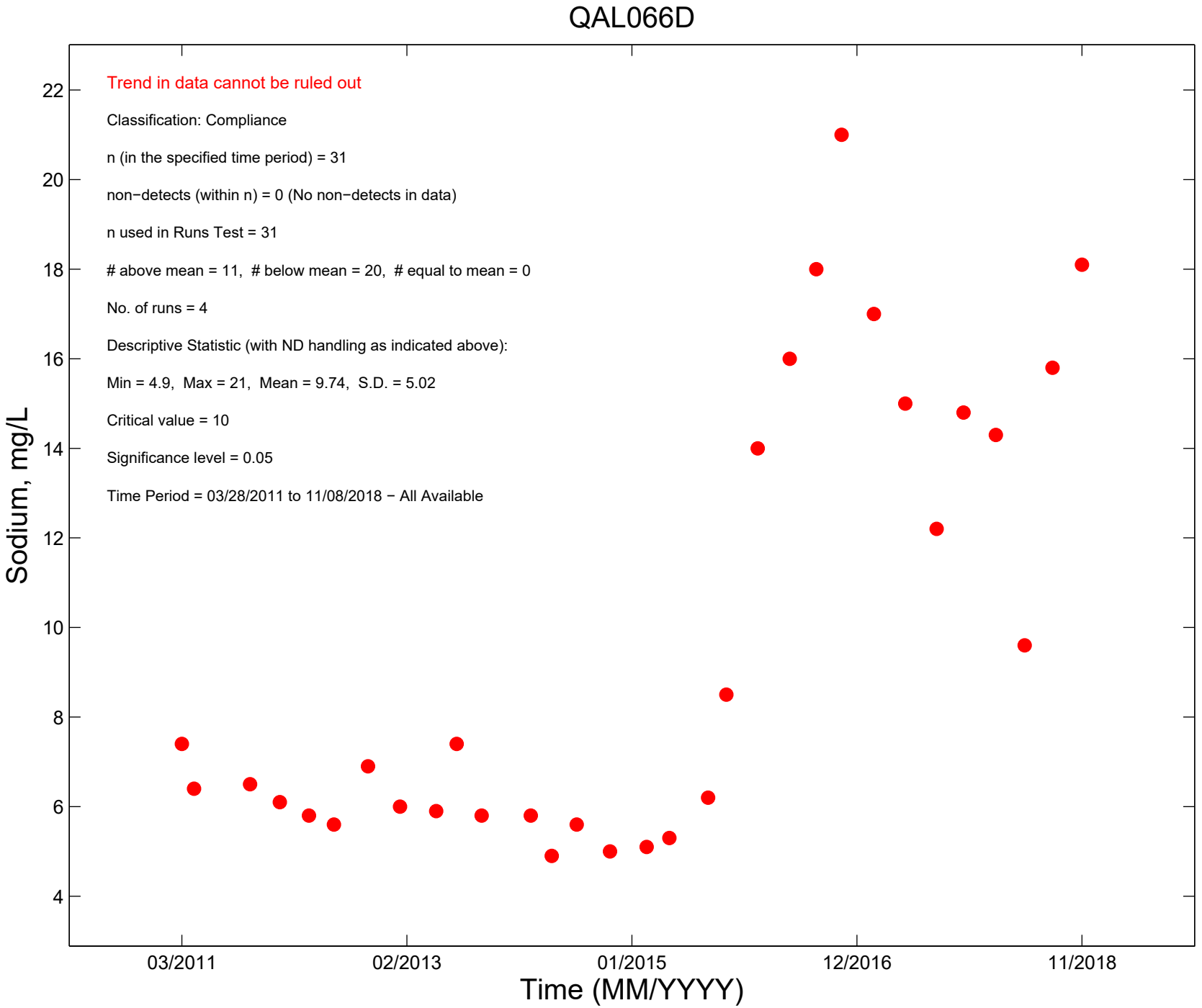

QAL063A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 31
above mean = 11, # below mean = 20, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.14, Max = 0.88, Mean = 0.365, S.D. = 0.221
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Nitrogen, Nitrate, mg/L
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

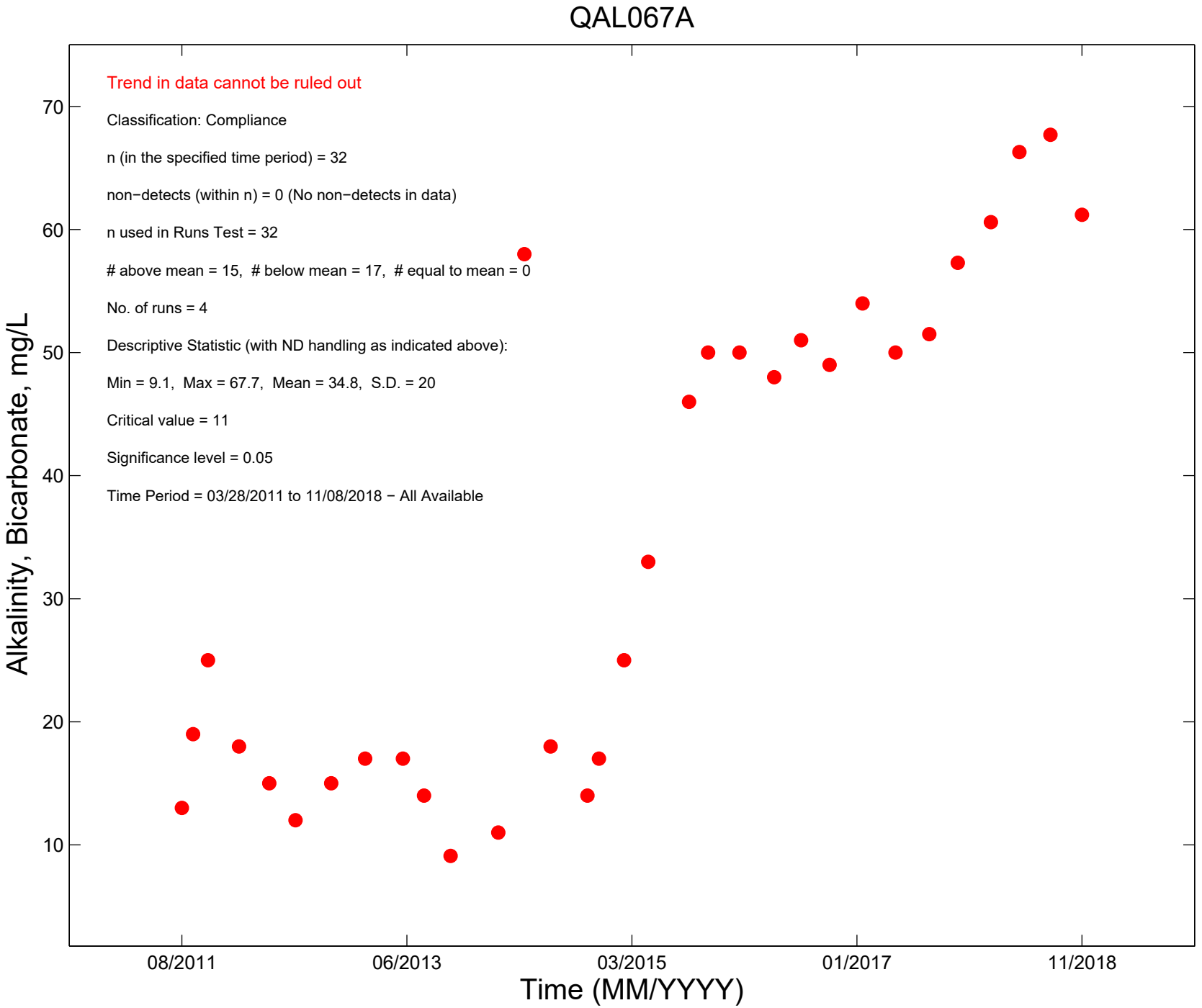

QAL063A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 31
above mean = 19, # below mean = 12, # equal to mean = 0
No. of runs = 6
Descriptive Statistic (with ND handling as indicated above):
Min = 7.5, Max = 8.8, Mean = 8.3, S.D. = 0.43
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
pH, SU
8.8
8.6
8.4
8.2
8
7.8
7.6
7.4
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

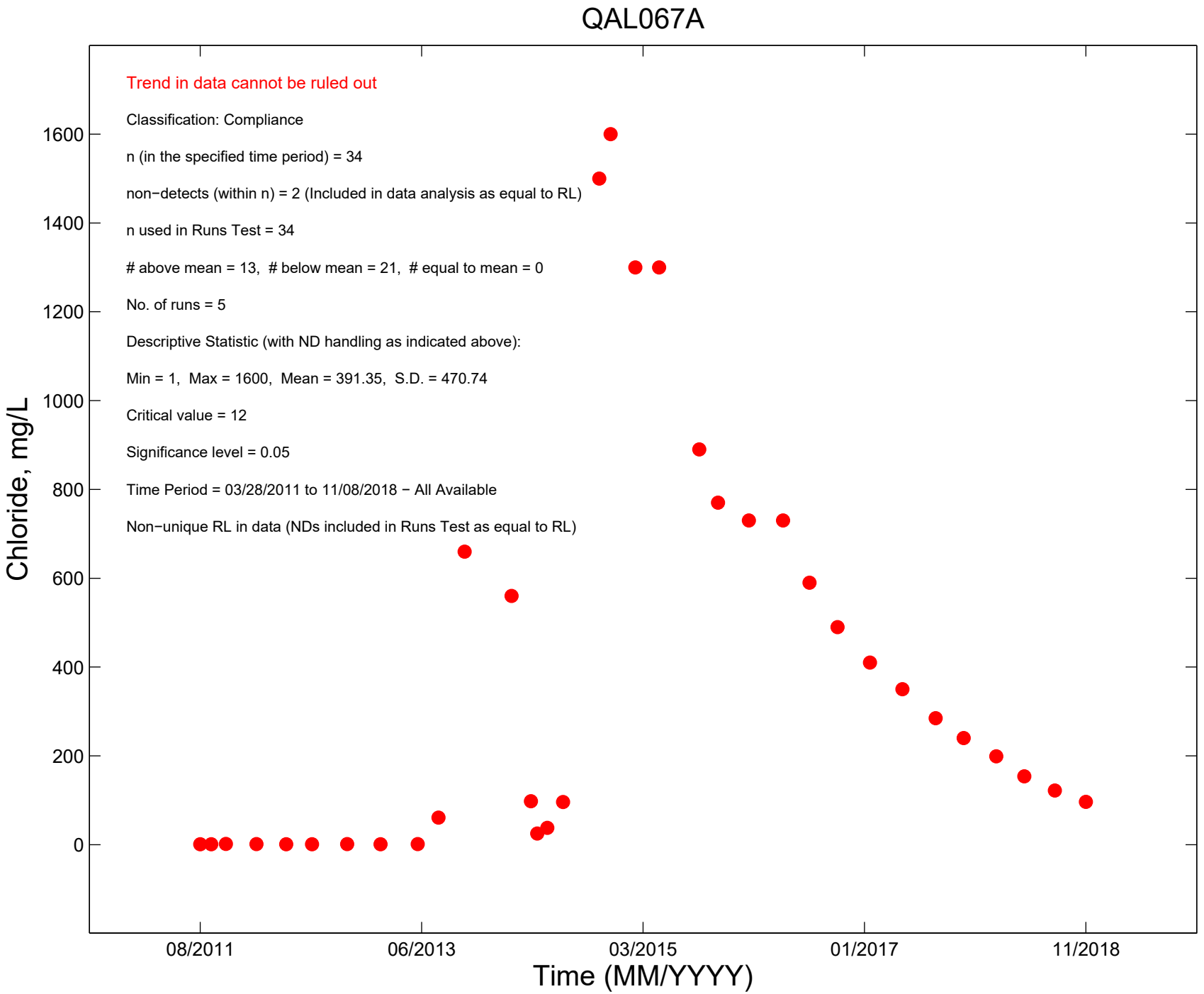

QAL063A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 1 (Included in data analysis as equal to RL)
n used in Runs Test = 31
above mean = 6, # below mean = 25, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.5, Max = 14.5, Mean = 2.73, S.D. = 4.035
Critical value = 7
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Sodium, mg/L
16
14
12
10
8
6
4
2
0
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

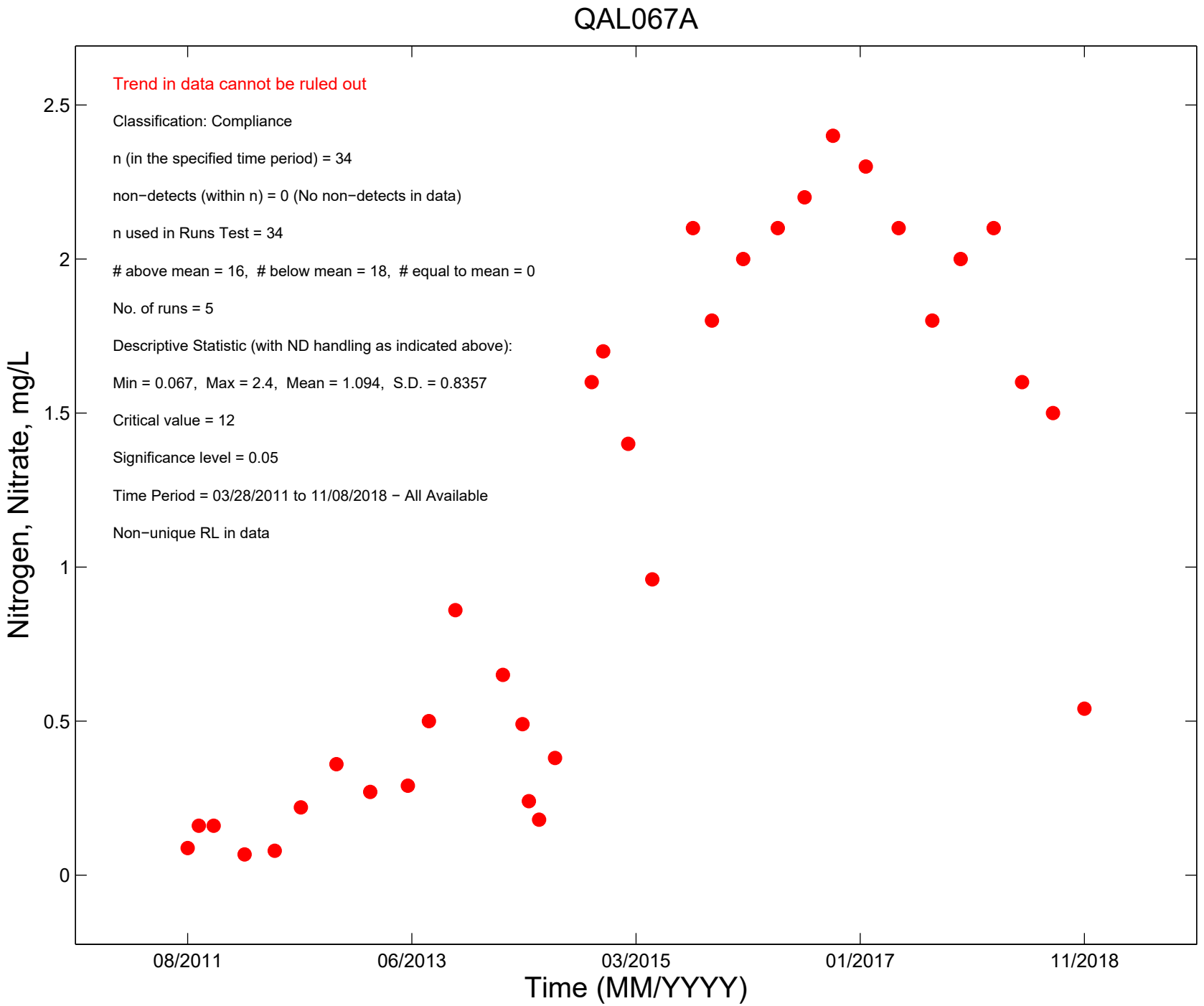

QAL064D
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 8
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 8
above mean = 6, # below mean = 2, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 3.1, Max = 4.2, Mean = 3.8, S.D. = 0.44
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/08/2018 − All Available
Magnesium, mg/L
4.2
4
3.8
3.6
3.4
3.2
3
03/2011
01/2013
10/2014
07/2016
05/2018
Time (MM/YYYY)

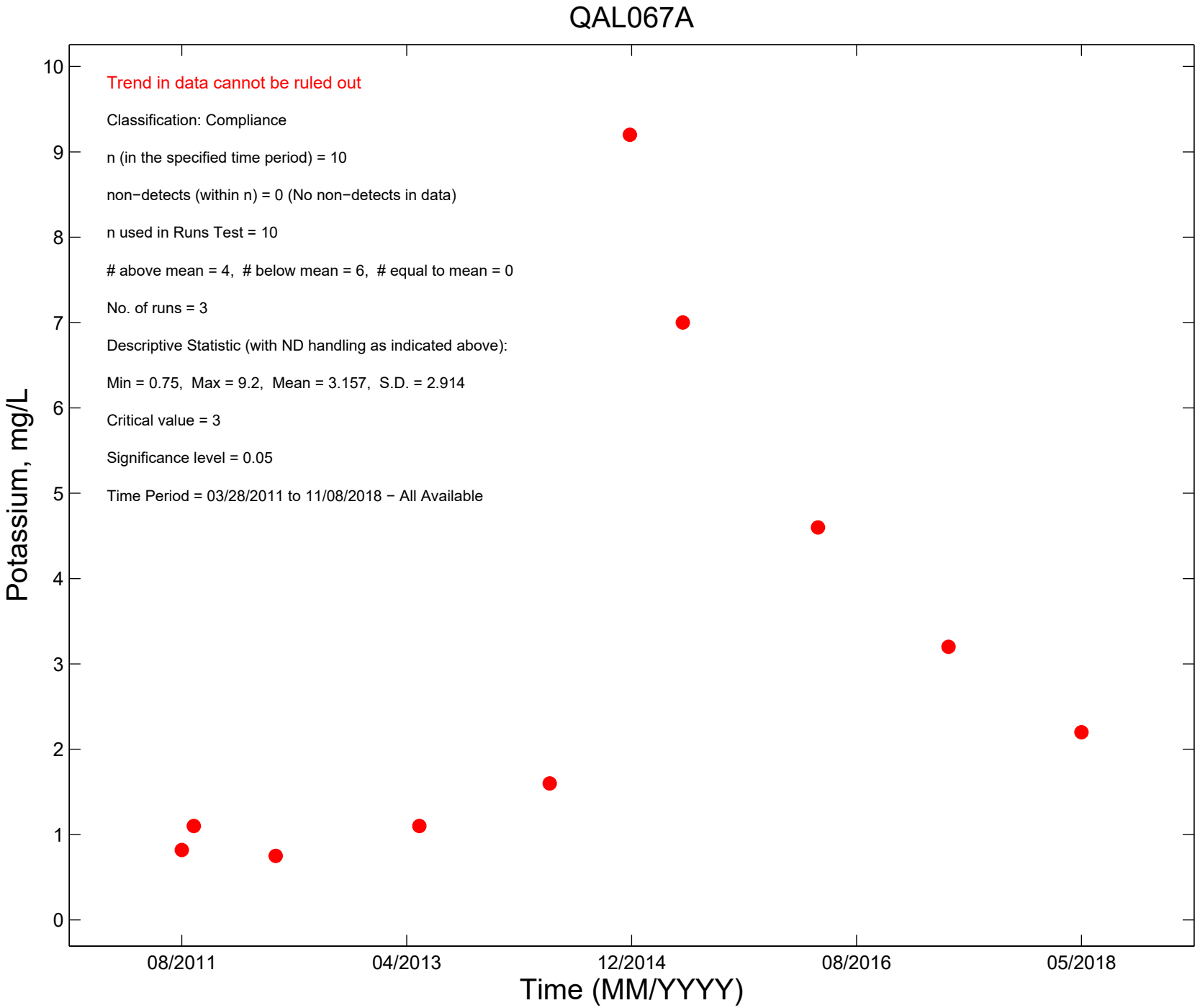

QAL066D
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 12 (Included in data analysis as equal to RL)
n used in Runs Test = 31
above mean = 8, # below mean = 23, # equal to mean = 0
No. of runs = 8
Descriptive Statistic (with ND handling as indicated above):
Min = 20, Max = 1300, Mean = 150.9, S.D. = 266.4
Critical value = 8
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Iron, ug/L
1400
1200
1000
800
600
400
200
0
03/2011
02/2013
01/2015
12/2016
11/2018
Time (MM/YYYY)

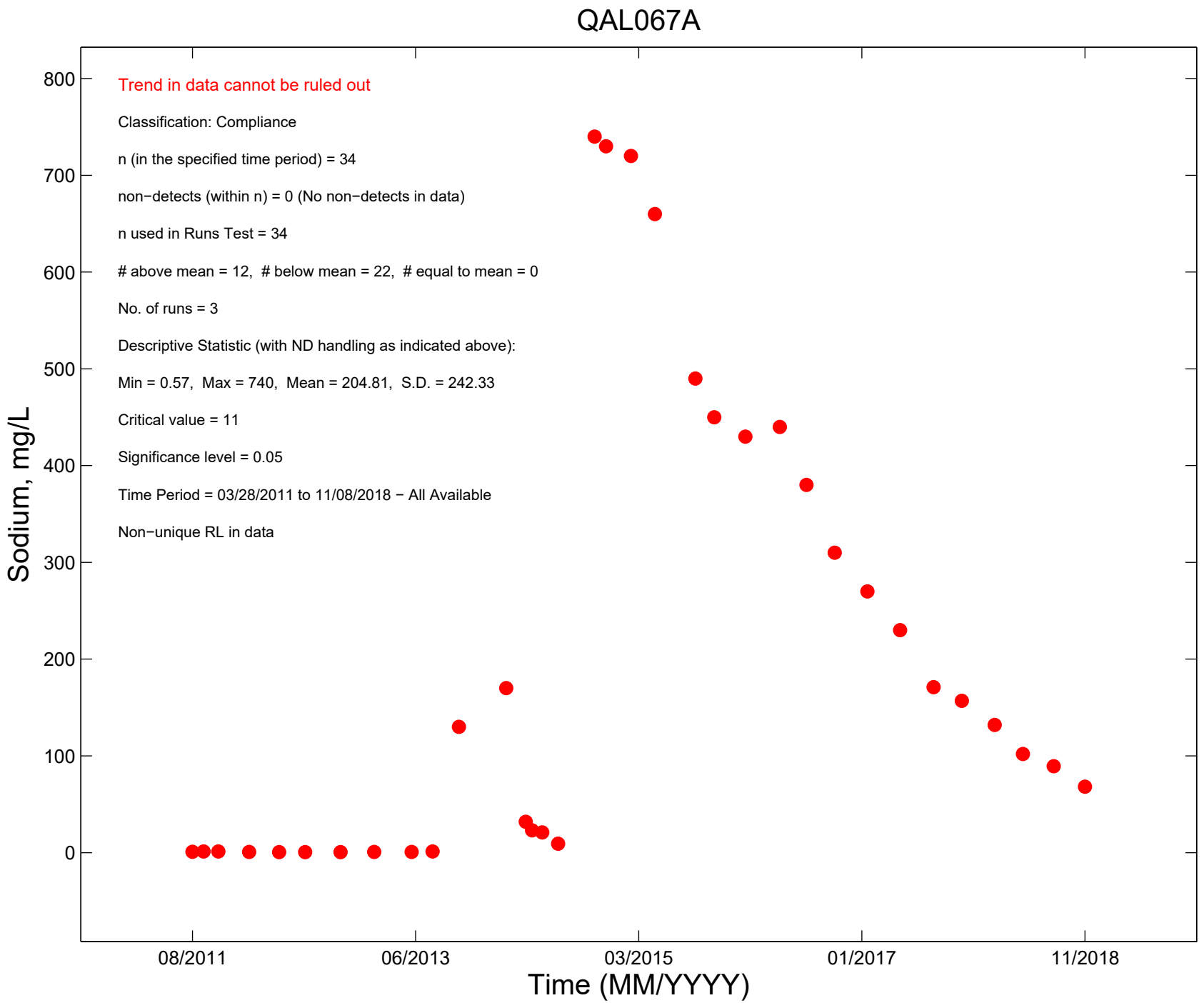

QAL066D
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 31
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 31
above mean = 11, # below mean = 20, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 4.9, Max = 21, Mean = 9.74, S.D. = 5.02
Critical value = 10
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Sodium, mg/L
22
20
18
16
14
12
10
8
6
4
03/2011
02/2013
01/2015
12/2016
11/2018
Time (MM/YYYY)

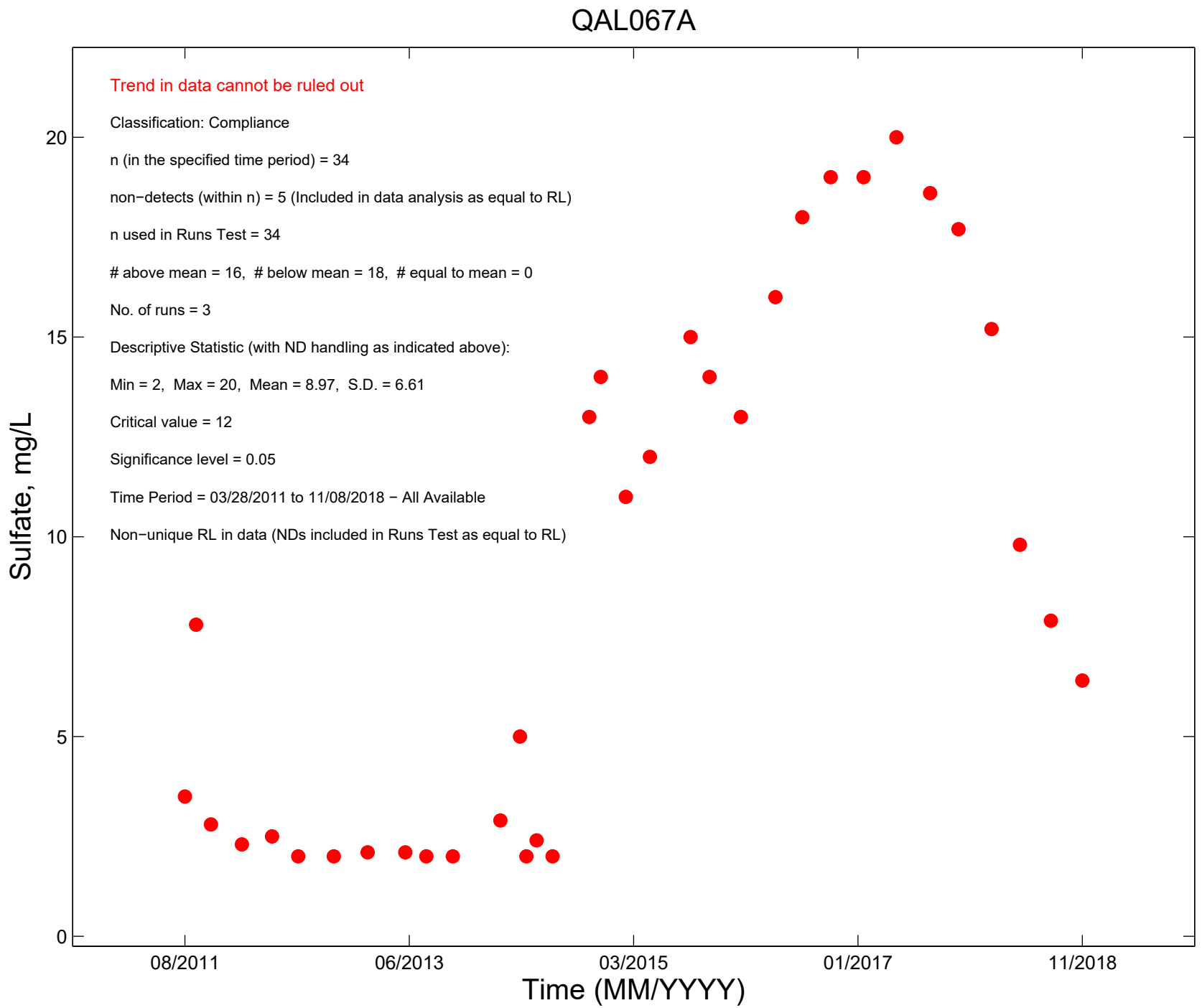

QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 32
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 32
above mean = 15, # below mean = 17, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 9.1, Max = 67.7, Mean = 34.8, S.D. = 20
Critical value = 11
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Alkalinity, Bicarbonate, mg/L
70
60
50
40
30
20
10
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

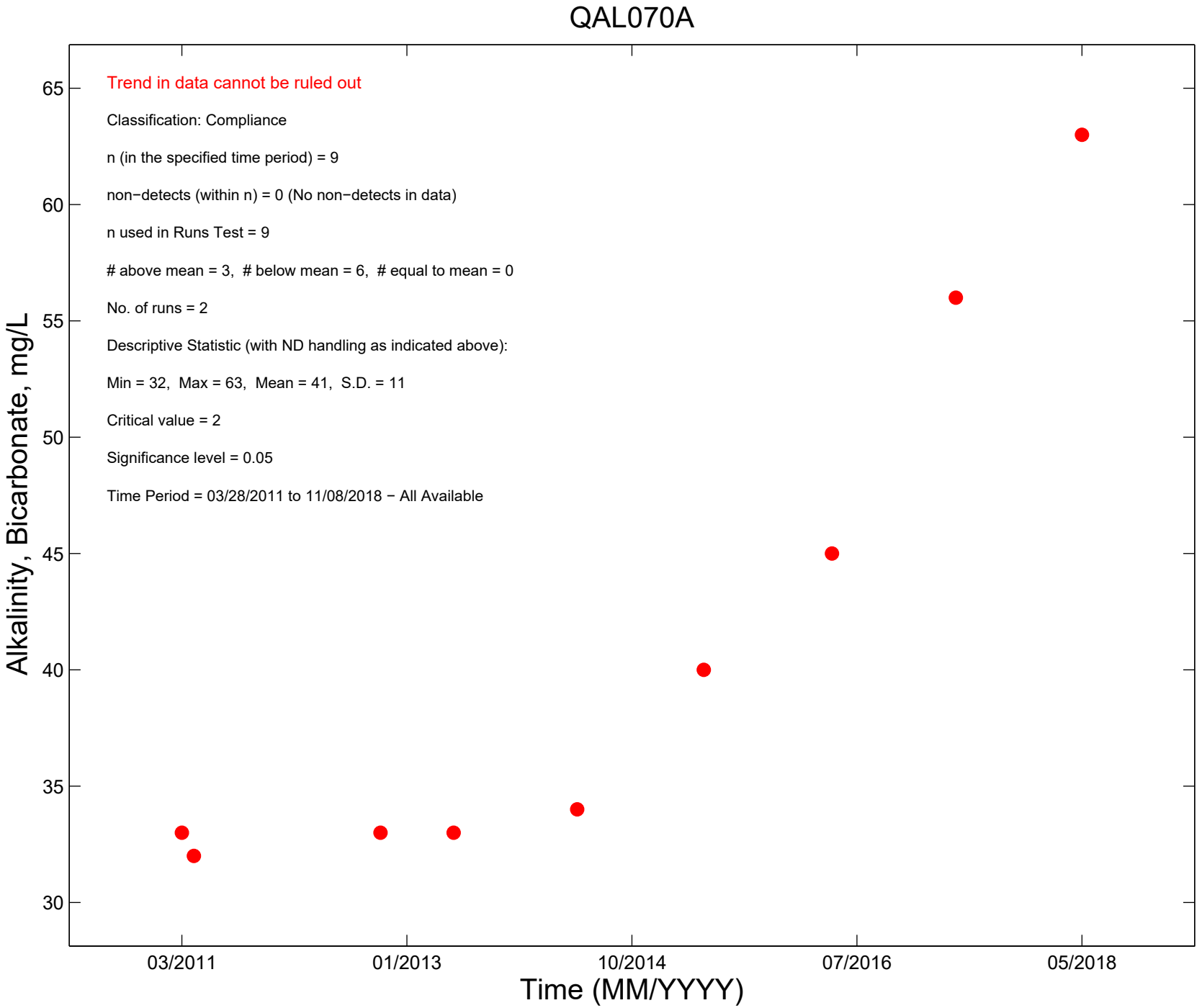

QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 34
non−detects (within n) = 2 (Included in data analysis as equal to RL)
n used in Runs Test = 34
above mean = 13, # below mean = 21, # equal to mean = 0
No. of runs = 5
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 1600, Mean = 391.35, S.D. = 470.74
Critical value = 12
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Non−unique RL in data (NDs included in Runs Test as equal to RL)
Chloride, mg/L
1600
1400
1200
1000
800
600
400
200
0
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

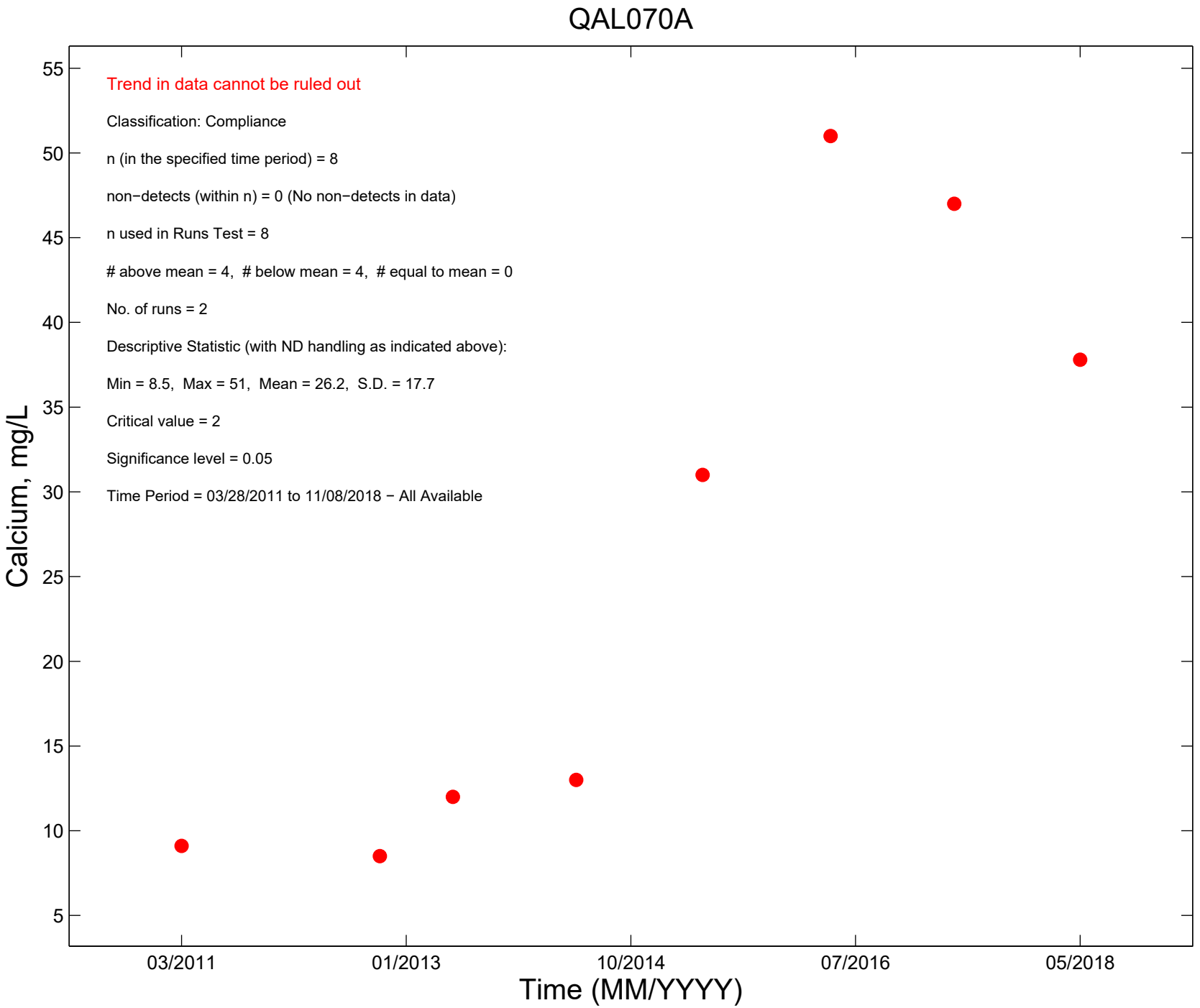

QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 34
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 34
above mean = 16, # below mean = 18, # equal to mean = 0
No. of runs = 5
Descriptive Statistic (with ND handling as indicated above):
Min = 0.067, Max = 2.4, Mean = 1.094, S.D. = 0.8357
Critical value = 12
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Non−unique RL in data
Nitrogen, Nitrate, mg/L
2.5
2
1.5
1
0.5
0
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

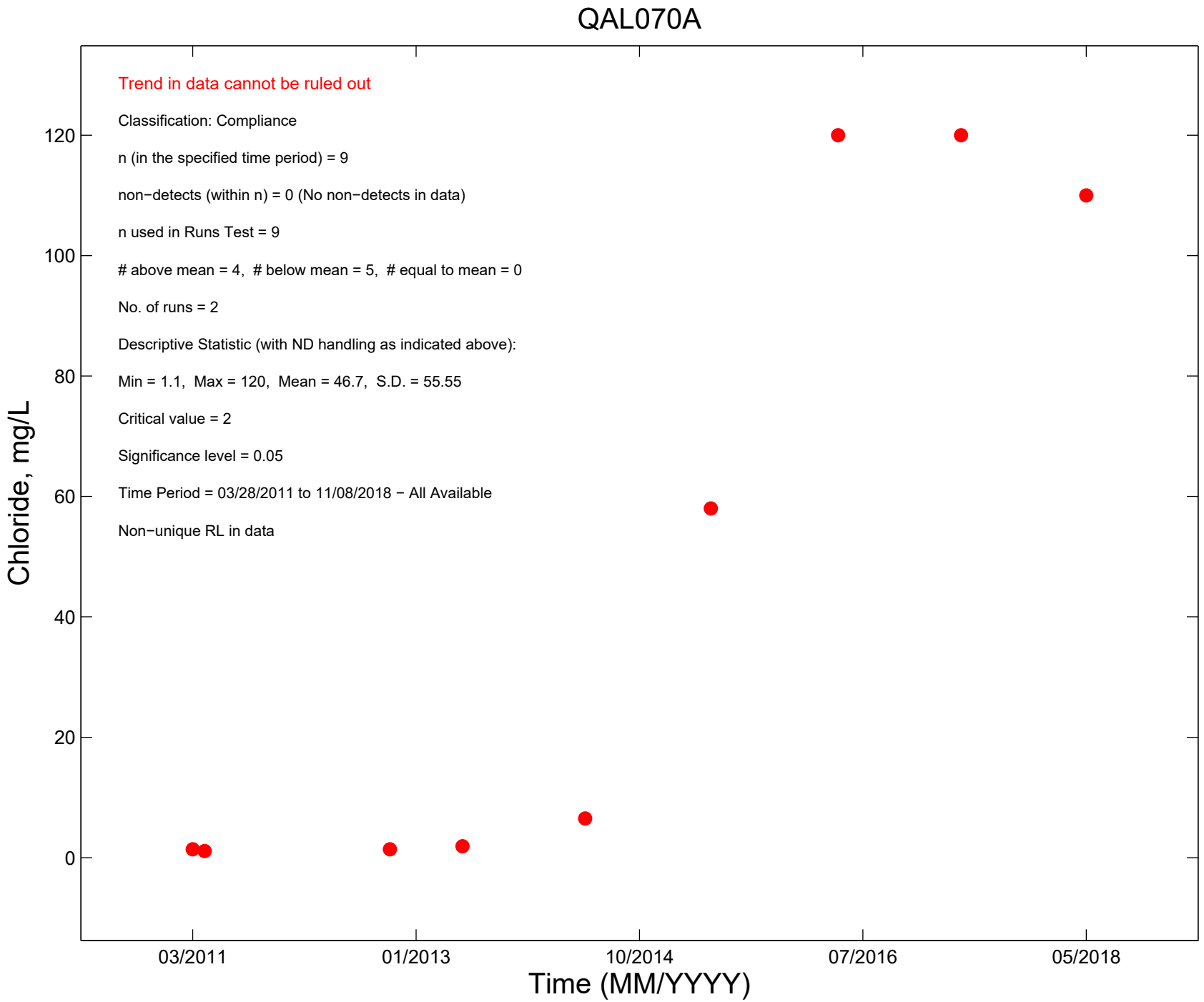

QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 10
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 10
above mean = 4, # below mean = 6, # equal to mean = 0
No. of runs = 3
Descriptive Statistic (with ND handling as indicated above):
Min = 0.75, Max = 9.2, Mean = 3.157, S.D. = 2.914
Critical value = 3
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Potassium, mg/L
0
1
2
3
4
5
6
7
8
9
10
08/2011
04/2013
12/2014
08/2016
05/2018
Time (MM/YYYY)

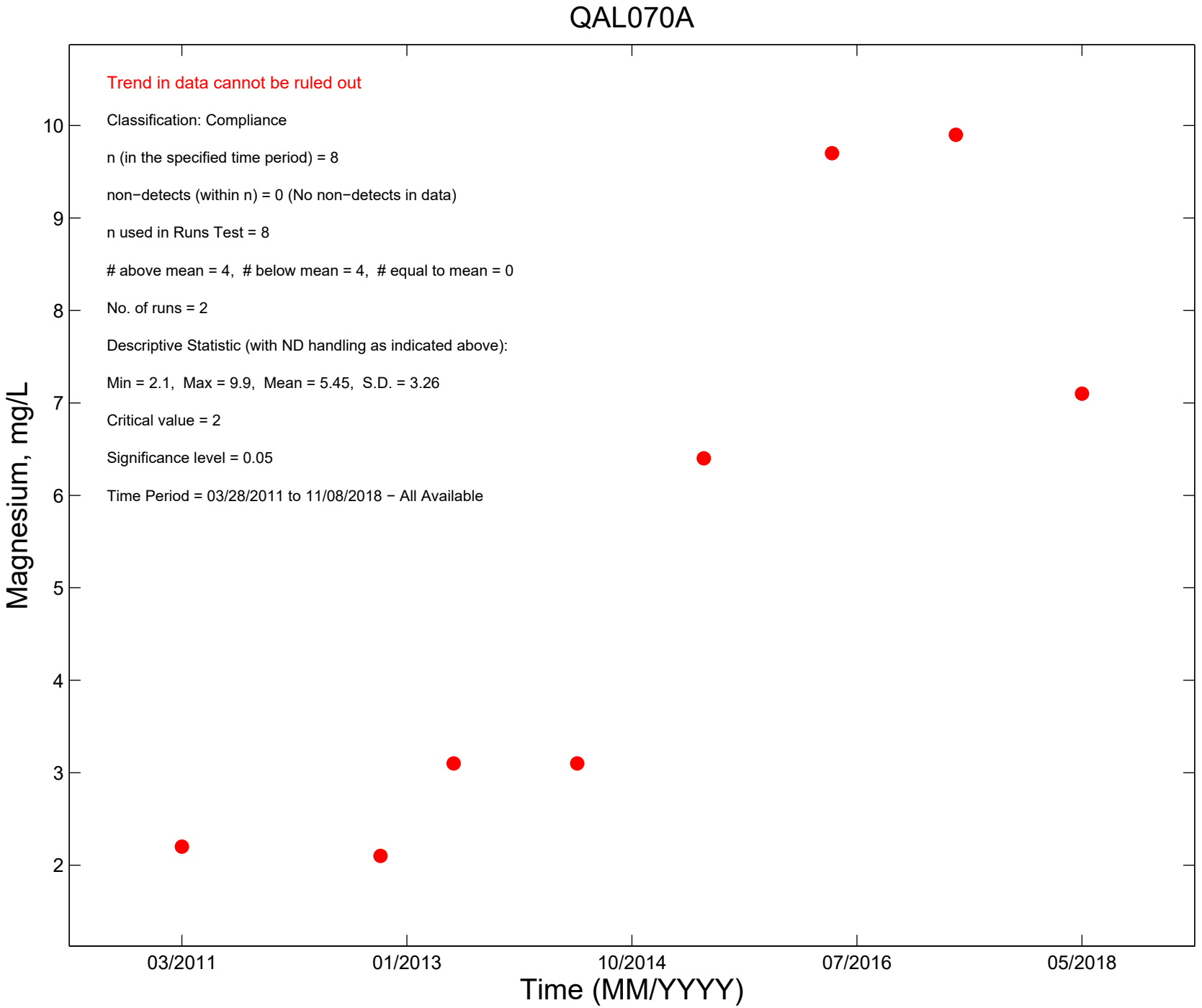

QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 34
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 34
above mean = 12, # below mean = 22, # equal to mean = 0
No. of runs = 3
Descriptive Statistic (with ND handling as indicated above):
Min = 0.57, Max = 740, Mean = 204.81, S.D. = 242.33
Critical value = 11
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Non−unique RL in data
Sodium, mg/L
800
700
600
500
400
300
200
100
0
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

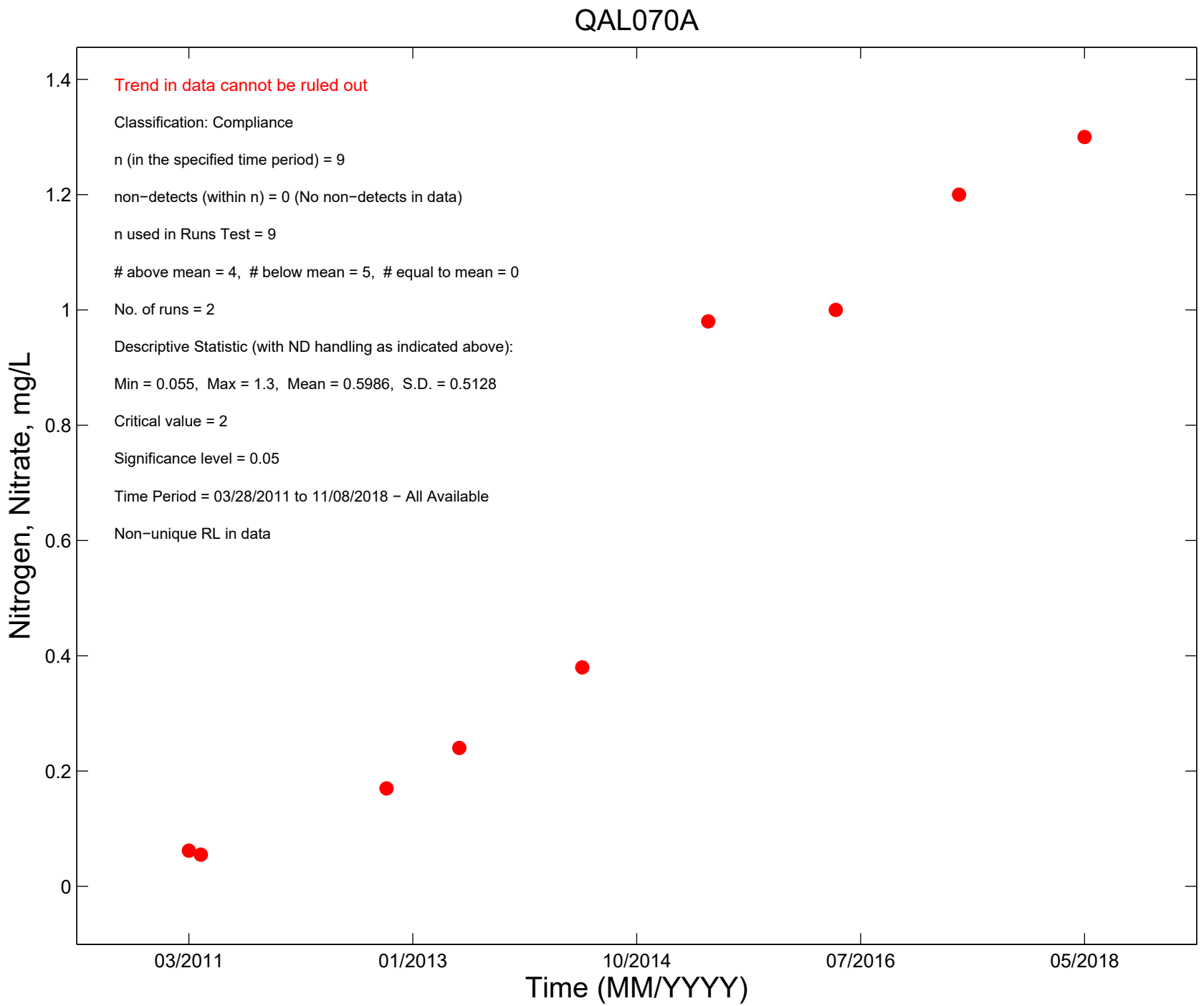

QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 34
non−detects (within n) = 5 (Included in data analysis as equal to RL)
n used in Runs Test = 34
above mean = 16, # below mean = 18, # equal to mean = 0
No. of runs = 3
Descriptive Statistic (with ND handling as indicated above):
Min = 2, Max = 20, Mean = 8.97, S.D. = 6.61
Critical value = 12
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Non−unique RL in data (NDs included in Runs Test as equal to RL)
Sulfate, mg/L
0
5
10
15
20
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

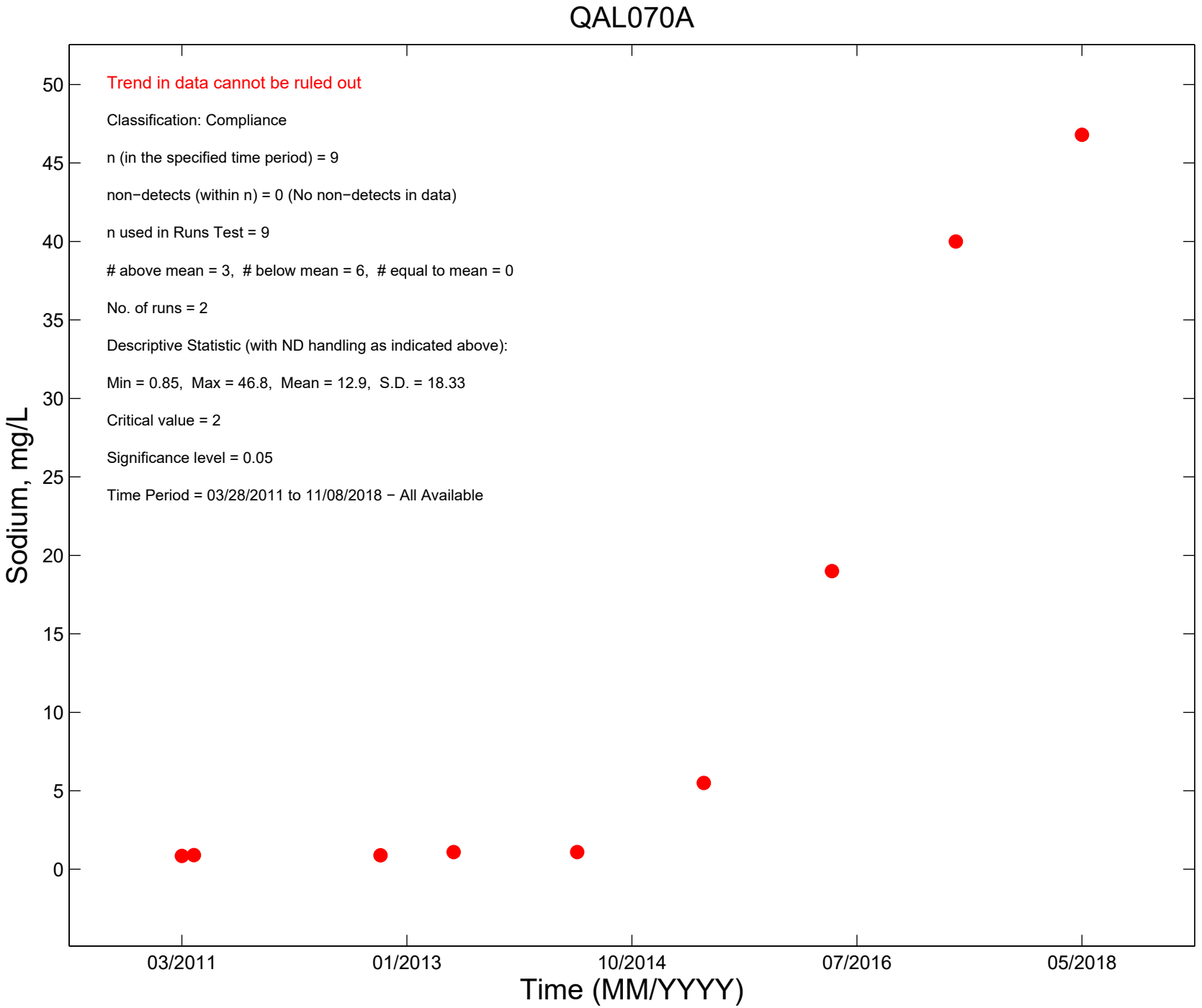

QAL070A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 3, # below mean = 6, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 32, Max = 63, Mean = 41, S.D. = 11
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Alkalinity, Bicarbonate, mg/L
65
60
55
50
45
40
35
30
03/2011
01/2013
10/2014
07/2016
05/2018
Time (MM/YYYY)

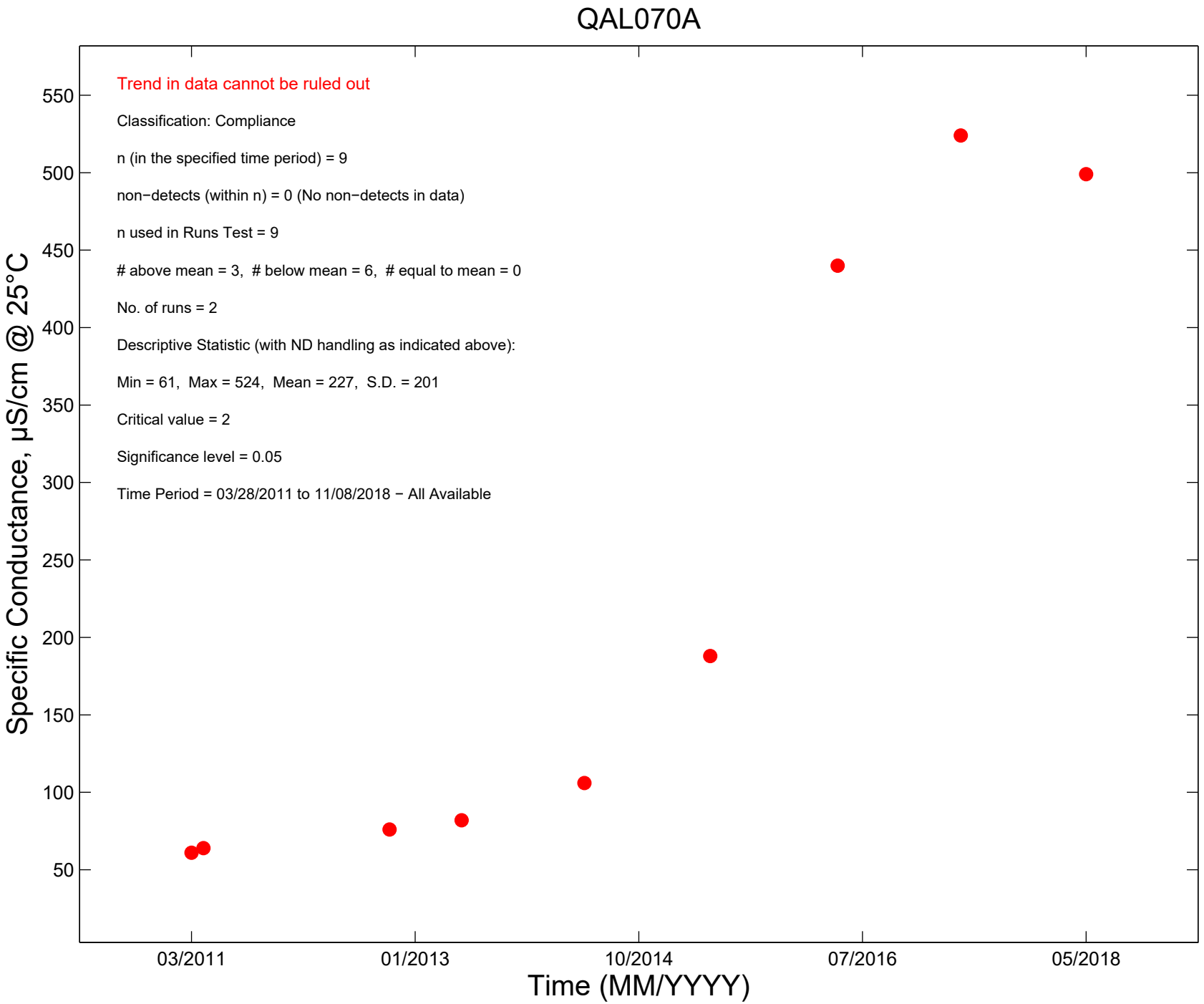

QAL070A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 8
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 8
above mean = 4, # below mean = 4, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 8.5, Max = 51, Mean = 26.2, S.D. = 17.7
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Calcium, mg/L
55
50
45
40
35
30
25
20
15
10
5
03/2011
01/2013
10/2014
07/2016
05/2018
Time (MM/YYYY)

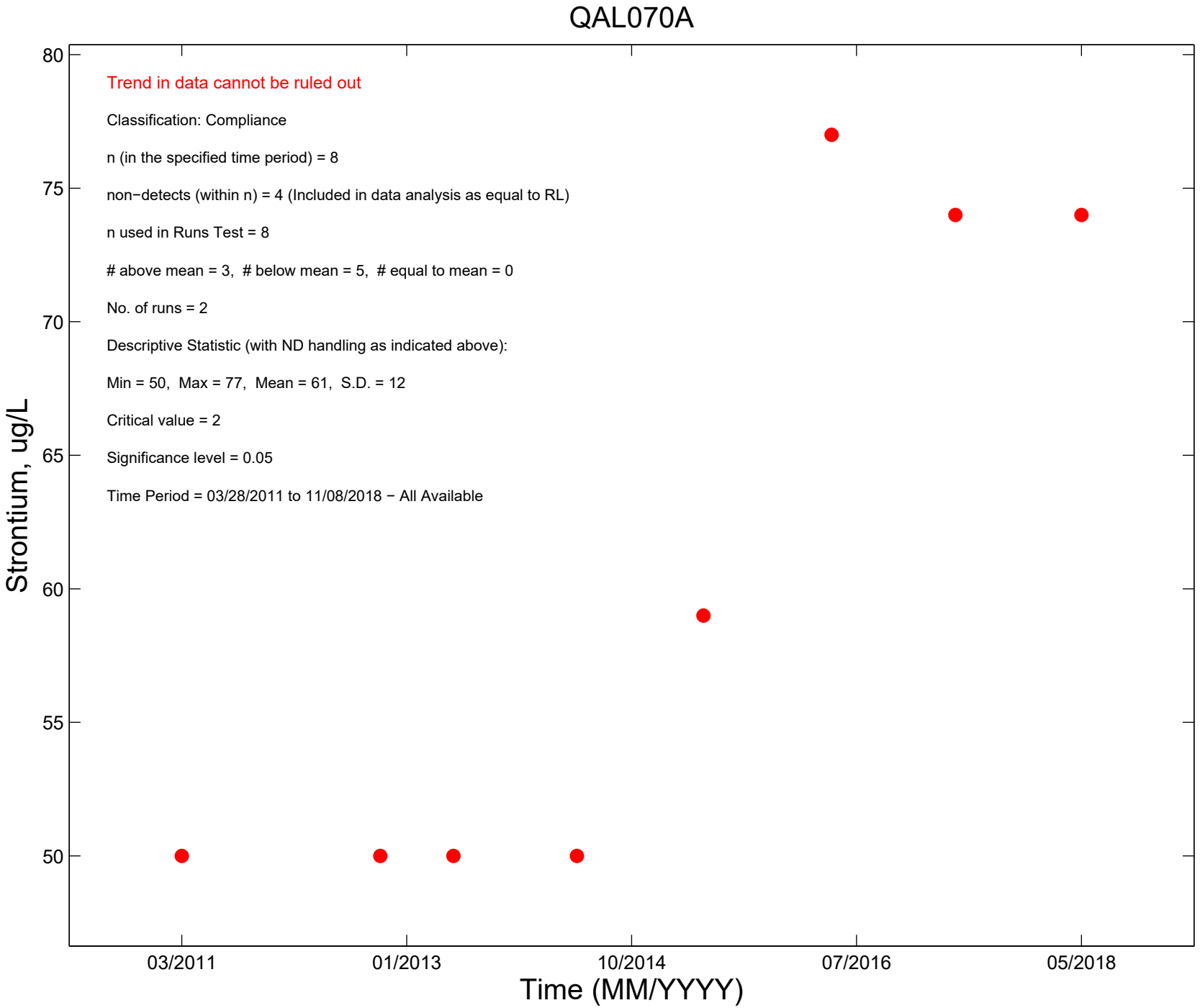

QAL070A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 4, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.1, Max = 120, Mean = 46.7, S.D. = 55.55
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Non−unique RL in data
Chloride, mg/L
120
100
80
60
40
20
0
03/2011
01/2013
10/2014
07/2016
05/2018
Time (MM/YYYY)

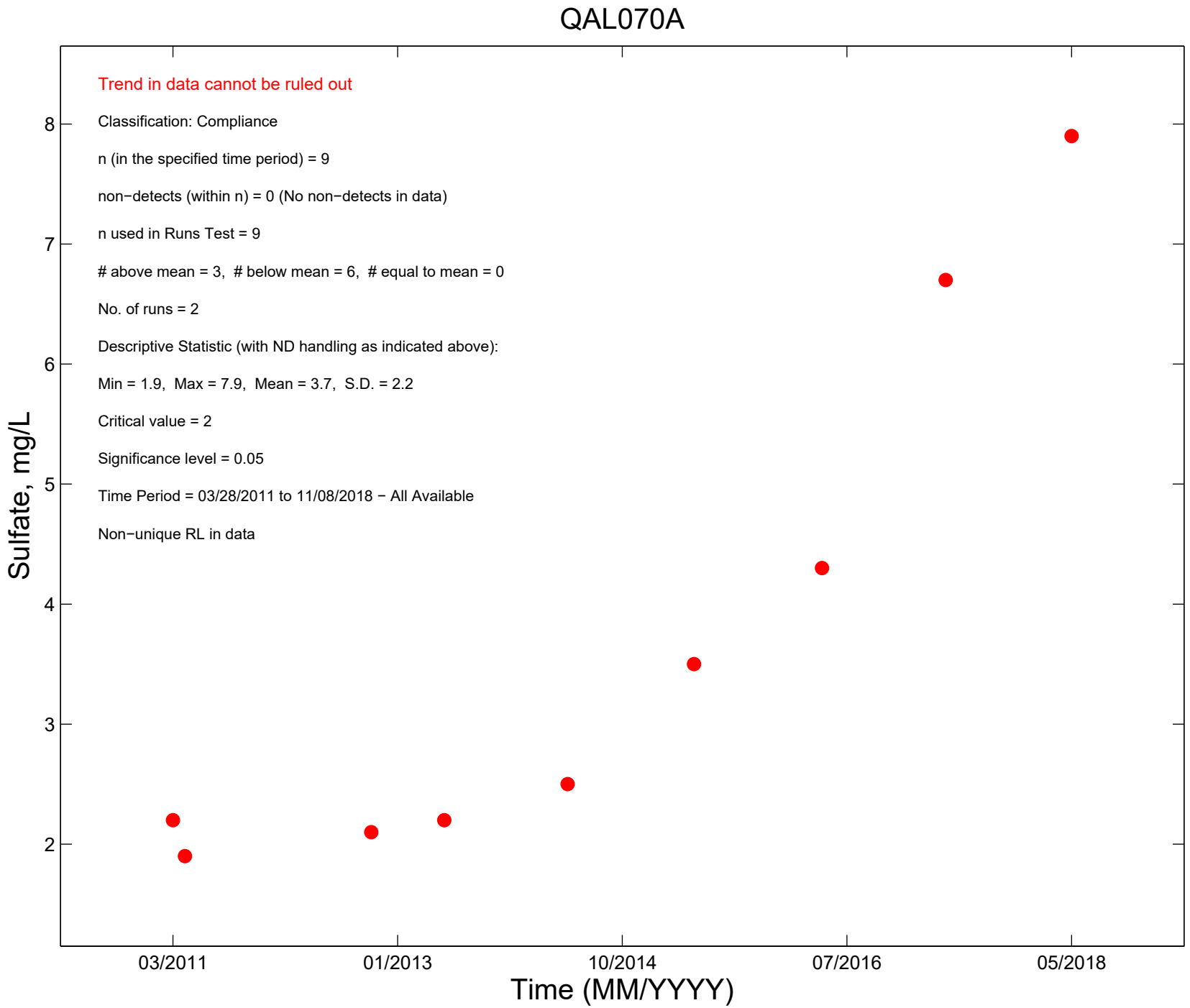

QAL070A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 8
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 8
above mean = 4, # below mean = 4, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 2.1, Max = 9.9, Mean = 5.45, S.D. = 3.26
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Magnesium, mg/L
10
9
8
7
6
5
4
3
2
03/2011
01/2013
10/2014
07/2016
05/2018
Time (MM/YYYY)

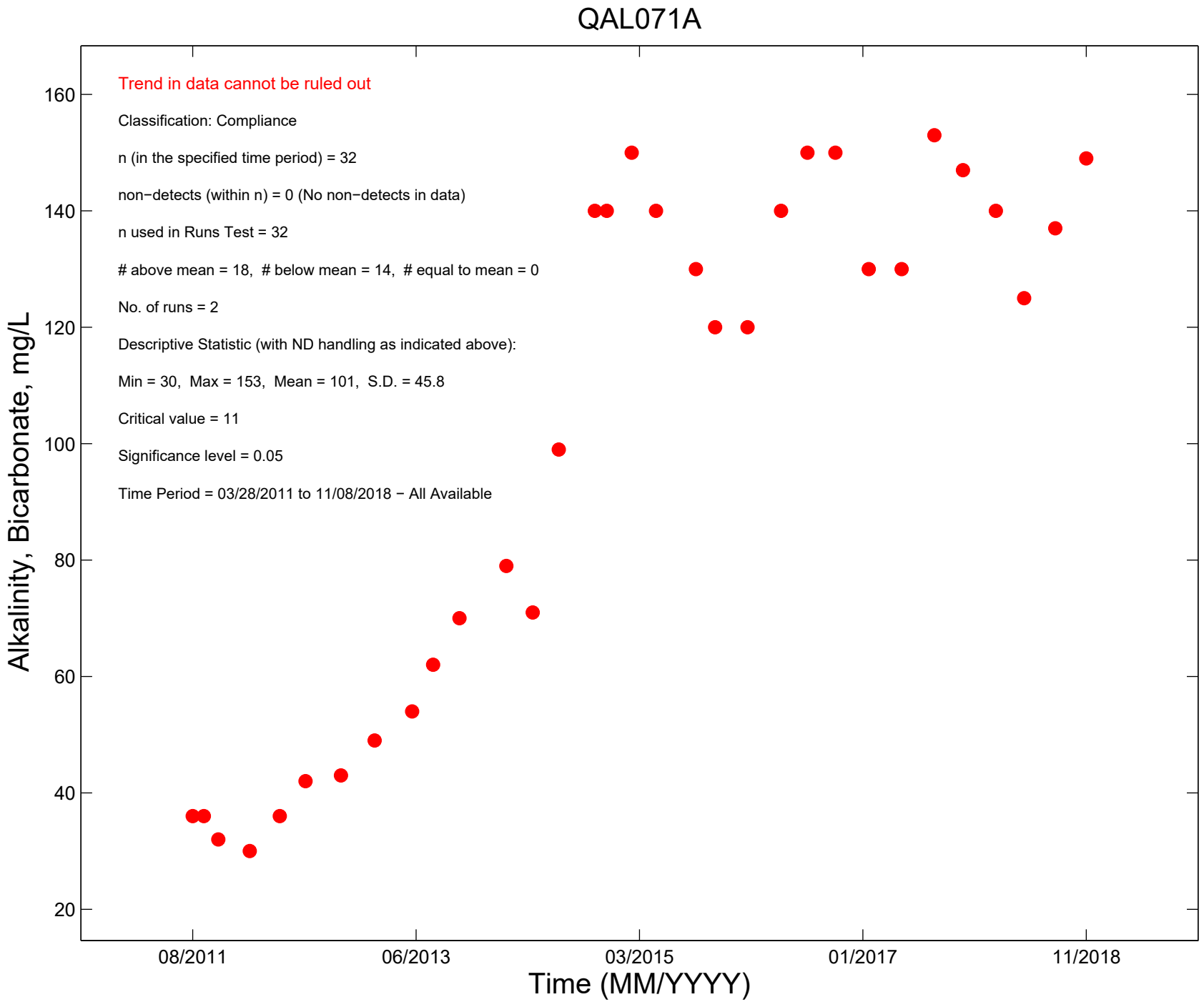

QAL070A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 4, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.055, Max = 1.3, Mean = 0.5986, S.D. = 0.5128
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Non−unique RL in data
Nitrogen, Nitrate, mg/L
1.4
1.2
1
0.8
0.6
0.4
0.2
0
03/2011
01/2013
10/2014
07/2016
05/2018
Time (MM/YYYY)

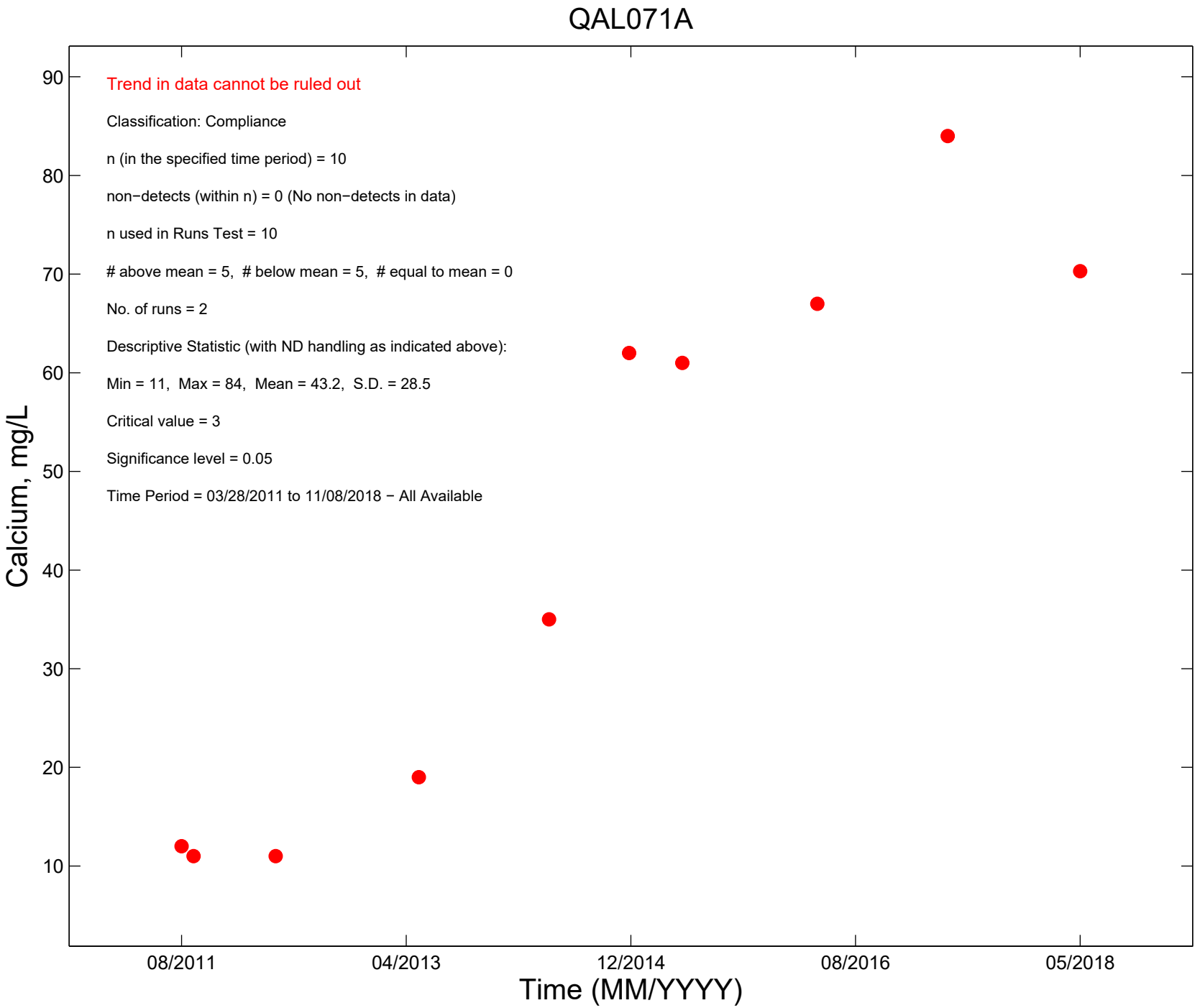

QAL070A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 3, # below mean = 6, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.85, Max = 46.8, Mean = 12.9, S.D. = 18.33
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Sodium, mg/L
50
45
40
35
30
25
20
15
10
5
0
03/2011
01/2013
10/2014
07/2016
05/2018
Time (MM/YYYY)

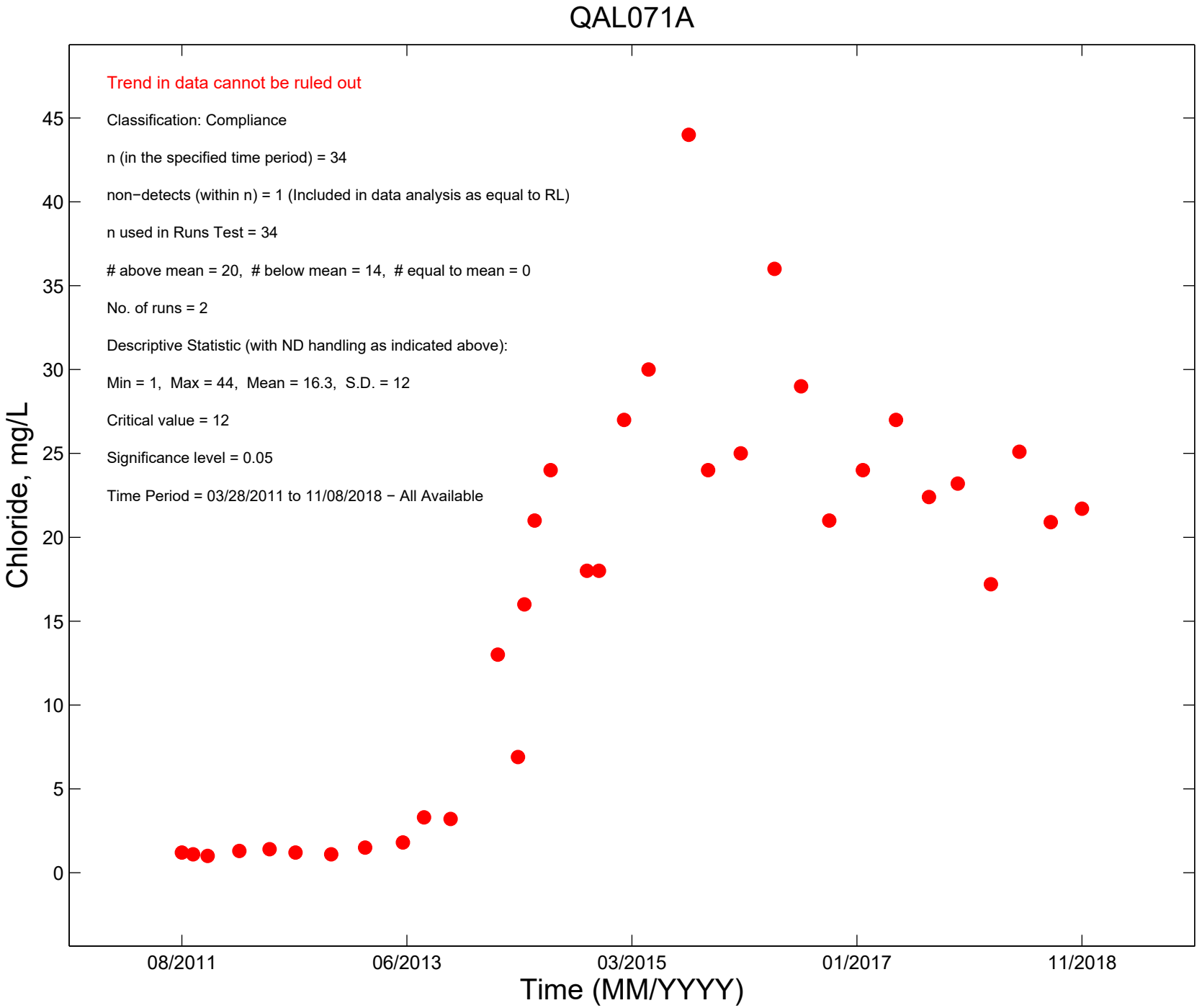

QAL070A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 3, # below mean = 6, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 61, Max = 524, Mean = 227, S.D. = 201
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Specific Conductance, µS/cm @ 25°C
550
500
450
400
350
300
250
200
150
100
50
03/2011
01/2013
10/2014
07/2016
05/2018
Time (MM/YYYY)

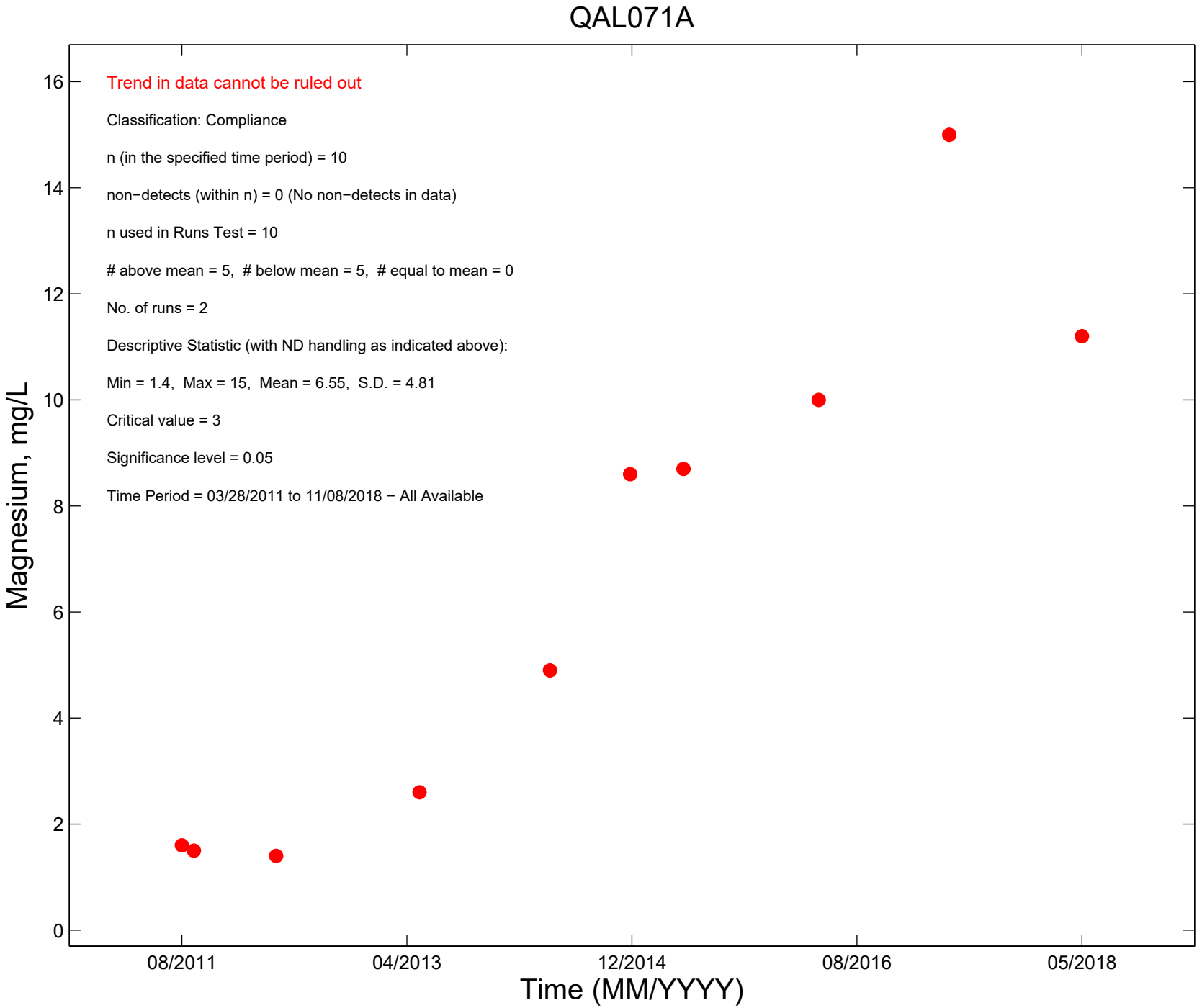

QAL070A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 8
non−detects (within n) = 4 (Included in data analysis as equal to RL)
n used in Runs Test = 8
above mean = 3, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 50, Max = 77, Mean = 61, S.D. = 12
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Strontium, ug/L
80
75
70
65
60
55
50
03/2011
01/2013
10/2014
07/2016
05/2018
Time (MM/YYYY)

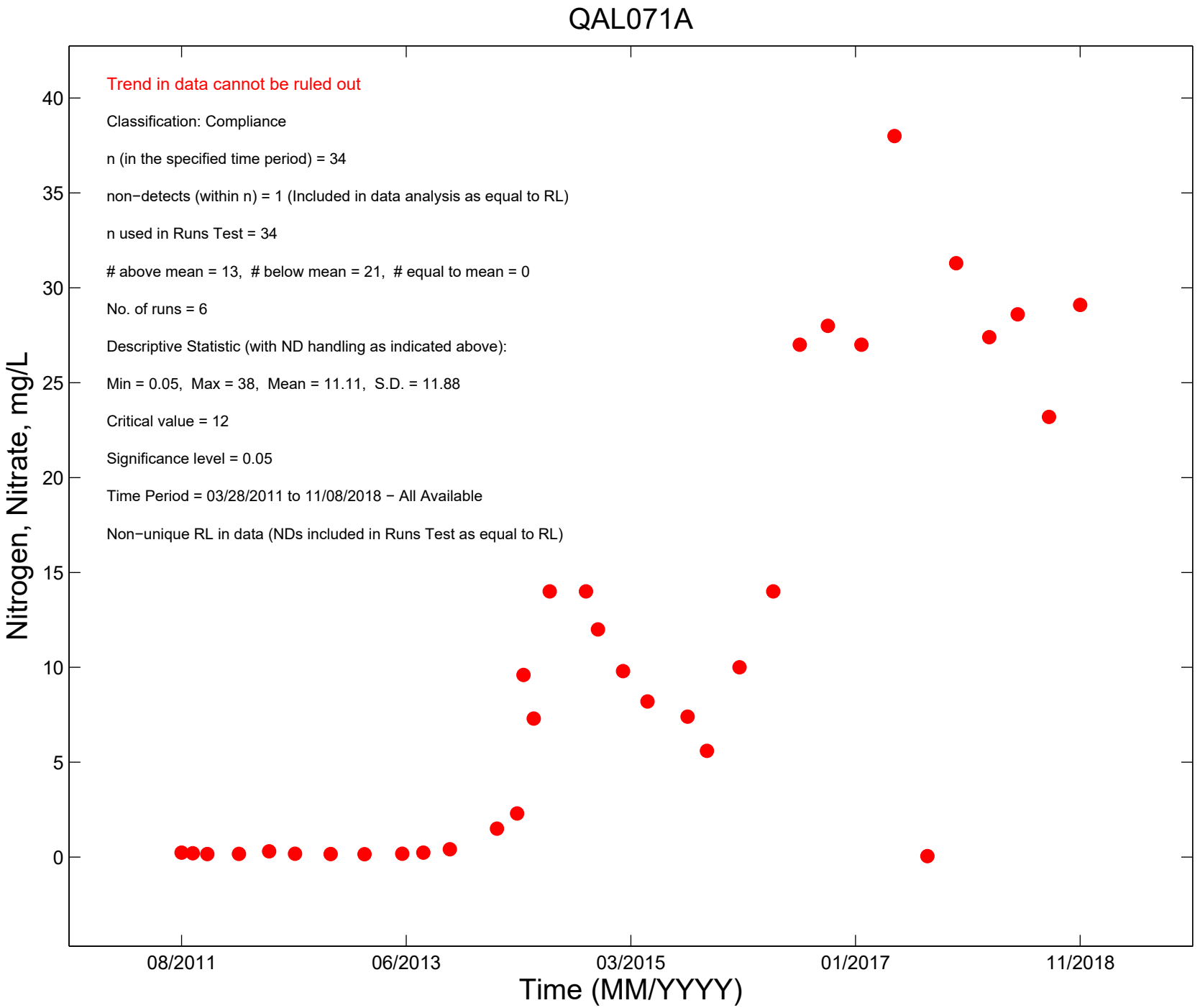

QAL070A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 3, # below mean = 6, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.9, Max = 7.9, Mean = 3.7, S.D. = 2.2
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Non−unique RL in data
Sulfate, mg/L
8
7
6
5
4
3
2
03/2011
01/2013
10/2014
07/2016
05/2018
Time (MM/YYYY)

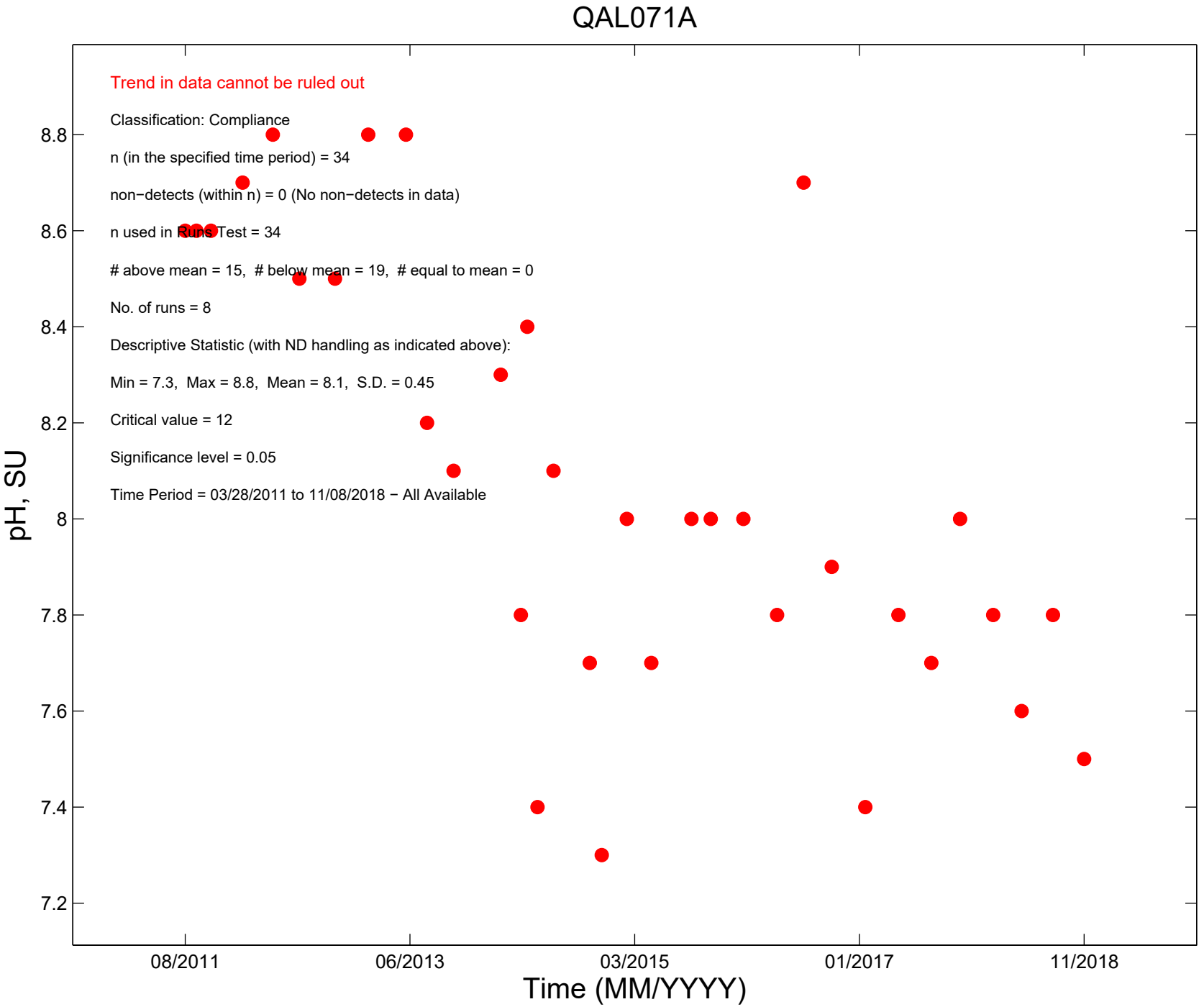

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 32
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 32
above mean = 18, # below mean = 14, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 30, Max = 153, Mean = 101, S.D. = 45.8
Critical value = 11
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Alkalinity, Bicarbonate, mg/L
160
140
120
100
80
60
40
20
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

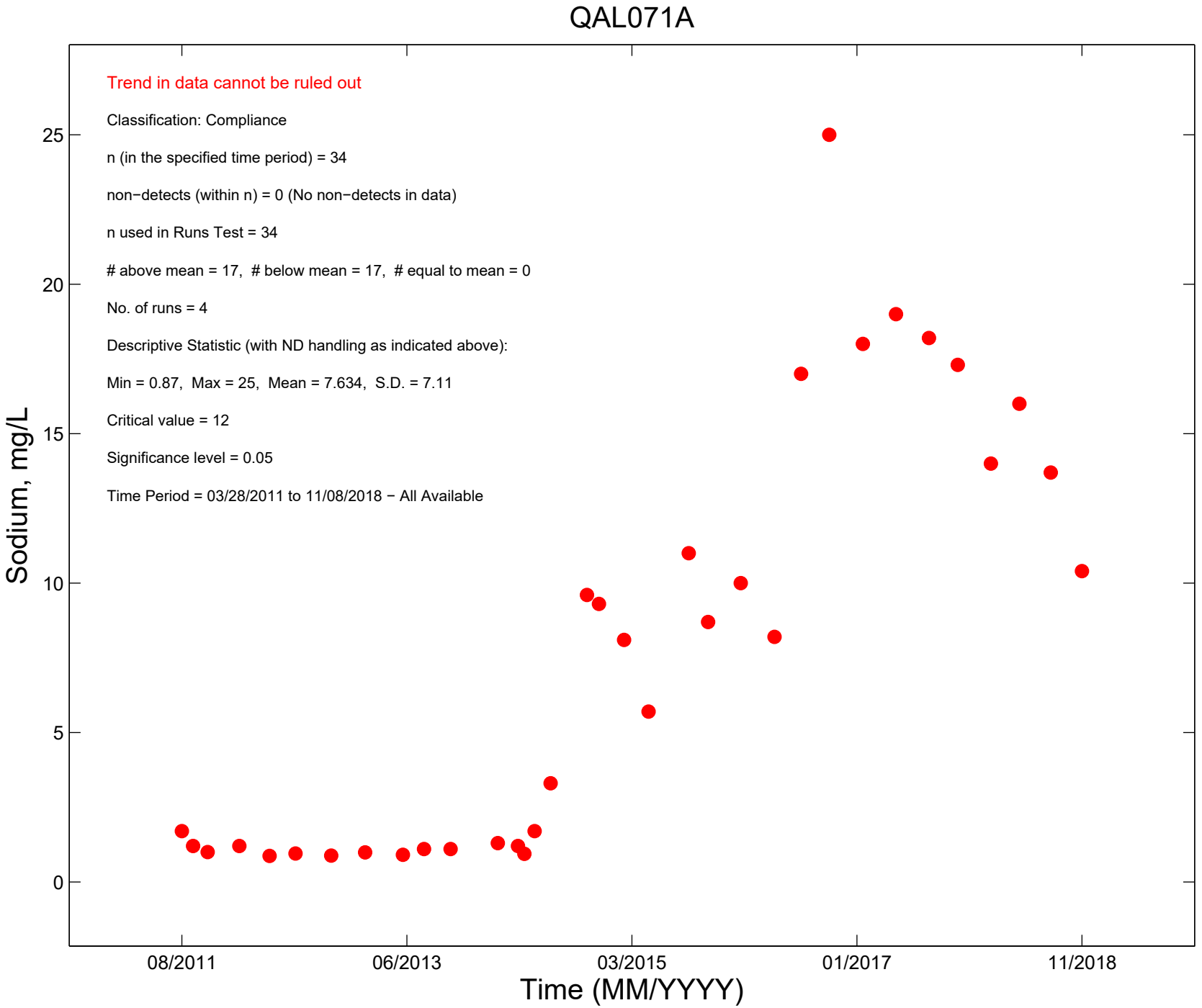

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 10
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 10
above mean = 5, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 11, Max = 84, Mean = 43.2, S.D. = 28.5
Critical value = 3
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Calcium, mg/L
90
80
70
60
50
40
30
20
10
08/2011
04/2013
12/2014
08/2016
05/2018
Time (MM/YYYY)

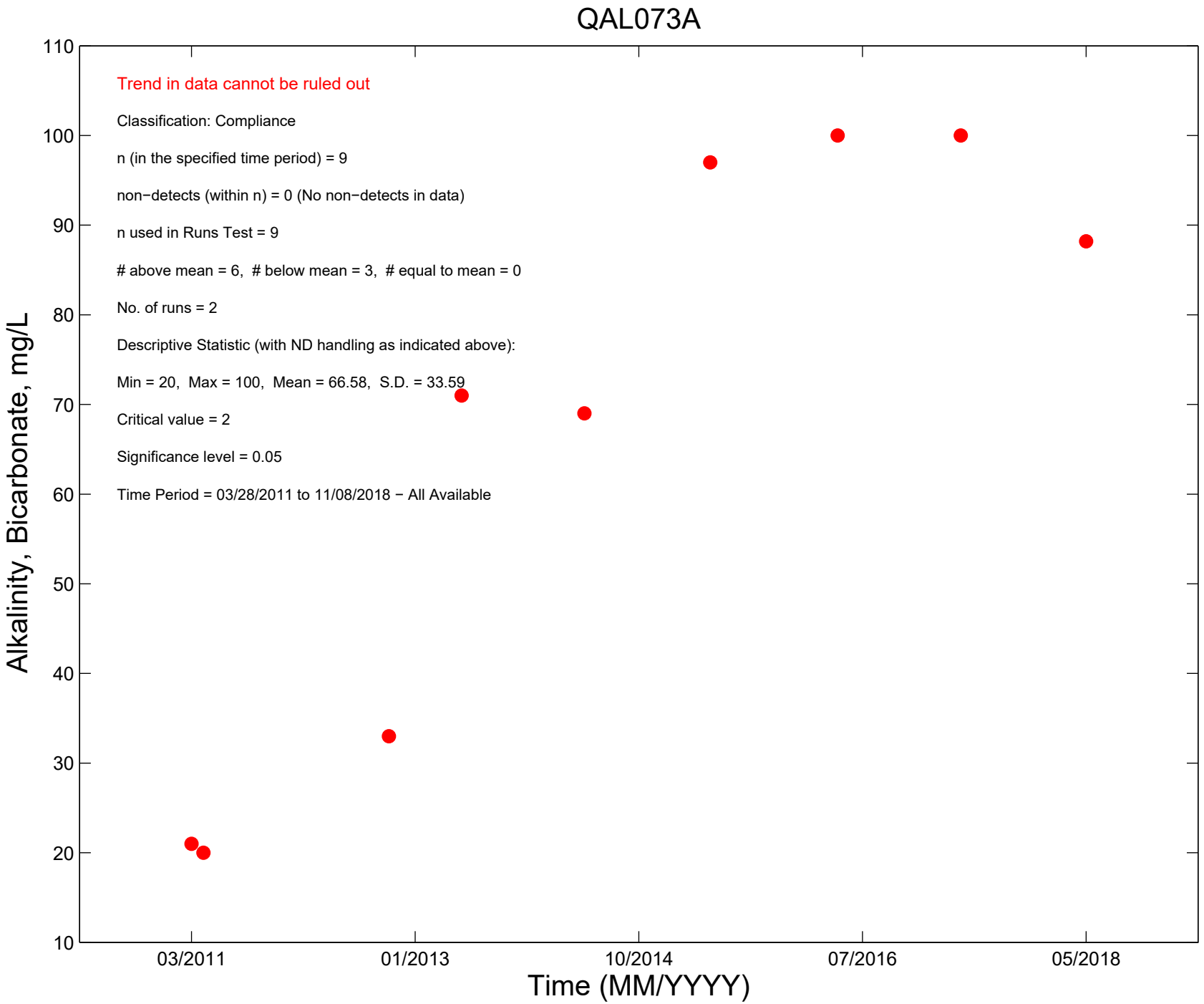

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 34
non−detects (within n) = 1 (Included in data analysis as equal to RL)
n used in Runs Test = 34
above mean = 20, # below mean = 14, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 44, Mean = 16.3, S.D. = 12
Critical value = 12
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Chloride, mg/L
0
5
10
15
20
25
30
35
40
45
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

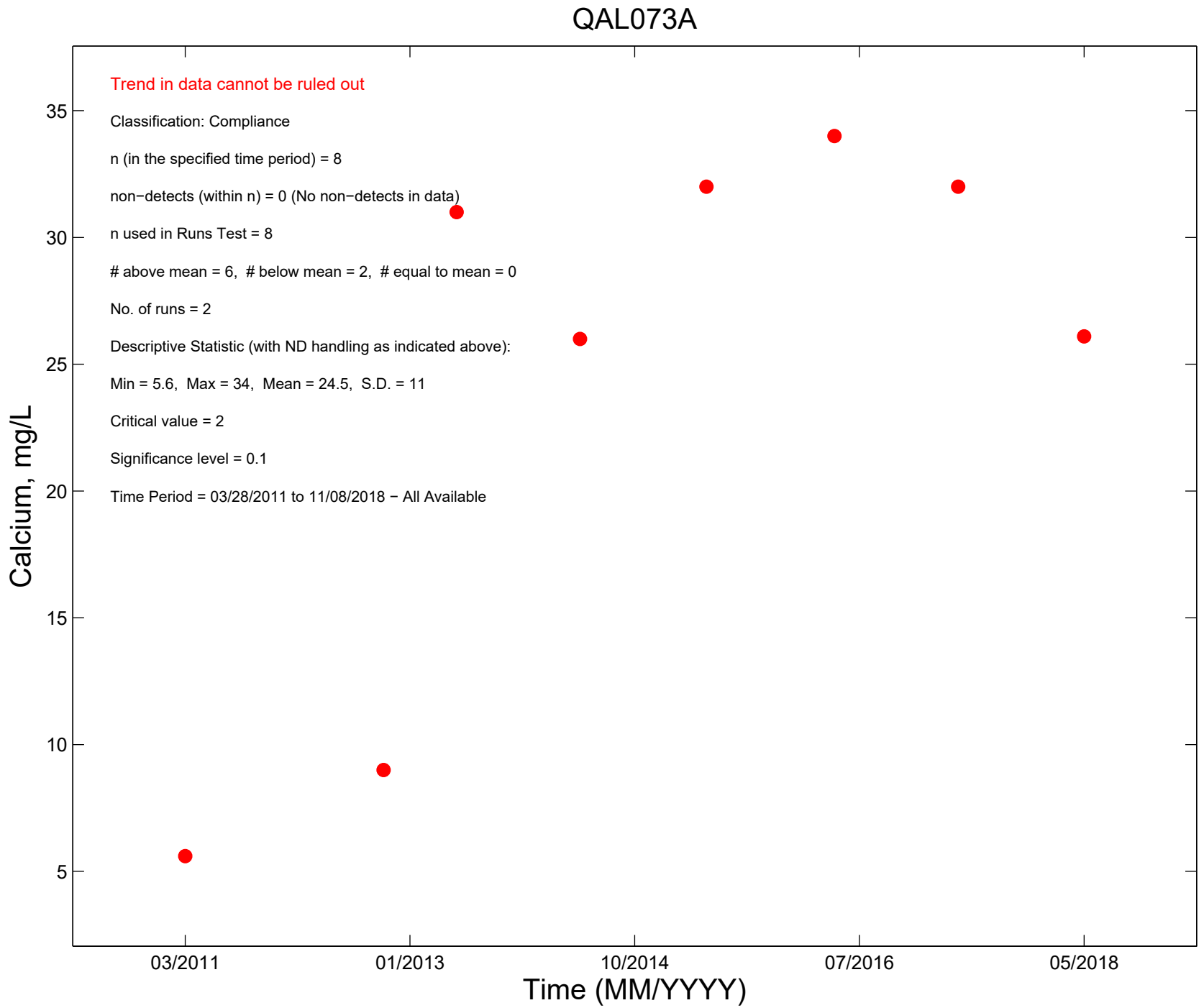

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 10
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 10
above mean = 5, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.4, Max = 15, Mean = 6.55, S.D. = 4.81
Critical value = 3
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Magnesium, mg/L
0
2
4
6
8
10
12
14
16
08/2011
04/2013
12/2014
08/2016
05/2018
Time (MM/YYYY)

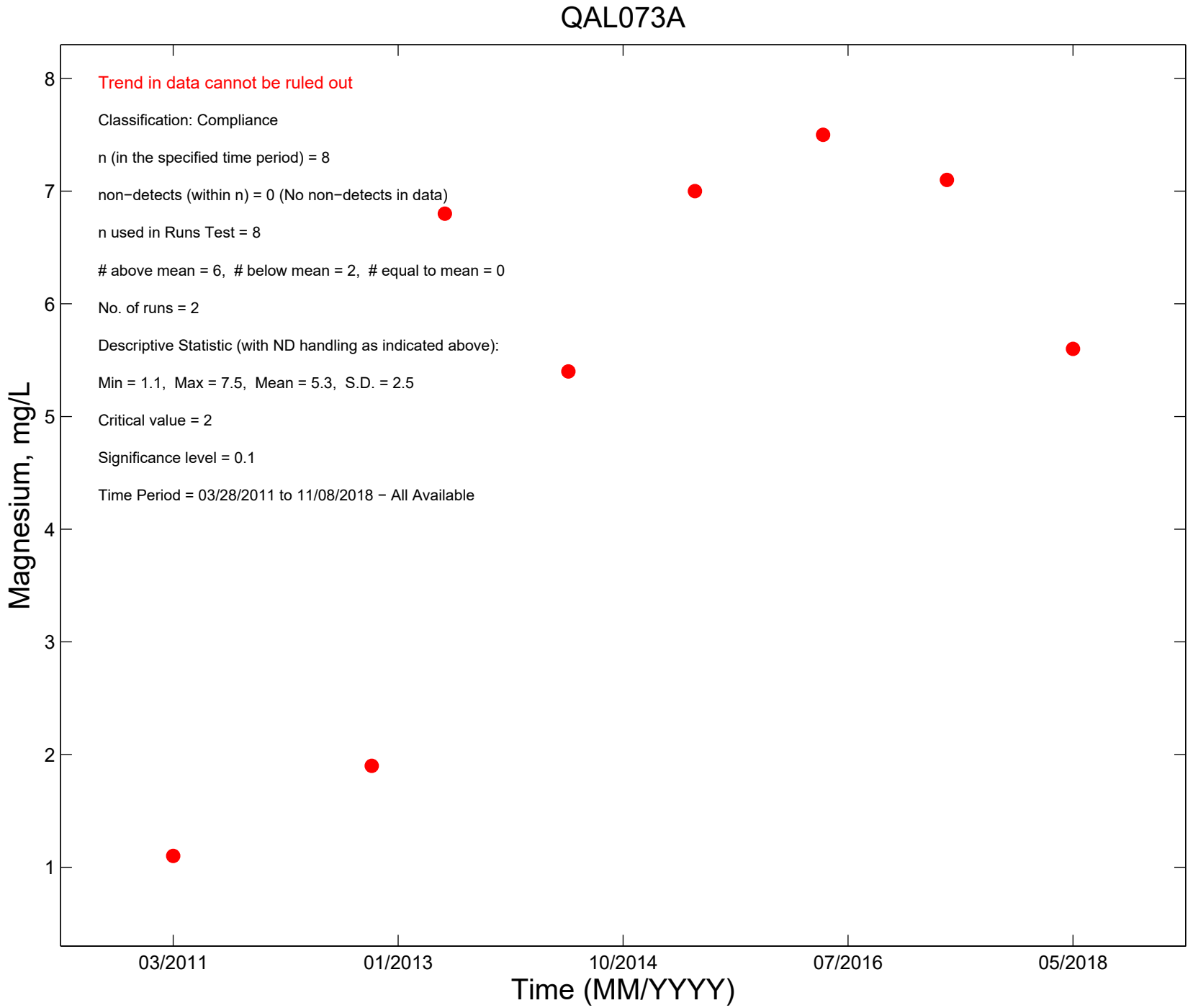

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 34
non−detects (within n) = 1 (Included in data analysis as equal to RL)
n used in Runs Test = 34
above mean = 13, # below mean = 21, # equal to mean = 0
No. of runs = 6
Descriptive Statistic (with ND handling as indicated above):
Min = 0.05, Max = 38, Mean = 11.11, S.D. = 11.88
Critical value = 12
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Non−unique RL in data (NDs included in Runs Test as equal to RL)
Nitrogen, Nitrate, mg/L
40
35
30
25
20
15
10
5
0
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

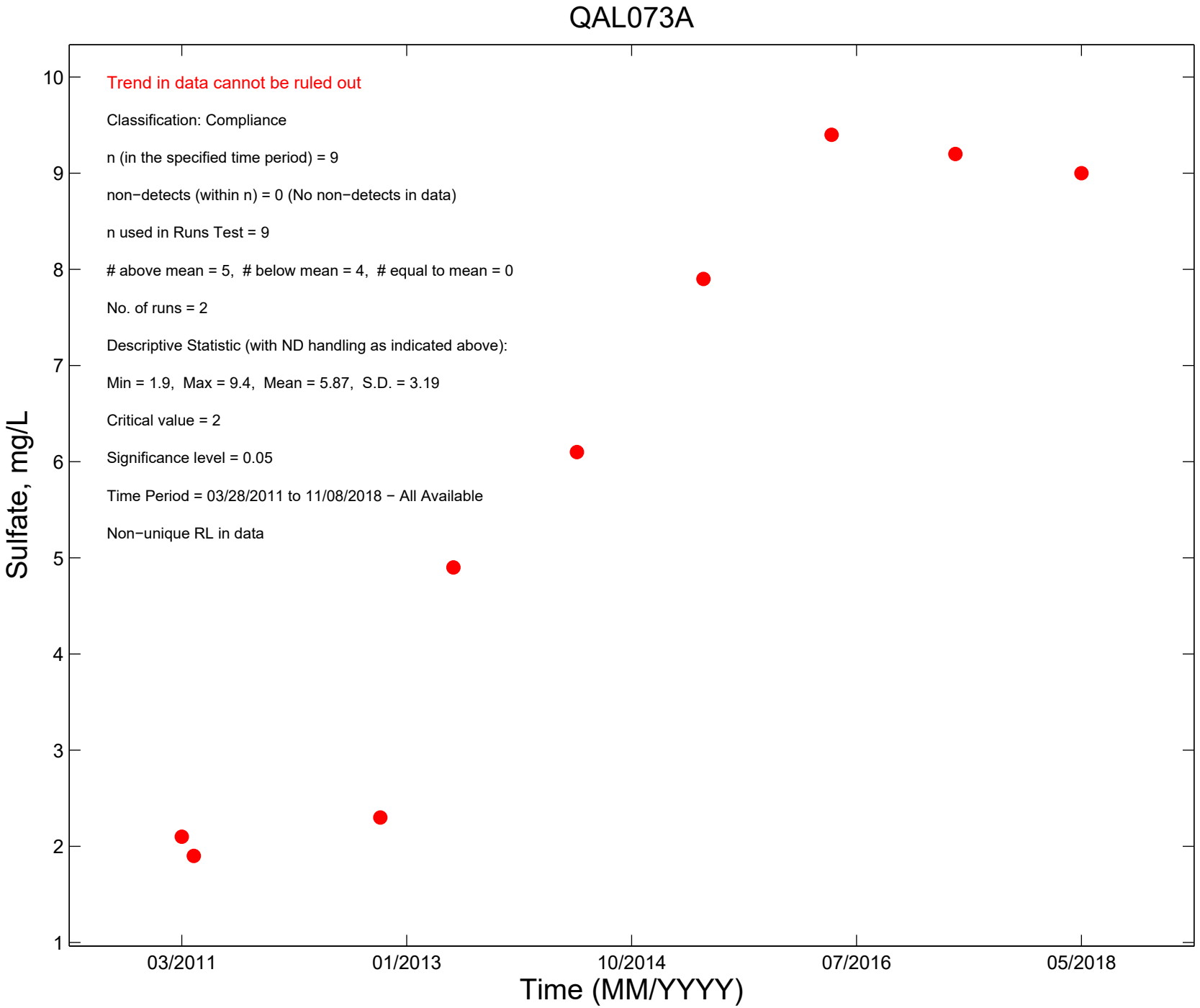

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 34
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 34
above mean = 15, # below mean = 19, # equal to mean = 0
No. of runs = 8
Descriptive Statistic (with ND handling as indicated above):
Min = 7.3, Max = 8.8, Mean = 8.1, S.D. = 0.45
Critical value = 12
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
pH, SU
8.8
8.6
8.4
8.2
8
7.8
7.6
7.4
7.2
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

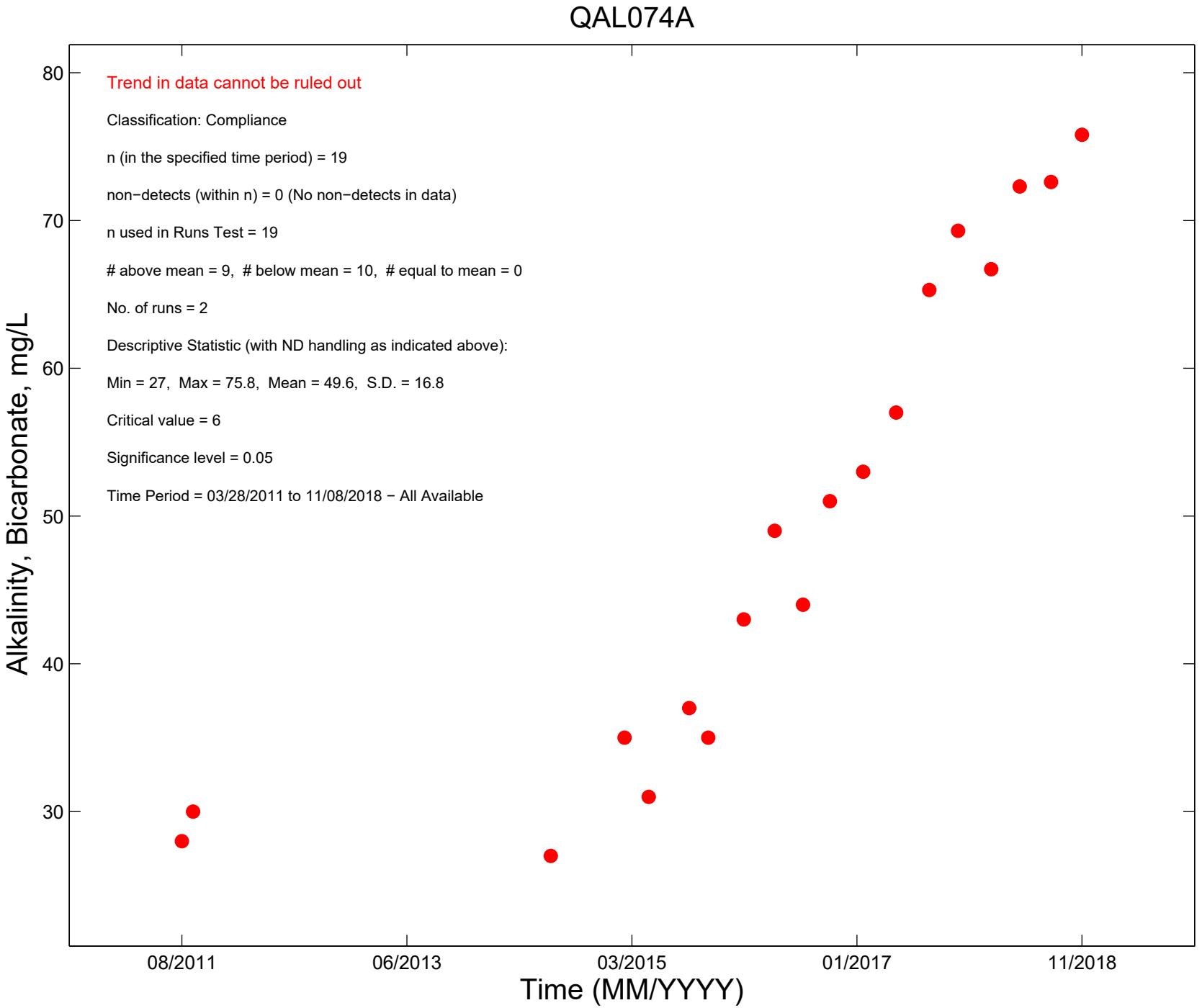

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 34
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 34
above mean = 17, # below mean = 17, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 0.87, Max = 25, Mean = 7.634, S.D. = 7.11
Critical value = 12
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Sodium, mg/L
0
5
10
15
20
25
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

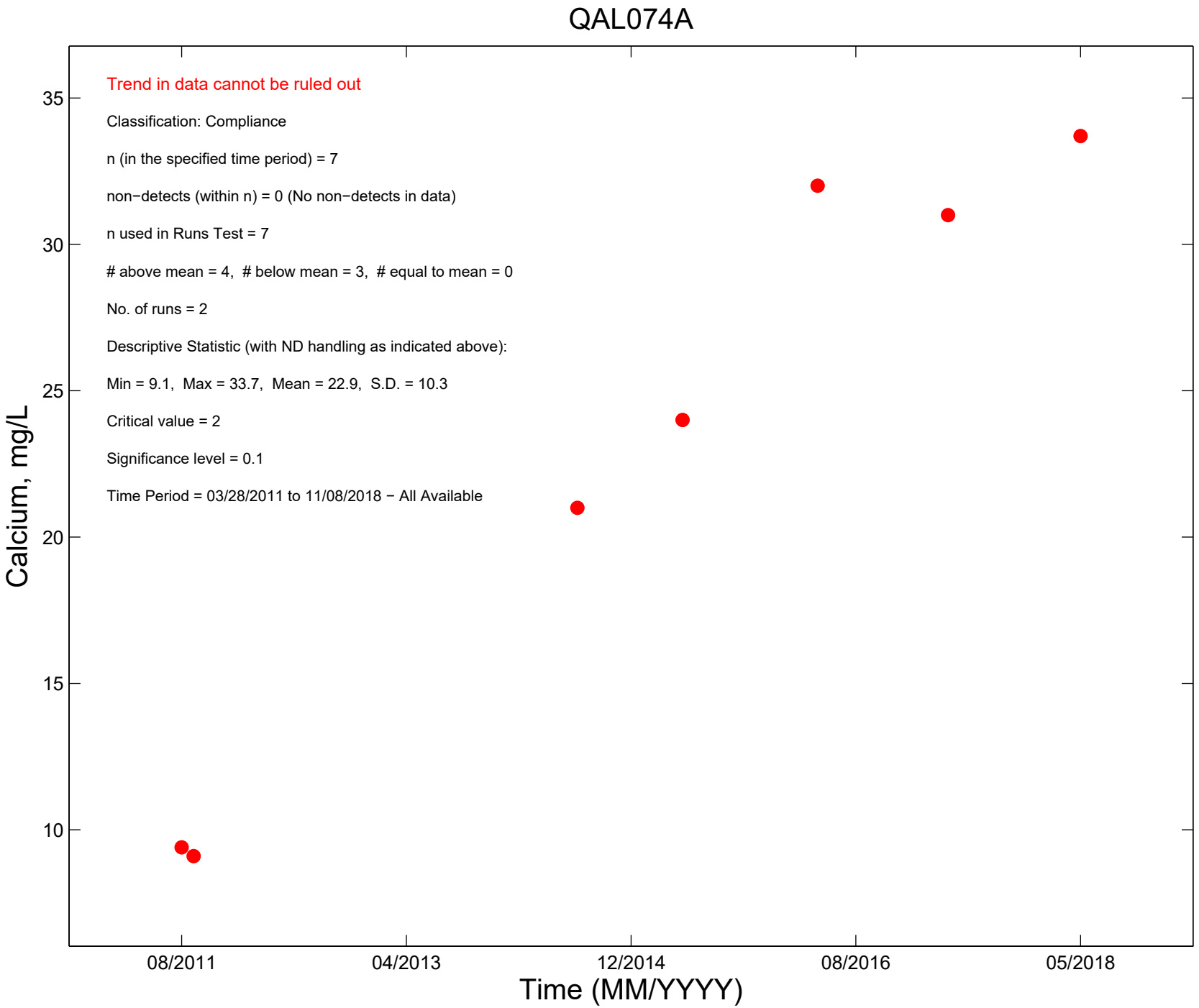

QAL073A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 6, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 20, Max = 100, Mean = 66.58, S.D. = 33.59
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Alkalinity, Bicarbonate, mg/L
110
100
90
80
70
60
50
40
30
20
10
03/2011
01/2013
10/2014
07/2016
05/2018
Time (MM/YYYY)

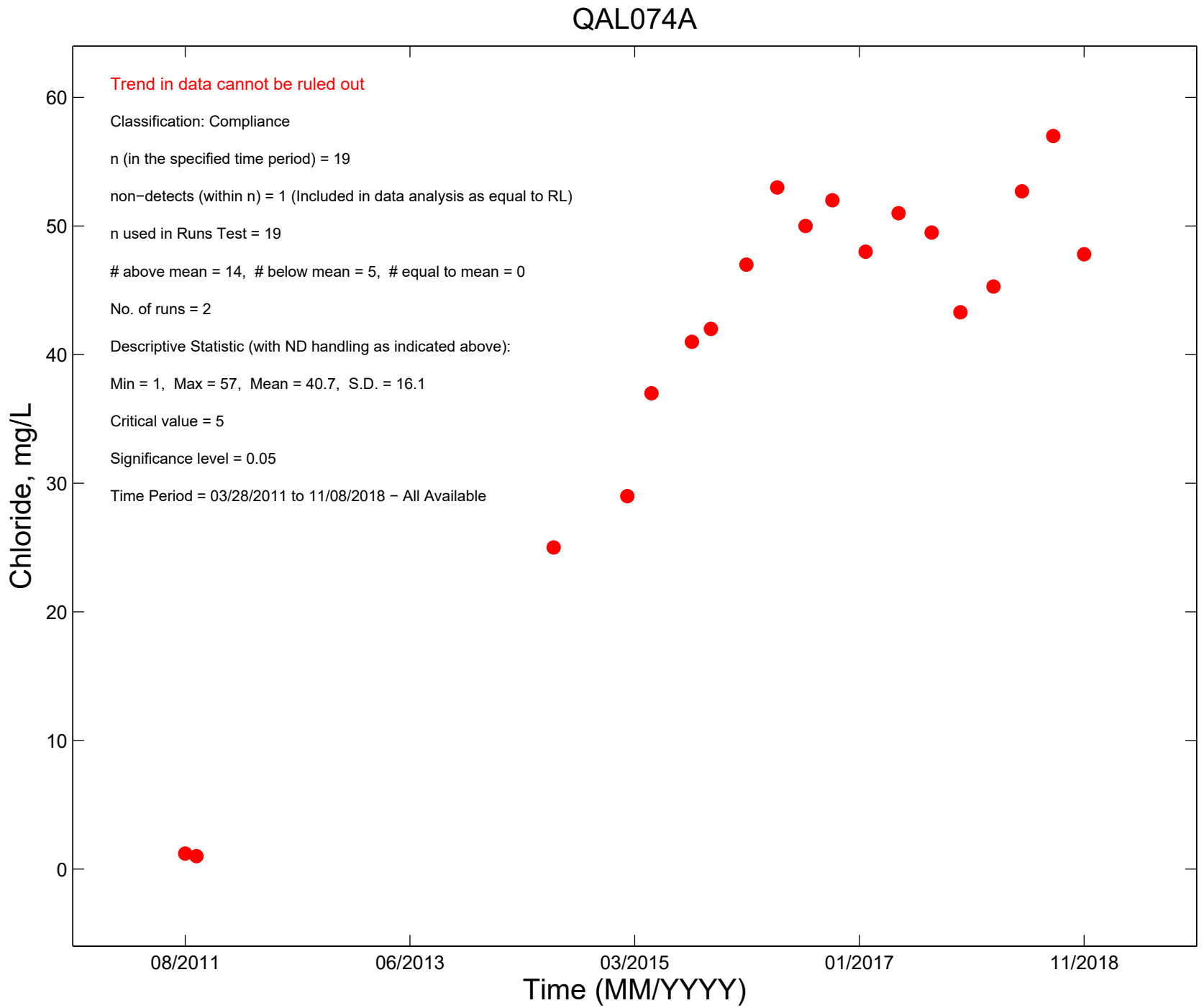

QAL073A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 8
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 8
above mean = 6, # below mean = 2, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 5.6, Max = 34, Mean = 24.5, S.D. = 11
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/08/2018 − All Available
Calcium, mg/L
35
30
25
20
15
10
5
03/2011
01/2013
10/2014
07/2016
05/2018
Time (MM/YYYY)

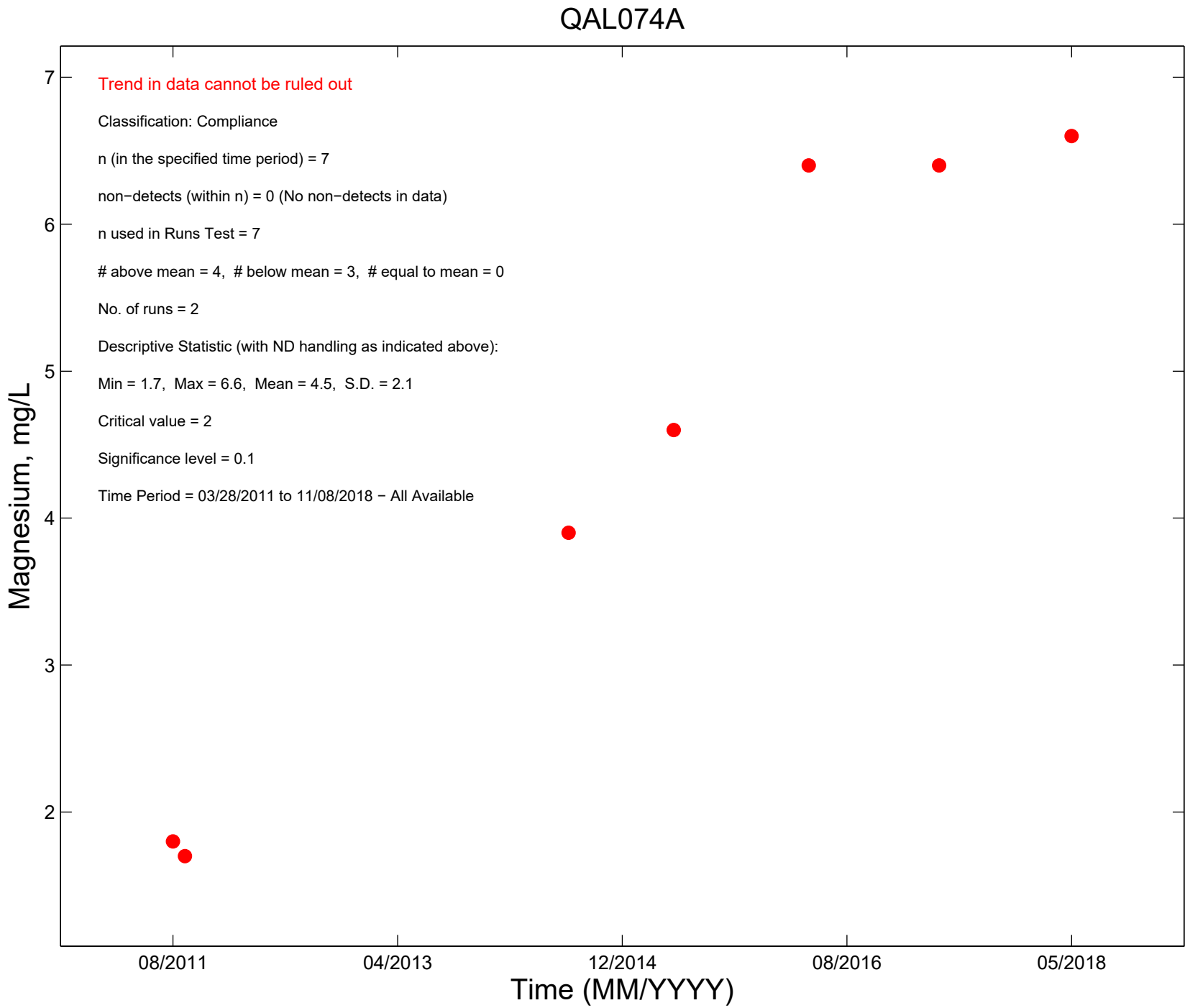

QAL073A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 8
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 8
above mean = 6, # below mean = 2, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.1, Max = 7.5, Mean = 5.3, S.D. = 2.5
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/08/2018 − All Available
Magnesium, mg/L
8
7
6
5
4
3
2
1
03/2011
01/2013
10/2014
07/2016
05/2018
Time (MM/YYYY)

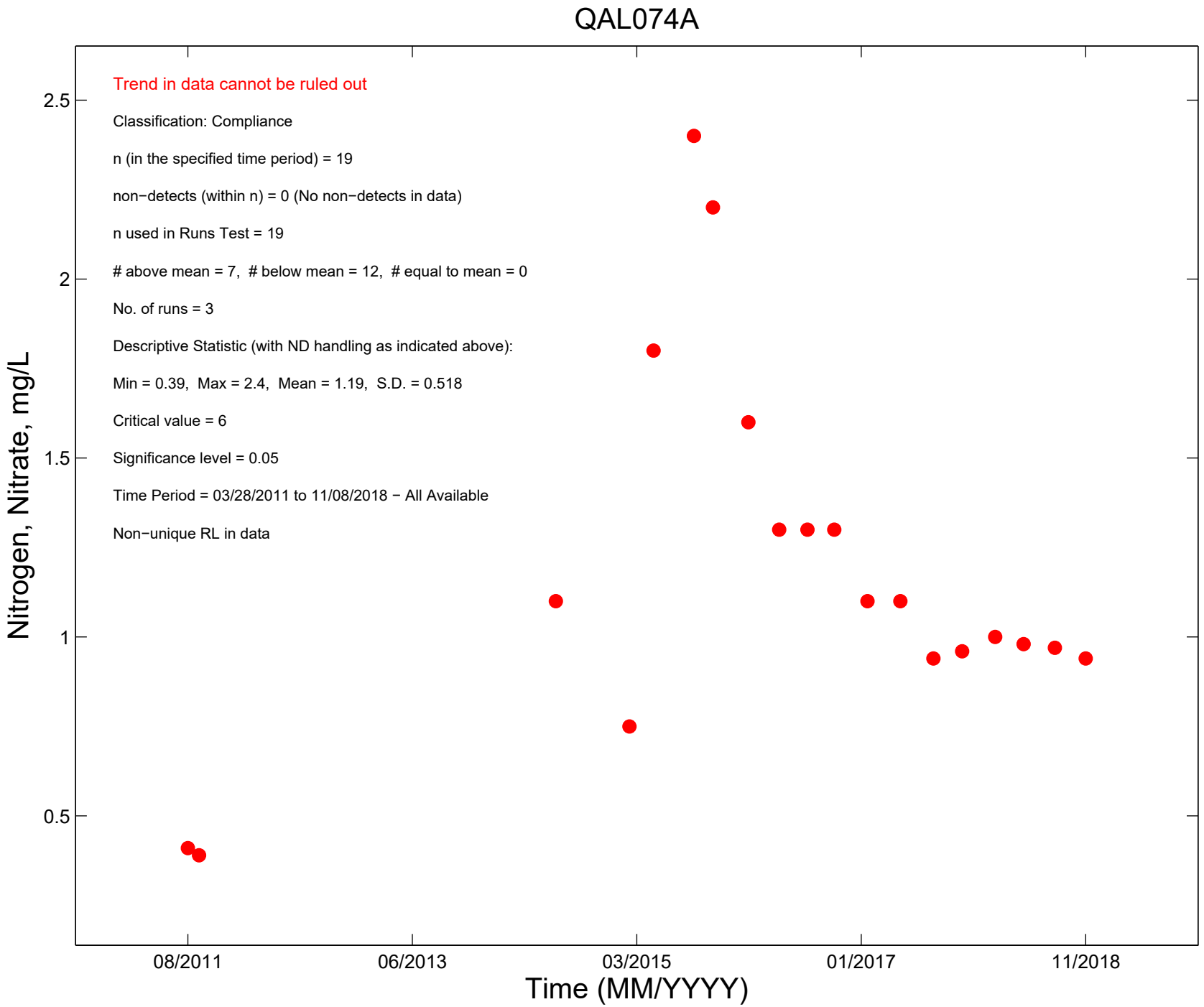

QAL073A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 9
above mean = 5, # below mean = 4, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.9, Max = 9.4, Mean = 5.87, S.D. = 3.19
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Non−unique RL in data
Sulfate, mg/L
10
9
8
7
6
5
4
3
2
1
03/2011
01/2013
10/2014
07/2016
05/2018
Time (MM/YYYY)

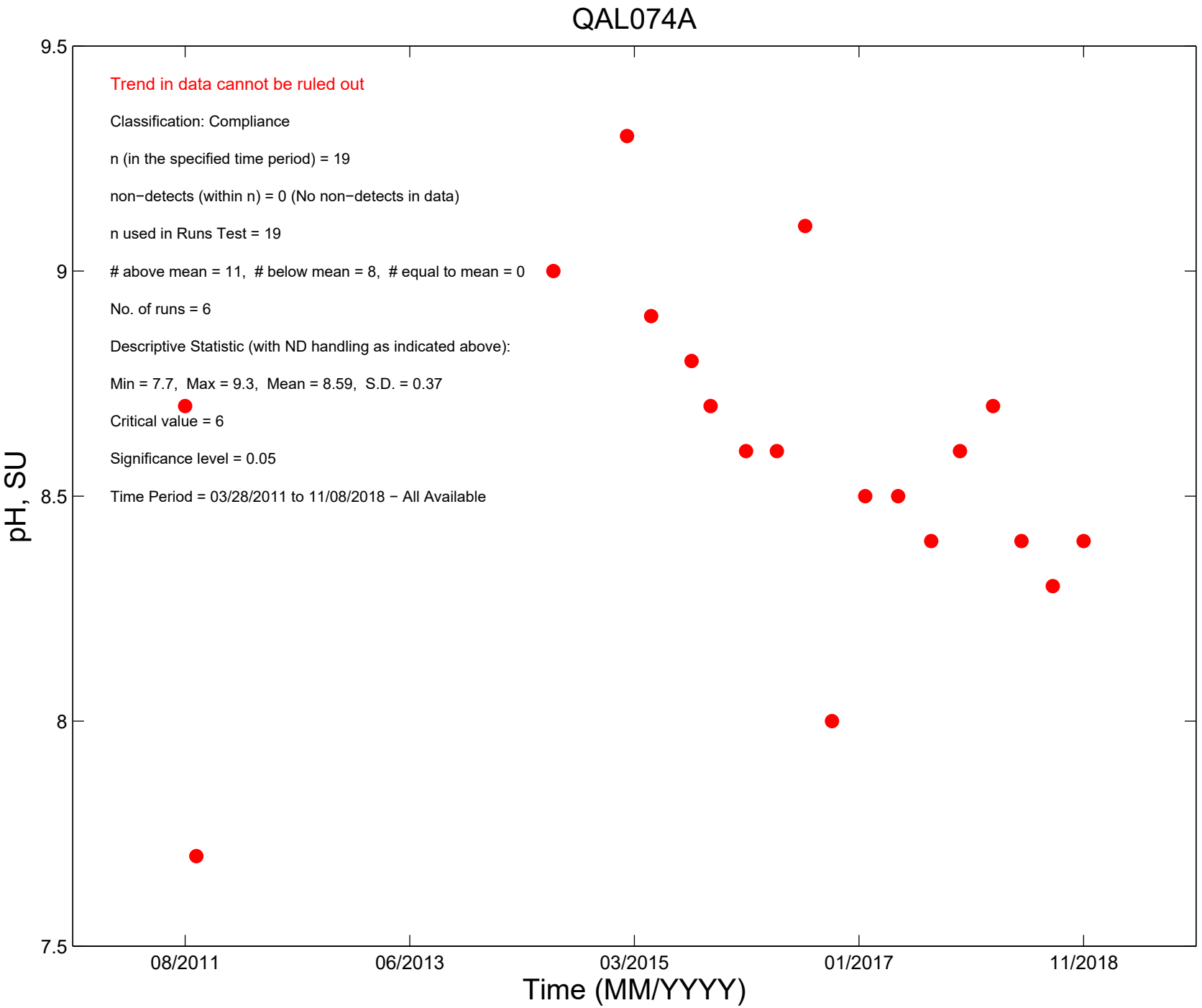

QAL074A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 19
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 19
above mean = 9, # below mean = 10, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 27, Max = 75.8, Mean = 49.6, S.D. = 16.8
Critical value = 6
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Alkalinity, Bicarbonate, mg/L
80
70
60
50
40
30
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

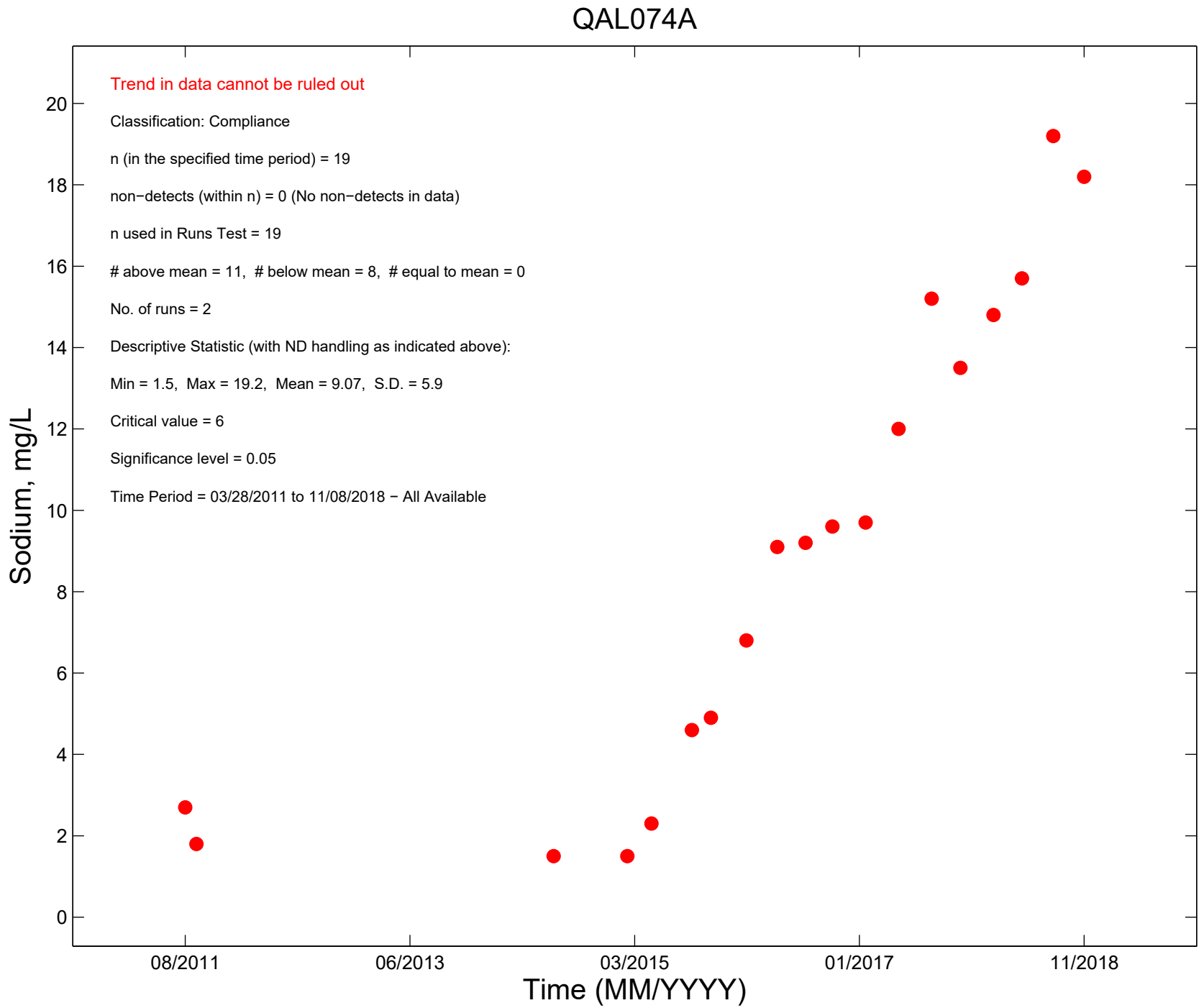

QAL074A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 7
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 7
above mean = 4, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 9.1, Max = 33.7, Mean = 22.9, S.D. = 10.3
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/08/2018 − All Available
Calcium, mg/L
35
30
25
20
15
10
08/2011
04/2013
12/2014
08/2016
05/2018
Time (MM/YYYY)


QAL074A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 19
non−detects (within n) = 1 (Included in data analysis as equal to RL)
n used in Runs Test = 19
above mean = 14, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 57, Mean = 40.7, S.D. = 16.1
Critical value = 5
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Chloride, mg/L
60
50
40
30
20
10
0
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)


QAL074A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 7
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 7
above mean = 4, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.7, Max = 6.6, Mean = 4.5, S.D. = 2.1
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/08/2018 − All Available
Magnesium, mg/L
7
6
5
4
3
2
08/2011
04/2013
12/2014
08/2016
05/2018
Time (MM/YYYY)


QAL074A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 19
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 19
above mean = 7, # below mean = 12, # equal to mean = 0
No. of runs = 3
Descriptive Statistic (with ND handling as indicated above):
Min = 0.39, Max = 2.4, Mean = 1.19, S.D. = 0.518
Critical value = 6
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Non−unique RL in data
Nitrogen, Nitrate, mg/L
2.5
2
1.5
1
0.5
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)


QAL074A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 19
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 19
above mean = 11, # below mean = 8, # equal to mean = 0
No. of runs = 6
Descriptive Statistic (with ND handling as indicated above):
Min = 7.7, Max = 9.3, Mean = 8.59, S.D. = 0.37
Critical value = 6
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
9.5
9
8.5
8
7.5
pH, SU
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

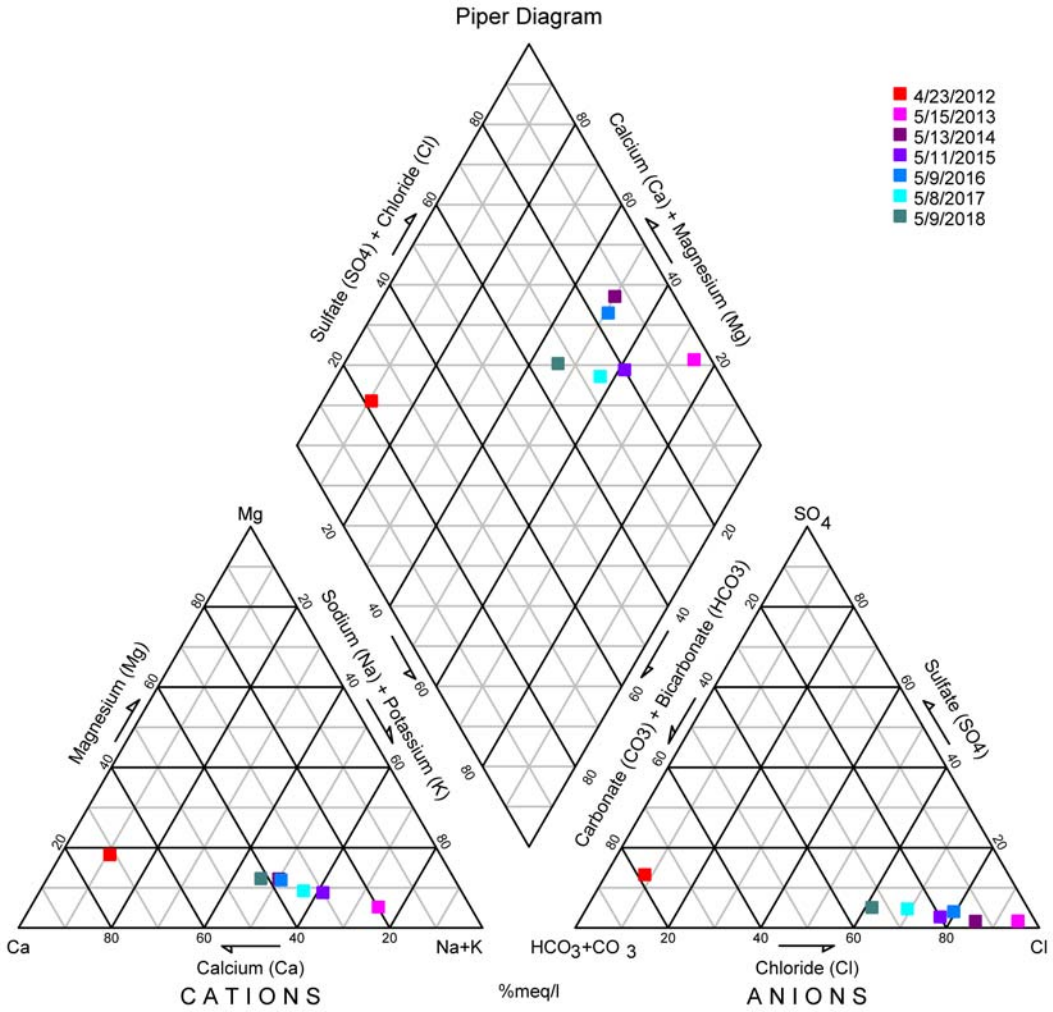

QAL074A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 19
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 19
above mean = 11, # below mean = 8, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.5, Max = 19.2, Mean = 9.07, S.D. = 5.9
Critical value = 6
Significance level = 0.05
Time Period = 03/28/2011 to 11/08/2018 − All Available
Sodium, mg/L
0
2
4
6
8
10
12
14
16
18
20
08/2011
06/2013
03/2015
01/2017
11/2018
Time (MM/YYYY)

Appendix H

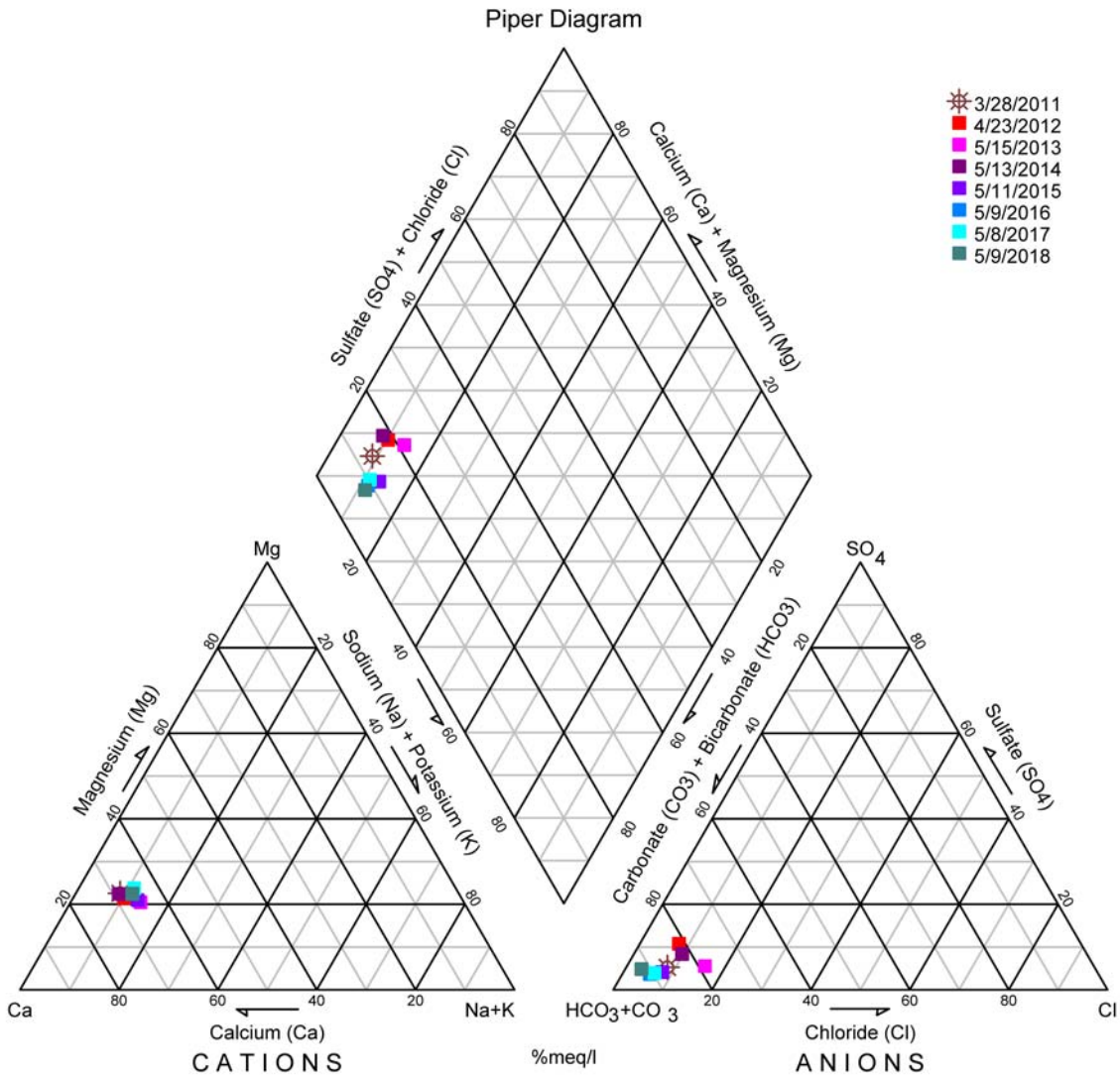
Eagle Mine

Groundwater Piper Diagrams

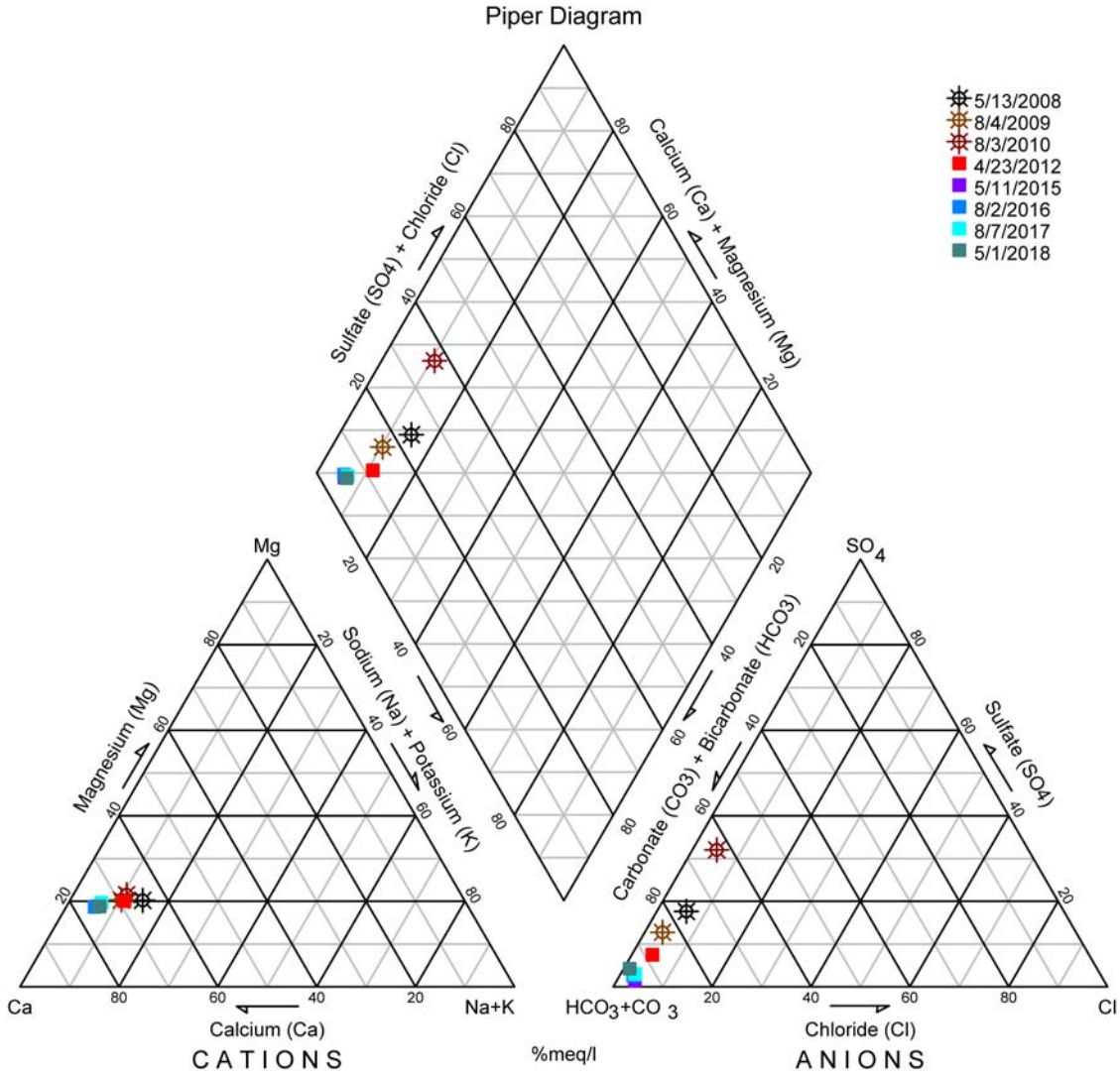
QAL024A


Piper Diagram
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
5/8/2017
5/9/2018
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Mg
Magnesium (Mg)
Sodium (Na) + Potassium (K)
Ca
Na+K
Calcium (Ca)
CATIONS
SO4
Carbonate (CO3) + Bicarbonate (HCO3)
Sulfate (SO4)
HCO3+CO 3
Cl
Chloride (Cl)
ANIONS
%meq/l

QAL025A

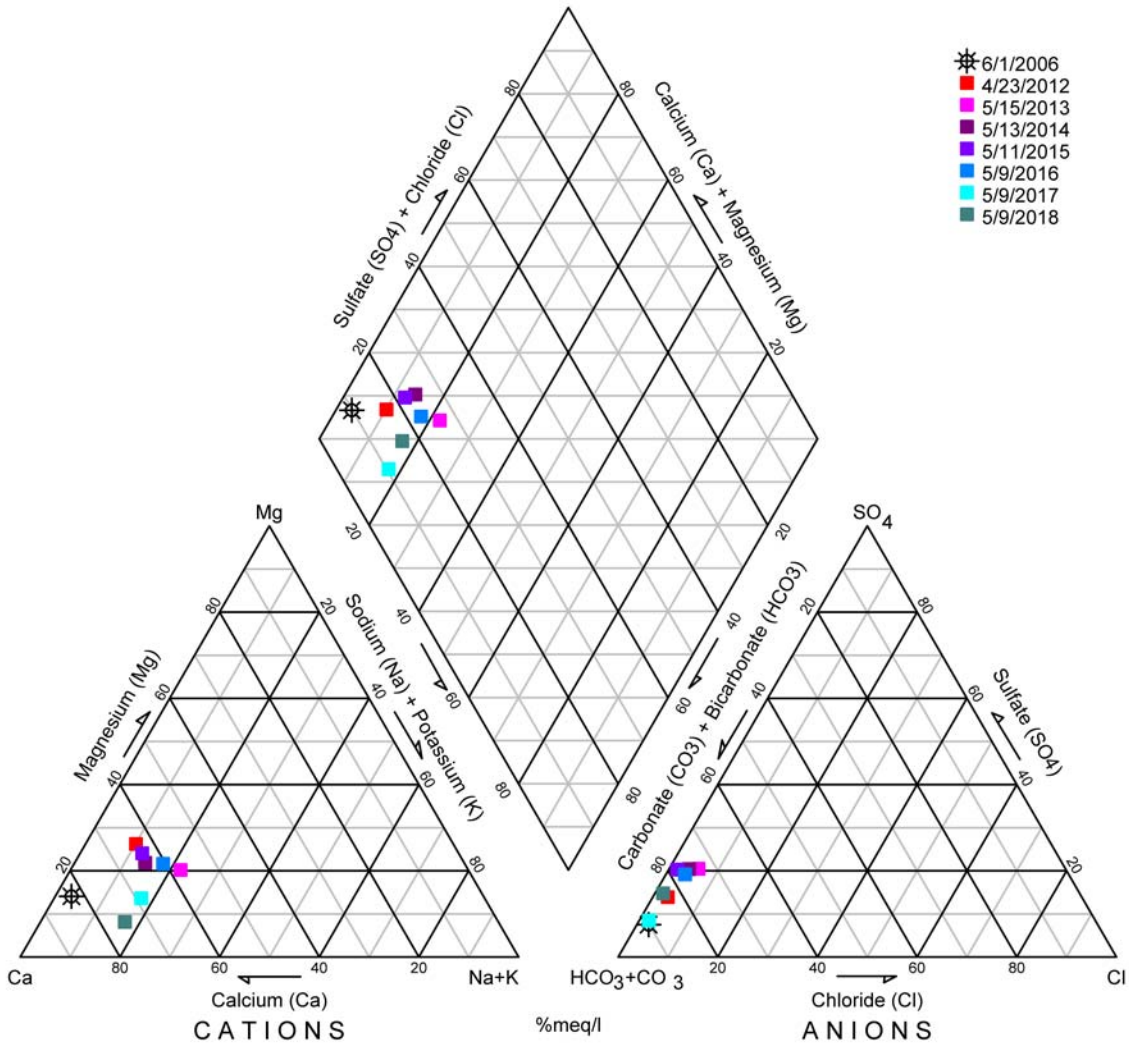

Piper Diagram
3/28/2011
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
5/8/2017
5/9/2018
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
HCO3+CO 3
Chloride (Cl)
Cl
ANIONS
%meq/l

QAL026A


Piper Diagram
5/13/2008
8/4/2009
8/3/2010
4/23/2012
5/11/2015
8/2/2016
8/7/2017
5/1/2018
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
HCO3+CO 3
Chloride (Cl)
Cl
ANIONS
%meq/l

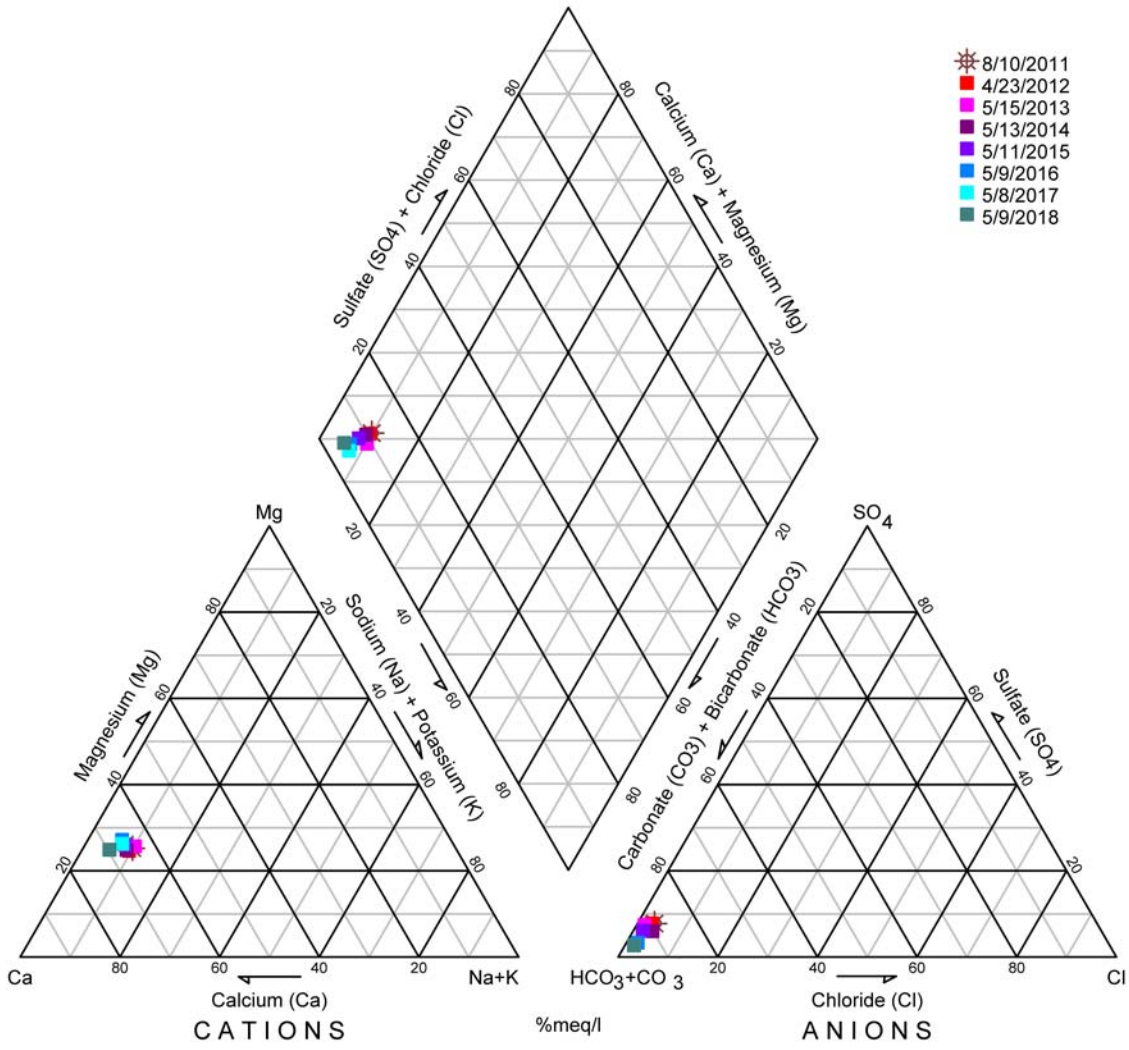
QAL044B

Piper Diagram



QAL060A

Piper Diagram



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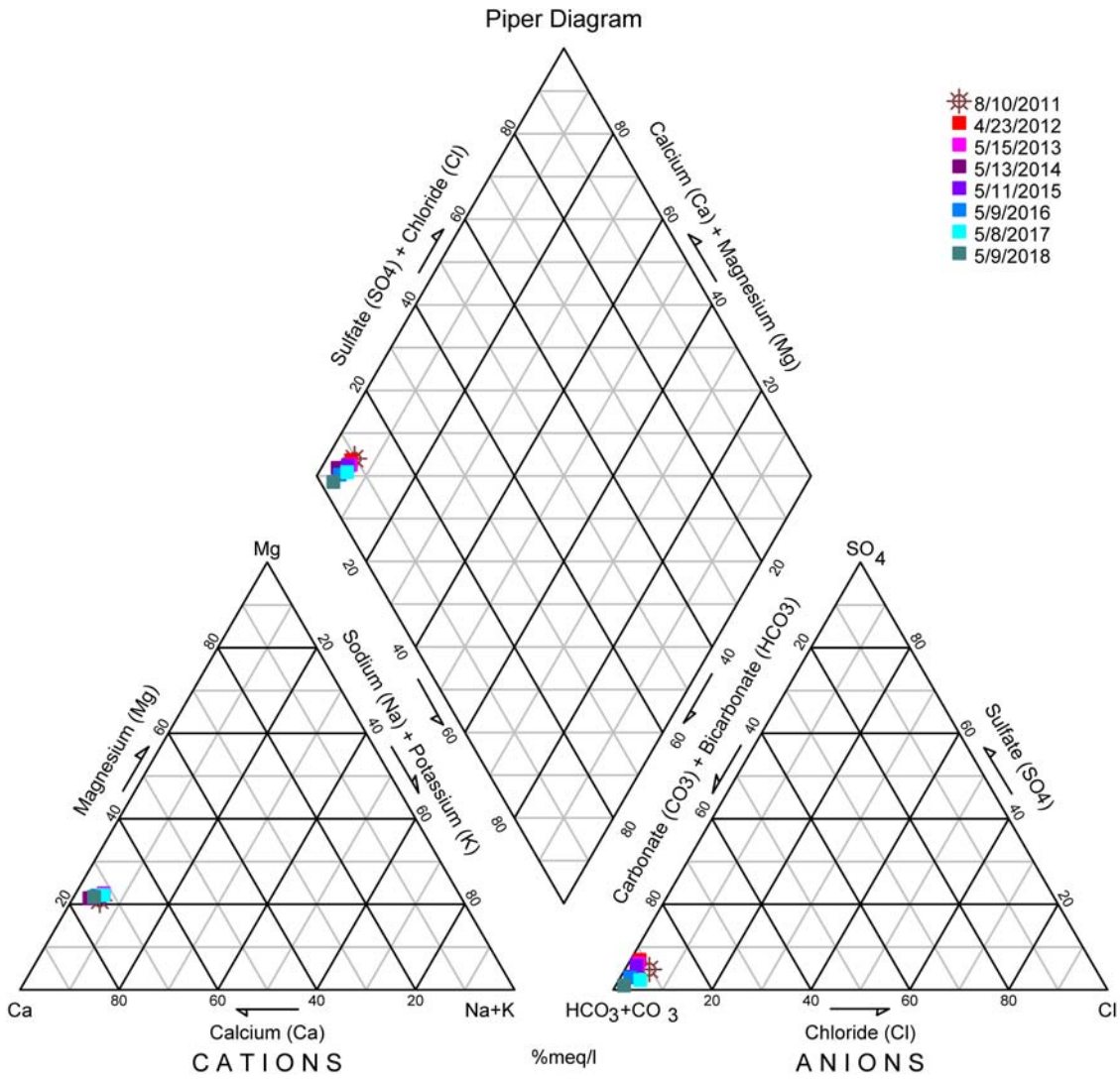
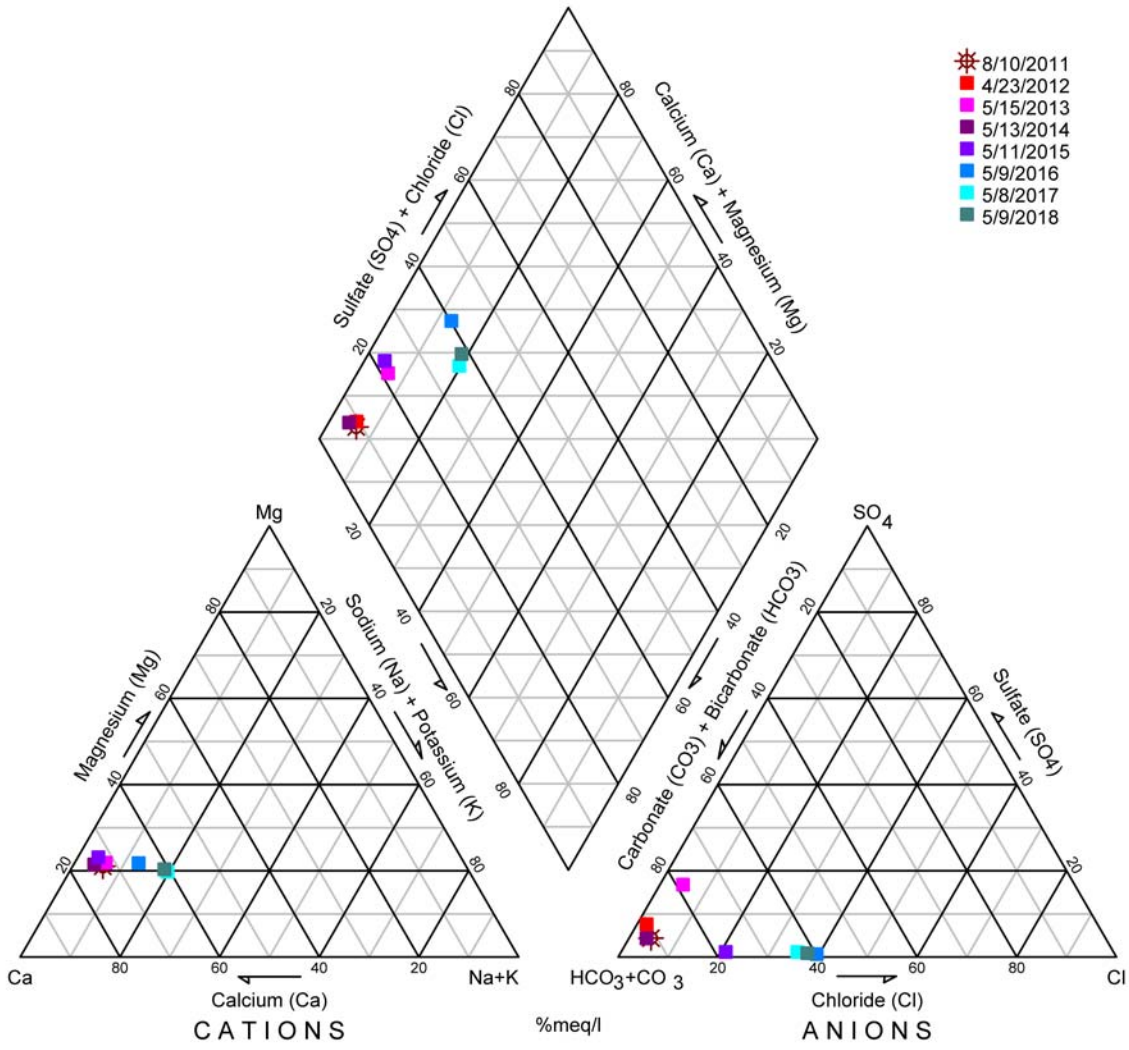

Piper Diagram
8/10/2011
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
5/8/2017
5/9/2018
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
HCO3+CO 3
Chloride (Cl)
Cl
ANIONS
%meq/l

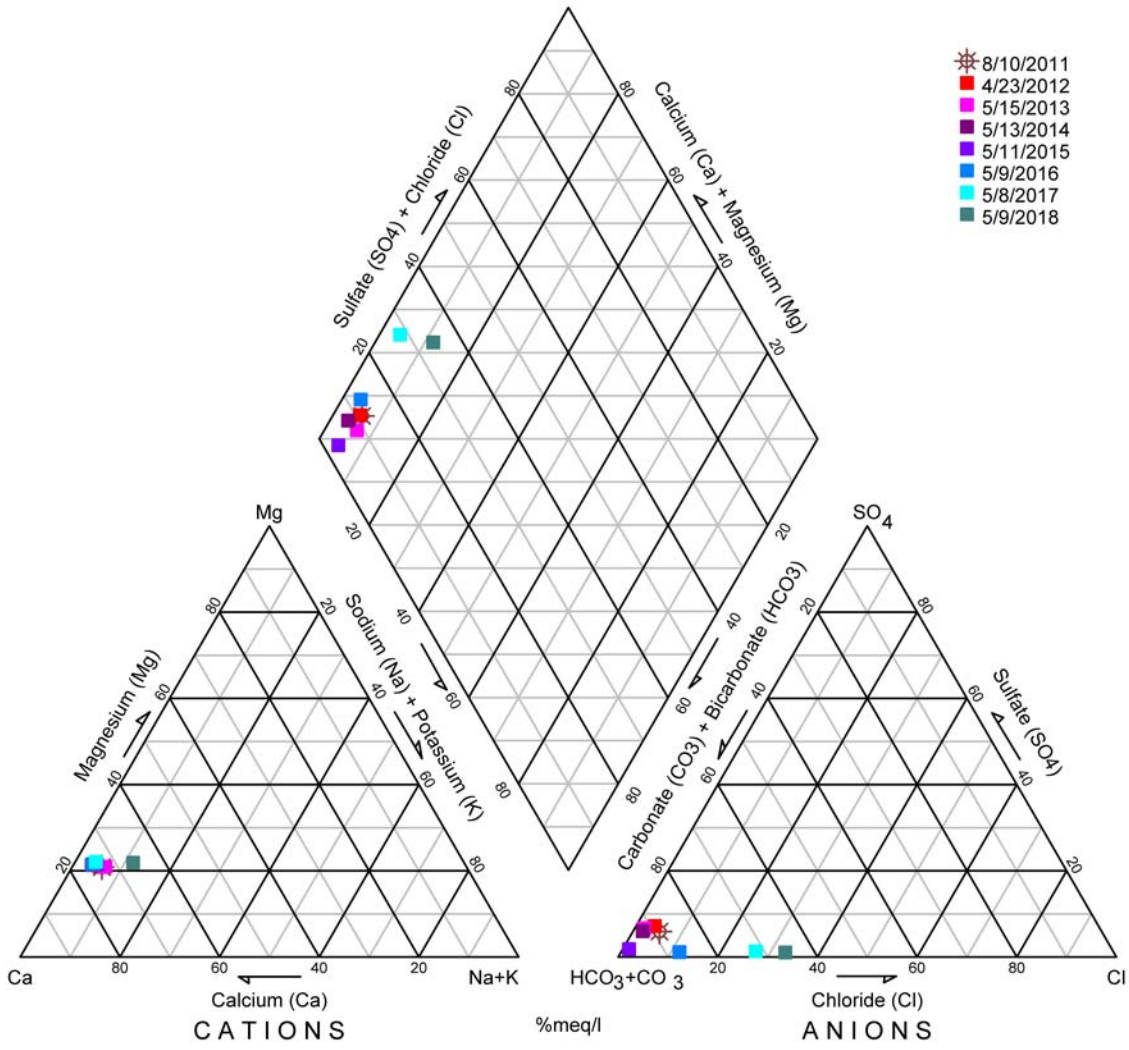
QAL062A

Piper Diagram



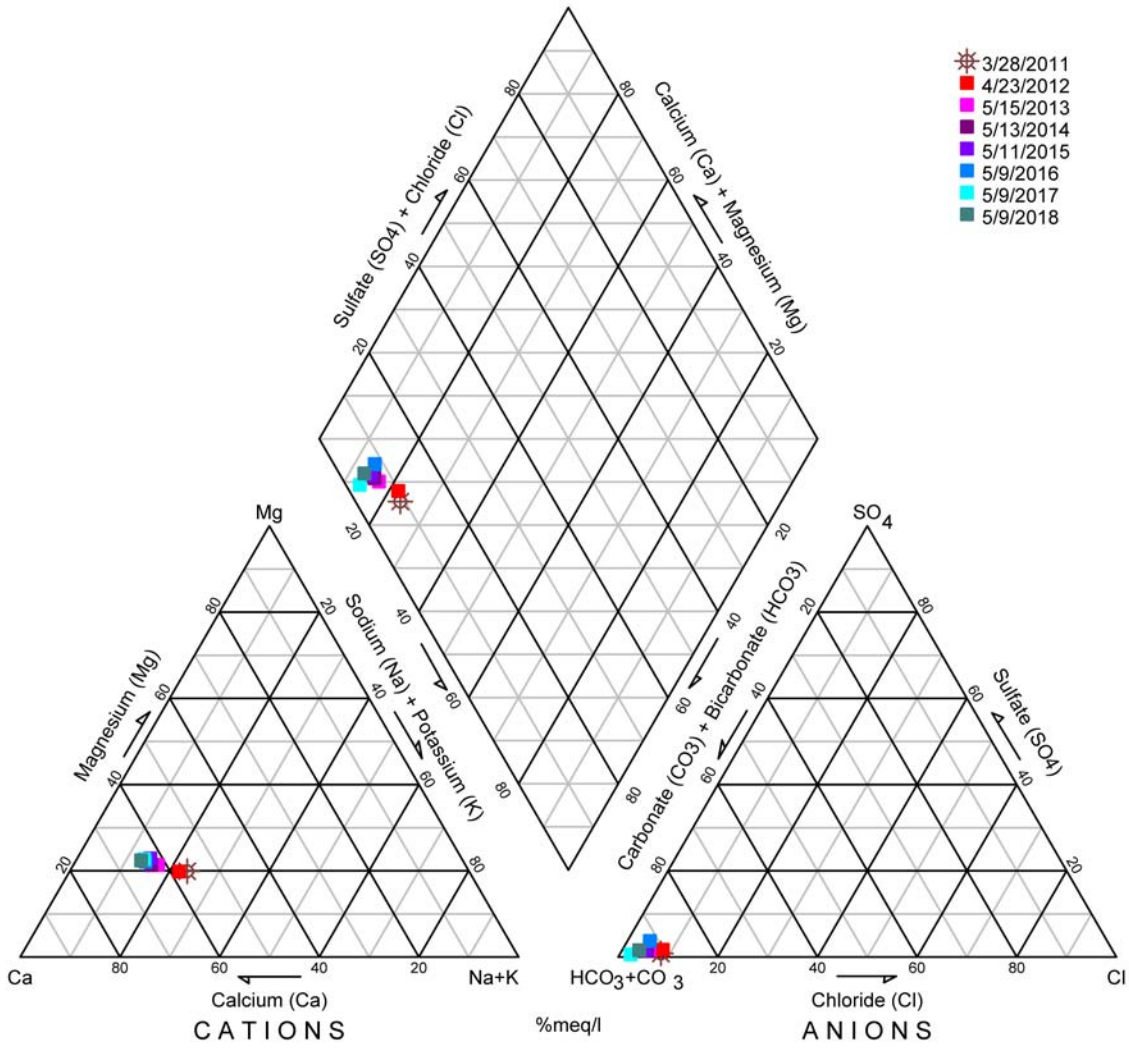
QAL063A

Piper Diagram



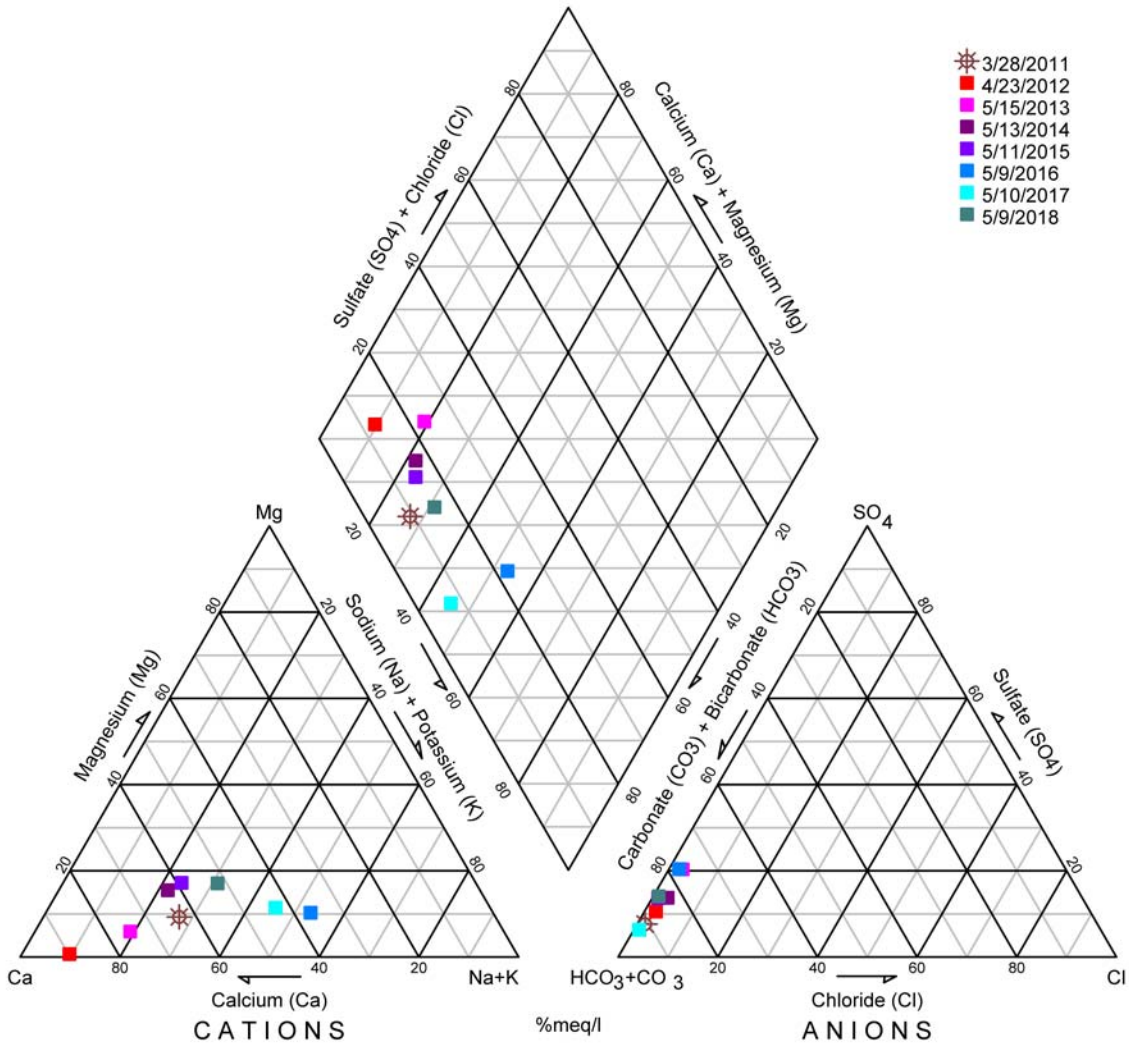
QAL064D

Piper Diagram



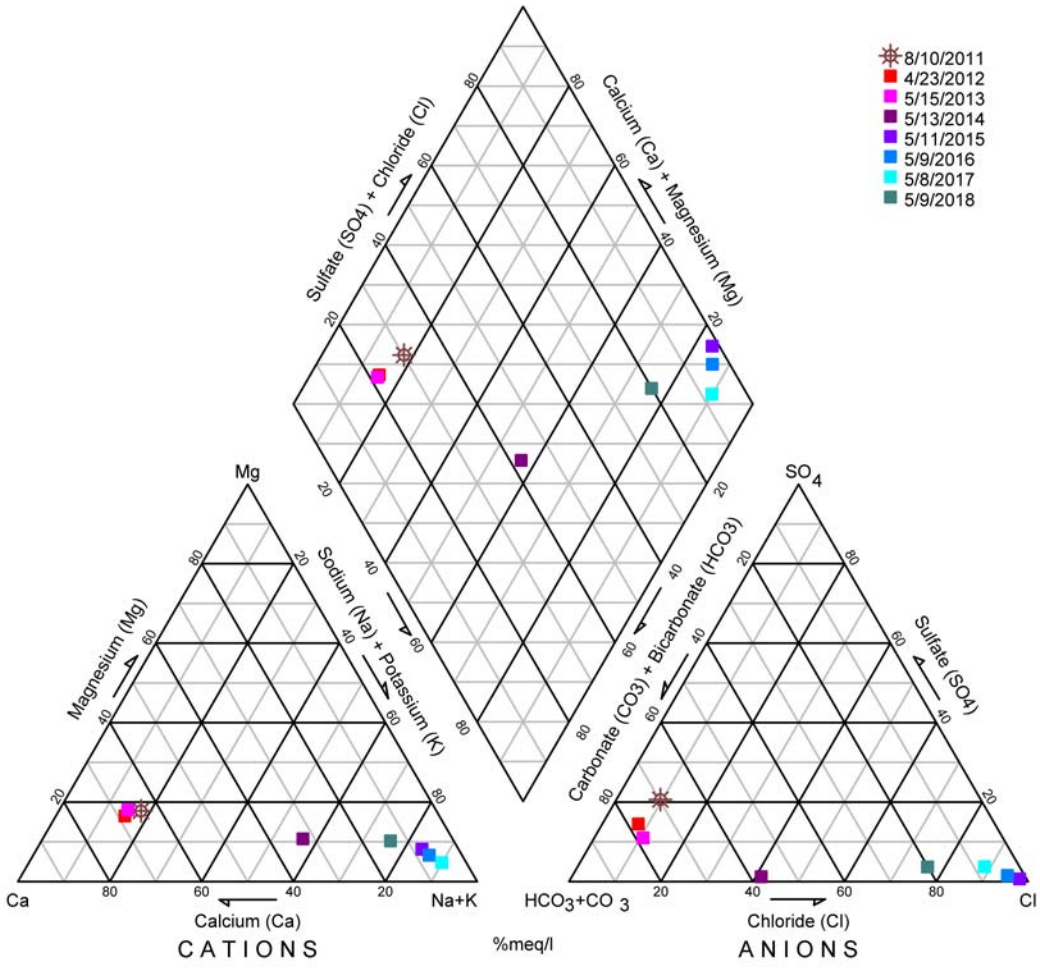
QAL066D

Piper Diagram

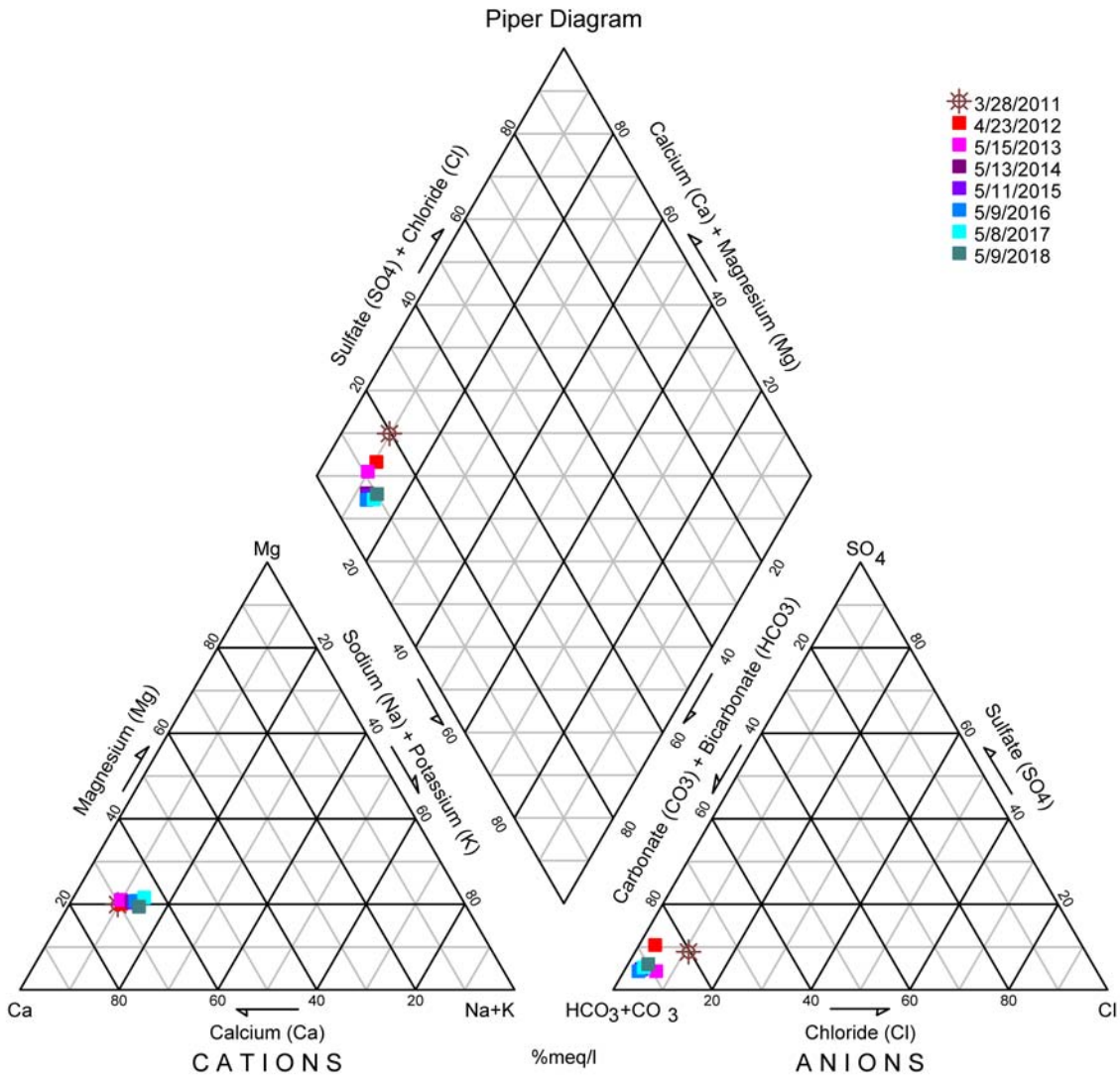


QAL067A

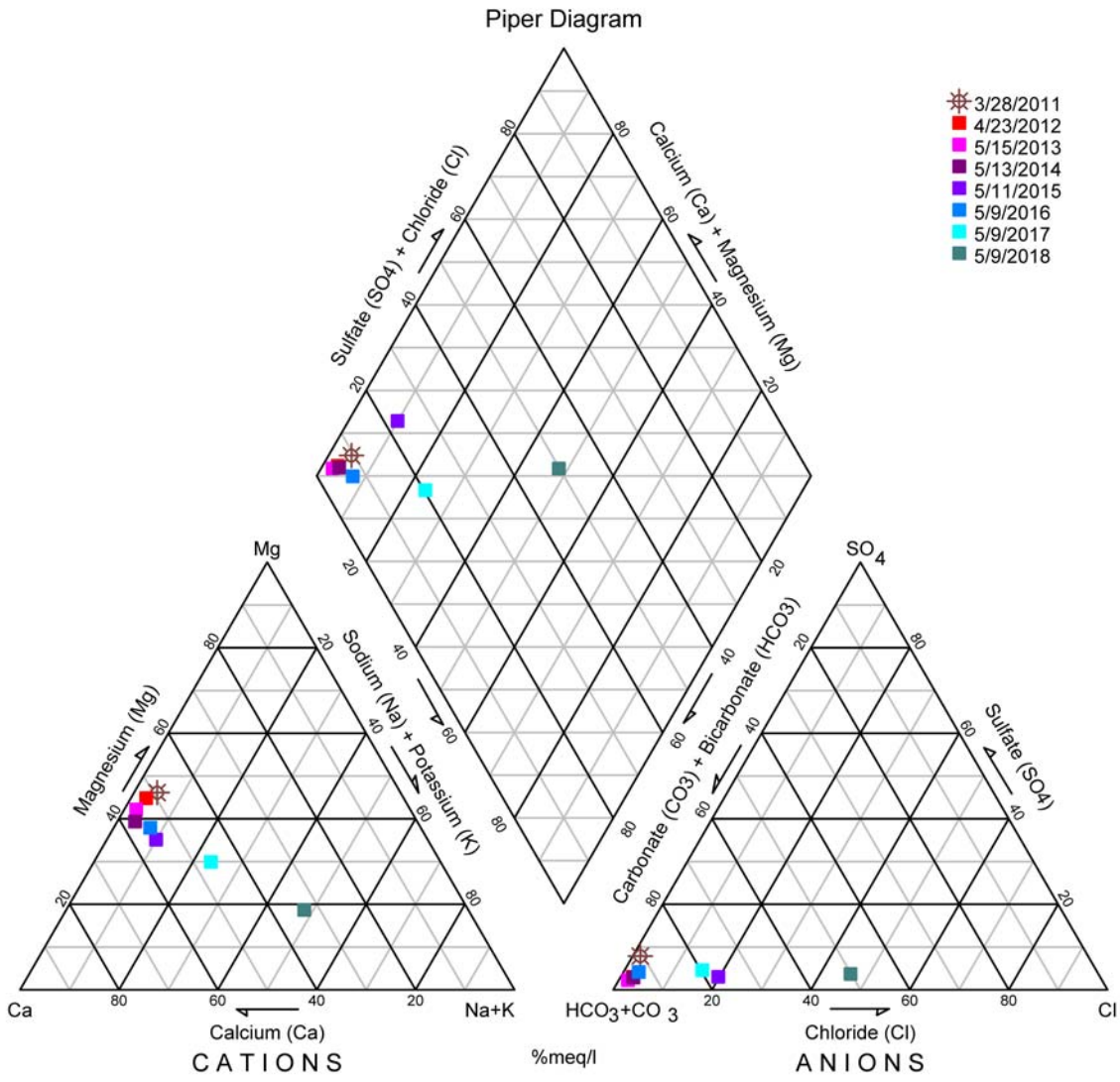
Piper Diagram



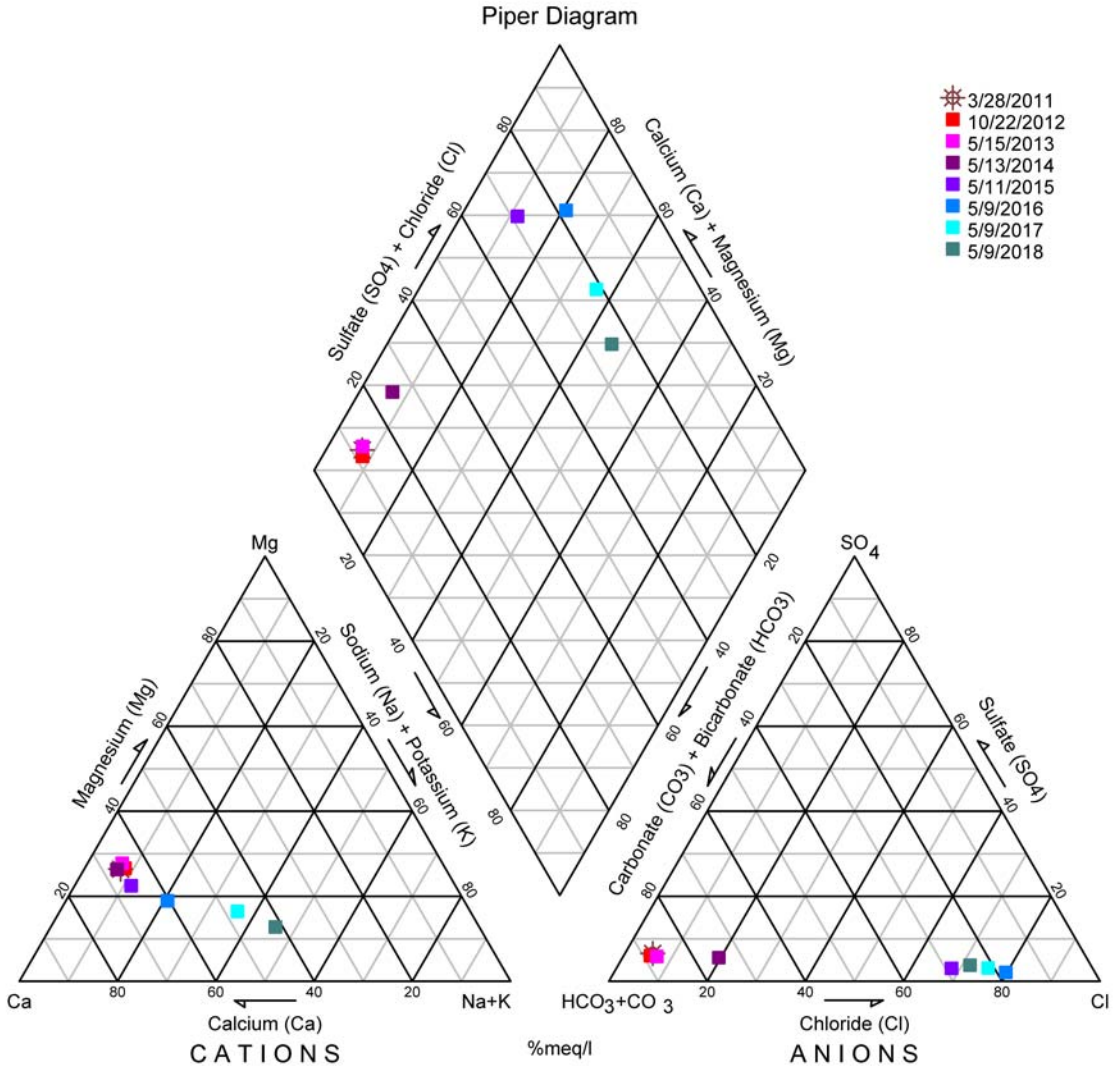
QAL068A


Piper Diagram
3/28/2011
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
5/8/2017
5/9/2018
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
HCO3+CO 3
Chloride (Cl)
Cl
ANIONS
%meq/l

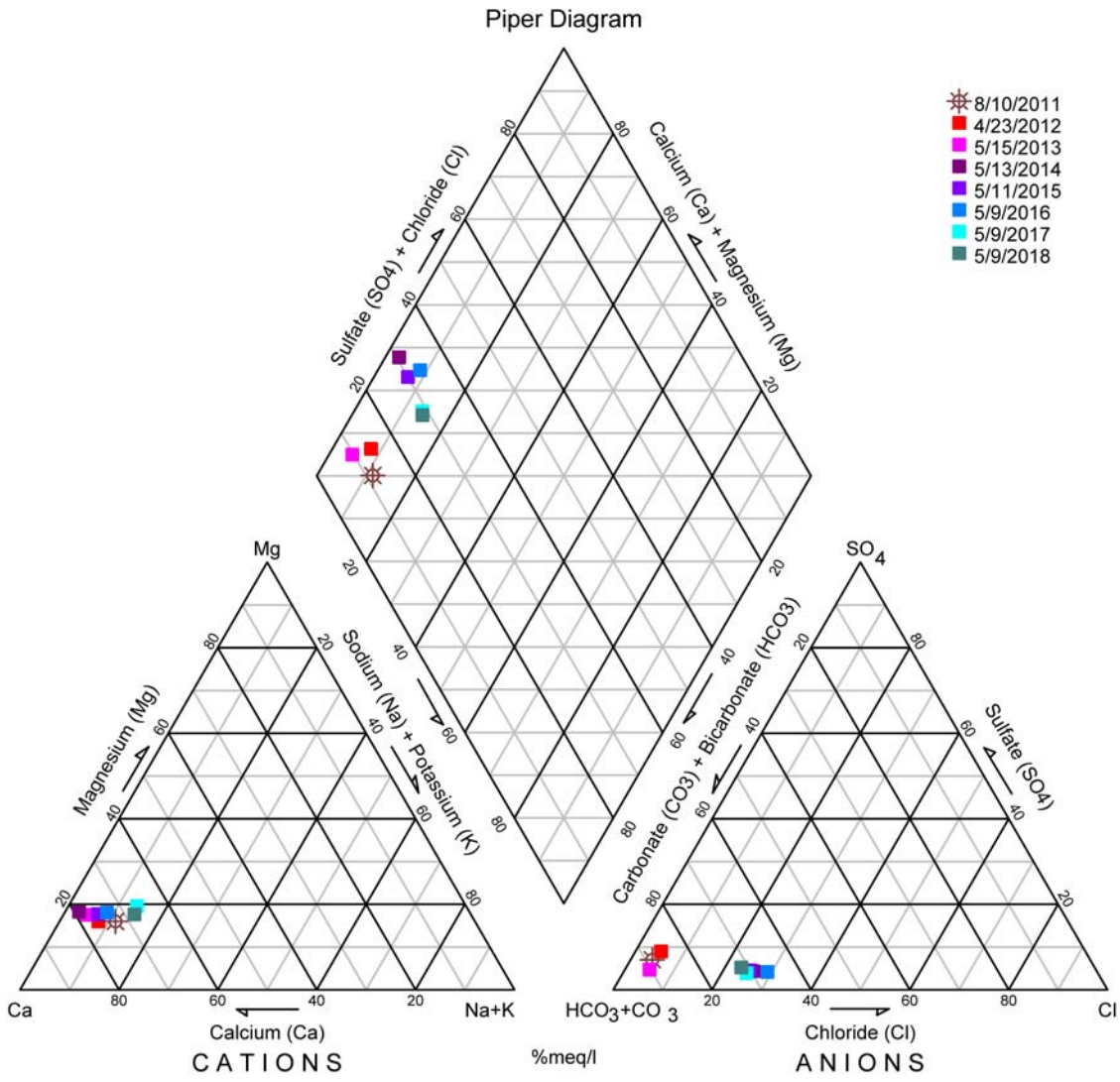
QAL069A


Piper Diagram
3/28/2011
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
5/9/2017
5/9/2018
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
HCO3+CO 3
Chloride (Cl)
Cl
ANIONS
%meq/l

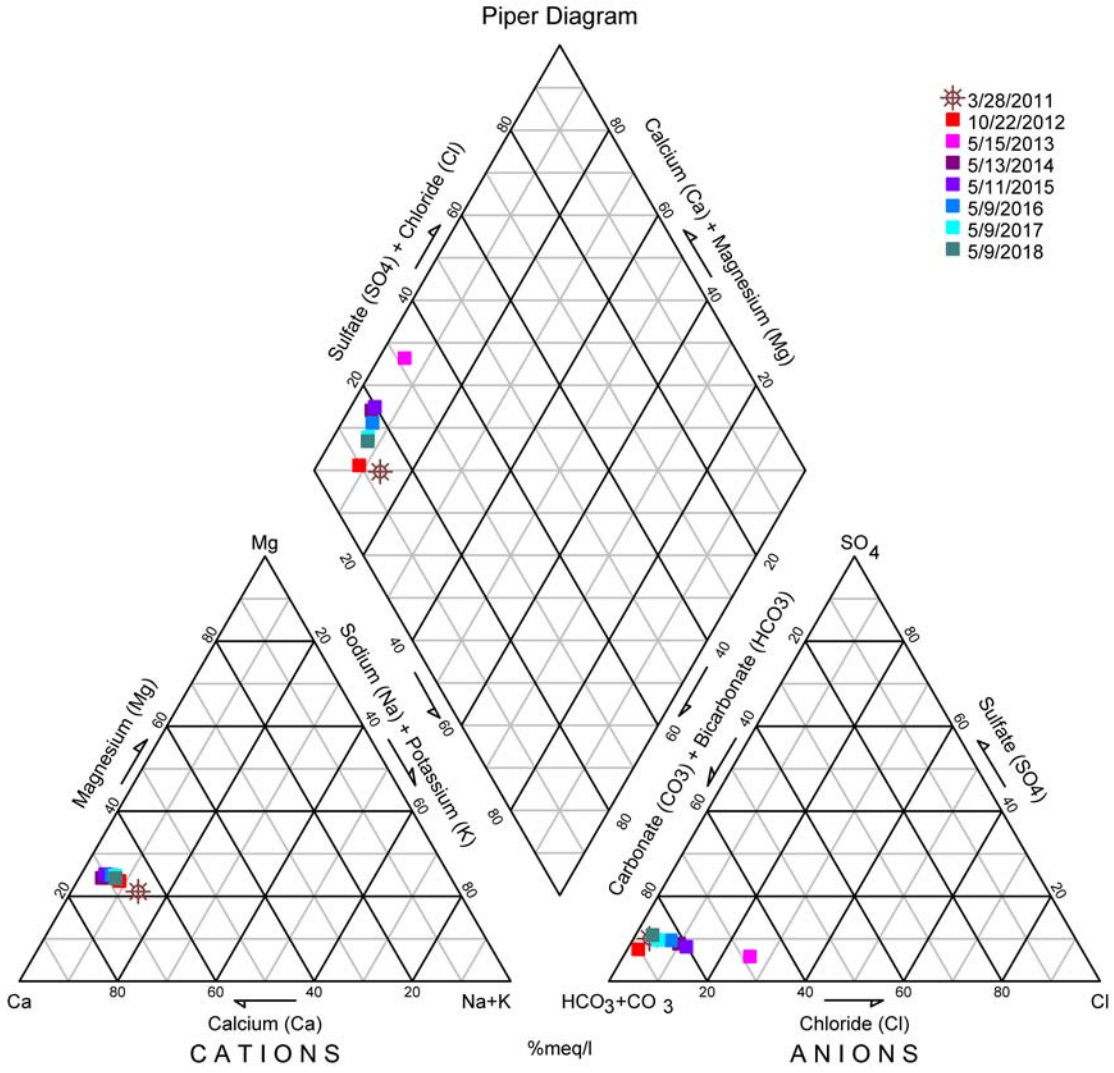
QAL070A


Piper Diagram
3/28/2011
10/22/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
5/9/2017
5/9/2018
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
%meq/l
SO4
Sulfate (SO4)
HCO3+CO 3
Chloride (Cl)
Cl
ANIONS

QAL071A


Piper Diagram
8/10/2011
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
5/9/2017
5/9/2018
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
HCO3+CO 3
Chloride (Cl)
Cl
ANIONS
%meq/l

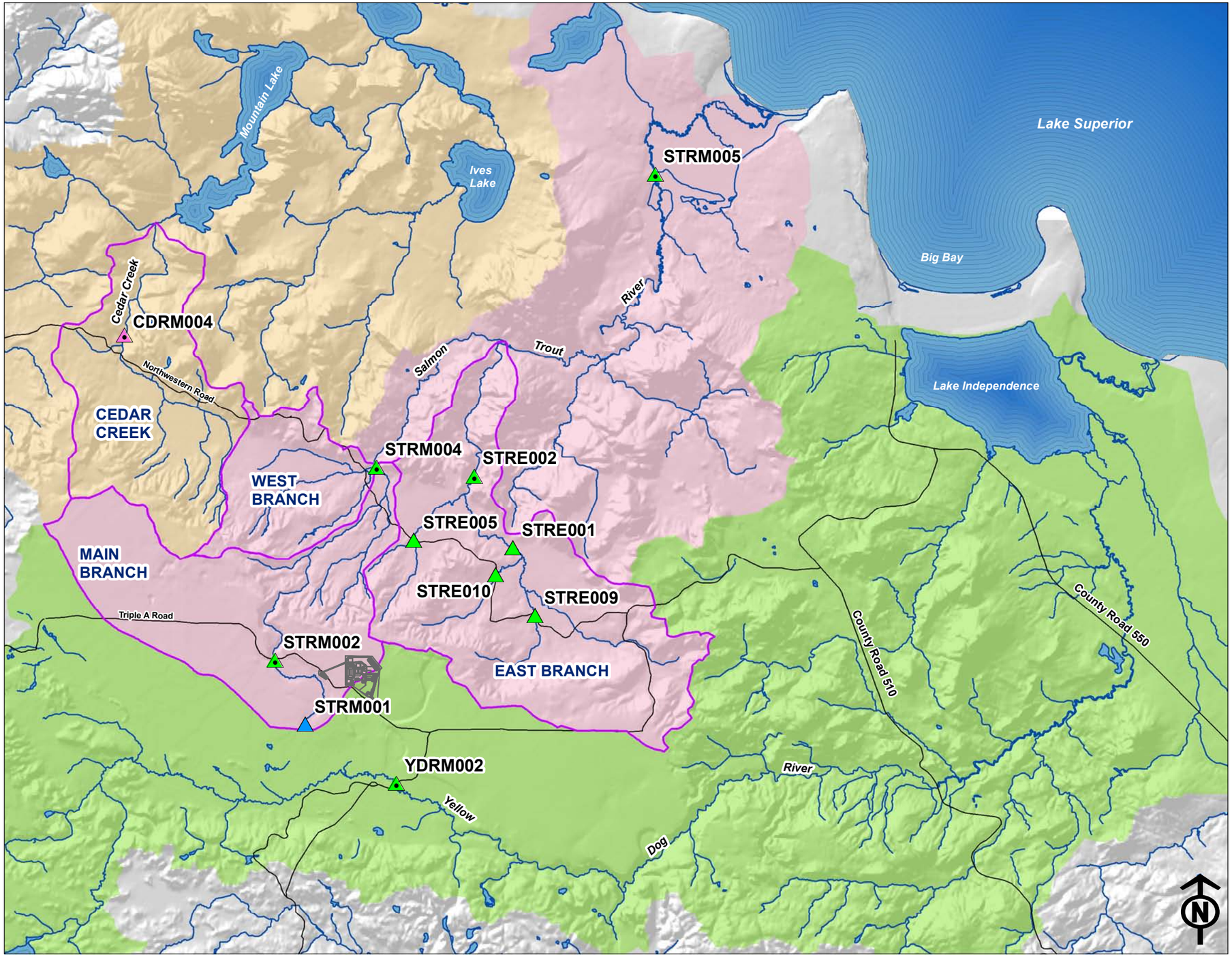
QAL073A


Piper Diagram
3/28/2011
10/22/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
5/9/2017
5/9/2018
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
HCO3+CO 3
Chloride (Cl)
Cl
ANIONS
%meq/l

Appendix I

Eagle Mine

Surface water Location Map



MINE PERMIT SURFACE WATER MONITORING LOCATIONS

- COMPLIANCE WATER QUALITY
- BACKGROUND WATER QUALITY
- REFERENCE WATER QUALITY
- *Instrumented for continuous monitoring*
- PINE RIVER WATERSHED
- SALMON TROUT RIVER WATERSHED
- YELLOW DOG RIVER WATERSHED
- SUBWATERSHED
- ROAD
- HYDROGRAPHY
- MINE FACILITY

Reference

Data provided by: Eagle Mine and North Jackson Company

Projection & Datum: UTM NAD 83 Zone 16N

0 1 2 Miles

Scale: 1:90,000

Eagle Mine
a subsidiary of lundin mining

North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Appendix J

Eagle Mine

Surface Water Results

and

Benchmark Summary Table

2018
Mine Permit Surface Water Quality Monitoring Data
Benchmark Summary Table

Location	Location Classification	Q1	Q2	Q3	Q4
STRM001	Background			Mercury	**Mercury**
STRM002	Compliance	pH			pH
STRM004	Compliance				pH
STRM005	Compliance	**Iron**	pH	pH	
STRE001	Compliance			**Iron**	
STRE002	Compliance	Iron			
STRE005	Compliance	pH	Alkalinity Bicarbonate		
STRE009	Compliance		Alkalinity Bicarbonate	pH	
STRE010	Compliance		Alkalinity Bicarbonate, Calcium, Magnesium, Hardness		
YDRM002	Compliance				**pH**
CDRM004	Reference	Iron			

Parameters listed in this table had values reported that were equal to or greater than a site-specific benchmark. Parameters in BOLD are instances in which the Department was notified because benchmarks deviations were identified at compliance monitoring locations for two consecutive seasonal (e.g. Q1 2013 and Q1 2014) sampling events. If the location is classified as background or reference, Department notification is not required for an exceedance.

2018
Mine Permit Surface Water Quality Monitoring Data
STRM001 (Background)
Eagle Mine

Parameter	Unit	Permit RL	STRM001 Seasonal Benchmark				STRM001 Data (Q1-Q4 2018)							
			Q1	Q2	Q3	Q4	Q1 2018		Q2 2018		Q3 2018		Q4 2018	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/27/18		5/16/18		8/2/18		10/29/18	
Field														
D.O.	ppm	--	--	--	--	--	**8.6**		**6.9**		**1.7**		**5.7**	
Flow	cfs	--	--	--	--	--	<0.10		**0.40**		**0.60**		**1.2**	
pH	SU	--	6.2-7.2	6.2-7.2	6.2-7.2	6.0-7.0	**6.5**		**6.5**		**6.3**		**6.4**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**46**		**44**		**78**		**38**	
Temperature	°C	--	--	--	--	--	**1.5**		**12**		**14**		**6.4**	
Metals														
Aluminum	ug/L	50	--	200	--	--	--		<50	e	--		--	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Barium	ug/L	10	--	40	--	--	--		**11**		--		--	
Beryllium	Q4	1.0	--	4.0	--	--	--		<1.0		--		--	
Boron	ug/L	50	200	200	200	200	<50	e	<50		<50		<50	
Cadmium	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Cobalt	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Copper	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Iron	ug/L	20	875	1,616	6,195	675	**203**		**354**	e	**2,830**		**428**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	44	179	392	40	**12**	e	**20**		**192**	e	**11**	
Mercury	ng/L	0.50	2.0	3.6	2.9	2.0	**0.67**		**1.1**		**3.5**		**2.0**	
Molybdenum	ug/L	10	--	40	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Selenium	ug/L	2.0	8.0	8.0	8.0	8.0	<2.0		<2.0		<2.0		<2.0	e
Silver	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Zinc	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	40	--	--	--		**22**	a	--		--	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	7.3	--	--	--		**1.2**		--		--	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.05	--	0.20	--	--	--		<0.05	e	--		--	
Sulfate	mg/L	1.0	4.0	10	4.0	4.0	<1.0		<1.0	e	<5.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	11	--	--	--		**5.6**		--		--	
Magnesium	mg/L	0.50	--	2.4	--	--	--		**1.3**		--		--	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.57**	e	--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**0.73**	e	--		--	
General														
Hardness	mg/L	3.0	--	36	--	--	--		**19**		--		--	
TDS	mg/L	50	200	200	200	200	<50		<50		**100**		<50	

Explanations of abbreviations are included on the final page of this table.

2018
Mine Permit Surface Water Quality Monitoring Data
STRM002 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRM002 Seasonal Benchmark				STRM002 Data (Q1-Q4 2018)							
			Q1	Q2	Q3	Q4	Q1 2018		Q2 2018		Q3 2018		Q4 2018	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/26/18		5/16/18		8/2/18		10/30/18	
Field														
D.O.	ppm	--	--	--	--	--	**13**		**9.1**		**8.1**		**10**	
Flow	cfs	--	--	--	--	--	**1.8**		**2.4**		**1.5**		**2.5**	
pH	SU	--	6.8-7.8	6.5-7.5	6.3-7.3	6.5-7.5	**6.7**		**7.1**		**6.8**		**6.1**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**65**		**57**		**77**		**42**	
Temperature	°C	--	--	--	--	--	**1.1**		**14**		**13**		**5.5**	
Metals														
Aluminum	ug/L	50	--	200	--	--	--		**80**	e	--		**--**	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Barium	ug/L	10	--	40	--	--	--		<10		--		--	
Beryllium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Boron	ug/L	50	200	200	200	200	<50	e	<50		<50		<50	
Cadmium	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Cobalt	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Copper	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Iron	ug/L	20	304	651	703	504	**189**		**315**	e	**324**		**282**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	58	40	40	**14**	e	**21**		<10	e	<10	
Mercury	ng/L	0.50	2.0	5.8	2.4	2.8	**1.3**		**2.0**		**1.7**		<2.6	
Molybdenum	ug/L	10	--	40	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Selenium	ug/L	2.0	8.0	8.0	8.0	8.0	<2.0		<2.0		<2.0		<2.0	e
Silver	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Zinc	ug/L	10	250	40	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	34	--	--	--		**28**	a	--		**--**	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		**1.6**		--		**--**	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.05	--	0.20	--	--	--		<0.05	e	--		--	
Sulfate	mg/L	1.0	4.0	6.2	4.0	4.0	<1.0		<1.0	e	<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	10	--	--	--		**7.7**		--		**--**	
Magnesium	mg/L	0.50	--	2.0	--	--	--		**1.6**		--		**--**	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.61**	e	--		**--**	
Sodium	mg/L	0.50	--	2.0	--	--	--		**0.82**	e	--		--	
General														
Hardness	mg/L	3.0	--	32	--	--	--		**26**		--		**--**	
TDS	mg/L	50	200	200	200	200	**66**		**146**		<50		<50	

2018
Mine Permit Surface Water Quality Monitoring Data
STRM004 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRM004 Seasonal Benchmark				STRM004 Data (Q1-Q4 2018)							
			Q1	Q2	Q3	Q4	Q1 2018		Q2 2018		Q3 2018		Q4 2018	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/21/18		5/15/18		8/1/18		10/30/18	
Field														
D.O.	ppm	--	--	--	--	--	**14**		**11**		**9.3**		**12**	
Flow	cfs	--	--	--	--	--	**6.2**		**7.4**		**5.6**		**8.0**	
pH	SU	--	7.0-8.0	7.3-8.3	7.2-8.2	7.2-8.2	**7.4**		**7.8**		**7.7**		**7.2**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**103**		**91**		**110**		**77**	
Temperature	°C	--	--	--	--	--	**0.10**		**9.5**		**14**		**4.8**	
Metals														
Aluminum	ug/L	50	--	993	--	--	--		**135**	e	--		**--**	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		**1.3**		<1.0	
Barium	ug/L	10	--	40	--	--	--		<10		--		**--**	
Beryllium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Boron	ug/L	50	200	200	200	200	<50	e	<50		<50		<50	
Cadmium	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		**--**	
Cobalt	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Copper	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Iron	ug/L	20	312	984	500	406	**182**		**256**	e	**231**		**191**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	61	40	40	**14**	e	**17**		**16**	e	<10	
Mercury	ng/L	0.50	2.5	14	3.5	2.9	**1.4**		**2.5**		**1.7**		**1.5**	
Molybdenum	ug/L	10	--	40	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Selenium	ug/L	2.0	8.0	8.0	8.0	8.0	<2.0		<2.0		<2.0		<2.0	e
Silver	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Zinc	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	52	--	--	--		**46**	a	--		**--**	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		<1.0		--		**--**	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.05	--	0.20	--	--	--		**0.06**	e	--		**--**	
Sulfate	mg/L	1.0	4.5	4.0	4.0	4.0	**4.4**		<1.0	e	<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	16	--	--	--		**13**		--		**--**	
Magnesium	mg/L	0.50	--	3.0	--	--	--		**2.7**		--		**--**	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.72**	e	--		**--**	
Sodium	mg/L	0.50	--	2.0	--	--	--		**1.3**	e	--		**--**	
General														
Hardness	mg/L	3.0	--	54	--	--	--		**44**		--		**--**	
TDS	mg/L	50	200	200	200	200	**78**		**124**		**76**		**52**	

2018
Mine Permit Surface Water Quality Monitoring Data
STRM005 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRM005 Seasonal Benchmark				STRM005 Data (Q1-Q4 2018)							
			Q1	Q2	Q3	Q4	Q1 2018		Q2 2018		Q3 2018		Q4 2018	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/26/18		5/16/18		8/2/18		10/31/18	
Field														
D.O.	ppm	--	--	--	--	--	**14**		**11**		**10**		**12**	
Flow	cfs	--	--	--	--	--	**46**		**52**		**37**		**60**	
pH	SU	--	7.1-8.1	6.6-7.6	6.6-7.6	7.2-8.2	**7.3**		**7.6**		**8.0**		**7.3**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**132**		**112**		**148**		**93**	
Temperature	°C	--	--	--	--	--	**0.0**		**12**		**13**		**5.5**	
Metals														
Aluminum	ug/L	50	--	568	--	--	--		**104**	e	--		--	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		**1.1**		<1.0	
Barium	ug/L	10	--	40	--	--	--		**13**		--		--	
Beryllium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Boron	ug/L	50	200	200	200	200	<50	e	<50		<50		<50	
Cadmium	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Cobalt	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Copper	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Iron	ug/L	20	166	470	201	309	**191**		**169**	e	**174**		**200**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	40	40	40	**12**	e	**16**		**11**	e	**11**	
Mercury	ng/L	0.50	2.0	11	2.0	2.5	**0.91**		**2.6**		**1.1**		**2.2**	
Molybdenum	ug/L	10	--	40	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0	4.0	4.0	4.0	**1.8**		<1.0		<1.0		<1.0	
Selenium	ug/L	2.0	8.0	8.0	8.0	8.0	<2.0		<2.0		<2.0		<2.0	e
Silver	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Zinc	ug/L	10	40	89	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	66	--	--	--		**54**	a	--		--	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.05	--	0.20	--	--	--		<0.050	e	--		--	
Sulfate	mg/L	1.0	6.6	4.0	4.0	4.0	**3.0**		<1.0	e	**1.1**		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	19	--	--	--		**15**		--		--	
Magnesium	mg/L	0.50	--	3.9	--	--	--		**3.3**		--		--	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.74**	e	--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**1.1**	e	--		--	
General														
Hardness	mg/L	3.0	--	65	--	--	--		**52**		--		--	
TDS	mg/L	50	200	200	200	200	**88**		**60**		**144**		**88**	

2018
Mine Permit Surface Water Quality Monitoring Data
STRE001 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRE001 Seasonal Benchmark				STRE001 Data (Q1-Q4 2018)							
			Q1	Q2	Q3	Q4	Q1 2018		Q2 2018		Q3 2018		Q4 2018	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/21/18		5/15/18		8/6/18		10/29/18	
Field														
D.O.	ppm	--	--	--	--	--	**13**		**11**		**9.4**		**11**	
Flow	cfs	--	--	--	--	--	**13**		**15**		**15**		**18**	
pH	SU	--	7.3-8.3	7.0-8.0	7.1-8.1	7.2-8.2	**7.4**		**7.7**		**7.6**		**7.7**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**138**		**124**		**147**		**104**	
Temperature	°C	--	--	--	--	--	**1.3**		**9.9**		**16**		**5.9**	
Metals														
Aluminum	ug/L	50	--	339	--	--	--		**90**	e	--		--	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		**1.4**		<1.0	
Barium	ug/L	10	--	40	--	--	--		**10**		--		--	
Beryllium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Boron	ug/L	50	200	200	200	200	<50	e	<50		<50		<50	
Cadmium	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Cobalt	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Copper	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Iron	ug/L	20	96	327	109	160	**90**		**136**	e	**121**		**159**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	40	40	94	**11**	e	**16**		**16**	e	**13**	
Mercury	ng/L	0.50	2.0	8.6	2.0	2.2	**1.0**		**1.9**		**1.0**		**1.6**	
Molybdenum	ug/L	10	--	40	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Selenium	ug/L	2.0	8.0	8.0	8.0	8.0	<2.0		<2.0		<2.0		<2.0	e
Silver	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Zinc	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	81	--	--	--		**61**	a	--		--	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		**1.0**		--		--	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.05	--	0.20	--	--	--		<0.050	e	--		--	
Sulfate	mg/L	1.0	6.1	4.0	4.0	4.0	**3.9**		<1.0	e	**1.1**		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	24	--	--	--		**18**		--		--	
Magnesium	mg/L	0.50	--	4.6	--	--	--		**3.8**		--		--	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.69**	e	--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**1.4**	e	--		--	
General														
Hardness	mg/L	3.0	--	78	--	--	--		**61**		--		--	
TDS	mg/L	50	200	200	200	200	**82**		**194**		**64**		**136**	

2018
Mine Permit Surface Water Quality Monitoring Data
STRE002 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRE002 Seasonal Benchmark				STRE002 Data (Q1-Q4 2018)							
			Q1	Q2	Q3	Q4	Q1 2018		Q2 2018		Q3 2018		Q4 2018	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/22/18		5/22/18		8/6/18		10/30/18	
Field														
D.O.	ppm	--	--	--	--	--	**14**		**11**		**10**		**12**	
Flow	cfs	--	--	--	--	--	**22**		**14**		**16**		**20**	
pH	SU	--	7.3-8.3	7.6-8.6	7.4-8.4	7.2-8.2	**7.5**		**7.8**		**7.7**		**7.8**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**103**		**132**		**150**		**104**	
Temperature	°C	--	--	--	--	--	**0.0**		**12**		**15**		**5.2**	
Metals														
Aluminum	ug/L	50	--	200	--	--	--		**106**	e	--		--	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		**1.2**		**1.5**		<1.0	
Barium	ug/L	10	--	40	--	--	--		**12**		--		--	
Beryllium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Boron	ug/L	50	200	200	200	200	<50	e	<50		<50		<50	
Cadmium	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Cobalt	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Copper	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Iron	ug/L	20	165	194	191	182	**171**		**129**	e	**120**		**109**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	40	40	40	**24**	e	**17**		**16**	e	<10	
Mercury	ng/L	0.50	2.0	4.8	2.0	2.0	**1.9**		**1.6**		**1.2**		**1.2**	
Molybdenum	ug/L	10	--	40	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Selenium	ug/L	2.0	8.0	8.0	8.0	8.0	<2.0		<2.0		<2.0		<2.0	e
Silver	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Zinc	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	81	--	--	--		**63**	a	--		--	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		**1.3**		--		--	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.05	--	0.20	--	--	--		<0.05	e	--		--	
Sulfate	mg/L	1.0	5.7	4.0	4.0	4.0	**3.7**		**1.5**	e	<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	24	--	--	--		**17**		--		--	
Magnesium	mg/L	0.50	--	4.7	--	--	--		**3.9**		--		--	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.66**	e	--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**1.2**	e	--		--	
General														
Hardness	mg/L	3.0	--	80	--	--	--		**58**		--		--	
TDS	mg/L	50	200	200	200	200	**90**		**72**		**108**		**86**	

2018
Mine Permit Surface Water Quality Monitoring Data
STRE005 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRE005 Seasonal Benchmark				STRE005 Data (Q1-Q4 2018)							
			Q1	Q2	Q3	Q4	Q1 2018		Q2 2018		Q3 2018		Q4 2018	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/21/18		5/15/18		8/1/18		10/29/18	
Field														
D.O.	ppm	--	--	--	--	--	**14**		**11**		**8.7**		**11**	
Flow	cfs	--	--	--	--	--	**1.2**		**2.0**		**0.50**		**1.6**	
pH	SU	--	7.1-8.1	6.8-7.8	7.3-8.3	7.0-8.0	**7.0**		**7.7**		**7.9**		**7.2**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**123**		**105**		**160**		**94**	
Temperature	°C	--	--	--	--	--	**0.0**		**9.7**		**16**		**5.9**	
Metals														
Aluminum	ug/L	50	--	1,722	--	--	--		**69**	e	--		**--**	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Barium	ug/L	10	--	40	--	--	--		<10		--		**--**	
Beryllium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Boron	ug/L	50	200	200	200	200	<50	e	<50		<50		<50	
Cadmium	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		**--**	
Cobalt	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Copper	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Iron	ug/L	20	489	1,218	501	259	**251**		**196**	e	**287**		**192**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	66	93	40	40	**43**	e	**22**		**25**	e	**17**	
Mercury	ng/L	0.50	2.0	17	2.0	2.0	**1.5**		**2.0**		**1.8**		**1.4**	
Molybdenum	ug/L	10	--	40	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Selenium	ug/L	2.0	8.0	8.0	8.0	8.0	<2.0		<2.0		<2.0		<2.0	e
Silver	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Zinc	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	60	--	--	--		**107**	a	--		**--**	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		<1.0		--		**--**	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.05	--	0.20	--	--	--		<0.05	e	--		**--**	
Sulfate	mg/L	1.0	6.1	4.0	4.0	6.4	<1.0		<1.0	e	<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	17	--	--	--		**15**		--		**--**	
Magnesium	mg/L	0.50	--	3.0	--	--	--		**2.8**		--		**--**	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.71**	e	--		**--**	
Sodium	mg/L	0.50	--	2.0	--	--	--		**1.2**	e	--		--	
General														
Hardness	mg/L	3.0	--	55	--	--	--		**50**		--		**--**	
TDS	mg/L	50	200	200	200	200	**62**		<50		**154**		**72**	

2018
Mine Permit Surface Water Quality Monitoring Data
STRE009 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRE009 Seasonal Benchmark				STRE009 Data (Q1-Q4 2018)							
			Q1	Q2	Q3	Q4	Q1 2018		Q2 2018		Q3 2018		Q4 2018	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/22/18		5/15/18		8/1/18		10/29/18	
Field														
D.O.	ppm	--	--	--	--	--	**14**		**11**		**7.9**		**10**	
Flow	cfs	--	--	--	--	--	**3.8**		**4.4**		**3.4**		**4.8**	
pH	SU	--	7.1-8.1	6.9-7.9	7.2-8.2	6.8-7.8	**7.4**		**7.7**		**7.2**		**7.0**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**123**		**114**		**132**		**98**	
Temperature	°C	--	--	--	--	--	**1.6**		**12**		**14**		**6.2**	
Metals														
Aluminum	ug/L	50	--	405	--	--	--		**57**	e	--		**--**	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		**1.2**		<1.0	
Barium	ug/L	10	--	40	--	--	--		<10		--		--	
Beryllium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Boron	ug/L	50	200	200	200	200	<50	e	<50		<50		<50	
Cadmium	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Cobalt	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Copper	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Iron	ug/L	20	86	400	224	114	**49**		**92**	e	**149**		**112**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	40	36	40	<10	e	**10**		**30**	e	**19**	
Mercury	ng/L	0.50	2.0	6.6	2.9	2.0	**0.40**		**1.1**		**2.0**		**1.0**	
Molybdenum	ug/L	10	--	40	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Selenium	ug/L	2.0	8.0	8.0	8.0	8.0	<2.0		<2.0		<2.0		<2.0	e
Silver	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Zinc	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	57	--	--	--		**57**	a	--		**--**	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		**1.0**		--		**--**	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.05	--	0.20	--	--	--		<0.05	e	--		**--**	
Sulfate	mg/L	1.0	4.8	4.0	4.0	10	**3.4**		<1.0	e	**1.2**		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	17	--	--	--		**16**		--		**--**	
Magnesium	mg/L	0.50	--	3.3	--	--	--		**3.1**		--		**--**	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.52**	e	--		**--**	
Sodium	mg/L	0.50	--	2.0	--	--	--		**1.2**	e	--		**--**	
General														
Hardness	mg/L	3.0	--	56	--	--	--		**52**		--		--	
TDS	mg/L	50	200	200	200	200	**70**		**98**		**116**		**94**	

2018
Mine Permit Surface Water Quality Monitoring Data
STRE010 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRE010 Seasonal Benchmark				STRE010 Data (Q1-Q4 2018)							
			Q1	Q2	Q3	Q4	Q1 2018		Q2 2018		Q3 2018		Q4 2018	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/21/18		5/15/18		8/1/18		10/29/18	
Field														
D.O.	ppm	--	--	--	--	--	**14**		**12**		**11**		**11**	
Flow	cfs	--	--	--	--	--	**3.1**		**3.0**		**2.8**		**3.7**	
pH	SU	--	7.3-8.3	6.9-7.9	7.2-8.2	7.0-8.0	**7.4**		**7.8**		**7.8**		**7.1**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**72**		**114**		**136**		**97**	
Temperature	°C	--	--	--	--	--	**1.5**		**8.3**		**11**		**6.2**	
Metals														
Aluminum	ug/L	50	--	431	--	--	--		**72**	e	--		**--**	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Barium	ug/L	10	--	40	--	--	--		<10		--		--	
Beryllium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Boron	ug/L	50	200	200	200	200	<50	e	<50		<50		<50	
Cadmium	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Cobalt	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Copper	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Iron	ug/L	20	280	514	135	97	**187**		**112**	e	**99**		**73**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	43	40	40	**18**	e	**10**		**11**	e	<10	
Mercury	ng/L	0.50	4.1	9.7	2.0	2.0	**2.2**		**1.7**		**0.93**		**1.2**	
Molybdenum	ug/L	10	--	40	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Selenium	ug/L	2.0	8.0	8.0	8.0	8.0	<2.0		<2.0		<2.0		<2.0	e
Silver	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Zinc	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	55	--	--	--		**61**	a	--		**--**	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		<1.0		--		**--**	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.05	--	0.20	--	--	--		**0.08**	e	--		**--**	
Sulfate	mg/L	1.0	4.7	4.0	4.0	4.0	**2.2**		<1.0	e	**1.8**		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	16	--	--	--		**17**		--		**--**	
Magnesium	mg/L	0.50	--	3.0	--	--	--		**3.1**		--		**--**	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.63**	e	--		**--**	
Sodium	mg/L	0.50	--	2.0	--	--	--		**1.1**	e	--		**--**	
General														
Hardness	mg/L	3.0	--	52	--	--	--		**55**		--		**--**	
TDS	mg/L	50	200	200	200	200	**78**		**56**		**86**		**64**	

2018
Mine Permit Surface Water Quality Monitoring Data
YDRM002 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	YDRM002 Seasonal Benchmark				YDRM002 Data (Q1-Q4 2018)							
			Q1	Q2	Q3	Q4	Q1 2018		Q2 2018		Q3 2018		Q4 2018	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/26/18		5/16/18		8/2/18		10/30/18	
Field														
D.O.	ppm	--	--	--	--	--	**12**		**8.9**		**8.1**		**11**	
Flow	cfs	--	--	--	--	--	**18**		**42**		**13**		**38**	
pH	SU	--	6.5-7.5	6.1-7.1	6.6-7.6	6.6-7.6	**6.6**		**6.8**		**7.0**		**6.4**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**65**		**34**		**74**		**33**	
Temperature	°C	--	--	--	--	--	**0.0**		**12**		**15**		**5.3**	
Metals														
Aluminum	ug/L	50	--	200	--	--	--		**175**	e	--		**--**	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Barium	ug/L	10	--	40	--	--	--		<10		--		--	
Beryllium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Boron	ug/L	50	200	200	200	200	<50	e	<50		<50		<50	
Cadmium	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Cobalt	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Copper	ug/L	1.0	4.0	6.8	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Iron	ug/L	20	1,231	1,192	1,270	1,207	**649**		**653**	e	**939**		**683**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	44	50	40	40	**27**	e	**27**		**22**	e	**27**	
Mercury	ng/L	0.50	2.73	8.1	3.1	6.0	**1.6**		**3.6**		**3.0**		**2.9**	
Molybdenum	ug/L	10	--	40	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Selenium	ug/L	2.0	8.0	8.0	8.0	8.0	<2.0		<2.0		<2.0		<2.0	e
Silver	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Zinc	ug/L	10	94	40	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	30	--	--	--		**15**	a	--		**--**	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		**1.5**		--		**--**	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.05	--	0.20	--	--	--		<0.05	e	--		**--**	
Sulfate	mg/L	1.0	5.9	10	4.0	24	<1.0		<5.0	e	<5.0		<2.0	
Major Cations														
Calcium	mg/L	0.50	--	10	--	--	--		**4.6**		--		**--**	
Magnesium	mg/L	0.50	--	2.1	--	--	--		**1.1**		--		**--**	
Potassium	mg/L	0.50	--	2.0	--	--	--		<0.50	e	--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**0.61**	e	--		--	
General														
Hardness	mg/L	3.0	--	32	--	--	--		**16**		--		**--**	
TDS	mg/L	50	200	200	200	200	**66**		<50		<50		**76**	

2018
Mine Permit Surface Water Quality Monitoring Data
CDRM004 (Reference)
Eagle Mine

Parameter	Unit	Permit RL	CDRM004 Seasonal Benchmark				CDRM004 Data (Q1-Q4 2018)							
			Q1	Q2	Q3	Q4	Q1 2018		Q2 2018		Q3 2018		Q4 2018	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/22/18		5/22/18		8/6/18		10/31/18	
Field														
D.O.	ppm	--	--	--	--	--	**14**		**11**		**10**		**12**	
Flow	cfs	--	--	--	--	--	**16**		**11**		**13**		**18**	
pH	SU	--	7.1-8.1	7.2-8.2	7.2-8.2	7.2-8.2	**7.3**		**7.5**		**7.8**		**7.3**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**124**		**132**		**155**		**103**	
Temperature	°C	--	--	--	--	--	**0.0**		**10**		**15**		**4.9**	
Metals														
Aluminum	ug/L	50	--	258	--	--	--		<50	e	--		--	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	**1.4**		**1.5**		**2.6**		**1.3**	
Barium	ug/L	10	--	40	--	--	--		**12**		--		--	
Beryllium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Boron	ug/L	50	200	200	200	200	<50	e	<50		<50		<50	
Cadmium	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Cobalt	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Copper	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Iron	ug/L	20	120	358	309	195	**273**		**107**	e	**163**		**119**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	57	44	96	**28**	e	**16**		**18**	e	<10	
Mercury	ng/L	0.50	2.0	8.1	2.0	2.0	**1.7**		**1.2**		**0.77**		**1.4**	
Molybdenum	ug/L	10	--	40	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Selenium	ug/L	2.0	8.0	8.0	8.0	8.0	<2.0		<2.0		<2.0		<2.0	e
Silver	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Zinc	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	85	--	--	--		**66**	a	--		--	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		**1.4**		--		--	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.05	--	0.20	--	--	--		**0.10**	e	--		--	
Sulfate	mg/L	1.0	6.6	4.0	4.0	4.0	<1.0		<1.0	e	<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	25	--	--	--		**18**		--		--	
Magnesium	mg/L	0.50	--	4.0	--	--	--		**3.4**		--		--	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.67**	e	--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**1.2**	e	--		--	
General														
Hardness	mg/L	3.0	--	80	--	--	--		**59**		--		--	
TDS	mg/L	50	200	200	200	200	**106**		**84**		**102**		**62**	

2018
Mine Permit Surface Water Quality Monitoring Data
Abbreviations & Data Qualifiers
Eagle Mine

Footnote	Explanation
a	Estimated value. Duplicate precision for this parameter exceeded quality control limit.
b	Estimated value. Sample received after EPA established hold time expired.
e	Estimated value. The laboratory statement of data qualifications indicates that a quality control limit for this parameter was exceeded.
NM	Not measured.
p	Pending. Some parameters/locations require additional baseline data to calculate a benchmark.
R	Measured value was rejected based on quality control procedures.
RL	Laboratory reporting limit.
s	Potential false positive value. Compound present in blank sample.
t	Trending. Benchmarks are not proposed for baseline datasets that appear to be trending because the data do not represent a random distribution about the baseline mean. Trend analysis is recommended in place of benchmark screening for parameters that appear to be trending.
	Value is equal to or above site-specific benchmark at a compliance monitoring.

Appendix K

Eagle Mine

Surface Water Monitoring

Trend Analysis Summary & Trending Charts

2018 Mine Permit Surface Water
Trend Analysis Summary
Eagle Mine

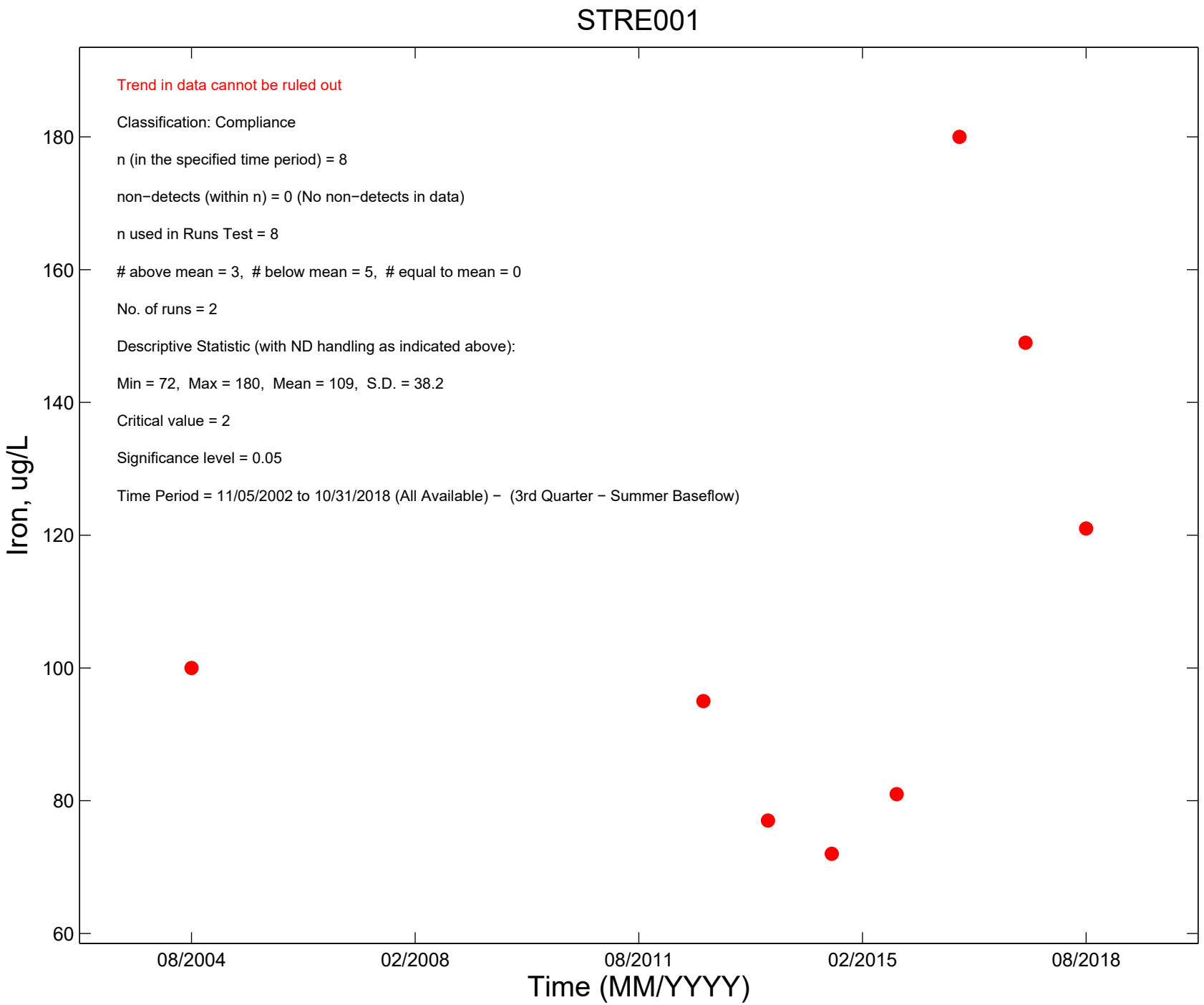
Location	Quarter	Classification	Parameter	Unit	# Samples	# NDs	Non-detects handling	# used in Runs Test	Min	Max	Mean	St. Dev.	# Above Mean	# Below Mean	# Equal Mean	# Runs	Criti- cal value	Sig level	Trend Present	Remarks
STRE005	1	Compliance	Sulfate	mg/L	7	2	Included as RL	7	1.000	5.50	3.00	1.80	4	3	0	2	2	0.10	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE005	1	Compliance	TDS	mg/L	7	0	No NDs	7	54.0	82.0	69.0	10.00	3	4	0	2	2	0.10	Y	
STRM001	1	Background	Sulfate	mg/L	10	9	Included as RL	10	1	7.1	2.4	2.30	3	7	0	2	2	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE001	2	Compliance	Sulfate	mg/L	11	10	Included as RL	11	1	5	2	2.00	2	9	0	2	2	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE002	2	Compliance	Cadmium	ug/L	9	8	Included as RL	9	0.2	0.5	0.2	0.10	2	7	0	2	2	0.10	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE002	2	Compliance	Mercury	ng/L	10	0	No NDs	10	0.9	8.5	3.6	2.54	4	6	0	3	3	0.05	Y	Non-unique RL in data
STRE002	2	Compliance	Zinc	ug/L	9	7	Included as RL	9	10.00	25.00	12.00	5.10	2	7	0	2	2	0.10	Y	
STRE005	2	Compliance	Potassium	mg/L	7	1	Included as RL	7	0.500	0.74	0.599	0.09	2	5	0	2	2	0.10	Y	
STRE005	2	Compliance	Sodium	mg/L	7	1	Included as RL	7	0.500	1.200	0.786	0.22	3	4	0	2	2	0.10	Y	
STRE009	2	Compliance	Calcium	mg/L	7	0	No NDs	7	9.4	15.9	12.7	2.44	5	2	0	2	2	0.10	Y	
STRE009	2	Compliance	Magnesium	mg/L	7	0	No NDs	7	1.90	3.10	2.60	0.50	5	2	0	2	2	0.10	Y	
STRM001	2	Background	Sulfate	mg/L	13	11	Included as RL	13	1	8	3	2.70	4	9	0	2	3	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRM004	2	Compliance	pH	SU	10	0	No NDs	10	7.00	8.30	7.60	0.44	5	5	0	3	3	0.05	Y	
STRM004	2	Compliance	TDS	mg/L	10	2	Included as RL	10	48.00	124.00	69.20	25.40	4	6	0	2	3	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
YDRM002	2	Compliance	Sulfate	mg/L	13	11	Included as RL	13	1.0	8	3	2.60	5	8	0	3	3	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE001	3	Compliance	Iron	ug/L	8	0	No NDs	8	72.0	180.0	109.0	38.20	3	5	0	2	2	0.05	Y	
STRE001	3	Compliance	Manganese	ug/L	8	2	Included as RL	8	10	23	15	4.80	3	5	0	2	2	0.05	Y	
STRE001	3	Compliance	Mercury	ng/L	8	2	Included as RL	8	0.5	2.2	1.0	0.57	3	5	0	2	2	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE001	3	Compliance	Sulfate	mg/L	8	3	Included as RL	8	1	5	3	1.50	5	3	0	2	2	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE005	3	Compliance	Specific Conductance	µS/cm @ 25°C	7	0	No NDs	7	132	160	140	9.59	2	5	0	2	2	0.10	Y	
STRE005	3	Compliance	TDS	mg/L	7	1	Included as RL	7	50.0	154	100	40.40	3	4	0	2	2	0.10	Y	
STRM002	3	Compliance	Iron	ug/L	9	0	No NDs	9	220	580	346	138.00	2	7	0	2	2	0.10	Y	
STRM002	3	Compliance	Manganese	ug/L	9	4	Included as RL	9	10	23	13	5.21	2	7	0	2	2	0.10	Y	
STRM005	3	Compliance	pH	SU	8	0	No NDs	8	7.0	8.1	7.6	0.39	4	4	0	2	2	0.05	Y	
CDRM004	4	Reference	Mercury	ng/L	13	0	No NDs	13	1	2	1	0.51	6	7	0	4	4	0.05	Y	Non-unique RL in data
STRE010	4	Compliance	Mercury	ng/L	8	0	No NDs	8	1	2	1	0.46	2	6	0	2	2	0.10	Y	
STRM001	4	Background	Sulfate	mg/L	13	12	Included as RL	13	1.000	5.00	2.40	1.80	4	9	0	2	3	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)

Mine Permit Surface Water Trend Analysis
Notes and Abbreviations Used in Statistical Summary Tables
Eagle Mine

Abbreviation	Explanation
Y	Null hypothesis that the sequence was produced in a random manner cannot be accepted at the indicated significance level (i.e., a trend in data cannot be ruled out).
N	Null hypothesis that the sequence was produced in a random manner cannot be rejected at the indicated significance level (i.e., a trend in data not indicated).
ND	Non detect (reported concentration was below the analytical reporting limit).
RL	Reporting limit.
TF	Too few observations to run the test.
TFA	Too few observations remaining after exclusion of values equal to mean.
TFPN	Too few + or - values in the logic series (n1 or n2 = 1).

Notes:

Trends that have inconsistent RLs or >50% NDs are typically rejected.
Trend analysis period is baseline through Q4 2018.


STRE001
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 8
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 8
above mean = 3, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 72, Max = 180, Mean = 109, S.D. = 38.2
Critical value = 2
Significance level = 0.05
Time Period = 11/05/2002 to 10/31/2018 (All Available) − (3rd Quarter − Summer Baseflow)
Iron, ug/L
180
160
140
120
100
80
60
08/2004
02/2008
08/2011
02/2015
08/2018
Time (MM/YYYY)

Appendix L

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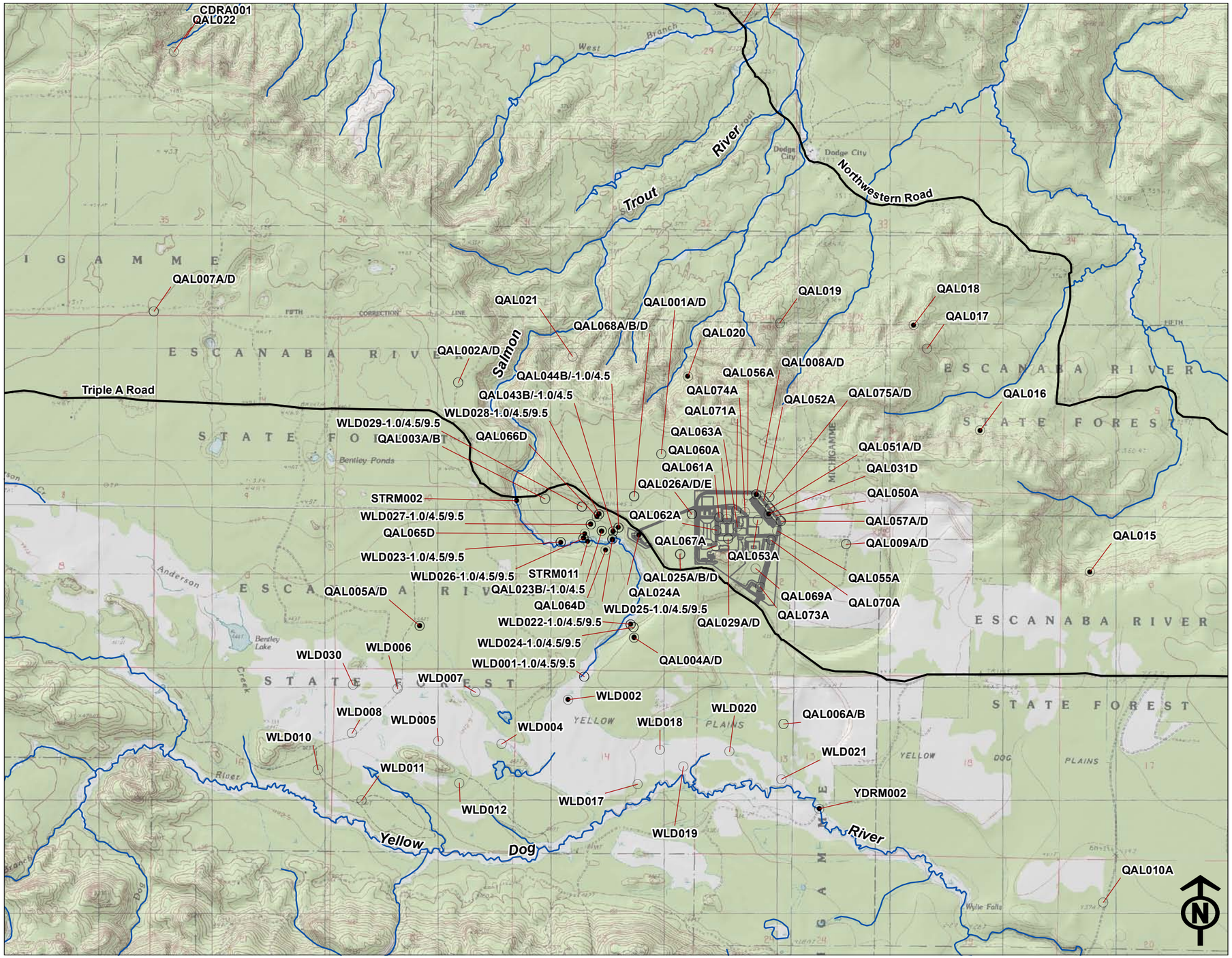
Water Level Monitoring Location Map



MINE PERMIT WATER LEVEL MONITORING LOCATION MAP

- ELEVATION
- *Instrumented for continuous monitoring*
- ROAD
- HYDROGRAPHY
- MINE FACILITY

Reference

Data provided by: Eagle Mine and North Jackson Company

Projection & Datum: UTM NAD 83 Zone 16N

0 — 1 Miles

Scale: 1:36,000

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Appendix M

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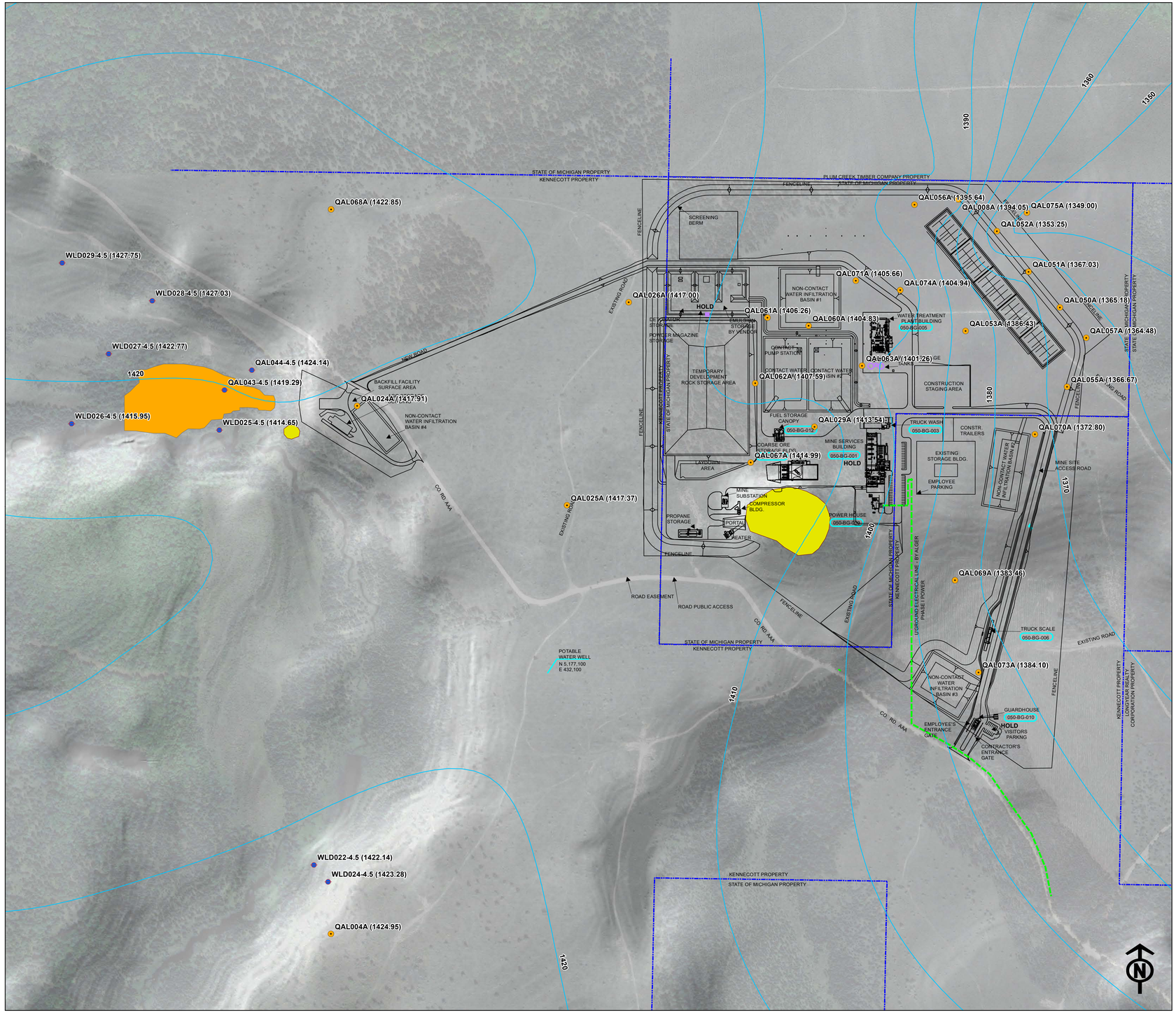
Groundwater Contour Maps



A-ZONE GROUNDWATER ELEVATION CONTOURS WINTER BASEFLOW, FEBRUARY - MARCH 2018

Legend

- Monitoring Well
- Seep Piezometer
- Surface Water Monitoring Location
- Wetland Piezometer
- Stream Elevation Point
  (Source: Digital Elevation Model: 98 ft resolution)
- Groundwater Elevation Contour (10' interval)
- Mine Facilities
- Ore Body
- Outcrop

Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 500 1,000 Feet

1:3,600

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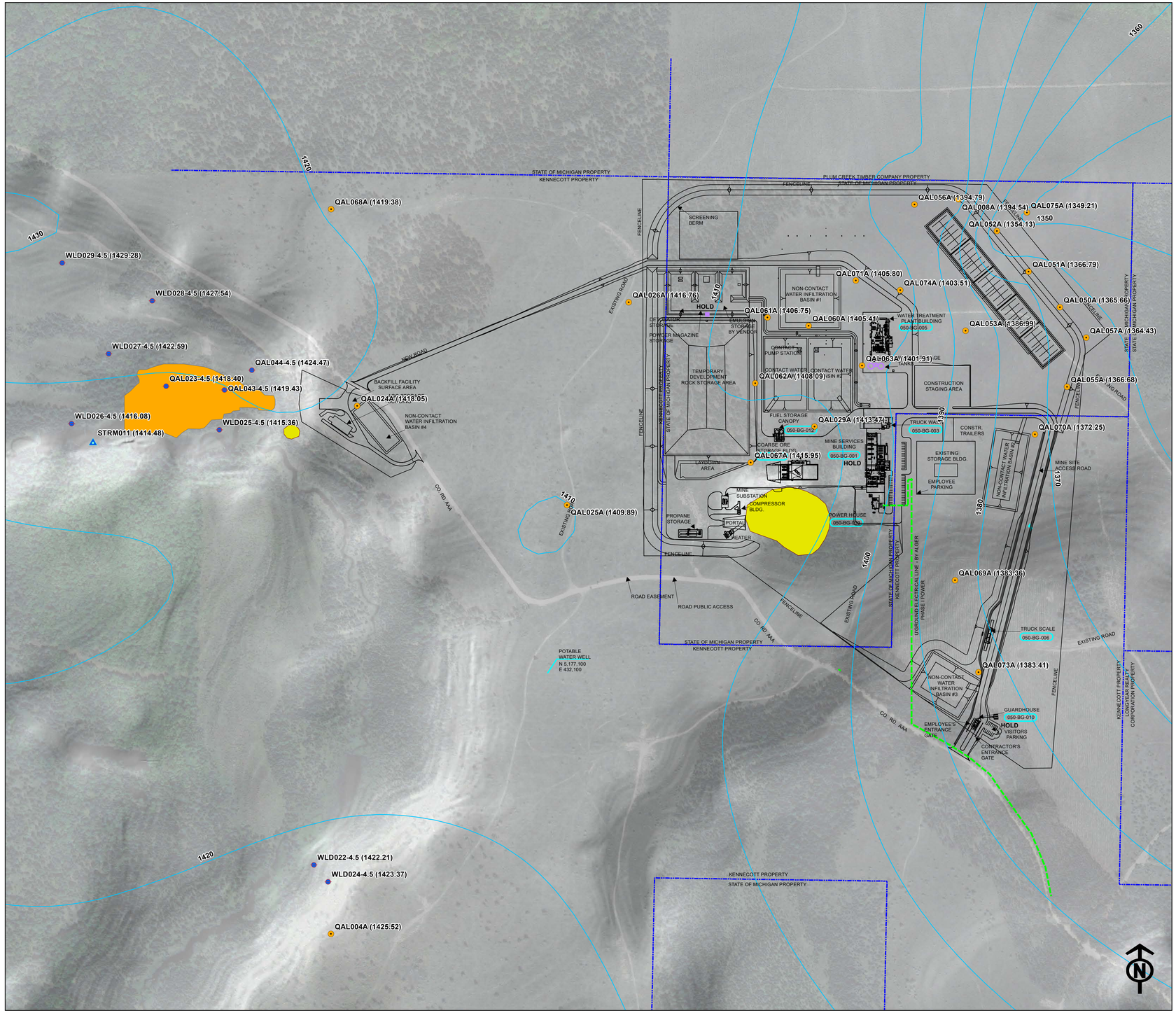
Figure: 1



A-ZONE GROUNDWATER ELEVATION CONTOURS SPRING BASEFLOW, MAY 2018

Legend

- Monitoring Well
- Seep Piezometer
- Surface Water Monitoring Location
- Wetland Piezometer
- Stream Elevation Point
  (Source: Digital Elevation Model: 98 ft resolution)
- Groundwater Elevation Contour (10' interval)
- Mine Facilities
- Ore Body
- Outcrop

Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 500 1,000 Feet

1:3,600

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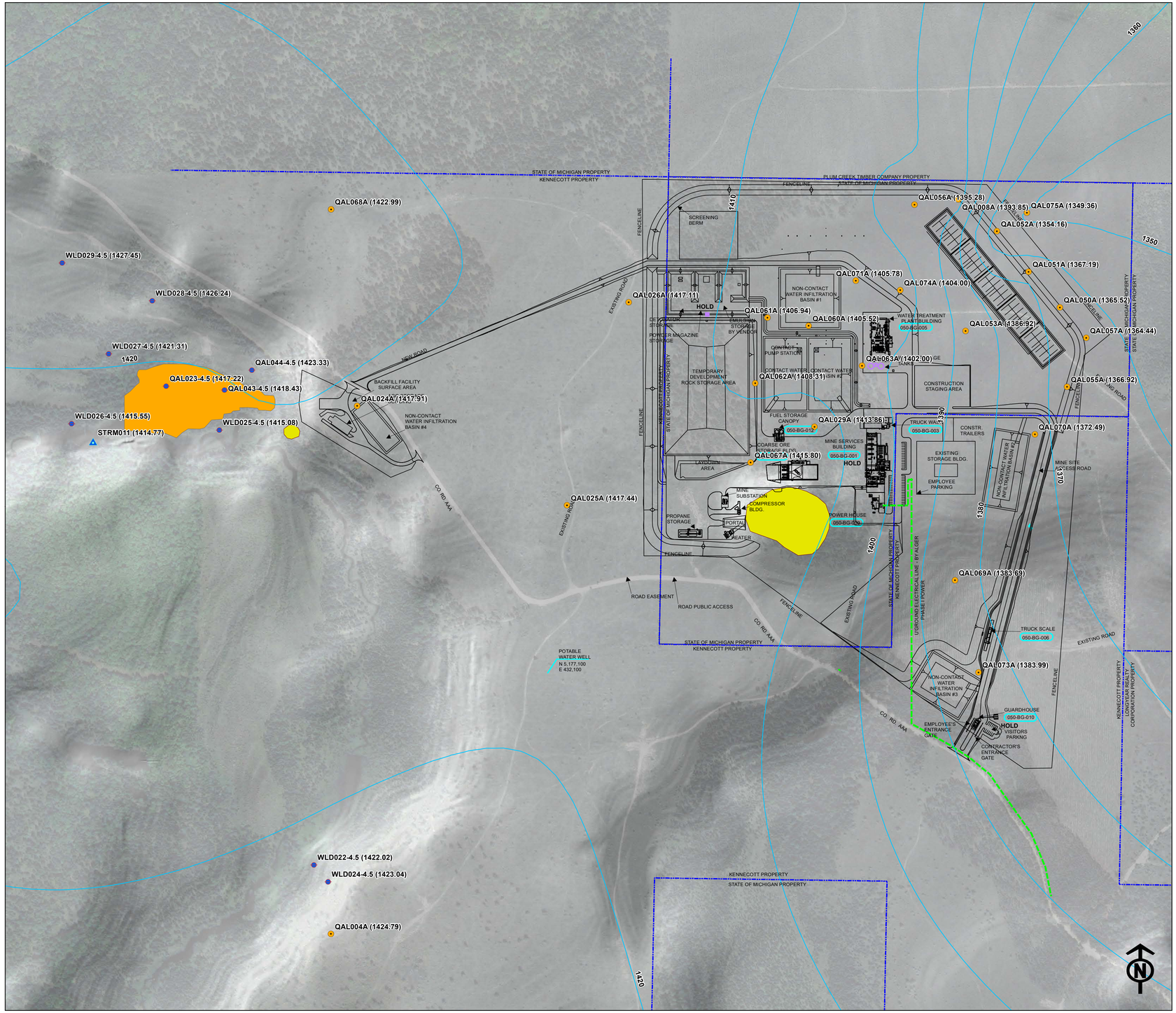
Figure: 1

A-ZONE GROUNDWATER ELEVATION CONTOURS
SUMMER BASEFLOW, AUGUST 2018



Legend

- Monitoring Well
- Seep Piezometer
- Surface Water Monitoring Location
- Wetland Piezometer
- Stream Elevation Point
  (Source: Digital Elevation Model: 98 ft resolution)
- Groundwater Elevation Contour (10' interval)
- Mine Facilities
- Ore Body
- Outcrop

Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 500 1,000 Feet

1:3,600

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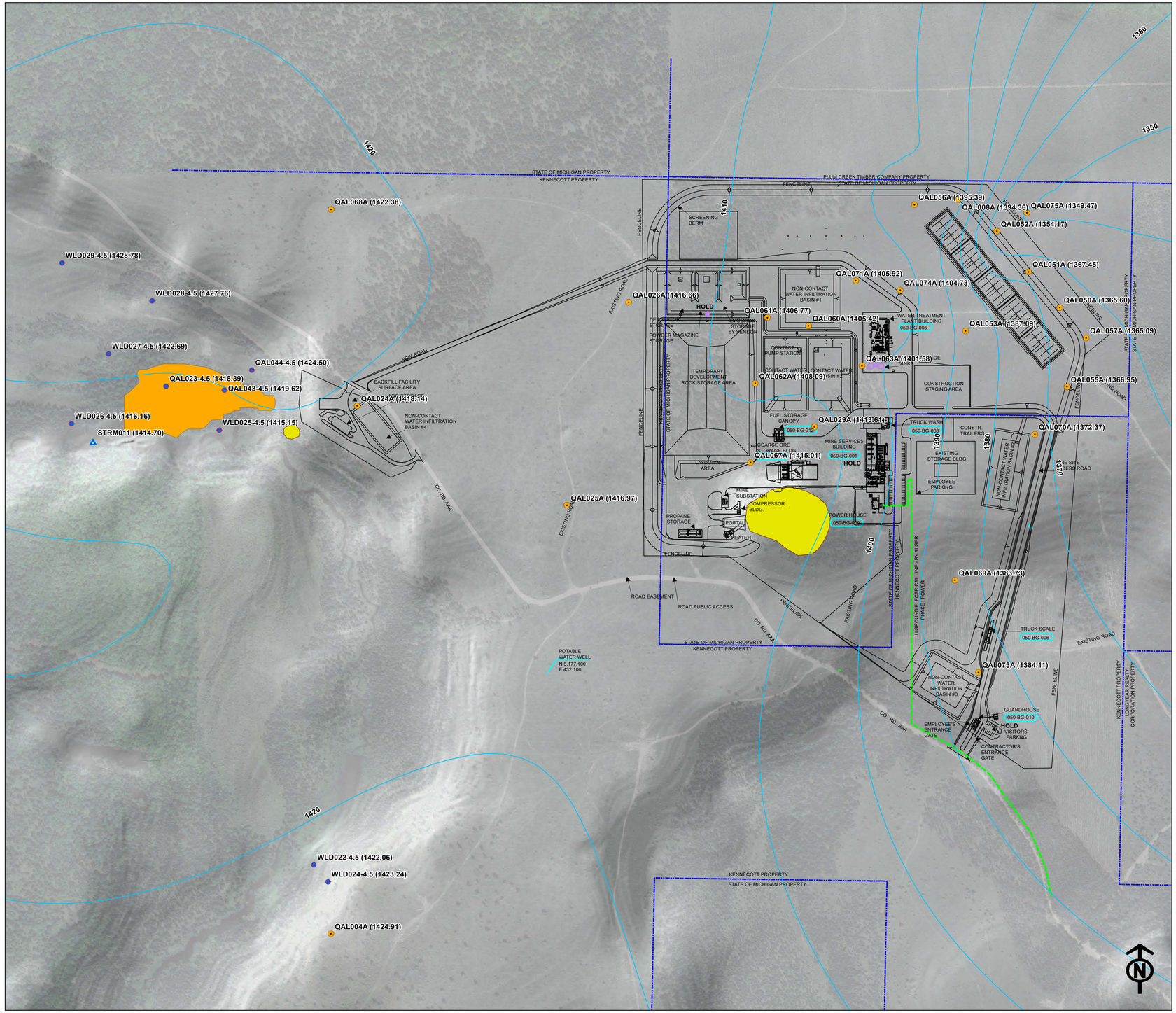
Figure: 1

A-ZONE GROUNDWATER ELEVATION CONTOURS
FALL BASEFLOW, OCTOBER - NOVEMBER 2018



Legend

- Monitoring Well
- Seep Piezometer
- Surface Water Monitoring Location
- Wetland Piezometer
- Stream Elevation Point
  (Source: Digital Elevation Model: 98 ft resolution)
- Groundwater Elevation Contour (10' interval)
- Mine Facilities
- Ore Body
- Outcrop

Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 500 1,000 Feet

1:3,600

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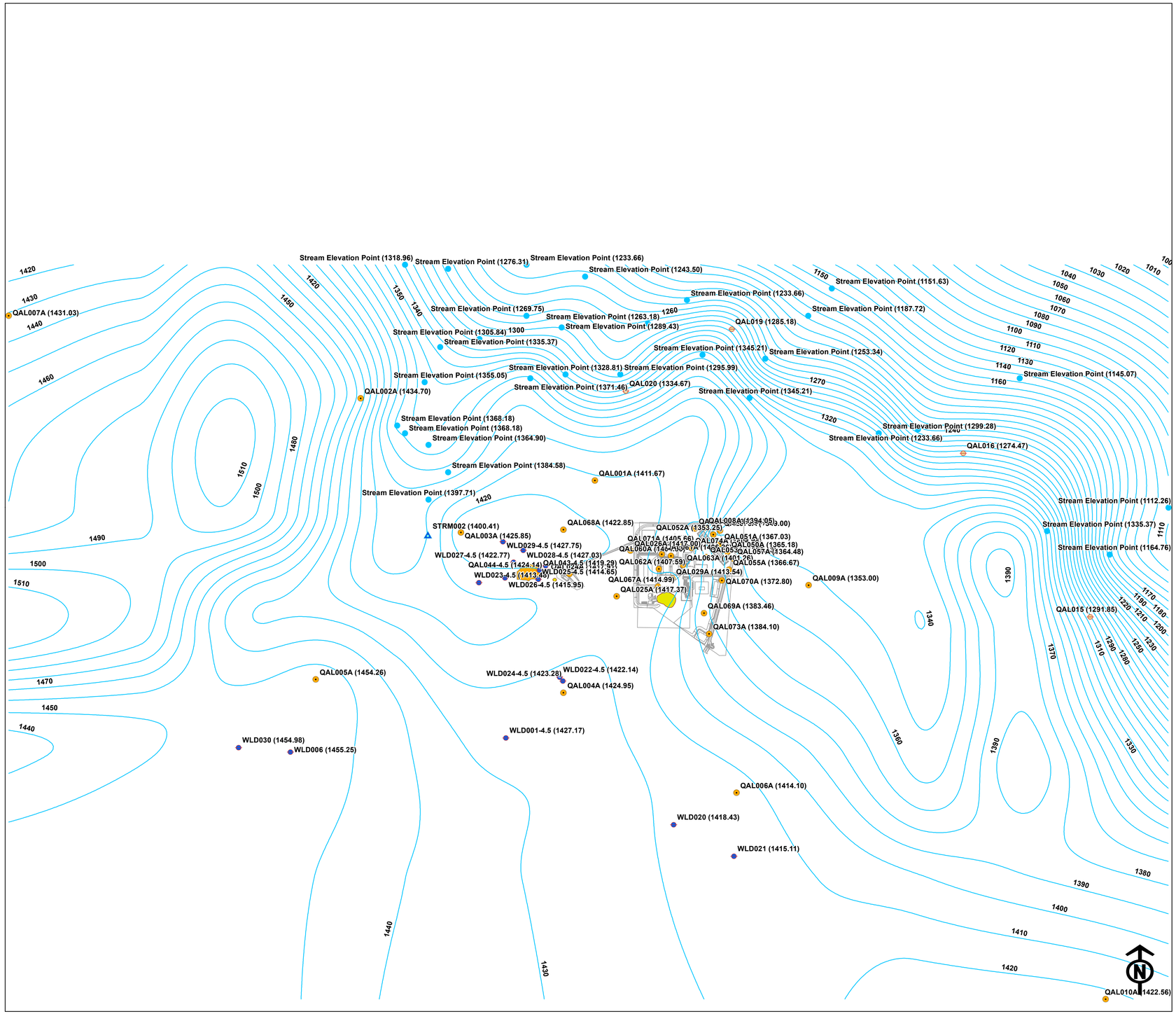
Figure: 1

A-ZONE GROUNDWATER ELEVATION CONTOURS
WINTER BASEFLOW, FEBRUARY - MARCH 2018
HS VIEW



Legend

- Monitoring Well
- Seep Piezometer
- Surface Water Monitoring Location
- Wetland Piezometer
- Stream Elevation Point
  (Source: Digital Elevation Model: 98 ft resolution)
- Groundwater Elevation Contour (10' interval)
- Mine Facilities
- Ore Body
- Outcrop

Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 2,000 4,000 Feet

1:16,000

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Figure: 1

A-ZONE GROUNDWATER ELEVATION CONTOURS SPRING BASEFLOW, MAY 2018 HS VIEW

Legend

- Monitoring Well
- Seep Piezometer
- Surface Water Monitoring Location
- Wetland Piezometer
- Stream Elevation Point
  (Source: Digital Elevation Model: 98 ft resolution)
- Groundwater Elevation Contour (10' interval)
- Mine Facilities
- Ore Body
- Outcrop

Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 2,000 4,000 Feet

1:16,000

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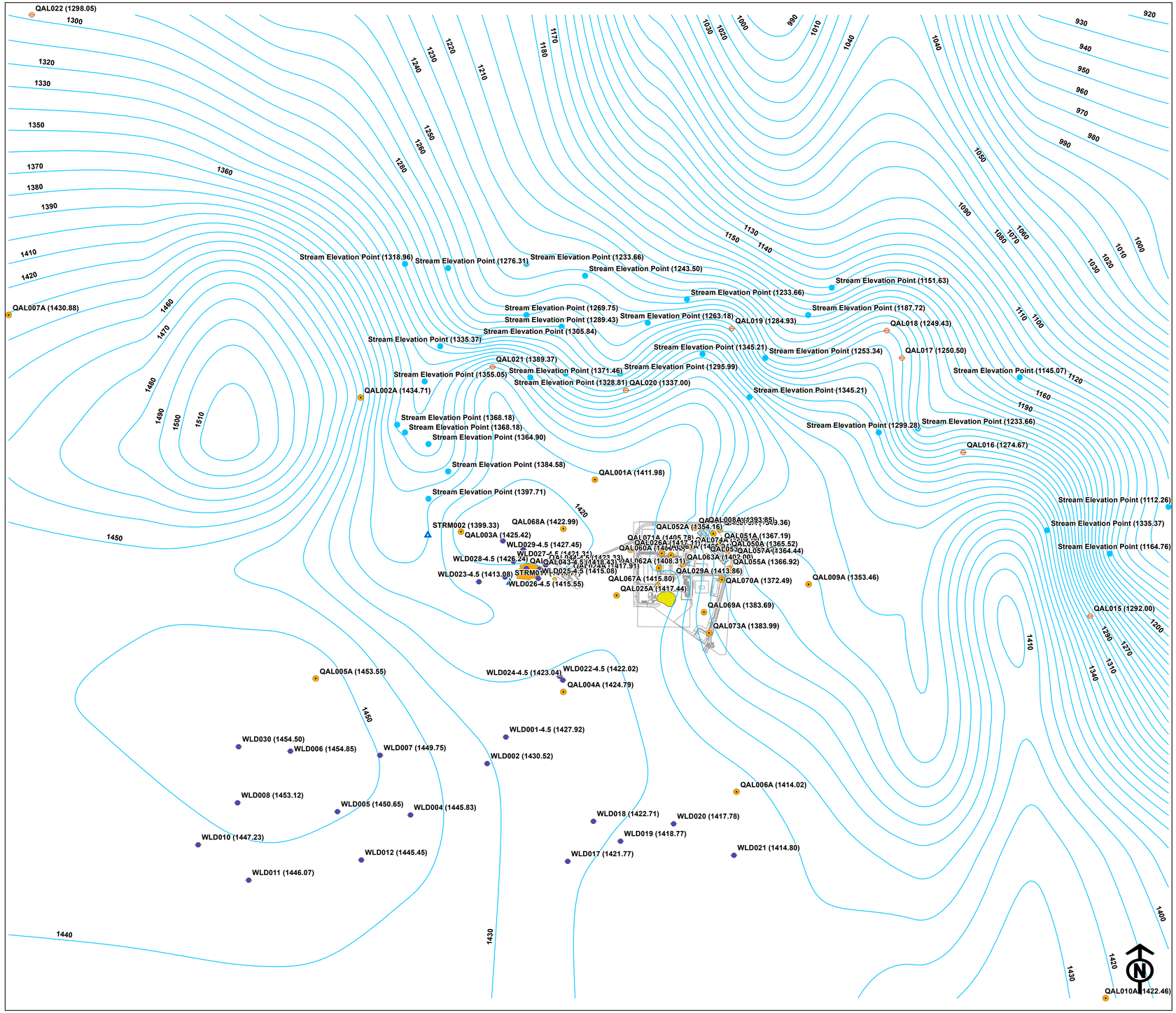
Figure: 1

A-ZONE GROUNDWATER ELEVATION CONTOURS SUMMER BASEFLOW, AUGUST 2018 HS VIEW



Legend

- Monitoring Well
- Seep Piezometer
- Surface Water Monitoring Location
- Wetland Piezometer
- Stream Elevation Point
  (Source: Digital Elevation Model: 98 ft resolution)
- Groundwater Elevation Contour (10' interval)
- Mine Facilities
- Ore Body
- Outcrop

Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 2,000 4,000 Feet

1:16,000

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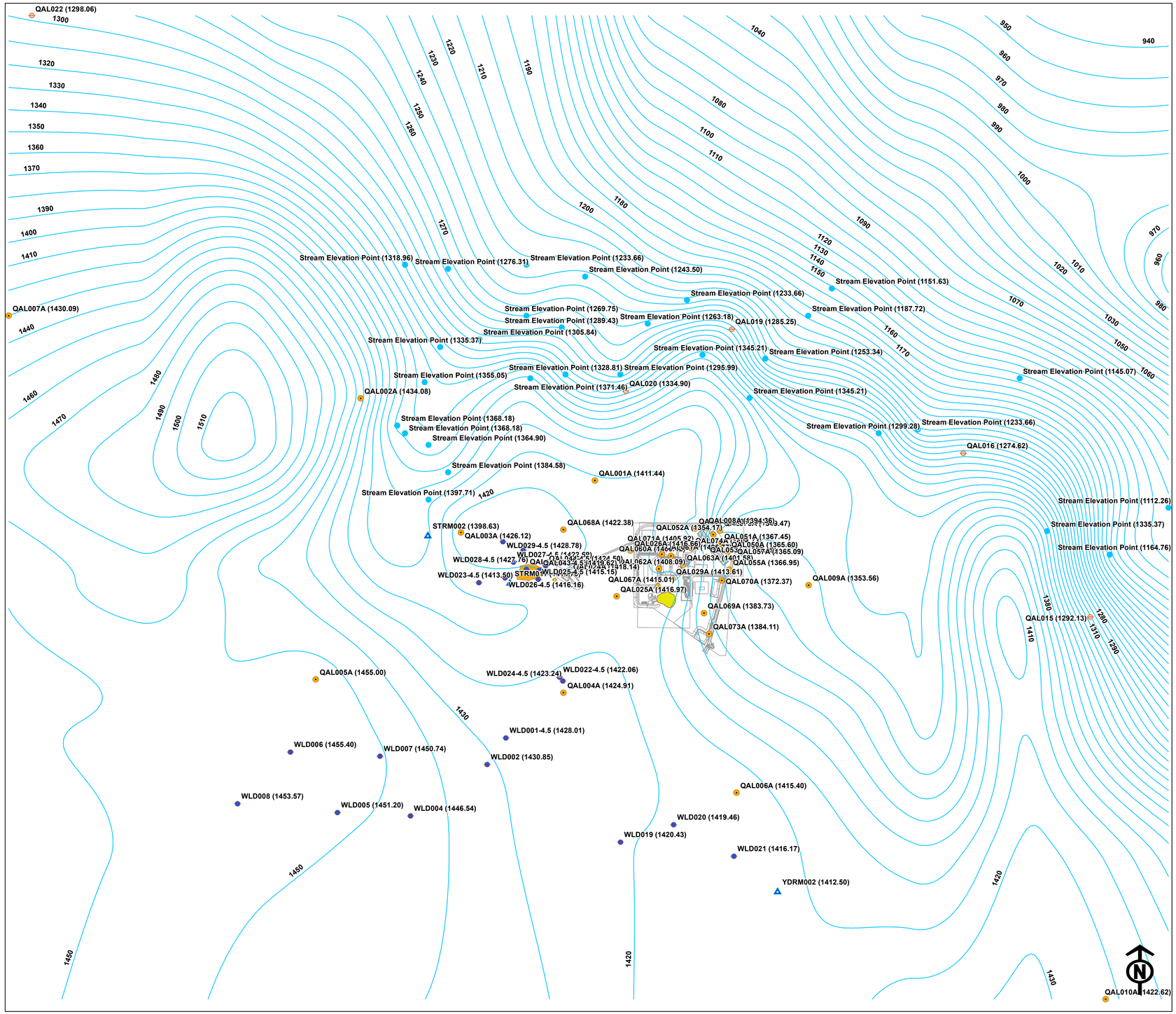
Figure: 1



A-ZONE GROUNDWATER ELEVATION CONTOURS FALL BASEFLOW, OCTOBER - NOVEMBER 2018 HS VIEW

Legend

- Monitoring Well
- Seep Piezometer
- Surface Water Monitoring Location
- Wetland Piezometer
- Stream Elevation Point
  (Source: Digital Elevation Model: 98 ft resolution)
- Groundwater Elevation Contour (10' interval)
- Mine Facilities
- Ore Body
- Outcrop

Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 1,950 3,900 Feet

1:16,000

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Figure: 1

D-ZONE GROUNDWATER ELEVATION CONTOURS
WINTER BASEFLOW, FEBRUARY - MARCH 2018

Legend

- Monitoring Well
- Seep Piezometer
- Surface Water Monitoring Location
- Wetland Piezometer
- Stream Elevation Point
  (Source: Digital Elevation Model: 98 ft resolution)
- Groundwater Elevation Contour (10' interval)
- Mine Facilities
- Ore Body
- Outcrop

Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 500 1,000 Feet

1:3,600

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Figure: 1

D-ZONE GROUNDWATER ELEVATION CONTOURS SPRING BASEFLOW, MAY 2018

Legend

- Monitoring Well
- Seep Piezometer
- Surface Water Monitoring Location
- Wetland Piezometer
- Stream Elevation Point
  (Source: Digital Elevation Model: 98 ft resolution)
- Groundwater Elevation Contour (10' interval)
- Mine Facilities
- Ore Body
- Outcrop

Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 500 1,000 Feet

1:3,600

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Figure: 1

D-ZONE GROUNDWATER ELEVATION CONTOURS SUMMER BASEFLOW, AUGUST 2018

Legend

- Monitoring Well
- Seep Piezometer
- Surface Water Monitoring Location
- Wetland Piezometer
- Stream Elevation Point
  (Source: Digital Elevation Model: 98 ft resolution)
- Groundwater Elevation Contour (10' interval)
- Mine Facilities
- Ore Body
- Outcrop

Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 500 1,000 Feet

1:3,600

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Figure: 1

D-ZONE GROUNDWATER ELEVATION CONTOURS
FALL BASEFLOW, OCTOBER - NOVEMBER 2018

Legend

- Monitoring Well
- Seep Piezometer
- Surface Water Monitoring Location
- Wetland Piezometer
- Stream Elevation Point
  (Source: Digital Elevation Model: 98 ft resolution)
- Groundwater Elevation Contour (10' interval)
- Mine Facilities
- Ore Body
- Outcrop

Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 500 1,000 Feet

1:3,600

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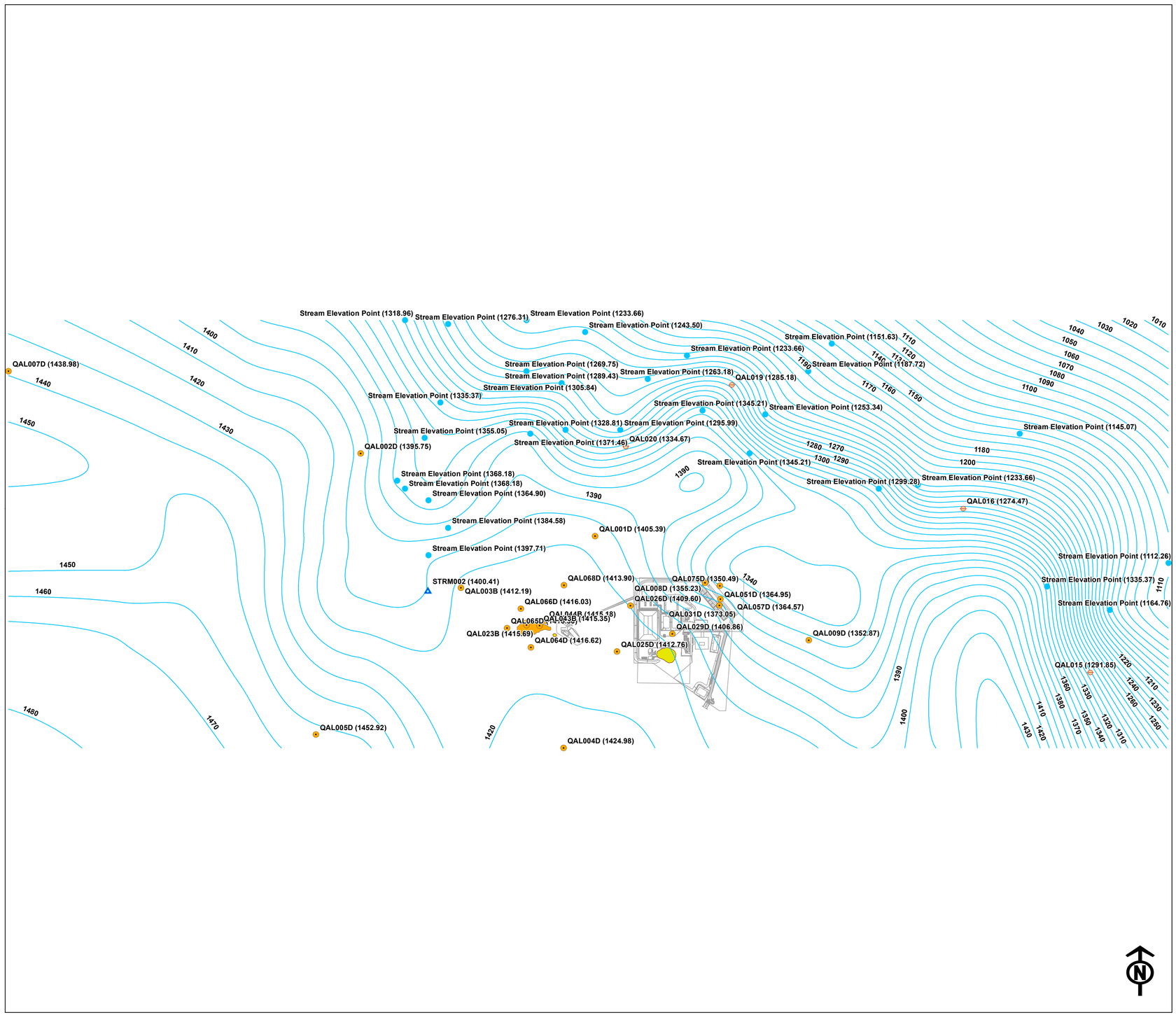
Figure: 1



D-ZONE GROUNDWATER ELEVATION CONTOURS
WINTER BASEFLOW, FEBRUARY - MARCH 2018
HS VIEW

Legend

- Monitoring Well
- Seep Piezometer
- Surface Water Monitoring Location
- Wetland Piezometer
- Stream Elevation Point
  (Source: Digital Elevation Model: 98 ft resolution)
- Groundwater Elevation Contour (10' interval)
- Mine Facilities
- Ore Body
- Outcrop

Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 2,000 4,000 Feet

1:16,000

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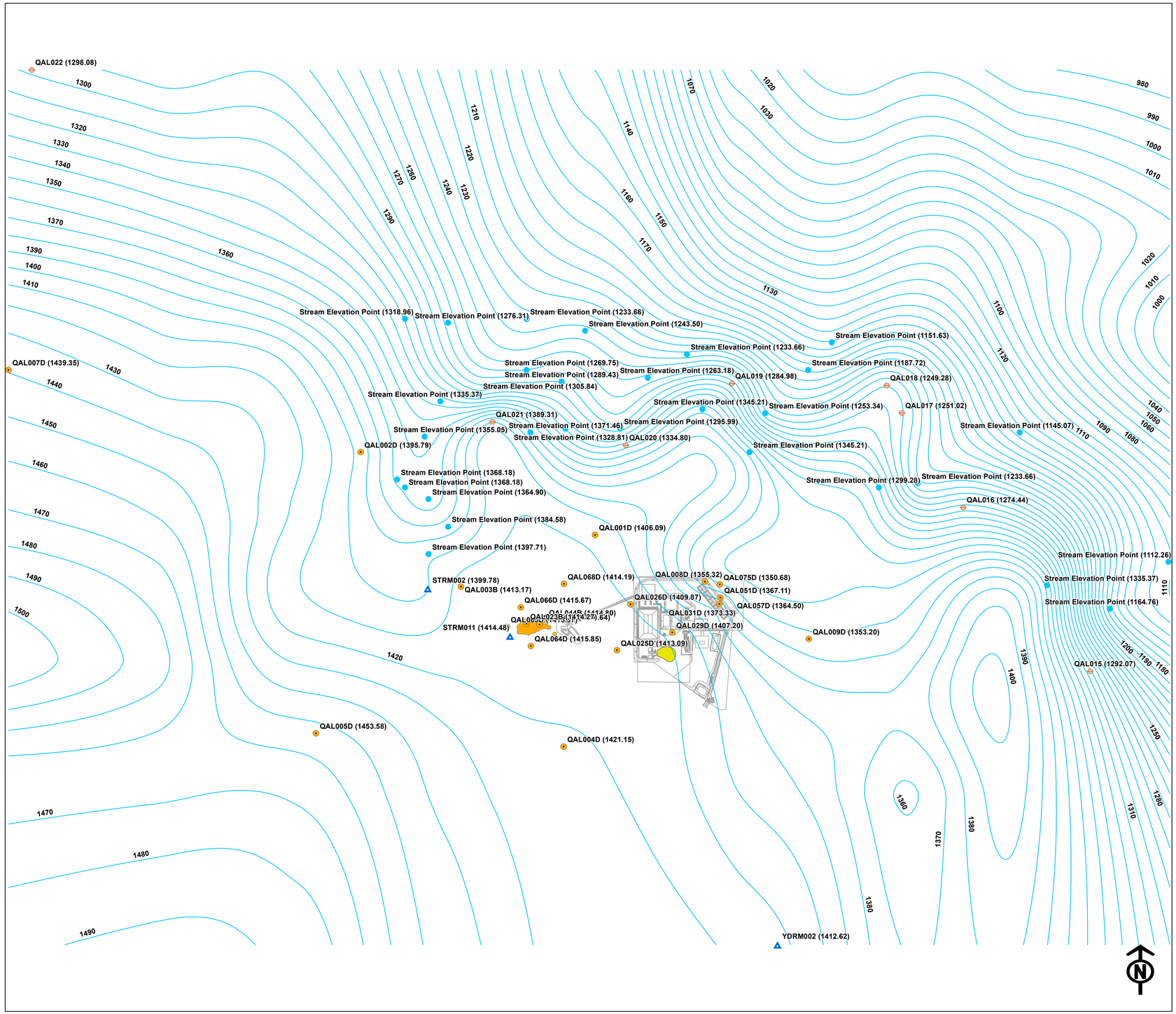
Figure: 1

D-ZONE GROUNDWATER ELEVATION CONTOURS
SPRING BASEFLOW, MAY 2018
HS VIEW



Legend

- Monitoring Well
- Seep Piezometer
- Surface Water Monitoring Location
- Wetland Piezometer
- Stream Elevation Point
  (Source: Digital Elevation Model: 98 ft resolution)
- Groundwater Elevation Contour (10' interval)
- Mine Facilities
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- Outcrop

Reference

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Projection & Datum: UTM NAD 83 Zone 16N

0 2,000 4,000 Feet

1:16,000

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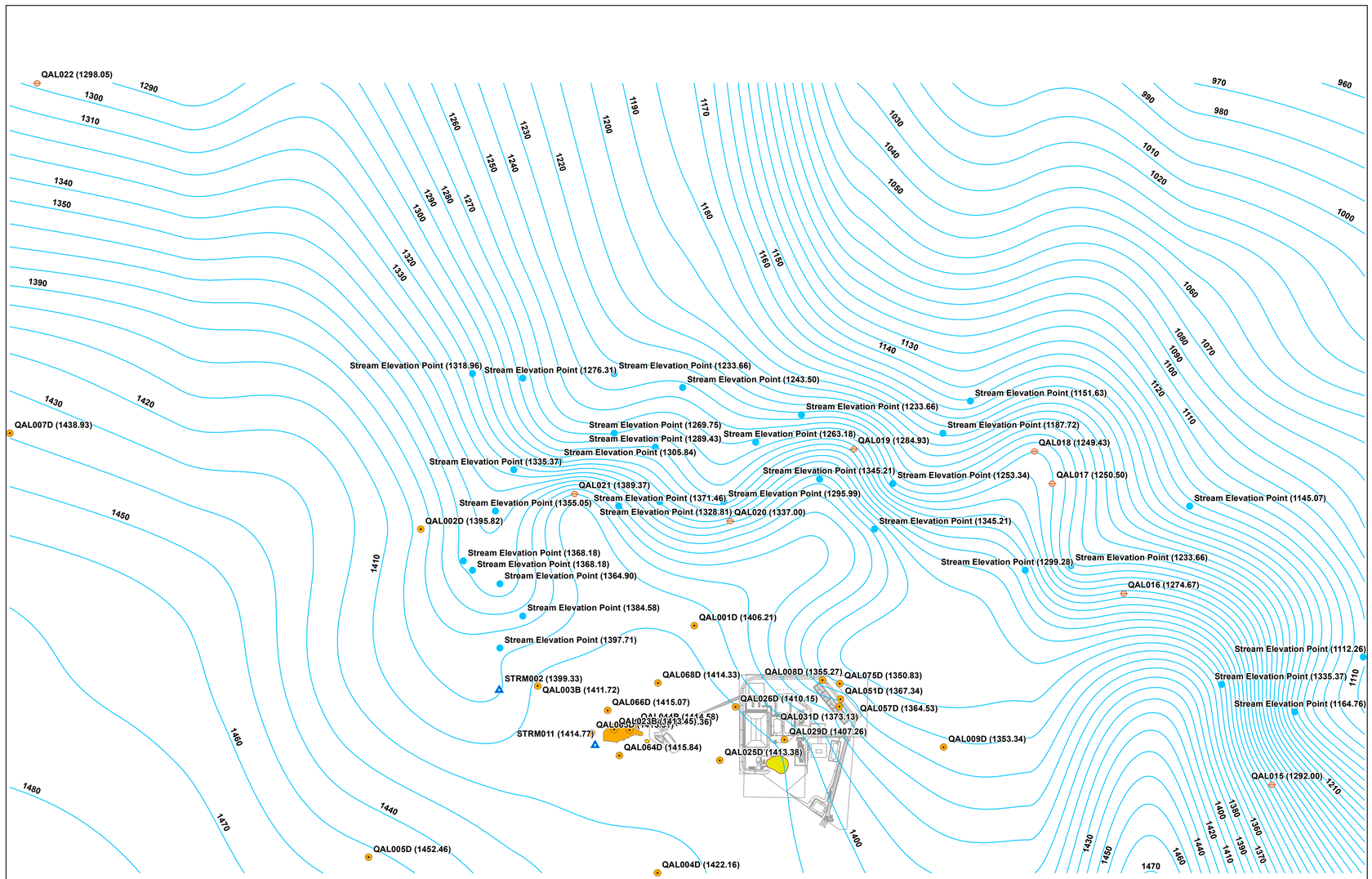
Figure: 1

D-ZONE GROUNDWATER ELEVATION CONTOURS
SUMMER BASEFLOW, AUGUST 2018
HS VIEW



Legend

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Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 2,000 4,000 Feet

1:16,000

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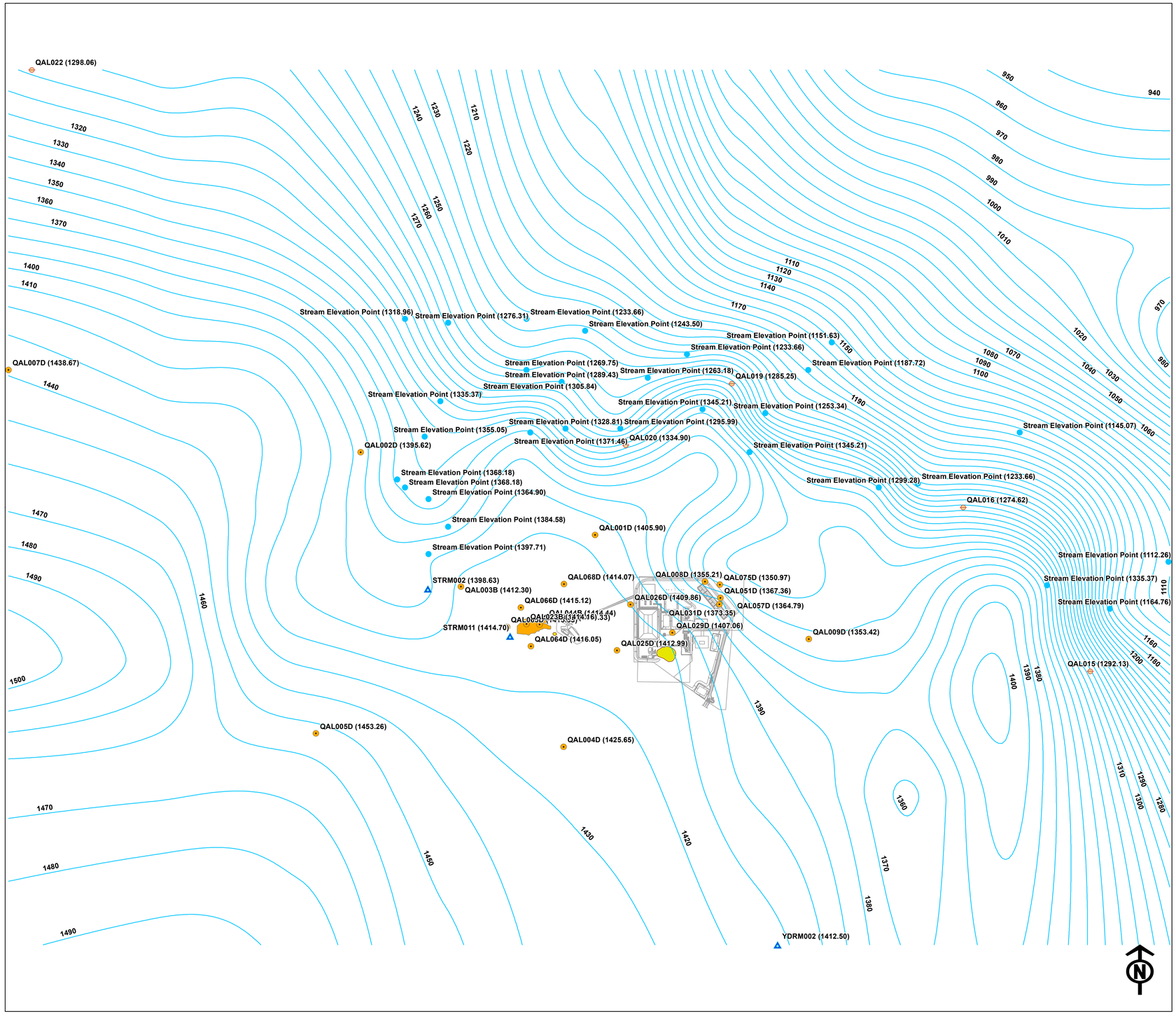
Figure: 1

D-ZONE GROUNDWATER ELEVATION CONTOURS
FALL BASEFLOW, OCTOBER - NOVEMBER 2018
HS VIEW



Legend

- Monitoring Well
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  (Source: Digital Elevation Model: 98 ft resolution)
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Reference

Data provided by: Eagle Mine and North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 2,000 4,000 Feet

1:16,000

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Figure: 1

Appendix N

Eagle Mine

Continuous Groundwater Level Results

2018 Water Year
Continuous Monitoring Results
Monitoring Well Locations
Eagle Mine

	QAL023B	QAL024A	QAL044B	QAL064D	QAL065D	QAL066D
Background						
Mean	1416.9	1417.8	1416.2	1418.7	1417.1	1416.9
Standard Dev.	0.4	0.4	0.4	0.7	0.4	0.3
Minimum	1415.7	1417.2	1414.9	1415.7	1416.1	1416.1
Maximum	1417.6	1418.5	1416.9	1419.6	1417.8	1417.5
Oct-17						
Mean	1415.5	1417.3	1414.7	1416.2	1416.2	1415.6
Minimum	1415.4	1417.3	1414.5	1415.9	1416.1	1415.5
Maximum	1415.7	1417.4	1414.9	1416.5	1416.6	1415.9
Nov-17						
Mean	1415.4	1417.7	1414.8	1416.3	1416.4	1415.7
Minimum	1414.1	1417.5	1414.5	1416.0	1416.0	1415.3
Maximum	1415.8	1417.9	1415.0	1416.6	1416.6	1415.9
Dec-17						
Mean	1415.7	1418.0	1415.0	1416.4	1416.4	1415.9
Minimum	1415.6	1417.9	1414.8	1416.1	1416.3	1415.7
Maximum	1415.9	1418.0	1415.1	1416.7	1416.6	1416.0
Jan-18						
Mean	1414.7	1417.9	1414.8	1416.0	1416.0	1415.7
Minimum	1413.6	1417.9	1414.5	1415.5	1415.5	1415.3
Maximum	1415.8	1418.0	1415.2	1416.5	1416.4	1416.1
Feb-18						
Mean	1415.6	1417.8	1415.0	1416.1	1416.2	1415.9
Minimum	1415.4	1417.8	1414.8	1415.7	1416.1	1415.8
Maximum	1415.8	1417.9	1415.3	1416.5	1416.3	1416.1
Mar-18						
Mean	1415.6	1417.6	1415.0	1416.1	1416.1	1415.9
Minimum	1415.5	1417.5	1414.8	1415.8	1416.0	1415.8
Maximum	1415.7	1417.7	1415.1	1416.5	1416.3	1416.0
Apr-18						
Mean	1415.3	1417.4	1415.0	1416.0	1416.1	1415.8
Minimum	1414.0	1417.4	1414.8	1415.7	1415.8	1415.5
Maximum	1415.7	1417.5	1415.2	1416.3	1416.3	1416.0

2018 Water Year
Continuous Monitoring Results
Monitoring Well Locations
Eagle Mine

	QAL023B	QAL024A	QAL044B	QAL064D	QAL065D	QAL066D
Background						
Mean	1416.9	1417.8	1416.2	1418.7	1417.1	1416.9
Standard Dev.	0.4	0.4	0.4	0.7	0.4	0.3
Minimum	1415.7	1417.2	1414.9	1415.7	1416.1	1416.1
Maximum	1417.6	1418.5	1416.9	1419.6	1417.8	1417.5
May-18						
Mean	1414.3	1417.6	1415.0	1415.9	1416.0	1415.7
Minimum	1414.1	1417.4	1414.8	1415.6	1415.8	1415.6
Maximum	1414.5	1417.9	1415.1	1416.1	1416.2	1415.9
Jun-18						
Mean	1414.3	1418.0	1414.9	1416.1	1416.0	1415.6
Minimum	1414.2	1417.9	1414.7	1415.7	1415.8	1415.3
Maximum	1414.6	1418.1	1415.1	1416.7	1416.3	1415.8
Jul-18						
Mean	1414.2	1418.0	1414.7	1416.1	1415.8	1415.3
Minimum	1413.9	1417.9	1414.6	1415.9	1415.6	1415.1
Maximum	1414.4	1418.1	1414.9	1416.4	1416.0	1415.5
Aug-18						
Mean	1414.0	1417.7	1414.6	1415.8	1415.5	1415.0
Minimum	1413.9	1417.7	1414.4	1415.6	1415.3	1414.9
Maximum	1414.1	1417.9	1414.7	1416.0	1415.7	1415.2
Sep-18						
Mean	1414.1	1417.6	1414.5	1415.9	1415.6	1415.1
Minimum	1414.0	1417.6	1414.4	1415.8	1415.4	1415.0
Maximum	1414.2	1417.7	1414.7	1416.1	1415.7	1415.2

Source: North Jackson Company, REACH System

* All results are calculated based on mean daily values from continuous monitoring.

NM = Not measured because water in well column was frozen.

Results in red indicate values outside of the background range.

2018 Water Year
Continuous Monitoring Results
Wetland Monitoring Locations
Eagle Mine

	WLD022-4.5	WLD023-4.5	WLD025-4.5	WLD025-9.5	WLD026-4.5	WLD026-9.5	WLD027-4.5	WLD027-9.5	WLD028-4.5	WLD028-9.5
Background										
Mean	1422.6	1413.5	1415.5	1415.9	1416.3	1416.2	1422.1	1422.2	1427.2	1427.0
Standard Dev.	0.2	0.5	0.3	0.2	0.3	0.3	0.7	0.7	0.5	0.5
6'' limit	1421.6	1411.4	1414.3	1414.6	1415.3	1415.3	1419.8	1419.8	1424.5	1424.7
Minimum	1422.1	1411.9	1414.8	1415.1	1415.8	1415.8	1420.3	1420.3	1425.0	1425.2
Maximum	1422.9	1414.7	1416.5	1416.7	1417.0	1416.7	1423.1	1423.1	1428.3	1428.3
Oct-17										
Mean	1422.2	1413.5	1415.1	1415.2	1416.5	1416.4	1422.7	1422.7	1427.8	1427.5
Minimum	1422.1	1413.5	1414.9	1415.0	1416.4	1416.3	1422.6	1422.6	1427.6	1427.2
Maximum	1422.4	1413.6	1415.3	1415.4	1416.8	1416.9	1423.0	1423.0	1428.2	1428.0
Nov-17										
Mean	1422.2	1413.5	1415.2	1415.3	1416.5	1416.5	1422.7	1422.7	1427.9	1427.6
Minimum	1422.2	1413.5	1415.1	1415.2	1416.5	1416.4	1422.7	1422.6	1427.9	1427.5
Maximum	1422.3	1413.6	1415.3	1415.4	1416.6	1416.7	1422.8	1422.8	1428.0	1427.7
Dec-17										
Mean	1422.3	1413.5	1415.1	1415.2	1416.4	1416.4	1422.6	1422.6	1427.7	1427.4
Minimum	1422.3	1413.5	1415.1	1415.2	1416.4	1416.3	1422.5	1422.5	1427.6	1427.3
Maximum	1422.4	1413.6	1415.3	1415.4	1416.6	1416.6	1422.9	1422.9	1428.0	1427.7
Jan-18										
Mean	1422.3	1413.5	1415.0	1415.1	1416.3	1416.1	1422.5	1422.5	1427.5	1427.2
Minimum	1422.3	1413.5	1415.0	1415.0	1416.3	1416.1	1422.5	1422.5	1427.4	1427.2
Maximum	1422.3	1413.5	1415.1	1415.3	1416.4	1416.2	1422.6	1422.5	1427.6	1427.3
Feb-18										
Mean	1422.2	1413.5	1414.9	1415.0	1416.3	1416.0	1422.5	1422.5	1427.3	1427.1
Minimum	1422.2	1413.5	1414.9	1415.0	1416.3	1416.0	1422.5	1422.5	1427.3	1427.1
Maximum	1422.3	1413.5	1415.0	1415.2	1416.3	1416.1	1422.5	1422.5	1427.4	1427.2
Mar-18										
Mean	1422.1	1413.5	1414.9	1415.1	1416.3	1416.0	1422.5	1422.5	1427.3	1427.1
Minimum	1422.1	1413.4	1414.8	1415.0	1416.3	1416.0	1422.5	1422.5	1427.3	1427.1
Maximum	1422.2	1413.5	1415.0	1415.2	1416.4	1416.1	1422.7	1422.6	1427.5	1427.3
Apr-18										
Mean	1422.1	1413.5	1415.0	1415.2	1416.4	1416.2	1422.6	1422.6	1427.6	1427.3
Minimum	1422.1	1413.4	1414.9	1415.1	1416.3	1416.0	1422.5	1422.5	1427.4	1427.1
Maximum	1422.2	1413.6	1415.2	1415.4	1416.6	1416.6	1422.9	1422.9	1428.1	1427.8

2018 Water Year
Continuous Monitoring Results
Wetland Monitoring Locations
Eagle Mine

	WLD022-4.5	WLD023-4.5	WLD025-4.5	WLD025-9.5	WLD026-4.5	WLD026-9.5	WLD027-4.5	WLD027-9.5	WLD028-4.5	WLD028-9.5
Background										
Mean	1422.6	1413.5	1415.5	1415.9	1416.3	1416.2	1422.1	1422.2	1427.2	1427.0
Standard Dev.	0.2	0.5	0.3	0.2	0.3	0.3	0.7	0.7	0.5	0.5
6" limit	1421.6	1411.4	1414.3	1414.6	1415.3	1415.3	1419.8	1419.8	1424.5	1424.7
Minimum	1422.1	1411.9	1414.8	1415.1	1415.8	1415.8	1420.3	1420.3	1425.0	1425.2
Maximum	1422.9	1414.7	1416.5	1416.7	1417.0	1416.7	1423.1	1423.1	1428.3	1428.3
May-18										
Mean	1422.2	1413.5	1415.3	1415.3	1416.6	1416.6	1422.7	1422.7	1427.8	1427.6
Minimum	1422.2	1413.4	1415.1	1415.2	1416.4	1416.5	1422.5	1422.5	1427.5	1427.3
Maximum	1422.4	1413.6	1415.6	1415.5	1416.9	1417.0	1423.1	1423.1	1428.3	1428.2
Jun-18										
Mean	1422.2	1413.6	1415.6	1415.6	1416.4	1416.5	1422.5	1422.4	1427.5	1427.2
Minimum	1422.1	1413.4	1415.6	1415.6	1416.3	1416.4	1422.2	1422.2	1427.3	1427.1
Maximum	1422.3	1413.8	1415.7	1415.7	1416.7	1416.8	1422.9	1422.9	1427.8	1427.6
Jul-18										
Mean	1422.1	1413.6	1415.5	1415.4	1416.2	1416.3	1422.1	1422.1	1427.1	1426.9
Minimum	1422.0	1413.4	1415.4	1415.3	1416.1	1416.1	1421.7	1421.6	1426.6	1426.6
Maximum	1422.2	1413.8	1415.7	1415.7	1416.5	1416.6	1422.6	1422.6	1427.6	1427.3
Aug-18										
Mean	1422.0	1413.2	1415.3	1415.2	1416.0	1415.9	1421.4	1421.4	1426.3	1426.3
Minimum	1422.0	1412.9	1415.2	1415.0	1415.7	1415.8	1420.9	1420.9	1425.8	1426.0
Maximum	1422.2	1413.5	1415.5	1415.5	1416.3	1416.2	1422.3	1422.3	1427.2	1426.9
Sep-18										
Mean	1422.1	1413.3	1415.3	1415.2	1416.3	1416.3	1422.4	1422.4	1427.4	1427.1
Minimum	1422.0	1413.1	1415.1	1415.1	1416.1	1416.1	1422.0	1422.0	1427.0	1426.8
Maximum	1422.3	1413.6	1415.6	1415.5	1416.5	1416.5	1422.8	1422.7	1427.7	1427.4

Source: North Jackson Company, REACH System

* All results are calculated based on mean daily values from continuous monitoring.

NM = Not measured because water in well column was frozen.

Results in red indicate values outside of the background range but not below 6" limit.

Appendix O

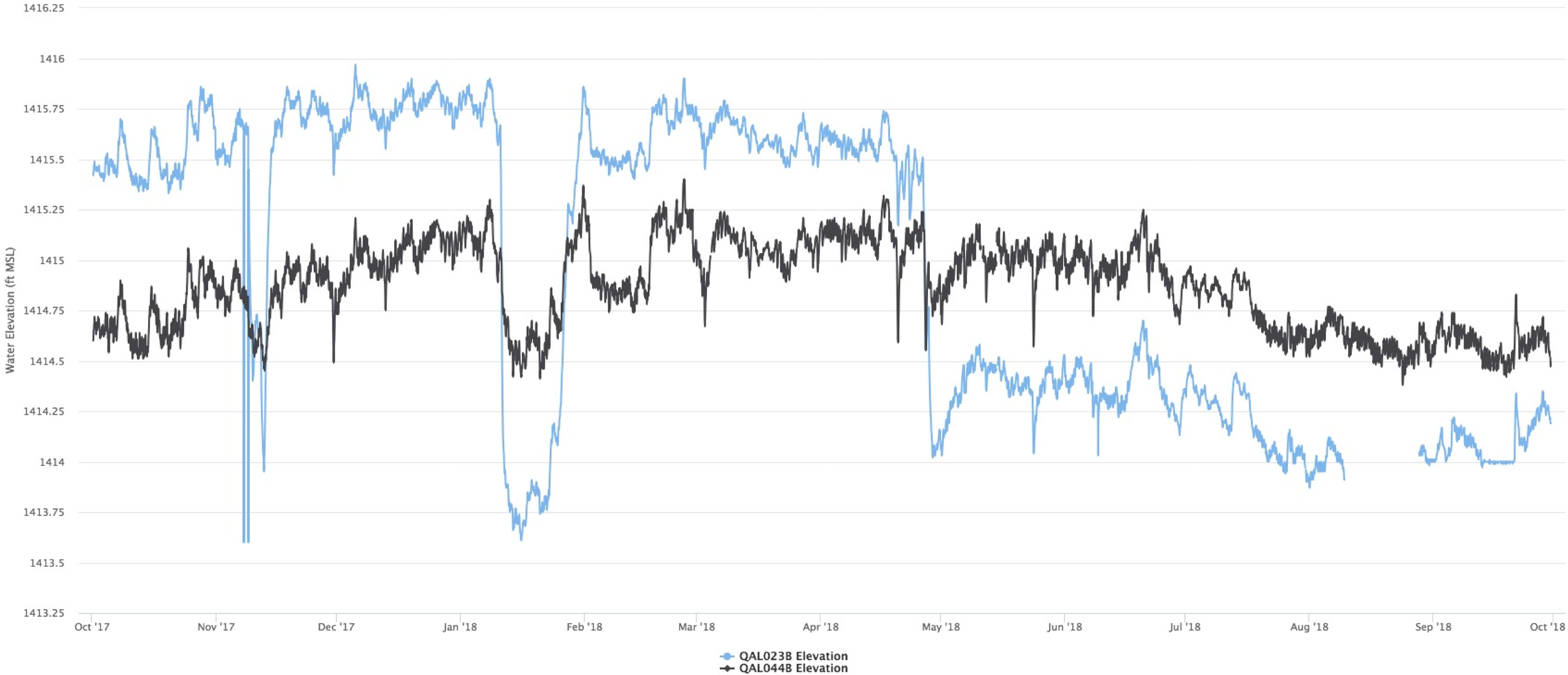
Eagle Mine

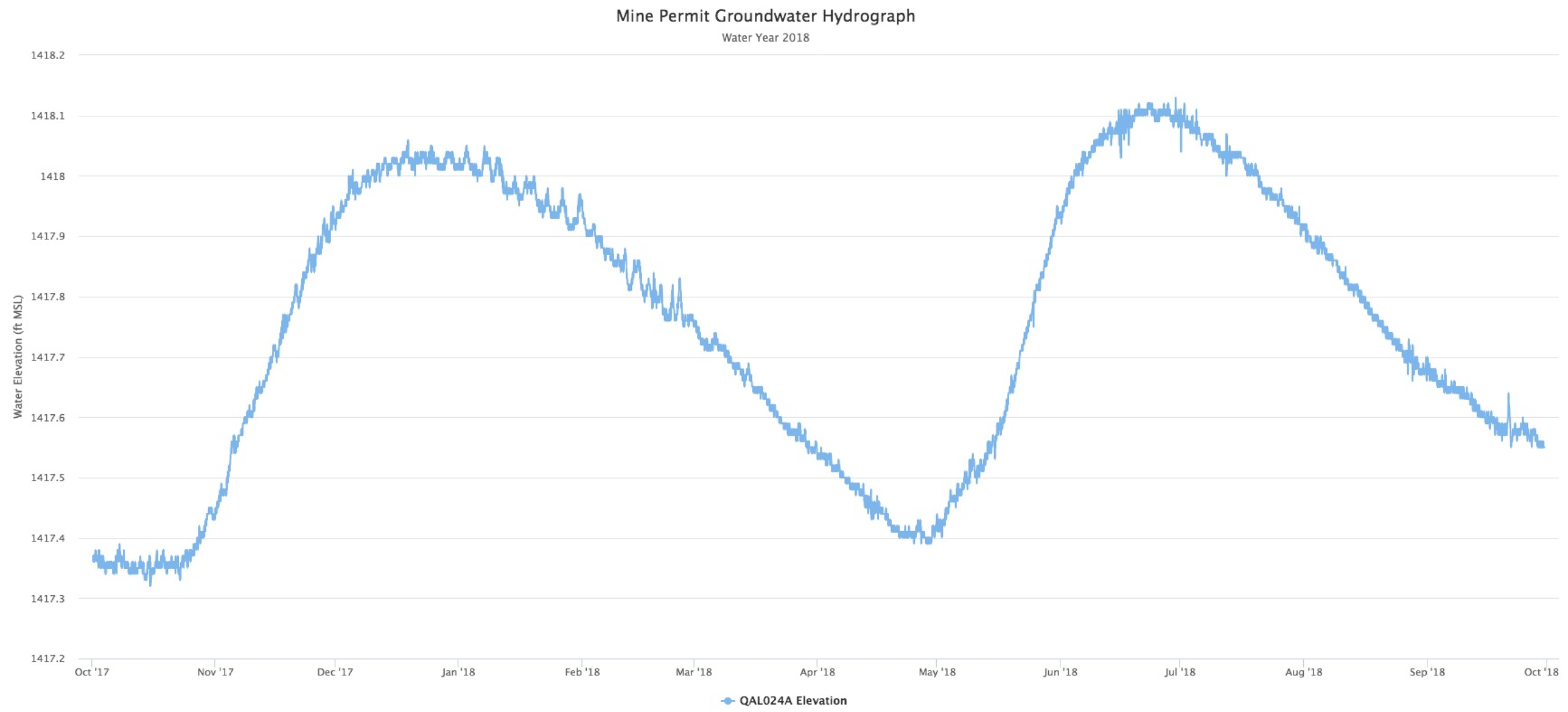
Groundwater and Wetland

Hydrographs

Mine Permit Groundwater Hydrograph

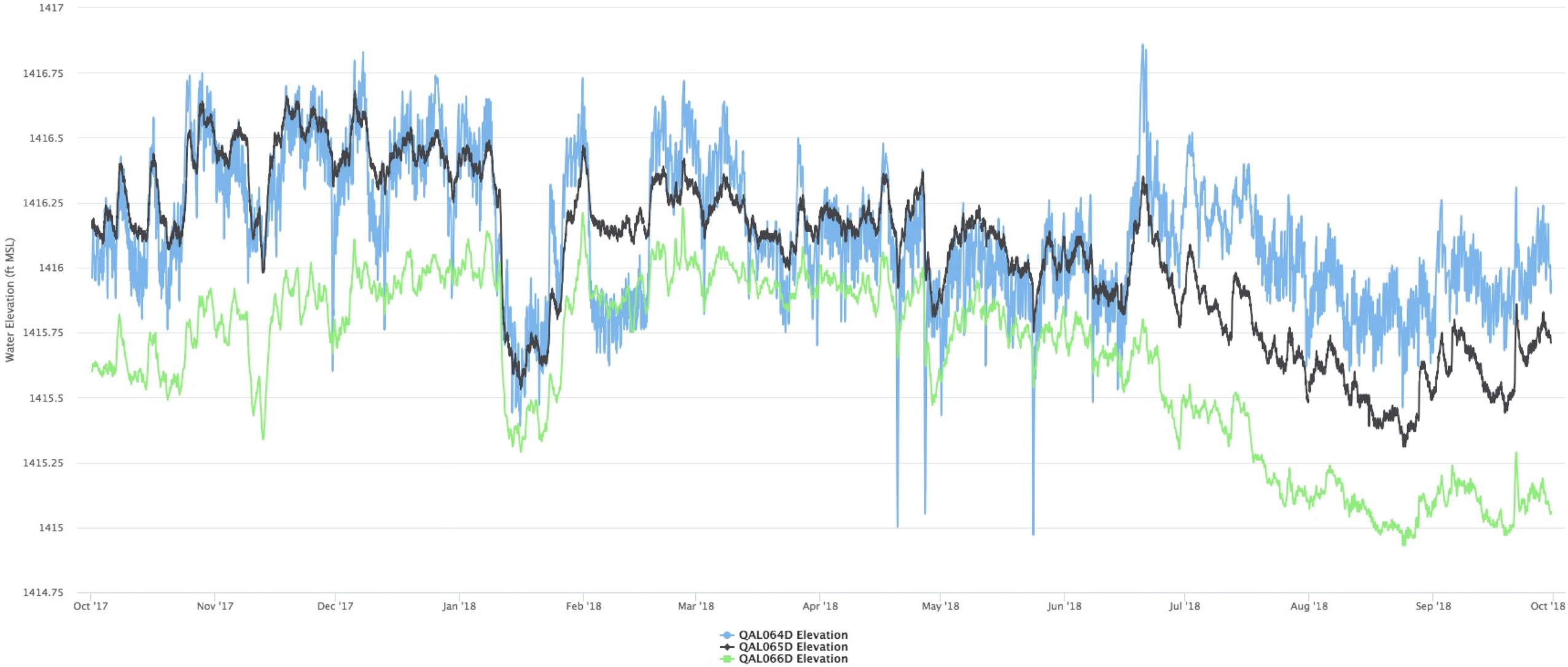
Water Year 2018

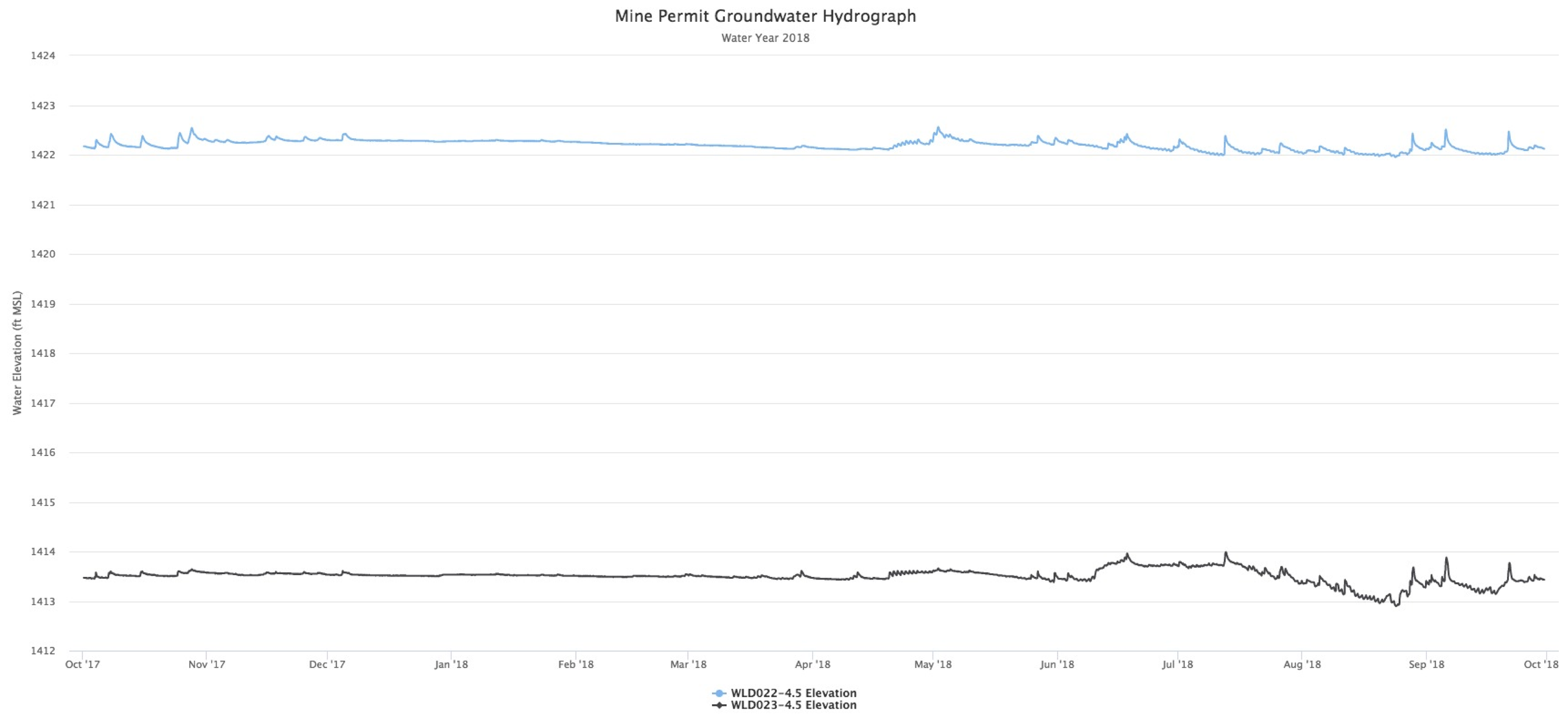



Mine Permit Groundwater Hydrograph
Water Year 2018
Water Elevation (ft MSL)
1418.2
1418.1
1418
1417.9
1417.8
1417.7
1417.6
1417.5
1417.4
1417.3
1417.2
Oct '17
Nov '17
Dec '17
Jan '18
Feb '18
Mar '18
Apr '18
May '18
Jun '18
Jul '18
Aug '18
Sep '18
Oct '18
QAL024A Elevation

Mine Permit Groundwater Hydrograph

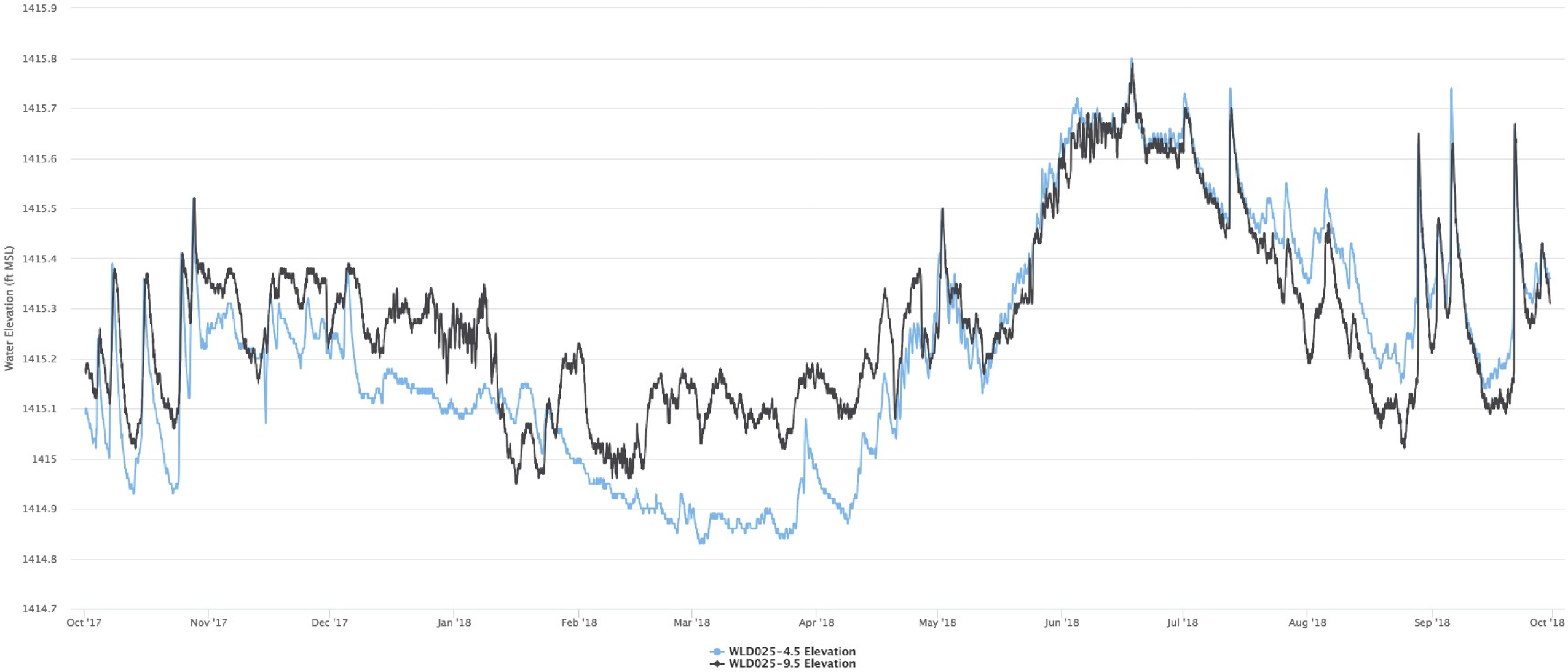
Water Year 2018




Mine Permit Groundwater Hydrograph
Water Year 2018
Water Elevation (ft MSL)
1424
1423
1422
1421
1420
1419
1418
1417
1416
1415
1414
1413
1412
Oct '17
Nov '17
Dec '17
Jan '18
Feb '18
Mar '18
Apr '18
May '18
Jun '18
Jul '18
Aug '18
Sep '18
Oct '18
WLD022-4.5 Elevation
WLD023-4.5 Elevation

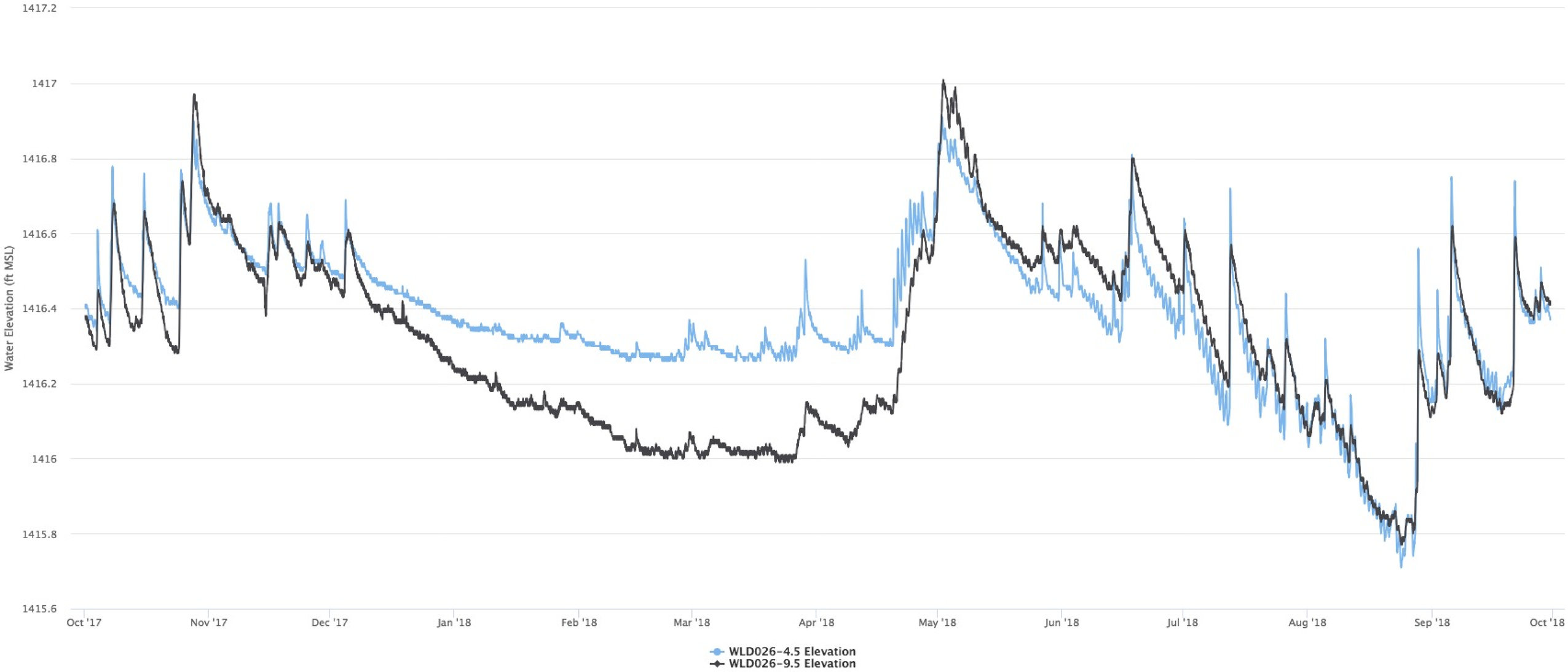
Mine Permit Groundwater Hydrograph

Water Year 2018



Mine Permit Groundwater Hydrograph

Water Year 2018

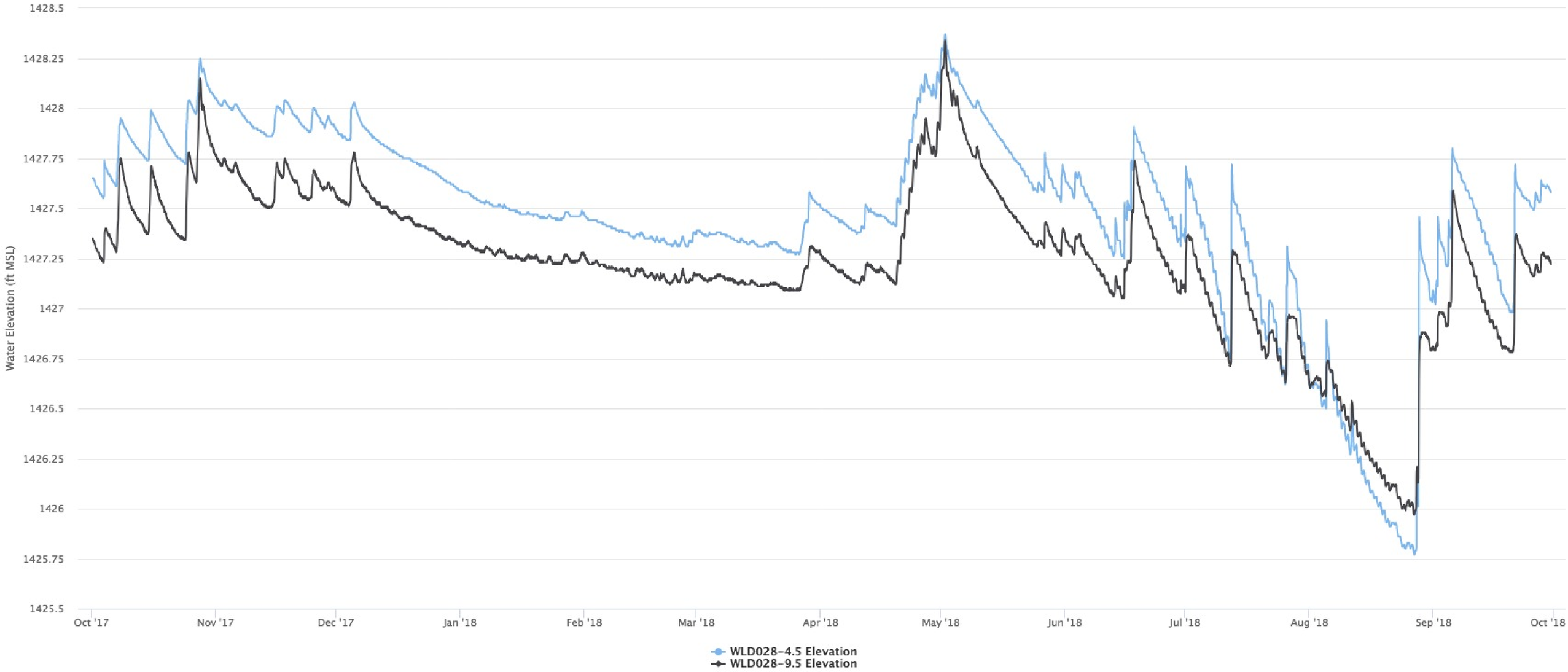


Mine Permit Groundwater Hydrograph

Water Year 2018

Mine Permit Groundwater Hydrograph

Water Year 2018



Appendix P

Eagle Mine

Discrete Water Level Results

Mine Permit Water Elevation Data
2018 Full Network Quarterly Discrete Measurements
Eagle Mine

Location	1st Qtr 2018		2nd Qtr 2018		3rd Qtr 2018		4th Qtr 2018	
	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date
QAL001A	1411.67	02/28/18	1411.78	05/29/18	1411.98	08/15/18	1411.44	11/12/18
QAL001D	1405.39	02/28/18	1406.09	05/29/18	1406.21	08/15/18	1405.90	11/12/18
QAL002A	1433.72	03/05/18	1434.49	05/29/18	1434.71	08/15/18	1434.08	11/09/18
QAL002D	1394.77	03/05/18	1395.79	05/29/18	1395.82	08/15/18	1395.62	11/09/18
QAL003A	1425.85	02/27/18	1427.32	05/29/18	1425.42	08/15/18	1426.12	11/09/18
QAL003B	1412.19	02/27/18	1413.17	05/29/18	1411.72	08/15/18	1412.30	11/09/18
QAL004A	1424.95	02/28/18	1425.52	05/29/18	1424.79	08/15/18	1424.91	11/12/18
QAL004D	1424.98	02/28/18	1421.15	05/29/18	1422.16	08/15/18	1425.65	11/12/18
QAL005A	1454.26	02/27/18	1454.87	05/29/18	1453.55	08/15/18	1455.00	11/09/18
QAL005D	1452.92	02/27/18	1453.58	05/29/18	1452.46	08/15/18	1453.26	11/09/18
QAL006A	1413.12	03/01/18	1415.40	05/30/18	1414.02	08/15/18	1415.40	11/09/18
QAL006B	1398.54	03/01/18	1400.15	05/30/18	1399.79	08/15/18	1400.24	11/09/18
QAL007A	1430.05	03/05/18	1430.62	05/29/18	1430.88	08/16/18	1430.09	11/09/18
QAL007D	1438.98	03/05/18	1439.35	05/29/18	1438.93	08/16/18	1438.67	11/09/18
QAL008A	1394.05	03/01/18	1394.54	05/30/18	1393.85	08/15/18	1394.36	11/09/18
QAL008D	1355.23	03/01/18	1355.32	05/30/18	1355.27	08/15/18	1355.21	11/09/18
QAL009A	1353.00	03/01/18	1353.32	05/29/18	1353.46	08/15/18	1353.56	11/12/18
QAL009D	1352.87	03/01/18	1353.20	05/29/18	1353.34	08/15/18	1353.42	11/12/18
QAL010A	1422.56	02/28/18	1423.11	05/29/18	1422.46	08/15/18	1422.62	11/09/18
QAL015	1291.85	03/01/18	1292.07	05/30/18	1292.00	08/16/18	1292.13	11/09/18
QAL016	1274.47	03/01/18	1274.44	05/30/18	1274.67	08/16/18	1274.62	11/09/18
QAL017	F	03/01/18	1251.02	05/30/18	1250.50	08/16/18	NM	11/12/18
QAL018	F	03/01/18	1249.28	05/30/18	1249.43	08/16/18	F	11/09/18
QAL019	1284.20	03/01/18	1284.98	05/30/18	1284.93	08/16/18	1285.25	11/09/18
QAL020	1334.67	03/01/18	1334.80	05/30/18	R	08/16/18	1334.90	11/09/18
QAL021	F	03/01/18	1389.31	05/30/18	1389.37	08/16/18	NM	11/12/18
QAL022	NM	03/05/18	1298.08	05/29/18	1298.05	08/16/18	1298.06	11/09/18
QAL023-1.0	F	02/27/18	1418.45	05/29/18	D	08/15/18	1418.39	11/08/18
QAL023-4.5	F	02/27/18	1418.40	05/29/18	1417.22	08/15/18	1418.39	11/08/18
QAL023B	1415.69	02/27/18	1414.27	05/29/18	1413.45	08/15/18	1414.16	11/08/18
QAL024A	1417.91	02/27/18	1418.05	05/29/18	1417.91	08/15/18	1418.14	11/09/18
QAL025A	1417.37	02/13/18	R	05/09/18	1417.44	08/07/18	1416.97	11/06/18
QAL025B	1417.26	02/13/18	1417.00	05/09/18	1417.47	08/07/18	1416.87	11/06/18
QAL025D	1412.76	02/06/18	1413.09	05/03/18	1413.38	08/07/18	1412.99	11/05/18
QAL026A	1417.00	02/06/18	1416.76	05/03/18	1417.11	08/01/18	1416.66	11/05/18
QAL026D	1409.60	02/06/18	1409.87	05/03/18	1410.15	08/01/18	1409.86	11/05/18
QAL026E	1409.54	02/13/18	1409.88	05/08/18	1410.05	08/07/18	1409.88	11/06/18
QAL029A	1413.54	02/05/18	1413.47	05/02/18	1413.86	08/02/18	1413.61	11/06/18
QAL029D	1406.86	02/05/18	1407.20	05/02/18	1407.26	08/02/18	1407.06	11/06/18
QAL031D	1373.05	03/01/18	1373.33	05/30/18	1373.13	08/15/18	1373.35	11/09/18
QAL043-1.0	1419.27	02/27/18	1419.43	05/29/18	D	08/15/18	1419.61	11/08/18
QAL043-4.5	1419.29	02/27/18	1419.43	05/29/18	1418.43	08/15/18	1419.62	11/08/18
QAL043B	1415.35	02/27/18	1414.64	05/29/18	1414.36	08/15/18	1414.33	11/08/18
QAL044-1.0	1424.02	02/27/18	1424.41	05/29/18	D	08/15/18	1424.60	11/08/18
QAL044-4.5	1424.14	02/27/18	1424.47	05/29/18	1423.33	08/15/18	1424.50	11/08/18
QAL044B	1415.18	02/27/18	1414.80	05/29/18	1414.58	08/15/18	1414.44	11/08/18
QAL050A	1365.18	02/07/18	1365.66	05/01/18	1365.52	08/01/18	1365.60	11/05/18
QAL051A	1367.03	02/07/18	1366.79	05/02/18	1367.19	08/02/18	1367.45	11/05/18
QAL051D	R	02/07/18	1367.11	05/02/18	1367.34	08/02/18	1367.36	11/05/18
QAL052A	1353.25	02/07/18	1354.13	05/01/18	1354.16	08/01/18	1354.17	11/05/18
QAL053A	1386.43	02/06/18	1386.99	05/01/18	1386.92	08/01/18	1387.09	11/06/18
QAL055A	1366.67	02/06/18	1366.68	05/02/18	1366.92	08/01/18	1366.95	11/05/18
QAL056A	1395.64	02/07/18	1394.79	05/01/18	1395.28	08/01/18	1395.39	11/05/18
QAL057A	1364.48	02/07/18	1364.43	05/02/18	1364.44	08/02/18	1365.09	11/06/18
QAL057D	1364.57	02/07/18	1364.50	05/02/18	1364.53	08/02/18	1364.79	11/06/18
QAL060A	1404.83	02/12/18	1405.41	05/07/18	1405.52	08/06/18	1405.42	11/06/18
QAL061A	1406.26	02/12/18	1406.75	05/07/18	1406.94	08/06/18	1406.77	11/06/18
QAL062A	1407.59	02/12/18	1408.09	05/07/18	1408.31	08/06/18	1408.09	11/06/18
QAL063A	1401.26	02/12/18	1401.91	05/08/18	1402.00	08/06/18	1401.58	11/07/18

Mine Permit Water Elevation Data
2018 Full Network Quarterly Discrete Measurements
Eagle Mine

Location	1st Qtr 2018		2nd Qtr 2018		3rd Qtr 2018		4th Qtr 2018	
	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date
QAL064D	1416.62	02/27/18	1415.85	05/29/18	1415.84	08/15/18	1416.05	11/09/18
QAL065D	1416.30	02/27/18	1415.97	05/29/18	1415.51	08/15/18	1415.83	11/08/18
QAL066D	1416.03	02/27/18	1415.67	05/29/18	1415.07	08/15/18	1415.12	11/08/18
QAL067A	1414.99	02/12/18	1415.95	05/07/18	1415.80	08/06/18	1415.01	11/07/18
QAL068A	1422.85	02/13/18	1419.38	05/09/18	1422.99	08/07/18	1422.38	11/07/18
QAL068B	1413.64	02/13/18	1414.36	05/09/18	1414.34	08/07/18	1414.02	11/07/18
QAL068D	1413.90	02/13/18	1414.19	05/09/18	1414.33	08/07/18	1414.07	11/07/18
QAL069A	1383.46	02/14/18	1383.36	05/07/18	1383.69	08/06/18	1383.73	11/08/18
QAL070A	1372.80	02/28/18	1372.25	05/08/18	1372.49	08/15/18	1372.37	11/09/18
QAL071A	1405.66	02/12/18	1405.80	05/07/18	1405.78	08/07/18	1405.92	11/07/18
QAL073A	1384.10	02/28/18	1383.41	05/08/18	1383.99	08/15/18	1384.11	11/09/18
QAL074A	1404.94	02/12/18	1403.51	05/07/18	1404.00	08/15/18	1404.73	11/06/18
QAL075A	1349.00	02/06/18	1349.21	05/03/18	1349.36	08/02/18	1349.47	11/05/18
QAL075D	1350.49	02/06/18	1350.68	05/03/18	1350.83	08/02/18	1350.97	11/05/18
QAL076E	1318.18	03/01/18	1316.96	05/29/18	1315.90	08/15/18	1315.65	11/09/18
QAL077E	NM	03/01/18	1232.56	05/29/18	1232.80	08/15/18	1233.08	11/12/18
STRM002	1399.77	02/26/18	1399.78	05/16/18	1399.33	08/06/18	1398.63	10/30/18
STRM011	F	02/27/18	1414.48	05/29/18	1414.77	08/15/18	1414.70	11/09/18
WLD001-1.0	1428.13	02/27/18	1428.20	05/29/18	1428.84	08/16/18	1428.93	11/12/18
WLD001-4.5	1427.17	02/27/18	1427.29	05/29/18	1427.92	08/15/18	1428.01	11/12/18
WLD001-9.5	F	02/27/18	1428.62	05/29/18	1429.16	08/16/18	F	11/12/18
WLD002	F	02/27/18	1430.83	05/29/18	1430.52	08/16/18	1430.85	11/12/18
WLD004	NM	03/05/18	1446.36	05/29/18	1445.83	08/15/18	1446.54	11/09/18
WLD005	NM	03/05/18	1451.10	05/29/18	1450.65	08/15/18	1451.20	11/09/18
WLD006	1454.27	03/05/18	1455.60	05/29/18	1454.85	08/15/18	1455.40	11/09/18
WLD007	F	03/05/18	1450.69	05/29/18	1449.75	08/15/18	1450.74	11/09/18
WLD008	F	03/05/18	1453.63	05/29/18	1453.12	08/15/18	1453.57	11/09/18
WLD010	NM	03/05/18	1447.63	05/29/18	1447.23	08/15/18	NM	11/12/18
WLD011	NM	03/05/18	1446.94	05/29/18	1446.07	08/15/18	NM	11/12/18
WLD012	NM	03/05/18	1446.15	05/29/18	1445.45	08/15/18	NM	11/12/18
WLD017	NM	03/01/18	1423.80	05/30/18	1421.77	08/15/18	NM	11/12/18
WLD018	F	03/01/18	1423.19	05/30/18	1422.71	08/15/18	NM	11/12/18
WLD019	F	03/01/18	1420.43	05/30/18	1418.77	08/15/18	1420.43	11/09/18
WLD020	1417.45	03/01/18	1419.35	05/30/18	1417.78	08/15/18	1419.46	11/09/18
WLD021	1414.13	03/01/18	1415.48	05/30/18	1414.80	08/15/18	1416.17	11/09/18
WLD022-1.0	1422.13	02/28/18	1422.10	05/29/18	1421.83	08/15/18	1422.13	11/12/18
WLD022-4.5	1422.14	02/28/18	1422.21	05/29/18	1422.02	08/15/18	1422.06	11/12/18
WLD022-9.5	F	02/28/18	1422.59	05/29/18	1422.39	08/15/18	1422.48	11/12/18
WLD023-1.0	F	02/28/18	1413.71	05/30/18	1413.38	08/16/18	1413.38	11/09/18
WLD023-4.5	1413.48	02/28/18	1413.43	05/30/18	1413.08	08/16/18	1413.50	11/09/18
WLD023-9.5	F	02/28/18	1415.39	05/30/18	1415.05	08/16/18	F	11/09/18
WLD024-1.0	F	02/28/18	1423.07	05/29/18	1422.81	08/15/18	1423.02	11/12/18
WLD024-4.5	1423.28	02/28/18	1423.37	05/29/18	1423.04	08/15/18	1423.24	11/12/18
WLD024-9.5	F	02/28/18	1423.79	05/29/18	1423.32	08/15/18	1423.43	11/12/18
WLD025-1.0	F	02/28/18	1415.39	05/29/18	1414.91	08/15/18	1415.18	11/08/18
WLD025-4.5	1414.65	02/28/18	1415.36	05/29/18	1415.08	08/15/18	1415.15	11/08/18
WLD025-9.5	1414.88	02/28/18	1415.26	05/29/18	1414.94	08/15/18	1415.12	11/08/18
WLD026-1.0	1415.52	02/28/18	1415.52	05/29/18	1415.28	08/15/18	1415.58	11/08/18
WLD026-4.5	1415.95	02/28/18	1416.08	05/29/18	1415.55	08/15/18	1416.16	11/08/18
WLD026-9.5	1415.72	02/28/18	1416.23	05/29/18	1415.65	08/15/18	1416.17	11/08/18
WLD027-1.0	1423.17	02/28/18	1423.03	05/29/18	D	08/15/18	1422.97	11/08/18
WLD027-4.5	1422.77	02/28/18	1422.59	05/29/18	1421.31	08/15/18	1422.69	11/08/18
WLD027-9.5	1422.53	02/28/18	1422.56	05/29/18	1421.36	08/15/18	1422.68	11/08/18
WLD028-1.0	F	02/28/18	1427.62	05/29/18	D	08/15/18	1427.75	11/08/18
WLD028-4.5	1427.03	02/28/18	1427.54	05/29/18	1426.24	08/15/18	1427.76	11/08/18
WLD028-9.5	1426.94	02/28/18	1427.14	05/29/18	1428.05	08/15/18	1427.12	11/08/18
WLD029-1.0	F	02/28/18	1429.27	05/29/18	D	08/15/18	F	11/09/18
WLD029-4.5	1427.75	02/28/18	1429.28	05/29/18	1427.45	08/15/18	1428.78	11/09/18
WLD029-9.5	F	02/28/18	1429.43	05/29/18	1429.78	08/15/18	1428.92	11/09/18
WLD030	1454.00	03/05/18	1455.17	05/29/18	1454.50	08/15/18	NM	11/12/18
YDRM002	F	02/26/18	1412.62	05/16/18	NM	08/02/18	1412.50	10/30/18

Mine Permit Water Elevation Data
Footnote Explanation
Eagle Mine

Footnote	Explanation
BP	Below pump. Maximum water elevation is shown.
D	Dry.
F	Frozen.
NM	Not measured.
R	Measured value was rejected based on quality control procedures.

Appendix Q

Eagle Mine

Continuous Surface Water Monitoring Results

2018 Water Year
Continuous Monitoring Results
Surface Water Location STRE002
Eagle Mine

STRE002								
Parameter	Month	Background MEAN	Background Min	Background MAX	Background SD	Water Year MEAN	Water Year MIN	Water Year MAX
Temperature	2017/10	7.5	3.2	14.6	1.5	8.9	3.3	12.6
	2017/11	3.4	-0.1	9.3	0.5	2.0	0.0	4.3
	2017/12	0.8	-0.2	3.2	0.4	0.6	0.0	3.5
	2018/01	0.6	-0.2	0.8	0.5	0.4	0.0	2.0
	2018/02	0.5	-0.2	2.4	0.2	0.5	0.0	2.5
	2018/03	1.5	-0.2	4.7	0.3	1.4	0.4	2.7
	2018/04	4.2	-0.1	10.8	1.6	1.8	0.0	3.9
	2018/05	9.7	1.3	17.8	1.0	10.3	2.3	15.9
	2018/06	13.0	8.1	17.0	0.7	13.5	10.7	16.8
	2018/07	14.1	10.6	18.2	1.0	15.1	12.7	17.5
	2018/08	13.5	10.0	17.6	0.7	13.8	11.3	15.9
	2018/09	11.4	7.0	16.6	0.8	12.0	6.7	15.2
Flow	2017/10	22.9	12.0	119.0	7.1	36.8	17.7	115.8
	2017/11	18.5	12.4	37.8	3.1	27.1	19.1	49.9
	2017/12	17.8	12.1	58.8	4.1	NA	NA	NA
	2018/01	18.1	12.0	45.0	3.5	NA	NA	NA
	2018/02	17.3	12.0	50.0	5.6	NA	NA	NA
	2018/03	23.3	12.0	110.9	5.7	NA	NA	NA
	2018/04	37.0	12.0	131.5	10.3	28.4	12.8	70.4
	2018/05	22.2	11.8	160.6	6.3	29.3	12.3	117.0
	2018/06	18.0	12.0	90.1	3.5	16.2	11.8	48.5
	2018/07	14.0	11.8	33.0	1.5	14.4	11.4	44.2
	2018/08	14.5	11.8	74.4	2.3	14.0	11.6	48.6
	2018/09	16.9	11.7	69.8	3.2	20.6	11.8	79.9
Specific Conductivity	2017/10	127.8	70.0	146.0	14.4	126.6	28.0	152.6
	2017/11	130.2	80.0	148.0	9.2	79.5	51.6	103.5
	2017/12	132.9	89.0	153.0	6.7	110.3	94.5	123.0
	2018/01	133.3	115.0	145.0	3.9	115.9	112.5	126.5
	2018/02	133.2	111.0	144.0	3.1	NA	NA	NA
	2018/03	122.0	54.0	148.0	13.6	NA	NA	NA
	2018/04	95.6	50.0	146.0	18.2	NA	NA	NA
	2018/05	122.0	37.0	149.0	9.3	111.9	56.0	144.0
	2018/06	129.1	94.0	169.0	6.4	149.6	118.3	164.5
	2018/07	146.4	119.0	165.0	7.4	151.8	122.8	162.3
	2018/08	146.1	107.0	163.0	6.5	NA	NA	NA
	2018/09	138.2	80.0	149.0	6.0	NA	NA	NA

2018 Water Year
Continuous Monitoring Results
Surface Water Location STRM004
Eagle Mine

STRM004								
Parameter	**Month**	**Background MEAN**	**Background Min**	**Background MAX**	**Background SD**	**Water Year MEAN**	**Water Year MIN**	**Water Year MAX**
Temperature	2017/10	7.5	2.3	15.2	1.6	8.6	3.0	13.9
	2017/11	3.0	0.0	9.6	0.5	1.6	0.0	4.2
	2017/12	0.3	-0.1	2.5	0.2	0.3	0.0	3.2
	2018/01	0.2	-0.1	1.9	0.3	0.1	0.0	0.9
	2018/02	0.1	0.0	1.3	0.1	0.1	0.0	1.1
	2018/03	0.9	-0.1	5.0	0.4	0.4	0.0	1.4
	2018/04	4.2	-0.1	11.3	1.9	1.1	0.0	3.1
	2018/05	10.1	1.9	18.2	1.0	10.9	3.7	16.5
	2018/06	13.8	7.9	18.6	1.2	13.5	10.5	17.6
	2018/07	14.8	11.0	19.0	1.3	15.3	13.0	17.7
	2018/08	14.2	10.4	18.1	0.7	14.3	11.4	16.6
	2018/09	11.8	7.3	17.3	4.5	12.3	6.7	15.9
Flow	2017/10	7.7	3.9	41.1	2.2	14.2	7.4	50.0
	2017/11	6.8	4.2	23.1	2.5	11.8	8.8	18.9
	2017/12	6.7	4.6	18.9	1.6	NA	NA	NA
	2018/01	5.6	3.5	13.2	1.8	NA	NA	NA
	2018/02	5.7	2.8	15.5	1.8	NA	NA	NA
	2018/03	8.2	3.1	56.7	3.0	NA	NA	NA
	2018/04	14.9	5.2	44.5	2.5	15.7	6.3	30.6
	2018/05	8.3	4.4	59.9	2.5	12.9	6.9	51.0
	2018/06	5.7	3.0	27.4	1.1	8.1	6.2	21.8
	2018/07	4.6	2.8	9.9	0.4	7.5	6.2	19.3
	2018/08	4.8	2.8	28.0	1.1	6.9	5.9	19.9
	2018/09	5.2	2.8	24.0	2.2	9.7	6.8	35.6
Specific Conductivity	2017/10	87.3	56.0	140.0	9.2	107.0	73.7	129.8
	2017/11	87.1	59.0	96.0	4.2	80.0	69.7	92.0
	2017/12	84.7	61.0	95.0	11.6	82.0	71.8	98.1
	2018/01	91.3	67.0	97.0	1.6	NA	NA	NA
	2018/02	94.5	58.0	103.0	3.5	NA	NA	NA
	2018/03	88.6	44.0	105.0	8.1	NA	NA	NA
	2018/04	69.5	33.0	105.0	12.6	NA	NA	NA
	2018/05	85.6	37.0	114.0	9.2	85.2	53.3	103.0
	2018/06	88.5	57.0	116.0	14.3	96.4	74.0	112.5
	2018/07	97.1	82.0	114.0	6.2	103.0	84.8	114.1
	2018/08	100.6	70.0	119.0	9.2	109.6	92.9	112.8
	2018/09	81.3	57.0	130.0	48.8	85.5	65.6	110.0

2018 Water Year
Continuous Monitoring Results
Surface Water Location STRM005
Eagle Mine

STRM005								
Parameter	**Month**	**Background MEAN**	**Background Min**	**Background MAX**	**Background SD**	**Water Year MEAN**	**Water Year MIN**	**Water Year MAX**
Temperature	2017/10	7.9	2.6	15.5	2.4	9.1	4.2	13.8
	2017/11	3.1	0.0	7.6	0.2	2.0	-0.1	4.4
	2017/12	0.3	-0.1	2.2	0.2	NA	NA	NA
	2018/01	0.3	-0.1	2.6	0.2	NA	NA	NA
	2018/02	0.0	-0.1	1.4	0.1	NA	NA	NA
	2018/03	0.5	-0.1	3.7	0.3	1.0	0.4	2.4
	2018/04	4.2	0.1	11.1	1.4	1.9	0.5	4.0
	2018/05	10.4	2.1	17.5	1.0	11.3	3.8	17.2
	2018/06	15.4	9.2	20.5	1.0	15.0	11.6	19.1
	2018/07	17.2	11.9	21.3	1.1	17.4	14.7	20.3
	2018/08	16.6	12.7	21.1	0.4	15.9	13.0	18.5
	2018/09	13.1	9.2	18.7	1.1	13.2	7.4	16.7
Flow	2017/10	64.2	29.2	346.6	29.2	108.3	44.7	571.8
	2017/11	52.8	29.2	188.7	24.1	89.8	66.3	194.1
	2017/12	55.7	33.6	131.3	17.6	NA	NA	NA
	2018/01	44.9	38.0	83.3	2.7	NA	NA	NA
	2018/02	59.6	40.7	119.3	0.0	NA	NA	NA
	2018/03	126.0	36.0	456.2	115.0	NA	NA	NA
	2018/04	126.8	41.7	459.4	21.5	NA	NA	NA
	2018/05	67.2	32.5	781.5	28.7	101.6	47.6	460.1
	2018/06	40.5	26.3	164.1	9.9	52.4	39.7	136.1
	2018/07	29.8	24.0	52.0	22.0	43.3	36.8	87.8
	2018/08	28.8	23.2	82.0	4.0	40.9	35.5	92.2
	2018/09	38.6	21.8	155.5	14.2	57.7	39.2	189.8
Specific Conductivity	2017/10	112.0	29.0	147.0	26.8	119.1	55.3	149.8
	2017/11	123.5	65.0	143.0	15.9	104.9	74.5	125.2
	2017/12	126.6	79.0	145.0	8.4	NA	NA	NA
	2018/01	129.3	99.0	145.0	4.7	NA	NA	NA
	2018/02	128.1	91.0	143.0	5.3	NA	NA	NA
	2018/03	119.1	55.0	141.0	9.4	NA	NA	NA
	2018/04	77.5	36.0	121.0	11.3	NA	NA	NA
	2018/05	112.5	30.0	141.0	8.1	97.5	44.7	135.1
	2018/06	130.9	78.0	149.0	4.2	109.0	74.5	120.0
	2018/07	142.9	111.0	161.0	8.4	115.4	89.3	126.7
	2018/08	145.0	101.0	163.0	11.4	108.2	108.2	108.2
	2018/09	133.3	90.0	150.0	15.7	104.9	73.3	120.0

2018 Water Year
Continuous Monitoring Results
Surface Water Location YDRM002
Eagle Mine

YDRM002								
Parameter	**Month**	**Background MEAN**	**Background Min**	**Background MAX**	**Background SD**	**Water Year MEAN**	**Water Year MIN**	**Water Year MAX**
Temperature	2017/10	8.5	2.7	17.2	1.9	8.9	2.2	14.4
	2017/11	2.4	0.0	9.3	0.5	0.7	0.0	2.8
	2017/12	0.1	0.0	1.4	0.0	0.1	0.0	1.3
	2018/01	0.0	-0.1	1.0	0.1	0.0	0.0	0.0
	2018/02	0.0	0.0	0.2	0.0	0.0	0.0	0.0
	2018/03	0.4	-0.1	4.9	0.3	0.2	0.0	1.7
	2018/04	4.3	0.0	11.4	2.1	1.1	0.0	3.2
	2018/05	11.5	0.8	21.6	1.4	12.2	1.7	19.7
	2018/06	16.5	9.8	22.2	1.2	16.9	13.7	21.6
	2018/07	18.6	12.4	23.6	1.4	18.7	15.4	21.4
	2018/08	17.9	11.7	23.2	0.9	17.5	13.9	20.7
	2018/09	14.3	8.5	21.0	0.7	14.3	7.4	18.8
Flow	2017/10	34.6	7.1	214.9	25.4	NA	NA	NA
	2017/11	26.8	10.0	94.0	9.9	NA	NA	NA
	2017/12	21.1	10.6	74.0	6.9	NA	NA	NA
	2018/01	18.4	10.0	41.1	4.1	NA	NA	NA
	2018/02	16.8	12.2	29.7	2.9	NA	NA	NA
	2018/03	25.7	11.4	173.1	11.1	NA	NA	NA
	2018/04	91.8	14.9	306.2	29.0	48.2	19.8	105.1
	2018/05	47.2	8.1	204.3	22.2	90.0	14.8	270.2
	2018/06	21.2	8.0	61.2	8.6	17.5	5.4	71.9
	2018/07	11.6	6.2	32.6	1.9	11.9	1.7	34.4
	2018/08	9.0	4.3	45.6	2.7	25.2	10.8	44.0
	2018/09	13.1	5.5	68.5	5.9	32.3	5.5	135.5
Specific Conductivity	2017/10	61.3	30.0	102.0	18.8	44.2	23.7	65.0
	2017/11	53.1	32.0	74.0	7.6	35.6	27.8	40.6
	2017/12	62.0	32.0	91.0	9.0	44.0	32.7	54.1
	2018/01	64.6	52.0	76.0	5.8	NA	NA	NA
	2018/02	69.6	55.0	79.0	5.6	NA	NA	NA
	2018/03	57.0	28.0	75.0	12.4	NA	NA	NA
	2018/04	35.2	19.0	72.0	7.1	48.9	27.0	57.7
	2018/05	45.9	20.0	92.0	11.7	33.2	17.8	47.8
	2018/06	67.1	44.0	94.0	4.6	50.1	37.9	57.9
	2018/07	81.6	53.0	105.0	7.7	57.1	45.0	64.4
	2018/08	87.4	47.0	107.0	10.2	66.2	50.7	82.9
	2018/09	80.3	42.0	103.0	11.0	45.4	30.8	62.7

Source: North Jackson Company, REACH System (mean daily values)

NA =Continuous record suppressed where >50% of values missing or data failed to meet quality control measures (e.g., due to ice or beaver activity).

Results in red indicate mean monthly value is outside background range.

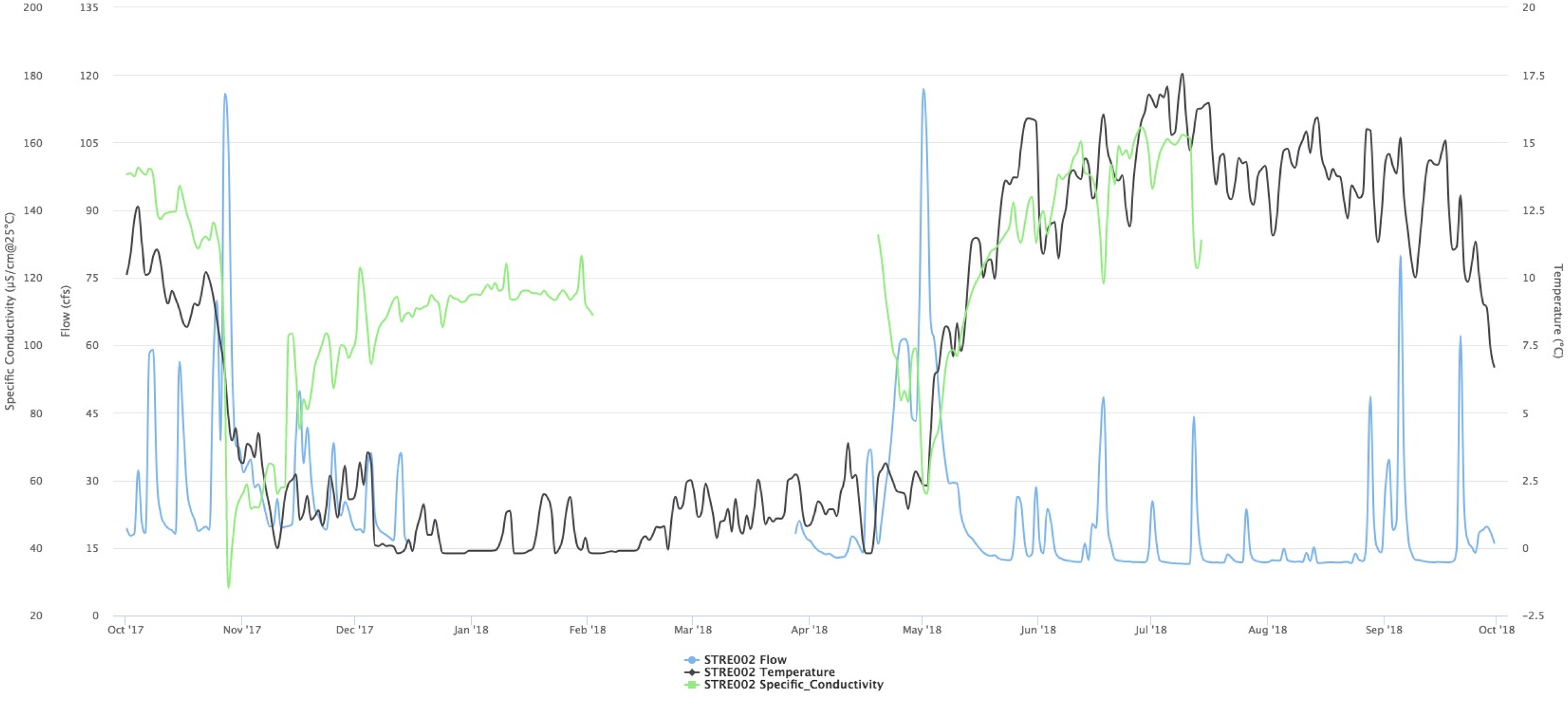
Appendix R

Eagle Mine

Surface Water Hydrographs

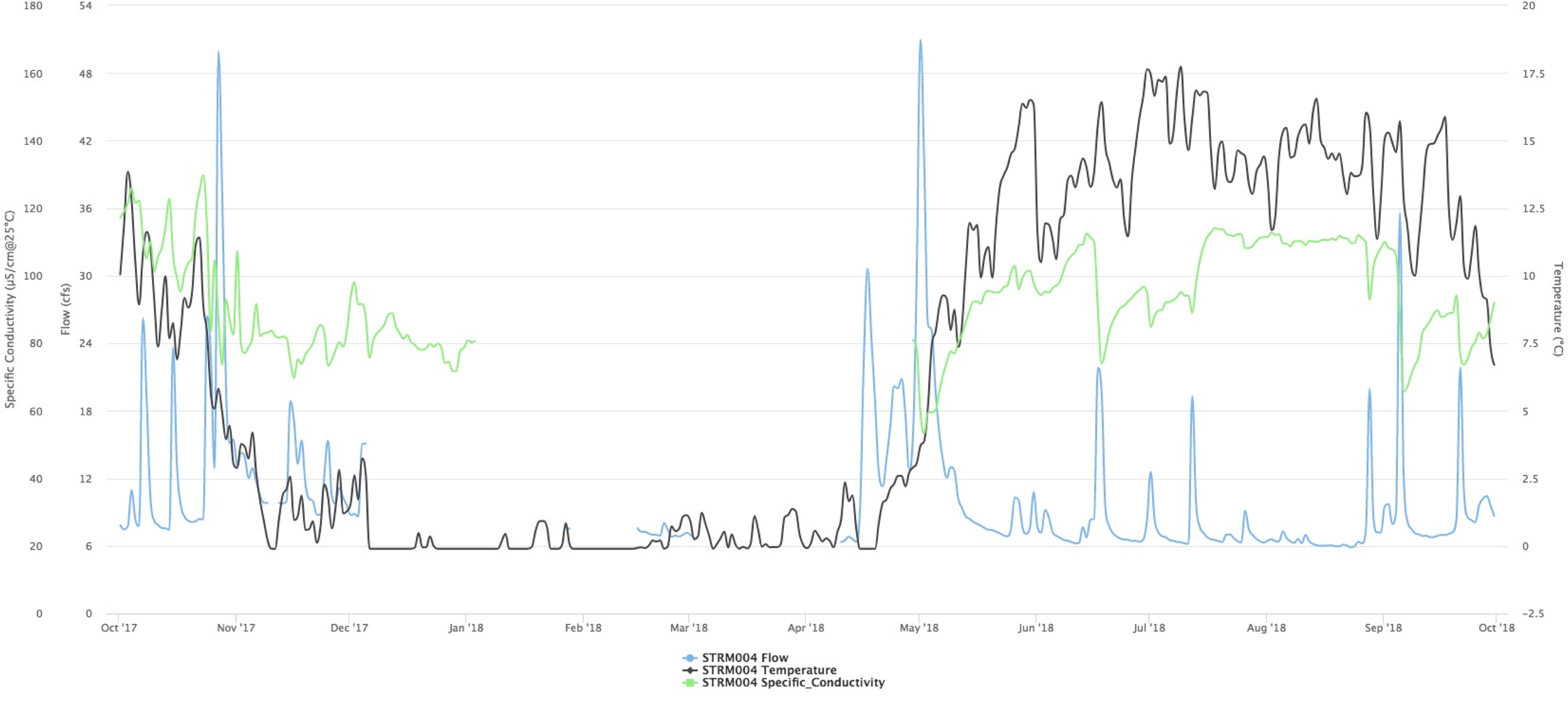
Mine Permit Surface Water Hydrograph

Water Year 2018



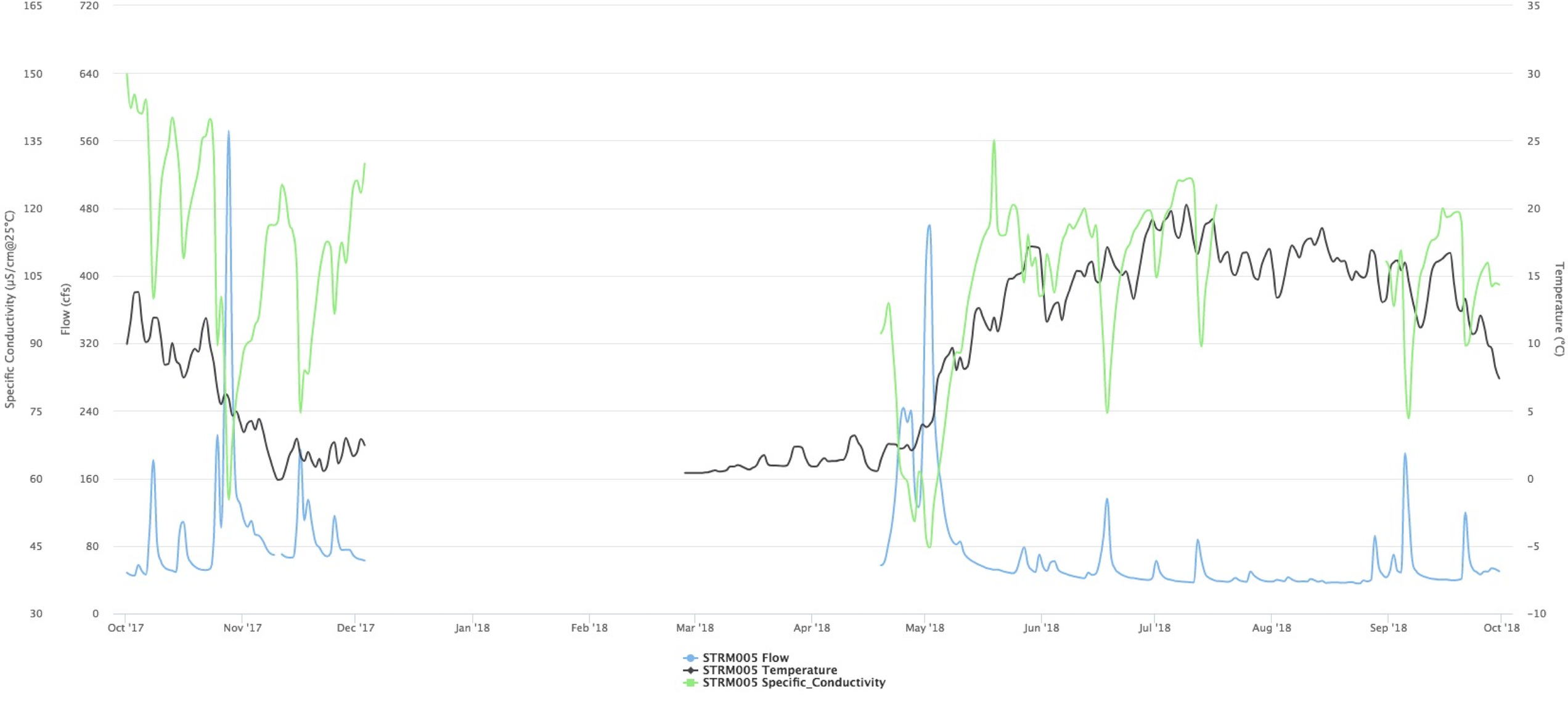
Mine Permit Surface Water Hydrograph

Water Year 2018



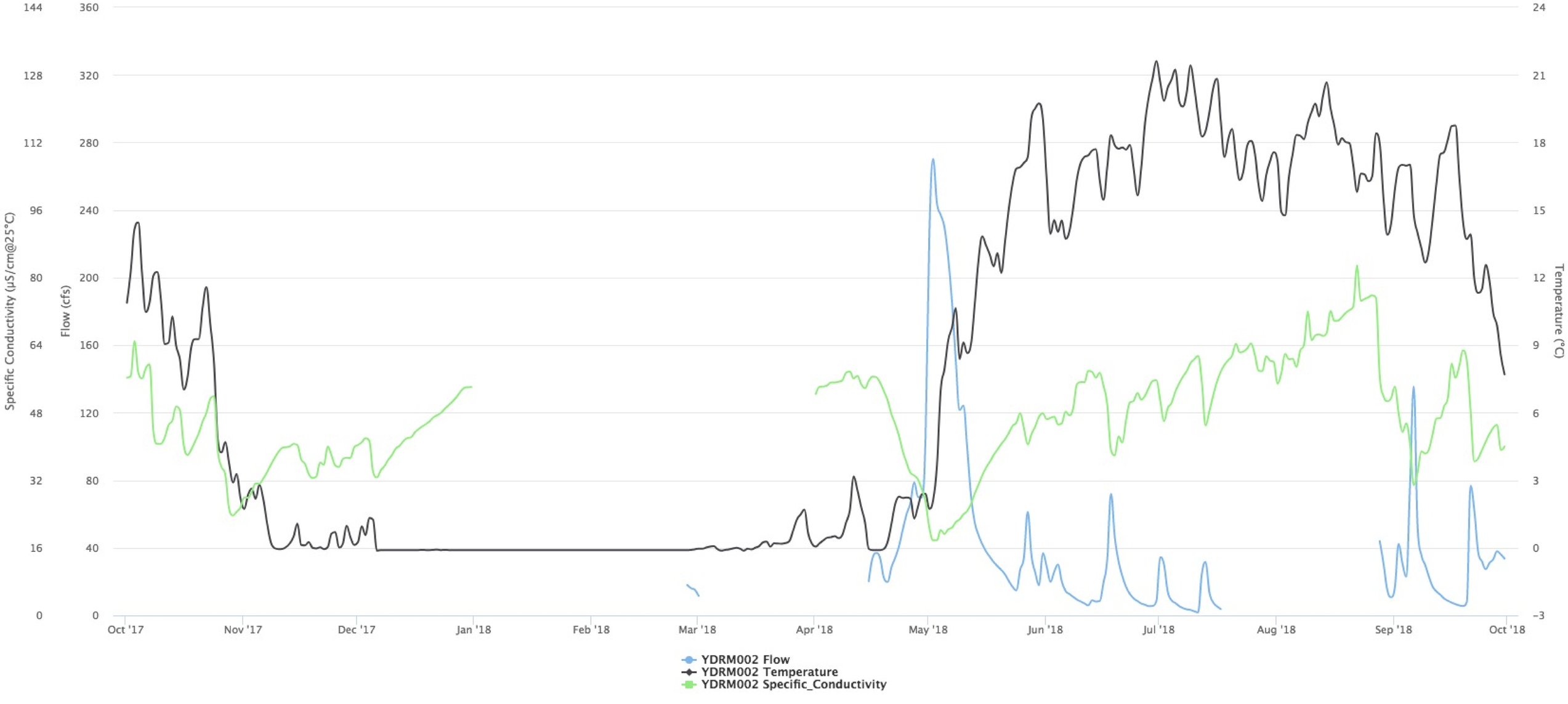
Mine Permit Surface Water Hydrograph

Water Year 2018



Mine Permit Surface Water Hydrograph

Water Year 2018



Appendix S

Eagle Mine

Flora & Fauna Survey Location Map

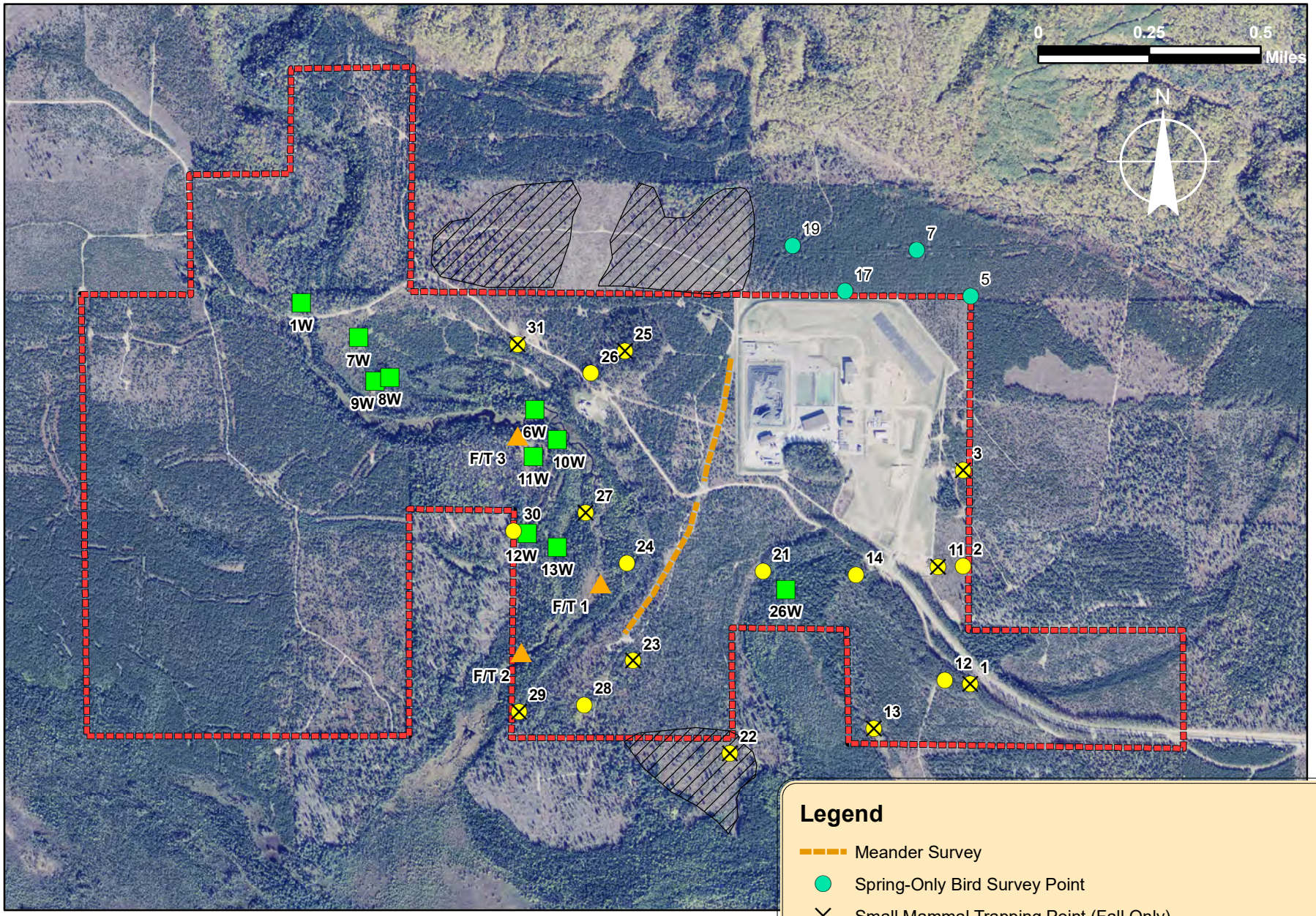


Figure 1-3. Biological and Wetland Survey Areas

King & MacGregor Environmental, Inc.

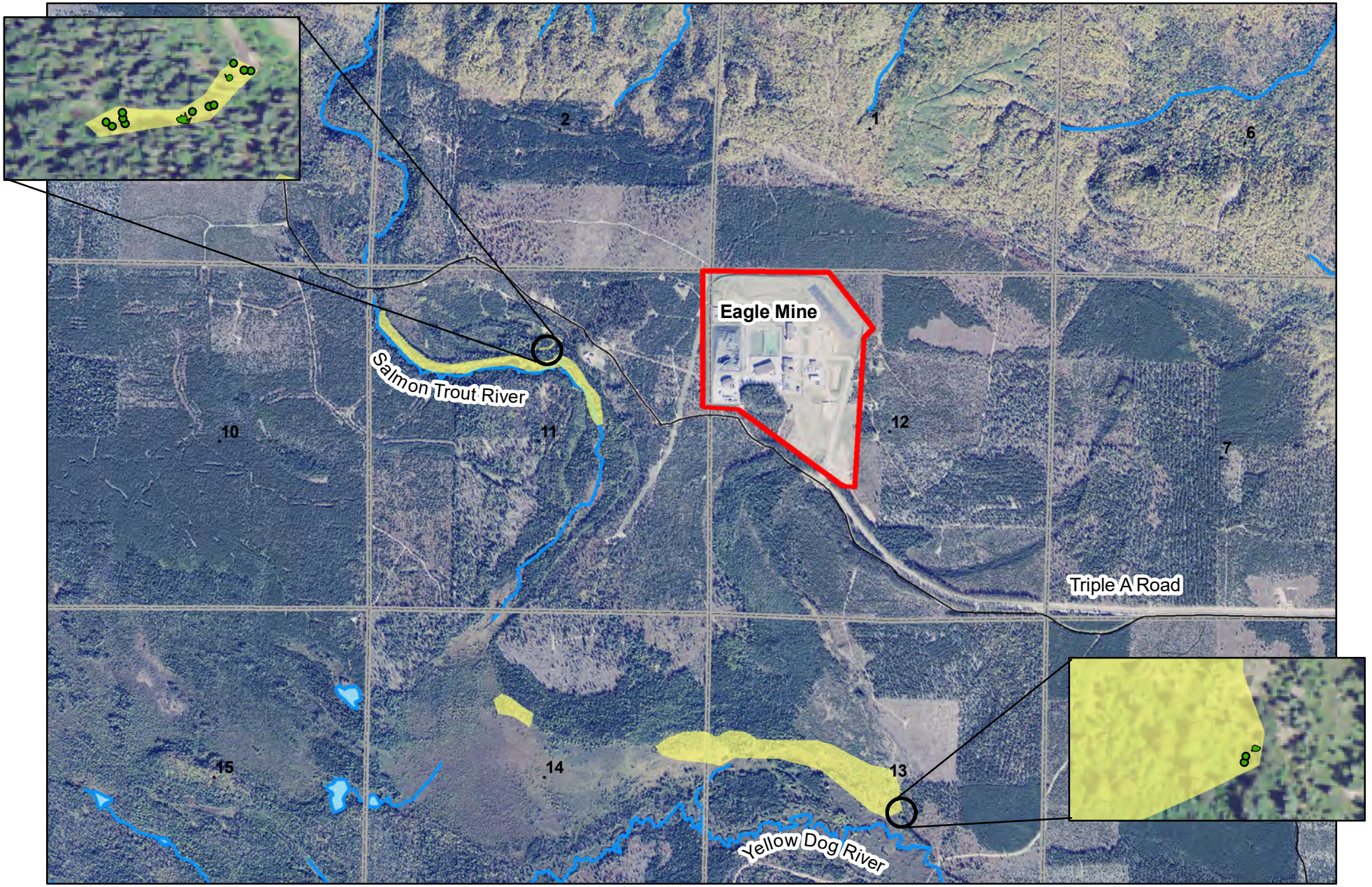


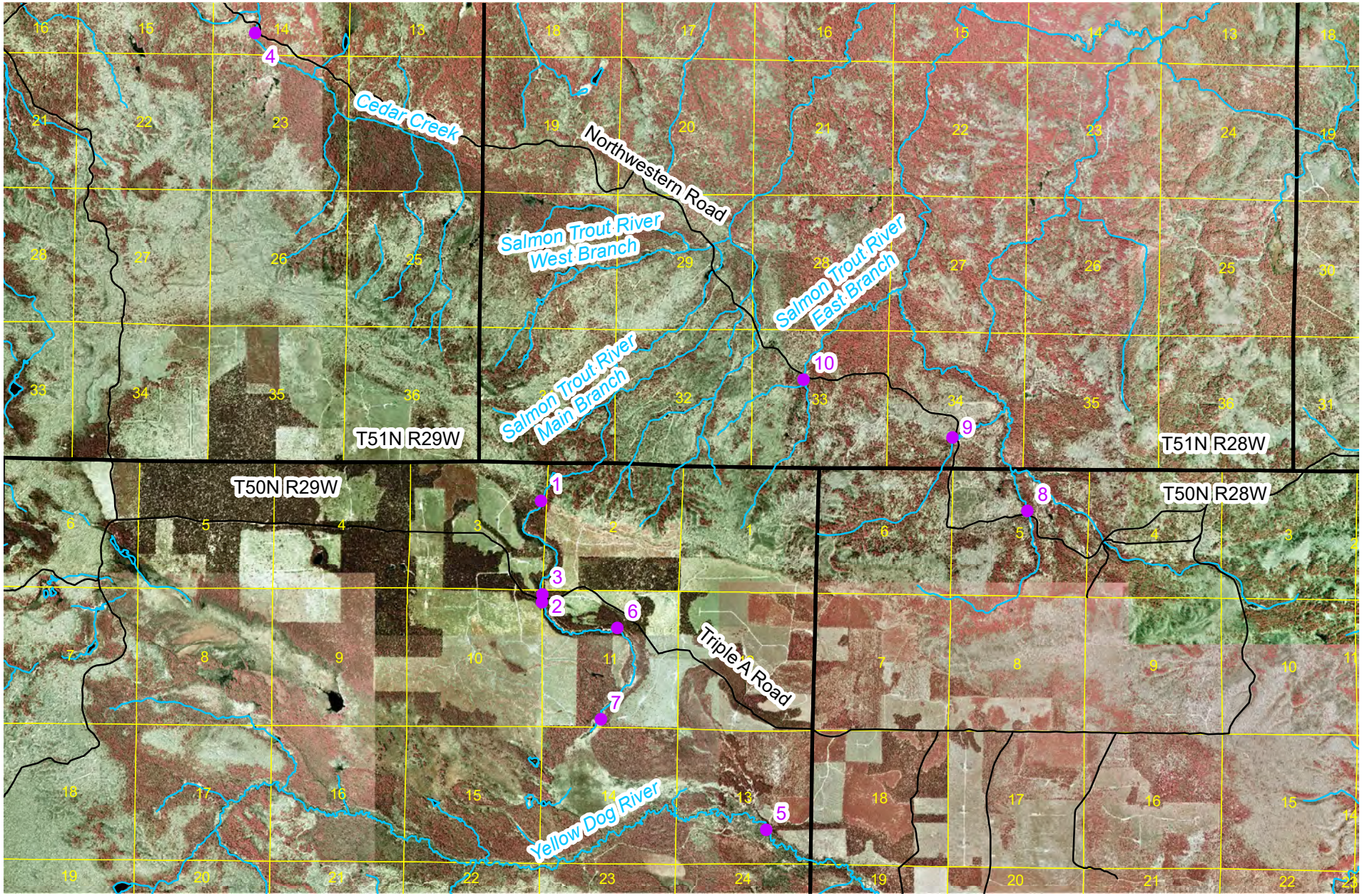
Figure 5-1. Narrow-leaved Gentian Survey (August 2017)

King & MacGregor Environmental, Inc.

Appendix T

Eagle Mine

Aquatic Survey Location Map



Legend

- Survey Stations
- Rivers
- Township/Range
- Sections

N

0 0.375 0.75 1.5 2.25 3 Miles

AeM | ADVANCED ECOLOGICAL MANAGEMENT

PROJECT	Eagle Mine
TITLE	Aquatic Sampling Locations
FIGURE	1-2

Appendix U

Eagle Mine

Updated Contingency Plan

Eagle Mine
a subsidiary of lundin mining

1 Contingency Plan – Eagle Mine Site

This contingency plan addresses requirements defined in R 425.205. This includes a qualitative assessment of the risk to public health and safety or the environment (HSE risks) associated with potential accidents or failures involving activities at the Eagle Mine. Engineering or operational controls to protect human health and the environment are discussed in Section 4 and Section 5 of this document. The focus of this contingency plan is on possible HSE risks and contingency measures. Possible HSE risks to on- site workers will be addressed by Eagle Mine through HSE procedures in accordance with Occupational Safety and Health Administration (OSHA) and Mine Safety and Health Administration (MSHA) requirements.

Processes undertaken at the Eagle Mine Site includes mining ore, as well as storing and treating by-products of that process. Eagle Mine's mining, storage, and treatment facilities have been designed, constructed, and operated in a manner that is protective of the environment through the use of proven technologies and engineering practices.

1.1 Contingency Items

This contingency plan addresses the items listed below in this Section in accordance with R 425.205 (1)(a)(i) - (xii).

- Release or threat of release of toxic or acid-forming materials
- Storage, transportation and handling of explosives
- Fuel storage and distribution
- Fires
- Wastewater collection and treatment system
- Air emissions
- Spills of hazardous substances
- Other natural risks defined in the EIA
- Power disruption
- Unplanned subsidence, and
- Leaks from containment systems for stockpiles or disposal and storage facilities.
- Basin berm failures.

For each contingency item, a description of the risk is provided, followed by a qualitative assessment of the risk(s) to the environment or public health and safety. Next, the response measures to be taken in the event of an accident or failure are described.

1.1.1 Release of Toxic or Acid-Forming Materials

Potentially reactive materials generated as a result of mining operations include the ore and development rock. Both the development rock and ore have the potential to leach mining related constituents when exposed to air and water. As described in the following sub-sections, handling and temporary storage of both the ore and development rock have been carefully considered in the design of the Eagle Mine so as to prevent the uncontrolled release of acid rock drainage (ARD). Since secondary processing will occur at an off-site mill, the only chemical reagents used on-site are associated with the water treatment plant (WTP).

1.1.1.1 Coarse Ore Storage Area (COSA)

Coarse ore from the underground mine is trucked to the surface and placed in the COSA. The COSA is a steel sided building with a full roof that is used for temporary storage of stockpiled coarse ore. The COSA has a concrete floor that is sloped to a floor drain that collects any contact water associated with the ore. This contact water is collected in an epoxy lined sump in the COSA and pumped into the composite lined contact water basins (CWB) where it is stored until treatment at the water treatment plant. Contingency measures associated with the CWB liner systems are discussed in Section 1.1.12. Also, in accordance with Air Permit (No. 50-06B) all overhead doors must be closed during loading or unloading of ore and a fugitive dust management plan, which includes sweeping and watering, is in place to minimize the generation of dust.

1.1.1.2 Temporary Development Rock Storage Area (TDRSA)

Development of the mine began with excavation of surrounding rock to provide access to the ore body through portals, raises and ramps. This rock is known as "development rock" and upon excavation is transported to the surface and temporarily stored in the TDRSA. The development rock stored in the TDRSA is returned underground as backfill in areas where ore has been removed.

Most of the development rock is classified as inert while stored on the surface, posing no threat to the environment. Ongoing tests show some of this rock has the potential to oxidize when exposed to air and water over longer periods of time. Therefore, Eagle Mine handles the development rock in a way to minimize the potential formation of ARD, and if formed, prevent it from being released into the environment.

Accordingly, Eagle Mine has designed and constructed a state-of-the-art TDRSA to contain the development rock. The TDRSA is constructed of the following components to minimize the potential generation of ARD, and if formed, prevent it from being released to the environment:

- A composite liner system comprised of a geo-membrane liner underlain by a GCL.
- A water collection system over the composite liner to collect precipitation that comes in contact with development rock. The collection system also helps protect the geo-membrane from damage by the development rock. The collection system consists of a geo-composite drainage fabric overlain by a 12-in thick granular drainage layer sloping towards the collection sump.
- A leak detection system for early detection and collection of potential percolation through the composite liner system. The leak detection system includes a collection sump, and a sump pump for liquid removal.
- A geo-membrane cover system placed over the development rock if development stops for an extended period of time.

In accordance with MP 01 2007, condition F4 and the Limestone Addition Plan, as development rock is placed in the TDRSA it is amended with high-calcium limestone at a rate of two percent. This is added as an additional contingency measure to offset the formation of ARD. Moreover, if development or mining is suspended for an extended period of time the development rock will be covered to further limit the generation of ARD by minimizing contact with precipitation. As an added measure, the time in which development rock will be stored in the TDRSA has been modified. Development rock was originally scheduled for storage on the TDRSA for approximately seven years before being returned underground. Eagle Mine has chosen to immediately return the rock underground as cemented rock fill in order to further reduce the risk of ARD generation. The short-term nature of this project significantly reduces the potential for release of toxic and acid-forming materials.

If the event that the water that comes in contact with the development rock become acidic, it will not be exposed to the environment due to the design of the TDRSA. All contact water from the TDRSA is collected in the contact water basins and treated at the WTP. The contingency actions that address potential failure of the liner contact water collection system are discussed in Section 1.1.12.

1.1.1.3 Ore Transportation

The ore will be loaded from the Coarse Ore Storage Building into tractor-trailer combinations utilizing front end-loaders and transported to the Humboldt Mill. All loaded ore trucks will be covered and have the tires washed at the on-site truck wash prior to leaving the Contact Area at the Mine site.

The following sixty-six mile route is being utilized for moving the ore from the Eagle Mine site to the Humboldt Mill on existing roadways:

- East on Triple A Road, 9.0 miles to CR 510.
- East on CR 510, 3.0 miles to CR 550
- South on CR 550 approximately 20 miles to Sugarloaf Avenue
- South on Sugarloaf to Wright Street
- Wright Street to US-41 West
- US-41 West to M-95
- M-95 South to CR 601
- CR 601 East to the Humboldt Mill entrance.

Eagle Mine, in cooperation with the Marquette County Road Commission (MCRC), upgraded the portions of the sixty-six mile route that were not currently "all season" status. These upgrades included widening of roadways and addition of passing lanes all of which add a level of safety for all drivers on the road.

The trucks are covered side-dump units with a length limit of approximately 80 ft. They consist of a tractor, a trailer, and second trailer (pup). The truck carries approximately 45 metric tons per load on average. All loads are weighed prior to departure from the COSA to ensure that they do not exceed roadway weight limits.

Safety is stressed with the ore truck drivers. Tracking devices are mounted on the tractors to monitor and record speed, location and braking effort. Excessive speeds or erratic driving are not tolerated. In addition, Eagle Mine will work with the MCRC to maintain a safe road surface for employees, vendors and ore shipment.

Potential truck accidents are possible while transporting ore from the Mine to the Mill. In the event of a truck roll over, ore could be spilled onto the road and adjacent areas. Since the coarse ore is run of mine rock and not crushed, it will be relatively easy to pick the material up with conventional earthmoving equipment and place the ore back into a truck. If such an event should occur, removal action would take place as soon as possible. Although geochemical testing of the ore has shown that ARD will not occur in this short of a time period, it is important to respond appropriately to any spills. If an accident results in spillage of ore into a water body, specialized equipment and procedures may be required. Items such as temporary dams/cofferdams and large backhoes may be required to remove the material from the water. Eagle Mine has an emergency response contractor on call to immediately respond to environmental incidents, assist with clean-up efforts, and conduct environmental monitoring associated with any spills. In addition, a transportation spill response standard operating procedure has been developed.

The Mill Coarse Ore Facility is designed such that all unloading of ore will occur in an enclosed building with a concrete floor. These features will prevent release of dust and prevent precipitation from contacting the ore. After the ore is unloaded into the Coarse Ore Facility, it is crushed and transferred, with loading and transfer points featuring dust control in accordance with the Air Permit to Install (50-06B).

1.1.2 Storage, Transportation and Handling of Explosives

Blasting agents or explosives are required for blasting operations in the development and operation of the mine. The bulk explosives selected for use at the Eagle Mine are comprised of ammonium nitrate and small percentages of sodium and calcium nitrate, and diesel fuel. Although uncommon, accidental detonation of explosives could result from impact, shock, fire, or electrical discharge.

The entire surface operations are located within a fenced area. Vehicular access to Eagle Mine is controlled by a gate house and fence system. To further mitigate concerns related to explosives, with the exception of the bulk emulsion, all explosives components are stored in a locked explosives magazine located underground.

The storage, transportation, and use of explosives comply with applicable MSHA and/or ATF standards. Caps, primers, and detonating cord are stored in a locked magazine underground while the bulk emulsion is stored in locked storage tanks on the surface. Explosives are transported by a clearly marked truck.

The main impacts of an uncontrolled explosion on the surface would be in the immediate area of the explosion and would include direct injury from the blast zone, falling debris, fire, and the release of combustion products. Combustion products expected from the explosives are carbon monoxide and nitrogen oxides. Neither of these products is expected to be generated in high enough concentrations for significant above ground or off-site exposures to occur. Dust could also be generated but would likely settle to the ground before migrating beyond the Eagle Mine site. Uncontrolled underground explosions have not been considered since the environmental effects would not be different from controlled explosions in normal mine operations. In the event of a surface explosion, the Emergency Procedure will be followed, as discussed in Section 1.2.

1.1.3 Fuel Storage and Distribution

The fuel storage area is located within the contact area of the Eagle Mine Site. The entire surface operations are located within a fenced area and controlled by a gate house and fence system. The fuel storage area contains two off-road diesel fuel storage tanks with a capacity of 20,000 gallons each and one smaller 570 gallon tank for on-road diesel. An additional 1,700 gallon diesel fuel storage tank is located in the non-contact area near the power house generator and a 500 gallon diesel tank associated with the fire water system is located inside the water treatment plant. All fuel tanks are made of double-walled construction for added protection against leaks. In addition, the mine site currently has a propane storage capacity of approximately 93,600 gallons. All propane tanks, currently on site, are located adjacent to the buildings that require the fuel for heating purposes.

In general, fuel spills and leaks will be minimized by the following measures:

- A Spill Prevention Control and Countermeasures Plan (SPCC) has been written and implemented.
- Training of personnel responsible for handling fuel in proper procedures and emergency response;
- Regular equipment inspections and documentation of findings;

- Double-walled construction of all above ground tanks and/or additional secondary containment, and
- Staging of on-site emergency response equipment to quickly respond to unanticipated spills or leaks.

Specific procedures have been prepared as part of the project's SPCC Plan. In addition, a Pollution Incident Prevention Plan (PIPP) has been prepared which addresses potential spillage of fuels and other polluting materials.

Diesel fuel and propane (fuels) are transported to the Eagle Mine by tanker truck from local petroleum distributors. The probability of an accidental release during transportation will be dependent on the location of the supplier(s) and the frequency of shipment. A fuel release resulting from a vehicular accident during transportation is judged to be a low probability event. Transport of fuel in tanker trucks does not pose an unusual risk to the region since tanker trucks currently travel to the region on a regular basis to deliver fuels to gasoline stations located in the communities surrounding the Eagle Mine.

Three potential release events associated with the surface-stored fuels are a bulk tank failure, mishandling/leaking hoses, and a construction/reclamation phase release.

Bulk Tank Failure - A tank failure could potentially result from unusual thermal, mechanical, or chemical stresses. Chemical stresses are not anticipated as the storage tanks will be constructed of materials compatible with the fuels. Mechanical stress is also not anticipated since the tanks will be located within an area offering protection from vehicles. Contingency measures required to mitigate a fuel spill are included in the SPCC and PIPP. All fuel tanks are double-walled and visually inspected at regular frequencies to verify that the storage tanks are not leaking.

Mishandling/Leaking Hoses - A release might result from leaking hoses or valves, or from operator mishandling. This type of release is likely to be small in volume and is judged to be a low probability event given that operators will be trained to manage these types of potential releases. These small spills will be cleaned up by using on-site spill response equipment such as absorbent materials and/or removing impacted soils.

Construction/Reclamation Phase Release - A major fuel spill during the construction or reclamation phases could occur from a mobile storage tank failure or mishandling of fuels. Such a release is also considered to be a low probability event given that operators will be trained to manage these types of potential releases and all tanks are required to have secondary containment. As with mishandling or leaking hoses, these small spills will be cleaned up by using on-site spill response equipment such as absorbent materials and/or removing impacted soils.

Absorptive materials may be used initially to contain a potential spill. After the initial response, soil impacted with residual fuel would be addressed. Remedial efforts could include, if necessary, the removal of soil to preclude migration of fuel to groundwater or surface water. The project's PIPP and SPCC plans addresses fueling operations, fuel spill prevention measures, inspections, training, security, spill reporting, and equipment needs. In addition, standard operating procedures have been developed which cover fueling operations and spill response activities. All responses to a fuel spill, both large and small, will follow the guidelines dictated by the spill response plan and be reported internally. The tanks will be inspected regularly, and records of spills will be kept and reported to MDEQ and other agencies as required.

In the event of a release in the contact area, fuels would be routed (due to site grading) to the contact water basins where they would cleaned-up using absorbent pads/booms or other fuel absorbing products. Any fuel not absorbed would be routed to the WTP and treated prior to release to the environment. In the event of a release in the non-contact area, fuels would be absorbed by soil, retarding their migration. Exposures to contaminated groundwater are not expected because of regulatory requirements for timely and effective response actions which will dictate soil or source removal before migration to groundwater takes place. A transportation-related fuel spill resulting from a non-traffic accident is considered a low probability event. Therefore, the risk of a fuel spill from a non-traffic accident is judged to be minor.

Contingency plans for responding to fuel spills from tanker trucks are required of all mobile transport owners as dictated by Department of Transportation (DOT) regulation 49 CFR 130. These response plans require appropriate personnel training and the development of procedures for timely response to spills. The plan must identify who will respond to the spill and describe the response actions to potential releases, including the complete loss of cargo. The plan must also list the names and addresses of regulatory contacts to be notified in the event of a release.

1.1.4 Fires

This section discusses contingency measures to be taken in the event of either an underground mine fire or surface fires.

1.1.4.1 Mine Fire

One potential source of combustion could occur during the handling of combustible minerals in the Eagle Mine ore body. The ore body contains certain quantities of pyrrhotite, which is an iron sulfide mineral. Iron sulfide is considered to be a phyrophoric material that oxidizes exothermically when exposed to air. Due to the exothermic reaction, ignition can occur, especially if the surface area is increased with the occurrence of finely divided material. This situation is often encountered in a petroleum refinery, where finely divided iron sulfide scales form in refinery units in oxygen deficient atmospheres. When subsequently exposed to air, these crystals of iron sulfide oxidize rapidly back to iron oxide. While this condition can also occur in underground mines, this problem should be adequately controlled through proper mine ventilation.

In the event that a mine fire develops it would be expected to be localized, short lived, and would not pose a threat to the workers or the environment. Off-site populations would not be exposed to agents resulting in adverse effects. Events that do not result in exposure cannot result in health effects and do not pose a risk. Mine fires, therefore, pose a negligible risk to the environment.

Appropriate preventative and contingency measures will be exercised as required by MSHA. These measures include housekeeping, the installation of fire suppression systems on mobile equipment, the widespread distribution of fire extinguishers throughout the mine, employee safety training programs, and the use of a mine rescue team trained in firefighting techniques. Mine evacuation procedures, as discussed in Section 1.2, may be invoked, depending on the nature and extent of an underground fire.

1.1.4.2 Surface Fire

Surface fires can be started by a variety of causes including vehicular accidents, accidental ignition of fuels or flammable chemical reagents, and lightning strikes. Smoking is only allowed in designated areas on the site. Contingency measures include having the required safety equipment, appropriate personnel training and standard operating procedures. Given these measures, uncontrolled or large surface fires are considered a low probability event with negligible risk.

Because the Eagle Mine is situated in a forested region, forest fires started off-site could potentially impact the mine site. The cleared area in the vicinity of the surface facilities and excess soil berms will serve as a fire break to protect surface facilities. At Eagle Mine Wildfire Response Guideline has been developed in conjunction with Michigan DNR Fire Division to ensure the best possible response. Contingency measures discussed below can be implemented in the event of an off-site forest fire.

In order to minimize the risk of a fire on-site, stringent safety standards are being followed during both the construction and operation phases of surface facilities. All vehicles/equipment are required to be equipped with fire extinguishers and all personnel trained in their use. In addition, all personnel are required to complete a "hot work" permit whenever work is being performed where an ignition source is present. Water pipelines and network of fire hydrants have been installed throughout the site and additional fire extinguishers are also located in high risk areas. On-site firefighting equipment includes:

- An above ground water storage tank and distribution system for fire suppression.
- Stocked and maintained fire hose stations/cabinets.
- Multiple dry chemical fire extinguishers located throughout the facility.
- An alarm system which automatically notifies security of any onsite alarm.

1.1.5 Wastewater Collection and Treatment

The major sources of water requiring treatment are groundwater inflow to the mine, water used in support of underground operations, contact water from the TDRSA, and precipitation and storm water runoff from the operations area. All water is routed to CWBs No.1 and No.2. These basins provide wastewater storage and equalization capacity. Water from the basins is conveyed to the WTP which is comprised of several unit processes, including: metals precipitation, multi-media filtration, weak acid ion exchange, and double pass reverse osmosis. The final product water is pH adjusted prior to subsurface discharge via a Treated Water Infiltration System (TWIS). This discharge is authorized by the State of Michigan under a Groundwater Discharge Permit.

The water treatment system is designed to handle various process upset conditions such as power disruption (Section 1.1.10) or maintenance of the various process units. The effluent is continually monitored for key indicator parameters to verify the proper operation. Effluent not meeting treatment requirements is pumped back to the CWBs for re-treatment. The CWBs are designed to hold approximately 14,000,000 gallons of water. This storage capacity allows sufficient time to correct the process upset condition. Potential hazards and chemical reagents associated with the WTP are discussed in Section 1.1.8.

1.1.5.1 Contact Water Basins

The CWBs were very conservatively designed to handle a combined 100 year peak snow melt and rain event.

The CWBs have also been designed with the following contingencies which are further addressed in the Eagle Mine Site Water Management Plan:

- The CWBs are designed to hold approximately 14,00,000 gallons of water allowing sufficient time for maintenance of WTP equipment.
- In the unlikely event that a runoff event exceeds capacity of the CWBs the following actions will be taken:

- By-pass CWBs and divert underground mine water directly to the WTP.
    - Transfer water from CWBs to the TDRSA (During a true emergency, more than one foot of head can be stored on the TDRSA with consent from the MDEQ).
- Water can be pumped into vacant underground mine workings for additional temporary storage of water.

Potential release events associated with breach of the composite liner, and overtopping of the berms are discussed in Section 1.1.6 and the Eagle Mine Site Water Management Plan. Potential leakage of the liner system is discussed in Section 1.1.12.

1.1.5.2 Non-Contact Storm Water

Storm water runoff from the non-contact areas will be directed to one of four NCWIBs. The NCWIBs allows runoff from non-contact areas to infiltrate through the on-site sandy soils. In general, the NCWIBs have been designed such that no runoff is expected to leave the disturbed areas of the site. The NCWIBs are very conservatively sized to accommodate the same runoff event as the CWBs.

As an additional conservative design measure, the NCWIBs have been sized assuming the ground is frozen 6 months out of the year with no infiltration during this time period. In the event that the infiltration capacity of the CWB soils is reduced over time by the presence of silt, the solids will be removed to restore the infiltration capacity.

1.1.5.3 Treated Water Infiltration System

Treated water is piped from the WTP to the TWIS in a buried pipeline. The treated water is discharged to the on-site sandy soils through the TWIS. The TWIS is located in highly permeable soil. The treated effluent is applied evenly within individual infiltration cells and discharged to groundwater. The treated effluent is applied to the TWIS through five separate infiltration cells. This design allows at least one cell to be out of service for resting and/or maintenance while the other cells are being used.

Potential failure mechanisms of the TWIS include reduced infiltration capacity, pipe breakage and frost damage. The infiltration capacity of the TWIS is designed with a capacity that is greater than the capacity of the WTP. In the unlikely event that the infiltration capacity becomes reduced over time, additional capacity could be constructed adjacent to the proposed footprint. If pipe breakage occurs, the damaged sections will be removed and replaced. Frost is not expected to be a problem. As a contingency against frost damage, Styrofoam insulation was incorporated into the design, which keeps the natural temperature of the earth above 32 degrees. Furthermore, since the material below the TWIS is free draining, water should not freeze in the interstitial space.

1.1.6 Berm Failures

This section discusses contingency actions to be taken in the event of berm failures at the CWBs and TDRSA. Liner failures are discussed in Section 1.1.12.

Embankment failure of the CWBs or the TDRSA is not likely due to the very small height of the embankments, and the flat slopes and the stable nature of the onsite foundation soils at the site. All construction was under strict QA/QC procedures to verify good construction of the embankments. In addition, the berms are inspected on a monthly basis or after a rain event that exceeds 0.5 inches in a 24-hour period, as required by permit condition L-31& L-32 of the mining permit. These inspections identify preventative maintenance required in order to maintain stability of the berms and embankments. All identified issues are immediately reported to onsite maintenance staff for repair.

Overtopping of the CWBs is also very unlikely due to the requirement to maintain two feet of freeboard above an already very conservative design. In addition, in the event of a catastrophic flood event, the TDRSA and underground workings will be used for excess water storage.

Erosion on the external berm slopes could be caused by unusually high precipitation. Erosion control contingency measures will be to quickly repair potential rutting or other soil instability with conventional earth moving equipment.

1.1.7 Air Emissions

The construction, operation and reclamation phases of the project will be performed in a manner to minimize the potential for accidents or failures that could result in off-site air quality impacts. All phases of the project will incorporate a combination of operating and work practices, maintenance practices, emission controls and engineering design to minimize potential accidents or failures. Below is a description of identified areas of risk and associated contingency measures that may be required. As part of a comprehensive environmental control plan, these contingency measures will assist in minimizing air impacts to the surrounding area.

1.1.7.1 Air Emissions during Operations

During operation of the mine, potential emissions from the facility will be controlled as detailed in the project's current Michigan Air Use Permit (No. 50-06B). These controls include paving of the site access road and parking areas, implementation of an on-site roadway sweeping and watering program, use of building enclosures or flexible membrane covers on storage areas, installation of dust collection or suppression systems where necessary, or enclosed structures to control dust during ore transfer operations, and following prescribed preventive maintenance procedures for the facility. Ore that is moved off-site will be transported in covered trucks to minimize dust emissions. Below is a more detailed discussion of potential airborne risks associated with proposed operations at the facility.

During facility operations, Eagle Mine will utilize certain pieces of mobile equipment to move ore about the site. Equipment includes ore production trucks, front end loaders, product haul trucks and miscellaneous delivery trucks. Although the movement of most vehicles across the site is on asphalt surfaces, a comprehensive on-site watering and sweeping program has been developed to control potential fugitive sources of dust. While the watering program is closely monitored, if excessive dust emissions should occur, the facility will take appropriate corrective action, which may include intensifying and/or adjusting the watering program to properly address the problem.

To minimize dust emissions from development rock and coarse ore storage areas, such areas will either be fully or partially enclosed. Materials will be moved to and from these areas during the course of operations. Given the relatively large size and moisture content of these materials, it is anticipated that the risk of excessive fugitive dust emissions from these activities is low. Any development rock crushed in preparation for use in backfill will be watered prior to crushing and conveyors will be equipped with water sprays to minimize dust emissions. The TDRSA will also be temporary in nature, in that development rock will be moved back underground to fill stopes that have been mined.

The coarse ore storage building is designed as an enclosed structure to control fugitive emissions from ore transfer between underground production vehicles and offsite haul trucks. No crushing will occur in the COSA, so the risk of fugitive dust emissions from this activity is low due to the enclosed nature of the building and moisture content of the ore. If necessary, water sprays are used to control dust within the building and best housekeeping practices apply to ensure cleanliness of the building (i.e. sweeping and washing down of floors). Although the risk of fugitive dust during transport of coarse ore material off-site

is considered to be low due to its large size, this risk is further reduced as all trucks will be equipped with covers. Trucks undergo a tire wash prior to exiting the facility to reduce the potential for ore dust migration from the property.

Portland cement is being incorporated as a binder for aggregate material used in backfilling primary stope areas underground. The cement is unloaded at the surface and stored in silos at the surface backfill facilities. Controls have been incorporated to minimize fugitive dust emissions during this process and include the use of a truck mounted pneumatic conveying system, vent fabric collectors and enclosed screw conveyors. While it is anticipated the risk of accidental emissions from these operations is moderate, Eagle Mine will be prepared to take appropriate corrective action if an upset condition should occur. All cemented rock fill generating activities will occur under emissions control such as fabric filters until the material is wet and transferred back to the underground.

1.1.7.2 Air Emissions during Reclamation

Once underground mining and ore transfer activities are completed at the site, reclamation will commence in accordance with R 425.204. Similar to construction activities, there is a moderate risk fugitive dust emissions could be released during certain re-vegetation activities and during temporary storage of materials in stockpiles. Similar to controls employed during the construction phase, areas that are reclaimed will be re-vegetated to stabilize soil and reduce dust emissions. If severe wind or an excessive rain event reduces the effectiveness of these protective measures, appropriate action will take place as soon as possible to restore vegetated areas to their previous effectiveness and replace covers as necessary.

To the extent necessary, areas being reclaimed will be kept in a wet state by continuing the watering program. It is anticipated this program should minimize the possibility of excessive dust associated with mobile equipment. In the event fugitive dust is identified as an issue, corrective action will determine the cause of the problem and appropriate action will occur.

1.1.8 Spills of Hazardous Substances

Since secondary mineral processing is not planned on-site, the primary chemical reagents used are associated with the WTP. Table 1-1 includes a list of reagents used at WTP along with the storage volumes and physical state of each chemical.

Table 1-1

Chemical Reagents Used at the Water Treatment Plant

Item No.	Chemical Name	CAS No.	Storage Volume (Gallons)	Storage Volumes (pounds)	Delivery State
1	Sodium hydroxide (50%)	1310-73-2	5,000	63,384	Liquid
2	Sodium hypochlorite (12.5%)	7681-52-9	110	1,101	Liquid
3	Soda ash	497-19-8	-	40,000	Solid
4	Ferric chloride (35%)	7705-08-0	900	10,508	Liquid
5	Hydrochloric acid (32%)	7647-01-0	5,000	49,206	Liquid
6	Suppressor 1615 (Antifoam)	-	220	1,807	Liquid
7	Hydrex 4501 (RO Cleaner)	-	-	1,200	Solid
8	Nitric acid (30%)	7697-37-2	900	8,867	Liquid
9	Sulfuric acid (93%)	7664-93-9	880	13,467	Liquid
10	Sodium Metabisulfite	-	-	100	Solid
11	Permatreat PC-191-T (Antiscalant)	-	330	3,711	Liquid
12	POL-EZ 83904	-	165	1,481	Liquid

Chemical storage and delivery systems follow current standards that are designed to prevent and to contain spills. All use areas and indoor storage areas were designed, constructed and/or protected to prevent run-on and run-off to surface or groundwater. This includes development of secondary containment areas for liquids. The secondary containment area is constructed of materials that are compatible with and impervious to the liquids that are being stored. In addition, the truck off-loading area for bulk chemicals is an enclosed facility curbed with a sloped pad, such that spills are directed and contained within the secondary containment area. A release in the WTP from the associated piping would be contained within the curbed and contained plant area and neutralized. Absorbent materials are available to contain acid or caustic spills. Eagle Mine has an emergency response contractor on call to immediately respond to environmental incidents, assist with clean-up efforts, and conduct environmental monitoring associated with any spills.

Spill containment measures for chemical storage and handling will reduce the risk of a spill from impacting the environment. Due to the low volatility of these chemicals, fugitive emissions from the WTP to the atmosphere during a spill incident are likely to be negligible. Off-site exposures are not expected. It is therefore anticipated that management and handling of WTP reagents will not pose a significant risk to human health or the environment.

1.1.9 Other Natural Risks

Earthquakes – The Upper Peninsula of Michigan is in a seismically stable area. The USGS seismic impact zone maps show the maximum horizontal acceleration to be less than 0.1 g in 250 years at 90% probability. Therefore, the mine site is not located in a seismic impact zone and the risk of an earthquake is minimal. Therefore, no contingency measures are discussed in this section.

Floods - High precipitation events have been discussed previously in sections that describe the CWBs, NCWIBs and the TDRSA. High precipitation could also lead to the failure of erosion control structures. The impacts of such an event would be localized erosion. Contingency measures to control erosion include sandbag sediment barriers and temporary diversion berms. Long term or off-site impacts would not be expected. Failed erosion control structures would be repaired or rebuilt. Impacts from high precipitation are reversible and off-site impacts are not expected to occur. Given the considerable planning and engineering efforts to manage high precipitation events, the risk posed by high precipitation is considered negligible.

Severe Thunderstorms or Tornadoes – Severe thunderstorms or tornadoes are addressed in the emergency procedures developed for the mine site. Certain buildings are designated shelters in the event of severe weather. Evacuation procedures are part of the on- site training of all employees.

Blizzard – The mine site is designed to accommodate the winter conditions anticipated for the Upper Peninsula. Triple A Road has been upgraded to accommodate the increased vehicle traffic which allows access to the mine during the worst of winter weather. Eagle Mine and the MCRC have an arrangement for maintenance of the County Roads during winter conditions. If road conditions deteriorate beyond the capability of the maintenance equipment, Eagle Mine will have arrangements to keep workers on-site for extended periods.

Forest Fires – Forest fires were discussed in Section 1.1.4.

1.1.10 Power Disruption

Facility electric power is provided by Alger-Delta Electric Cooperative, as well as, a backup generator capable of delivering 2,000 kW of power. The electrical distribution system provides power to the main surface facilities, the backfill surface facilities, the potable well, and underground facilities. In the event of a power outage, the backup generator automatically starts and provides power to the surface facilities and underground ventilation system. A second portable generator can be utilized to power the potable water system, if necessary. During the outage, Eagle Mine would have to reduce operations so as to keep critical equipment in operation with the reduced power.

In the event the WTP would need to be temporarily shut down during power disruptions, the CWBs were designed with significantly larger capacity than required in daily operations. The CWBs can hold approximately 14,000,000 gallons of mine inflow water which would be sufficient enough in size to store water for an extended period of time if necessary.

1.1.11 Unplanned Subsidence

The blast hole mining method being used at the Eagle Mine consists of primary and secondary stopes. This method requires that prior to mining a secondary stope, the primary stopes on both sides and on the level above be backfilled with cemented rock fill. Mining will start with a small number of stopes near the middle elevation of the ore body and then proceed to the lower parts of the ore body and progress vertically to the top of the deposit over the life of the mine. This mining method and sequence will minimize the potential for surface subsidence to occur.

The primary stopes are backfilled using an engineered cemented development rock or aggregate fill. A Portland cement binder is used to prepare the backfill. The quantity of binder required is estimated at approximately four percent by weight. The secondary stopes are backfilled with either limestone amended development rock from the TDRSA or local uncemented fill material obtained from off-site sources. Backfilling the primary and secondary stopes as proposed above is designed to mitigate surface subsidence and the subsidence is predicted to be immeasurable at the ground surface.

A comprehensive evaluation of the stability of the crown pillar and surface subsidence was completed as part of the mine design. The conclusion of the stability assessment was that the pillar is predicted to be stable with the typical rock mass classification values obtained prior to the start of mining. The crown pillar assessment also predicted the vertical displacement of the crown pillar. The modeling results predicted vertical displacement at the top of bedrock less than 2 cm (<1 in). Given that the bedrock is covered by overburden, this displacement of the crown pillar and this subsidence will be imperceptible at the ground surface. As a contingency, a crown pillar management plan has been developed that includes subsidence monitoring measured both through surface and underground extensometers as well as five survey monuments that detect vertical subsidence and progressive ground movement. The surface extensometer is downloaded and survey completed on a monthly basis. The underground extensometers are continually monitored and tied into a telemetry system for on-demand data retrieval. In the event of unanticipated subsidence, the mining sequence and backfill methods as described above and in Section 4, will be evaluated and adjusted to reduce the subsidence. Adjustments to the stope sequence, backfill methods, crown pillar thickness, and backfill mix would be adjusted as needed to minimize subsidence. In addition, ground support inspections are completed on a daily basis by onsite staff to ensure safe working conditions for miners.

1.1.12 Containment System Leaks

Details of the containment systems for the CWBs and TDRSA were previously discussed. These containment facilities are both designed with composite liner systems to minimize the potential for

release. In addition, QA/QC measures required by the mining permit assure proper construction of the containment structures. As an additional preventative measure to minimize the potential for leaks from these facilities, leak location surveys were completed during construction of the TDRSA and CWBs and will continue to be completed periodically for the CWBs to identify potential leaks that occur during operations. The TDRSA is equipped with a leak detection system and therefore a leak detection survey is not necessary.

1.2 Emergency Procedures

This section includes the emergency notification procedures and contacts for the Eagle Mine. In accordance with R 425.205(2), a copy of this contingency plan will be provided to each emergency management coordinator having jurisdiction over the affected area at the time the application is submitted to the MDEQ.

Emergency Notification Procedures – An emergency will be defined as any unusual event or circumstance that endangers life, health, property or the environment. If an incident were to occur, all employees are instructed to contact Security via radio or phone. Security then makes the proper notifications to the facility managers and activates the Eagle Mine Emergency Response Guideline as needed. If personnel on site need to be notified of such an event an emergency toned broadcast via radio will be made with instructions.

Eagle Mine has adopted an emergency response structure that allows key individuals to take immediate responsibility and control of the situation and ensures appropriate public authorities, safety agencies and the general public are notified, depending on the nature of the emergency. A brief description of the key individuals is as follows:

- Health & Safety Officer: The facility H&S manager and H&S staff are responsible for monitoring activities in response to any emergencies. During an emergency, H&S representatives will manage special situations that expose responders to hazards, coordinate emergency response personnel, mine rescue teams, fire response, and ensure relevant emergency equipment is available for emergency service. This individual will also ensure appropriate personnel are made available to respond to the situation.

- Environmental Officer: The facility environmental manager will be responsible for managing any environmental aspects of an emergency situation. This individual will coordinate with personnel to ensure environmental impact is minimized, determine the type of response that is needed and act as a liaison between environmental agencies and mine site personnel.

- Public Relations Officer: The facility external relations manager will be responsible for managing all contacts with the public and will coordinate with the safety and environmental officers to provide appropriate information to the general public.

In addition to the emergency response structure cited above, a Crisis Management Team (CMT) has also been established for situations that may result in injuries, loss of life, environmental damage, property or asset loss, or business interruption. If a situation is deemed a “crisis” the CMT immediately convenes to actively manage the situation. The following is a description of the core members and their roles:

Crisis Management Team – Core Members and Roles

Core Members	Role
Team Leader	Responsible for strategy and decision making by the CMT during a crisis and maintaining a strategic overview.
Coordinator	Ensures a plan is followed and all logistical/administrative support required is provided.
Administrator	Records key decisions and actions and provides appropriate administrative supports to the CMT.
Information Lead	Gathers, shares, and updates facts on a regular basis.
Emergency Services and Security	Liaises with external response agencies and oversees requests for resources. Maintains a link between the ERT and CMT and oversees and necessary evacuations.
Communications Coordinator	Develops and implements the communications plan with support from an external resource.
Spokesperson	Conducts media interviews and stakeholder briefings.

Evacuation Procedures – While the immediate surrounding area is sparsely populated, if it is necessary to evacuate the general public, this activity will be handled in conjunction with emergency response agencies. The Public Relations Officer will be responsible for this notification and will work with other site personnel, including the safety and environmental officers.

In the event evacuation of mine personnel is required, Eagle Mine has developed emergency response procedures for underground facilities as well as surface facilities. All evacuation procedures were developed in compliance with MSHA regulations and practiced on a regular basis. In addition, in accordance with MSHA, Eagle Mine is required to have a Mine Rescue Team that is routinely and adequately trained to respond to underground emergency situations. The Mine Rescue team is comprised of nineteen members making up three teams. The teams train approximately 8-10 hours per month which includes at least two hours "under air" using the Draeger BG-4 closed-circuit breathing apparatus. Training activities may include familiarization with the mine map and underground navigation, understanding ventilation and air flow in the mine, mine gases, rescue and recovery, basic extrication, underground fire suppression, first aid, and operation and maintenance of the BG-4 breathing apparatus.

In addition to the Mine Rescue Team, security personnel at the Eagle Mine site are EMTs and paramedics who are trained in accordance with state and federal regulations. Eagle Mine also maintains a state licensed ALS ambulance onsite for immediate response to emergency situations.

Emergency Equipment – Emergency equipment includes but is not be limited to the following:

- ABC Rechargeable fire extinguishers
- Telephone mine communication system
- Radios

- First aid kits, stretchers, backboards, and appropriate medical supplies with a licensed transporting advance life support ambulance on site properly staffed at all times.
- BG-4 Self Contained Breathing Apparatus
- Gas detection monitors that detect 5 gases and LEL.
- Cap lamps
- Self-rescuers
- Underground refuge stations
- Mine elevator
- Spill kits (hydrocarbon and chemical)
- High expansion foam machines
- Portable drift seal.

This equipment is located both underground and at the surface facilities. Fire extinguishers are located at appropriate locations throughout the facility, in accordance with MSHA requirements. Mine and surface facility personnel are also equipped with radios for general communications and emergencies. Other emergency response equipment is located at appropriate and convenient locations for easy access for response personnel. In addition, the Eagle Mine has two ambulances (surface and underground) and certified EMTs and paramedics onsite at all times to respond in the event of an emergency.

Emergency Telephone Numbers – Emergency telephone numbers are included for site and emergency response agencies, as required by R 425.205(1)(c). They are as follows:

- Mine Security: (906) 339-7018
- Local Ambulance Services: Mine ALS Ambulance Service provided by G4S Security they can be contacted at Extension 7018, or on the radio system using the Security, Emergency, or UG out Channels.
- Hospitals: Marquette General Hospital – (906) 225-3560
  Bell Hospital – (906) 485-2200
- Local Fire Departments: Powell Township - 911
- Local Police: Marquette County Central Dispatch – 911
  Marquette County Sheriff Department – (906) 225-8435
  Michigan State Police – (906) 475-9922
- Trimedia 24-hr emergency spill response: (906) 360-1545
- MDEQ Marquette Office: (906) 228-4853
- Michigan Pollution Emergency Alerting System: (800) 292-4706
- Federal Agencies: EPA Region 5 Environmental Hotline: (800) 621-8431
  EPA National Response Center: (800) 424-8802
  MSHA North Central District: (218) 720-5448
- MDNR Marquette Field Office: (906) 228-6561
- Michigamme Township Supervisor: Alvar Maki, (906) 323-6547
- MSHA: 1-800-746-1553

1.3 Testing of Contingency Plan

During the course of each year, the facility will test the effectiveness of the Contingency Plan. Conducting an effective test will be comprised of two components. The first component will include participation in adequate training programs on emergency response procedures for those individuals that will be involved in responding to emergencies and the second component is completion of a mock field or desktop exercise.

Training will include participation of the Incident Commander, Safety Officer, Environmental Officer, Public Relations Officer and other individuals designated to respond to emergencies including the Mill ERT. Individuals will receive appropriate training and information with respect to their specific roles, including emergency response procedures and use of applicable emergency response equipment.

The second component of an effective Contingency Plan is to conduct desktop exercises or mock field tests. At least one desktop exercise or mock field test will be performed each year. The Safety Officer will work with the Environmental Officer and Emergency Response Coordinator to first define the situation that will be tested. The types of test situations may include responding to a release of a hazardous substance, fire or natural disaster such as a tornado. A list of objectives will be developed for planning and evaluating each identified test situation. A date and time will then be established to carry out the test. Local emergency response officials may be involved, depending on the type of situation selected.

Once the test is completed, members of the crisis management team and emergency response team will evaluate the effectiveness of the response and make recommendations to improve the system. These recommendations will then be incorporated into a revision of the facility Contingency Plan.

Appendix V

Financial Assurance

EAGLE MINE AND HUMBOLDT MILL CLOSURE

2018 CLOSURE PLAN ESTIMATE - MDEQ

SUMMARY OF THE ESTIMATE (US$)

Description	SLR Estimate 2018	Comments
Functional Currency	USD	
Current Day Cost	2018	
Expected Operations Completion Date	2023	9 years (SLR) (from late 2014 through summer 2023)
Expected Closure Completion Date	2026/27	Provides 2 years for Mine Closure and 3 years for Mill Closure (winter work is avoided)
Expected Post-Closure Completion Date	2027	Provides for an initial post-closure period of 5 years to allow Sites to come to equlibriam.
Post-Closure Monitoring Completion Date	2047	Provides 15 years to demonstrate no further action is required including monitoring.

Phase	Code	Description	Estimated Cost ($1000's)	Contingency ($1000's)	Closure Estimate ($1000's)	Description
Direct Closure		**Closure at Life of Mine**				
	1000	**Eagle Mine and Related Facilities Closure**				
	1100	**Eagle Mine Underground**				
	1110	Underground Mine Equipment	$220,367	$26,444	$246,811	Decontaminate, Prepare for Transport, Load and Haul all Mining Equipment from Site
	1130	Demolition of Underground Infrastructure	$1,097,368	$131,684	$1,229,052	Underground Infrastructure Demolition, Load, Haul to Surface Processing Area
	1160	Backfill of Mine (Backfill of Stopes Complete at Start of Closure)	$105,990	$15,899	$121,889	(The estimate assumes that backfilling of the mine stopes has been completed upon start of closure)
	1170	Closure Elements Construction	$2,485,000	$308,500	$2,793,500	Ramp and Shaft Plugs
	1200	**Surface Facilities and Infrastructure**				
	1210	Mobile Equipment	$17,619	$2,643	$20,262	Allowance for Surface Equipment at 50 percent of the UG Equipment (Excluding Loaders, Haul Units and Drills)
	1220	Building Demolition	$2,876,566	$345,188	$3,221,754	Mine Building Demolition, Load, Haul to Processing Area
	1230	Demolition of Mine Surface Infrastructure	$877,657	$131,648	$1,009,305	Mine Surface Infrastructure Demolition, Load, Haul to Processing Area
	1240	Concrete and Asphalt Demolition	$678,132	$81,376	$759,507	Potential Recycle
	1250	Drainage Facilities and Road Removal	$749,467	$112,420	$861,887	Water Basins, TDRSA, Drainage Channels and Road Removal
	1260	Site Backfill, Grading and Preparation for Revegetation	$1,262,697	$189,405	$1,452,102	Regrade the Site Using Material from Site Berms
	1270	Closure Elements Construction	$636,000	$95,400	$731,400	Permanent Drainage Facilities (provide for drainage channels, sediment basins and drainage infrastructure)
	1280	General Site Planting and Revegetation	$1,277,555	$191,633	$1,469,188	Total Site Area for Revegetation equals Approximately 160 Acres
	2000	**Humboldt Mill Closure**				
	2200	**Surface Facilities and Infrastructure**				
	2210	Mobile Equipment	$17,619	$2,643	$20,262	Decommission, Prepare for Transport and Load Equipment
	2220	Building Demolition	$4,004,980	$480,598	$4,485,577	Mill Building Demolition, Load, Haul to Processing Area
	2230	Demolition of Surface Infrastructure	$1,119,326	$167,899	$1,287,225	Mill Surface Infrastructure Demolition, Load, Haul to Processing Area
	2240	Concrete and Asphalt Demolition	$876,097	$131,414	$1,007,511	Concrete SOG and Foundation Removal and Asphalt
	2250	Drainage Facilities and Road Removal	$111,445	$16,717	$128,162	Fill Stormwater Basins
	2260	Site Backfill, Grading and Preparation for Revegetation	$1,016,951	$122,034	$1,138,985	Import Topsoil
	2270	Closure Elements Construction	$379,375	$45,525	$424,900	Permanent Drainage Facilities (provide for drainage channels, sediment basins and drainage infrastructure)
	2280	General Site Planting and Revegetation	$507,051	$76,058	$583,109	Total Site Area for Revegetation equals Approximately 60 Acres
	2290	Other Miscellaneous Closure Requirements	$896,893	$134,534	$1,031,427	Fencing, signage, soil removal, spillways, increase FS for Rock Face north of mill building
		Subtotal Direct Closure Costs	$21,214,154	$2,809,661	$24,023,816	
	5000	**Contractor's Indirect Costs**				
	5100	Mine Closure	$2,905,814	$372,437	$3,278,251	Engineering Procurement and Construction Management (EPCM) Costs)
	5200	Humboldt Mill Closure	$3,704,897	$462,062	$4,166,958	Engineering Procurement and Construction Management (EPCM) Costs)
		Summary				
		Eagle Mine Subtotal	$15,190,231	$2,004,677	$17,194,908	
		Humboldt Mill Subtotal	$12,634,634	$1,639,483	$14,274,117	
		Total Direct Closure Construction Cost	**$27,824,865**	**$3,644,160**	**$31,469,025**	
	7000	**Site Operations, Maintenance and Monitoring (OM&M)**				
Closure Phase OM&M +		**Provide OM&M During Active Closure of the Eagle Mine & WTP Operations per estimated years beyond**				
Full Years WTP Ops		Eagle Mine OM&M with 5 Years WTP Operation	$5,613,114	$562,464	$6,175,578	Includes Site Care, Monitoring during Closure Phase and 5 years of Mine Water Treatment Operation
		Humboldt Mill OM&M with 3.5 years WTP Operation	$6,961,101	$697,918	$7,659,019	Includes Site Care, Monitoring during Closure Phase and 3.5 years of Mill Water Treatment Operation
Phase I (5 Years)		**Post-Closure Phase I - OM&M**				
		Eagle Mine	$3,500,162	$379,872	$3,880,034	Post-Closure Phase I - Five Year Period Following Completion of Closure Construction
		Humboldt Mill	$1,556,541	$171,435	$1,727,976	Post-Closure Phase I - Five Year Period Following Completion of Closure Construction
Post Closure (25 Years)		**Long Term Care and Maintenance**				
		Eagle Mine	$4,749,120	$579,831	$5,328,951	Post-Closure Phase II - Long Term Care and Maintenance
		Humboldt Mill	$3,922,915	$531,210	$4,454,125	Post-Closure Phase II - Long Term Care and Maintenance
		Eagle Mine Subtotal	$29,052,627	$3,526,844	$32,579,471	
		Humboldt Mill Subtotal	$25,075,191	$3,040,046	$28,115,237	
		Total	$54,127,818	$6,566,890	$60,694,708	
		Grand Total of All Cash Flows - Engineer's Estimate	**$54,127,818**	**$6,566,890**	**$60,694,708**	
ADD		**ADD** - Fill Open Stopes with CRF & Clear TDRSA of waste material	$2,096,334	$0	$2,096,334	Mine Site Only Costs
		Total for Project before inflation	$56,224,152	$6,566,890	$62,791,041	
		Escalation Factor - Detroit CPI No Adjustment for this estimate as prepared with 2018 year-end dollars	$0	$0	$0	Per Part 632, utilize Detroit Consumer Price Index inflation factor for cost adjustment
		Total for Project including inflation (excludes Contingency)	$56,224,152	$6,566,890	$62,791,041	
		MDEQ Adminstrative Oversight	$5,983,860	$0	$5,983,860	2016 Added by MDEQ as Part 425.301 (b) of the permit notes "The department (MDEQ) may require financial assurance in an amount larger than calculated by operator…" Breakout was $2,589,102 Mill Site and $3,394,758 Mine Site
		Estimate to MDEQ - Total for Project	**$62,208,012**	**$6,566,890**	**$68,774,901**	

Previous Estimate	**$ 53,914,295**
Difference	**$ 14,860,606**

Breakdown by Mine and Mill for Bonding Valuation of Each

Mine Site Total Estimate	$38,070,563
Mill Site Total Estimate	$30,704,339
	$68,774,901

Appendix W

Eagle Mine

Organizational Information Update

Eagle Mine
4547 County Road 601
Champion, MI 49814, USA
Phone: (906) 339-7000
Fax: (906) 339-7005
www.eaglemine.com

Organizational Information

Eagle Mine LLC

January 24, 2019

Registered Address: Eagle Mine, LLC
1209 Orange Street
Wilmington, DE 19801

Business Address: Eagle Mine, LLC
4547 County Road 601
Champion, MI 49814

Board of Directors

Kristen Mariuzza	4547 County Road 601 Champion, MI 49814
Peter Richardson	4547 County Road 601 Champion, MI 49814
John McGonigle	4547 County Road 601 Champion, MI 49814

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Officers

Jinhee Magie	Treasurer	4547 County Road 601 Champion, MI 49814
Annie Laurenson	Secretary	4547 County Road 601 Champion, MI 49814
Kristen Mariuzza	President	4547 County Road 601 Champion, MI 49814
John Kenneth McGonigle	CFO	4547 County Road 601 Champion, MI 49814