Eagle Mine
a subsidiary of lundin mining

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Tuesday, March 14, 2017

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 2016 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 906-251-0237.

Sincerely,

David Bertucci
Environmental Field Technician

Cc: Michigamme Township

enclosure

Eagle Mine
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2016 Annual Mining and Reclamation Report
Mine Permit MP 01 2007

March 15, 2017

Contents

Appendices

Appendix A	Mine Site Map
Appendix B	Rock Stability Certification
Appendix C	Map of Production Mining Progress
Appendix D	Facilities Water Quality Monitoring Results
Appendix E	Groundwater Monitoring Well Location Map
Appendix F	Groundwater Monitoring Well Results and Benchmark Summary Table
Appendix G	Groundwater Monitoring Trend Analysis Summary
Appendix H	Groundwater Piper Diagrams
Appendix I	Surface Water Location Map
Appendix J	Surface Water Results and Benchmark Summary Table
Appendix K	Surface Water Monitoring Trend Analysis Summary
Appendix L	Water Level Monitoring Location Map
Appendix M	Groundwater Contour Maps
Appendix N	Continuous Groundwater Level Results
Appendix O	Groundwater and Wetland Hydrographs
Appendix P	Discrete Groundwater Elevations
Appendix Q	Continuous Surface Water Monitoring Results
Appendix R	Surface Water Hydrographs
Appendix S	Flora & Fauna Survey Location Map
Appendix T	Aquatic Survey Location Map
Appendix U	Contingency Plan Update
Appendix V	Organizational Information Update

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	David Bertucci	Environmental Field Technician
Eagle Mine LLC	Kristen Mariuzza	HSE & Permitting Manager
Eagle Mine LLC	Amanda Zeidler	HSE Superintendent
Report contributors		
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Eagle Mine LLC	Jonathan Dale	Surface Supervisor
Eagle Mine LLC	Jason Evans	Land & Information Management Specialist
Eagle Mine LLC	Wilhelm Greuer	Geotechnical Mining Engineer
Eagle Mine LLC	Kristie Grimes	Water Treatment Plant Lab Technician
Eagle Mine LLC	Tucker Jensen	Mine Planner
Eagle Mine LLC	Josh Lam	Senior Mining Engineer/Project Superintendent
Eagle Mine LLC	Margo Longo	Underground Senior Geologist
Eagle Mine LLC	Jennifer Nutini	Environmental Engineer
Eagle Mine LLC	Peter Raymond	Project Geologist
Eagle Mine LLC	Matthew Taylor	Surface Supervisor
King & MacGregor Environmental, Inc.	Matt MacGregor	Wetland Scientist/Biologist
North Jackson Company	Jessica Bleha	Geologist
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

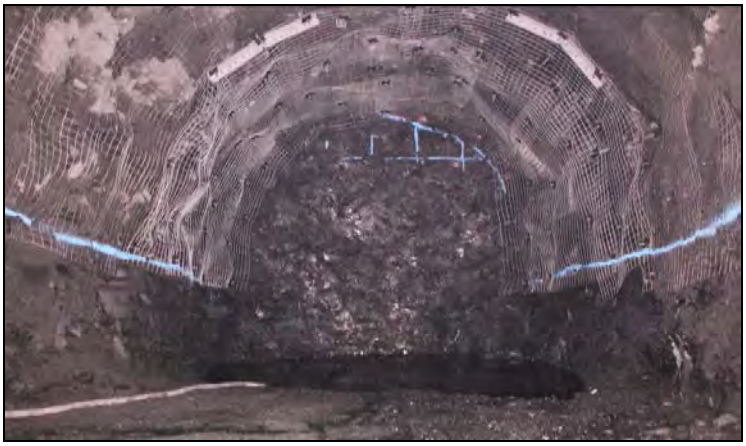
No permit amendments were submitted to the Department in 2016. Table 3 below lists the notifications and required submittals and approvals that were provided to the Department in 2016 as required under the Part 632 Mining Permit. A copy of the current site map is provided in Appendix A.

Table 3. Submittals and Approvals Required Under Part 632

Date	Description	Approval
11/25/15	Submitted crown pillar – Phase 3 engineering assessment	7/14/16
3/14/16	Submitted 2015 Annual Mining and Reclamation Report	
3/24/16	Submitted Q1 groundwater and surface water monitoring data	
4/28/16	Submitted response to request for additional information – Annual Mining and Reclamation Report	
5/4/16	Submitted Pollution Incident Prevention Plan (PIPP) Notification	
5/6/16	Submitted notification of plan to move forward with advanced exploration and decline development activities related to Eagle East mineralization	5/16/16
7/20/16	Submitted Q2 groundwater and surface water monitoring data	
8/2/16	Submitted request to change the Yellow Dog continuous monitoring location	9/6/16
10/12/16	Submitted Q3 groundwater and surface water monitoring data	
9/28/16	Submitted TDRSA leak sump pump testing request	10/11/16
1/17/16	Submitted Q4 groundwater and surface water monitoring data	

3.1 Eagle East Mineralization

In June 2015, Lundin Mining Corporation (LMC) announced that exploration drilling crews had intercepted a new zone of nickel and copper mineralization located approximately two kilometers east of the Eagle deposit, an area known as Eagle East. In May 2016, Eagle notified the Department regarding the plan to move forward with a new underground decline originating at the bottom of the Eagle ore deposit. As detailed in the May 2016 letter, development of the decline did not meet the definition of mining in §63201(g) of Part 632 since there was not sufficient data to define the Eagle East deposit as a mineable resource or to design a mine. Throughout that development, the conditions of the existing mine permit and required site infrastructure have provided adequate protection of the environment, natural resources, and public health. In July 2016, the development of the Eagle East decline began.

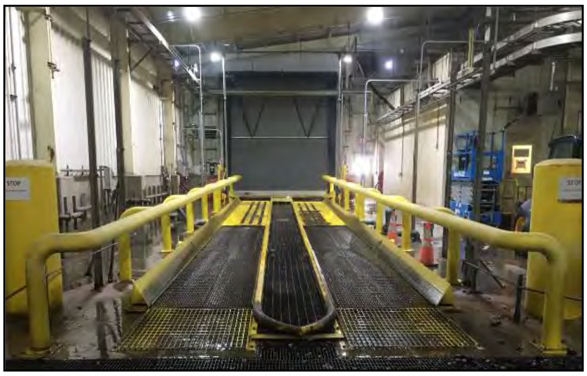


East East Decline Face at 200 meters of Advancement,

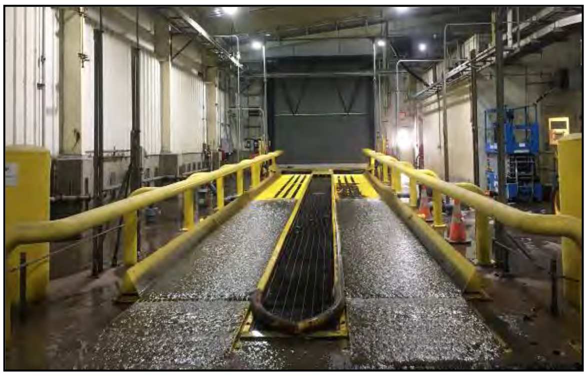
3.2 Modification of the Truck Wash

In 2016, the truck wash was redesigned to more effectively remove mining materials from the tandem haul truck tires and further prevent mining materials from being tracked out of the facility. The redesign included the implementation of a two stage tire bath system. Spray nozzles push water through a trough system which cleans the tire treads and minimizes build-up of material within the system. The first stage utilizes recycled water to initially wash materials from the tires, while the second stage uses freshwater to rinse the tires prior to exiting the building. Large fans are positioned near the exit which forces water back into the facility to further reduce the inadvertent track out of mining materials.

In addition to redesigning the truck wash additional measures were implemented in 2016 to further reduce the potential for the track out of mining materials from the facility. This includes requiring all vehicles, other than the over the road haul trucks, that are driven underground or on the contact area by mine employees to be hand washed prior to leaving the contact area. Measures were also taken to minimize traffic on and off the contact area and identify areas that should be avoided by pick-up truck traffic where mining materials are more prone to build up.



Truck Wash – Tire Bath System, December 2016



Truck Wash – First Stage, December 2016

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

2016 marked the second 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 2016. 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, in late 2015 Eagle submitted the Crown Pillar Engineering Assessment which provided geological, geotechnical, and hydrologic data that supports the advancement of mining above 327.5 meters above sea level (MASL). In July 2016, the Department approved the request authorizing mining above 327.5 MASL. Additionally, 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.

To ensure the safety of miners in the event of an emergency three, 12 person and two, four person, 36 hour self-contained Mine Arc refuge chambers stationed underground in 2016. Two additional four person refuge chambers and one, 12 person refuge chamber are expected to be put into service in early 2017.

Mine Arc Refuge Chanber

4.1.1. Underground Development Progress

An additional 2,294 meters of development occurred in 2016. This included 777 meters of sill development which is required in order to access the stopes, 52 meters of vertical development for internal escape raises, and 1,465 meters of general or horizontal development which included the up-ramp to the 294 level, stope accesses, down-ramp to the 145 level, and development of the Eagle East decline below the 145 level. Table 4.1.1a below summarizes the total 2016 development meters by type, including the Eagle East decline, and Table 4.1.1b breaks out the development completed in the Eagle East decline in 2016

Table 4.1.1a 2016 Underground Development Totals

Type of Development	Meters
Vertical	52
Sills	777
General/Horizontal	1,465
Total	**2,294**

Source: Mine Engineering Department – Dec. 2016 End of Month Report

Table 4.1.1b 2016 Eagle East Decline Meters of Development

Eagle East Decline Development	Meters
Passing Bays and Muck Bays	116
General/Horizontal	457

Source: Mine Engineering Department – Dec. 2016 End of Month Report

Underground Drilling Operations, 2016

4.1.2. Underground Ore Production – Stoping & Backfilling

In 2016, ore was encountered and mined in two ways; blasting of stopes and while developing stope access levels. Twenty-five primary stopes were mined and backfilled in 2016. Primary stopes are backfilled with cemented rock fill as soon as possible after all ore has been extracted. In 2016, 351,219 tonnes (t) of 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 waste rock. Table 4.1.2a summarizes the number of stopes that were mined and backfilled in 2016. In addition, the total tonnes of ore mined in 2016 is listed in Table 4.1.2b and is categorized as either sill, bench, 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 2016.

Table 4.1.2a Number of Stopes Fully Mined & Backfilled in 2016

Stope Type	Total (number)
Secondary Stopes	22
Primary Stopes	25

Source: Mine Engineering Department

Table 4.1.2b Tonnes of Ore Mined in 2016

Ore Mined	Tonnage of ore mined (tonnes)
Bench	18,623
Sills	149,021
Stopes	589,905
Survey Actual Adjustment	-12,676
Total	**744,874**

Source: Mine Engineering Department – Dec. 2016 End of Month Report

4.1.3. Dewatering Volume and Quality

Water is required underground in order to complete drilling, bolting, and dust suppression activities, and to knock down loose material that remains suspended after a stope blast. In 2016, 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.

Water use was fairly consistent in 2016 with underground operations continuing throughout the entire year. The amount of water supplied for underground operations in 2016 ranged from an average of 44,928 gallons per day (gpd) (31 gallons per minute (gpm) in August to 63,513 gpd (43 gpm) in December. 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 46,718 gpd (32 gpm) in April to 59,499 gpd (41 gpm) in December.

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. In 2016, increased water infiltration was encountered during definition drilling of the Eagle ore body. These events were temporary and are further discussed in section 5.2.1. Similar to 2015, the overall calculated dewatering volume for the mine was actually negative during the majority of 2016. To ensure that the negative flow values were not the result of an instrument malfunction, the flow meters were tested and found to be functioning properly. Additional research determined that the 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 2016.

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	49,999	48,063	-1936	-1.34
February	50,967	48,007	-2960	-2.06
March	54,076	53,164	-912	-0.63
April	47,266	46,718	-548	-0.38
May	49,453	48,125	-1328	-0.92
June	48,723	52,887	4164	2.89
July	46,960	49,825	2865	1.99
August	44,928	51,308	6380	4.43
September	52,989	51,910	-1079	-0.75
October	50,529	51,218	689	0.48
November	61,309	56,730	-4579	-3.18
December	63,513	59,199	-4314	-3.00

* 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 2016. In March 2016, 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 178,000 tonnes of development rock was crushed from March to August 2016. Crushing was suspended for approximately one month from mid-June to mid-July for equipment maintenance.

TDRSA – Development Rock Crushing, July 2016

4.2.1. Development Rock Storage Volume

In 2016, the total volume of waste rock mined was 41,688 m^3 (111,034 t), however only 19,898 m^3 (53,000 t) of development rock was placed on the TDRSA from the underground. The remaining 21,789 m^3 (58,034 t) was utilized as uncemented backfill in secondary stopes. Assuming a development rock swell factor of 1.3, approximately 25,867 m^3 of development rock was placed on the TDRSA in 2016. Also in 2016, 87,683 m^3 (245,512 t) of development rock was removed from the TDRSA for use in cemented rock fill. The average density of waste rock mined in 2016 was 2.66 tonnes per cubic meter. The overall average waste rock density of the material stored on the TDRSA is 2.8 tonnes per cubic meter. The TDRSA rock density takes into account the densities of mined material from 2011 – 2016.

No limestone was added to the TDRSA in 2016 as the volume of waste rock added was significantly less than the volume removed. However, after reviewing the volumes of waste rock added and removed from the TDRSA since backfilling commenced, it is difficult to determine how much limestone remained on the TDRSA, as such in October 2016, the Department requested that Eagle resume the application of limestone and to submit a plan on how this would be accomplished. The plan was submitted and approved in January 2017. A review of the material stored on the TDRSA found that the south end of the TDRSA had sufficient limestone to meet the requirement of special condition F4. Waste rock had not been excavated and removed on the south end for crushing and therefore limestone from previous applications still remained and is providing sufficient buffering capacity as confirmed by the pH of the TDRSA contact water. The crushing campaign completed in 2016 focused on the north end of the TDRSA. New development rock has since been placed in the void created by the removal of rock for crushing. In accordance with the requirement of special condition F4, limestone will be added to the north end of the TDRSA at a rate of two percent of the volume of development rock that was added to that area. The volume of limestone required will be determined by a survey of the TDRSA. Going forward the TDRSA will be surveyed on a routine basis and limestone will be applied at a rate of 2% of the total volume when necessary. The length of time that the development rock will be stored on the TDRSA will also be taken into consideration. In addition, the effectiveness of the limestone will continue 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 2016.

Table 4.2.1 2016 TDRSA Volume Totals

Month	Volume of Waste Rock Mined and brought to TDRSA (m^3)	Swelled Volume of Waste Rock (m^3)	Limestone Delivered (m^3)	Waste Rock Used for Backfill (m^3)	Swelled Volume of Waste Rock Used for Backfill (m^3)	TDRSA Surveyed Volume 1/17/17 (m^3)
2016 Total*	19,898	25,867	0	87,683	113,988	113,636

*Note: 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 – Dec. 2016 End of Month Report

4.2.2. Mining Forecast

The 2017 mining forecast for the Eagle deposit calls for the continued development of extraction drifts and stope accesses for a total of 1,305 meters of lateral advance. Total ore tonnes produced for 2017 is forecasted to be approximately 738,500 tonnes. In 2017, approximately eighty-percent of the stopes mined will be secondary stopes and twenty-percent primary stopes. Further advancement planned for the Eagle East decline in 2017 includes the development of approximately 5.6 meters per day based upon the current production schedule. 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 leak detection sump collects water from beneath the primary liner within the secondary liner system. This water has not been in contact with the development rock because it 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 2016, approximately 6.7 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 February, June, August, and November 2016. The majority of results were consistent with those previously reported including pH which ranged from 6.3 – 7.0 SU. A pH value in this range indicates that the waste rock is being managed effectively as it is not resulting in water that is characterized as acidic. Results for nickel trended upwards in 2016 while manganese, sodium, chloride, ammonia, and nitrite reported elevated levels in early 2016, but levels trended back towards historical levels as the year progressed. A summary of the 2016 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 2016, four samples were collected and the accumulation rates calculated. The daily rate of accumulation was estimated throughout the year at 0.02 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 from the TDRSA leak detection sump for 2016. A total of approximately 20 gallons of water was purged from the leak detection sump in 2016 which is the same volume removed in 2015. These values are estimated as the flow did not consistently totalize on the flow meter. The flow meter was tested by maintenance in 2016 and found to be functioning properly. It was determined that the flow meter may have seized 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 small 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, in October

2016, approval was received from the Department to increase the frequency of pumping to prevent the flow meter from seizing. A minimal volume of water will be pumped to keep the flow meter from seizing and still allow sufficient volume to continue quarterly sampling. Increased frequency of pumping is expected to take place in 2017.

Samples were collected from the leak detection sump in February, June, August, and November 2016. Upon sample collection, the pH and conductivity of the sample is 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 2016. The pH results were fairly consistent and ranged from a low of 7.1 to a high of 7.5 which is neutral to slightly basic in nature. Sulfate results trended down throughout the year and ranged from a maximum of 1,000 mg/L in February to a minimum of 810 mg/L in November. The sulfate concentrations for each of the samples collected in 2016 were above the 500 mg/L threshold identified in the permit.

As required, the MDEQ was notified of the elevated sulfate results. Review 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. In addition, as stated above, the volume of water present in the sump in 2016 was consistent with the volume present in 2015 further demonstrating that the liner has not been compromised. The source of sulfate was likely introduced during construction of the lining system and is becoming more concentrated as the volume of water present in the sump decreases. Results will continue to be reviewed and any potential trends documented. Any upward trending will be reported to the Department. A summary of the 2016 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 2016

Parameter	**2/22/16**	**6/2/16**	**8/24/16**	**11/29/16**
Magnesium (mg/L)	15	16	16	15
Sodium (mg/L)	610	610	590	510
Chloride (mg/L)	14	14	13	11
Sulfate (mg/L)	1000	980	840	810
Nitrate (mg/L)	26	29	28	25
Nitrite (mg/L)	0.15	<0.05	0.36	0.06
Ammonia (mg/L)	0.19	0.09	0.07	<0.05
Average Daily Flow Rate (gal/acre/day)*	0.02	0.02	0.02	0.02
Purged Volume (gal)*	5	5	5	5
pH	7.4	7.1	7.4	7.5
Specific Conductivity (µS/cm)	2,976	3,133	2,693	2,441

*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, for recycle within the mining operations, 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, truck wash, and fire water tank if necessary. During 2016, the approximate water use was 19,765 gpd (14 gpm). This was up from the average of 9,787 gpd utilized in 2015. Higher water use in 2016 are likely attributed to the modifications completed on the truck wash facility which now utilizes treated domestic water for a fresh water rinse of the vehicles prior to exiting the contact area.

The mine services well (QAL011D) is primarily used to supply water for exploration drilling, underground operations, dust suppression, and the fire water tank which supplies water to the network of fire hydrants onsite. Approximately 63,721 gpd (44 gpm) of water was utilized in 2016 which is up from an average of 59,163 gpd supplied in 2015. The increase is likely due to the utilization of additional equipment for the development of the Eagle East decline which began in 2016 as well as an increased water demand associated with working in multiple stopes. Water cannons are also utilized to knock down loose material that remain suspended after a stope blast. This is required as no one is allowed to work under unsupported ground. Water use was highest in summer months as water is used as the primary form of dust suppression on surface as well as underground.

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 2016, the total volume of utility water treated and recycled was approximately 2,110 gpd (1.5 gpm) which is down from 2015.

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, 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 2016 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 February, June, August, and November with the annual parameter list collected in Q3. The majority of the CWB monitoring results were consistent with those previously reported. Sodium, chloride, nitrate, iron, boron, and specific conductance remained consistent with results reported in 2015 and are below historic levels. Aluminum increased from previous results while copper and nickel trended up slightly in 2016. 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. In 2016, the results indicated a small number of cations and/or anions including sodium, chloride, nitrate, sulfate, calcium, magnesium, and hardness were outside of calculated benchmarks at one or more locations. 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. Anion and cation results that were in excess of the calculated benchmarks at QAL024A remained consistent throughout 2016 and did not show signs of trending upwards. Parameters that exceeded baseline values at QAL073A also remained consistent with results reported in 2015. 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 51 million gallons of water in 2016. 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.

Table 4.3.5 Volume of Water Discharged in 2016

Month	Volume of Water Discharged (gallons)
January	3,252,408
February	2,391,397
March	5,924,876
April	6,853,666
May	3,832,747
June	3,712,736
July	3,505,100
August	4,142,025
September	6,153,817
October	4,044,235
November	3,164,253
December	4,118,003
Total	**51,095,264**

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 2016, 385 metric tonnes of crystallizer waste was disposed at a Wisconsin landfill and approximately 222 metric tonnes of filter press waste was disposed at the Marquette County 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 2016, 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 2016 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 October 2016. The Eagle Mine Permit prescribes both a long parameter list for annual monitoring events (conducted in Q2 2016) and a short list to be used quarterly (Q1, Q3, Q4 2016). 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 2016 and with the exception of toluene at location QAL067A, 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. Starting in Q1 2016, the updated benchmarks were used for comparison.

Groundwater Elevation Monitoring (Photo Courtesy of NJC)

Monitoring Results

Twenty-three monitoring well samples were collected during each of the four quarterly sampling events. 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, formerly TriMatrix Laboratories, 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 2016:

- Location QAL023B reported pH results that were lower than the established benchmarks during the Q1, Q2, and Q4 sampling events in 2016. These results are more neutral than the benchmarks and are consistent with the previous year's results.
- Location QAL024A reported benchmark deviations for one or more of the following anions/cations during 2016; chloride, nitrate, sodium, and alkalinity-bicarbonate. Although the results were above the calculated benchmarks, they remained fairly consistent throughout the year and are not currently trending upward. No metals were regularly detected at location QAL024A.
- pH levels trended upwards at location QAL044B. A review of nearby wells found the elevated pH levels to be isolated to this monitoring location.
- QAL066D results were above benchmark levels for at least two consecutive sampling quarters for arsenic, sulfate, and sodium. Detections of mercury were also reported during two sampling events in 2016. This location has historically seen detections of metals including arsenic and mercury which were attributed to fine grained sediment present in the well resulting from improper grouting during well installation. In the past, the location has been aggressively purged removing the sediment and therefore temporarily removing the source of the elevated metals. The location was not aggressively purged in 2016 and if the issue persists the decision will need to be made as to whether purging should be continued or if the location should be abandoned or re-drilled.
- Location QAL067A, located on the southeast corner of the TDRSA, reported benchmark deviations for mercury, chloride, nitrate, sodium and sulfate during each of the 2016 sampling quarters. Additional parameters were detected above established benchmarks for one sampling event and are summarized in Appendix F. The sodium and chloride results trended down while the nitrate and sulfate results trended up slightly in 2016. Results for mercury also remained fairly consistent and are trending down from values reported in 2015. It is still believed that the elevated results are associated with the extensive use of salt on the contact area as no additional changes have occurred in the area.
- QAL062A, located on the eastern berm of the TDRSA, reported pH, alkalinity bicarbonate, sodium, and chloride results that were above calculated benchmarks for each sampling event in 2016, and nitrate was greater than the benchmark for the last two quarters. Although the monitoring well is located next to the TDRSA it can be eliminated as a potential source as metals are present in the contact water of the TDRSA but are not detected in

QAL062A. The elevated sodium and chloride levels are most likely the result of the chloride plume that appears to be slowly moving across the site that is the result of historical salt use on the contact area. This location will continue to be closely monitored.

- Elevated levels of chloride were detected at monitoring QAL063A which is located near the southwest corner of the WTP in Q2-Q4. These results are also likely attributed to the chloride plume that is moving across the contact area and most likely the result of historical salt use onsite.
- In 2016, 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 2016 sampling events. As noted in the 2015 annual report, it was suspected that the elevated values were 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 2016. 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 and seeding/mulching) 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 or chloride levels. At this time there is no threat of elevated nitrate levels migrating offsite from monitoring location QAL071A.
  - In Q3 2015, it was discovered the septic system and drain field was not functioning properly and although repairs were made it is possible that this may have contributed to the elevated results in 2016.

Based on the review of data collected in 2016, the septic tank effluent still cannot be excluded as a source of the elevated nitrate levels reported at QAL071A.

- Benchmark deviations were also reported at locations QAL044B, QAL061A, QAL063A, QAL070A, and QAL073A and are summarized in Appendix F. The majority of the deviations were for anions and cations and results were only slightly greater than established benchmarks. It is highly probable that the deviations being seen are consistent with natural groundwater variations.

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 fifteen compliance locations and eight background monitoring locations using data collected from baseline sampling events (2011) through December 2016. Sodium, nitrate, chloride, and alkalinity bicarbonate were the most frequently noted as possibly trending.

A trend analysis will continue to be conducted in 2017 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. The diagrams consist of three main components; two trilinear diagrams, one representing anion concentrations and the other cation concentrations; and one central diagram that illustrates the combination of the anion and cation concentrations. Once the water chemistry of a monitoring location is plotted on the Piper Diagram, groundwater can be classified into water types or chemical compositions based on the dominant ion chemistry. Piper Diagrams can also be used to illustrate the spatial and temporal chemical evolution of groundwater. If a significant change in groundwater chemistry is observed over a period of time it may be indicative of groundwater contamination.

In order to determine if significant changes in water chemistry have occurred, 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, QAL063A, QAL064D, QAL068A, QAL069A, 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 five samples collected during Q2, 2012 – 2016 were plotted. The water type was originally classified as calcium bicarbonate in 2012, then drifted into the sodium chloride classification in 2013. In 2014, 2015, and again in 2016 the water chemistry was classified as mixed-cation chloride. 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. The water chemistry appears to be shifting back towards a mixed-cation classification. Future quarterly sampling will increase understanding of the water chemistry at this location.
- QAL062A – Water chemistry data from this location was classified as having a calcium bicarbonate water chemistry with a trend towards Na-Cl major ion chemistry. This was further evidenced in 2016. This shift is indicative of historic road salt use and snow storage that occurred onsite.
- QAL067A – Water chemistry data from nine samples collected during 2011 – 2016 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.

- QAL070A – Water chemistry from six samples collected during 2011 – 2016 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 2016 in which the water is now classified as calcium sulfate waters. Further sampling is necessary to better understand the water chemistry at this location. This location will continue to be closely monitored.

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 2016 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, May, August, and November 2016. The spring runoff sample was collected in late May 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. Starting in Q1 2016, the updated benchmarks were used for comparison.

Surface Water Sampling (Photo Courtesy of NJC)

Monitoring Results

Grab samples were collected from each location during the quarterly sampling events completed in February, May, August, and November 2016. The Eagle Mine Permit prescribes a long parameter list for annual monitoring events (conducted in Q2 2016) and a short list to be used quarterly (Q1, Q3, and Q4 2016). 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 2016 events that occurred.

- At compliance monitoring location STRM005, the results for pH were detected above the established benchmark for two consecutive Q3 sampling events. This location is the most northern surface water monitoring point and is well outside of the direct influence of the mine site. 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 December 2016. Sulfate, pH, total dissolved solids (TDS), and specific conductance were the most frequently noted as possibly trending. The largest number of the trends identified occurred in Q2 as a longer parameter list is analyzed during that sampling event. Results in Q2 also tend to deviate the most from baseline values as this event captures spring snowmelt/runoff. 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 2017 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. In 2016, the only location with a result outside of the established benchmark for two consecutive seasonal quarters was pH at monitoring location STRM005. 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 and downloaded quarterly by North Jackson Company field technicians. 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:

- QAL064D - Water levels at this location remained consistent with baseline data, while the remaining wells located near the ore body reported elevations below pre-operational levels.
- QAL023B – The mean water level readings from October – September 2016 were reported at a maximum of 0.6 feet below the minimum baseline level calculated for this location.
- QAL024A – The mean water level readings from December – April 2016 were reported at a maximum of 0.8 feet below the minimum baseline level calculated for this location. The lowest reading was recorded in March 2016 but returned to baseline levels by May, similar to the previous year. The lower water level readings during this time are likely due to frozen conditions when little to no recharge occurs from precipitation.

- QAL044B - The mean water level readings from October – August 2016 were a maximum of 0.9 feet below the minimum baseline level calculated for this location. The lowest reading was recorded in March. Water levels returned to baseline levels by the end of the water year.
- QAL065D - The mean water level readings from October – March and August 2016 were a maximum of 0.3 feet below the minimum baseline level calculated for this location. Readings returned to baseline levels the remainder of the year.
- QAL066D - The mean water level readings in October - September 2016 were a maximum of 1.1 feet below the minimum baseline level calculated for this location and is further explained below.

During the winter months, the lower water levels at locations QAL023B, QAL044B, QAL065D, and QAL066D may be partially attributed to frozen conditions when little to no recharge occurs. However, in addition these monitoring locations are also likely influenced by pumping of the mine services well as described in the groundwater levels summary report that was submitted to the Department in May 2016. Monitoring location QAL004D shows similar trends and is located 4,500 feet south/southeast of these monitoring locations above the ore body, near the mine services well. The water level in this confined aquifer responds immediately to pumping at the mine services well. 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) and that influence may extend 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 and 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 elevation data was also used to better understand groundwater infiltration into the mine in Q4 2016. With underground conditions drier than modeling predicted, even a small change in the infiltration rate is noticeable. Therefore, additional information is sought by Eagle to better understand when atypical groundwater inflows are observed.

An above average water inflow, from the 172 level, was noticed following a post blast inspection. Water elevation data was reviewed and a drop in water level was detected in monitoring locations QAL044B, QAL064D, QAL065D, and QAL066D above the ore body.

Underground diamond drilling is performed to better define the existing ore body and may have intercepted the quaternary level aquifer resulting in the measureable drawdown in monitoring locations above the ore body. The drop in water level, reported at these locations, only affected the deeper wells and did not impact the wetland or surface water levels as a confining layer separates the two aquifers. In an effort to better understand the origin of the water observed Golder Associates completed a groundwater assessment and additional information is currently being collected by the drilling crews including depth in which water is intercepted and the collection of water quality samples as warranted. In addition, water levels from bedrock piezometers and monitoring wells located above the orebody are currently being downloaded on a monthly rather than quarterly basis and reviewed for changing conditions. A copy of Golder's groundwater assessment is available upon request.

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 levels slightly below baseline in January, February, and August with levels just one tenth of a foot below baseline minimum. Levels returned to baseline the following month. Location WLD026-9.5 reported water levels slightly above baseline levels in May which may be attributable to spring snowmelt conditions. Water levels returned to baseline levels by June 2016. 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 118 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 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 2016.
- Mounding has been noted at down gradient TWIS locations and is likely associated with the effluent discharge from the water treatment plant.
- New minimum water levels were reported in one or more sampling quarters in 2016 at the following locations: QAL004A, QAL023B, QAL026E, QAL043B, QAL044B, QAL064D, QAL065D, QAL066D, QAL067A, QAL068B, QAL075A, and QAL075D.
    - All water levels were consistent with historical levels in Q3.
    - QAL026E showed a new minimum level anomaly in Q2 with levels in Q3 and Q4 falling back within historical range.
    - QAL075D was the only location to have consecutive quarterly minimums. This location is relatively new, installed in 2015, therefore there are few historical discrete measurements for comparison. Q1 and Q2 showed a new minimum water level at a maximum .14' below historical range, while Q3 and Q4 water levels remained within the previous range.
    - QAL004A is located within the direct influence of the mine services well and water levels fluctuate based on the use of the well.
    - As reported in the continuous monitoring discussion above, 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 infiltration of water encountered during definition drilling exercises.
- New minimum water levels were reported in 2016 for the following wetland monitoring locations: WLD022-4.5/9.5, WLD024-1.0/4.5, and WLD025-9.5. The new minimums were reported in either Q1 or Q4 and likely the result of winter conditions when little to no recharge occurs.

A summary of discrete water elevation results from Q1-Q4 2016 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 2016 water year were averaged over each month of operation from October 1, 2015 thru September 30, 2016 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:

- Continuous flow readings were not collected from location STRE002 from January 2016 – October 2016 due to beaver activity preventing the sensor from accurately recording flow data. In addition, flow readings were not collected at location STRM004, STRM005, or YDRM002 in the winter months due to ice build-up.
- Temperature and specific conductance measurements were not reported from January to mid-May 2016 at location STRM004 due to an equipment malfunction. The instrument was replaced in mid-May and data was collected for the rest of the year. A secondary issue occurred at this location requiring changes to the rating curve which is used to determine flow readings. Structures (i.e. beaver dams) near the monitoring station created pooling which required the rating curve to be adjusted to ensure proper flow measurements were being recorded.
- When collected, all temperature, flow, and specific conductance measurements were found to be within historical minimum and maximum value readings at all locations.
- Surface water monitoring location YDRM002 is situated on the Main Branch of the Yellow Dog River. This is the only monitoring location positioned on the Yellow Dog River and is located near a bridge used by local logging companies. Improvements to the bridge were completed and drainage controls were installed resulting in significant channel geometry and substrate changes from removal of rocks and boulders. These changes invalidated the reference point and rating curve for this location. In August, Eagle Mine requested the ability to the use the Yellow Dog USGS monitoring station 04043275 located approximately 2.6 miles downstream from YDRM002. This request was approved by the Department in September 2016. The USGS station continuously monitors temperature, conductivity, and stage; all of which are required by permit condition L-29 and a review of data from both locations shows a strong correlation. Water quality sampling and discrete measurements for temperature, conductivity, and flow will continue to be completed on a quarterly basis at location YDRM002.

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 Salmon-Trout River

5.3 Biological Monitoring

Biological monitoring events conducted in 2016 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 2016 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 2016. A map of the survey locations is available in Appendix S.

Table 5.3.1 Type and Duration of 2016 Flora, Fauna, and Wetland Surveying Events

Survey Type	Survey Date
Bird	June 14, 16, 17, September 26, 28, 29
Small Mammals	September 27-29
Large Mammals	May 3 & 31, June 13-17 & 30, August 16-17, September 26-29
Toads/Frogs	May 3-31, June 30
Wetland Vegetative Monitoring	June 14-15
Upland Vegetative Monitoring	June 13-15, August 16
Narrow-Leaved Gentian	August 17

The wildlife and plant species identified during the 2016 surveys within the Study Area are similar to those identified during previous KME surveys with the exception of Points 11W and 12W which could not be surveyed as they continue to be active roadways for logging and exploration drilling operations. Following is a summary of the survey results:

- A combined total of 750 birds representing thirty-seven species, none of which are threatened or endangered, were observed during the bird surveys. Consistent with previous studies, the Nashville warbler was the most abundant bird observed during the June survey. In previous years, the Canada goose was the most abundant species observed during the September survey as they are usually beginning to flock during this time period, resulting in flyovers of relatively large numbers, however only two Canada geese were observed, making the dark-eyed junco the most abundant species observed in September 2016. The bird species identified during the 2016 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 with the exception of the Canada Geese. Many factors influence the timing of Canada goose migratory departure including local cloud cover, wind speed and direction, declining mean daily temperatures, etc. Occurring in pulses, Canada goose flocking/flyover events are unpredictable and episodic by nature, where a single flyover observation can greatly affect the total number of individual birds recorded during any given survey period (Wedge and Raveling 1983). Additionally, the well-above average temperatures during the fall of 2016 (NOAA 2016) may have delayed departure.

- Thirty-one small mammals representing six species were collected during the September survey period this is up from the 23 small mammals collected in 2015. The most common small mammal identified during the survey was the deer mouse. 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 2016 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 2016 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 moose and coyote were observed occasionally throughout the Study Area.
- Two 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 and toad species identified are typical of those expected in the habitats present in the Study Area. Fewer species were recorded in 2016 (two compared to three in 2015), but the overall number of frogs observed was higher in 2016 than 2015 (14 in 2015 versus 23 in 2016). The absence of calls during the May 3rd survey and diminished species observations in general is likely due, in-part, to weather conditions including low temperatures and persistent ice and snow cover in early spring as well as frequent cold snaps occurring into the summer.
- 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 2016 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 was 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.


Wetland vegetation survey plot, June 2016


Upland vegetation survey plot 22, June 2016

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.

In 2006, the federally endangered Kirtland's warbler was observed in Marquette County. Although one has never been detected in the study area since KME began monitoring, there is suitable habitat present for the species to exist. Spruce grouse is a state special concern species; this species was occasionally observed during the 2016 ecological surveys near the Salmon-Trout River. Scat and tracks of moose (State Special Concern) were observed occasionally in 2016 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 2016 NLG field investigation were consistent with the previous NLG studies. Photographic and Global Positioning System documentation was collected on August 17, 2016. 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, precipitation totals were 25-50% above normal for the area during the 2016 water year and mean monthly temperatures were near average for April through July and above average for August and September. Flow in the Salmon Trout River and Yellow Dog River appeared normal. Therefore, the necessary hydrology to support the NLG population was present in 2016.

The NLG colonies appeared healthy in 2016 relative to previous observances. 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, in approximately the same areas where they were observed in previous years.

Narrow-leaved Gentian North of the Yellow Dog River, August 2016

5.3.4 Fisheries and Macro Invertebrate Report

The 2016 Fisheries and Macro-Invertebrate annual surveys were conducted by Advanced Ecological Management (AEM). A total of ten stations were surveyed during the summer of 2016, 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 865 fish were collected in 2016 from all stations, up from 575 fish collected in 2015, with 89% of the total being captured at Station 6 located on the main branch of the Salmon Trout River. Among all stations, a total of seven species of fish were observed during the aquatic survey. 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 2016. The biggest difference in total fish from 2015 to 2016 was observed at Station 6 where 492 fish were collected in 2015 and 769 fish were collected in 2016. The majority of species collected both years were northern red belly dace and brook stickleback. Overall, the fish community composition and relative abundance has remained consistent with previous surveys.

Using the State of Michigan P-51 survey protocol, a total of 2,224 macro-invertebrates were collected from all ten stations that were investigated in 2016. 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 total macro-invertebrates collected in 2016 is a decrease of 63 specimens compared to the total number collected in 2015. The annual variation is consistent with previous surveys conducted during the baseline period. 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 2016 were rated as “Good” or “Excellent” habitat quality which is consistent with results previously reported in 2015.

A copy of the full report is available upon request.

Aquatic monitoring location Station 3 downstream extent, June 2016

5.3.5 Fish Tissue Survey

No fish tissue survey was conducted in 2016. Surveys are only required once every three years, with the next survey scheduled for 2017.

5.4 Miscellaneous Monitoring

5.4.1. Soil Erosion Control Measures (SESC)

In accordance with Part 91 (NREPA, 1994 PA 451, as amended), SESC measures installed around the perimeter of the mine ventilation area were removed in 2016 as permanent vegetation had been established. Although SESC measures related to the construction of mining facilities falls under the purview of Part 632, Eagle Mine maintained compliance with the requirements of Part 91 for the SESC permit that was in place for the mine ventilation area until the area was closed out, once proper vegetation was established. To ensure the integrity of the installed controls, inspections occurred on a weekly basis (except during frozen conditions) and after a 0.5” rain event or greater. Any issues identified are immediately addressed by onsite staff. Eagle Mine staff conducts the inspections and maintains the proper SESC and storm water certifications. Inspections are recorded in a logbook maintained by the Environmental Department.

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 2016 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 2016, the drainage ditch located south of the ambulance garage, which conveys water to NCWIB 3, required repair due to the erosion of the bank. Riprap was added to the drainage area in June to eliminate any further erosion.


Drainage ditch prior to repairs, May 2016


Drainage ditch during repairs, June 2016

In August 2016, the perimeter road was also repaired due to signs of minor erosion. A combination of riprap and gravel was applied to a fifty foot section of the perimeter road along the eastern fence line to improve the road condition and mitigate erosion.

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 2016 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 2016. Inspections of the contact area and travel ways were completed during the months of April through November. 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 resumed for the contact area after snowmelt occurred in the spring of 2016. The contact area repairs completed in 2015 were the main focus of the spring 2016 inspections. Inspections showed the asphalt cap remained intact, but was showing signs of wear along with underlying concrete not fully covered by the asphalt. To ensure that the contact area remained impermeable, in June 2016, major repairs were completed. The asphalt cap was removed along with the eight inches of concrete that had been repaired and failed prematurely the previous year. The underlying road bed was prepped and asphalt was applied in lifts to a matching depth of the existing asphalt contact area. In all, eight inches of asphalt was installed from the COSA dump bays to the portal heater house.

Removal of asphalt cap and underlying concrete, June 2016

Removal of asphalt cap and underlying concrete, June

Two additional areas on the north side of the aggregate storage building were also repaired in 2016 due to wear resulting from the articulation of the loader tires used to haul development rock from the TDRSA into the aggregate storage building. The worn asphalt was removed and the areas were patched with concrete.

Removal of worn asphalt prior to repair, September

Removal of worn asphalt prior to repair, September 2016

Inspections of the contact area will resume in the spring of 2017 and will focus on the repairs made in 2016. At that time the determination will be made as to whether any additional repairs are necessary.

No other areas were identified as requiring repairs in 2016.

5.4.4 Geochemistry Program

In 2016, 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 February, June, August, and November 2016 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. Review of the data, available to date, is 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. The samples are sent to SGS Laboratories for analysis. As sample results are received from the laboratory in 2017, they will be reviewed to determine if they are 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 2016. With the exception of NCWIB 2, located near the cold storage warehouse, no reportable accumulation was observed at any of the locations. 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 sand that is currently present in the basin 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 2017. 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 wading method and a boat and Sludge Judge to measure the accumulation. The first inspection was conducted on July 19th, 2016, for both basins and the second sediment thickness measurements were completed in September for CWB 1 and October for CWB 2.

The average sediment accumulation in CWB 2 was just under four inches, with one location measuring over one foot. The highest sediment measurement of sixteen inches was in the northwest corner of the basin, where the WTP outfall is located. 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 northwest corner of CWB 2 will continue to be monitored for sediment accumulation. CWB 2 measurements were slightly higher in 2016 with average thickness measuring two inches in 2015 compared to four inches in 2016.

The first sediment measurement of CWB 1 indicated an accumulation greater than 50 inches at the south end of the basin with the north end averaging eight inches or less. CWB 1 sediment accumulation did not increase significantly from levels reported in 2015 indicating that the underground sump is functioning as designed. The underground sump system allows settling to occur underground and minimizes the amount of sediment being pumped to the surface reducing accumulation in the basin.

Even though the sediment accumulation in CWB 1 does not reduce the capacity of the basins to a level in which removal is necessary in order to meet the volume requirements of the permit, the decision was made to remove the material.

Sediment removal operations occurred in September 2016. A dredge was placed in CWB 1 and lines were installed connecting the dredge pump system to geotubes placed on the contact area to allow the dredged material to dewater. Sediment measurements averaged six inches after the removal operations were completed with an estimated 1,300 yd^3 of material being removed from CWB 1. Once dewatered, the material will be placed on the TDRSA and eventually used as backfill in an open stope.

Dredge performing sediment removal, September 2016

Geotubes dewatering west of CWB 2, September 2016

Following the sediment removal in September, a leak location survey was performed by Leak Location Services, Inc. (LSSI) in both CWB 1 and 2 in late October. The survey works by detecting electrical paths from the probe inside the basin to an electrode connected to earth ground. This process can detect a leak that is 0.001 square inches or greater in size.

Five signals were detected during the survey of the two contact water basins. Signals one and two were found to be the WTP intake pipes that were not isolated from an electrical ground during the survey. Signal 3A was detected on the side slope of CWB 1. Signal 3B and 4 were detected on the south end of CWB 2. Metal objects can trigger false positives by the probe during surveys and is expected to be the source of the remaining three anomalies as a roll of metal sheeting was found at location 4 and various metal objects including nuts and bolts were found along the side slopes upon inspection. Weather prevented further inspections in the basins and a follow-up inspection will be performed by LSSI in 2017. It is not expected that a breach in the liner has occurred as no activities have occurred in CWB 2 since the last survey was completed and a review of the results from monitoring wells located downgradient of the CWBs do not show a correlation in water quality. In the event that a leak was present, the basins are designed with a bentonite/clay layer as part of the liner system. If a leak were to exist, the bentonite would provide a protective layer beneath the liner system. Results of the follow-up inspection will be provided to the Department upon completion.

6. Reclamation Activities

No reclamation activities occurred in 2016 and there are currently no plans to conduct any reclamation activities in 2017. The Department will be notified, in advance, if any activities do commence in 2017.

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 fifteen members and is comprised of two 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 2016, training included exploration in smoke (theatrical), basic first aid, CPR, firefighting, knot tying for rope rescue, 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 and were task trained on the operation of the underground ambulance.

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 October 2016 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 2016 the emergency was related to a propane tank fire and train derailment that resulted in the loss of copper concentrate into the Escanaba River 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

Updated reclamation costs were submitted in the 2014 Annual Report and approved by the Department in July 2015. The updated bond was submitted to the MDEQ in April 2016. In accordance with Part 632, the financial assurance will be reviewed every three years with the next review required in 2018.

9. Organizational Information

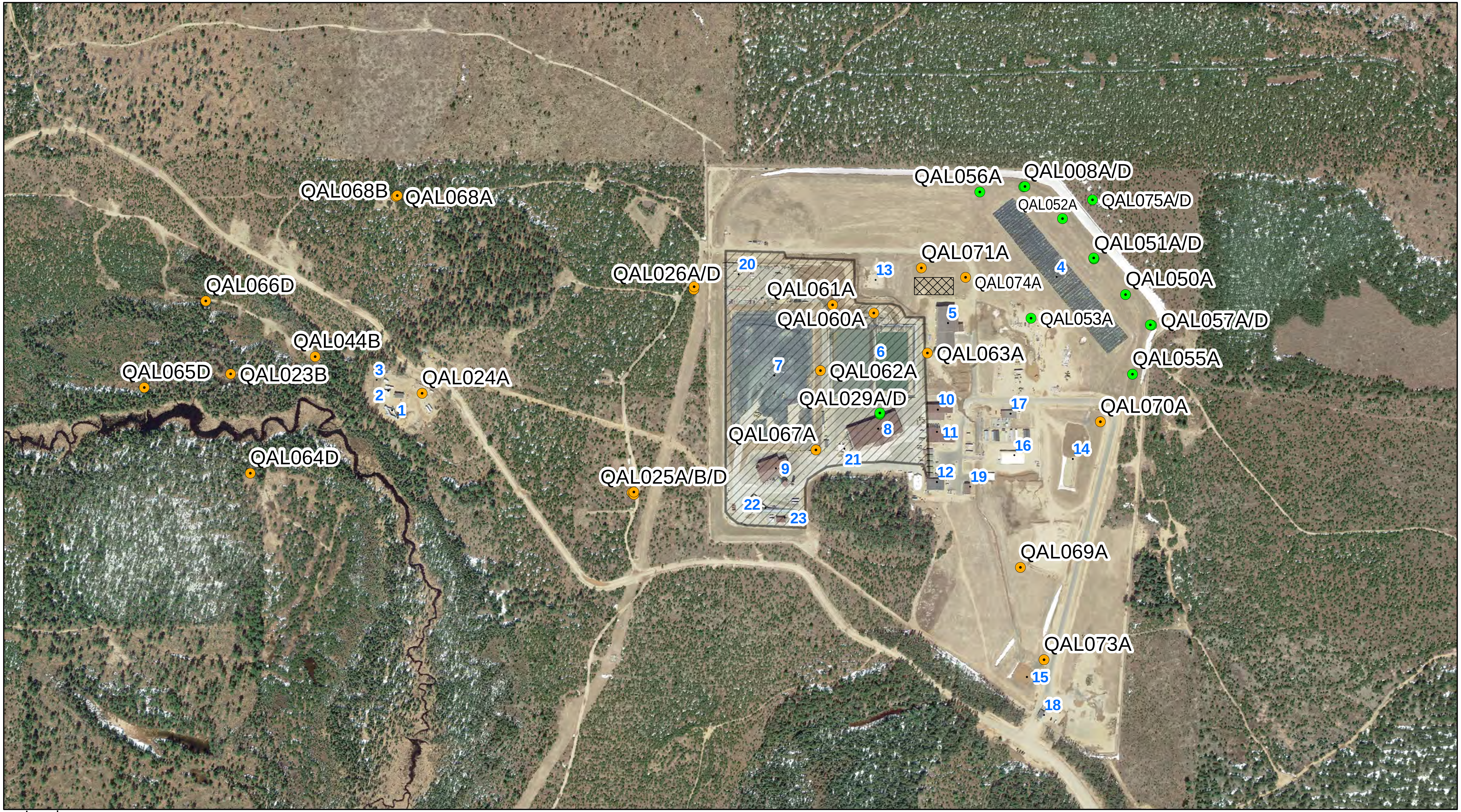
An updated organization report can be found in Appendix V.

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: 2/4/2016

0 0.0425 0.085 0.17 0.255 0.34 0.425 Miles

N W E S

Appendix B

Eagle Mine

Rock Stability Certification

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

Tuesday, February 28, 2017

Mr. Joe Maki
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 2016. In addition, daily visual inspections are also conducted by Eagle Mine representatives and/or contractor mining personnel to verify ground stability.

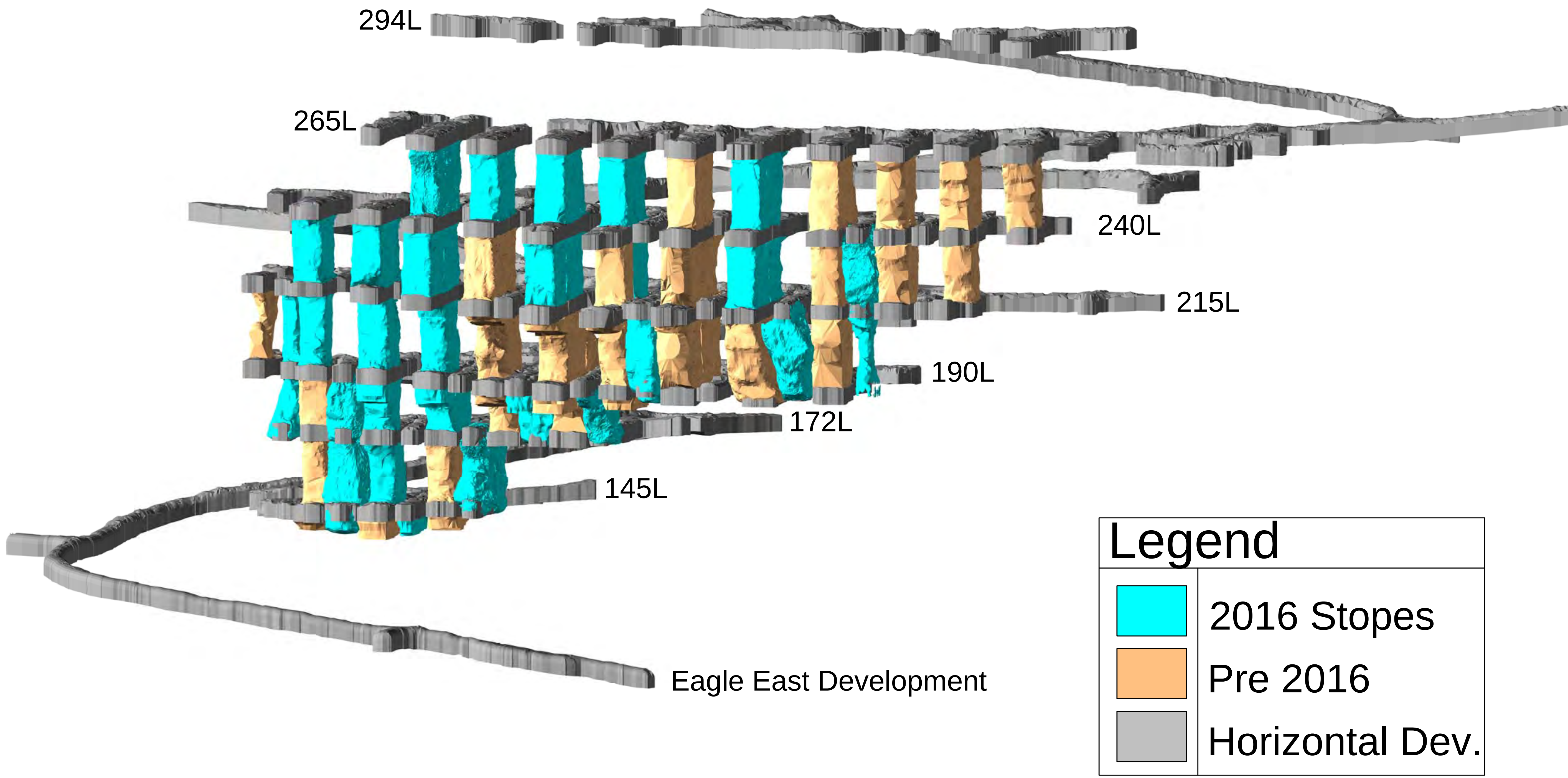
Sincerely,

Jeff Murray
Mine Manager
Eagle Mine, LLC.

Appendix C

Eagle Mine

Map of Production Mining Progress



Eagle Mine a subsidiary of lundin mining | Cementation WE BUILD MINES

Project: Eagle Mine		Drawing Title: 2016 Mining Activity		Drawn By: Tucker.Jensen		
Date: 28/02/2017	Mine Superintendent	Signature / Date	Cementation Superintendent	Signature / Date	Cem. Safety	Signature / Date

Appendix D

Eagle Mine

Facilities Water Quality Monitoring Results

2016
Mine Permit Water Quality Monitoring Data
Contact Water Basins
Eagle Mine

		Q1 2016	Q2 2016	Q3 2016	Q4 2016
Parameter	**Unit**	**2/22/2016**	**6/2/2016**	**8/24/2016**	**11/29/2016**
Field					
pH	SU	**11.2**	**7.4**	**7.4**	**7.5**
Specific Conductivity	µS/cm	**2870**	**1923**	**1747**	**2570**
Metals					
Aluminum, Total	mg/L	—	—	**860**	—
Antimony, Total	µg/L	—	—	**1.8**	—
Arsenic, Total	µg/L	**1.3**	**1.1**	**1.6**	**2.6**
Barium, Total	µg/L	—	—	**29**	—
Beryllium, Total	µg/L	—	—	<1.0	—
Boron, Total	µg/L	**530**	**490**	**510**	**890**
Cadmium, Total	µg/L	—	—	<0.20	—
Chromium, Total	µg/L	—	—	**8.3**	—
Cobalt, Total	µg/L	—	—	**3.4**	—
Copper, Total	µg/L	**17**	**42**	**55**	**94**
Iron, Total	µg/L	**100**	**730**	**1700**	**2800**
Lead, Total	µg/L	—	—	**1.1**	—
Lithium, Total	µg/L	—	—	**15**	—
Manganese, Total	µg/L	**6**	**27**	**43**	**68**
Mercury, Total	µg/L	**0.0009**	**0.0021**	**0.0024**	**0.0045**
Molybdenum, Total	µg/L	—	—	**27**	—
Nickel, Total	µg/L	**37**	**76**	**100**	**170**
Selenium, Total	µg/L	**8.9**	**7.5**	**4.8**	**9.0**
Silver, Total	µg/L	—	—	<0.20	—
Strontium, Total	µg/L	—	—	**610**	—
Thallium, Total	µg/L	—	—	<1.0	—
Vanadium, Total	µg/L	—	—	**5.0**	—
Zinc, Total	µg/L	<10	<10	**14**	**18**
Major Anions					
Alkalinity, Bicarbonate	mg/L	**64**	**33**	**42**	**65**
Alkalinity, Carbonate	mg/L	<2.0	<2.0	<2.0	<2.0
Chloride	mg/L	**370**	**170**	**100**	**220**
Fluoride	µg/L	—	—	**130**	—
Nitrogen, Nitrate	mg/L	**68**	**38**	**37**	**58**
Sulfate	mg/L	**530**	**570**	**490**	**690**
Major Cations					
Calcium, Total	mg/L	—	—	**84**	—
Magnesium, Total	mg/L	—	—	**15**	—
Potassium, Total	µg/L	—	—	**40000**	—
Sodium, Total	mg/L	**430**	**260**	**230**	**420**

— Analyte not included in the quarterly parameter list.

2016
Mine Permit Water Quality Monitoring Data
TDRSA Contact Water Sump
Eagle Mine

		Q1 2016	Q2 2016	Q3 2016	Q4 2016
Parameter	**Unit**	**2/22/2016**	**6/2/2016**	**8/24/2016**	**11/29/2016**
Field					
pH	SU	**6.9**	**6.3**	**6.5**	**7.0**
Specific Conductivity	µS/cm	**6025**	**3107**	**2932**	**2768**
Metals					
Aluminum, Total	mg/L	—	—	<500	—
Antimony, Total	µg/L	—	—	<1.0	—
Arsenic, Total	µg/L	<1.0	<1.0	<1.0	<1.0
Barium, Total	µg/L	—	—	**62**	—
Beryllium, Total	µg/L	—	—	<1.0	—
Boron, Total	µg/L	**1200**	**900**	**1300**	**950**
Cadmium, Total	µg/L	—	—	<0.20	—
Chromium, Total	µg/L	—	—	**1.5**	—
Cobalt, Total	µg/L	—	—	**5.6**	—
Copper, Total	µg/L	<1.0	**1.0**	<1.0	**2.9**
Iron, Total	µg/L	**37**	**25**	**41**	<20
Lead, Total	µg/L	—	—	<1.0	—
Lithium, Total	µg/L	—	—	<8.0	—
Manganese, Total	µg/L	**760**	**390**	**210**	**190**
Mercury, Total	µg/L	**0.0098**	**0.0063**	**0.0031**	**0.0114**
Molybdenum, Total	µg/L	—	—	**23**	—
Nickel, Total	µg/L	**200**	**140**	**810**	**880**
Selenium, Total	µg/L	**9.1**	**6.5**	**8.6**	**8.9**
Silver, Total	µg/L	—	—	<0.20	—
Strontium, Total	µg/L	—	—	**2300**	—
Thallium, Total	µg/L	—	—	<1.0	—
Vanadium, Total	µg/L	—	—	<4.0	—
Zinc, Total	µg/L	<10	<10	<10	**10**
Major Anions					
Alkalinity, Bicarbonate	mg/L	**27**	**20**	**37**	**27**
Alkalinity, Carbonate	mg/L	<2.0	<2.0	<2.0	<2.0
Chloride	mg/L	**110**	**45**	**28**	**26**
Fluoride	µg/L	—	—	<100	—
Nitrogen, Ammonia	mg/L	**51**	**13**	**0.79**	**1.0**
Nitrogen, Nitrate	mg/L	**440**	**190**	**150**	**120**
Nitrogen, Nitrite	mg/L	**9.7**	**2.7**	**0.14**	**0.47**
Sulfate	mg/L	**1700**	**1100**	**1100**	**1200**
Major Cations					
Calcium, Total	mg/L	—	—	**290**	—
Magnesium, Total	mg/L	**170**	**110**	**110**	**110**
Potassium, Total	µg/L	—	—	**46000**	—
Sodium, Total	mg/L	**460**	**250**	**190**	**160**

— Analyte not included in the quarterly parameter list.

2016
Mine Permit Water Quality Monitoring Data
TDRSA Leak Detection Sump
Eagle Mine

		Q1 2016	Q2 2016	Q3 2016	Q4 2016
Parameter	**Unit**	**2/22/2016**	**6/2/2016**	**8/24/2016**	**11/29/2016**
Field					
pH	SU	**7.4**	**7.1**	**7.4**	**7.5**
Specific Conductivity	µS/cm	**2976**	**3133**	**2693**	**2441**
Major Anions					
Chloride	mg/L	**14**	**14**	**13**	11
Nitrogen, Ammonia	mg/L	**0.19**	**0.09**	**0.07**	<0.05
Nitrogen, Nitrate	mg/L	**26**	**29**	**28**	**25**
Nitrogen, Nitrite	mg/L	**0.15**	<0.05	**0.36**	**0.06**
Sulfate	mg/L	**1000**	**980**	**840**	**810**
Major Cations					
Magnesium, Total	mg/L	**15**	**16**	**16**	**15**
Sodium, Total	mg/L	**610**	**610**	**590**	**510**

2016
Mine Permit Water Quality Monitoring Data
Underground Influent
Eagle Mine

		Q1 2016	Q2 2016	Q3 2016	Q4 2016
Parameter	**Unit**	**2/22/2016**	**6/2/2016**	**8/24/2016**	**11/29/2016**
Field					
pH	SU	**7.3**	**8.1**	**7.2**	**8.7**
Specific Conductivity	µS/cm	**1470**	**2445**	**1420**	**2016**
Metals					
Aluminum, Total	mg/L	—	—	**1700**	—
Antimony, Total	µg/L	—	—	**4.3**	—
Arsenic, Total	µg/L	**7.6**	**17**	**2.8**	**2.2**
Barium, Total	µg/L	—	—	**36**	—
Beryllium, Total	µg/L	—	—	<1.0	—
Boron, Total	µg/L	**560**	**660**	**570**	**600**
Cadmium, Total	µg/L	—	—	<0.20	—
Chromium, Total	µg/L	—	—	**25**	—
Cobalt, Total	µg/L	—	—	**9.9**	—
Copper, Total	µg/L	**8700**	**22000**	**300**	**230**
Iron, Total	µg/L	**36000**	**120000**	**3200**	**2900**
Lead, Total	µg/L	—	—	**4.0**	—
Lithium, Total	µg/L	—	—	**21**	—
Manganese, Total	µg/L	**390**	**1400**	**43**	**26**
Mercury, Total	µg/L	**0.148**	**0.006**	**0.0168**	**0.0067**
Molybdenum, Total	µg/L	—	—	**35**	—
Nickel, Total	µg/L	**7200**	**23000**	**350**	**220**
Selenium, Total	µg/L	**13**	**25**	**4.9**	**4.8**
Silver, Total	µg/L	—	—	<0.20	—
Strontium, Total	µg/L	—	—	**650**	—
Thallium, Total	µg/L	—	—	<1.0	—
Vanadium, Total	µg/L	—	—	**7.5**	—
Zinc, Total	µg/L	**180**	**520**	**30**	**13**
Major Anions					
Alkalinity, Bicarbonate	mg/L	**150**	**69**	**41**	**43**
Alkalinity, Carbonate	mg/L	<2	<2	<2	<2
Chloride	mg/L	**250**	**540**	**67**	**110**
Fluoride	µg/L	—	—	**270**	—
Nitrogen, Nitrate	mg/L	**25**	**30**	**38**	**70**
Nitrogen, Nitrite	mg/L	—	—	—	—
Sulfate	mg/L	**250**	**430**	**370**	**350**
Major Cations					
Calcium, Total	mg/L	—	—	**100**	—
Magnesium, Total	mg/L	—	—	**8.6**	—
Potassium, Total	µg/L	—	—	**39000**	—
Sodium, Total	mg/L	—	—	**120**	—

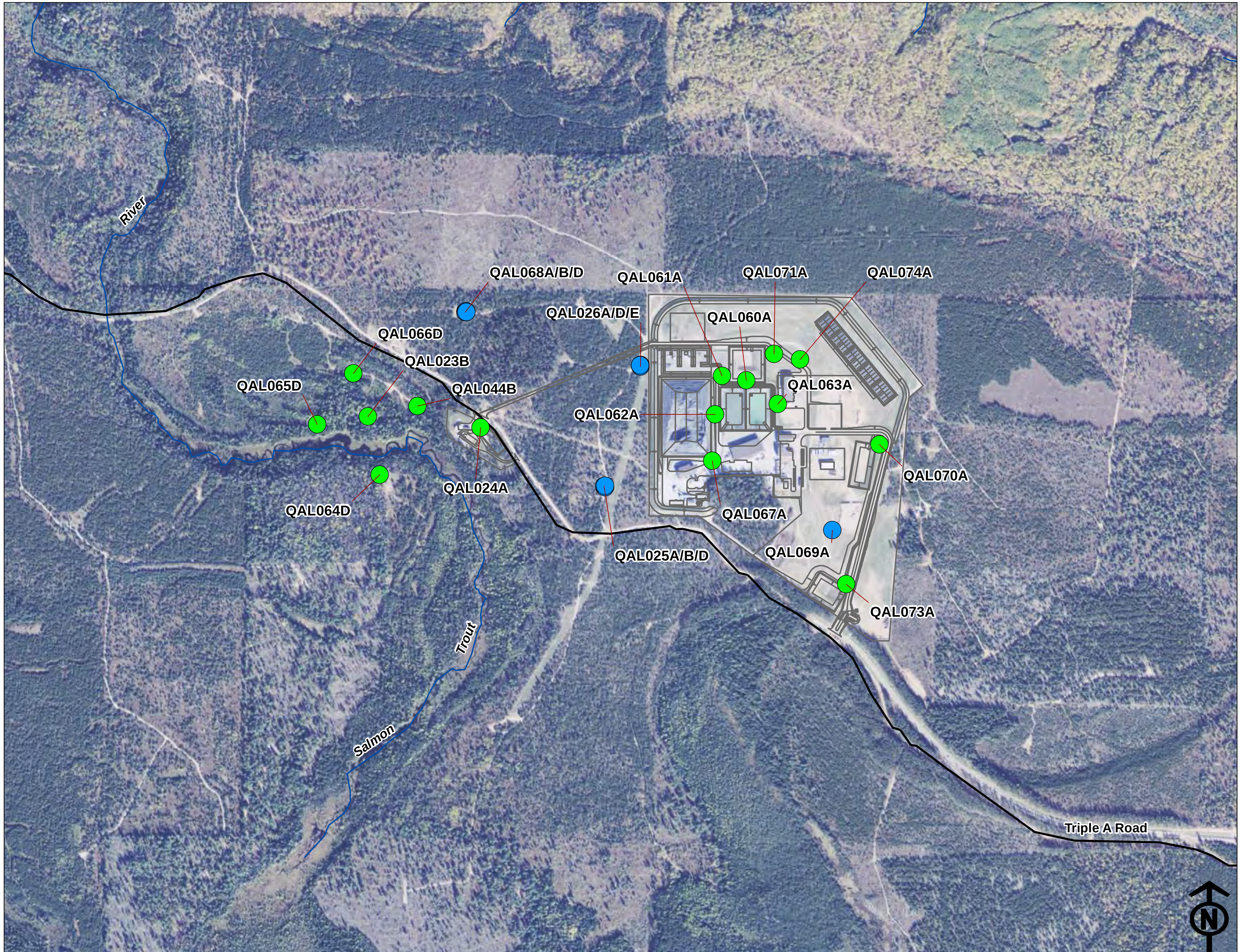
— Analyte not included in the quarterly parameter list.

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 lundin mining

North Jackson Company

ENVIRONMENTAL SCIENCE & ENGINEERING

Appendix F

Eagle Mine

Groundwater Monitoring Well Results

and

Benchmark Summary Table

Eagle Mine
2016 Mine Permit Groundwater Monitoring
Benchmark Comparison Summary

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

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

Parameter	Unit	Benchmark	Q1 2016 02/09/16[T]	Q2 2016 05/18/16[T]	Q3 2016 08/83/16[T]	Q4 2016 10/26/16[T]
Field						
D.O.[1]	ppm	--	**0.3**	**0.2**	**0.3**	**0.2**
ORP	mV	--	**-137**	**-33**	**-73**	**-128**
pH	SU	7.8-8.8	**7.2**	**7.0**	**8.1**	**7.0**
Specific Conductance	µS/cm @ 25°C	--	**122**	**120**	**123**	**121**
Temperature	°C	--	**5.2**	**7.7**	**10**	**7.2**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1414.99**	**1415.28**	**1414.96**	**1414.22**
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 e
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	**60**	**72**	**49**	**68**
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<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	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	67	**66**	**66**	**62**	**63**
Alkalinity, Carbonate	mg/L	8.0	<2.0 e	<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	0.20	<0.050	<0.050	<0.050 e	<0.050
Sulfate	mg/L	8.0	**3.7**	**3.5**	**4.3**	**2.2**
Major Cations						
Calcium	mg/L	16	**--**	**12** e	--	--
Magnesium	mg/L	3.7	**--**	**3.0**	--	--
Potassium	mg/L	2.0	--	<0.50	--	--
Sodium	mg/L	11	**9.8**	**10**	**9.8**	**11**
General						
Hardness	mg/L	55	**--**	**42**	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/04/16[T]	Q2 2016 05/17/16[T]	Q3 2016 08/04/16[T]	Q4 2016 10/25/16[T]
Field						
D.O.[1]	ppm	--	11	11	11	10
ORP	mV	--	179	196	217	169
pH	SU	6.1-7.1	6.4	6.5	6.3	6.3
Specific Conductance	µS/cm @ 25°C	--	551	421	392	353
Temperature	°C	--	7.6	7.6	8.7	8.0
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	1416.87	1417.64	1417.45	1417.35
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	--	51	--	--
Beryllium	ug/L	2.5	--	<1.0	--	--
Boron	ug/L	400	<100	<100	<100	<100 e
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	35	<20	<20	22
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	0.585	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<1.0
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	84	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	24	40	37	47	45
Alkalinity, Carbonate	mg/L	8.0	<2.0 e	<2.0	<2.0	<2.0
Chloride	mg/L	4.0	150	110	86	93
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	2.8	1.9	1.5 e	1.6
Sulfate	mg/L	8.0	4.1	7.6	7.7	7.6
Major Cations						
Calcium	mg/L	48	--	30 e	--	--
Magnesium	mg/L	8.1	--	5.8	--	--
Potassium	mg/L	3.7	--	2.5	--	--
Sodium	mg/L	2.0	40	45	33	52
General						
Hardness	mg/L	153	--	99	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/08/16[T]	Q2 2016 05/16/16[T]	Q3 2016 08/04/16[T]	Q4 2016 10/24/16[T]
Field						
D.O.[1]	ppm	--	**12**	**12**	**13**	**12**
ORP	mV	--	**165**	**106**	**73**	**304**
pH	SU	6.4-7.4	**7.2**	**6.6**	**7.5**	**6.5**
Specific Conductance	µS/cm @ 25°C	--	**76**	**53**	**59**	**51**
Temperature	°C	--	**6.4**	**7.5**	**7.6**	**7.3**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1415.74**	**1416.02**	**1416.53**	**1416.14**
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 e
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	<20	<20	**24**
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<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	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	25	**35**	**29**	**27**	**30**
Alkalinity, Carbonate	mg/L	8.0	<2.0 e	<2.0	<2.0	<2.0
Chloride	mg/L	4.0	**1.3**	**1.1**	**1.2**	**1.4**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	1.1	**0.60**	**0.92**	**0.55** e	**0.54**
Sulfate	mg/L	8.0	**2.5**	<2.0	<2.0	**2.2**
Major Cations						
Calcium	mg/L	8.5	--	**7.3** e	--	--
Magnesium	mg/L	2.0	--	**1.5**	--	--
Potassium	mg/L	2.0	--	**0.80**	--	--
Sodium	mg/L	2.0	**0.94**	**1.0**	**1.1**	**0.99**
General						
Hardness	mg/L	28	--	**24**	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/08/16[T]	Q2 2016 05/16/16[T]	Q3 2016 08/04/16[T]	Q4 2016 10/24/16[T]
Field						
D.O.[1]	ppm	--	11	12	12	11
ORP	mV	--	118	81	51	281
pH	SU	8.5-9.5	9.0	8.8	9.2	8.7
Specific Conductance	µS/cm @ 25°C	--	68	62	67	55
Temperature	°C	--	6.7	7.0	7.6	7.3
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	1415.61	1415.91	1416.41	1415.99
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 e
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	<20	<20	<20	<20
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<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	<1.0	1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	36	27	27	28	30
Alkalinity, Carbonate	mg/L	12	8.0 e	9.1	7.1	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	0.13	0.12	0.10 e,s	0.11
Sulfate	mg/L	8.0	2.2	<2.0	2.2	2.1
Major Cations						
Calcium	mg/L	10	--	9.4 e	--	--
Magnesium	mg/L	2.0	--	1.7	--	--
Potassium	mg/L	2.0	--	<0.50	--	--
Sodium	mg/L	4.5	1.9	1.9	1.8	1.7
General						
Hardness	mg/L	33	--	30	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/02/16T	Q2 2016 05/09/16T	Q3 2016 08/02/16T	Q4 2016 11/07/16T
Field						
D.O.[1]	ppm	--	**5.6**	**6.1**	**6.3**	**5.4**
ORP	mV	--	**13**	**62**	**33**	**121**
pH	SU	8.2-9.2	**8.7**	**8.5**	**9.0**	**8.5**
Specific Conductance	µS/cm @ 25°C	--	**89**	**86**	**95**	**91**
Temperature	°C	--	**7.0**	**7.3**	**7.5**	**7.4**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1411.74**	**1411.53**	**1412.34**	**1411.91**
Metals						
Aluminum	ug/L	200	--	**110**	--	--
Antimony	ug/L	5.5	--	<5.0	--	--
Arsenic	ug/L	6.5	**2.6**	**3.1**	**2.8**	**2.9**
Barium	ug/L	80	--	<20	--	--
Beryllium	ug/L	2.5	--	<1.0	--	--
Boron	ug/L	400	<100	<100	<100	<100 e
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	**48**	**70**	**62**	**45**
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<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	**3.8**	**4.3**	**4.1**	**3.9**
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	52	**59**	**43**	**42**	**39**
Alkalinity, Carbonate	mg/L	14	**5.0** e	**2.0**	**3.0**	**6.0**
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	**0.16**	**0.17**	**0.16** e	**0.16**
Sulfate	mg/L	8.0	**4.6**	**4.7**	**5.1**	**5.2**
Major Cations						
Calcium	mg/L	12	--	**11** e	--	--
Magnesium	mg/L	2.7	--	**2.7**	--	--
Potassium	mg/L	2.0	--	**0.61**	--	--
Sodium	mg/L	12	**4.1**	**4.4**	**3.9**	**3.8**
General						
Hardness	mg/L	42	--	**39**	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/02/16[T]	Q2 2016 05/09/16[T]	Q3 2016 08/02/16[T]	Q4 2016 11/07/16[T]
Field						
D.O.[1]	ppm	--	**14**	i	**11**	**11**
ORP	mV	--	**101**	i	**84**	**185**
pH	SU	6.2-7.2	**6.3**	i	**7.0**	**6.3**
Specific Conductance	µS/cm @ 25°C	--	**165**	i	**153**	**144**
Temperature	°C	--	**5.9**	i	**11**	**10.7**
Turbidity	NTU	--	<1	i	<1	<1
Water Elevation	ft MSL	--	**1415.70**	<1461.1 BP	**1416.40**	**1416.26**
Metals						
Aluminum	ug/L	236	--	i	--	--
Antimony	ug/L	5.5	--	i	--	--
Arsenic	ug/L	6.0	<2.0	i	<2.0	<2.0
Barium	ug/L	80	--	i	--	--
Beryllium	ug/L	2.5	--	i	--	--
Boron	ug/L	400	<100	i	<100	<100 e
Cadmium	ug/L	2.0	--	i	--	--
Chromium	ug/L	20	--	i	--	--
Cobalt	ug/L	40	--	i	--	--
Copper	ug/L	20	<5.0	i	<5.0	<5.0
Iron	ug/L	368	**90**	i	**310**	**120**
Lead	ug/L	4.0	--	i	--	--
Lithium	ug/L	32	--	i	--	--
Manganese	ug/L	80	<20	i	<20 e	<20
Mercury	ng/L	2.00	<0.500	i	**0.576**	<0.500 e
Molybdenum	ug/L	40	--	i	--	--
Nickel	ug/L	100	<25	i	<25	<25
Selenium	ug/L	4.0	<1.0	i	<1.0 e	<1.0
Silver	ug/L	0.80	--	i	--	--
Strontium	ug/L	200	--	i	--	--
Thallium	ug/L	2.0	--	i	--	--
Vanadium	ug/L	4.0	<1.0	i	<1.0	<1.0
Zinc	ug/L	40	<10	i	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	114	**93**	i	**83**	**77**
Alkalinity, Carbonate	mg/L	8.0	<2.0 e	i	<2.0	<2.0
Chloride	mg/L	4.0	**1.2**	i	<1.0	**1.1**
Fluoride	mg/L	0.40	--	i	--	--
Nitrogen, Nitrate	mg/L	0.73	**1.3**	i	**1.2** e	**0.99**
Sulfate	mg/L	8.0	<2.0	i	**2.0**	**2.3**
Major Cations						
Calcium	mg/L	40.0	--	i	--	--
Magnesium	mg/L	5.9	--	i	--	--
Potassium	mg/L	2.0	--	i	--	--
Sodium	mg/L	2.4	**1.5**	i	**1.4**	**1.5**
General						
Hardness	mg/L	124	--	i	--	--

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

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

Parameter	Unit	Benchmark	Q1 2016 02/02/16^T	Q2 2016 05/09/16^T	Q3 2016 08/02/16^T	Q4 2016 11/07/16^T
Field						
D.O.[1]	ppm	--	**12**	**12**	**12**	**11**
ORP	mV	--	**21**	**65**	**56**	**145**
pH	SU	8.4-9.4	**8.9**	**8.4**	**8.9**	**8.6**
Specific Conductance	µS/cm @ 25°C	--	**60**	**60**	**65**	**63**
Temperature	°C	--	**7.0**	**7.4**	**8.0**	**7.6**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1408.61**	**1408.33**	**1409.04**	**1408.77**
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 e
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	<20	<20	<20
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<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	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	31	**31**	**30**	**31**	**27**
Alkalinity, Carbonate	mg/L	8.0	**4.0** e	**4.0**	**4.0**	**8.1**
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	**0.10**	**0.10**	**0.094** e,s	**0.11**
Sulfate	mg/L	8.0	**2.0**	<2.0	<2.0	<2.0
Major Cations						
Calcium	mg/L	13	--	**9.6** e	--	--
Magnesium	mg/L	2.4	--	**1.5**	--	--
Potassium	mg/L	2.0	--	**0.50**	--	--
Sodium	mg/L	2.0	**0.65**	**0.73**	**0.65**	**0.64**
General						
Hardness	mg/L	43	--	**30**	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/08/16[T]	Q2 2016 05/16/16[T]	Q3 2016 08/04/16[T]	Q4 2016 11/07/16[T]
Field						
D.O.[1]	ppm	--	**0.1**	**1.0**	**1.0**	**0.3**
ORP	mV	--	**-140**	**-1**	**-55**	**-9**
pH	SU	8.1-9.1	**8.4**	**8.4**	**9.1**	**8.5**
Specific Conductance	µS/cm @ 25°C	--	**120**	**112**	**121**	**100**
Temperature	°C	--	**6.7**	**7.1**	**7.7**	**7.2**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1408.71**	**1403.74**	**1409.14**	**1408.40**
Metals						
Aluminum	ug/L	200	--	<50	--	--
Antimony	ug/L	5.5	--	<5.0	--	--
Arsenic	ug/L	7.8	**7.4**	**7.1**	**7.0**	**6.7**
Barium	ug/L	80	--	<20	--	--
Beryllium	ug/L	2.5	--	<1.0	--	--
Boron	ug/L	400	<100	<100	<100	<100 e
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	<20	<20	<20
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<1.0
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	**--**	**61**	**--**	**--**
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	91	**58**	**59**	**56**	**57**
Alkalinity, Carbonate	mg/L	8.0	<2.0 e	<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	<0.050	<0.050	<0.050 e	<0.050
Sulfate	mg/L	8.6	**7.3**	**7.3**	**7.0**	**7.4**
Major Cations						
Calcium	mg/L	17	**--**	**16** e	**--**	**--**
Magnesium	mg/L	4.3	**--**	**4.2**	**--**	**--**
Potassium	mg/L	2.0	**--**	**1.9**	**--**	**--**
Sodium	mg/L	2.0	**1.7**	**1.7**	**1.7**	**1.7**
General						
Hardness	mg/L	60	**--**	**57**	**--**	**--**

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

Parameter	Unit	Benchmark	Q1 2016 02/09/16[T]	Q2 2016 05/18/16[T]	Q3 2016 08/08/16[T]	Q4 2016 10/25/16[T]
Field						
D.O.[1]	ppm	--	1.0	1.0	1.0	1.0
ORP	mV	--	-388	-103	-132	-180
pH	SU	8.3-9.3	9.0	9.3	9.5	9.9
Specific Conductance	µS/cm @ 25°C	--	70	63	75	77
Temperature	°C	--	6.3	7.9	8.4	7.9
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	1414.11	1414.23	1414.42	1413.98
Metals						
Aluminum	ug/L	200	--	<50	--	--
Antimony	ug/L	5.5	--	<5.0	--	--
Arsenic	ug/L	6.0	<2.0	<2.0	2.1	2.6
Barium	ug/L	80	--	<20	--	--
Beryllium	ug/L	2.5	--	<1.0	--	--
Boron	ug/L	400	<100	<100	<100	<100 e
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	65	31	23	31
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<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	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	64	30	21	18	12
Alkalinity, Carbonate	mg/L	8.0	4.0 e	10	14	16
Chloride	mg/L	4.0	1.5	1.2	1.1	1.4
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	<0.050	<0.050	<0.050 e	<0.050
Sulfate	mg/L	24	7.5	8.1	7.4	7.4
Major Cations						
Calcium	mg/L	17	--	8.3 e	--	--
Magnesium	mg/L	4.0	--	1.8	--	--
Potassium	mg/L	2.0	--	0.52	--	--
Sodium	mg/L	2.6	2.4	2.5	2.5	2.5
General						
Hardness	mg/L	58	--	28	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/04/16[T]	Q2 2016 05/16/16[T]	Q3 2016 08/03/16[T]	Q4 2016 10/24/16[T]
Field						
D.O.[1]	ppm	--	**12**	**11**	**11**	**11**
ORP	mV	--	**55**	**124**	**268**	**70**
pH	SU	8.1-9.1	**8.4**	**8.8**	**8.7**	**8.9**
Specific Conductance	µS/cm @ 25°C	--	**68**	**72**	**75**	**73**
Temperature	°C	--	**7.6**	**7.3**	**9.3**	**7.7**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1404.18**	**1403.86**	**1404.59**	**1404.21**
Metals						
Aluminum	ug/L	200	--	<50	--	--
Antimony	ug/L	5.5	--	<5.0	--	--
Arsenic	ug/L	7.2	**5.4**	**5.9**	**5.0**	**4.8**
Barium	ug/L	80	--	<20	--	--
Beryllium	ug/L	2.5	--	<1.0	--	--
Boron	ug/L	400	<100	<100	<100	<100 e
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	<20	<20	<20
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<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	**1.3**	**1.3**	**1.3**	**1.3**
Zinc	ug/L	40	**11**	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	62	**36**	**34**	**36**	**36**
Alkalinity, Carbonate	mg/L	8.0	**2.0** e	<2.0	**2.0**	**8.1**
Chloride	mg/L	4.0	<1.0	<1.0	**1.1**	**1.1**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	**0.15**	**0.15**	**0.16** e	**0.18**
Sulfate	mg/L	8.0	<2.0	<2.0	**2.2**	**2.0**
Major Cations						
Calcium	mg/L	17	--	**10** e	--	--
Magnesium	mg/L	4.2	--	**2.5**	--	--
Potassium	mg/L	2.0	--	**0.69**	--	--
Sodium	mg/L	2.1	**0.76**	**0.78**	**0.79**	**0.75**
General						
Hardness	mg/L	61	--	**35**	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/04/16[T]	Q2 2016 05/16/16[T]	Q3 2016 08/03/16[T]	Q4 2016 10/25/16[T]
Field						
D.O.[1]	ppm	--	**11**	**11**	**11**	**11**
ORP	mV	--	**32**	**131**	**249**	**62**
pH	SU	8.1-9.1	**8.7**	**8.8**	**8.7**	**9.1**
Specific Conductance	µS/cm @ 25°C	--	**68**	**74**	**75**	**79**
Temperature	°C	--	**7.6**	**7.2**	**8.6**	**7.4**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1405.52**	**1406.21**	**1405.92**	**1405.59**
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 e
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	<20	<20	<20
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<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	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	40	**36**	**38**	**28**	**36**
Alkalinity, Carbonate	mg/L	8.0	**3.0** e	**2.0**	**5.1**	**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	0.27	**0.27**	**0.29**	**0.26** e	**0.28**
Sulfate	mg/L	8.0	<2.0	<2.0	<2.0	<2.0
Major Cations						
Calcium	mg/L	15	**--**	**11** e	**--**	**--**
Magnesium	mg/L	2.2	**--**	**2.0**	**--**	**--**
Potassium	mg/L	2.0	**--**	<0.50	--	--
Sodium	mg/L	2.0	**0.65**	**0.63**	**0.72**	**0.72**
General						
Hardness	mg/L	37	**--**	**36**	**--**	**--**

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

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

Parameter	Unit	Benchmark	Q1 2016 02/04/16[T]	Q2 2016 05/16/16[T]	Q3 2016 08/03/16[T]	Q4 2016 10/24/16[T]
Field						
D.O.[1]	ppm	--	**10**	**9.8**	**9.8**	**9.6**
ORP	mV	--	**45**	**116**	**136**	**111**
pH	SU	8.3-9.3	**8.3**	**7.9**	**8.0**	**8.1**
Specific Conductance	µS/cm @ 25°C	--	**312**	**338**	**328**	**356**
Temperature	°C	--	**7.1**	**7.2**	**8.3**	**7.6**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1406.88**	**1406.54**	**1407.27**	**1406.88**
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 e
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	<20	<20	<20
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<1.0
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	**63**	**--**	**--**
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	48	**110**	**110**	**120**	**120**
Alkalinity, Carbonate	mg/L	8.0	<2.0 e	<2.0	<2.0	<2.0
Chloride	mg/L	4.0	**45**	**43**	**39**	**46**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.41	**0.39**	**0.40**	**0.41** e	**0.46**
Sulfate	mg/L	8.0	<2.0	<2.0	**2.3**	**2.2**
Major Cations						
Calcium	mg/L	12	**--**	**45** e	**--**	**--**
Magnesium	mg/L	2.2	**--**	**9.1**	**--**	**--**
Potassium	mg/L	2.0	**--**	**1.6**	**--**	**--**
Sodium	mg/L	2.0	**5.2**	**9.2**	**13**	**11**
General						
Hardness	mg/L	40	**--**	**150**	**--**	**--**

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

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

Parameter	Unit	Benchmark	Q1 2016 02/04/16[T]	Q2 2016 05/17/16[T]	Q3 2016 08/04/16[T]	Q4 2016 10/24/16[T]
Field						
D.O.[1]	ppm	--	**10**	**10**	**9.7**	**9.5**
ORP	mV	--	**-40**	**121**	**189**	**61**
pH	SU	8.1-9.1	**8.5**	**8.4**	**8.1**	**8.3**
Specific Conductance	µS/cm @ 25°C	--	**147**	**188**	**218**	**283**
Temperature	°C	--	**7.5**	**7.9**	**8.9**	**8.3**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1400.77**	**1400.31**	**1401.35**	**1400.83**
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 e
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	<20	<20	<20
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<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	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	42	**76**	**94**	**100**	**110**
Alkalinity, Carbonate	mg/L	8.0	**3.0** e	<2.0	<2.0	<2.0
Chloride	mg/L	4.0	**3.5**	**7.5**	**14**	**24**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.29	**0.28**	**0.39**	**0.45** e	**0.54**
Sulfate	mg/L	8.0	<2.0	<2.0	<2.0	**2.0**
Major Cations						
Calcium	mg/L	12	--	**32** e	--	--
Magnesium	mg/L	2.0	--	**5.6**	--	--
Potassium	mg/L	2.0	--	**1.1**	--	--
Sodium	mg/L	2.0	**1.0**	**1.2**	**1.2**	**1.4**
General						
Hardness	mg/L	40	--	**103**	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/11/16^{T}	Q2 2016 05/17/16^{T}	Q3 2016 08/04/16^{T}	Q4 2016 10/25/16^{T}
Field						
D.O.[1]	ppm	--	<0.1	<0.1	**0.2**	**0.2**
ORP	mV	--	**-96**	**-169**	**-206**	**-184**
pH	SU	8.0-9.0	**8.1**	**8.4**	**8.4**	**8.7**
Specific Conductance	µS/cm @ 25°C	--	**146**	**140**	**153**	**143**
Temperature	°C	--	**6.4**	**6.7**	**7.5**	**7.0**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1415.06**	**1415.80**	**1416.26**	**1415.58**
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	--	<20	--	--
Beryllium	ug/L	2.5	--	<1.0	--	--
Boron	ug/L	400	<100	<100	<100	<100 e
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	**44**	**36**	**26**	**31**
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<1.0
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	**--**	**110**	**--**	**--**
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	82	**77**	**79**	**74**	**82**
Alkalinity, Carbonate	mg/L	8.0	**2.0** e	<2.0	**4.0**	<2.0
Chloride	mg/L	4.2	**2.4**	**2.3**	**2.1**	**2.5**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	<0.050	<0.050	<0.050 e	<0.050
Sulfate	mg/L	8.0	<2.0	**2.6**	<2.0	<2.0
Major Cations						
Calcium	mg/L	22	**--**	**20** e	**--**	**--**
Magnesium	mg/L	3.3	**--**	**4.2**	**--**	**--**
Potassium	mg/L	2.0	**--**	**1.3**	**--**	**--**
Sodium	mg/L	6.9	**4.4**	**4.3**	**4.1**	**4.2**
General						
Hardness	mg/L	51	**--**	**67**	**--**	**--**

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

Parameter	Unit	Benchmark	Q1 2016 02/09/16^T	Q2 2016 05/18/16^T	Q3 2016 08/08/16^T	Q4 2016 10/26/16^T
Field						
D.O.[1]	ppm	--	**0.1**	**0.2**	**0.6**	**1.0**
ORP	mV	--	**-215**	**-176**	**-120**	**-72**
pH	SU	7.9-8.9	**8.6**	**8.5**	**8.4**	**8.7**
Specific Conductance	µS/cm @ 25°C	--	**150**	**143**	**144**	**143**
Temperature	°C	--	**6.2**	**6.7**	**7.8**	**7.0**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1415.84**	**1416.26**	**1415.92**	**1415.80**
Metals						
Aluminum	ug/L	200	--	<50	--	--
Antimony	ug/L	5.5	--	<5.0	--	--
Arsenic	ug/L	6.6	**3.3**	**3.3**	**3.0**	**3.3**
Barium	ug/L	80	--	<20	--	--
Beryllium	ug/L	2.5	--	<1.0	--	--
Boron	ug/L	400	<100	<100	<100	<100 e
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	**55**	**61**	**52**	**51**
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<1.0
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	**210**	**--**	**--**
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	86	**77**	**79**	**78**	**79**
Alkalinity, Carbonate	mg/L	8.7	**6.0** e	**2.0**	**3.0**	<2.0
Chloride	mg/L	4.0	**1.1**	<1.0	<1.0	**1.2**
Fluoride	mg/L	0.40	--	**0.15**	**--**	**--**
Nitrogen, Nitrate	mg/L	0.20	<0.050	<0.050	<0.050 e	<0.050
Sulfate	mg/L	8.0	<2.0	<2.0	<2.0	<2.0
Major Cations						
Calcium	mg/L	14	**--**	**13** e	**--**	**--**
Magnesium	mg/L	4.8	**--**	**4.4**	**--**	**--**
Potassium	mg/L	3.0	**--**	**2.6**	**--**	**--**
Sodium	mg/L	12	**11**	**11**	**10**	**12**
General						
Hardness	mg/L	53	**--**	**51**	**--**	**--**

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

Parameter	Unit	Benchmark	Q1 2016 02/09/16[T]	Q2 2016 05/18/16[D]	Q3 2016 08/08/16[D]	Q4 2016 10/25/16[D]
Field						
D.O.[1]	ppm	--	**1.5**	**1.1**	**2.3**	**3.2**
ORP	mV	--	**-253**	**12**	**-44**	**-3**
pH	SU	8.7-9.7	**9.9**	**9.1**	**9.0**	**9.1**
Specific Conductance	µS/cm @ 25°C	--	**118**	**125**	**141**	**121**
Temperature	°C	--	**5.1**	**8.6**	**11.4**	**8.3**
Turbidity	NTU	--	<1	**272**	**293**	**328**
Water Elevation	ft MSL	--	**1415.01**	**1415.09**	**1415.12**	**1414.85**
Metals						
Aluminum	ug/L	557	--	<50	--	--
Antimony	ug/L	5.5	--	<5.0	--	--
Arsenic	ug/L	8.9	**9.0**	**9.3**	**9.3**	**11**
Barium	ug/L	80	--	<20	--	--
Beryllium	ug/L	2.5	--	<1.0	--	--
Boron	ug/L	400	<100	<100	<100	<100 e
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	**1300**	<20	<20	<20
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	**3.89**	**0.679**	**1.23**	**2.79** e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<1.0
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	367	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	4.0	**2.2**	**1.8**	**1.4**	**1.5**
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	61	**44**	**60**	**55**	**56**
Alkalinity, Carbonate	mg/L	52	**16** e	**6.1**	**15**	**12**
Chloride	mg/L	4.0	**2.0**	**1.1**	**2.0**	**2.5**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	<0.050	<0.050	**0.052** e,s	<0.050
Sulfate	mg/L	11	**15**	**15**	**19**	**23**
Major Cations						
Calcium	mg/L	58	--	**10** e	--	--
Magnesium	mg/L	2.9	--	**1.7**	--	--
Potassium	mg/L	2.6	--	**1.1**	--	--
Sodium	mg/L	8.0	**14**	**16**	**18**	**21**
General						
Hardness	mg/L	146	--	**32**	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/04/16[T]	Q2 2016 05/16/16[T]	Q3 2016 08/03/16[T]	Q4 2016 10/26/16[T]
Field						
D.O.[1]	ppm	--	**9.1**	**8.9**	**8.8**	**8.7**
ORP	mV	--	**259**	**262**	**310**	**111**
pH	SU	5.6-6.6	**6.1**	**6.1**	**6.1**	**6.3**
Specific Conductance	µS/cm @ 25°C	--	**2160**	**2314**	**2010**	**1675**
Temperature	°C	--	**7.5**	**7.9**	**8.9**	**8.0**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1414.06**	**1413.65**	**1414.31**	**1414.20**
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	--	**220**	--	--
Beryllium	ug/L	2.5	--	<1.0	--	--
Boron	ug/L	400	<100	<100	<100	<100 e
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	<20	<20	<20
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	**2.07**	**2.38**	**2.33**	**2.17** e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<1.0
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	**180**	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	4.0	**1.1**	<1.0	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	51	**50**	**48**	**51**	**49**
Alkalinity, Carbonate	mg/L	8.0	<2.0 e	<2.0	<2.0	<2.0
Chloride	mg/L	4.0	**730**	**730**	**590**	**490**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.25	**2.0**	**2.1**	**2.2** e	**2.4**
Sulfate	mg/L	8.4	**13**	**16**	**18**	**19**
Major Cations						
Calcium	mg/L	8.2	--	**32** e	--	--
Magnesium	mg/L	2.0	--	**18**	--	--
Potassium	mg/L	2.0	--	**4.6**	--	--
Sodium	mg/L	2.0	**430**	**440**	**380**	**310**
General						
Hardness	mg/L	26	--	**154**	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/08/16[T]	Q2 2016 05/16/16[T]	Q3 2016 08/04/16[T]	Q4 2016 10/24/16[T]
Field						
D.O.[1]	ppm	--	**12**	**12**	**12**	**12**
ORP	mV	--	**93**	**109**	**210**	**231**
pH	SU	6.2-7.2	**6.7**	**6.4**	**6.5**	**6.9**
Specific Conductance	µS/cm @ 25°C	--	**37**	**42**	**37**	**28**
Temperature	°C	--	**7.2**	**7.4**	**7.9**	**7.4**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1421.61**	**1420.57**	**1422.03**	**1421.68**
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 e
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	<20	<20	<20
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<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	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	35	**21**	**25**	**11**	**16**
Alkalinity, Carbonate	mg/L	8.0	<2.0 e	<2.0	<2.0	<2.0
Chloride	mg/L	4.0	**1.4**	<1.0	<1.0	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	<0.050	<0.050	<0.050 e	<0.050
Sulfate	mg/L	8.0	<2.0	<2.0	<2.0	<2.0
Major Cations						
Calcium	mg/L	6.7	--	**6.3** e	--	--
Magnesium	mg/L	2.0	--	**1.2**	--	--
Potassium	mg/L	2.0	--	**1.1**	--	--
Sodium	mg/L	2.0	**0.69**	**0.76**	**0.64**	**0.64**
General						
Hardness	mg/L	21	--	**21**	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/08/16[T]	Q2 2016 05/16/16[T]	Q3 2016 08/04/16[T]	Q4 2016 10/24/16[T]
Field						
D.O.[1]	ppm	--	**12**	**12**	**12**	**11**
ORP	mV	--	**20**	**72**	**36**	**142**
pH	SU	8.4-9.4	**9.0**	**8.8**	**9.1**	**8.8**
Specific Conductance	µS/cm @ 25°C	--	**59**	**57**	**62**	**51**
Temperature	°C	--	**6.9**	**7.2**	**7.9**	**7.6**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1412.87**	**1412.39**	**1413.42**	**1412.68**
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 e
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	<20	**22**	<20
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<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**	<1.0	**1.1**
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	30	**27**	**31**	**26**	**37**
Alkalinity, Carbonate	mg/L	9.9	**7.0** e	**2.0**	**8.1**	**2.0**
Chloride	mg/L	4.0	**1.2**	<1.0	**1.0**	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	**0.068**	**0.064**	<0.050 e	**0.058**
Sulfate	mg/L	8.0	**2.5**	**2.0**	**2.5**	**2.4**
Major Cations						
Calcium	mg/L	9.4	--	**8.9** e	--	--
Magnesium	mg/L	2.0	--	**1.8**	--	--
Potassium	mg/L	2.0	--	**0.62**	--	--
Sodium	mg/L	2.0	**0.98**	**0.98**	**0.89**	**0.91**
General						
Hardness	mg/L	31	--	**30**	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/08/16[T]	Q2 2016 05/16/16[T]	Q3 2016 08/04/16[T]	Q4 2016 10/25/16[T]
Field						
D.O.[1]	ppm	--	**2.6**	**4.5**	**4.1**	**2.8**
ORP	mV	--	**-83**	**5**	**-44**	**8**
pH	SU	8.0-9.0	**8.4**	**8.3**	**8.9**	**8.3**
Specific Conductance	µS/cm @ 25°C	--	**115**	**111**	**122**	**100**
Temperature	°C	--	**6.1**	**7.3**	**--**	**8.4**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1413.03**	**1412.52**	**1413.47**	**1412.81**
Metals						
Aluminum	ug/L	200	--	<50	--	--
Antimony	ug/L	5.5	--	<5.0	--	--
Arsenic	ug/L	7.2	**5.2**	**4.8**	**4.5**	**5.1**
Barium	ug/L	80	--	<20	--	--
Beryllium	ug/L	2.5	--	<1.0	--	--
Boron	ug/L	400	<100	<100	<100	<100 e
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	<20	<20	<20
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.12	<0.500	<0.500	<0.500	<0.500 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<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	**3.0**	**2.5**	**2.5**	**1.6**
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	67	**61**	**59**	**59**	**60**
Alkalinity, Carbonate	mg/L	8.0	<2.0 e	<2.0	**2.0**	<2.0
Chloride	mg/L	4.0	**1.2**	**1.1**	**1.0**	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.21	<0.050	<0.050	<0.050 e	<0.050
Sulfate	mg/L	10	**5.5**	**5.6**	**5.1**	**5.6**
Major Cations						
Calcium	mg/L	16	**--**	**14** e	**--**	**--**
Magnesium	mg/L	3.9	**--**	**3.9**	**--**	**--**
Potassium	mg/L	2.0	**--**	**1.2**	**--**	**--**
Sodium	mg/L	6.1	**4.4**	**4.6**	**4.3**	**4.7**
General						
Hardness	mg/L	52	**--**	**51**	**--**	**--**

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

Parameter	Unit	Benchmark	Q1 2016 02/08/16[T]	Q2 2016 05/17/16[T]	Q3 2016 08/03/16[T]	Q4 2016 10/24/16[T]
Field						
D.O.[1]	ppm	--	**7.7**	**8.1**	**4.9**	**5.2**
ORP	mV	--	**137**	**166**	**27**	**64**
pH	SU	7.8-8.8	**7.0**	**7.1**	**8.0**	**7.0**
Specific Conductance	µS/cm @ 25°C	--	**429**	**376**	**533**	**559**
Temperature	°C	--	**6.7**	**7.9**	**8.7**	**8.2**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1381.38**	**1381.68**	**1382.35**	**1382.60**
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 e
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	<20	<20	**29**
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	**2.35**	**2.25**	**29.2**	**14.4 e**
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<1.0
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	**69**	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	138	**210**	**210**	**230**	**180**
Alkalinity, Carbonate	mg/L	8.0	<2.0 e	<2.0	<2.0	<2.0
Chloride	mg/L	4.0	**15**	**4.1**	**38**	**76**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.57	**1.3**	**0.98**	**0.81** e	**0.98**
Sulfate	mg/L	8.0	**8.6**	**7.5**	**6.1**	**8.8**
Major Cations						
Calcium	mg/L	35	--	**50** e	--	--
Magnesium	mg/L	18	--	**21**	--	--
Potassium	mg/L	2.0	--	**1.9**	--	--
Sodium	mg/L	2.0	**13**	**6.6**	**12**	**28**
General						
Hardness	mg/L	162	--	**211**	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/08/16T	Q2 2016 05/17/16T	Q3 2016 08/03/16T	Q4 2016 10/25/16T
Field						
D.O.[1]	ppm	--	**11**	**11**	**11**	**11**
ORP	mV	--	**20**	**62**	**30**	**72**
pH	SU	8.1-9.1	**8.0**	**7.8**	**8.7**	**7.9**
Specific Conductance	µS/cm @ 25°C	--	**345**	**418**	**559**	**494**
Temperature	°C	--	**7.3**	**8.0**	**8.6**	**8.1**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1403.89**	**1404.82**	**1405.57**	**1405.73**
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	--	**25**	--	--
Beryllium	ug/L	2.5	--	<1.0	--	--
Boron	ug/L	400	<100	<100	<100	<100 e
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	<20	<20	<20
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	0.512 e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<1.0
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	**73**	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	44	**120**	**140**	**150**	**150**
Alkalinity, Carbonate	mg/L	8.0	<2.0 e	<2.0	<2.0	<2.0
Chloride	mg/L	4.0	**25**	**36**	**29**	**21**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.31	**10**	**14**	**27** e	**28**
Sulfate	mg/L	8.0	**7.3**	**7.0**	**6.6**	**6.3**
Major Cations						
Calcium	mg/L	12	--	**67** e	--	--
Magnesium	mg/L	2.0	--	**10**	--	--
Potassium	mg/L	2.0	--	**1.3**	--	--
Sodium	mg/L	2.0	**10**	**8.2**	**17**	**25**
General						
Hardness	mg/L	38	--	**209**	--	--

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

Parameter	Unit	Benchmark	Q1 2016 02/16/16^{T}	Q2 2016 05/17/16^{T}	Q3 2016 08/08/16^{T}	Q4 2016 10/26/16^{T}
Field						
D.O.[1]	ppm	--	**11**	**11**	**7.9**	**9.0**
ORP	mV	--	**138**	**59**	**-15**	**82**
pH	SU	8.4-9.4	**8.6**	**8.6**	**9.1**	**8.0**
Specific Conductance	µS/cm @ 25°C	--	**267**	**245**	**277**	**230**
Temperature	°C	--	**5.3**	**10**	**16**	**6.0**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1403.03**	**1403.77**	**1404.69**	**1404.16**
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 e
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	212	**45**	**31**	<20	20
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20 e	<20
Mercury	ng/L	2.00	**0.954**	**0.817**	**1.92**	**1.82** e
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e	<1.0 e	<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	<1.0	<1.0
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	39	**43**	**49**	**44**	**51**
Alkalinity, Carbonate	mg/L	8.0	<2.0 e	<2.0	**2.0**	<2.0
Chloride	mg/L	4.0	**47**	**53**	**50**	**52**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.43	**1.6**	**1.3**	**1.3** e	**1.3**
Sulfate	mg/L	8.0	**6.8**	**6.9**	**6.7**	**7.8**
Major Cations						
Calcium	mg/L	31	--	**32** e	--	--
Magnesium	mg/L	5.9	--	**6.4**	--	--
Potassium	mg/L	2.0	--	**1.1**	--	--
Sodium	mg/L	3.5	**6.8**	**9.1**	**9.2**	**9.6**
General						
Hardness	mg/L	103	--	**106**	--	--

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]
Field				
D.O.[1]	ppm	--	**11**	**11**
ORP	mV	--	**167**	**102**
pH	SU	6.1-7.1	**6.8**	**6.7**
Specific Conductance	µS/cm @ 25°C	--	**160**	**207**
Temperature	°C	--	**10**	**10**
Turbidity	NTU	--	<1	<1
Water Elevation	ft MSL	--	**1382.45**	**1381.68**
Metals				
Aluminum	ug/L	200	**110**	<50
Antimony	ug/L	5.5	<5.0	<5.0
Arsenic	ug/L	6.0	<2.0	<2.0
Barium	ug/L	80	<20	<20
Beryllium	ug/L	2.5	<1.0	<1.0
Boron	ug/L	400	<100	<100
Cadmium	ug/L	2.0	<0.50	<0.50
Chromium	ug/L	20	<5.0	<5.0
Cobalt	ug/L	40	<10	<10
Copper	ug/L	20	<5.0	<5.0
Iron	ug/L	132	**130**	**74**
Lead	ug/L	4.0	<1.0	<1.0
Lithium	ug/L	32	<8.0	<8.0
Manganese	ug/L	80	<20	<20
Mercury	ng/L	2.00	**0.942** e	**0.632**
Molybdenum	ug/L	40	<10	<10
Nickel	ug/L	100	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0 e
Silver	ug/L	0.80	<0.20	<0.20
Strontium	ug/L	200	**94**	**98**
Thallium	ug/L	2.0	<2.0	<2.0
Vanadium	ug/L	4.0	<2.0	<1.0
Zinc	ug/L	40	<10	<10
Major Anions				
Alkalinity, Bicarbonate	mg/L	44	**97**	**100**
Alkalinity, Carbonate	mg/L	8.0	<2.0 e	<2.0
Chloride	mg/L	20	**8.4**	**5.6**
Fluoride	mg/L	0.40	<0.10	<0.10
Nitrogen, Nitrate	mg/L	0.60	**2.0** e	**1.6**
Sulfate	mg/L	8.0	**7.9**	**9.4**
Major Cations				
Calcium	mg/L	9.2	**32**	**34** e
Magnesium	mg/L	2.5	**7.0**	**7.5**
Potassium	mg/L	2.0	**1.3**	**1.3**
Sodium	mg/L	2.0	**1.8**	**2.8**
General				
Hardness	mg/L	33	**109**	**116**

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]	
Field						
D.O.[1]	ppm	--	**11**		**10**	
ORP	mV	--	**167**		**55**	
pH	SU	8.3-9.3	**8.6**		**8.5**	
Specific Conductance	µS/cm @ 25°C	--	**188**		**440**	
Temperature	°C	--	**9.0**		**9.0**	
Turbidity	NTU	--	<1		<1	
Water Elevation	ft MSL	--	**1370.25**		**1369.67**	
Metals						
Aluminum	ug/L	200	<50		<50	
Antimony	ug/L	5.5	<5.0		<5.0	
Arsenic	ug/L	6.0	<2.0		<2.0	
Barium	ug/L	80	<20		24	
Beryllium	ug/L	2.5	<1.0		<1.0	
Boron	ug/L	400	<100		<100	
Cadmium	ug/L	2.0	<0.50		<0.50	
Chromium	ug/L	20	<5.0		<5.0	
Cobalt	ug/L	40	<10		<10	
Copper	ug/L	20	<5.0		<5.0	
Iron	ug/L	80	<20		75	
Lead	ug/L	4.0	<1.0		<1.0	
Lithium	ug/L	32	<8.0		<8.0	
Manganese	ug/L	80	<20		<20	
Mercury	ng/L	2.00	**0.680**	e,s	**0.535**	
Molybdenum	ug/L	40	<10		<10	
Nickel	ug/L	100	<25		<25	
Selenium	ug/L	4.0	<1.0		<1.0	e
Silver	ug/L	0.80	<0.20		<0.20	
Strontium	ug/L	200	**59**		**77**	
Thallium	ug/L	2.0	<2.0		<2.0	
Vanadium	ug/L	4.0	<2.0		<1.0	
Zinc	ug/L	40	<10		<10	
Major Anions						
Alkalinity, Bicarbonate	mg/L	42	**40**		**45**	
Alkalinity, Carbonate	mg/L	8.0	<2.0	e	<2.0	
Chloride	mg/L	4.0	**58**		**120**	
Fluoride	mg/L	0.40	<0.10		<0.10	
Nitrogen, Nitrate	mg/L	0.22	**0.98**	e	**1.0**	
Sulfate	mg/L	8.0	**3.5**		**4.3**	
Major Cations						
Calcium	mg/L	11	**31**		**51**	e
Magnesium	mg/L	3.0	**6.4**		**9.7**	
Potassium	mg/L	2.0	**1.2**		**1.8**	
Sodium	mg/L	2.0	**5.5**		**19**	
General						
Hardness	mg/L	40	**104**		**167**	

Groundwater Quality Data
Mine Permit Monitoring
Explanation of Abbreviations and Data Qualifiers
Eagle Project

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.
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 there are 2 consecutive sampling events with a value equal to or greater than the benchmark at a compliance monitoring location.

Appendix G

Eagle Mine

Groundwater Monitoring

Trend Analysis Summary & Trending Charts

Mine Permit Groundwater Trend Analysis
All Monitoring Locations
March 2011 to November 2016
Eagle Mine

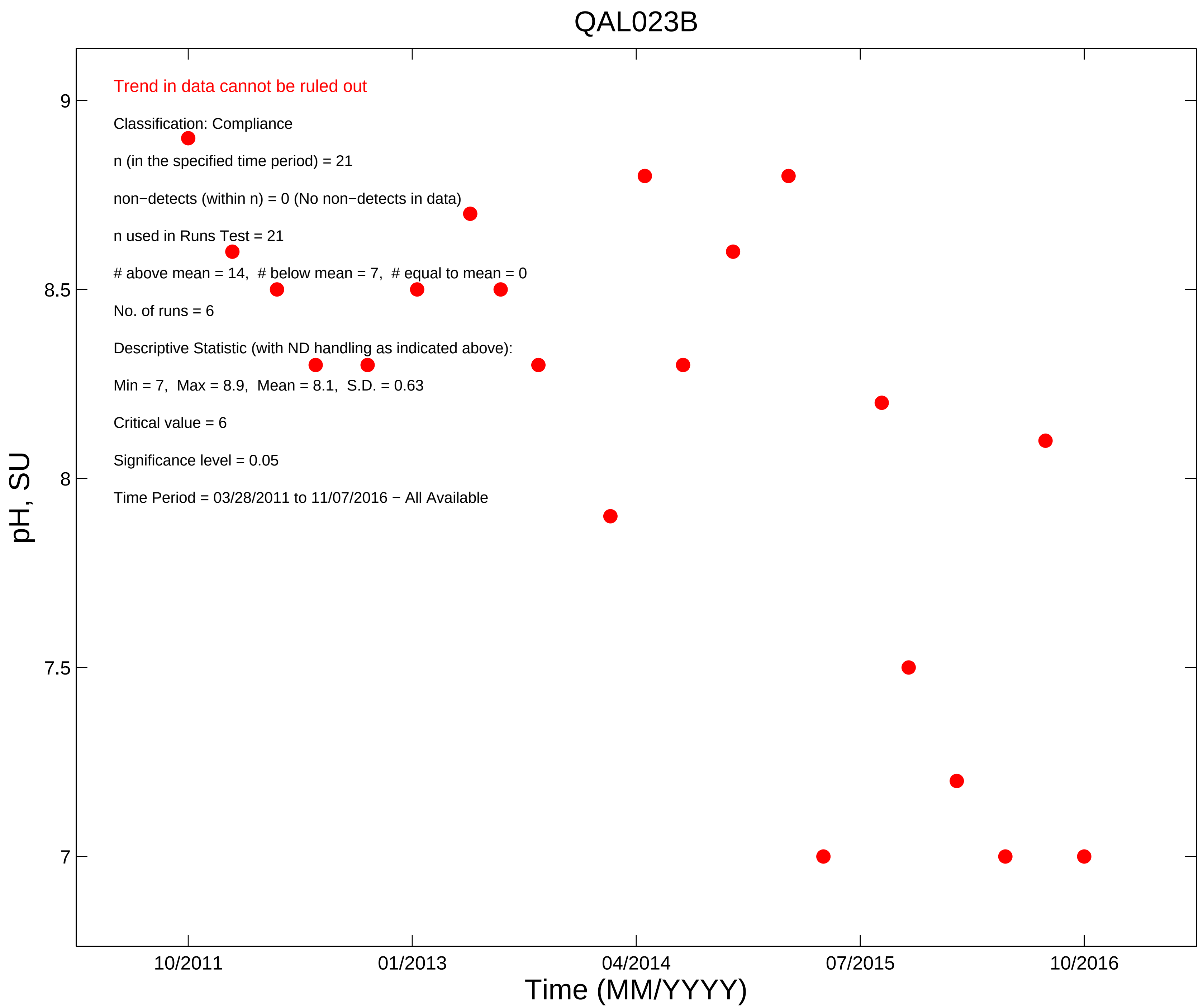
Location	Classi- fication	Parameter	Unit	# Samples	# NDs	Non-detects handling	# used in Runs Test	Min	Max	Mean	St. Dev.	# Above Mean	# Below Mean	# Equal Mean	# Runs	Criti- cal value	Sig level	Trend?	Remarks
QAL023B	Compliance	Iron	ug/L	21	1	Included as RL	21	20	150	85	34.40	9	12	0	7	7	0.05	Y	
QAL023B	Compliance	pH	SU	21	0	No NDs	21	7.0	8.9	8.1	0.63	14	7	0	6	6	0.05	Y	
QAL023B	Compliance	Sodium	mg/L	21	0	No NDs	21	6.7	11	8.9	1.39	11	10	0	5	7	0.05	Y	
QAL023B	Compliance	Specific Conductance	µS/cm @ 25°C	21	0	No NDs	21	107	245	136	36.40	5	16	0	4	5	0.05	Y	
QAL023B	Compliance	Sulfate	mg/L	21	0	No NDs	21	2.2	5.8	4.7	0.92	13	8	0	6	6	0.05	Y	Non-unique RL in data
QAL024A	Compliance	Alkalinity, Bicarbonate	mg/L	21	0	No NDs	21	19	47	29	8.40	10	11	0	4	7	0.05	Y	
QAL024A	Compliance	Nitrogen, Nitrate	mg/L	21	3	Included as RL	21	0.050	2.8	0.74	0.75	8	13	0	4	6	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL024A	Compliance	Specific Conductance	µS/cm @ 25°C	21	0	No NDs	21	33	1127	337	251.10	11	10	0	6	7	0.05	Y	
QAL025A	Background	Alkalinity, Bicarbonate	mg/L	23	0	No NDs	23	16	35	26	4.40	13	10	0	8	8	0.05	Y	
QAL025A	Background	Sodium	mg/L	23	0	No NDs	23	0.62	1.1	0.87	0.16	14	9	0	4	7	0.05	Y	
QAL025B	Background	Iron	ug/L	23	16	Included as RL	23	20	53	23	8.30	5	18	0	5	5	0.05	Y	
QAL025B	Background	Nitrogen, Nitrate	mg/L	23	0	No NDs	23	0.10	0.34	0.15	0.05	9	14	0	7	7	0.05	Y	
QAL025B	Background	Sodium	mg/L	23	0	No NDs	23	1.7	5.6	2.6	0.86	12	11	0	6	8	0.05	Y	
QAL025B	Background	Specific Conductance	µS/cm @ 25°C	23	0	No NDs	23	51	136	73	17.50	8	15	0	6	7	0.05	Y	
QAL025B	Background	Sulfate	mg/L	23	2	Included as RL	23	2.0	3.4	2.4	0.34	10	13	0	6	8	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL025B	Background	Vanadium	ug/L	11	6	Included as RL	11	1.0	10	4.4	4.46	4	7	0	2	3	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL025D	Background	Alkalinity, Bicarbonate	mg/L	23	0	No NDs	23	39	59	45	4.50	11	12	0	8	8	0.05	Y	
QAL025D	Background	Alkalinity, Carbonate	mg/L	23	4	Included as RL	23	2.0	16	4.8	3.54	9	14	0	5	7	0.05	Y	
QAL025D	Background	Sodium	mg/L	23	0	No NDs	23	3.8	15	5.8	2.80	5	18	0	2	5	0.05	Y	
QAL025D	Background	Vanadium	ug/L	11	4	Included as RL	11	3.7	10	6.1	3.07	4	7	0	2	3	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL026A	Background	Chloride	mg/L	17	2	Included as RL	17	1.0	4.2	1.9	0.94	6	11	0	3	5	0.05	Y	
QAL026A	Background	Nitrogen, Nitrate	mg/L	17	0	No NDs	17	0.49	3.2	1.27	0.64	9	8	0	3	5	0.05	Y	Non-unique RL in data
QAL026A	Background	Sodium	mg/L	17	0	No NDs	17	0.92	2.4	1.5	0.40	7	10	0	5	5	0.05	Y	
QAL026E	Background	Strontium	ug/L	5	0	No NDs	5	56	61	58	2.30	2	3	0	2	2	0.25	Y	
QAL044B	Compliance	Alkalinity, Carbonate	mg/L	21	10	Included as RL	21	2.0	16	4.9	4.21	7	14	0	6	6	0.05	Y	
QAL044B	Compliance	Arsenic	ug/L	21	19	Included as RL	21	2.0	2.6	2.0	0.13	2	19	0	2	2	0.05	Y	
QAL044B	Compliance	Chloride	mg/L	21	2	Included as RL	21	1.0	3.2	1.6	0.64	6	15	0	5	6	0.05	Y	
QAL044B	Compliance	pH	SU	21	0	No NDs	21	8.1	9.9	8.9	0.39	11	10	0	7	7	0.05	Y	
QAL044B	Compliance	Sodium	mg/L	21	0	No NDs	21	2.1	5.9	3.0	0.96	6	15	0	3	6	0.05	Y	
QAL044B	Compliance	Sulfate	mg/L	21	0	No NDs	21	7.1	34	11	6.12	6	15	0	5	6	0.05	Y	Non-unique RL in data
QAL060A	Compliance	Alkalinity, Bicarbonate	mg/L	23	0	No NDs	23	34	56	44	8.40	9	14	0	2	7	0.05	Y	
QAL060A	Compliance	Arsenic	ug/L	23	0	No NDs	23	3.6	5.9	4.6	0.51	13	10	0	6	8	0.05	Y	
QAL060A	Compliance	Calcium	mg/L	7	0	No NDs	7	10	15	13	2.30	4	3	0	2	2	0.10	Y	
QAL060A	Compliance	Magnesium	mg/L	7	0	No NDs	7	2.4	3.7	3.0	0.54	4	3	0	2	2	0.10	Y	
QAL060A	Compliance	Nitrogen, Nitrate	mg/L	23	0	No NDs	23	0.063	0.48	0.16	0.08	10	13	0	6	8	0.05	Y	
QAL060A	Compliance	Potassium	mg/L	7	0	No NDs	7	0.69	1.1	0.95	0.17	4	3	0	2	2	0.10	Y	
QAL060A	Compliance	Sodium	mg/L	23	0	No NDs	23	0.75	2.2	1.4	0.52	12	11	0	2	8	0.05	Y	
QAL060A	Compliance	Specific Conductance	µS/cm @ 25°C	23	0	No NDs	23	68	176	94	25.70	10	13	0	2	8	0.05	Y	
QAL060A	Compliance	Strontium	ug/L	7	5	Included as RL	7	50	54	51	1.60	2	5	0	2	2	0.10	Y	
QAL060A	Compliance	Sulfate	mg/L	23	3	Included as RL	23	2.0	4.1	2.8	0.79	9	14	0	2	7	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL060A	Compliance	Vanadium	ug/L	12	6	Included as RL	12	1.2	10	5.0	4.45	5	7	0	2	3	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL061A	Compliance	Alkalinity, Bicarbonate	mg/L	23	0	No NDs	23	28	40	35	2.80	13	10	0	7	8	0.05	Y	
QAL061A	Compliance	Nitrogen, Nitrate	mg/L	23	0	No NDs	23	0.10	0.31	0.20	0.08	11	12	0	4	8	0.05	Y	
QAL061A	Compliance	pH	SU	23	0	No NDs	23	8.2	9.1	8.7	0.27	14	9	0	6	7	0.05	Y	
QAL062A	Compliance	Alkalinity, Bicarbonate	mg/L	23	0	No NDs	23	29	120	61	31.70	8	15	0	2	7	0.05	Y	
QAL062A	Compliance	Calcium	mg/L	7	0	No NDs	7	11	45	19	13.00	2	5	0	2	2	0.10	Y	
QAL062A	Compliance	Chloride	mg/L	23	4	Included as RL	23	1.0	46	12	16.90	7	16	0	2	6	0.05	Y	
QAL062A	Compliance	Magnesium	mg/L	7	0	No NDs	7	2.0	9.1	3.7	2.66	2	5	0	2	2	0.10	Y	
QAL062A	Compliance	Nitrogen, Nitrate	mg/L	23	0	No NDs	23	0.21	0.46	0.32	0.07	10	13	0	8	8	0.05	Y	
QAL062A	Compliance	pH	SU	23	0	No NDs	23	7.9	9.4	8.5	0.32	11	12	0	6	8	0.05	Y	
QAL062A	Compliance	Potassium	mg/L	7	0	No NDs	7	0.70	1.6	0.96	0.33	2	5	0	2	2	0.10	Y	
QAL062A	Compliance	Sodium	mg/L	23	0	No NDs	23	0.53	13	2.4	3.62	4	19	0	2	4	0.05	Y	
QAL062A	Compliance	Specific Conductance	µS/cm @ 25°C	23	0	No NDs	23	54	356	148	102.00	8	15	0	2	7	0.05	Y	
QAL063A	Compliance	Alkalinity, Bicarbonate	mg/L	23	0	No NDs	23	33	110	51	23.80	7	16	0	2	6	0.05	Y	
QAL063A	Compliance	Calcium	mg/L	7	0	No NDs	7	11	32	15	7.70	2	5	0	2	2	0.10	Y	
QAL063A	Compliance	Chloride	mg/L	23	11	Included as RL	23	1.0	24	3.2	5.42	4	19	0	2	4	0.05	Y	
QAL063A	Compliance	Magnesium	mg/L	7	0	No NDs	7	1.9	5.6	2.6	1.40	2	5	0	2	2	0.10	Y	
QAL063A	Compliance	Nitrogen, Nitrate	mg/L	23	0	No NDs	23	0.14	0.54	0.25	0.09	6	17	0	4	6	0.05	Y	
QAL063A	Compliance	pH	SU	23	0	No NDs	23	7.9	8.8	8.5	0.25	16	7	0	6	6	0.05	Y	
QAL063A	Compliance	Sodium	mg/L	23	1	Included as RL	23	0.50	1.4	0.79	0.22	8	15	0	6	7	0.05	Y	
QAL063A	Compliance	Specific Conductance	µS/cm @ 25°C	23	0	No NDs	23	55	283	110	56.10	7	16	0	4	6	0.05	Y	
QAL064D	Compliance	Alkalinity, Bicarbonate	mg/L	23	0	No NDs	23	65	89	72	5.90	11	12	0	2	8	0.05	Y	
QAL064D	Compliance	Calcium	mg/L	6	0	No NDs	6	15	20	18	2.30	4	2	0	2	2	0.25	Y	

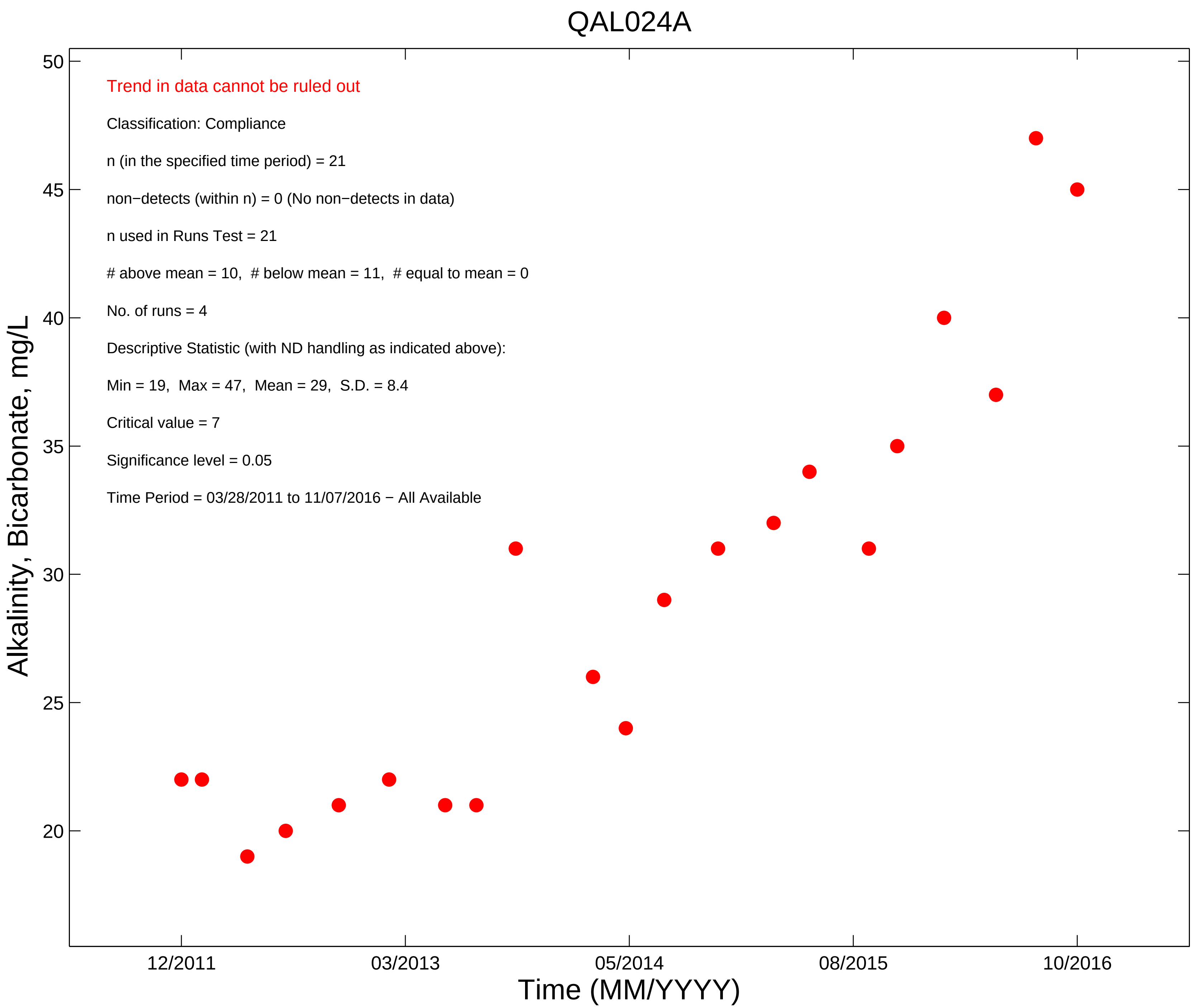
Mine Permit Groundwater Trend Analysis
All Monitoring Locations
March 2011 to November 2016
Eagle Mine

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
QAL064D	Compliance	Chloride	mg/L	23	0	No NDs	23	2.1	4.5	2.8	0.60	8	15	0	6	7	0.05	Y	
QAL064D	Compliance	Fluoride	mg/L	6	4	Included as RL	6	0.10	0.19	0.12	0.04	2	4	0	2	2	0.25	Y	
QAL064D	Compliance	Magnesium	mg/L	6	0	No NDs	6	3.1	4.2	3.8	0.49	4	2	0	2	2	0.25	Y	
QAL064D	Compliance	Sodium	mg/L	23	0	No NDs	23	4.1	6.9	5.0	0.84	11	12	0	4	8	0.05	Y	
QAL064D	Compliance	Sulfate	mg/L	23	22	Included as RL	23	1.0	2.6	1.9	0.32	21	2	0	2	2	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL065D	Compliance	Strontium	ug/L	6	0	No NDs	6	150	220	193	27.30	4	2	0	2	2	0.25	Y	Non-unique RL in data
QAL066D	Compliance	Alkalinity, Bicarbonate	mg/L	23	5	Included as RL	23	2	60	34	20.00	15	8	0	7	7	0.05	Y	
QAL066D	Compliance	Alkalinity, Carbonate	mg/L	23	1	Included as RL	23	2.0	57	18	14.80	8	15	0	6	7	0.05	Y	
QAL066D	Compliance	Arsenic	ug/L	23	0	No NDs	23	5.6	12	8.2	1.89	12	11	0	4	8	0.05	Y	
QAL066D	Compliance	Chloride	mg/L	23	7	Included as RL	23	1.0	2.5	1.3	0.40	6	17	0	6	6	0.05	Y	
QAL066D	Compliance	Fluoride	mg/L	6	4	Included as RL	6	0.10	0.13	0.11	0.01	2	4	0	2	2	0.25	Y	
QAL066D	Compliance	Mercury	ng/L	23	5	Included as RL	23	0.500	12.0	2.25	3.17	6	17	0	6	6	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL066D	Compliance	pH	SU	23	0	No NDs	23	8.5	12	9.6	1.08	8	15	0	7	7	0.05	Y	
QAL066D	Compliance	Sodium	mg/L	23	0	No NDs	23	4.9	21	8.1	4.53	5	18	0	2	5	0.05	Y	
QAL066D	Compliance	Specific Conductance	µS/cm @ 25°C	23	0	No NDs	23	74	697	194	174.00	5	18	0	5	5	0.05	Y	
QAL066D	Compliance	Sulfate	mg/L	23	0	No NDs	23	6.5	23	10	4.07	7	16	0	4	6	0.05	Y	Non-unique RL in data
QAL066D	Compliance	Vanadium	ug/L	11	6	Included as RL	11	1.0	18	5.4	5.72	4	7	0	2	3	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL067A	Compliance	Alkalinity, Bicarbonate	mg/L	24	0	No NDs	24	9	58	27	16.30	8	16	0	4	7	0.05	Y	
QAL067A	Compliance	Barium	ug/L	7	4	Included as RL	7	20	460	112	171.00	2	5	0	2	2	0.10	Y	Non-unique RL in data (NDs included as RL)
QAL067A	Compliance	Calcium	mg/L	8	0	No NDs	8	4.1	110	29	37.41	3	5	0	2	2	0.05	Y	
QAL067A	Compliance	Chloride	mg/L	26	2	Included as RL	26	1.0	1600	440	527.68	12	14	0	4	9	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL067A	Compliance	Copper	ug/L	24	21	Included as RL	24	5.0	63	8.5	12.00	3	21	0	3	3	0.05	Y	
QAL067A	Compliance	Magnesium	mg/L	8	0	No NDs	8	0.60	53	14	19.87	3	5	0	2	2	0.05	Y	
QAL067A	Compliance	Mercury	ng/L	24	12	Included as RL	24	0.500	4.03	1.50	1.21	10	14	0	2	8	0.05	Y	
QAL067A	Compliance	Nitrogen, Nitrate	mg/L	26	0	No NDs	26	0.067	2.4	0.89	0.81	10	16	0	2	8	0.05	Y	Non-unique RL in data
QAL067A	Compliance	Potassium	mg/L	8	0	No NDs	8	0.75	9.2	3.3	3.28	3	5	0	2	2	0.05	Y	
QAL067A	Compliance	Sodium	mg/L	26	0	No NDs	26	0.57	740	221	273.86	10	16	0	2	8	0.05	Y	Non-unique RL in data
QAL067A	Compliance	Specific Conductance	µS/cm @ 25°C	26	0	No NDs	26	27	4888	1382	1565.00	12	14	0	4	9	0.05	Y	
QAL067A	Compliance	Strontium	ug/L	7	5	Included as RL	7	50	300	104	99.00	2	5	0	2	2	0.10	Y	
QAL067A	Compliance	Sulfate	mg/L	26	5	Included as RL	26	2.0	19	7.3	6.10	11	15	0	4	9	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL067A	Compliance	Vanadium	ug/L	12	11	Included as RL	12	1.0	10	4.8	4.56	5	7	0	2	3	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL068B	Background	Nitrogen, Nitrate	mg/L	23	2	Included as RL	23	0.050	0.26	0.095	0.04	12	11	0	8	8	0.05	Y	
QAL068B	Background	Specific Conductance	µS/cm @ 25°C	23	0	No NDs	23	41	131	63	17.10	7	16	0	6	6	0.05	Y	
QAL068B	Background	Vanadium	ug/L	11	6	Included as RL	11	1.0	10	4.4	4.45	4	7	0	2	3	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL068D	Background	Arsenic	ug/L	23	0	No NDs	23	3.5	5.6	4.5	0.44	10	13	0	7	8	0.05	Y	
QAL068D	Background	Magnesium	mg/L	6	0	No NDs	6	3.3	3.9	3.6	0.22	2	3	1	2	2	0.25	Y	
QAL068D	Background	Mercury	ng/L	23	18	Included as RL	23	0.500	1.72	0.623	0.33	4	19	0	4	4	0.05	Y	
QAL068D	Background	Sulfate	mg/L	23	0	No NDs	23	5.0	12	6.3	1.58	6	17	0	2	6	0.05	Y	Non-unique RL in data
QAL068D	Background	Vanadium	ug/L	11	4	Included as RL	11	1.6	10	5.3	3.73	4	7	0	2	3	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL069A	Background	Alkalinity, Bicarbonate	mg/L	23	0	No NDs	23	49	260	178	68.00	16	7	0	2	6	0.05	Y	
QAL069A	Background	Calcium	mg/L	6	0	No NDs	6	9.5	55	40	18.80	4	2	0	2	2	0.25	Y	Non-unique RL in data
QAL069A	Background	Chloride	mg/L	23	2	Included as RL	23	1.0	76	19	21.80	8	15	0	4	7	0.05	Y	
QAL069A	Background	Magnesium	mg/L	6	0	No NDs	6	5.4	24	17	7.26	4	2	0	2	2	0.25	Y	
QAL069A	Background	Nitrogen, Nitrate	mg/L	23	0	No NDs	23	0.083	2.3	1.02	0.66	10	13	0	5	8	0.05	Y	Non-unique RL in data
QAL069A	Background	Potassium	mg/L	6	0	No NDs	6	0.55	1.9	1.2	0.49	4	2	0	2	2	0.25	Y	
QAL069A	Background	Sodium	mg/L	23	0	No NDs	23	0.71	28	7.0	7.54	8	15	0	4	7	0.05	Y	
QAL069A	Background	Specific Conductance	µS/cm @ 25°C	23	0	No NDs	23	99	576	373	147.00	13	10	0	6	8	0.05	Y	
QAL069A	Background	Sulfate	mg/L	23	1	Included as RL	23	2.0	8.8	5.0	1.90	12	11	0	2	8	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL070A	Compliance	Alkalinity, Bicarbonate	mg/L	7	0	No NDs	7	32	45	36	4.90	2	5	0	2	2	0.10	Y	
QAL070A	Compliance	Calcium	mg/L	6	0	No NDs	6	8.5	51	21	17.00	2	4	0	2	2	0.25	Y	
QAL070A	Compliance	Chloride	mg/L	7	0	No NDs	7	1.1	120	27	45.90	2	5	0	2	2	0.10	Y	Non-unique RL in data
QAL070A	Compliance	Magnesium	mg/L	6	0	No NDs	6	2.1	9.7	4.4	3.02	2	4	0	2	2	0.25	Y	
QAL070A	Compliance	Mercury	ng/L	7	5	Included as RL	7	0.500	0.680	0.531	0.07	2	5	0	2	2	0.10	Y	
QAL070A	Compliance	Nitrogen, Nitrate	mg/L	7	0	No NDs	7	0.055	1.0	0.41	0.41	2	5	0	2	2	0.10	Y	Non-unique RL in data
QAL070A	Compliance	Potassium	mg/L	6	0	No NDs	6	0.54	1.8	0.91	0.50	2	4	0	2	2	0.25	Y	
QAL070A	Compliance	Sodium	mg/L	7	0	No NDs	7	0.85	19	4.2	6.75	2	5	0	2	2	0.10	Y	
QAL070A	Compliance	Specific Conductance	µS/cm @ 25°C	7	0	No NDs	7	61	440	145	137.00	2	5	0	2	2	0.10	Y	
QAL070A	Compliance	Strontium	ug/L	6	4	Included as RL	6	50	77	56	11.00	2	4	0	2	2	0.25	Y	
QAL070A	Compliance	Sulfate	mg/L	7	0	No NDs	7	1.9	4.3	2.7	0.89	2	5	0	2	2	0.10	Y	Non-unique RL in data
QAL071A	Compliance	Alkalinity, Bicarbonate	mg/L	24	0	No NDs	24	30	150	88	46.20	11	13	0	2	8	0.05	Y	
QAL071A	Compliance	Barium	ug/L	7	5	Included as RL	7	20	25	21	1.90	2	5	0	2	2	0.10	Y	
QAL071A	Compliance	Calcium	mg/L	8	0	No NDs	8	11	67	35	25.00	4	4	0	2	2	0.05	Y	
QAL071A	Compliance	Chloride	mg/L	26	1	Included as RL	26	1.0	44	14	13.00	13	13	0	2	9	0.05	Y	

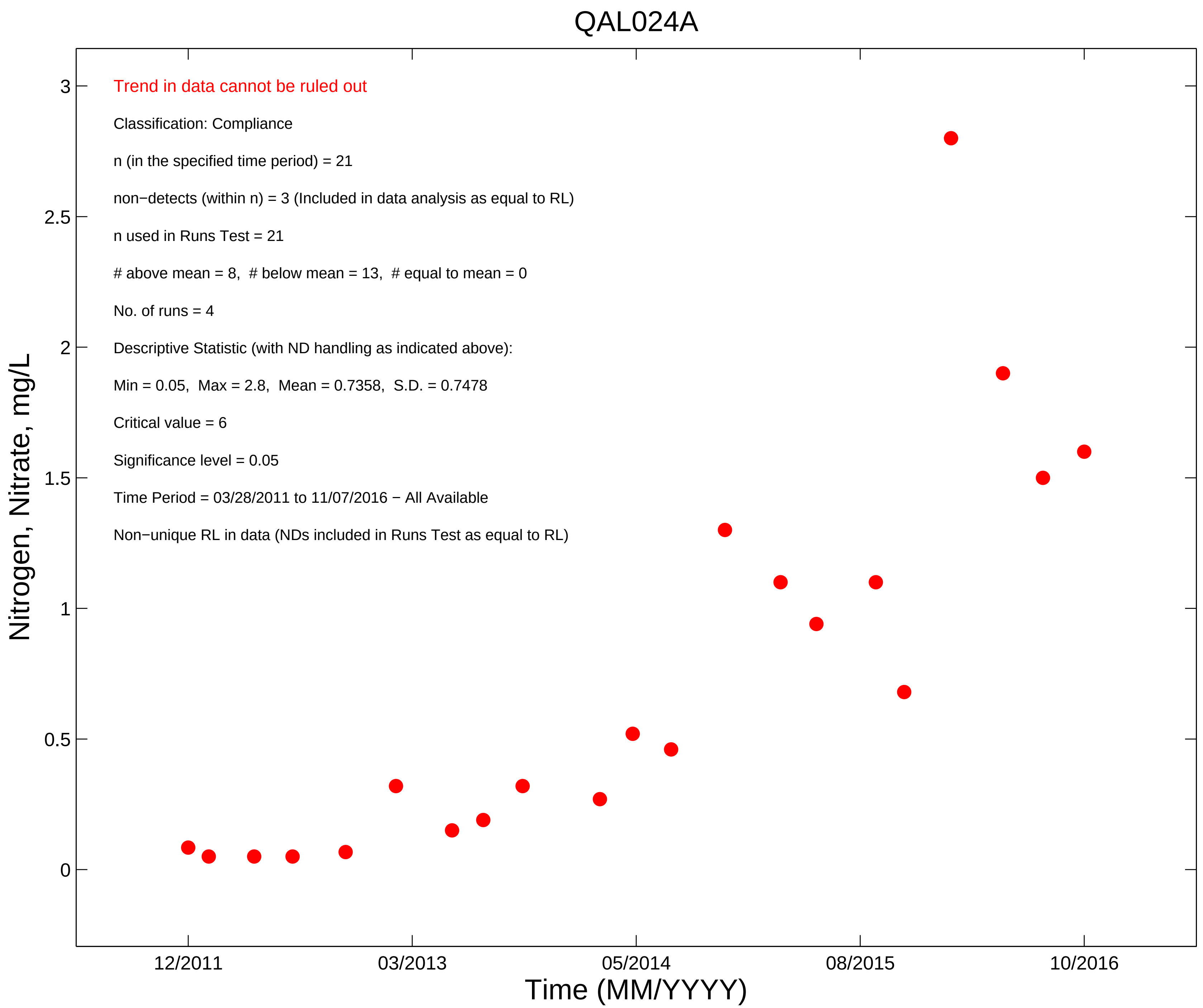
Mine Permit Groundwater Trend Analysis
All Monitoring Locations
March 2011 to November 2016
Eagle Mine

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
QAL071A	Compliance	Copper	ug/L	24	18	Included as RL	24	5.0	9.8	5.7	1.51	4	20	0	3	4	0.05	Y	
QAL071A	Compliance	Magnesium	mg/L	8	0	No NDs	8	1.4	10	4.9	3.67	3	5	0	2	2	0.05	Y	
QAL071A	Compliance	Mercury	ng/L	24	18	Included as RL	24	0.500	1.37	0.561	0.19	4	20	0	3	4	0.05	Y	
QAL071A	Compliance	Nitrogen, Nitrate	mg/L	26	0	No NDs	26	0.15	28	6.66	7.99	12	14	0	4	9	0.05	Y	Non-unique RL in data
QAL071A	Compliance	pH	SU	26	0	No NDs	26	7.3	8.8	8.2	0.44	12	14	0	8	9	0.05	Y	
QAL071A	Compliance	Potassium	mg/L	8	0	No NDs	8	0.70	1.4	0.96	0.29	3	5	0	2	2	0.05	Y	
QAL071A	Compliance	Sodium	mg/L	26	0	No NDs	26	0.87	25	5.1	6.02	10	16	0	2	8	0.05	Y	
QAL071A	Compliance	Specific Conductance	µS/cm @ 25°C	26	0	No NDs	26	53	559	263	159.00	14	12	0	6	9	0.05	Y	
QAL071A	Compliance	Strontium	ug/L	6	4	Included as RL	6	50	73	57	11.00	2	4	0	2	2	0.25	Y	
QAL071A	Compliance	Sulfate	mg/L	26	0	No NDs	26	2.0	9.3	4.9	2.53	12	14	0	2	9	0.05	Y	Non-unique RL in data
QAL073A	Compliance	Alkalinity, Bicarbonate	mg/L	7	0	No NDs	7	20	100	59	34.20	4	3	0	2	2	0.10	Y	
QAL073A	Compliance	Calcium	mg/L	6	0	No NDs	6	5.6	34	23	12.40	4	2	0	2	2	0.25	Y	
QAL073A	Compliance	Magnesium	mg/L	6	0	No NDs	6	1.1	7.5	5.0	2.80	4	2	0	2	2	0.25	Y	
QAL073A	Compliance	Mercury	ng/L	7	5	Included as RL	7	0.500	0.942	0.582	0.17	2	5	0	2	2	0.10	Y	
QAL073A	Compliance	Nitrogen, Nitrate	mg/L	7	0	No NDs	7	0.097	4.8	1.56	1.65	4	3	0	2	2	0.10	Y	Non-unique RL in data
QAL073A	Compliance	pH	SU	7	0	No NDs	7	6.6	6.9	6.7	0.12	2	3	2	2	2	0.25	Y	
QAL073A	Compliance	Potassium	mg/L	6	0	No NDs	6	0.63	1.3	1.1	0.33	4	2	0	2	2	0.25	Y	
QAL073A	Compliance	Specific Conductance	µS/cm @ 25°C	7	0	No NDs	7	50	219	136	75.10	4	3	0	2	2	0.10	Y	
QAL073A	Compliance	Sulfate	mg/L	7	0	No NDs	7	1.9	9.4	4.9	3.01	3	4	0	2	2	0.10	Y	Non-unique RL in data
QAL074A	Compliance	Alkalinity, Bicarbonate	mg/L	11	0	No NDs	11	27	51	37	8.40	4	7	0	2	3	0.05	Y	
QAL074A	Compliance	Calcium	mg/L	5	0	No NDs	5	9.1	32	19	9.85	3	2	0	2	2	0.25	Y	
QAL074A	Compliance	Chloride	mg/L	11	1	Included as RL	11	1.0	53	34	18.70	7	4	0	2	3	0.05	Y	
QAL074A	Compliance	Magnesium	mg/L	5	0	No NDs	5	1.7	6.4	3.7	2.00	3	2	0	2	2	0.25	Y	
QAL074A	Compliance	Nitrogen, Nitrate	mg/L	11	0	No NDs	11	0.39	2.4	1.32	0.66	4	7	0	3	3	0.05	Y	Non-unique RL in data
QAL074A	Compliance	Potassium	mg/L	5	0	No NDs	5	0.59	1.1	0.81	0.22	3	2	0	2	2	0.25	Y	
QAL074A	Compliance	Sodium	mg/L	11	0	No NDs	11	1.5	9.6	4.9	3.26	4	7	0	2	3	0.05	Y	
QAL074A	Compliance	Specific Conductance	µS/cm @ 25°C	11	0	No NDs	11	74	277	186	73.80	6	5	0	2	3	0.05	Y	
QAL074A	Compliance	Sulfate	mg/L	11	0	No NDs	11	3.5	7.8	5.8	1.40	6	5	0	2	3	0.05	Y	Non-unique RL in data

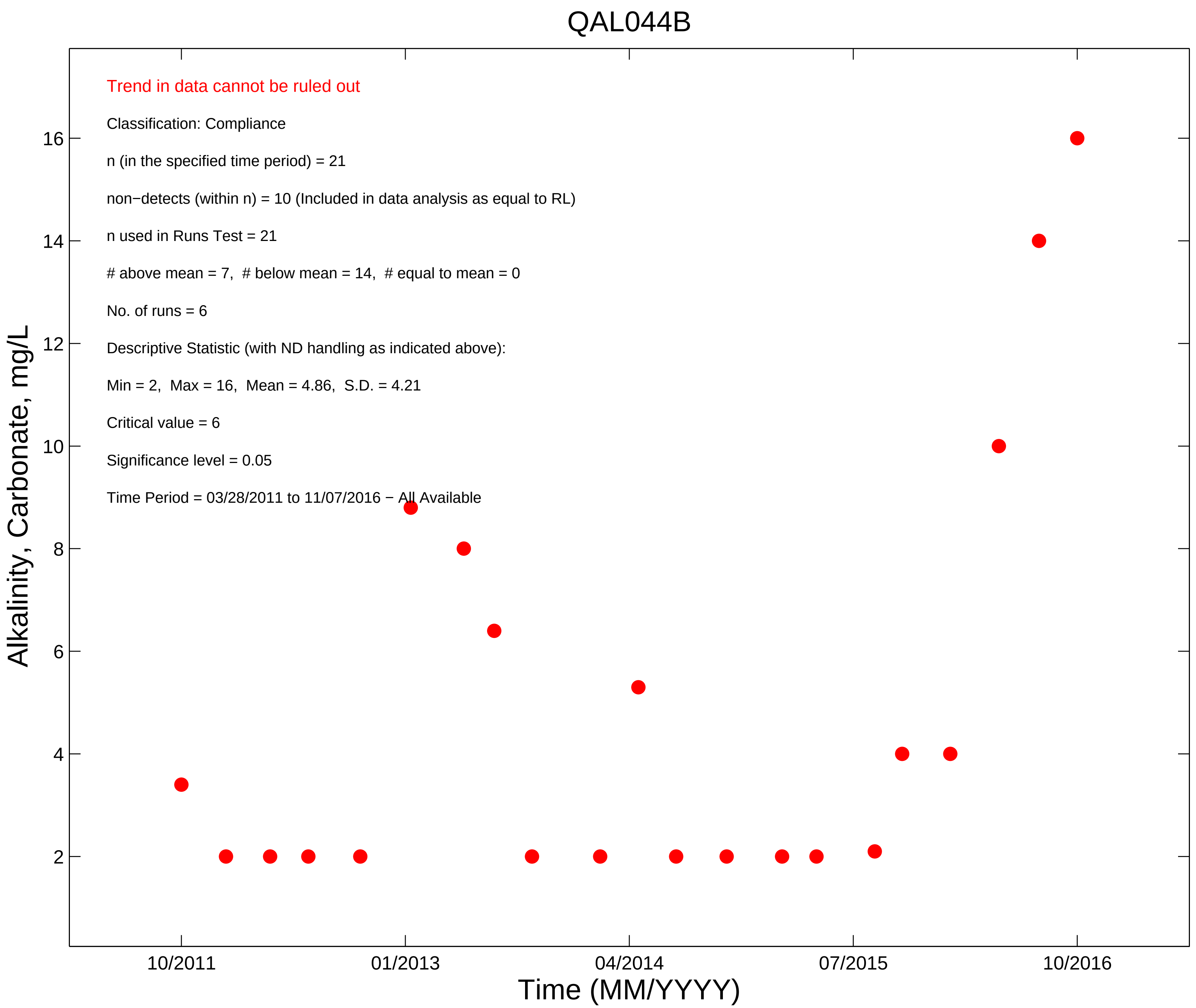

QAL023B
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 21
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 21
above mean = 14, # below mean = 7, # equal to mean = 0
No. of runs = 6
Descriptive Statistic (with ND handling as indicated above):
Min = 7, Max = 8.9, Mean = 8.1, S.D. = 0.63
Critical value = 6
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
pH, SU
9
8.5
8
7.5
7
10/2011
01/2013
04/2014
07/2015
10/2016
Time (MM/YYYY)

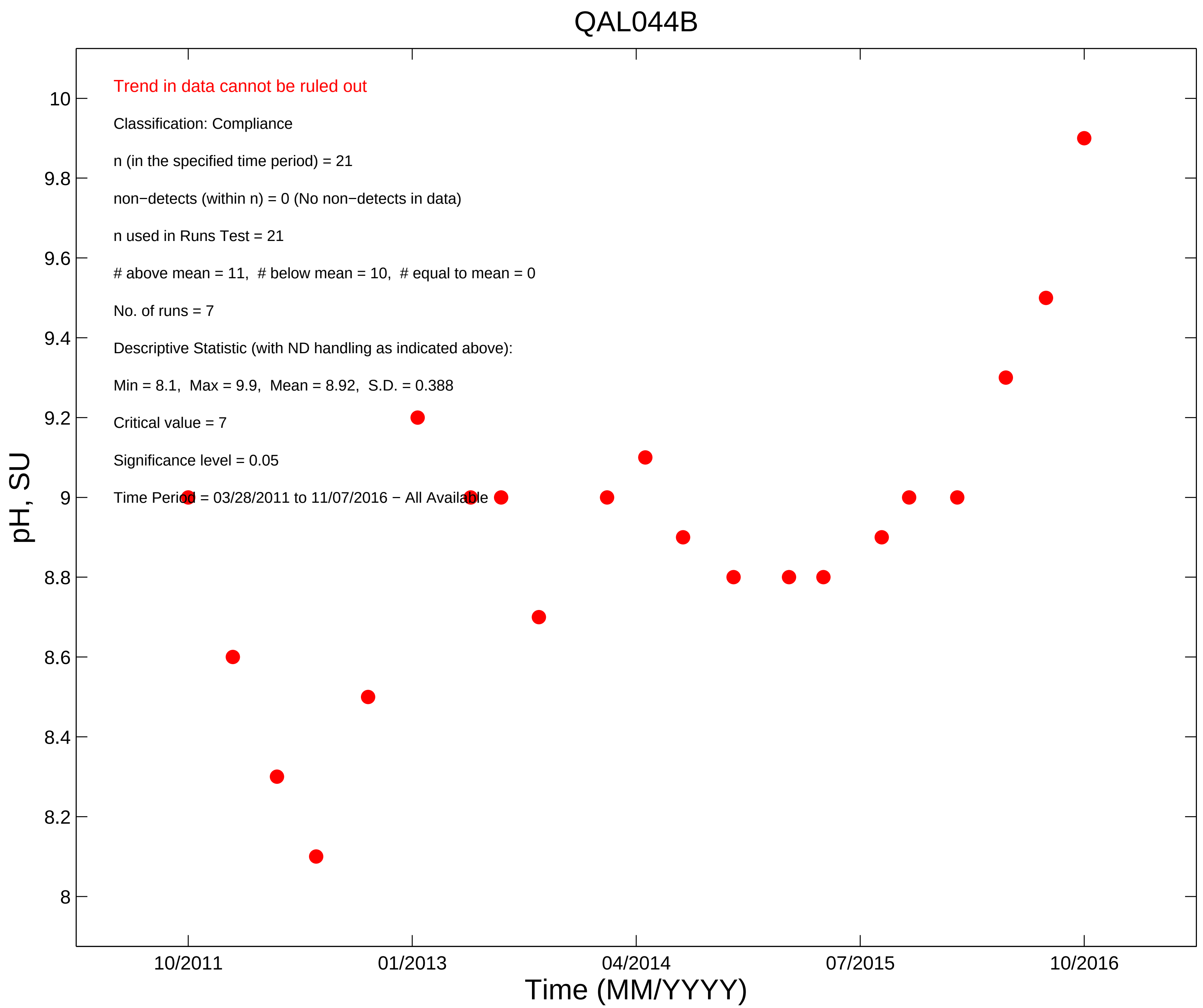


QAL024A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 21
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 21
above mean = 10, # below mean = 11, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 19, Max = 47, Mean = 29, S.D. = 8.4
Critical value = 7
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Alkalinity, Bicarbonate, mg/L
50
45
40
35
30
25
20
12/2011
03/2013
05/2014
08/2015
10/2016
Time (MM/YYYY)

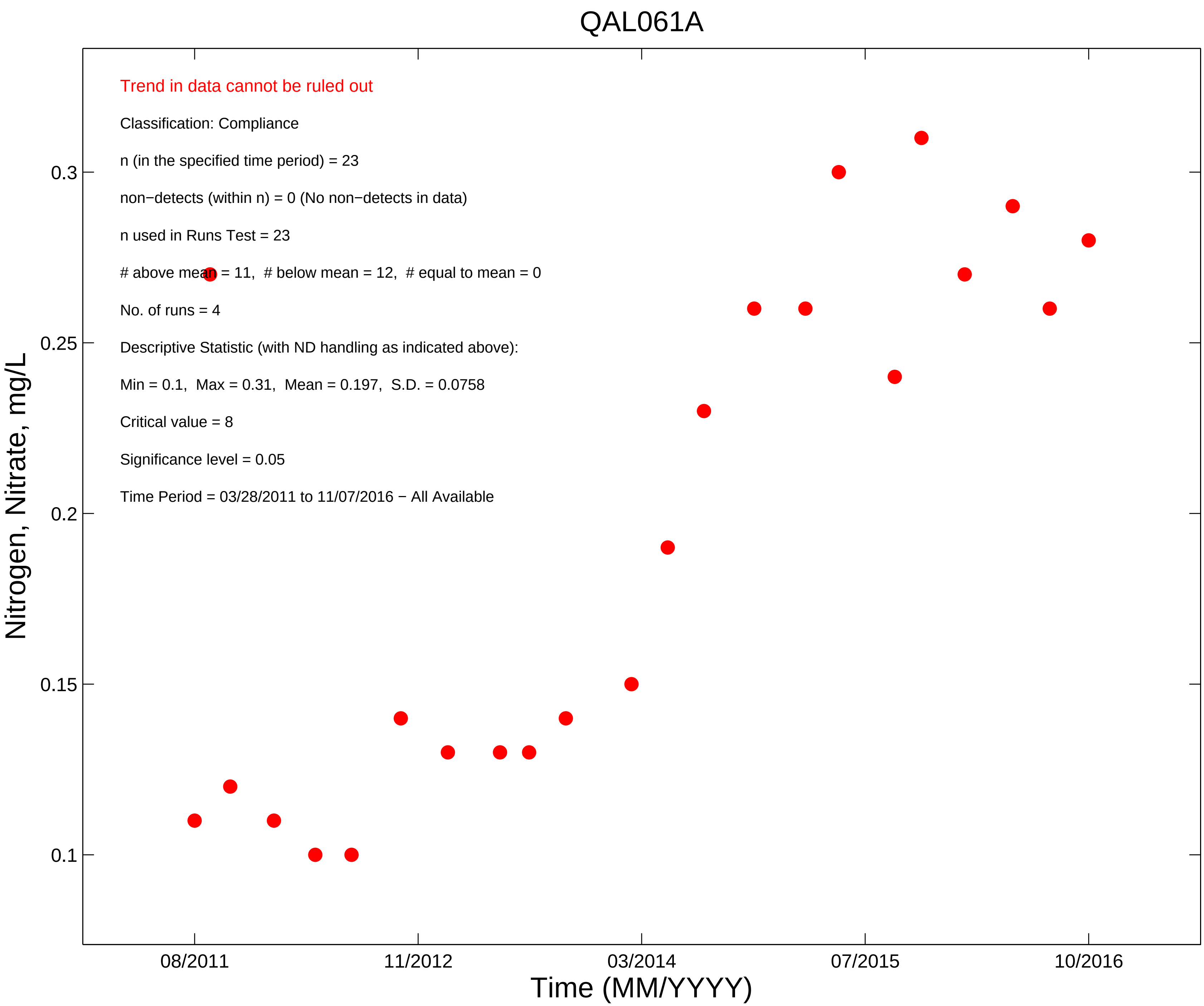


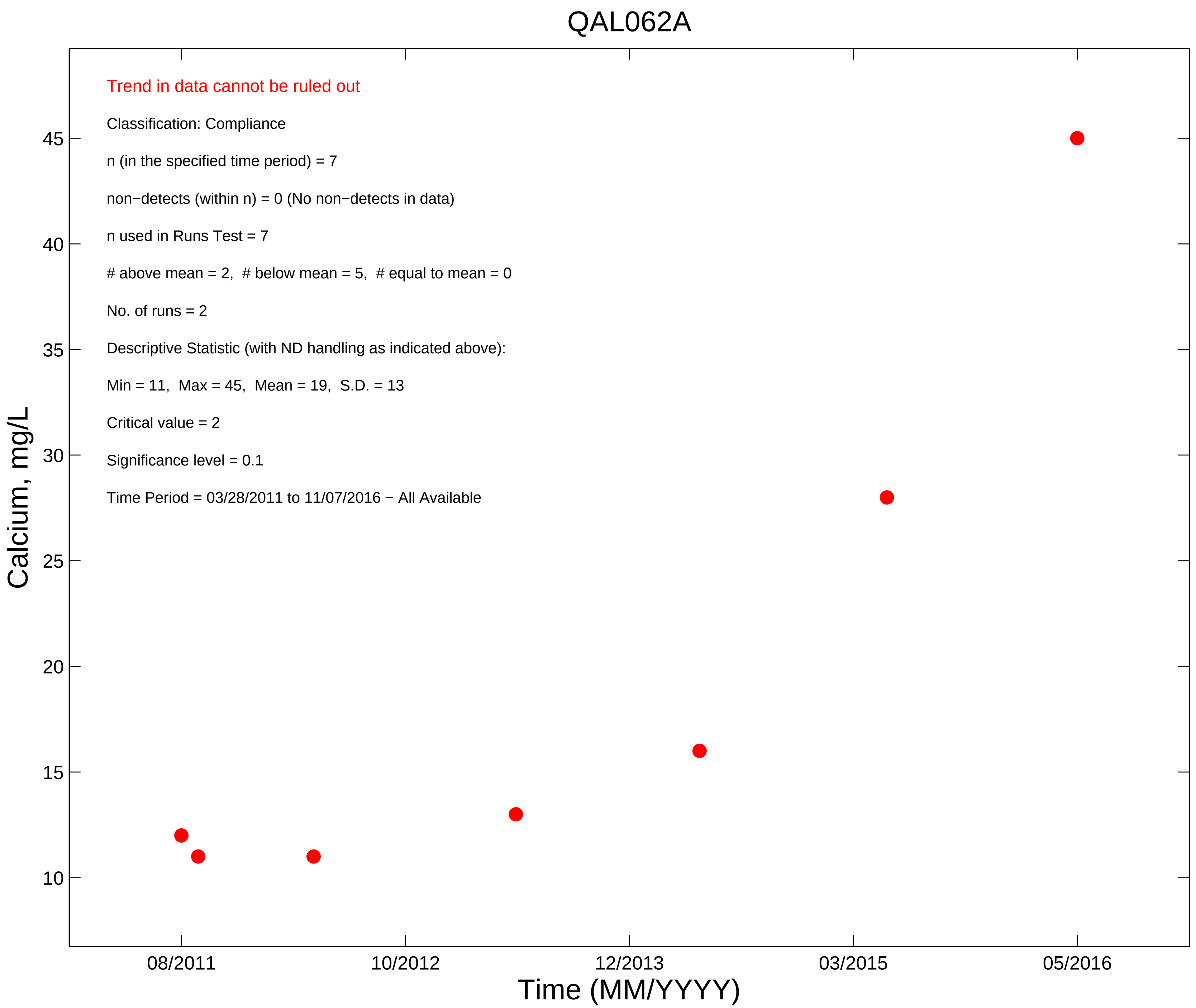
QAL024A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 21
non−detects (within n) = 3 (Included in data analysis as equal to RL)
n used in Runs Test = 21
above mean = 8, # below mean = 13, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 0.05, Max = 2.8, Mean = 0.7358, S.D. = 0.7478
Critical value = 6
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Non−unique RL in data (NDs included in Runs Test as equal to RL)
Nitrogen, Nitrate, mg/L
Time (MM/YYYY)
12/2011
03/2013
05/2014
08/2015
10/2016
0
0.5
1
1.5
2
2.5
3

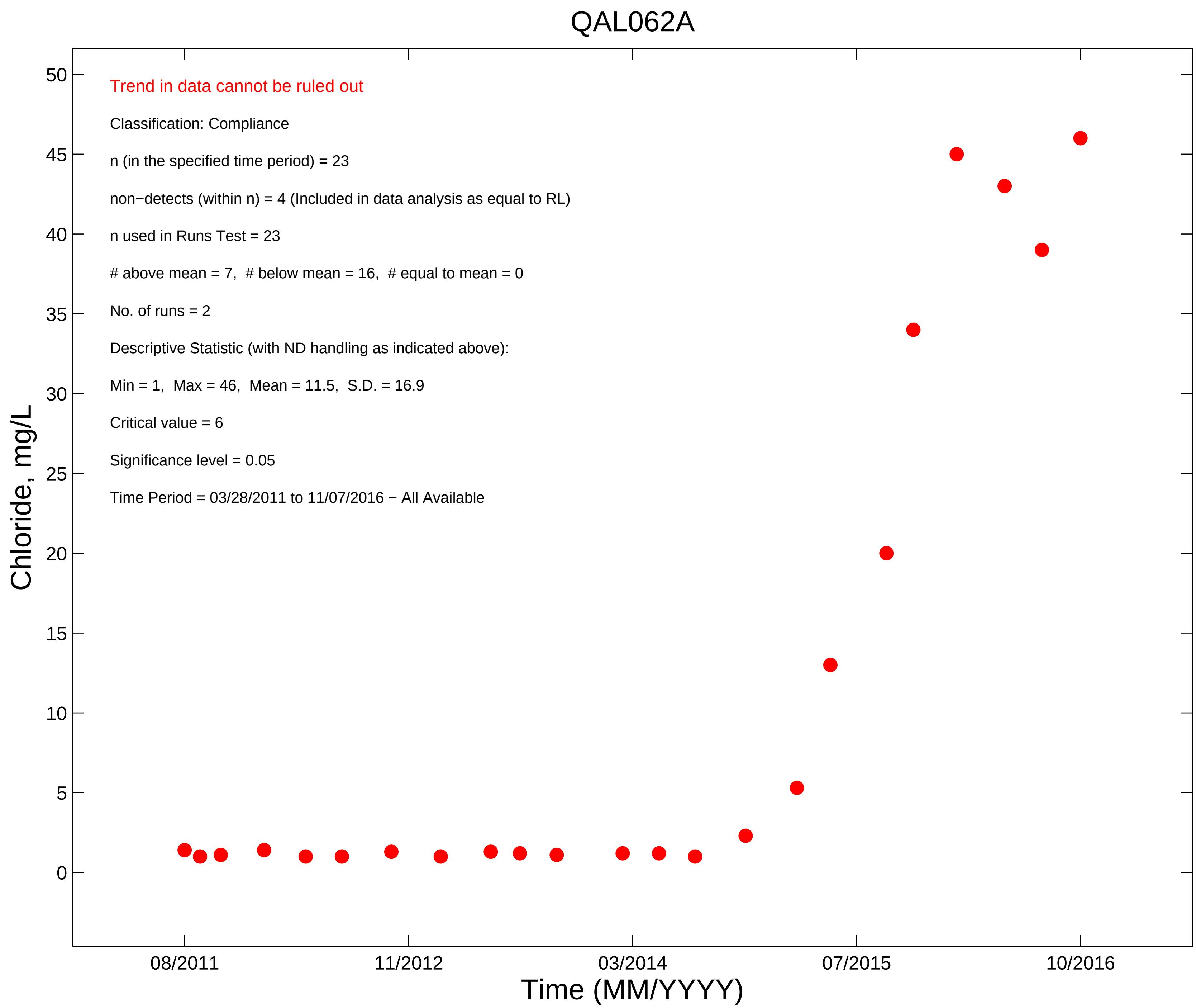

QAL044B
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 21
non−detects (within n) = 10 (Included in data analysis as equal to RL)
n used in Runs Test = 21
above mean = 7, # below mean = 14, # equal to mean = 0
No. of runs = 6
Descriptive Statistic (with ND handling as indicated above):
Min = 2, Max = 16, Mean = 4.86, S.D. = 4.21
Critical value = 6
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Alkalinity, Carbonate, mg/L
2
4
6
8
10
12
14
16
10/2011
01/2013
04/2014
07/2015
10/2016
Time (MM/YYYY)



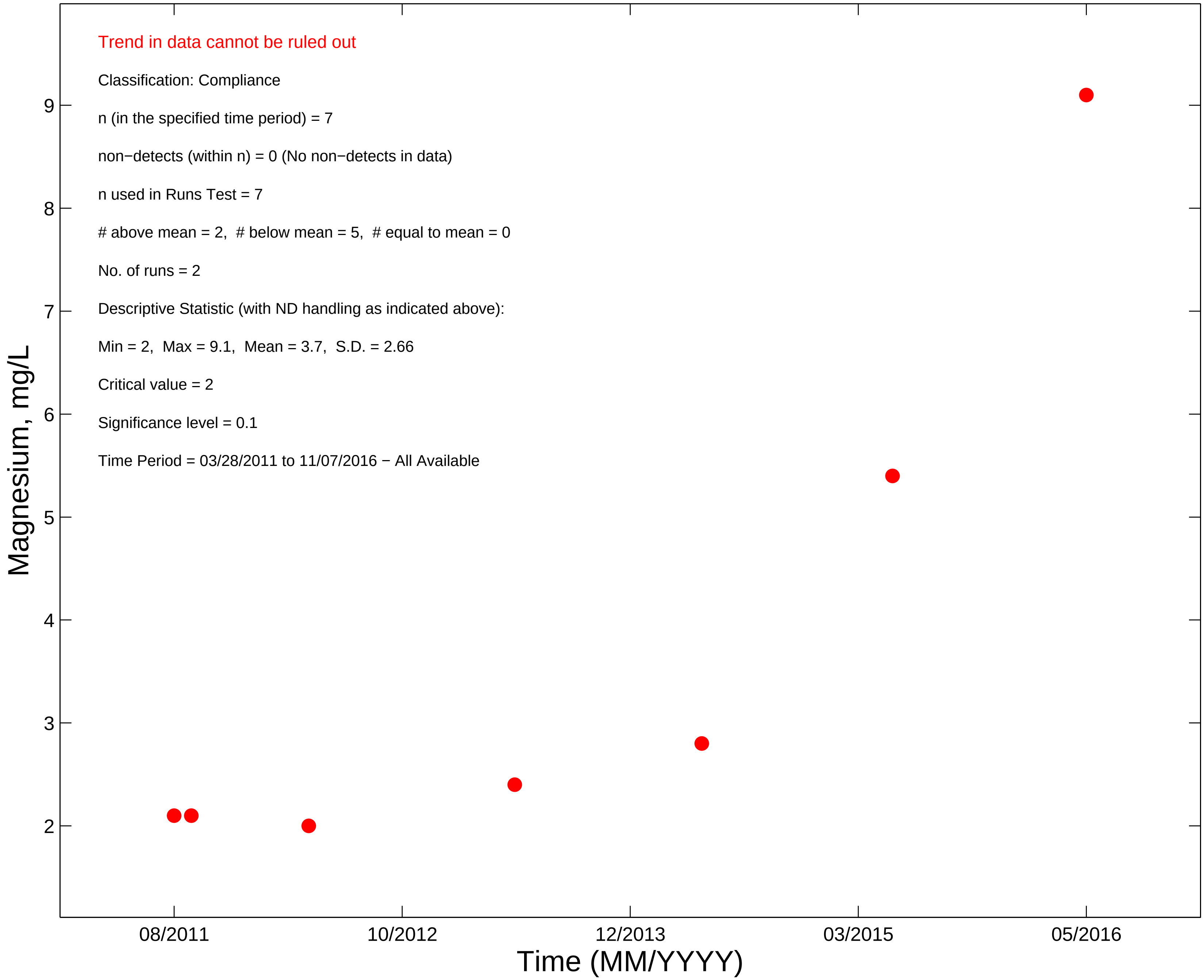
QAL044B
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 21
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 21
above mean = 11, # below mean = 10, # equal to mean = 0
No. of runs = 7
Descriptive Statistic (with ND handling as indicated above):
Min = 8.1, Max = 9.9, Mean = 8.92, S.D. = 0.388
Critical value = 7
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
pH, SU
10
9.8
9.6
9.4
9.2
9
8.8
8.6
8.4
8.2
8
10/2011
01/2013
04/2014
07/2015
10/2016
Time (MM/YYYY)


QAL061A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 23
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 23
above mean = 11, # below mean = 12, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 0.1, Max = 0.31, Mean = 0.197, S.D. = 0.0758
Critical value = 8
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Nitrogen, Nitrate, mg/L
0.3
0.25
0.2
0.15
0.1
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

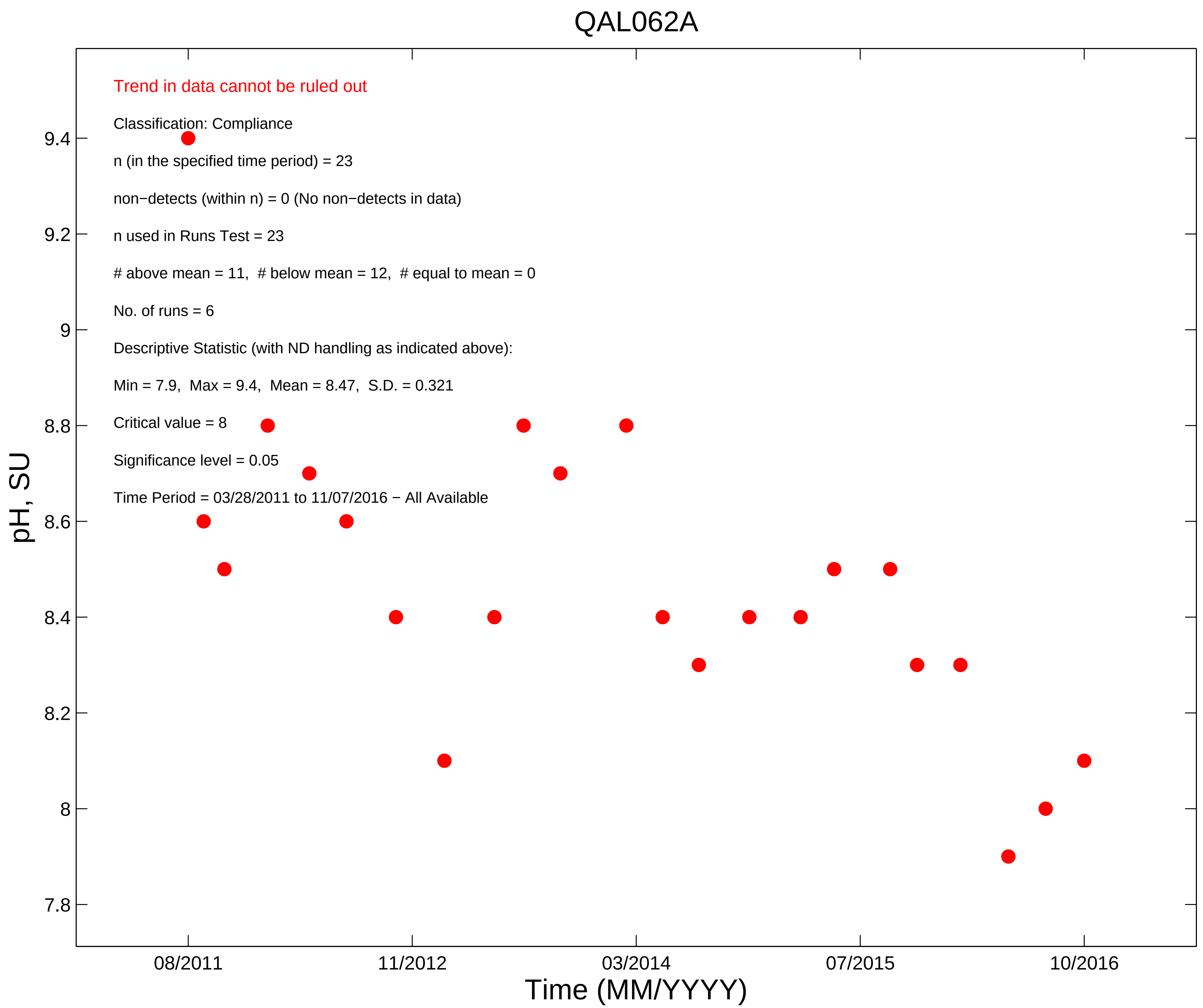

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 7
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 7
above mean = 2, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 11, Max = 45, Mean = 19, S.D. = 13
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/07/2016 − All Available
Calcium, mg/L
45
40
35
30
25
20
15
10
08/2011
10/2012
12/2013
03/2015
05/2016
Time (MM/YYYY)

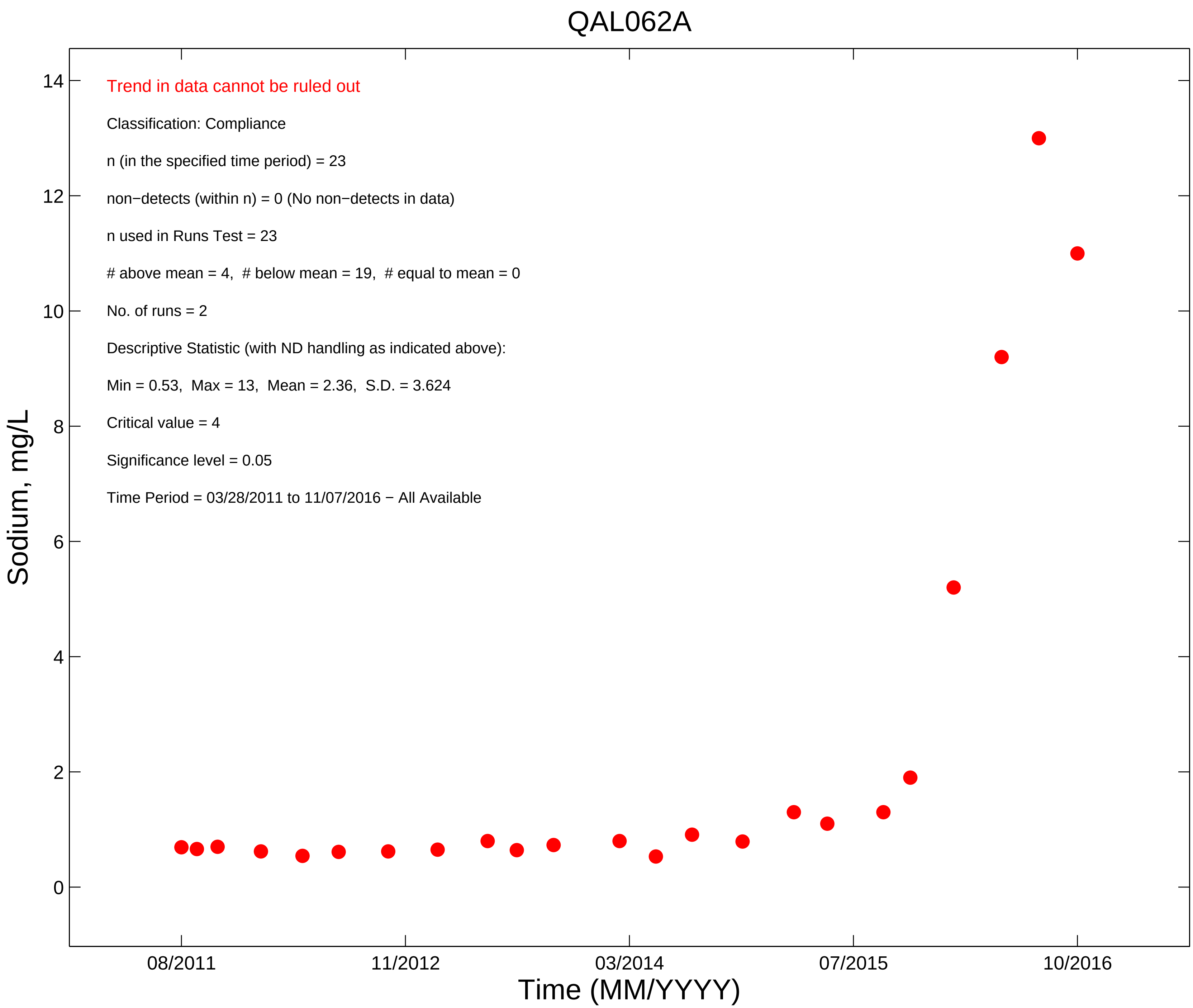

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 23
non−detects (within n) = 4 (Included in data analysis as equal to RL)
n used in Runs Test = 23
above mean = 7, # below mean = 16, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 46, Mean = 11.5, S.D. = 16.9
Critical value = 6
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Chloride, mg/L
0
5
10
15
20
25
30
35
40
45
50
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

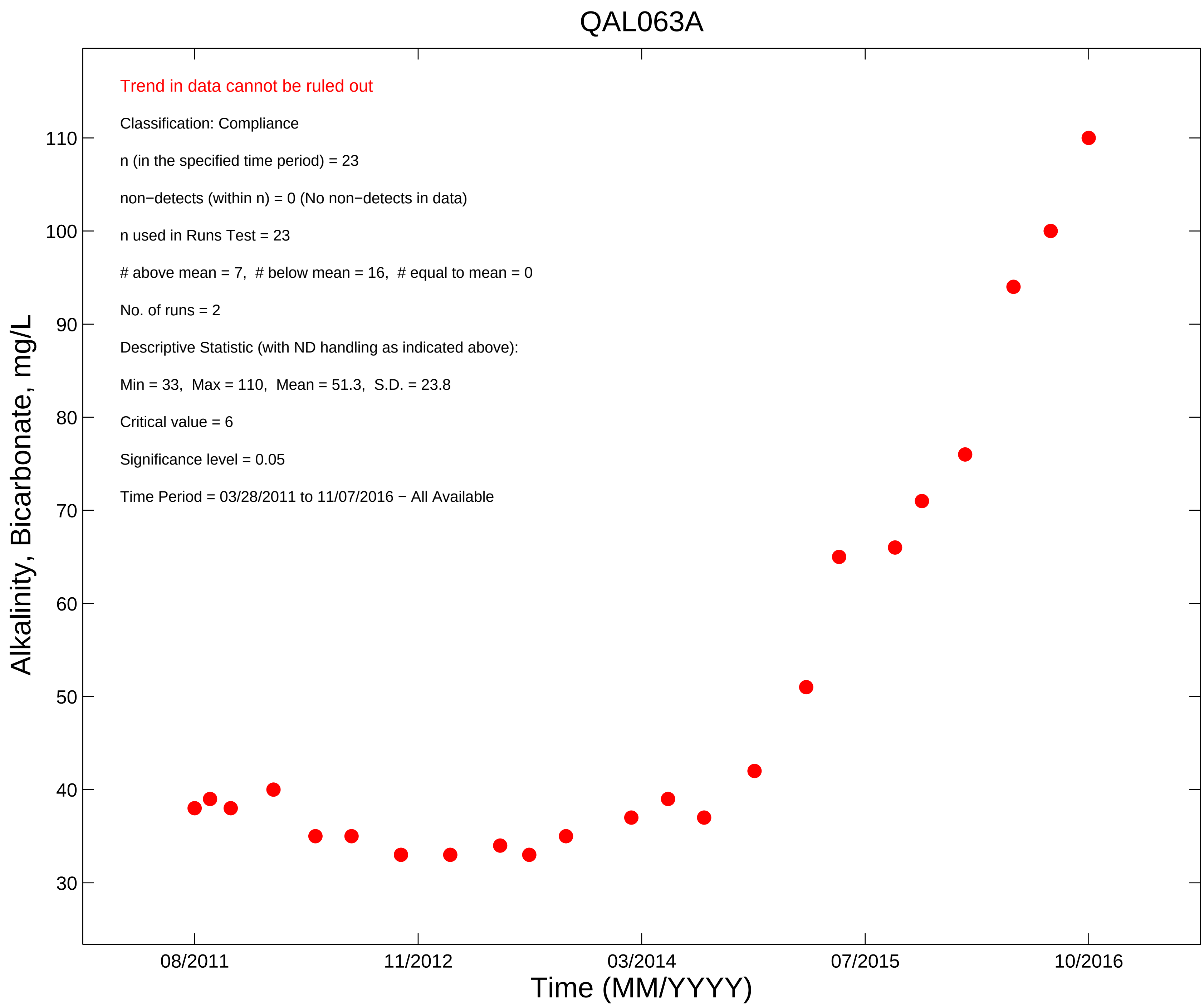
QAL062A



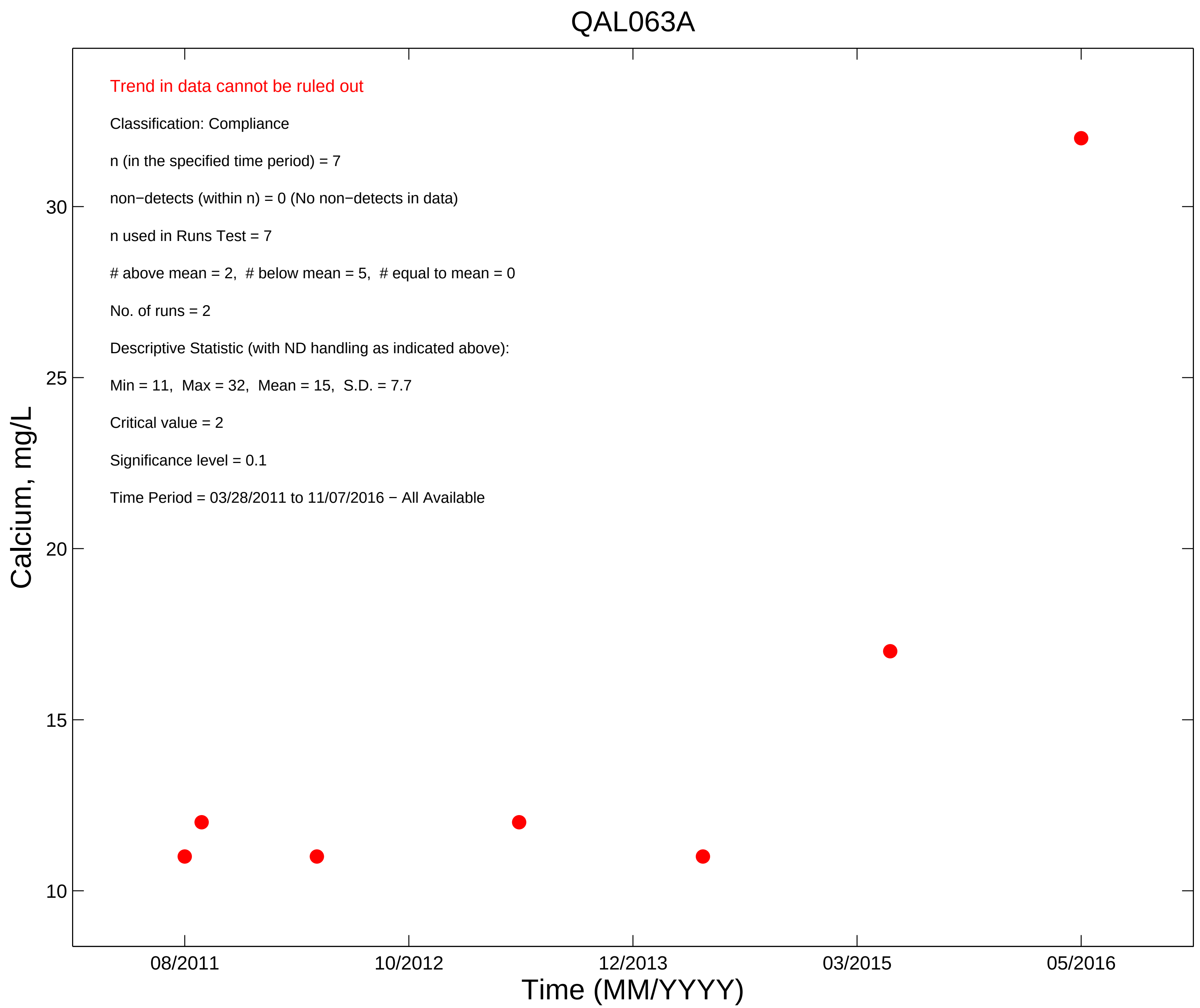
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 7
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 7
above mean = 2, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 2, Max = 9.1, Mean = 3.7, S.D. = 2.66
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/07/2016 − All Available
Magnesium, mg/L
9
8
7
6
5
4
3
2
08/2011
10/2012
12/2013
03/2015
05/2016
Time (MM/YYYY)

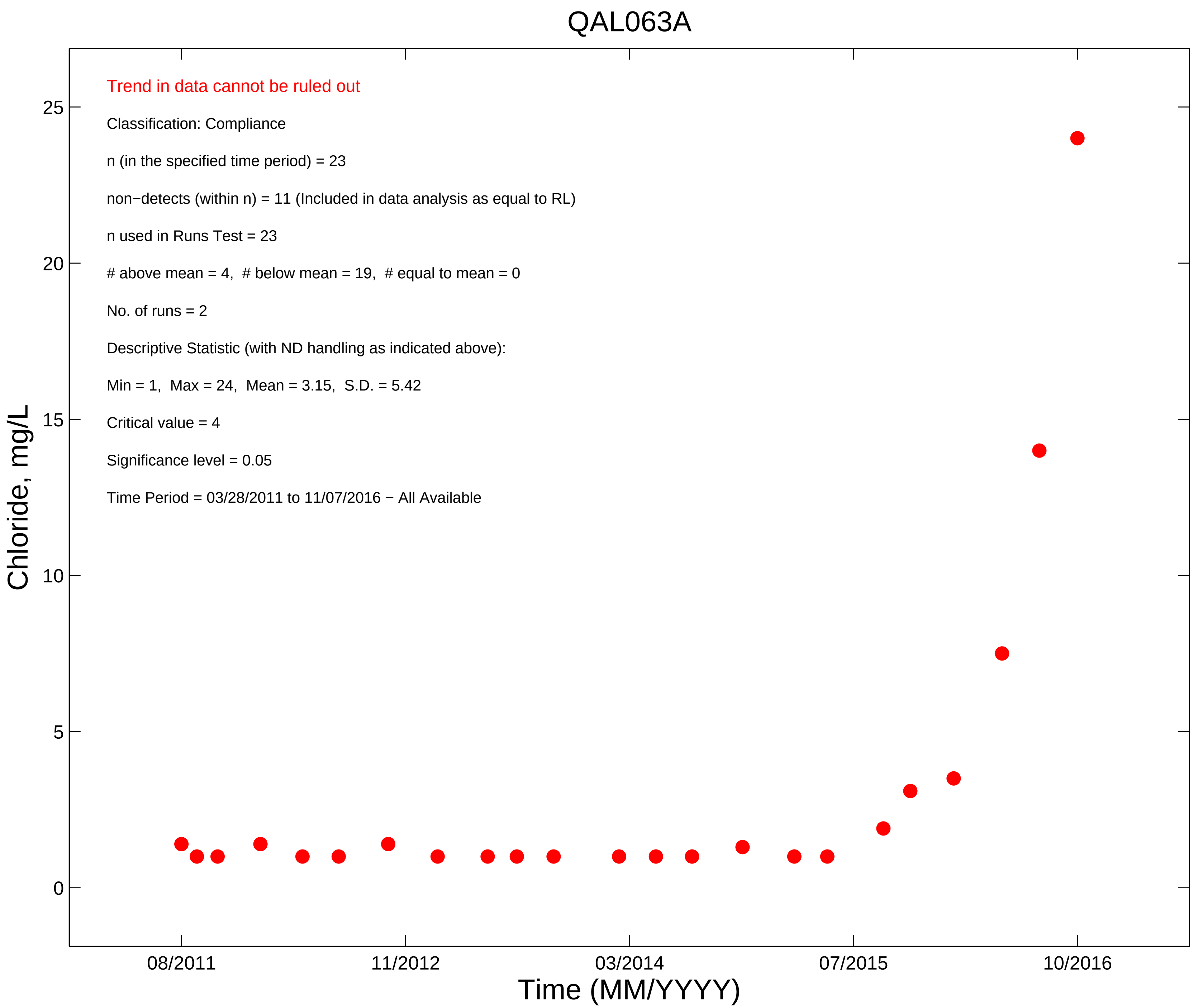

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 23
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 23
above mean = 11, # below mean = 12, # equal to mean = 0
No. of runs = 6
Descriptive Statistic (with ND handling as indicated above):
Min = 7.9, Max = 9.4, Mean = 8.47, S.D. = 0.321
Critical value = 8
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
pH, SU
9.4
9.2
9
8.8
8.6
8.4
8.2
8
7.8
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

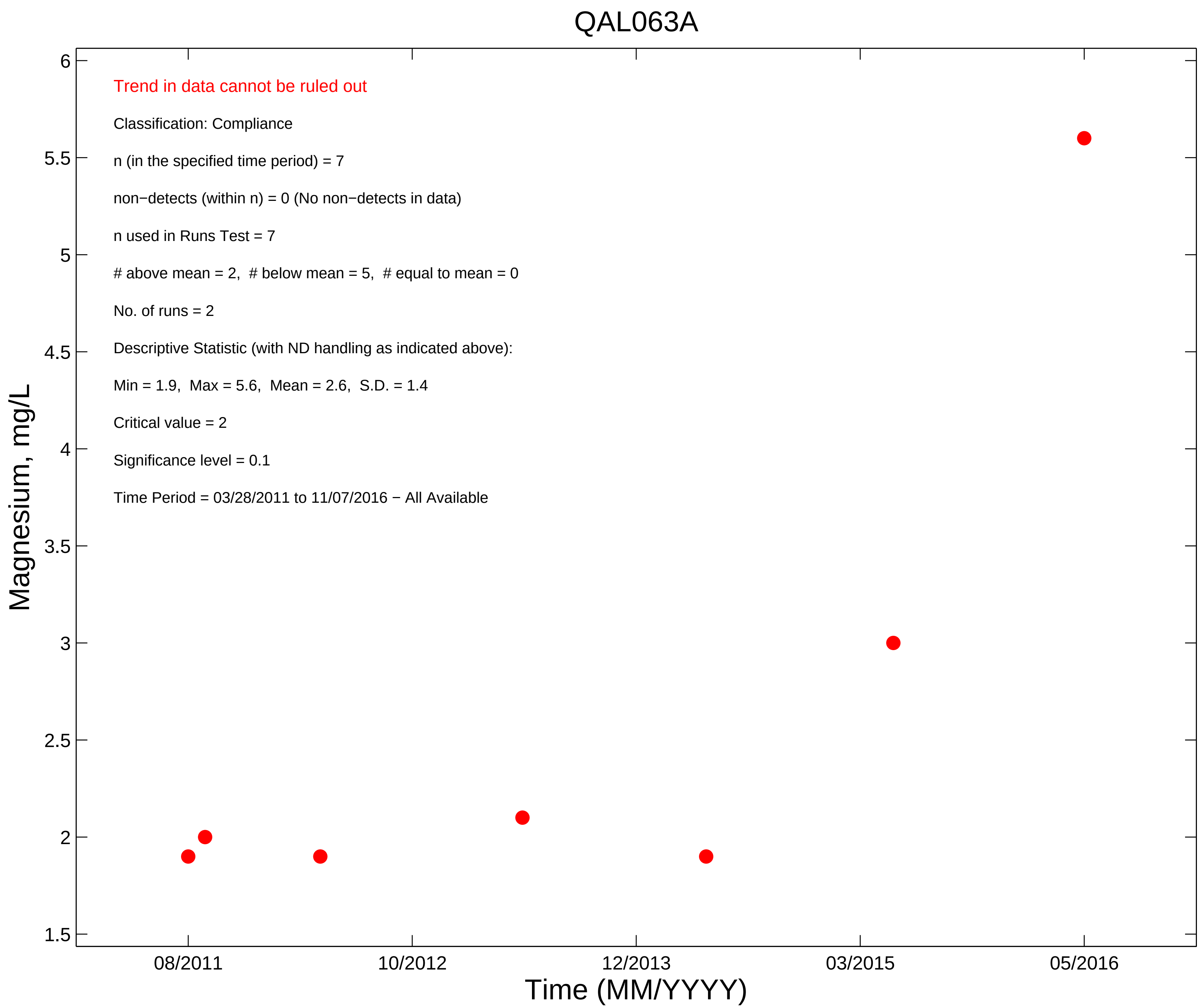

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 23
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 23
above mean = 4, # below mean = 19, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.53, Max = 13, Mean = 2.36, S.D. = 3.624
Critical value = 4
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Sodium, mg/L
0
2
4
6
8
10
12
14
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

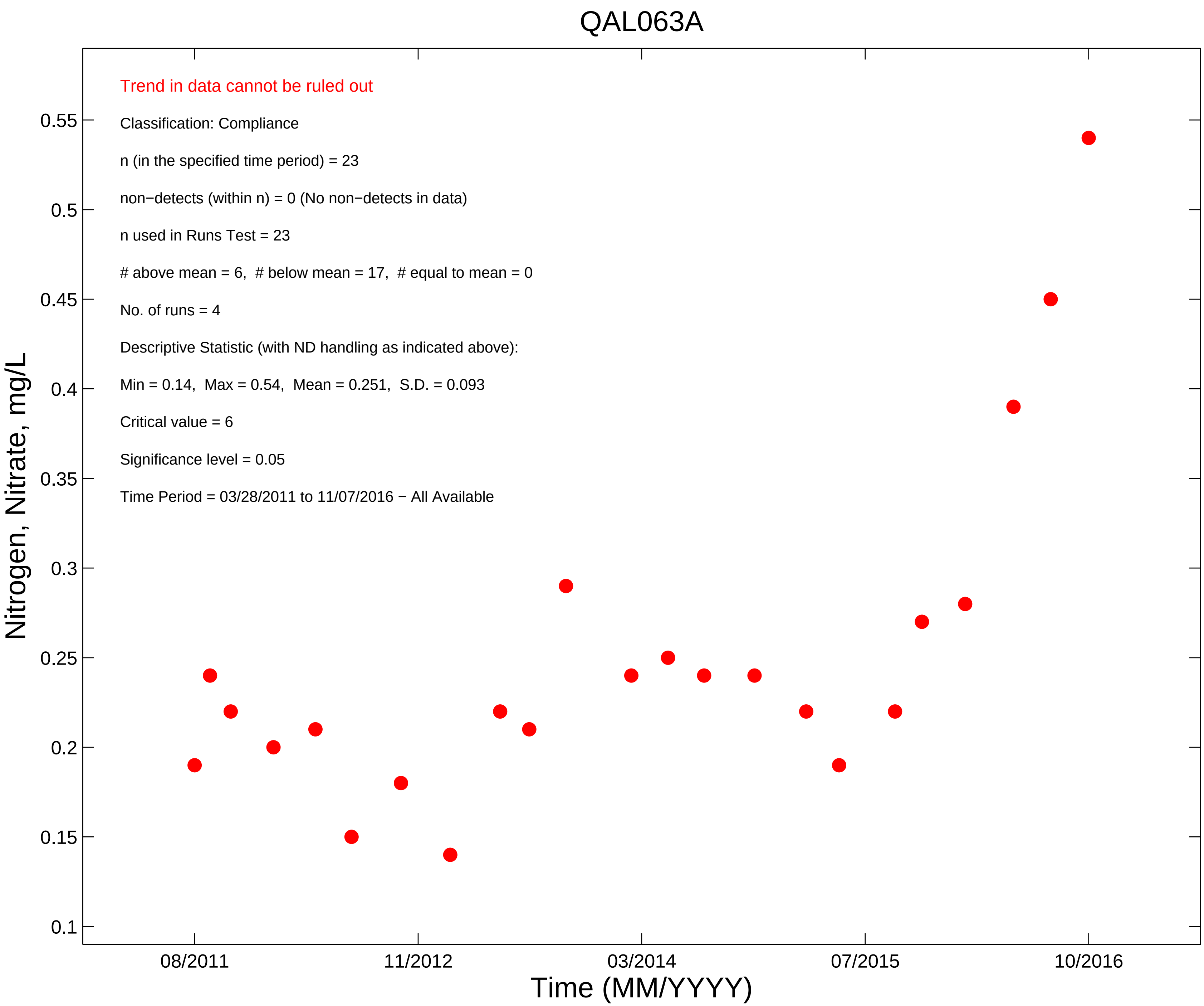


QAL063A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 23
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 23
above mean = 7, # below mean = 16, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 33, Max = 110, Mean = 51.3, S.D. = 23.8
Critical value = 6
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Alkalinity, Bicarbonate, mg/L
110
100
90
80
70
60
50
40
30
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

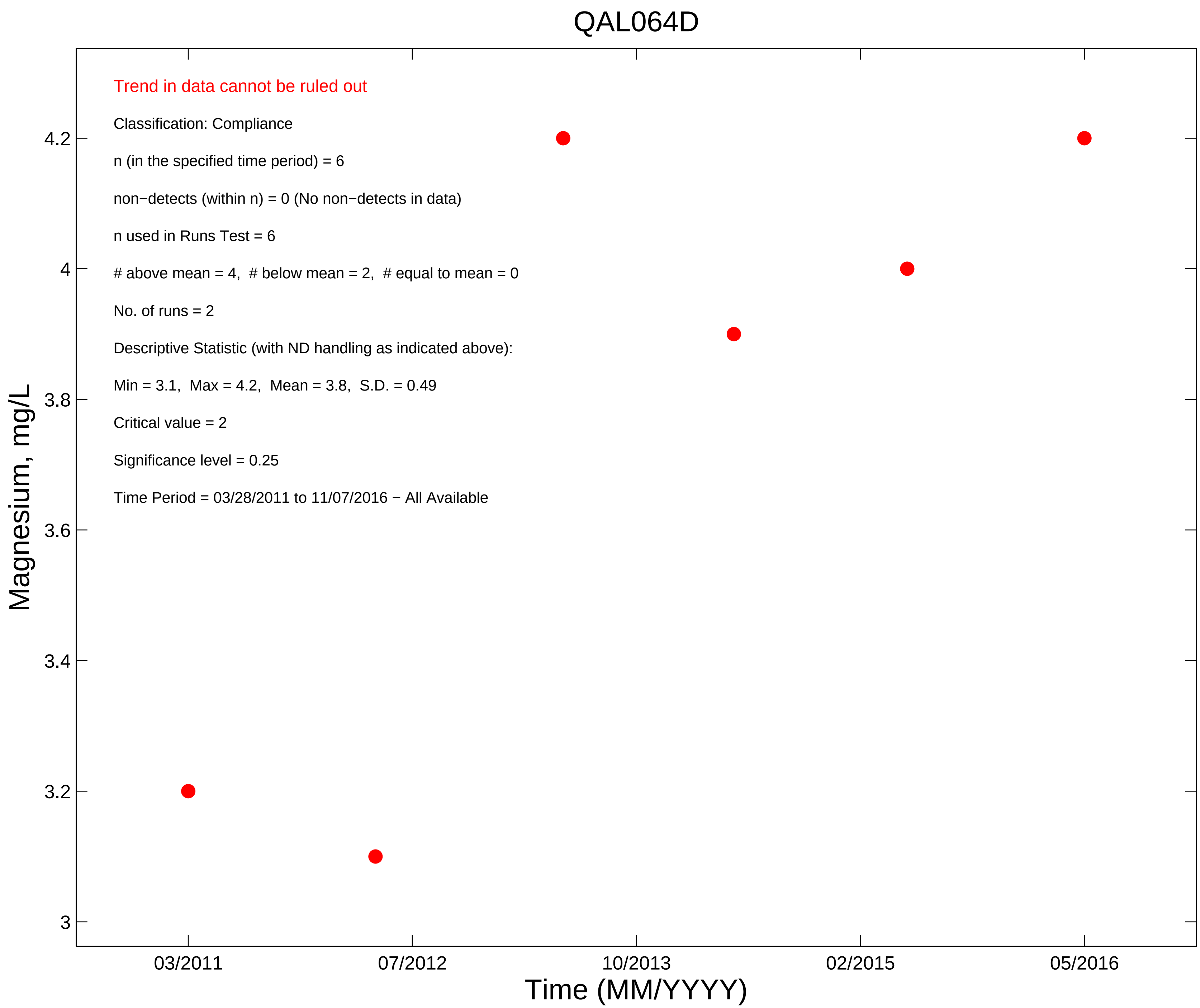

QAL063A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 7
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 7
above mean = 2, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 11, Max = 32, Mean = 15, S.D. = 7.7
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/07/2016 − All Available
Calcium, mg/L
30
25
20
15
10
08/2011
10/2012
12/2013
03/2015
05/2016
Time (MM/YYYY)

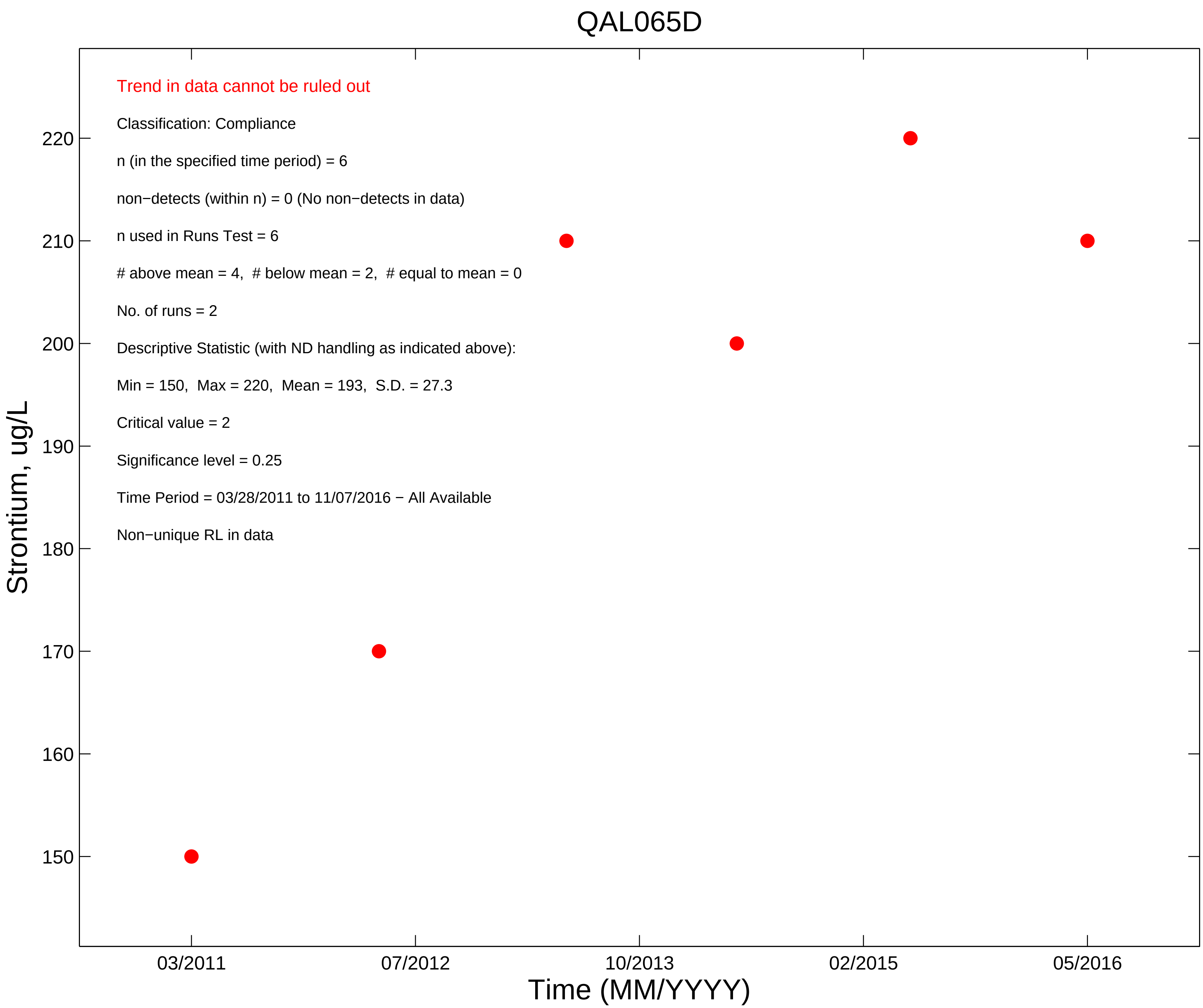

QAL063A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 23
non−detects (within n) = 11 (Included in data analysis as equal to RL)
n used in Runs Test = 23
above mean = 4, # below mean = 19, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 24, Mean = 3.15, S.D. = 5.42
Critical value = 4
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Chloride, mg/L
0
5
10
15
20
25
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

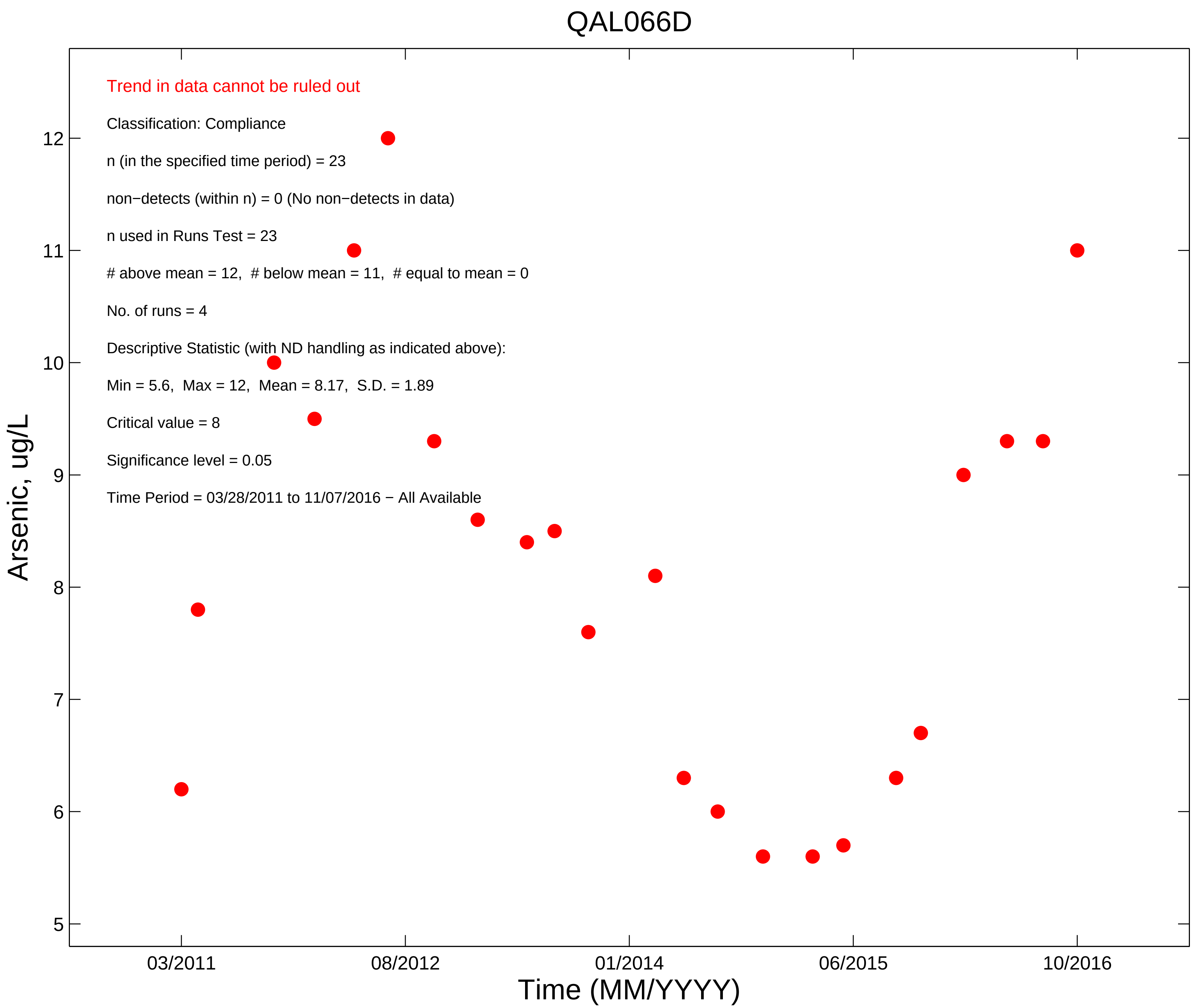

QAL063A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 7
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 7
above mean = 2, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.9, Max = 5.6, Mean = 2.6, S.D. = 1.4
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/07/2016 − All Available
Magnesium, mg/L
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
08/2011
10/2012
12/2013
03/2015
05/2016
Time (MM/YYYY)

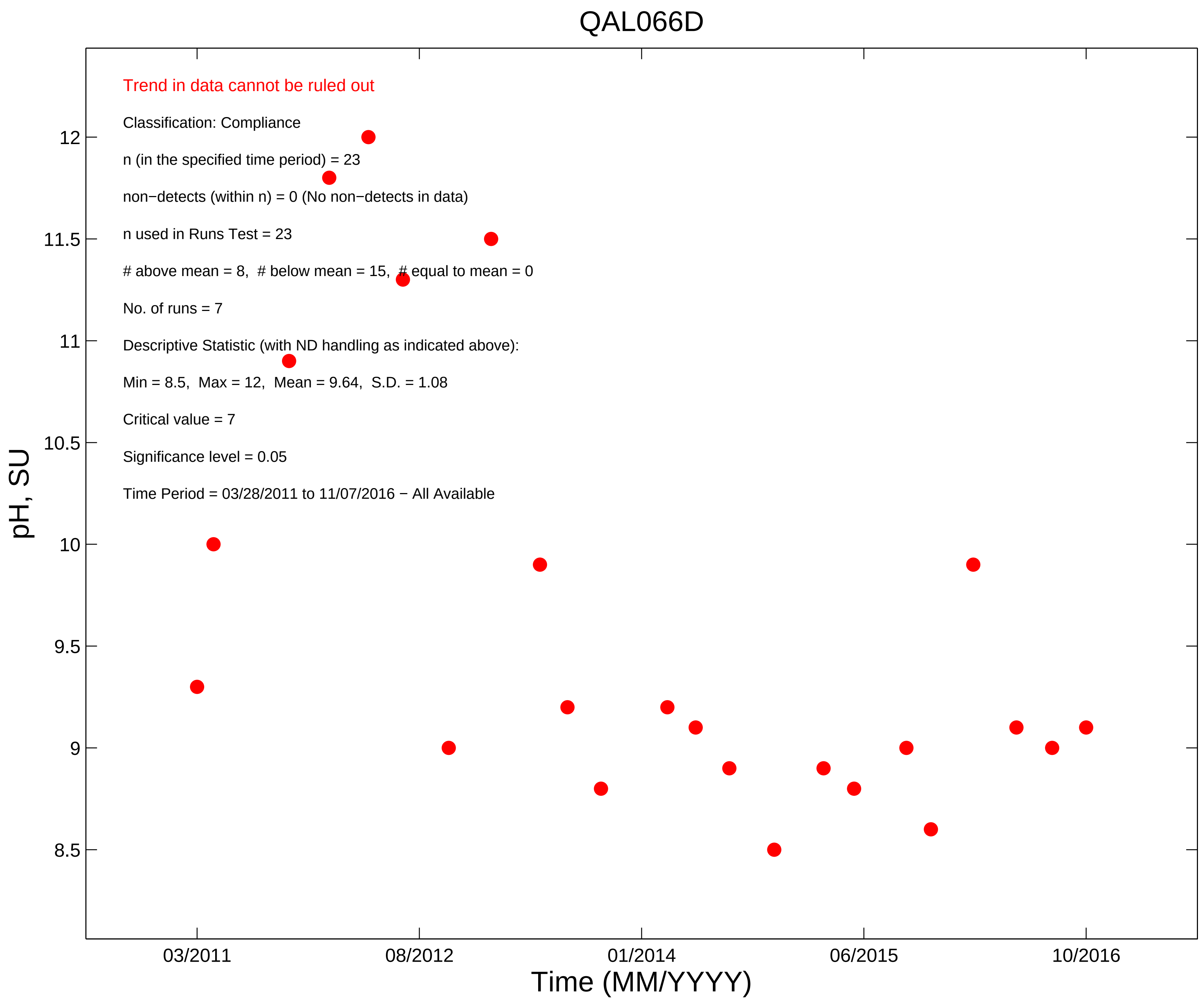


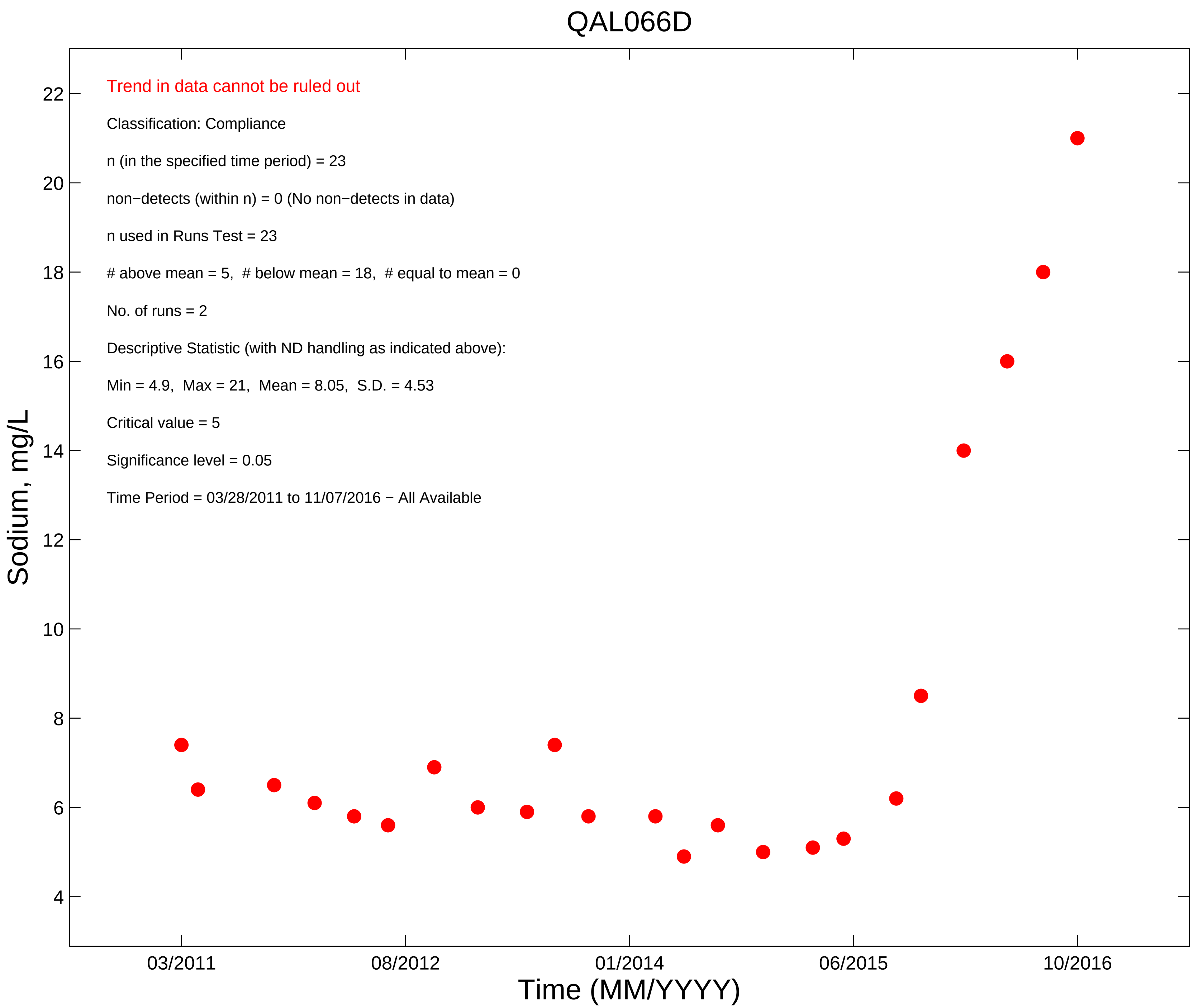
QAL063A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 23
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 23
above mean = 6, # below mean = 17, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 0.14, Max = 0.54, Mean = 0.251, S.D. = 0.093
Critical value = 6
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Nitrogen, Nitrate, mg/L
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

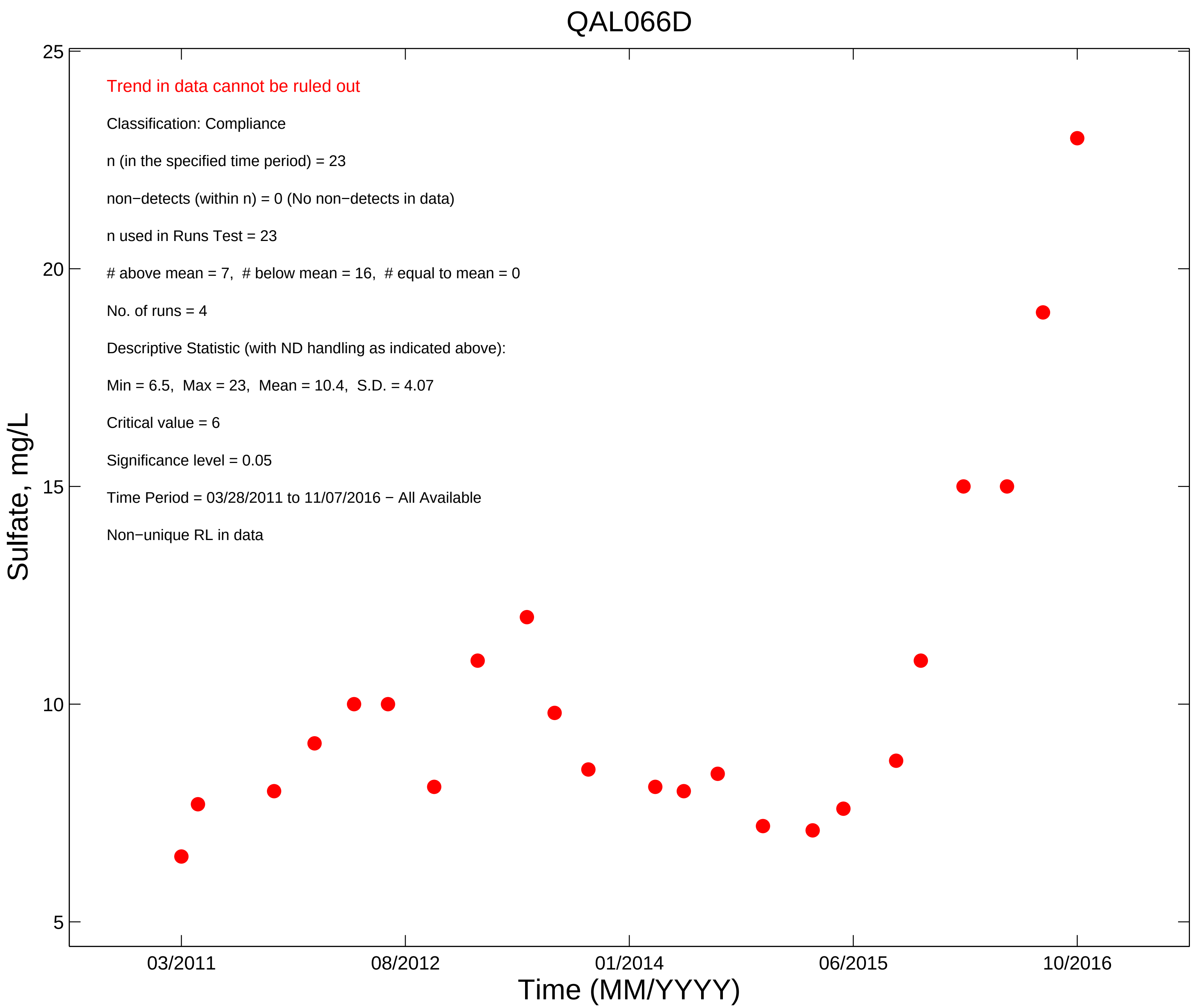

QAL064D
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 6
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 6
above mean = 4, # below mean = 2, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 3.1, Max = 4.2, Mean = 3.8, S.D. = 0.49
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/07/2016 − All Available
Magnesium, mg/L
4.2
4
3.8
3.6
3.4
3.2
3
03/2011
07/2012
10/2013
02/2015
05/2016
Time (MM/YYYY)

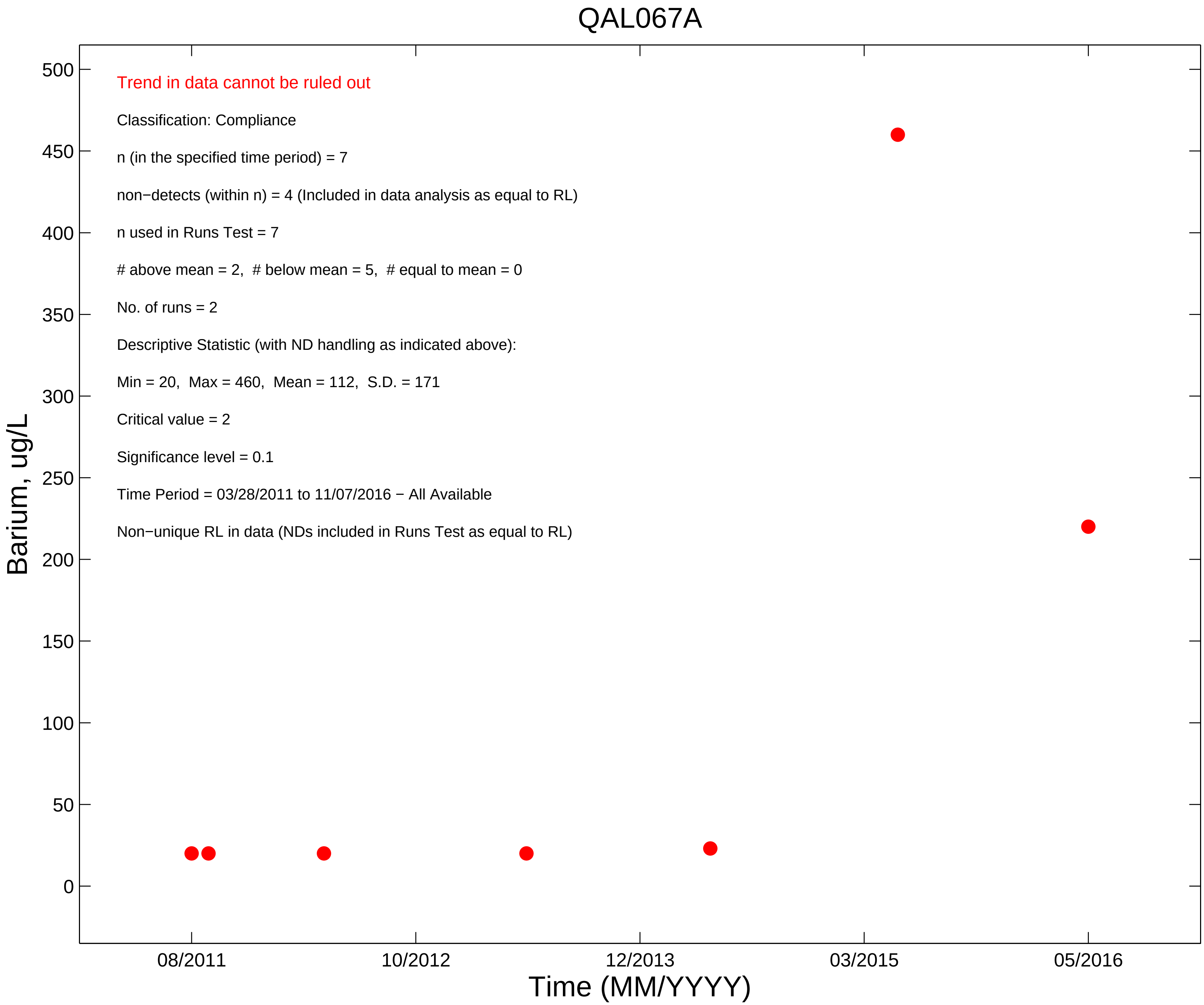

QAL065D
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 6
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 6
above mean = 4, # below mean = 2, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 150, Max = 220, Mean = 193, S.D. = 27.3
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/07/2016 − All Available
Non−unique RL in data
Strontium, ug/L
220
210
200
190
180
170
160
150
03/2011
07/2012
10/2013
02/2015
05/2016
Time (MM/YYYY)

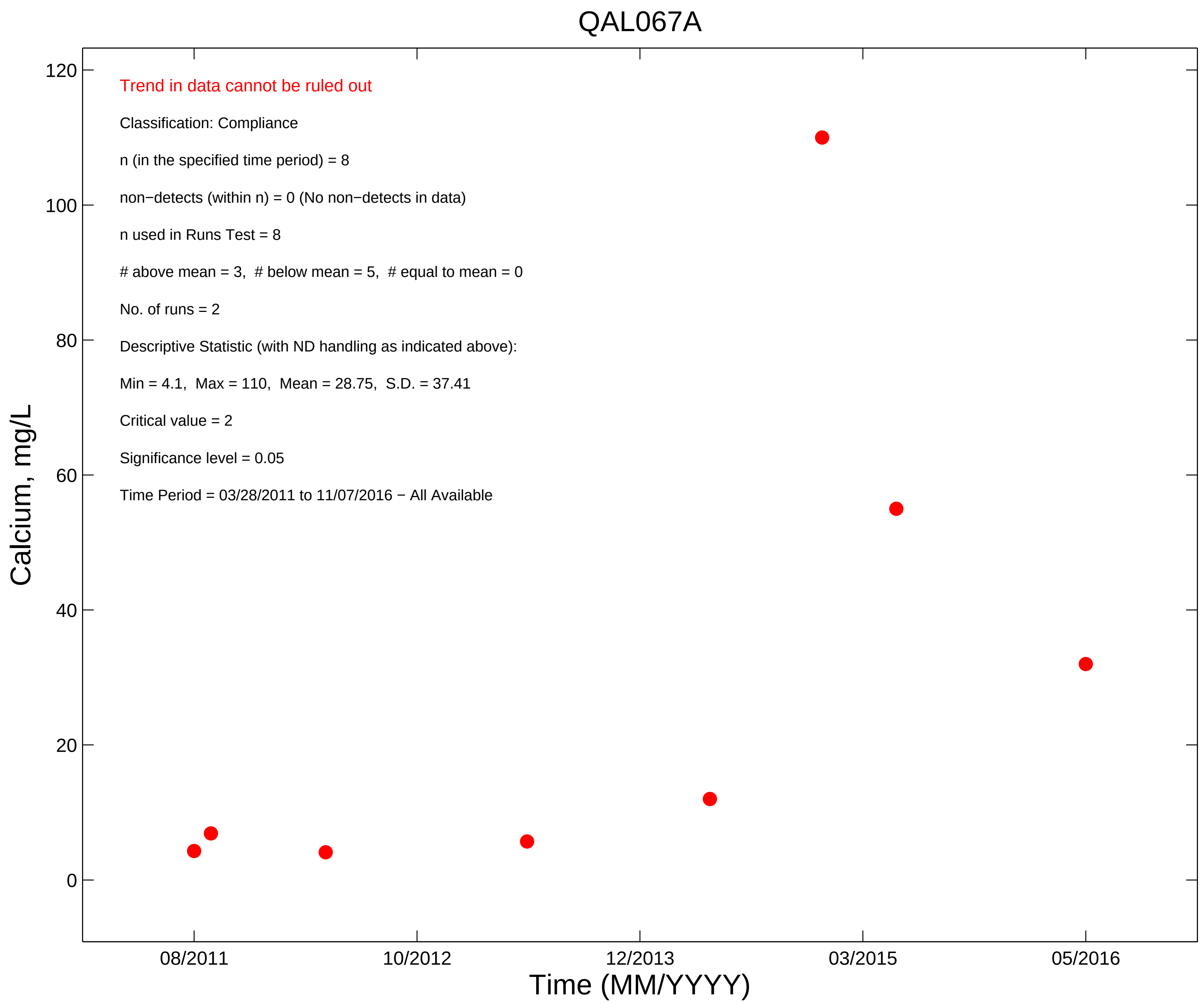

QAL066D
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 23
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 23
above mean = 12, # below mean = 11, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 5.6, Max = 12, Mean = 8.17, S.D. = 1.89
Critical value = 8
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Arsenic, ug/L
12
11
10
9
8
7
6
5
03/2011
08/2012
01/2014
06/2015
10/2016
Time (MM/YYYY)


QAL066D
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 23
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 23
above mean = 8, # below mean = 15, # equal to mean = 0
No. of runs = 7
Descriptive Statistic (with ND handling as indicated above):
Min = 8.5, Max = 12, Mean = 9.64, S.D. = 1.08
Critical value = 7
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
pH, SU
12
11.5
11
10.5
10
9.5
9
8.5
03/2011
08/2012
01/2014
06/2015
10/2016
Time (MM/YYYY)

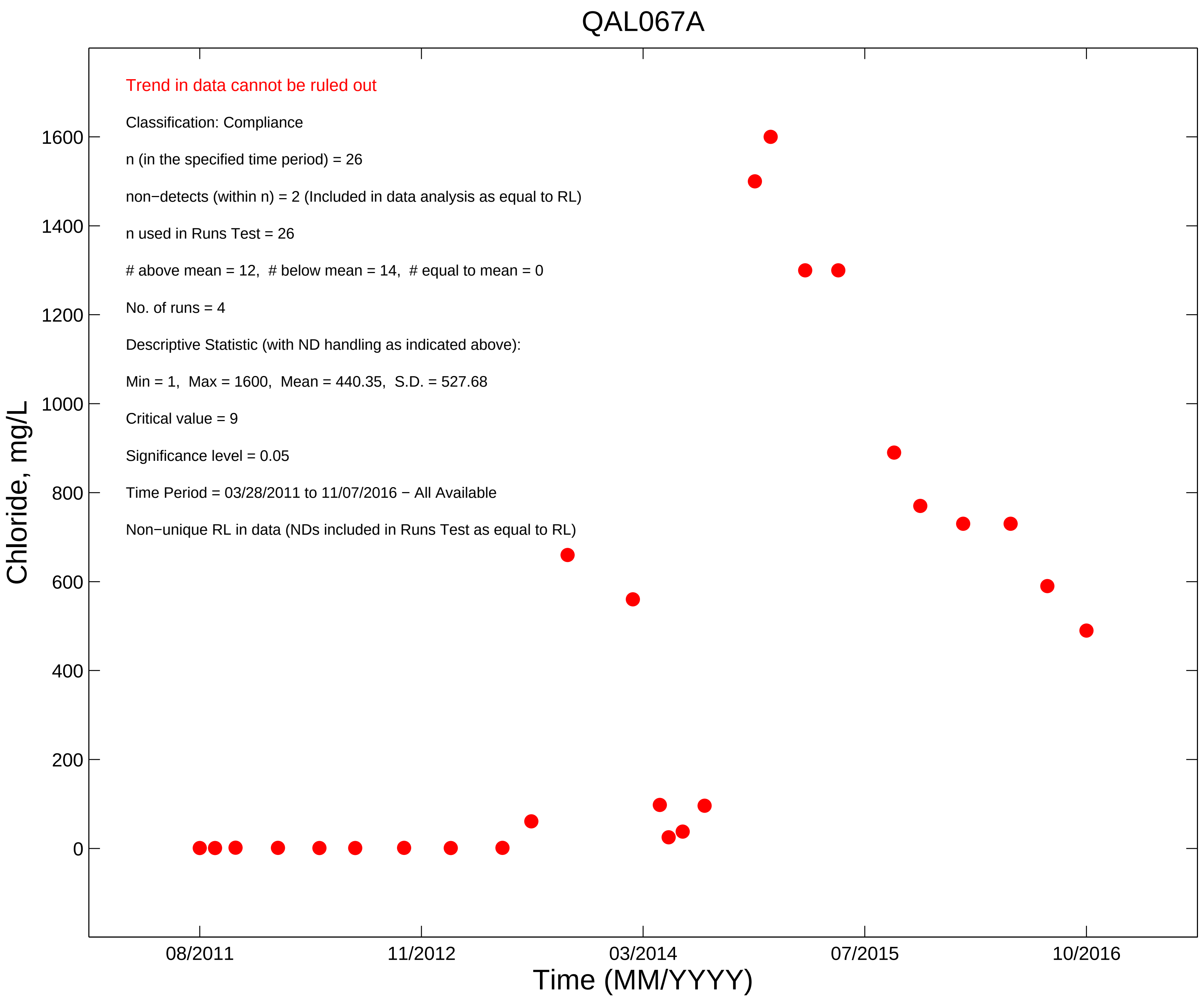

QAL066D
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 23
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 23
above mean = 5, # below mean = 18, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 4.9, Max = 21, Mean = 8.05, S.D. = 4.53
Critical value = 5
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Sodium, mg/L
22
20
18
16
14
12
10
8
6
4
03/2011
08/2012
01/2014
06/2015
10/2016
Time (MM/YYYY)

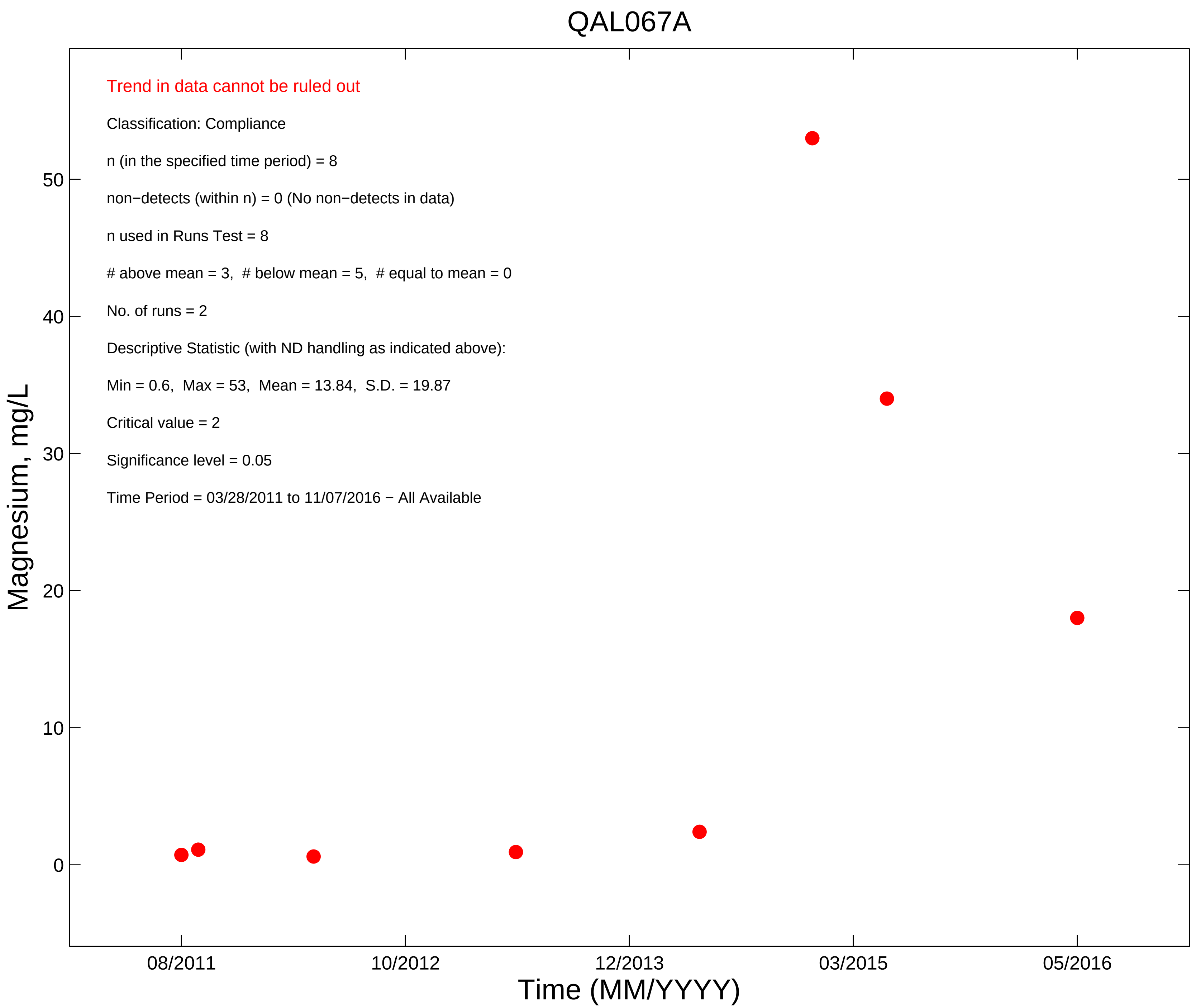

QAL066D
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 23
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 23
above mean = 7, # below mean = 16, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 6.5, Max = 23, Mean = 10.4, S.D. = 4.07
Critical value = 6
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Non−unique RL in data
Sulfate, mg/L
25
20
15
10
5
03/2011
08/2012
01/2014
06/2015
10/2016
Time (MM/YYYY)

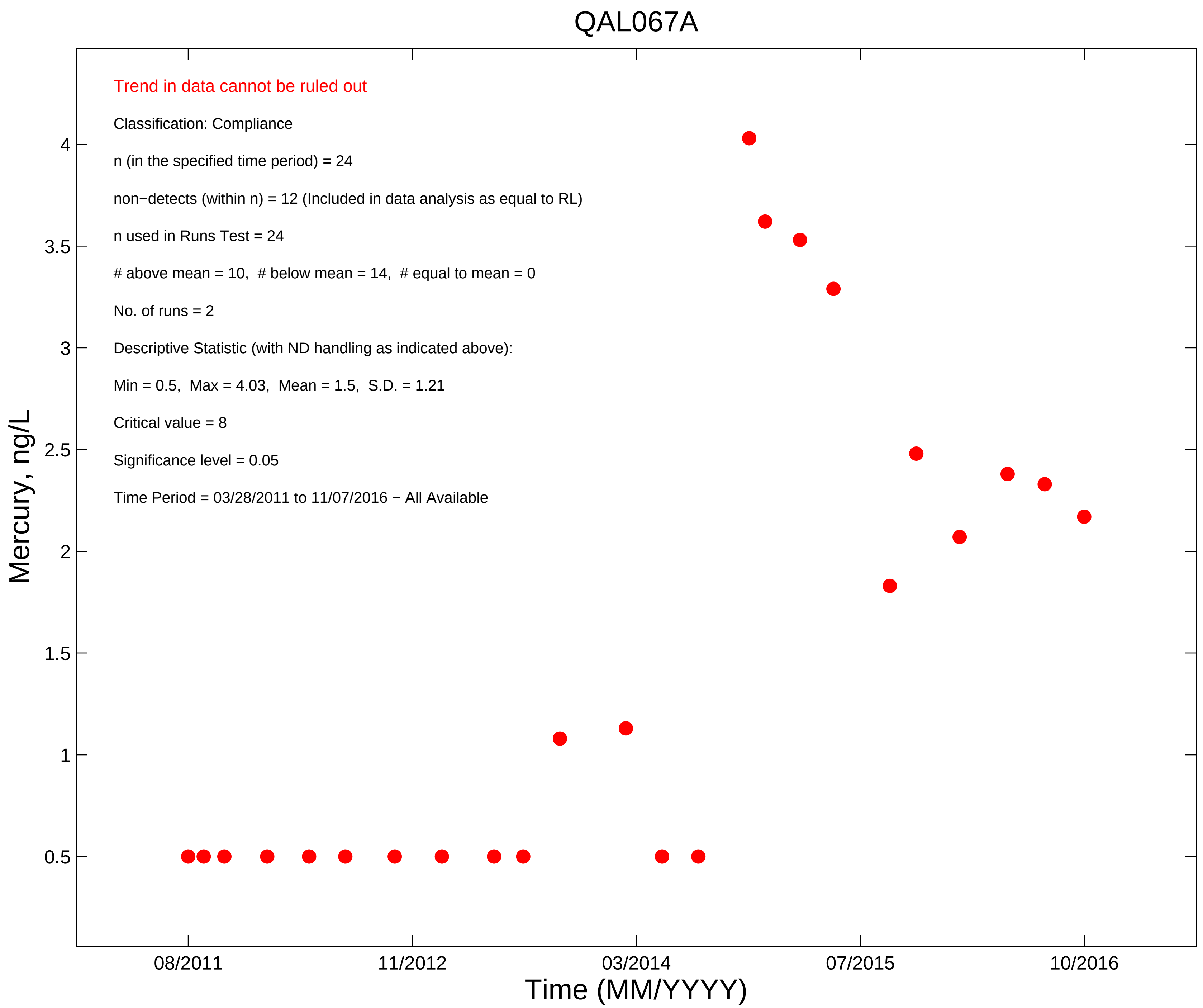

QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 7
non−detects (within n) = 4 (Included in data analysis as equal to RL)
n used in Runs Test = 7
above mean = 2, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 20, Max = 460, Mean = 112, S.D. = 171
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/07/2016 − All Available
Non−unique RL in data (NDs included in Runs Test as equal to RL)
Barium, ug/L
500
450
400
350
300
250
200
150
100
50
0
08/2011
10/2012
12/2013
03/2015
05/2016
Time (MM/YYYY)

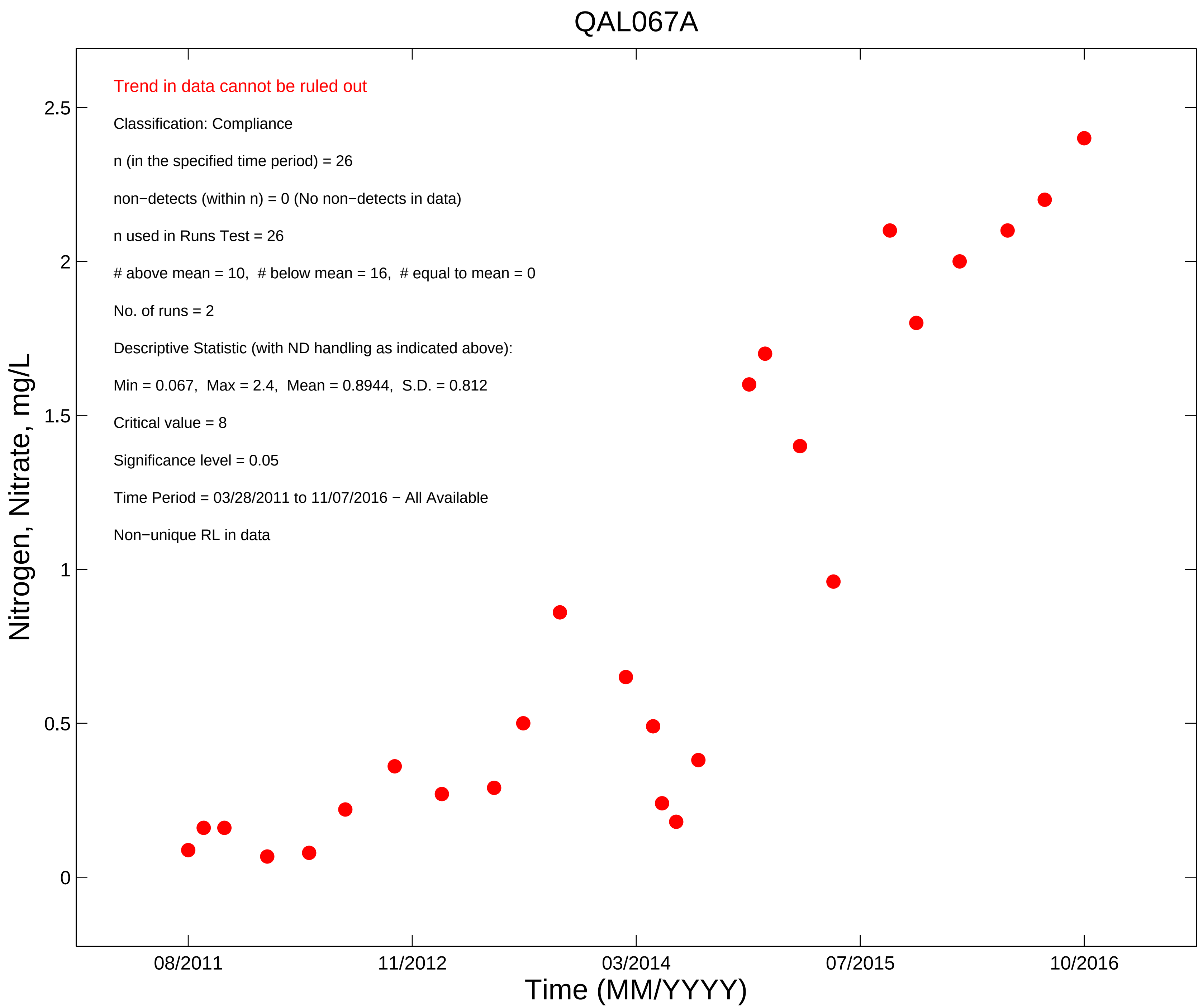


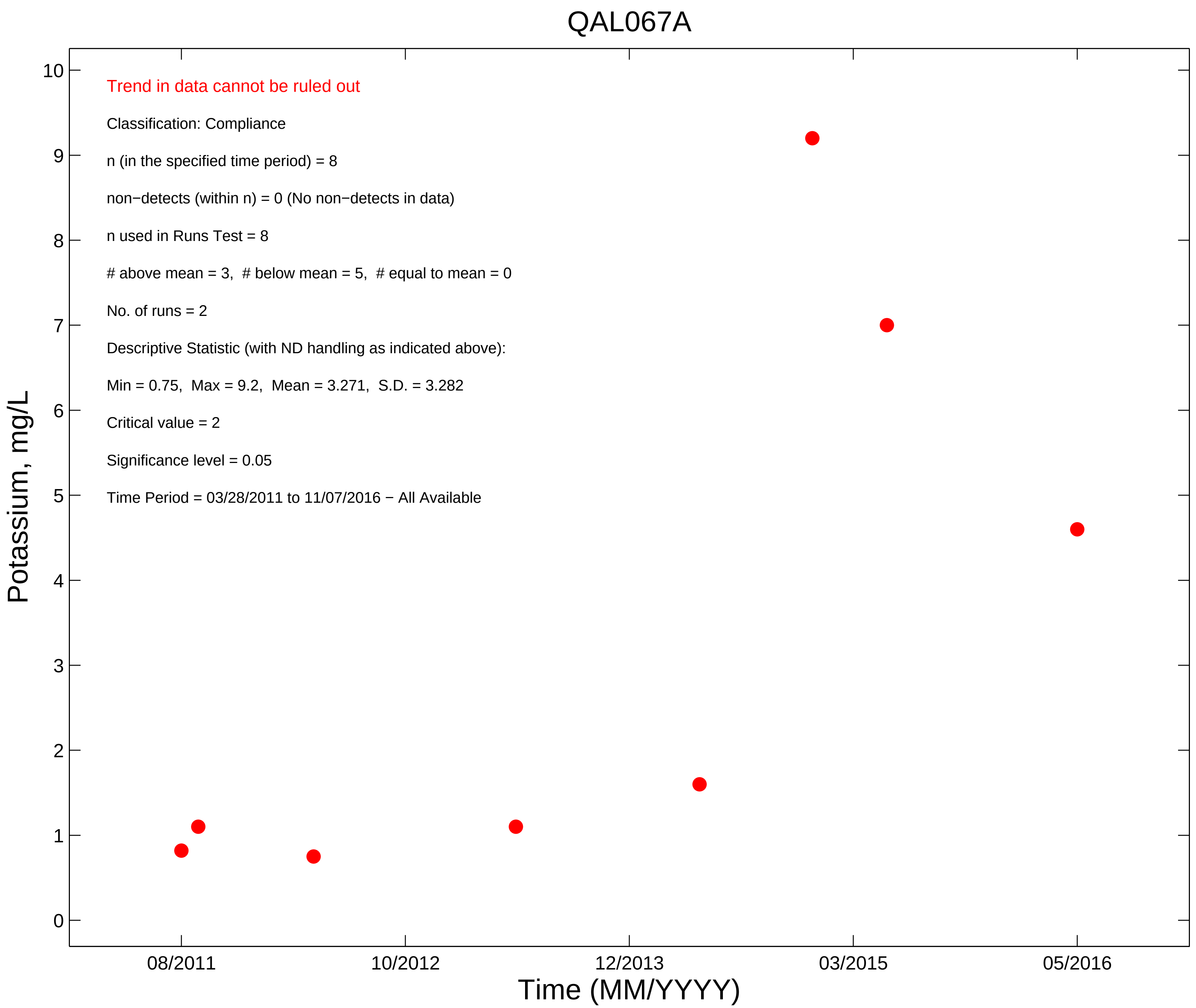
QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 8
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 8
above mean = 3, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 4.1, Max = 110, Mean = 28.75, S.D. = 37.41
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Calcium, mg/L
120
100
80
60
40
20
0
08/2011
10/2012
12/2013
03/2015
05/2016
Time (MM/YYYY)

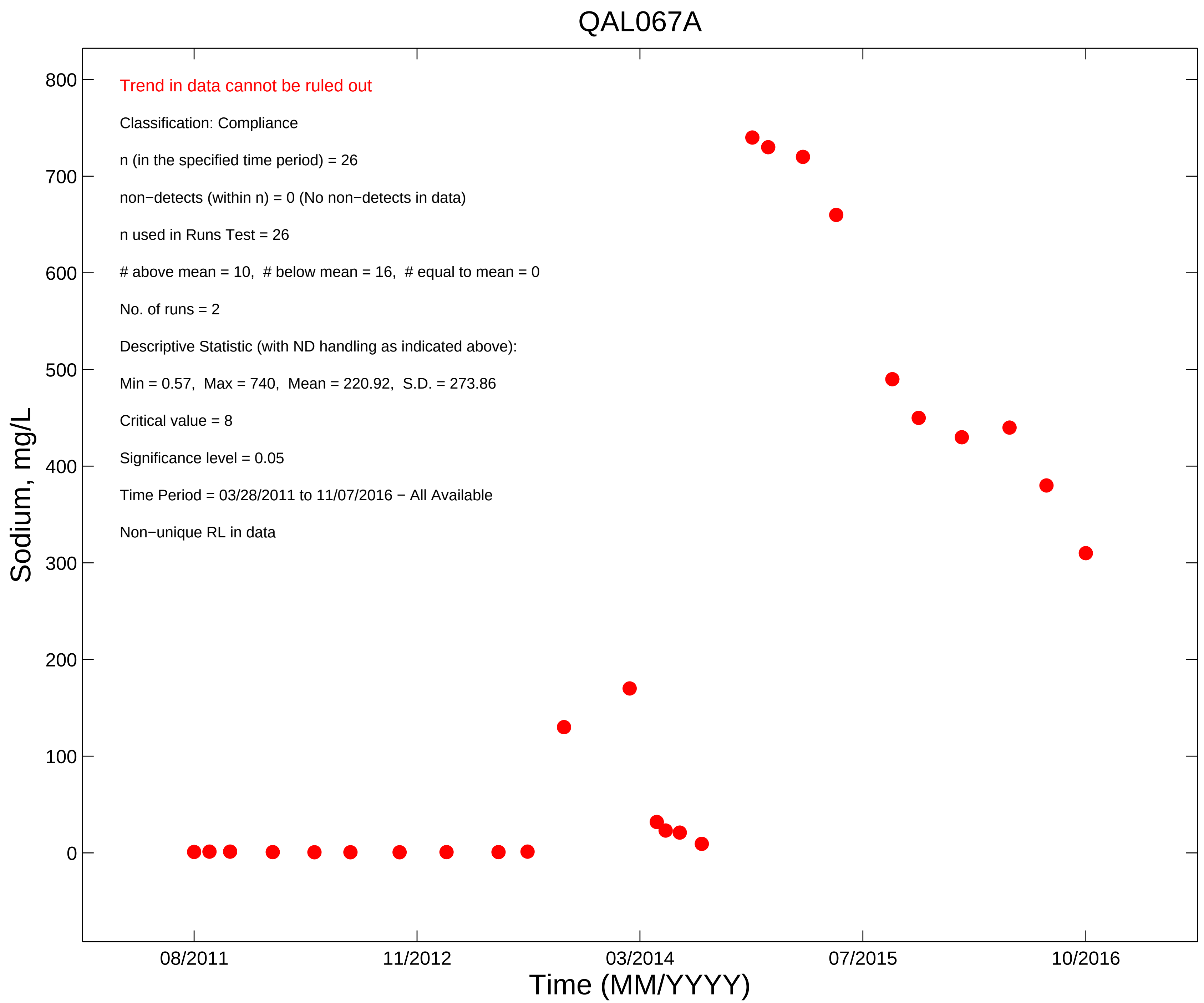

QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 26
non−detects (within n) = 2 (Included in data analysis as equal to RL)
n used in Runs Test = 26
above mean = 12, # below mean = 14, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 1600, Mean = 440.35, S.D. = 527.68
Critical value = 9
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − 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
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

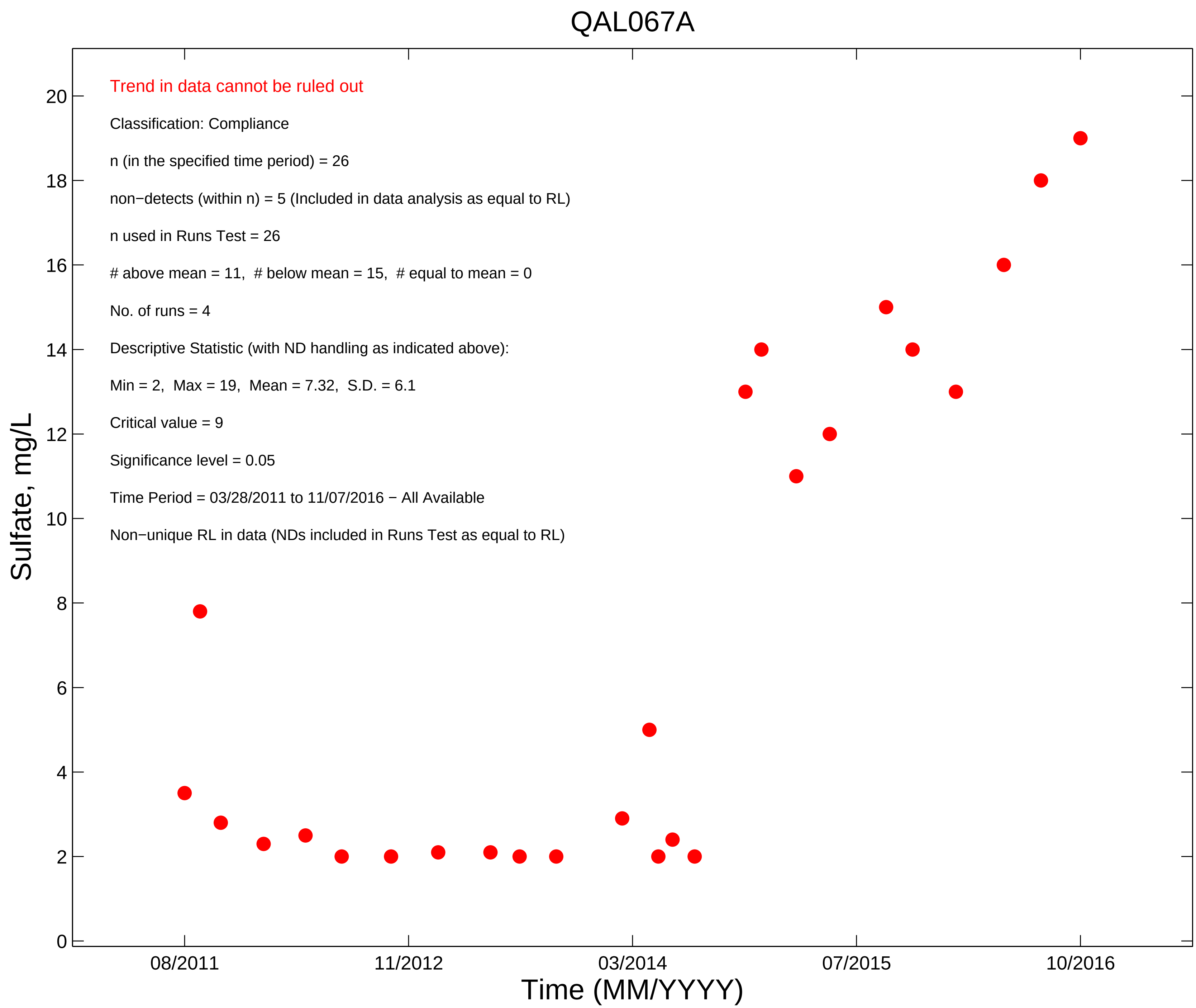

QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 8
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 8
above mean = 3, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.6, Max = 53, Mean = 13.84, S.D. = 19.87
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Magnesium, mg/L
0
10
20
30
40
50
08/2011
10/2012
12/2013
03/2015
05/2016
Time (MM/YYYY)


QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 24
non−detects (within n) = 12 (Included in data analysis as equal to RL)
n used in Runs Test = 24
above mean = 10, # below mean = 14, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.5, Max = 4.03, Mean = 1.5, S.D. = 1.21
Critical value = 8
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Mercury, ng/L
4
3.5
3
2.5
2
1.5
1
0.5
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

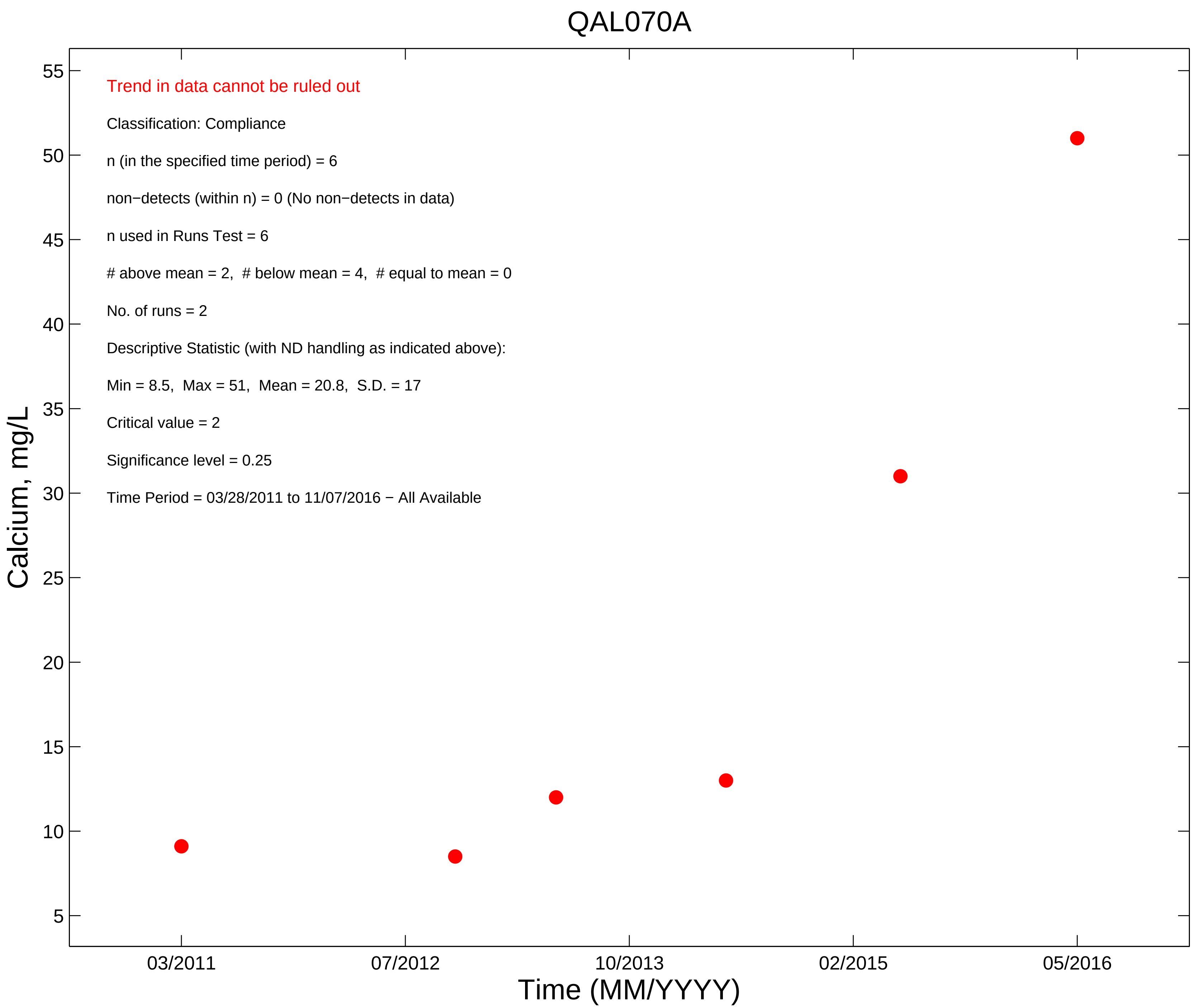

QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 26
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 26
above mean = 10, # below mean = 16, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.067, Max = 2.4, Mean = 0.8944, S.D. = 0.812
Critical value = 8
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Non−unique RL in data
Nitrogen, Nitrate, mg/L
2.5
2
1.5
1
0.5
0
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)


QAL067A
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 = 0.75, Max = 9.2, Mean = 3.271, S.D. = 3.282
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Potassium, mg/L
0
1
2
3
4
5
6
7
8
9
10
08/2011
10/2012
12/2013
03/2015
05/2016
Time (MM/YYYY)

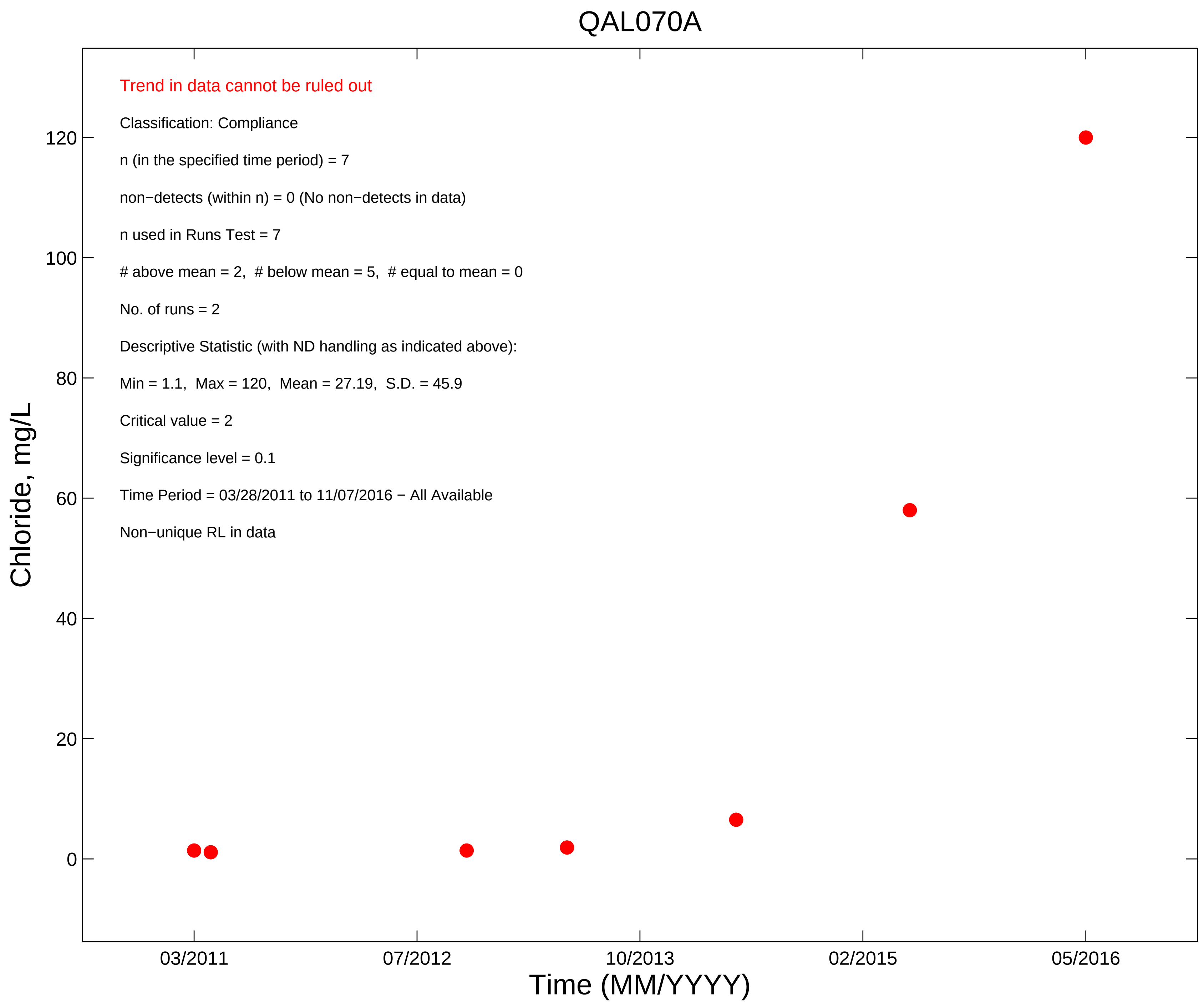

QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 26
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 26
above mean = 10, # below mean = 16, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.57, Max = 740, Mean = 220.92, S.D. = 273.86
Critical value = 8
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Non−unique RL in data
Sodium, mg/L
800
700
600
500
400
300
200
100
0
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

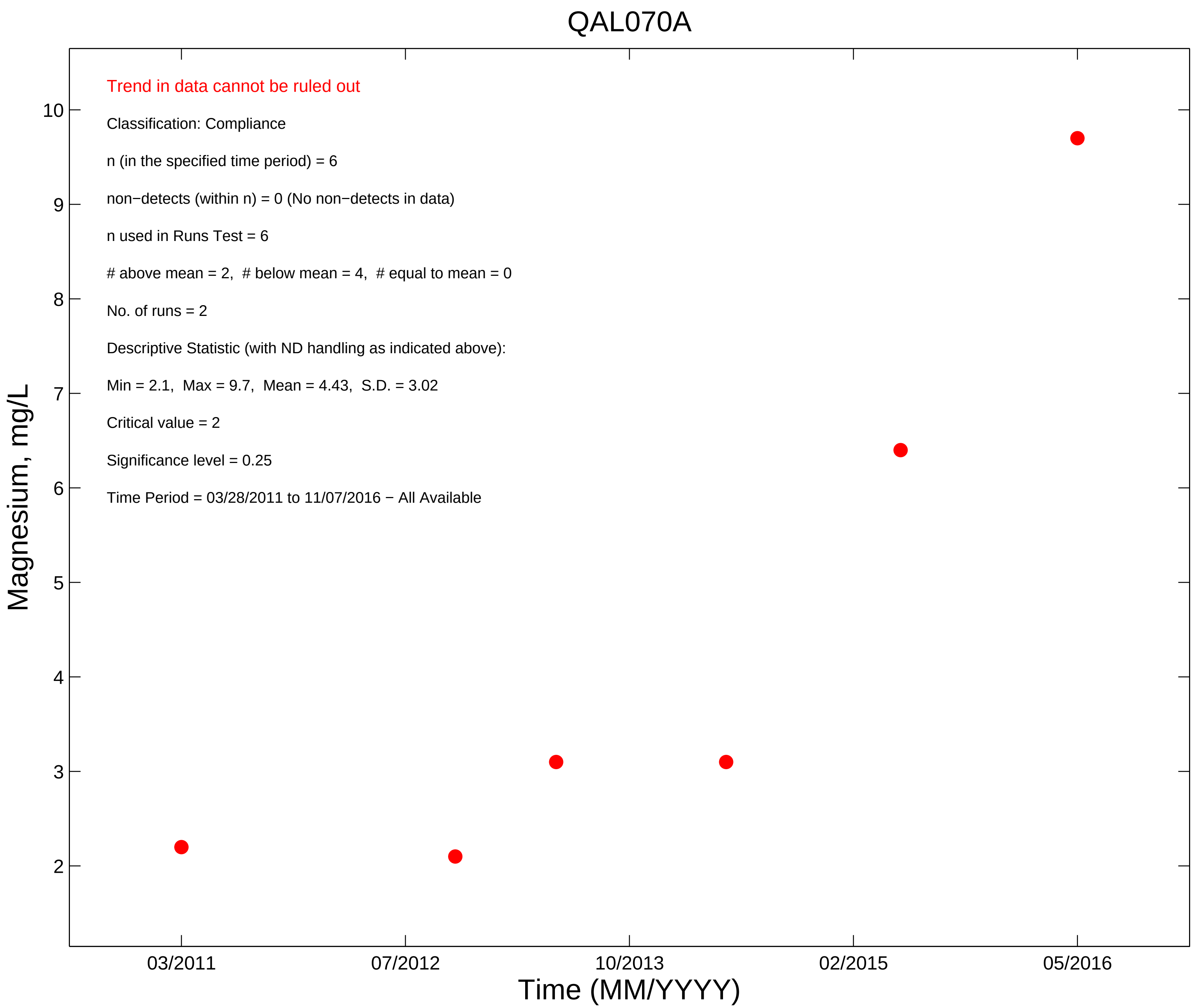


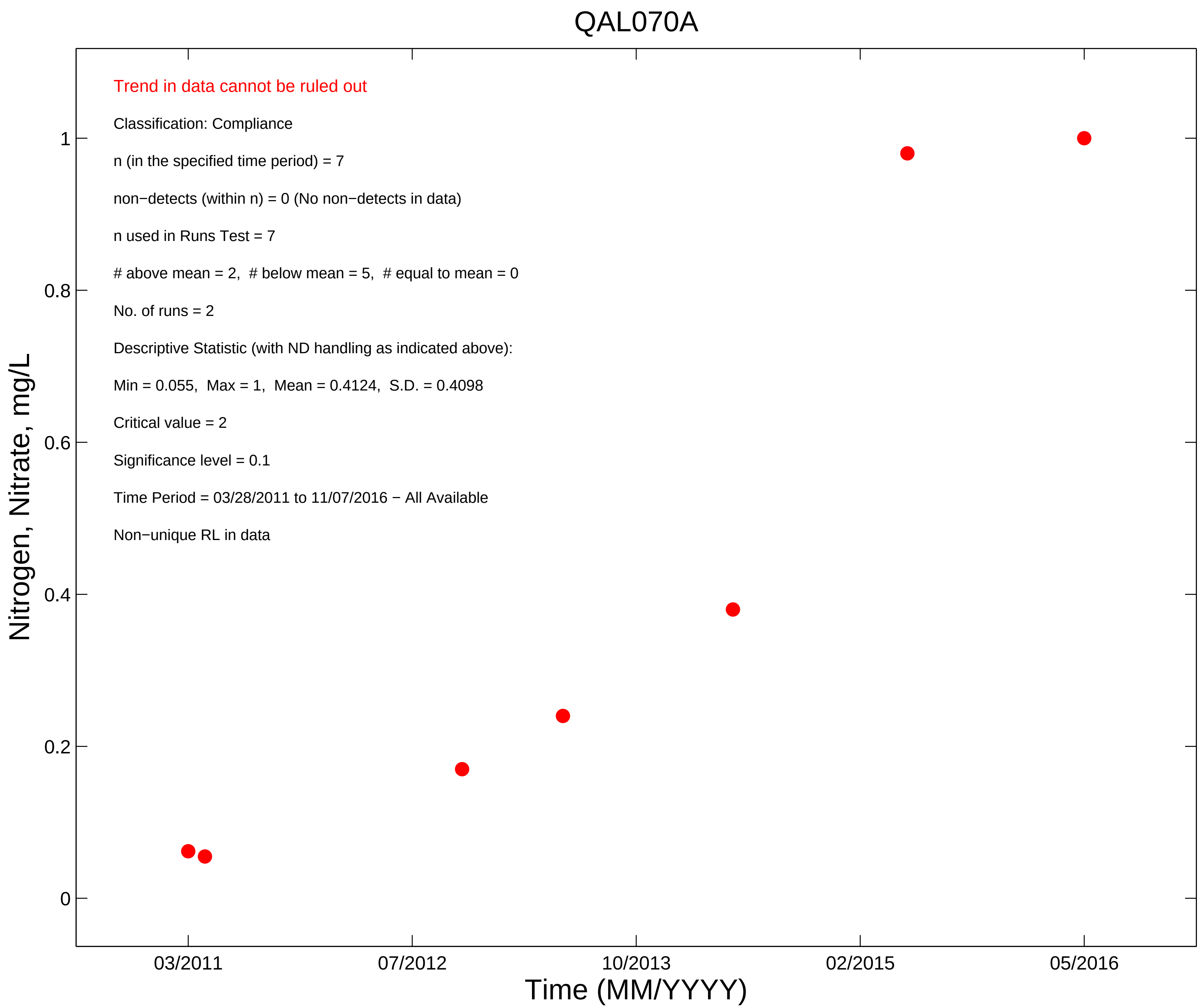
QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 26
non−detects (within n) = 5 (Included in data analysis as equal to RL)
n used in Runs Test = 26
above mean = 11, # below mean = 15, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 2, Max = 19, Mean = 7.32, S.D. = 6.1
Critical value = 9
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Non−unique RL in data (NDs included in Runs Test as equal to RL)
Sulfate, mg/L
0
2
4
6
8
10
12
14
16
18
20
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)



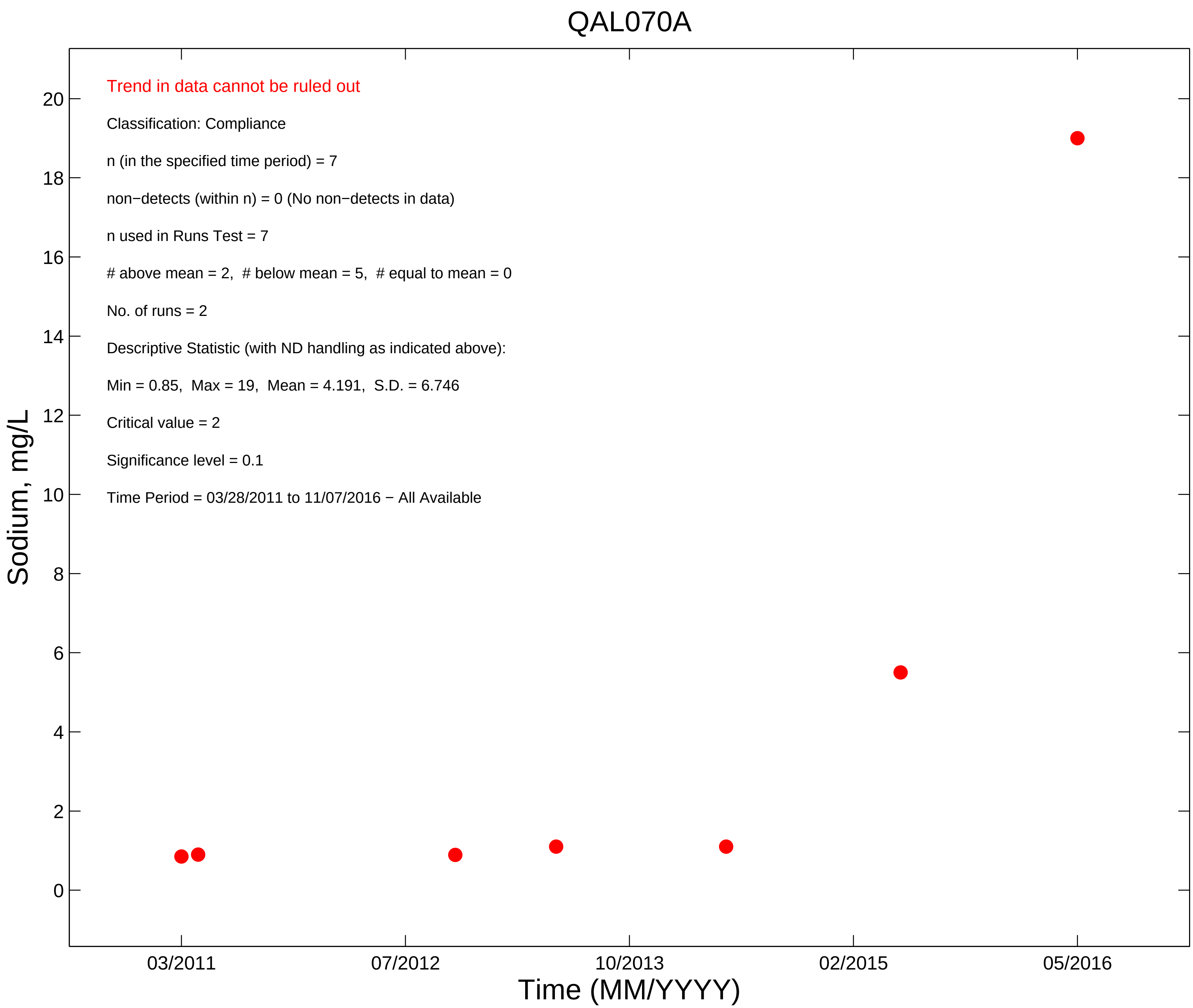
QAL070A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 6
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 6
above mean = 2, # below mean = 4, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 8.5, Max = 51, Mean = 20.8, S.D. = 17
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/07/2016 − All Available
Calcium, mg/L
55
50
45
40
35
30
25
20
15
10
5
03/2011
07/2012
10/2013
02/2015
05/2016
Time (MM/YYYY)


QAL070A
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 = 2, # 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 = 27.19, S.D. = 45.9
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/07/2016 − All Available
Non−unique RL in data
Chloride, mg/L
120
100
80
60
40
20
0
03/2011
07/2012
10/2013
02/2015
05/2016
Time (MM/YYYY)

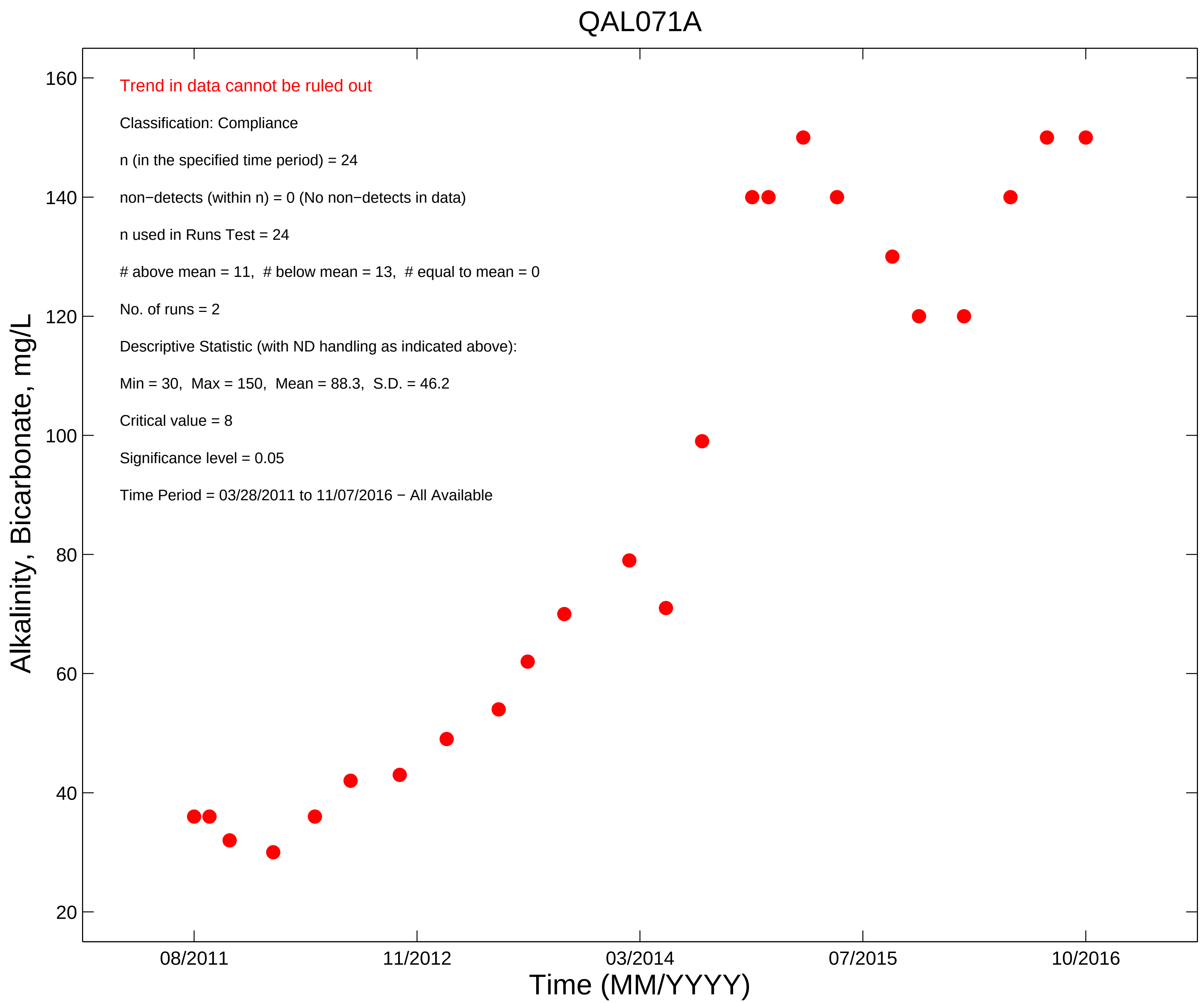

QAL070A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 6
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 6
above mean = 2, # below mean = 4, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 2.1, Max = 9.7, Mean = 4.43, S.D. = 3.02
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/07/2016 − All Available
Magnesium, mg/L
2
3
4
5
6
7
8
9
10
03/2011
07/2012
10/2013
02/2015
05/2016
Time (MM/YYYY)



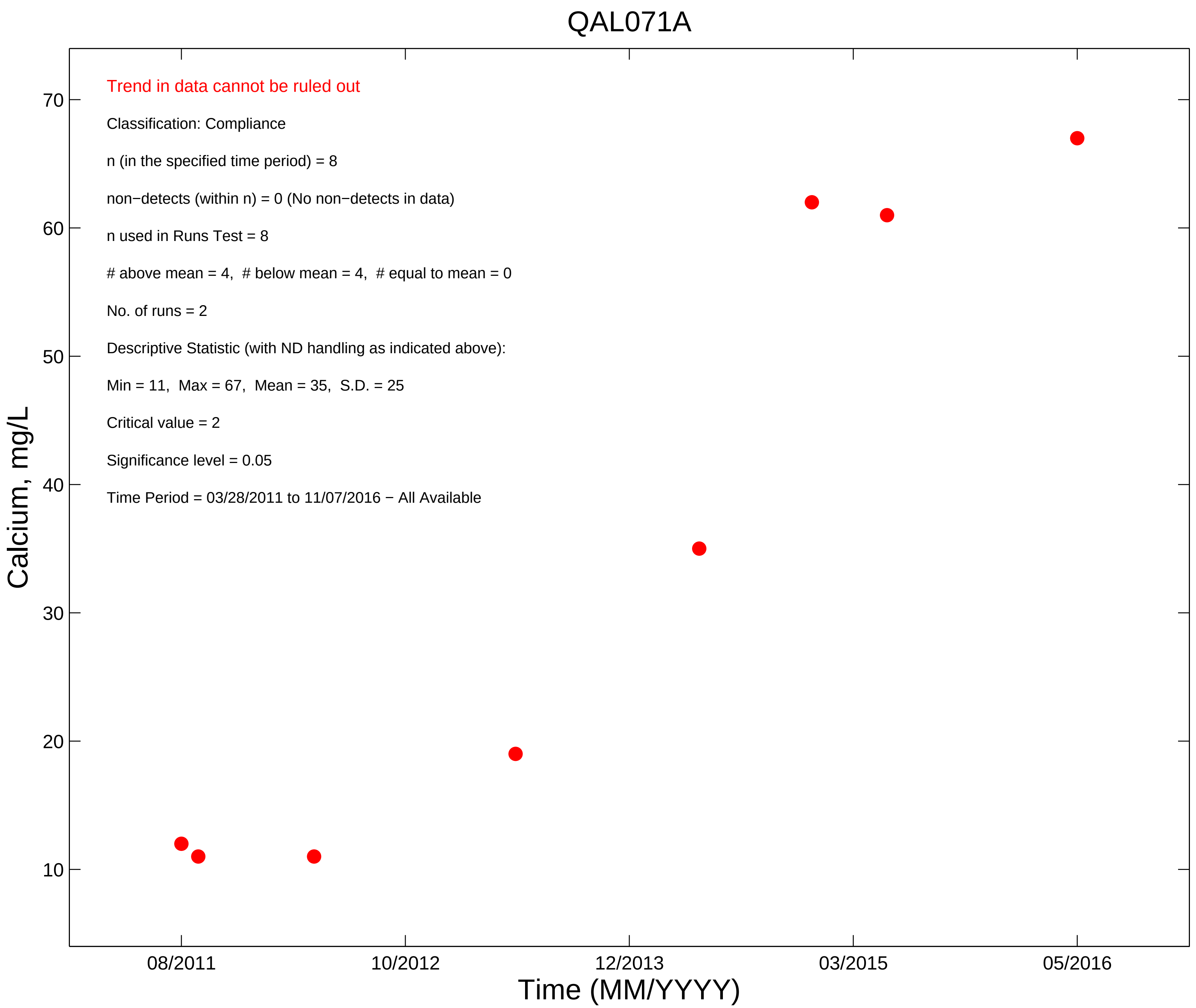
QAL070A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 7
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 7
above mean = 2, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.055, Max = 1, Mean = 0.4124, S.D. = 0.4098
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/07/2016 − All Available
Non−unique RL in data
Nitrogen, Nitrate, mg/L
0
0.2
0.4
0.6
0.8
1
03/2011
07/2012
10/2013
02/2015
05/2016
Time (MM/YYYY)

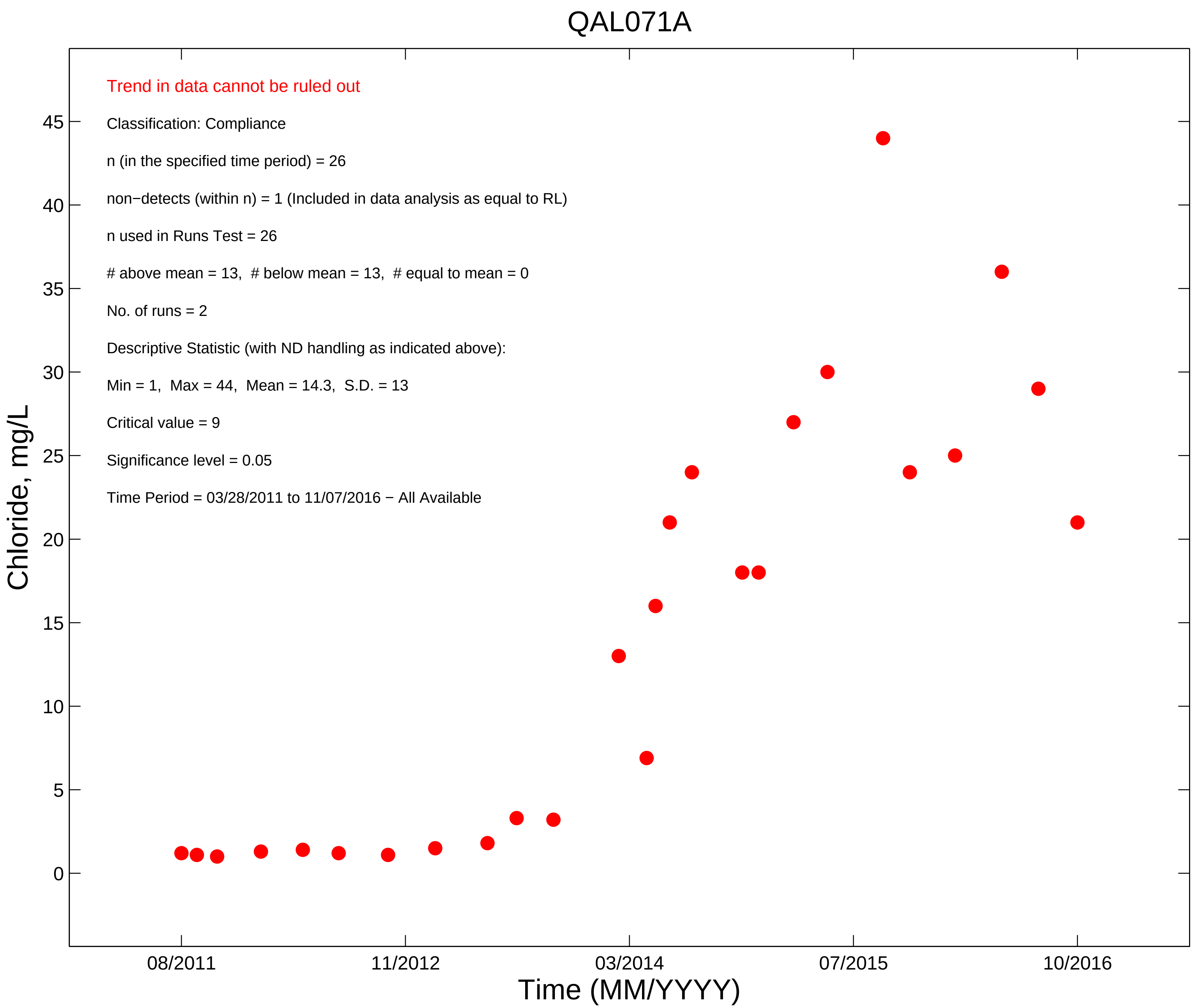


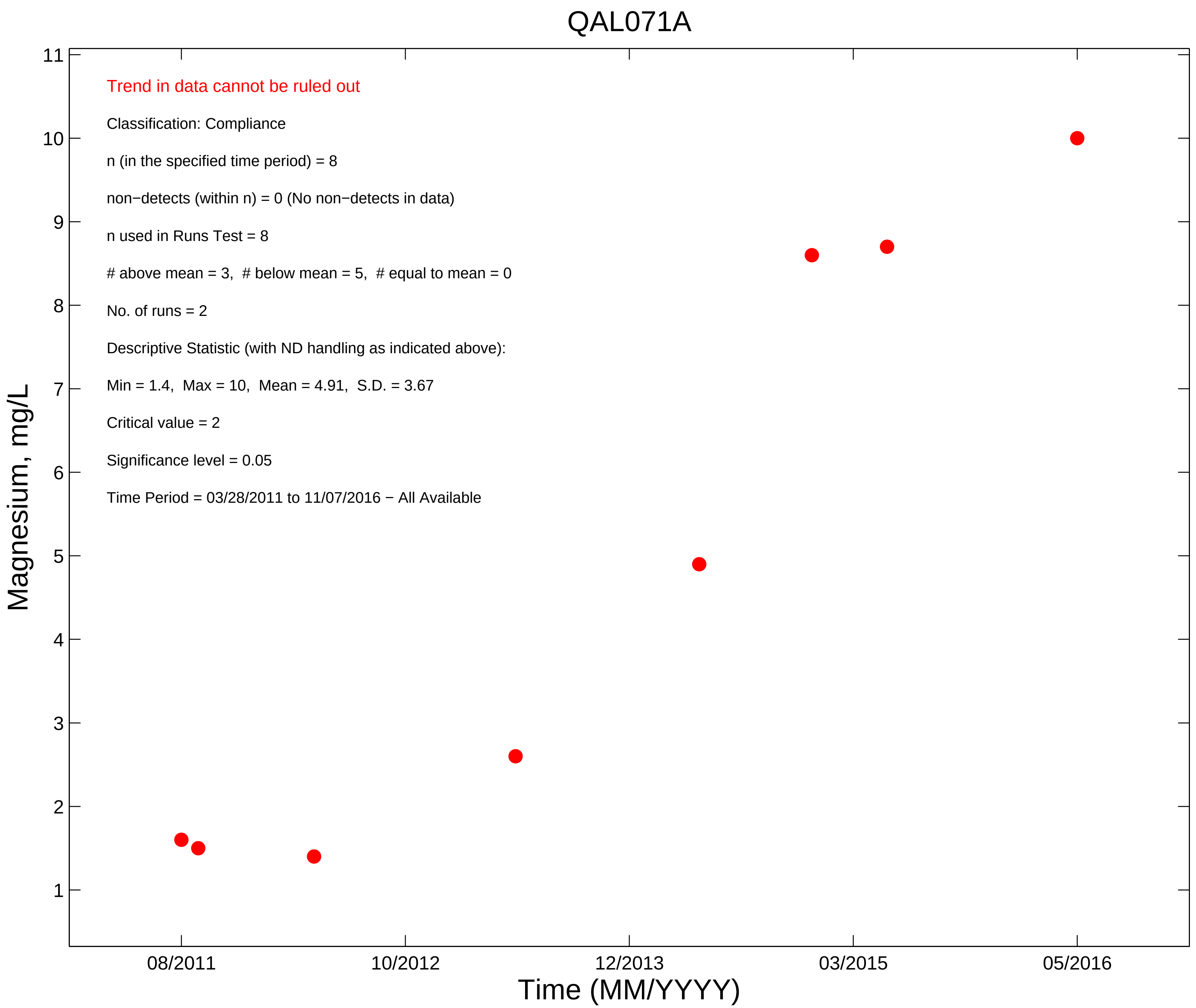
QAL070A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 7
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 7
above mean = 2, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.85, Max = 19, Mean = 4.191, S.D. = 6.746
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/07/2016 − All Available
Sodium, mg/L
0
2
4
6
8
10
12
14
16
18
20
03/2011
07/2012
10/2013
02/2015
05/2016
Time (MM/YYYY)

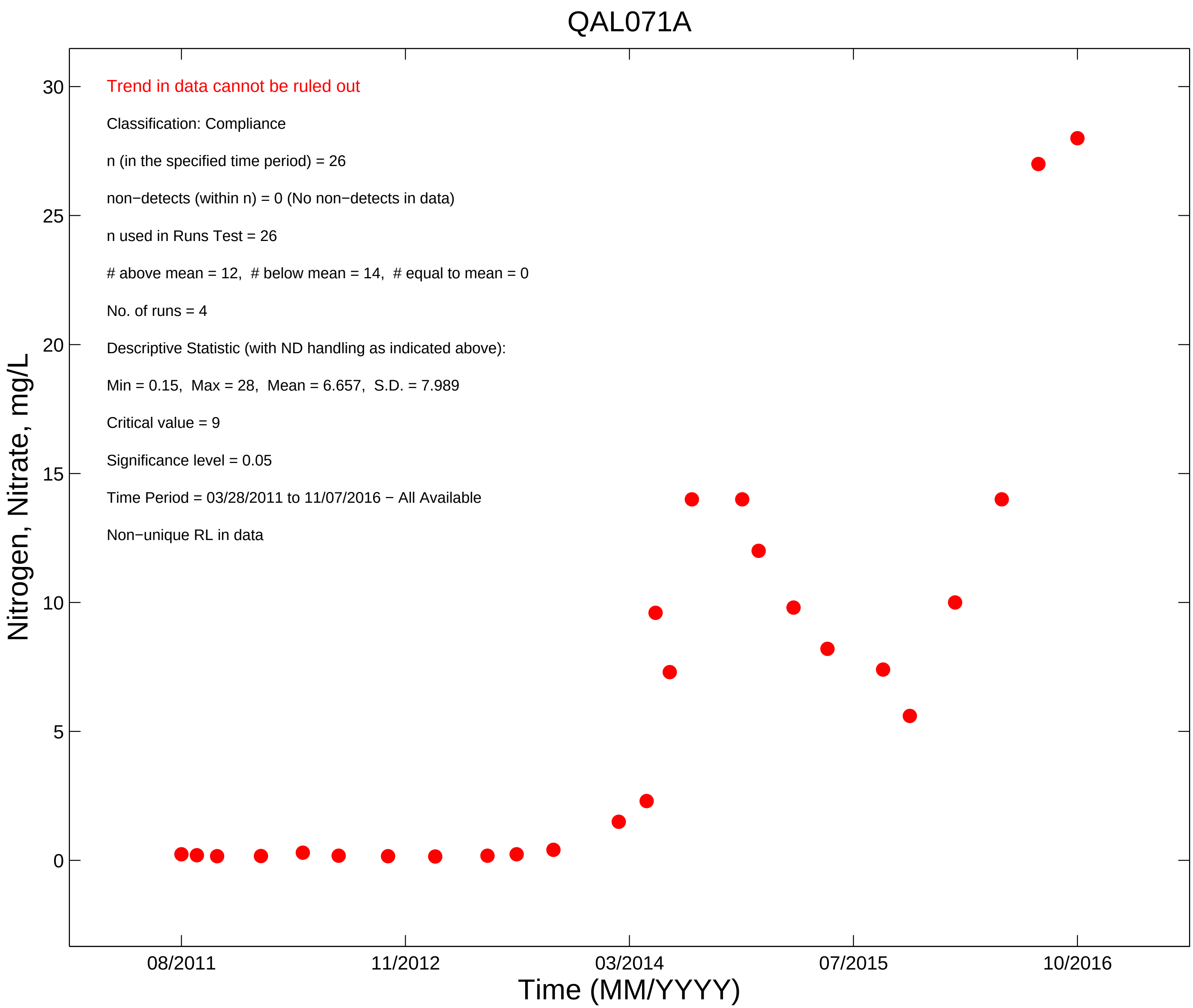


QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 24
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 24
above mean = 11, # below mean = 13, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 30, Max = 150, Mean = 88.3, S.D. = 46.2
Critical value = 8
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Alkalinity, Bicarbonate, mg/L
160
140
120
100
80
60
40
20
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

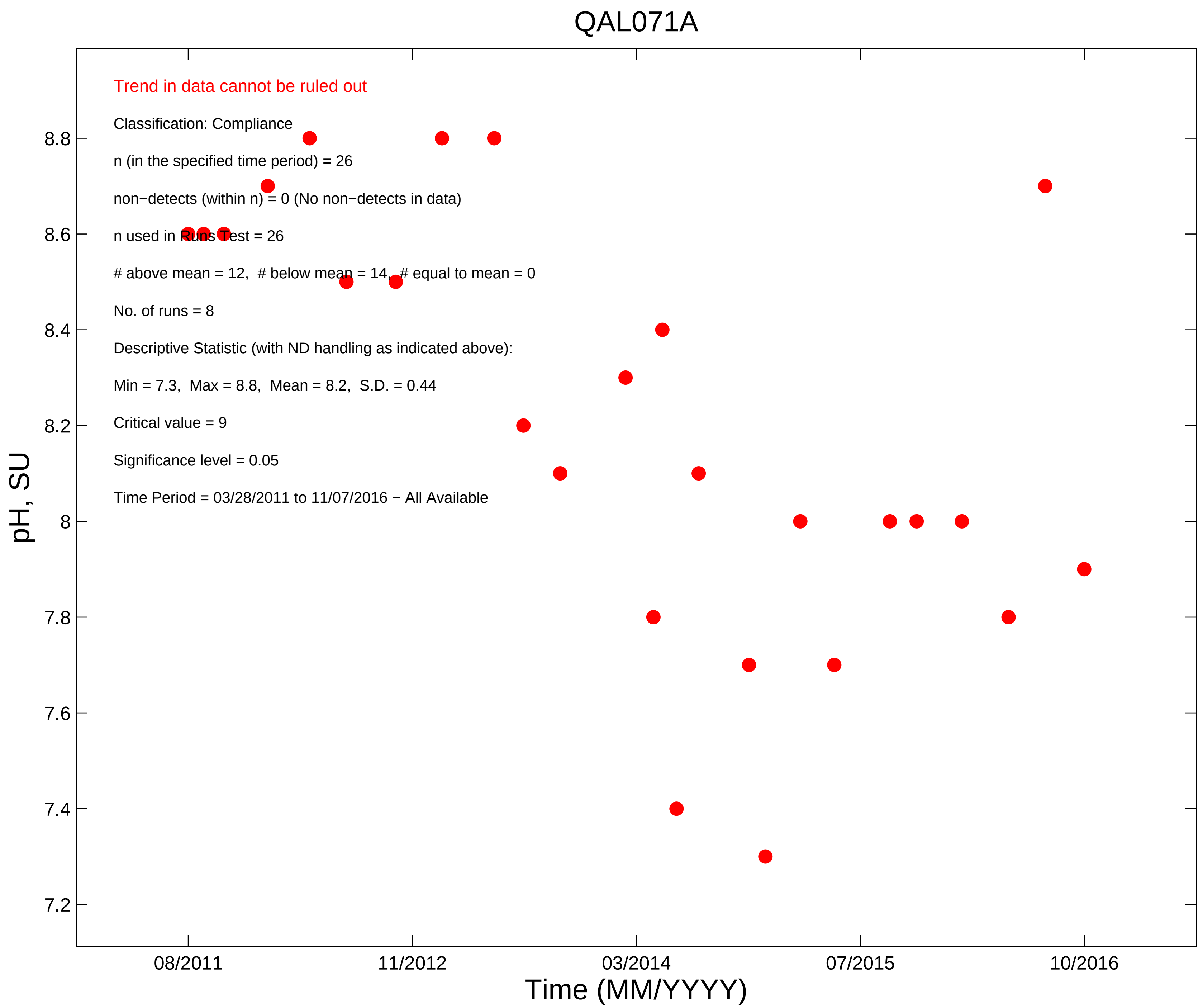

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 8
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 8
above mean = 4, # below mean = 4, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 11, Max = 67, Mean = 35, S.D. = 25
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Calcium, mg/L
70
60
50
40
30
20
10
08/2011
10/2012
12/2013
03/2015
05/2016
Time (MM/YYYY)


QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 26
non−detects (within n) = 1 (Included in data analysis as equal to RL)
n used in Runs Test = 26
above mean = 13, # below mean = 13, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 44, Mean = 14.3, S.D. = 13
Critical value = 9
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Chloride, mg/L
45
40
35
30
25
20
15
10
5
0
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

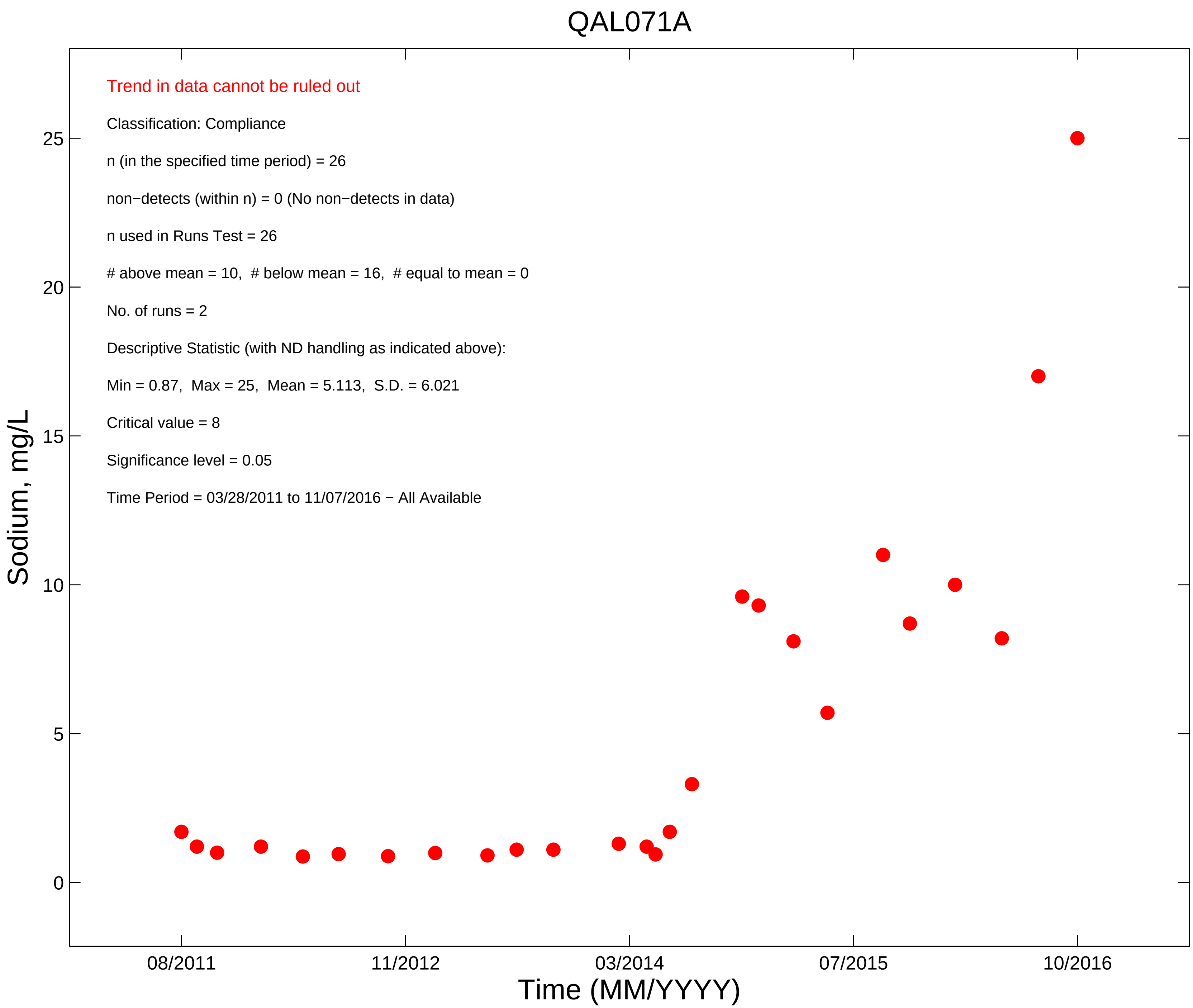

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 8
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 8
above mean = 3, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.4, Max = 10, Mean = 4.91, S.D. = 3.67
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Magnesium, mg/L
1
2
3
4
5
6
7
8
9
10
11
08/2011
10/2012
12/2013
03/2015
05/2016
Time (MM/YYYY)

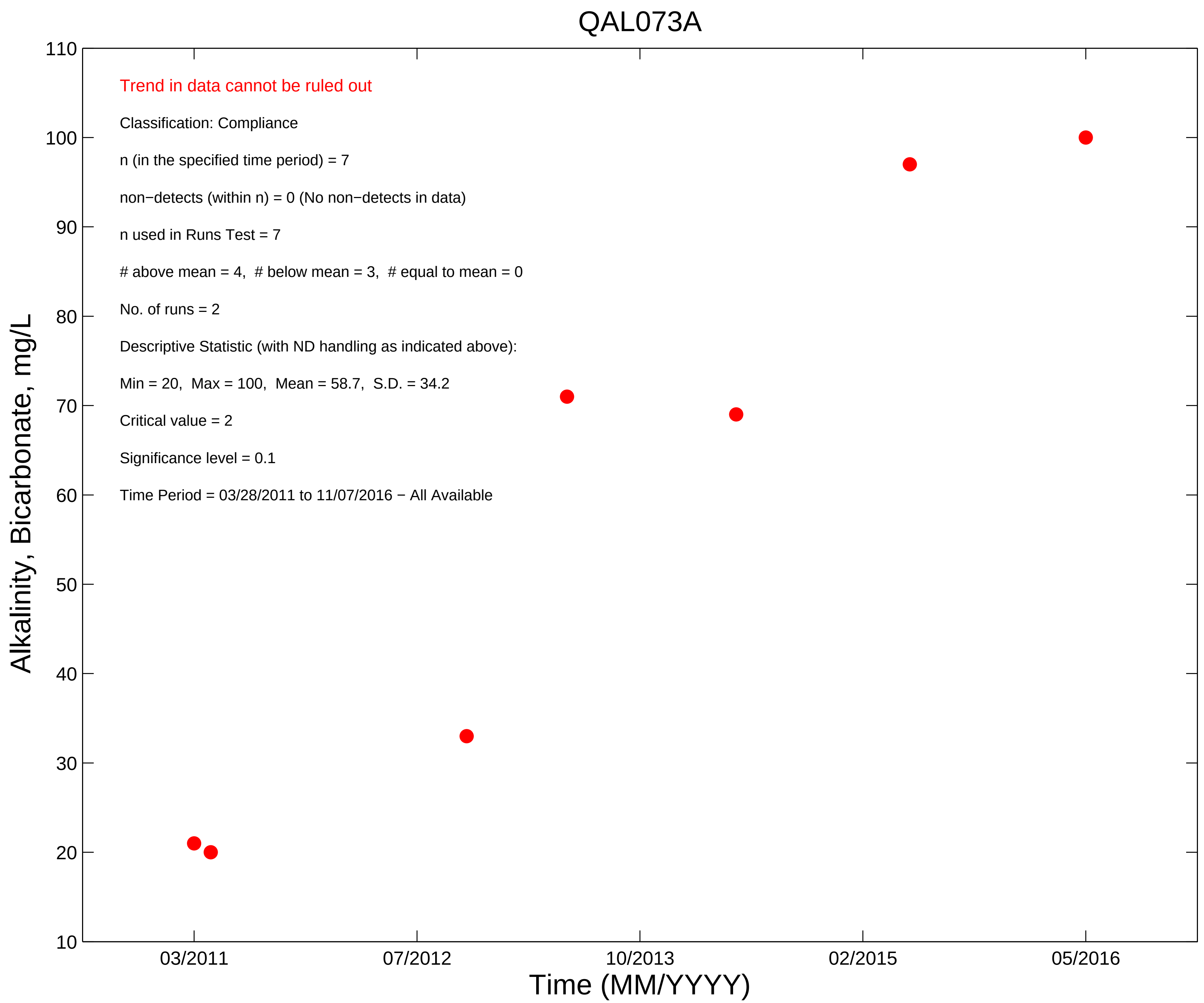


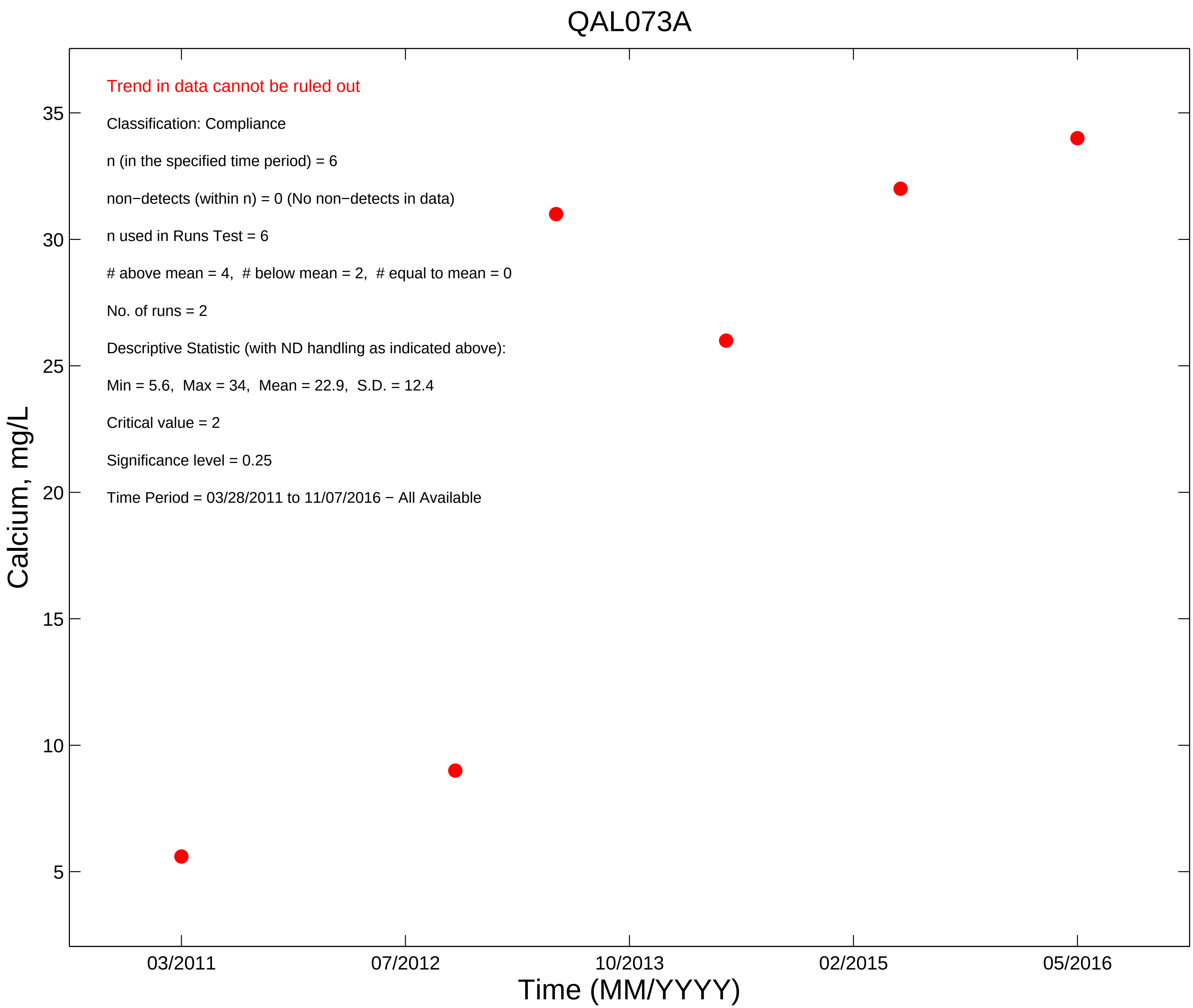
QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 26
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 26
above mean = 12, # below mean = 14, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 0.15, Max = 28, Mean = 6.657, S.D. = 7.989
Critical value = 9
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Non−unique RL in data
Nitrogen, Nitrate, mg/L
30
25
20
15
10
5
0
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)



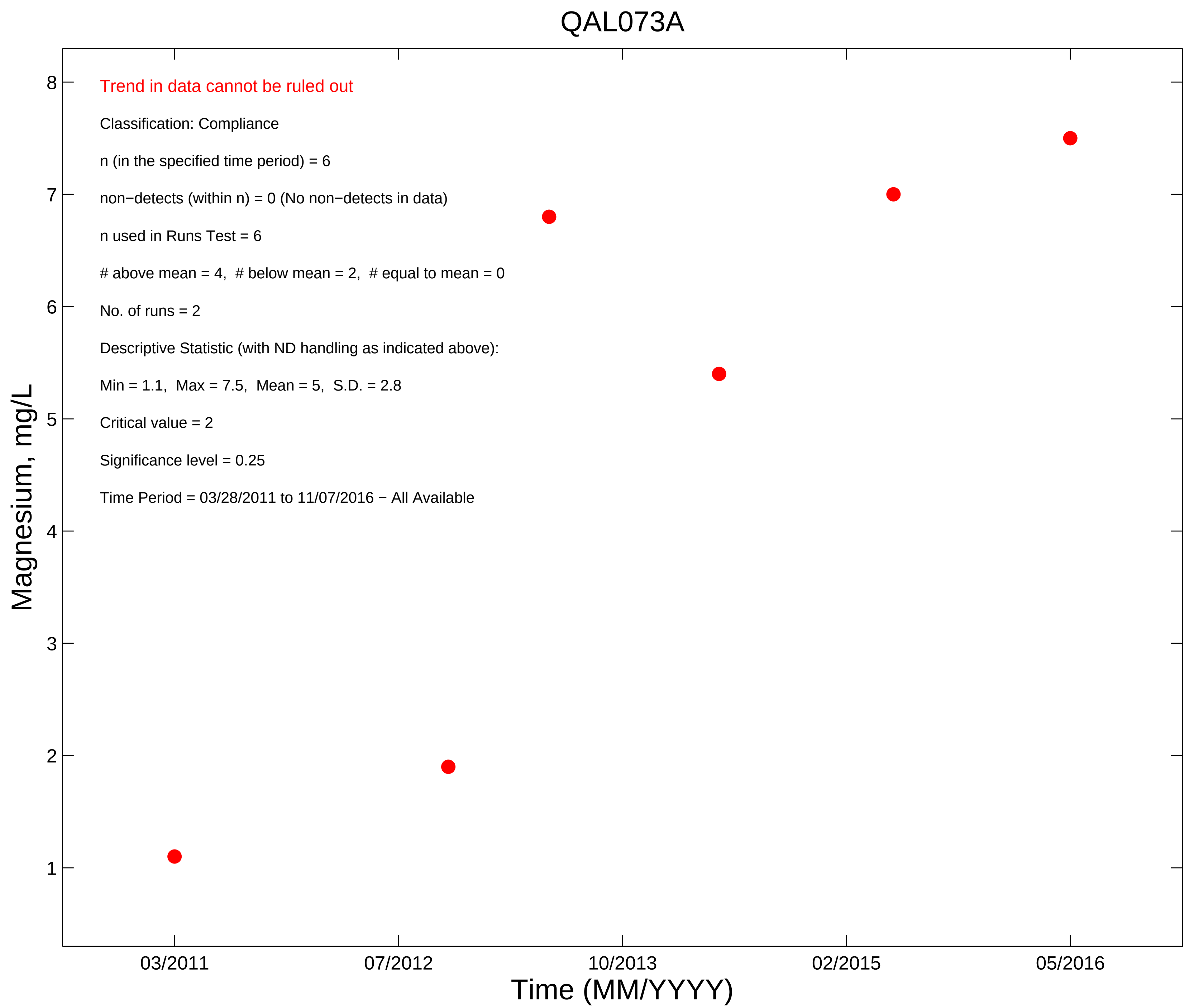
QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 26
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 26
above mean = 12, # below mean = 14, # equal to mean = 0
No. of runs = 8
Descriptive Statistic (with ND handling as indicated above):
Min = 7.3, Max = 8.8, Mean = 8.2, S.D. = 0.44
Critical value = 9
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
pH, SU
8.8
8.6
8.4
8.2
8
7.8
7.6
7.4
7.2
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

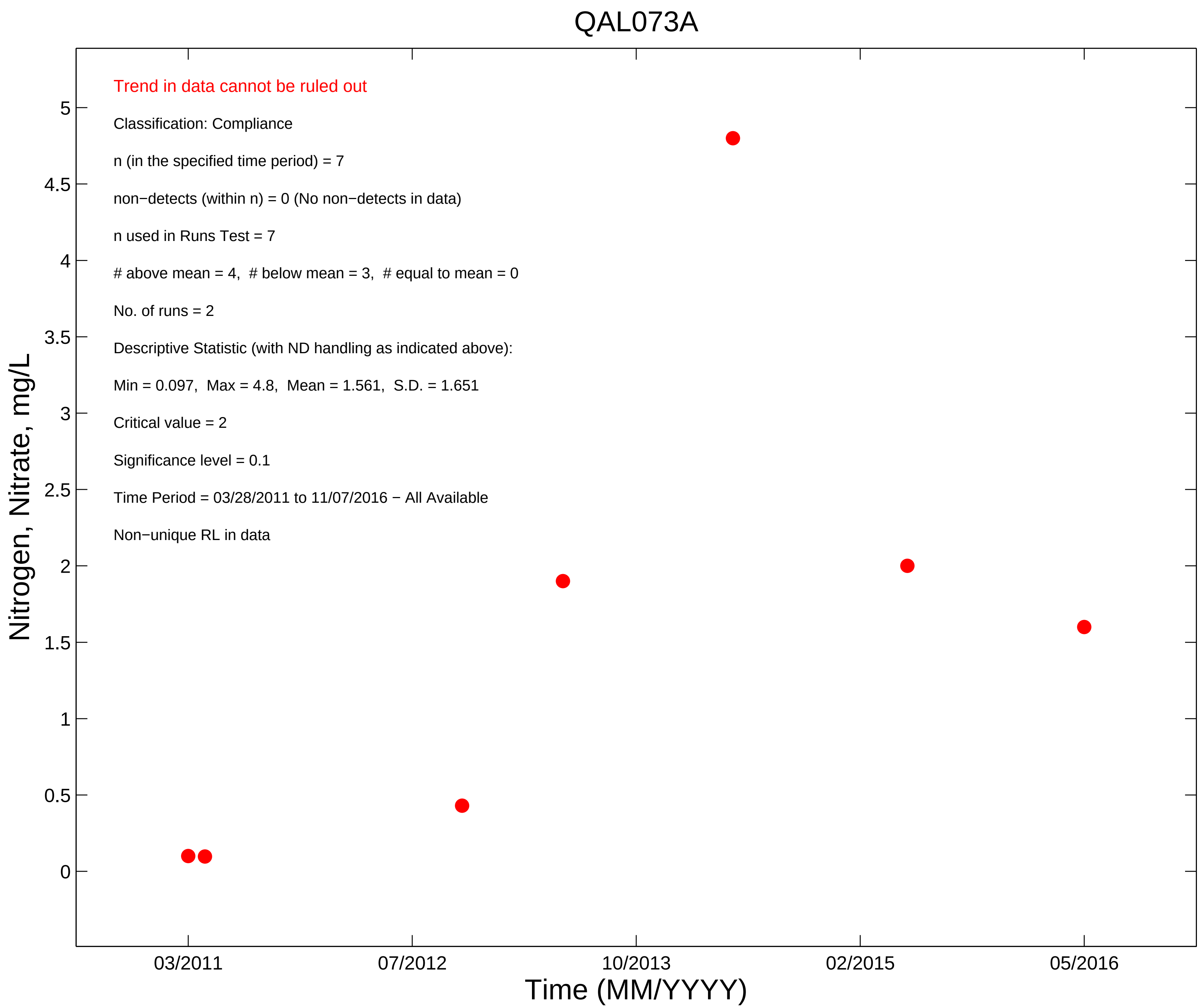

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 26
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 26
above mean = 10, # below mean = 16, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.87, Max = 25, Mean = 5.113, S.D. = 6.021
Critical value = 8
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Sodium, mg/L
0
5
10
15
20
25
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

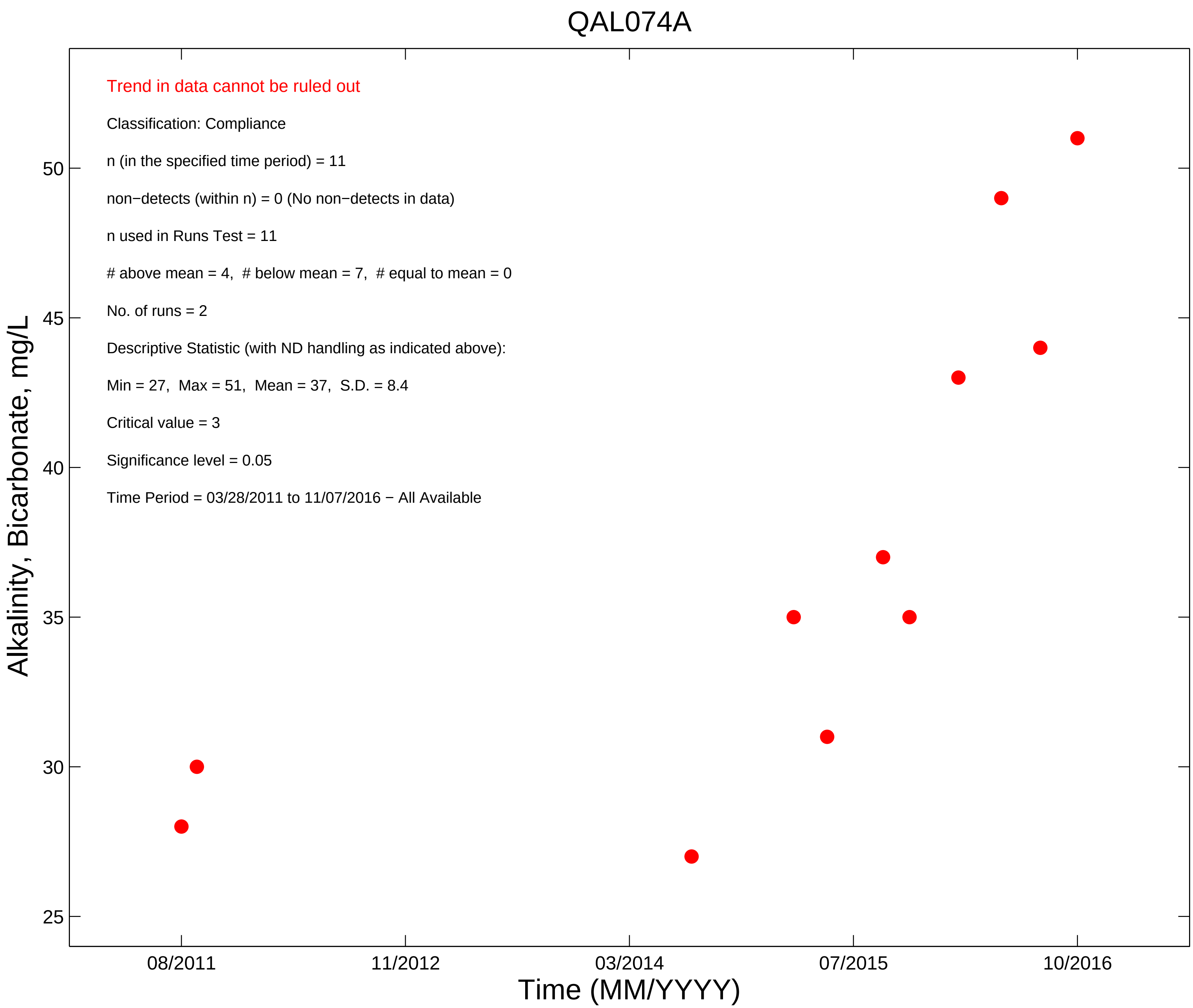

QAL073A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 7
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 7
above mean = 4, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 20, Max = 100, Mean = 58.7, S.D. = 34.2
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/07/2016 − All Available
Alkalinity, Bicarbonate, mg/L
110
100
90
80
70
60
50
40
30
20
10
03/2011
07/2012
10/2013
02/2015
05/2016
Time (MM/YYYY)



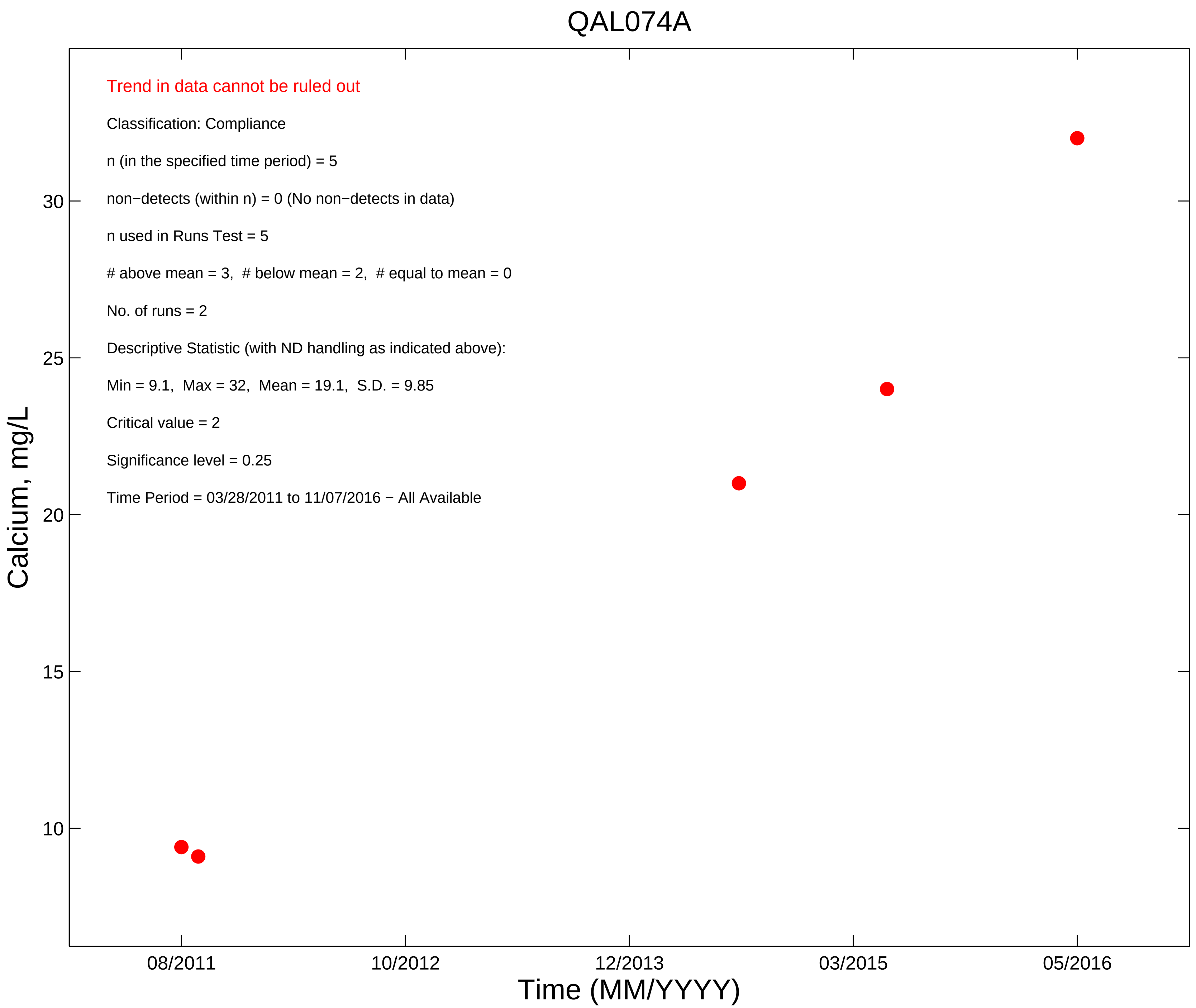
QAL073A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 6
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 6
above mean = 4, # below mean = 2, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 5.6, Max = 34, Mean = 22.9, S.D. = 12.4
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/07/2016 − All Available
Calcium, mg/L
35
30
25
20
15
10
5
03/2011
07/2012
10/2013
02/2015
05/2016
Time (MM/YYYY)

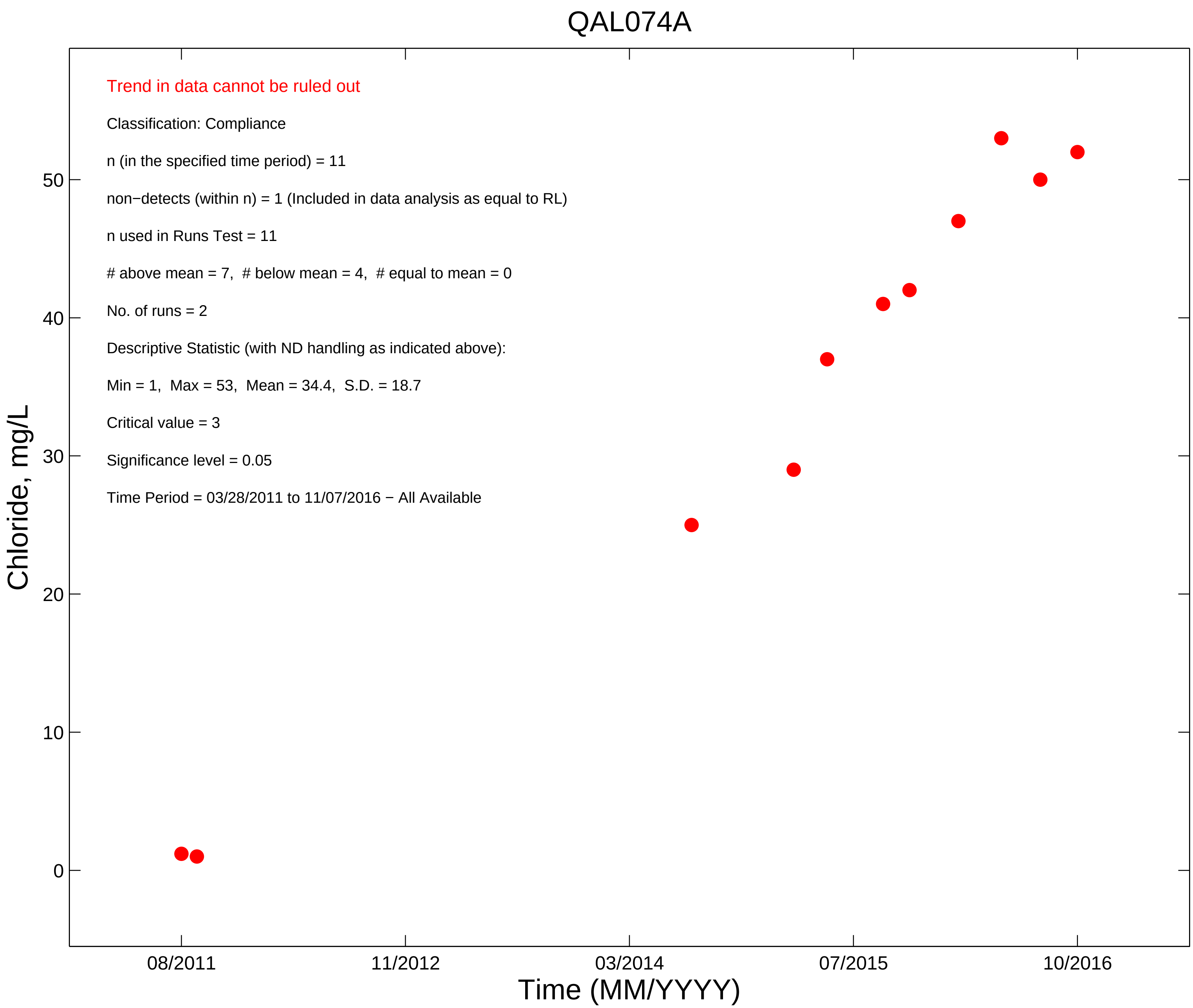

QAL073A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 6
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 6
above mean = 4, # below mean = 2, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.1, Max = 7.5, Mean = 5, S.D. = 2.8
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/07/2016 − All Available
Magnesium, mg/L
8
7
6
5
4
3
2
1
03/2011
07/2012
10/2013
02/2015
05/2016
Time (MM/YYYY)

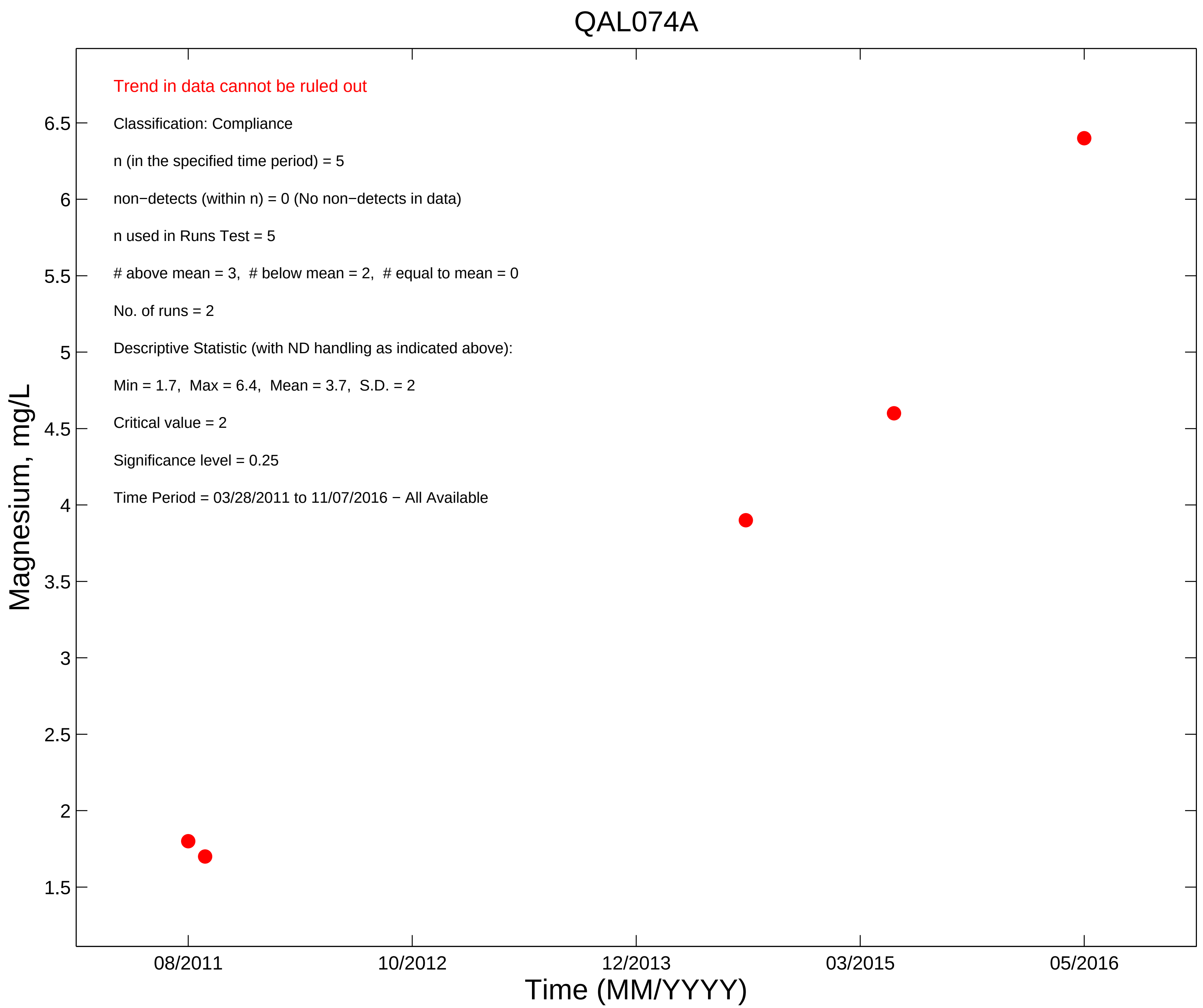

QAL073A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 7
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 7
above mean = 4, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.097, Max = 4.8, Mean = 1.561, S.D. = 1.651
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/07/2016 − All Available
Non−unique RL in data
Nitrogen, Nitrate, mg/L
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
03/2011
07/2012
10/2013
02/2015
05/2016
Time (MM/YYYY)

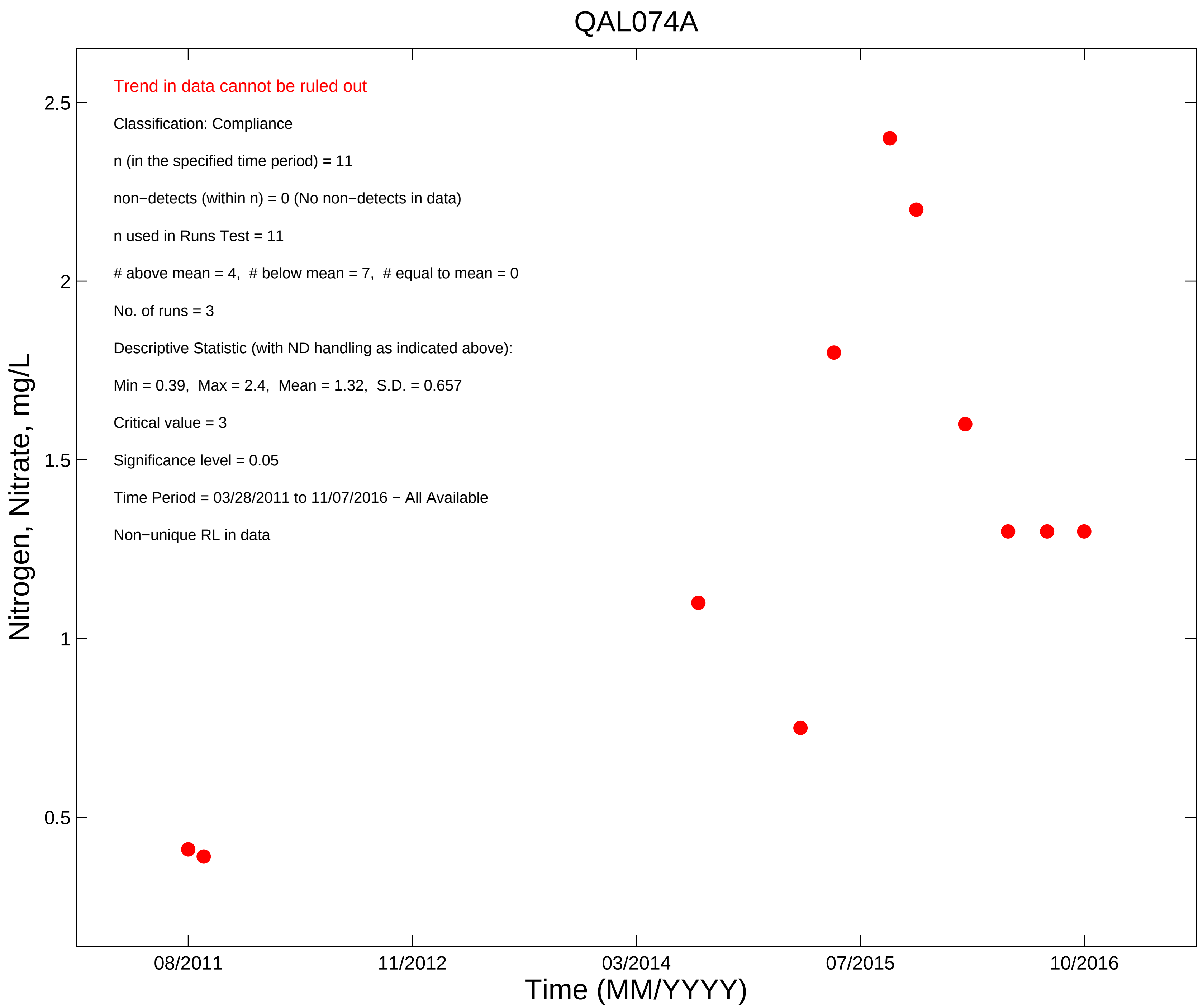


QAL074A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 11
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 11
above mean = 4, # below mean = 7, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 27, Max = 51, Mean = 37, S.D. = 8.4
Critical value = 3
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Alkalinity, Bicarbonate, mg/L
50
45
40
35
30
25
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

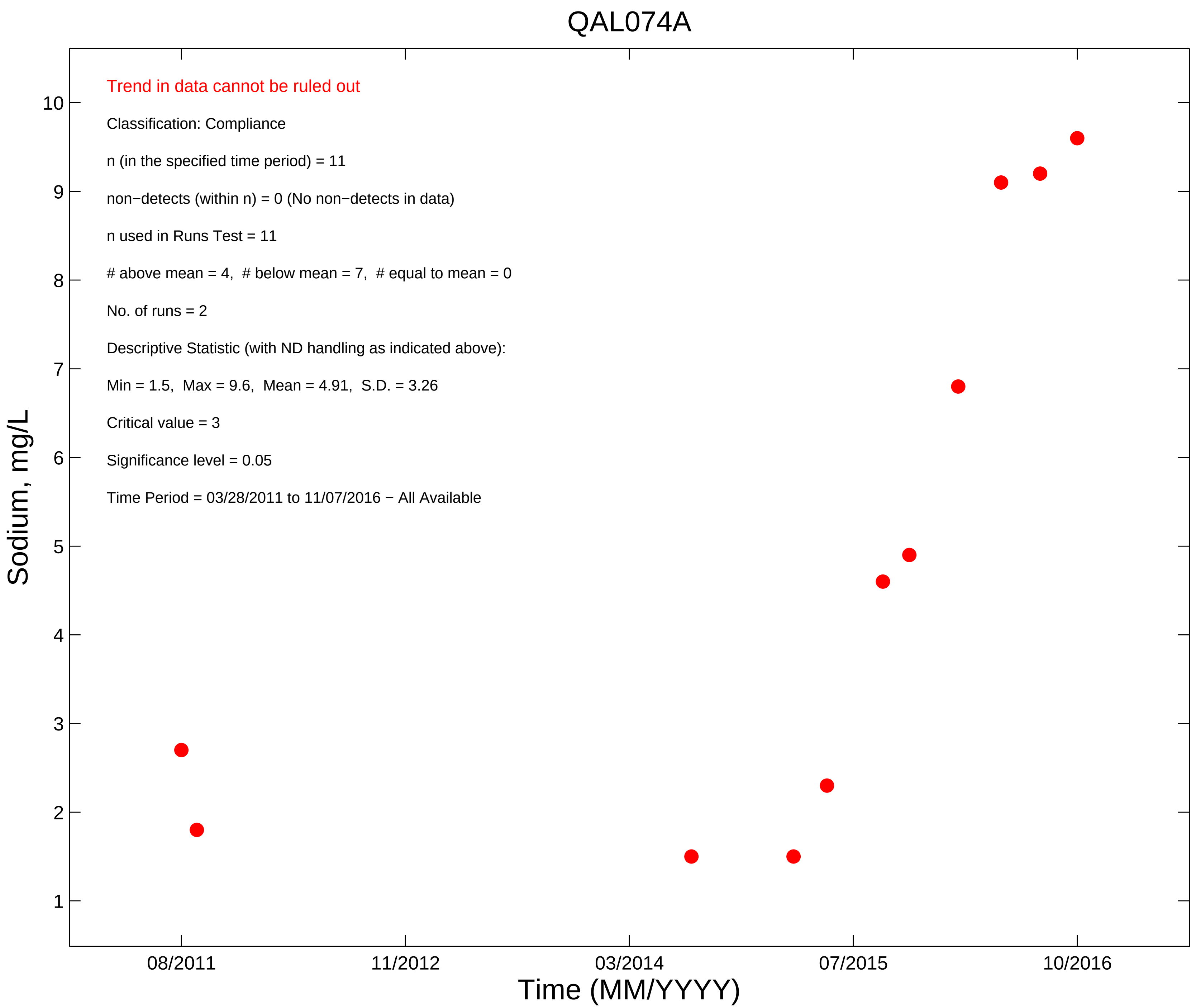

QAL074A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 5
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 5
above mean = 3, # below mean = 2, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 9.1, Max = 32, Mean = 19.1, S.D. = 9.85
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/07/2016 − All Available
Calcium, mg/L
30
25
20
15
10
08/2011
10/2012
12/2013
03/2015
05/2016
Time (MM/YYYY)


QAL074A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 11
non−detects (within n) = 1 (Included in data analysis as equal to RL)
n used in Runs Test = 11
above mean = 7, # below mean = 4, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 53, Mean = 34.4, S.D. = 18.7
Critical value = 3
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Chloride, mg/L
0
10
20
30
40
50
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)


QAL074A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 5
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 5
above mean = 3, # below mean = 2, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.7, Max = 6.4, Mean = 3.7, S.D. = 2
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/07/2016 − All Available
Magnesium, mg/L
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
08/2011
10/2012
12/2013
03/2015
05/2016
Time (MM/YYYY)



QAL074A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 11
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 11
above mean = 4, # below mean = 7, # equal to mean = 0
No. of runs = 3
Descriptive Statistic (with ND handling as indicated above):
Min = 0.39, Max = 2.4, Mean = 1.32, S.D. = 0.657
Critical value = 3
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Non−unique RL in data
Nitrogen, Nitrate, mg/L
2.5
2
1.5
1
0.5
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

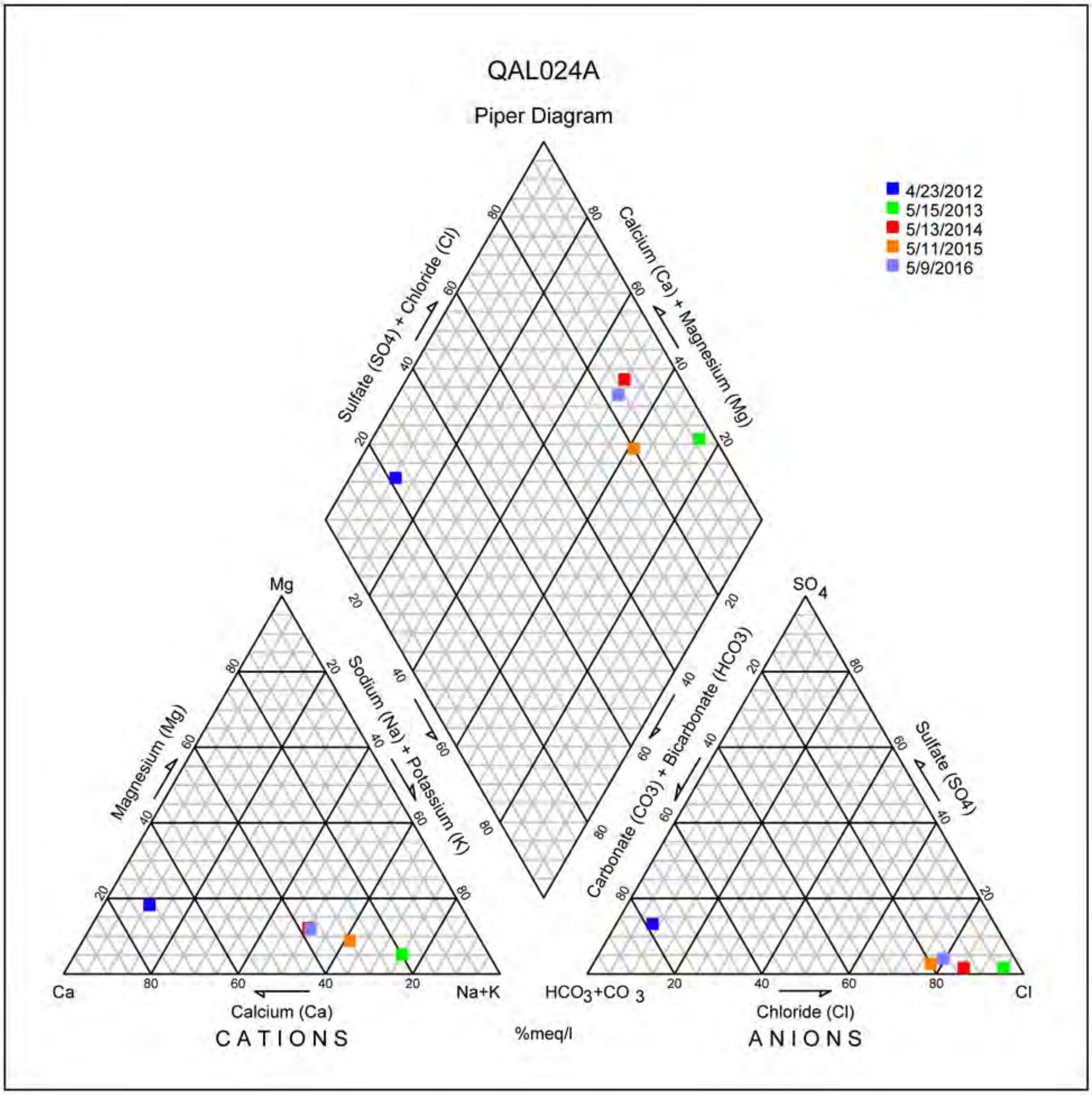


QAL074A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 11
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 11
above mean = 4, # below mean = 7, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.5, Max = 9.6, Mean = 4.91, S.D. = 3.26
Critical value = 3
Significance level = 0.05
Time Period = 03/28/2011 to 11/07/2016 − All Available
Sodium, mg/L
1
2
3
4
5
6
7
8
9
10
08/2011
11/2012
03/2014
07/2015
10/2016
Time (MM/YYYY)

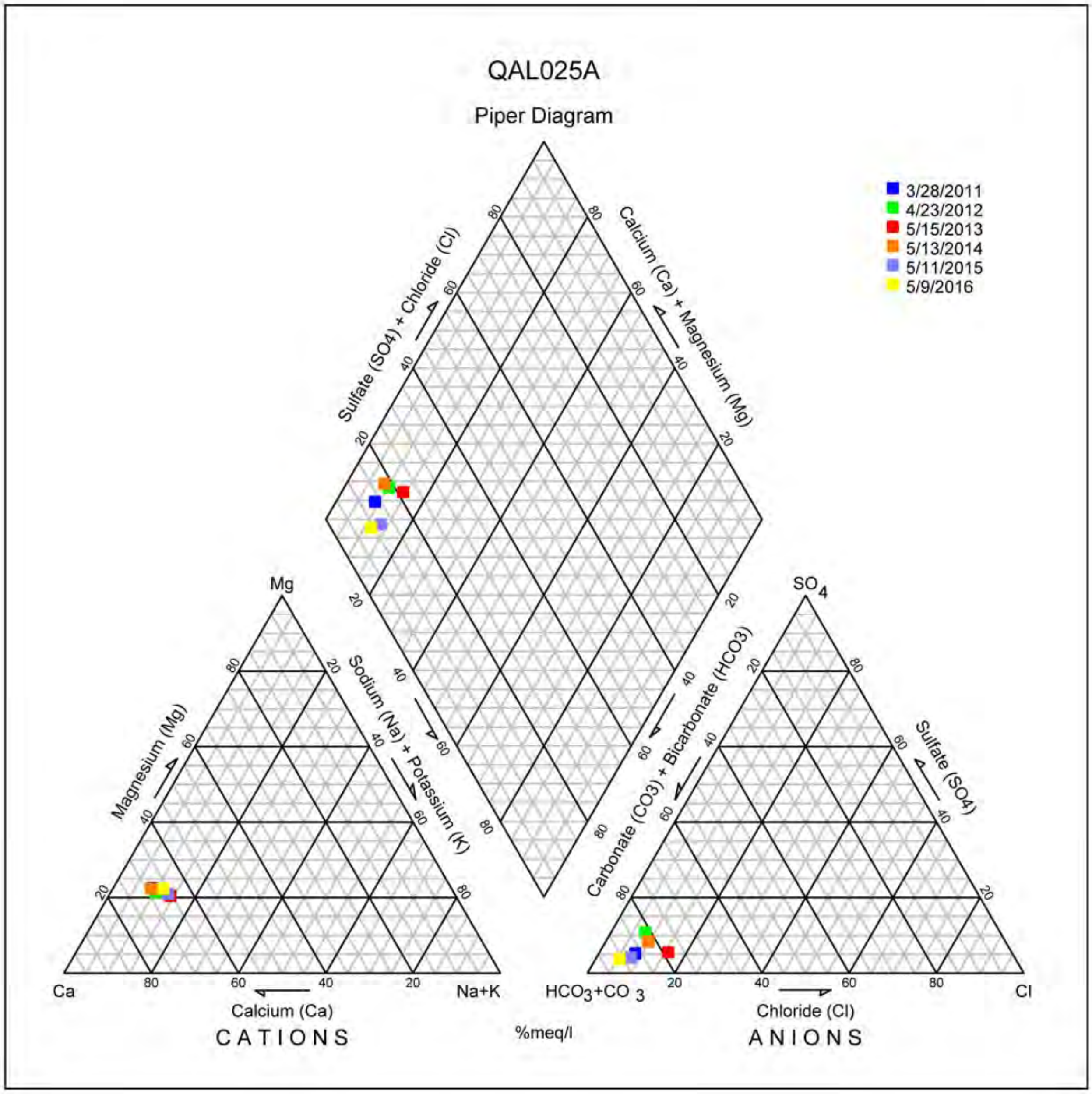
Appendix H

Eagle Mine

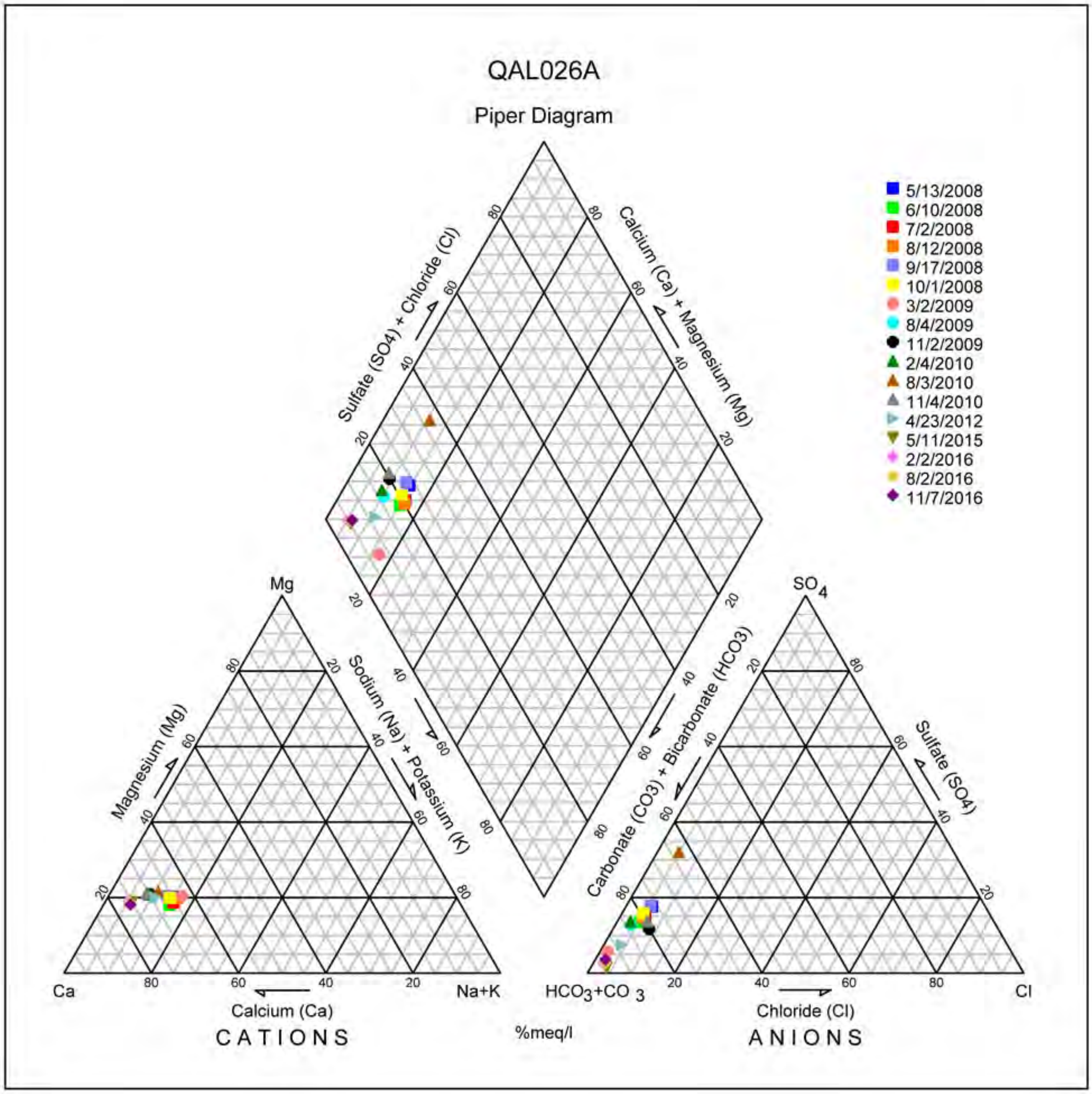
Groundwater Piper Diagrams

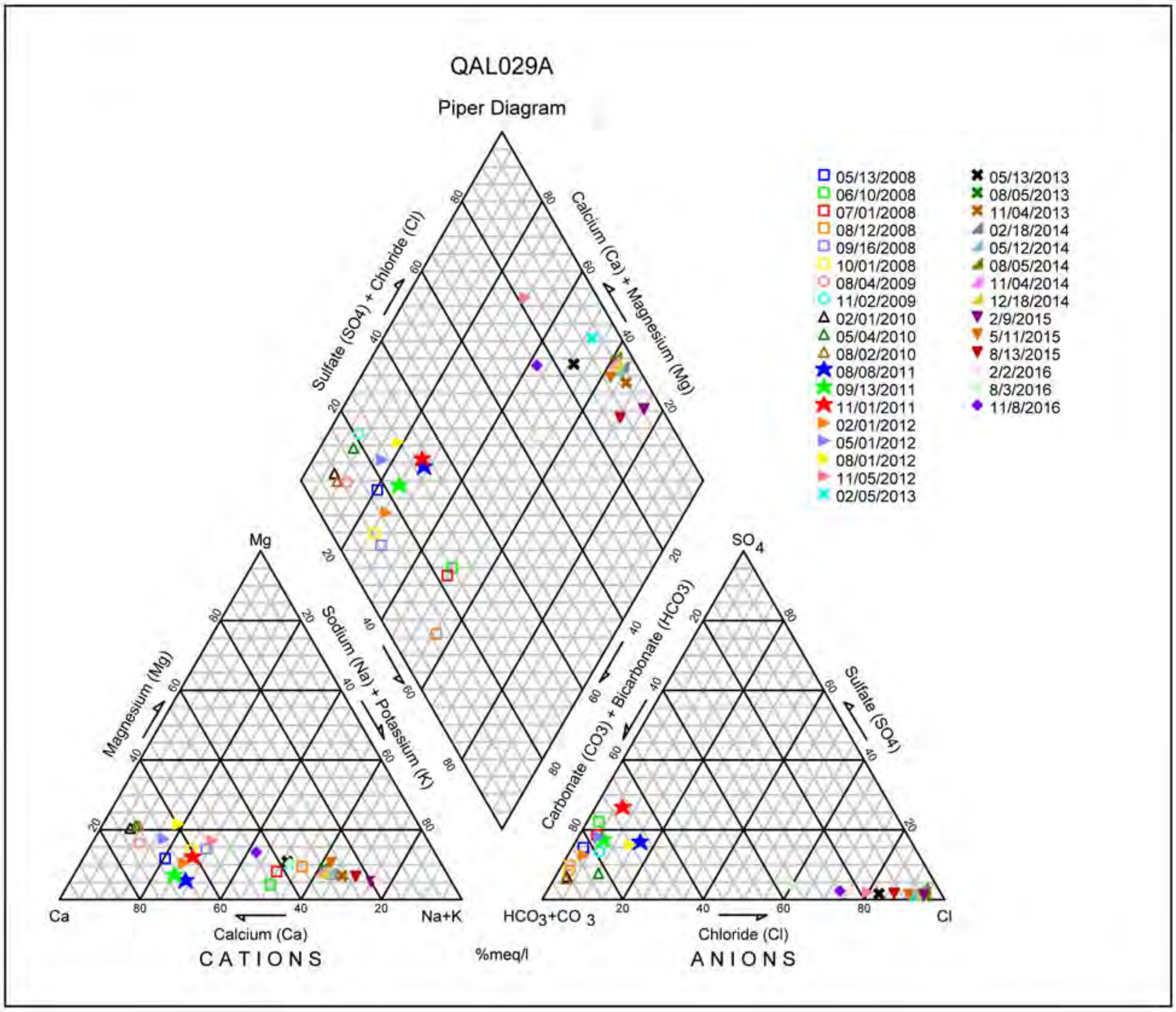


QAL024A
Piper Diagram
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Mg
Magnesium (Mg)
Ca
Na+K
Calcium (Ca)
CATIONS
%meq/l
SO_4
Sulfate (SO4)
HCO_3+CO_3
Cl
Chloride (Cl)
ANIONS

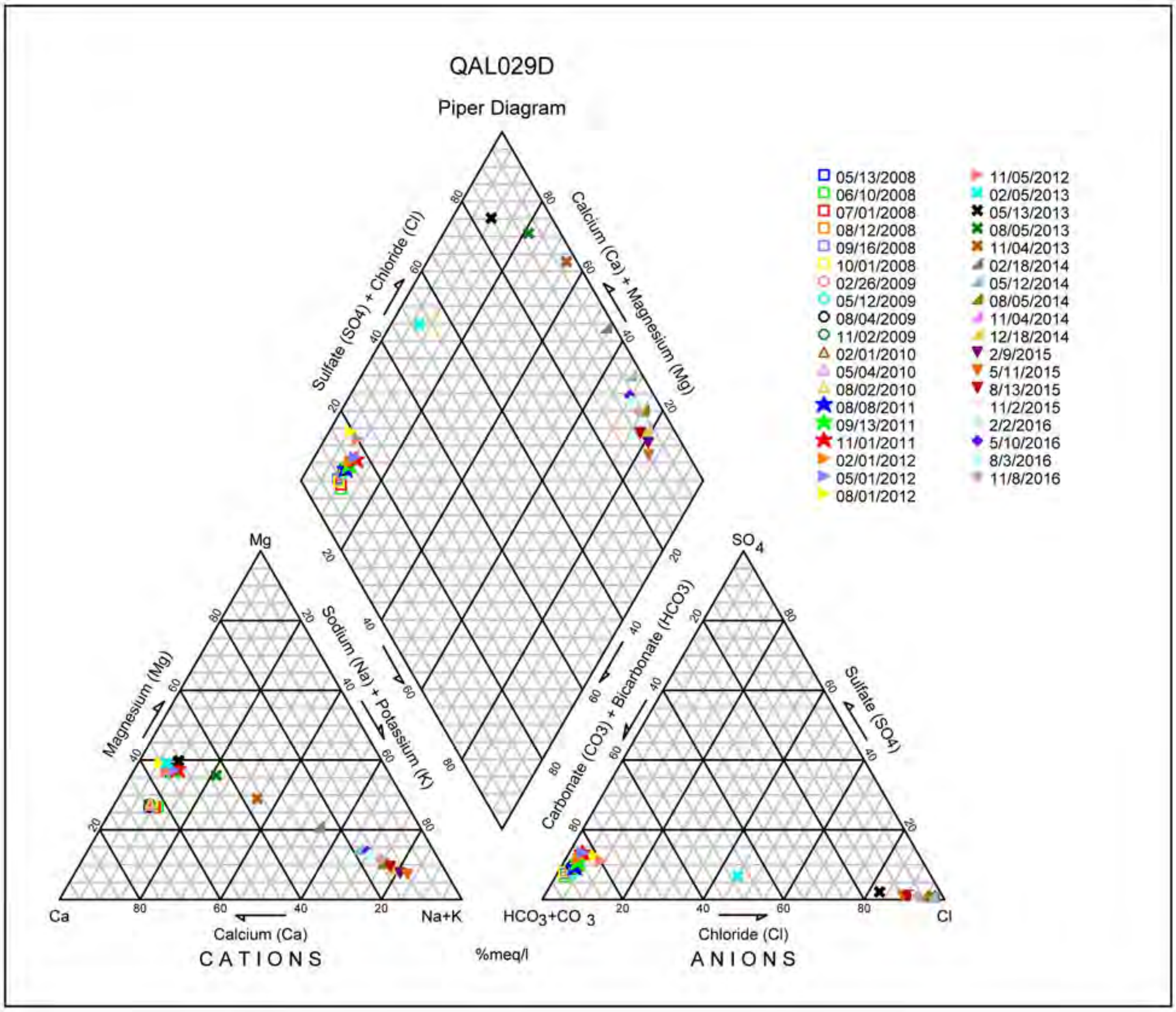


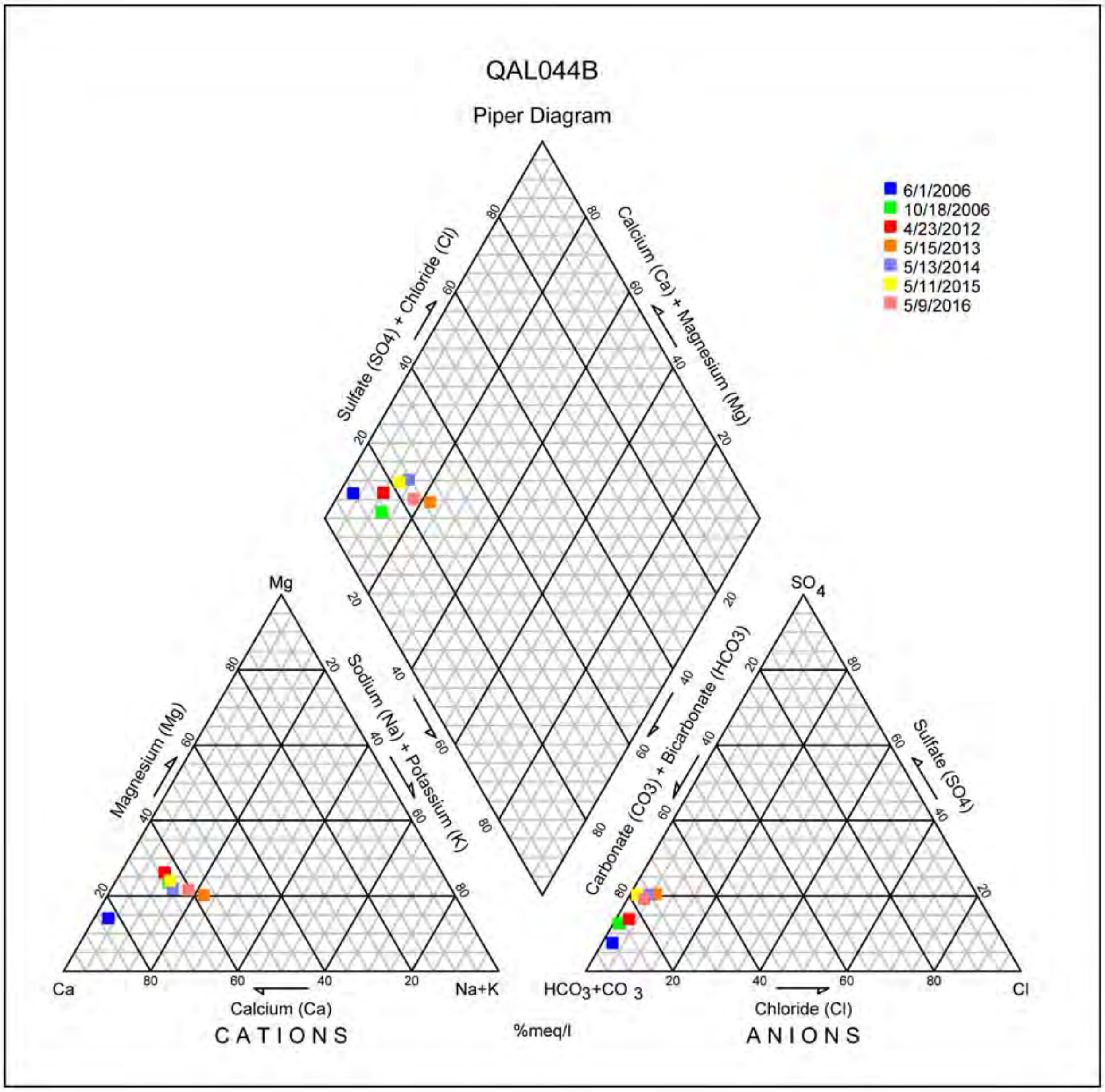
QAL025A
Piper Diagram
3/28/2011
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Magnesium (Mg)
Sulfate (SO4)
Mg
SO_4
Ca
Na+K
HCO_3+CO_3
Cl
Calcium (Ca)
Chloride (Cl)
CATIONS
%meq/l
ANIONS

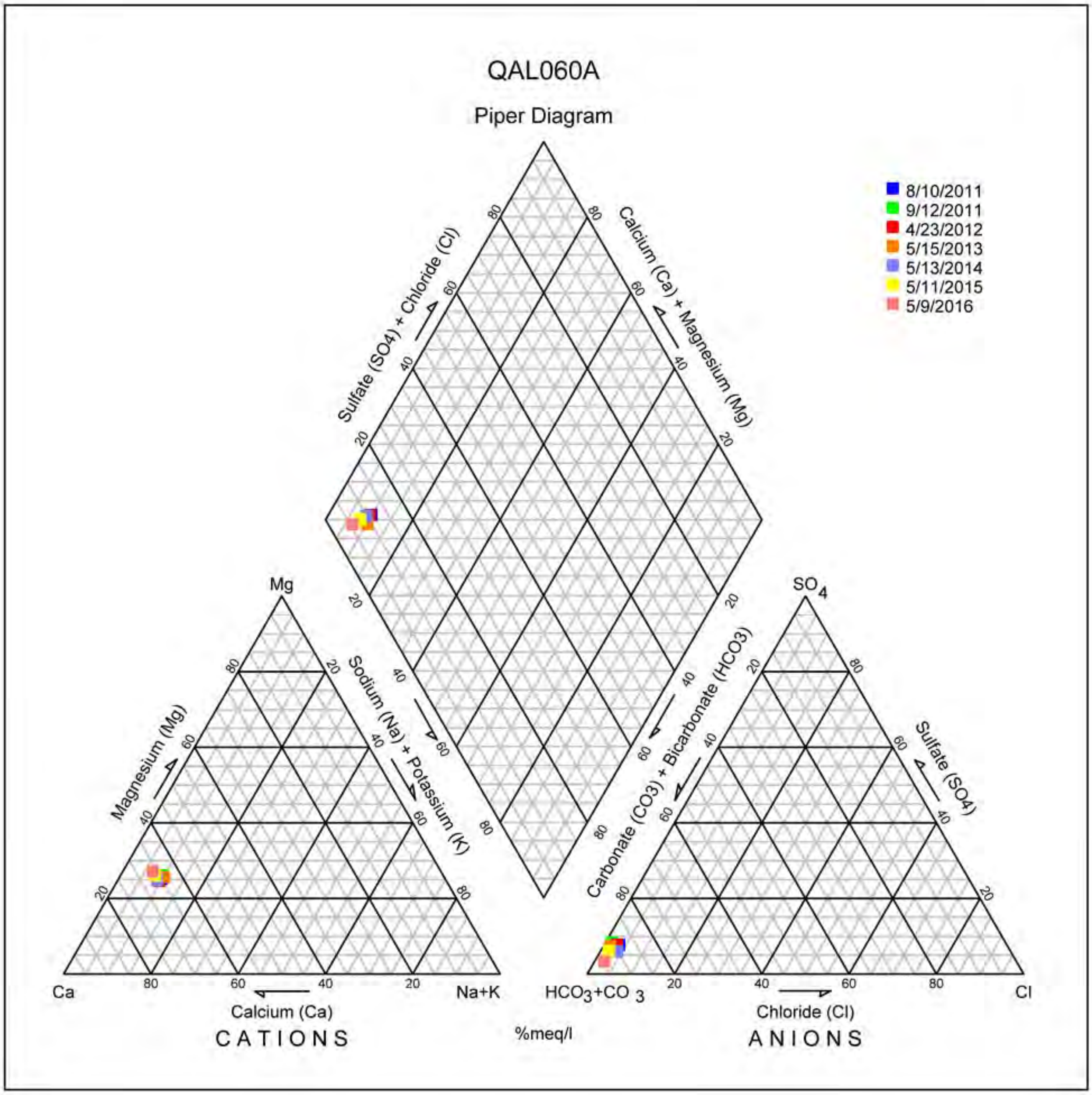

QAL026A
Piper Diagram
5/13/2008
6/10/2008
7/2/2008
8/12/2008
9/17/2008
10/1/2008
3/2/2009
8/4/2009
11/2/2009
2/4/2010
8/3/2010
11/4/2010
4/23/2012
5/11/2015
2/2/2016
8/2/2016
11/7/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Magnesium (Mg)
Sulfate (SO4)
Mg
SO4
Ca
Na+K
HCO3+CO3
Cl
Calcium (Ca)
Chloride (Cl)
CATIONS
%meq/l
ANIONS

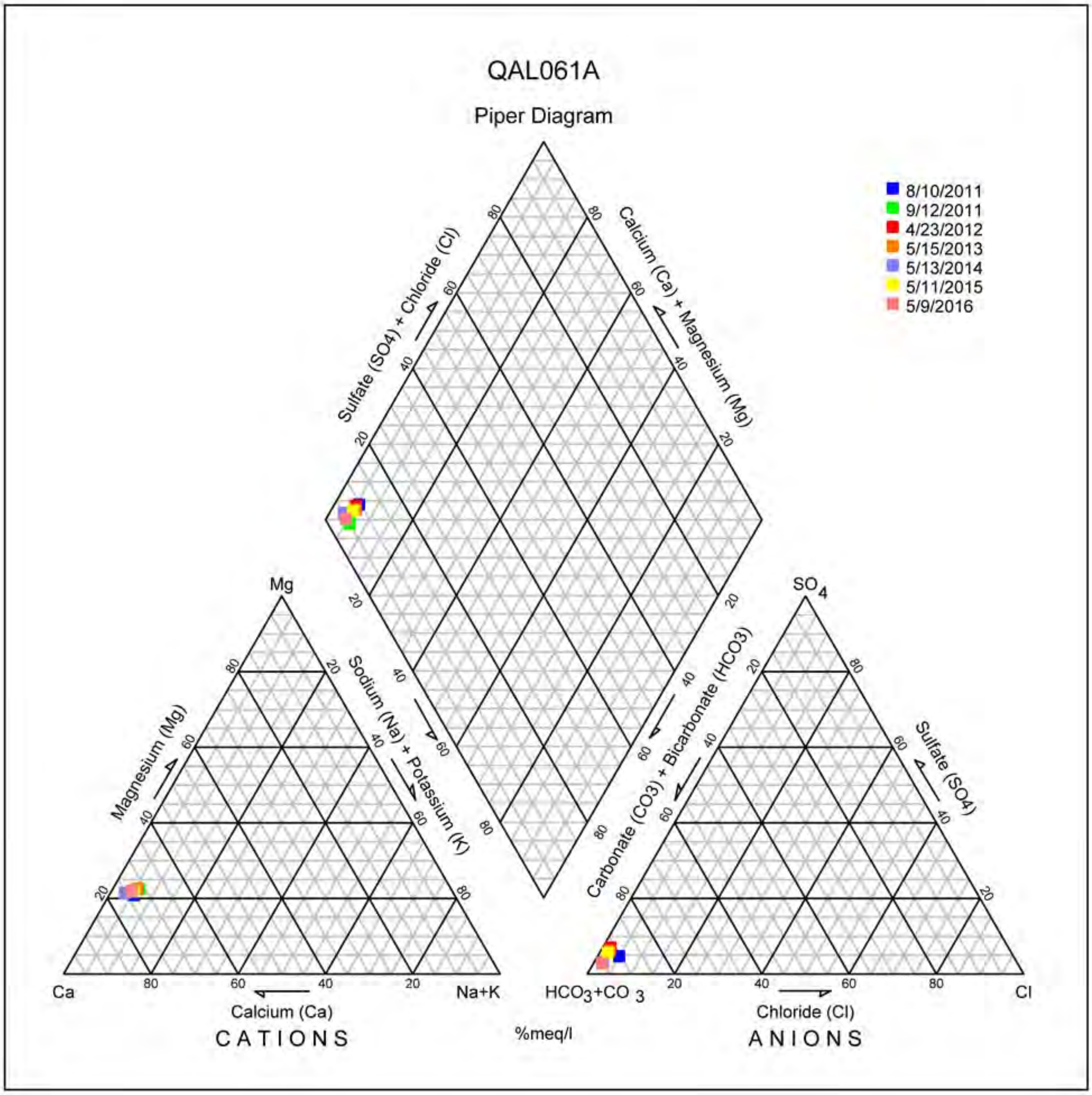


QAL029A
Piper Diagram
05/13/2008
06/10/2008
07/01/2008
08/12/2008
09/16/2008
10/01/2008
08/04/2009
11/02/2009
02/01/2010
05/04/2010
08/02/2010
08/08/2011
09/13/2011
11/01/2011
02/01/2012
05/01/2012
08/01/2012
11/05/2012
02/05/2013
05/13/2013
08/05/2013
11/04/2013
02/18/2014
05/12/2014
08/05/2014
11/04/2014
12/18/2014
2/9/2015
5/11/2015
8/13/2015
2/2/2016
8/3/2016
11/8/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Magnesium (Mg)
Sulfate (SO4)
Mg
SO4
Ca
Na+K
HCO3+CO3
Cl
Calcium (Ca)
Chloride (Cl)
CATIONS
%meq/l
ANIONS

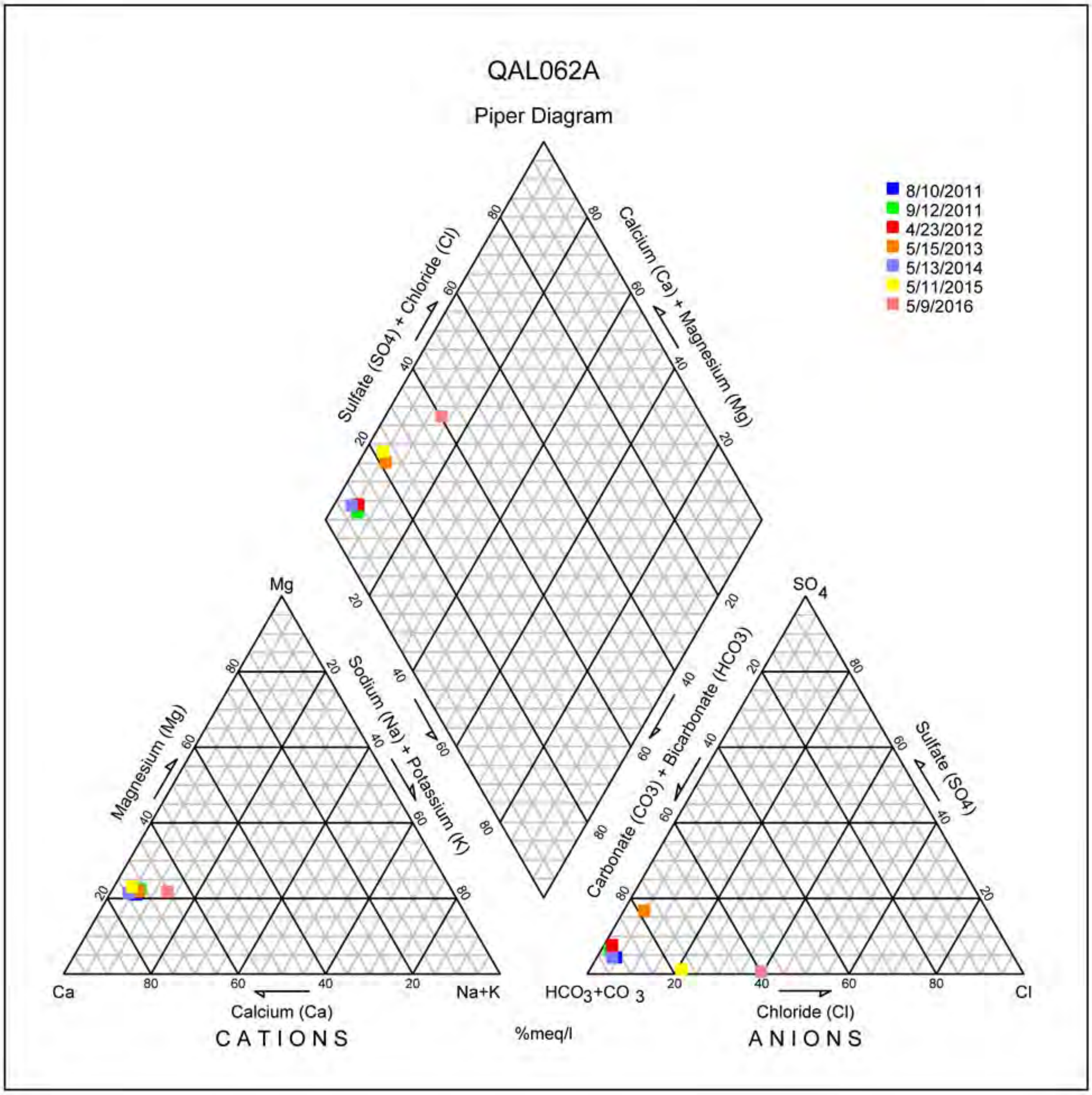

QAL029D
Piper Diagram
05/13/2008
06/10/2008
07/01/2008
08/12/2008
09/16/2008
10/01/2008
02/26/2009
05/12/2009
08/04/2009
11/02/2009
02/01/2010
05/04/2010
08/02/2010
08/08/2011
09/13/2011
11/01/2011
02/01/2012
05/01/2012
08/01/2012
11/05/2012
02/05/2013
05/13/2013
08/05/2013
11/04/2013
02/18/2014
05/12/2014
08/05/2014
11/04/2014
12/18/2014
2/9/2015
5/11/2015
8/13/2015
11/2/2015
2/2/2016
5/10/2016
8/3/2016
11/8/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Magnesium (Mg)
Sulfate (SO4)
Mg
SO4
Ca
Na+K
HCO3+CO3
Cl
Calcium (Ca)
Chloride (Cl)
CATIONS
%meq/l
ANIONS


QAL044B
Piper Diagram
6/1/2006
10/18/2006
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Magnesium (Mg)
Sulfate (SO4)
Mg
SO4
Ca
Na+K
HCO3+CO3
Cl
Calcium (Ca)
Chloride (Cl)
CATIONS
%meq/l
ANIONS

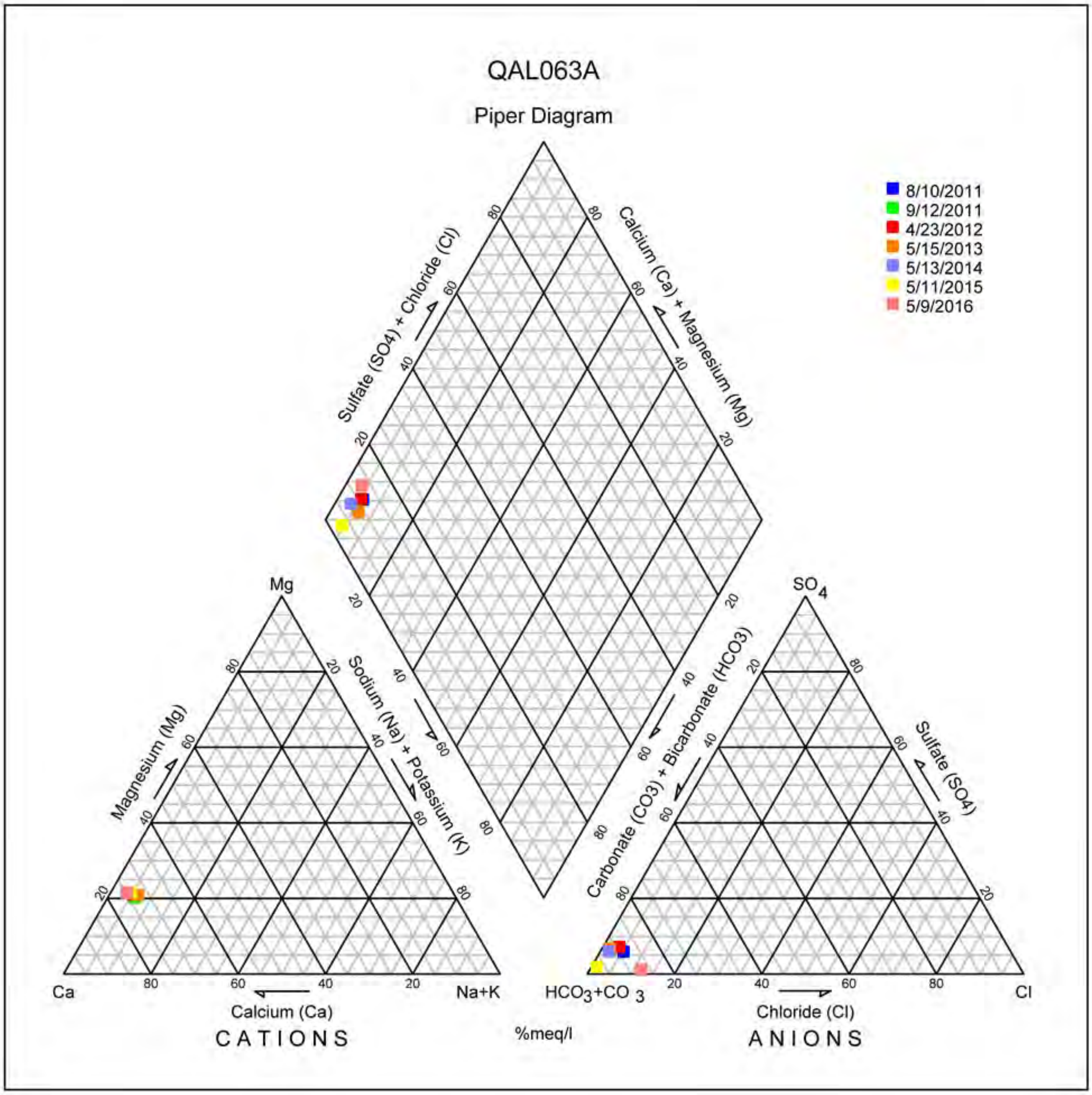

QAL060A
Piper Diagram
8/10/2011
9/12/2011
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Magnesium (Mg)
Sulfate (SO4)
Mg
SO4
Ca
Na+K
HCO3+CO3
Cl
Calcium (Ca)
Chloride (Cl)
CATIONS
%meq/l
ANIONS



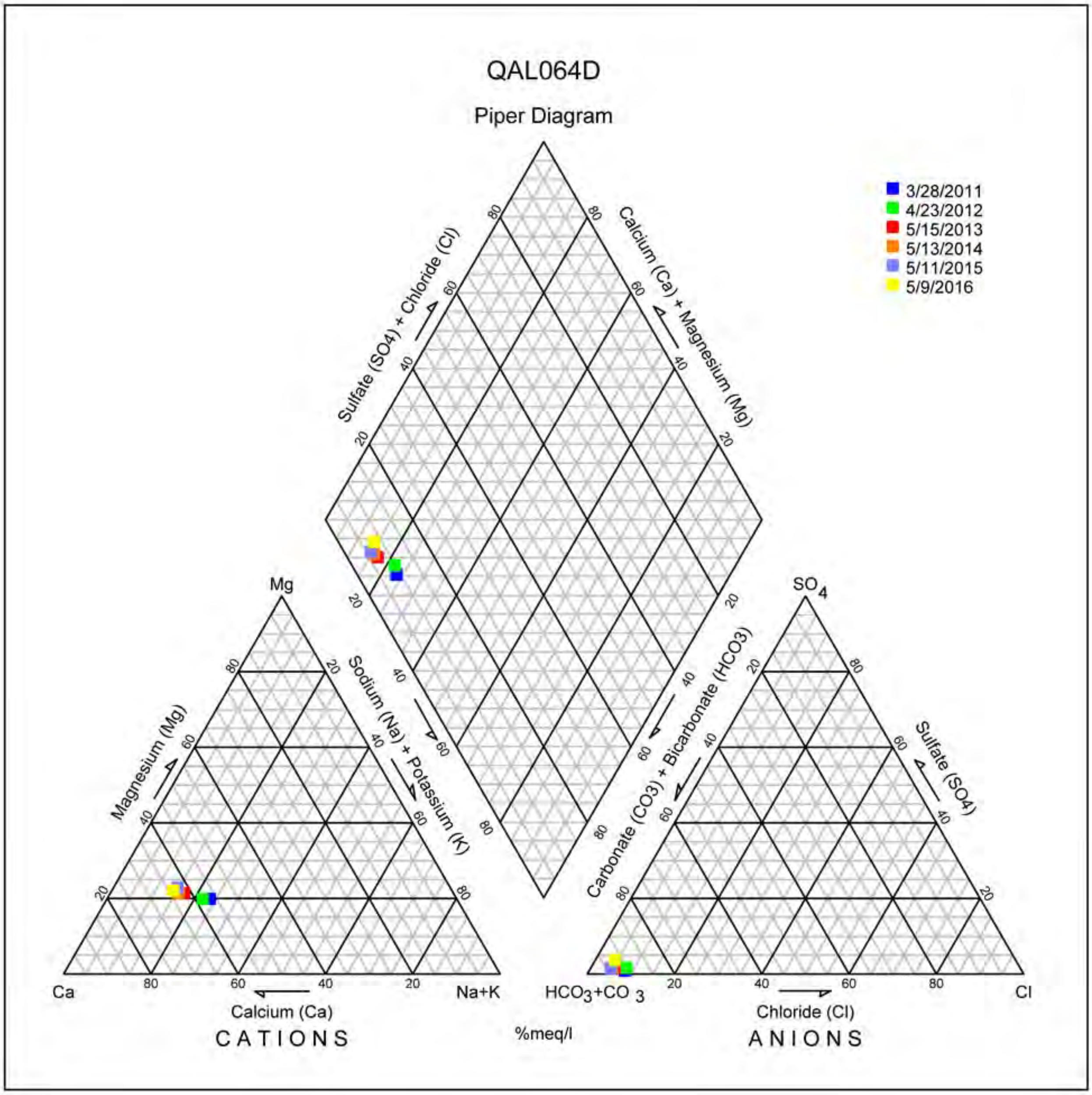
QAL061A
Piper Diagram
8/10/2011
9/12/2011
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Magnesium (Mg)
Sulfate (SO4)
Mg
SO4
Ca
Na+K
HCO3+CO3
Cl
Calcium (Ca)
Chloride (Cl)
CATIONS
%meq/l
ANIONS

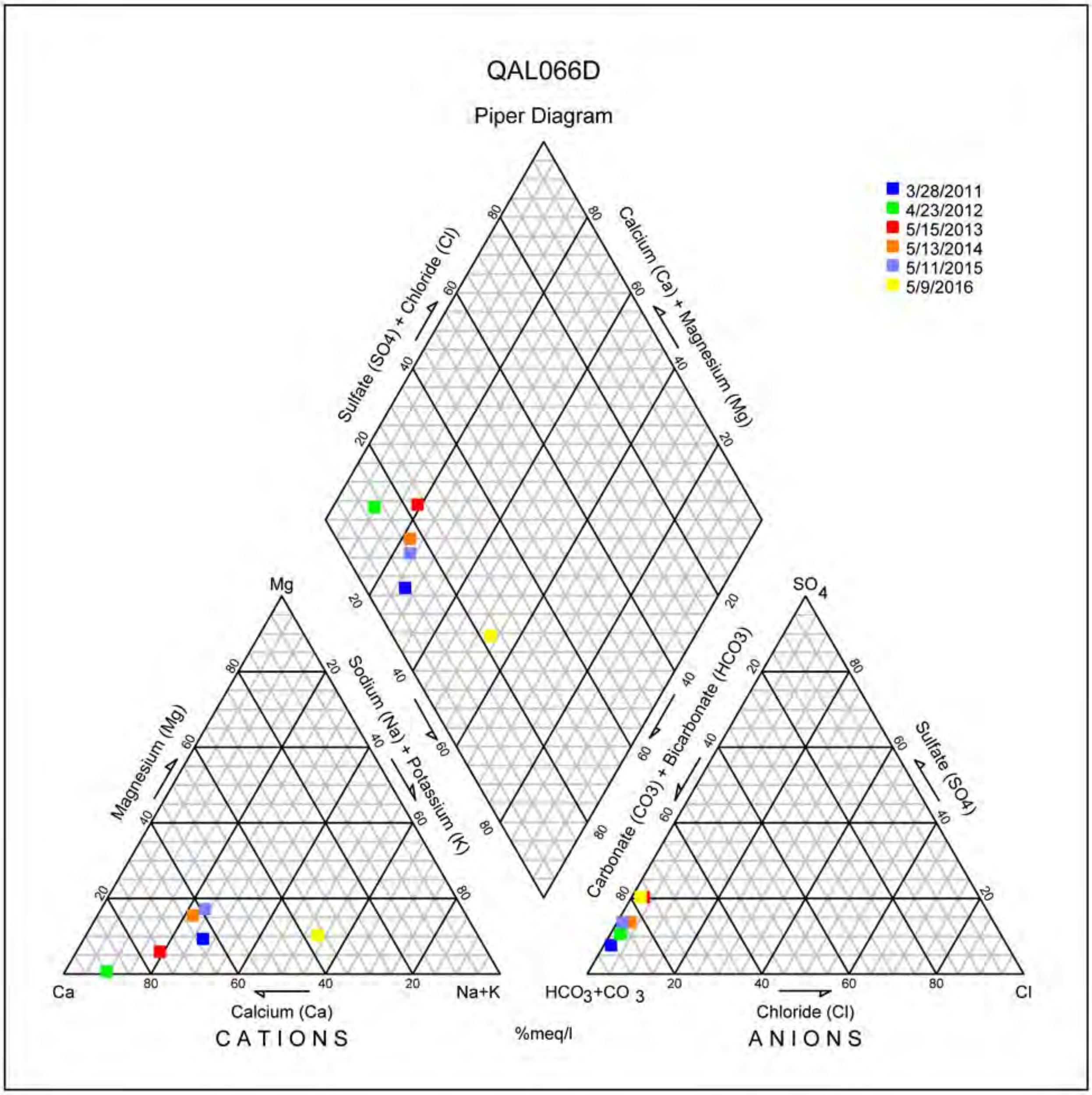


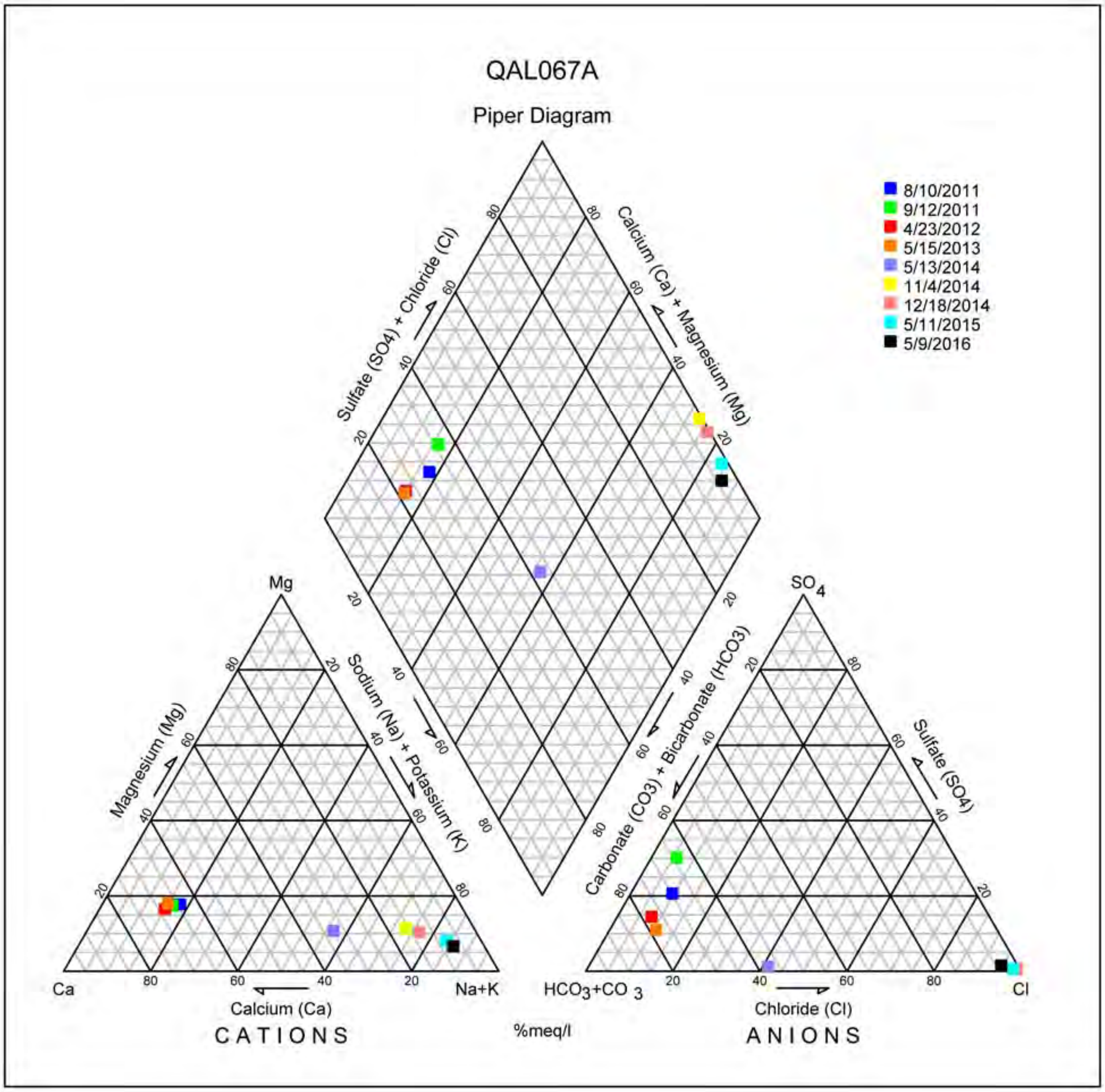
QAL062A
Piper Diagram
8/10/2011
9/12/2011
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Mg
Magnesium (Mg)
Sodium (Na) + Potassium (K)
Ca
Na+K
Calcium (Ca)
CATIONS
%meq/l
SO4
Carbonate (CO3) + Bicarbonate (HCO3)
Sulfate (SO4)
HCO3+CO3
Cl
Chloride (Cl)
ANIONS

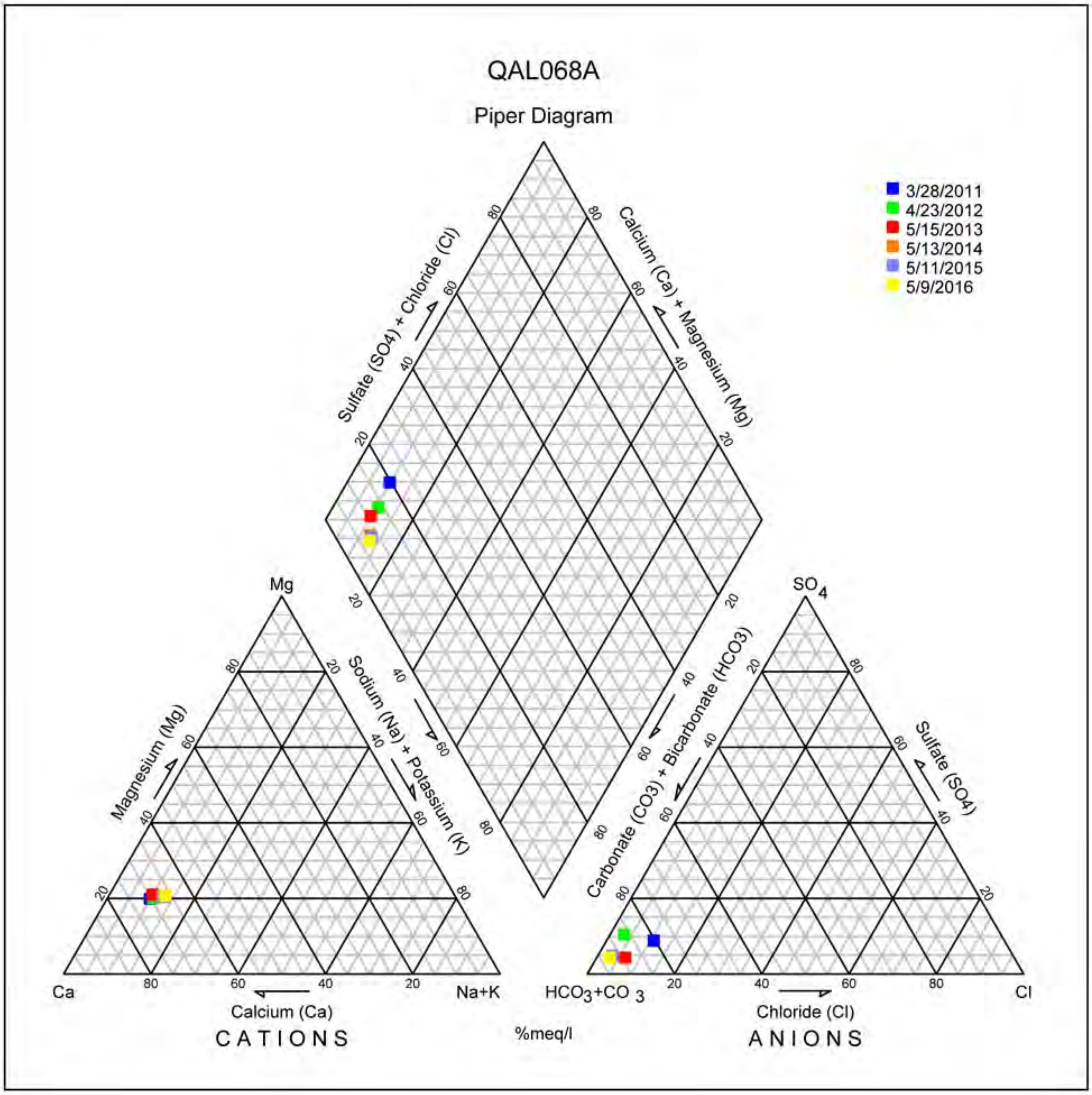


QAL063A
Piper Diagram
8/10/2011
9/12/2011
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Sulfate (SO4)
Mg
Ca
Na+K
Calcium (Ca)
CATIONS
%meq/l
SO4
HCO3+CO3
Cl
Chloride (Cl)
ANIONS

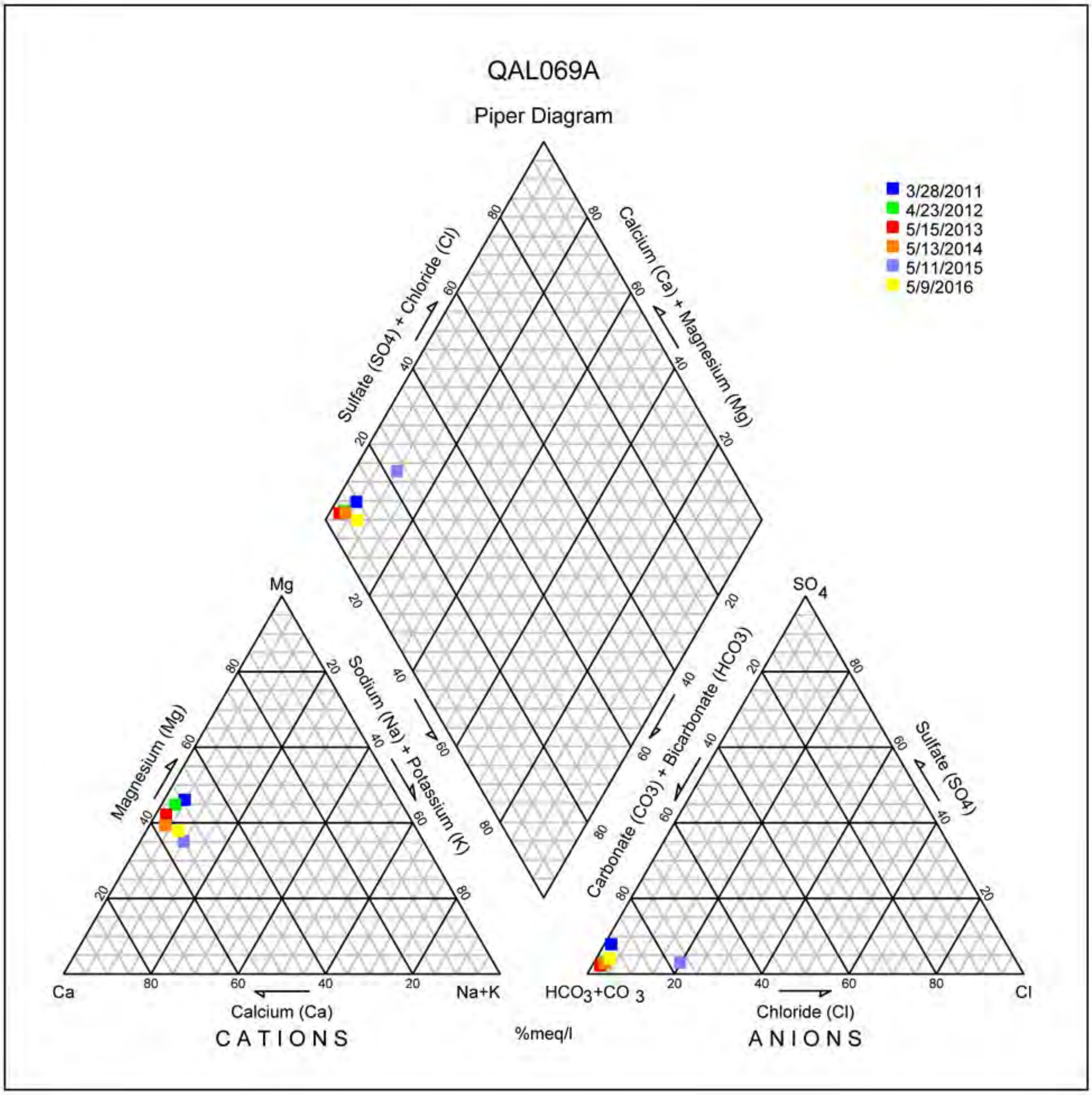

QAL064D
Piper Diagram
3/28/2011
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Mg
Magnesium (Mg)
Sodium (Na) + Potassium (K)
Ca
Na+K
Calcium (Ca)
CATIONS
%meq/l
SO_4
Carbonate (CO3) + Bicarbonate (HCO3)
Sulfate (SO4)
HCO_3+CO_3
Cl
Chloride (Cl)
ANIONS


QAL066D
Piper Diagram
3/28/2011
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Na+K
Calcium (Ca)
CATIONS
%meq/l
SO_4
Sulfate (SO4)
HCO_3+CO_3
Cl
Chloride (Cl)
ANIONS

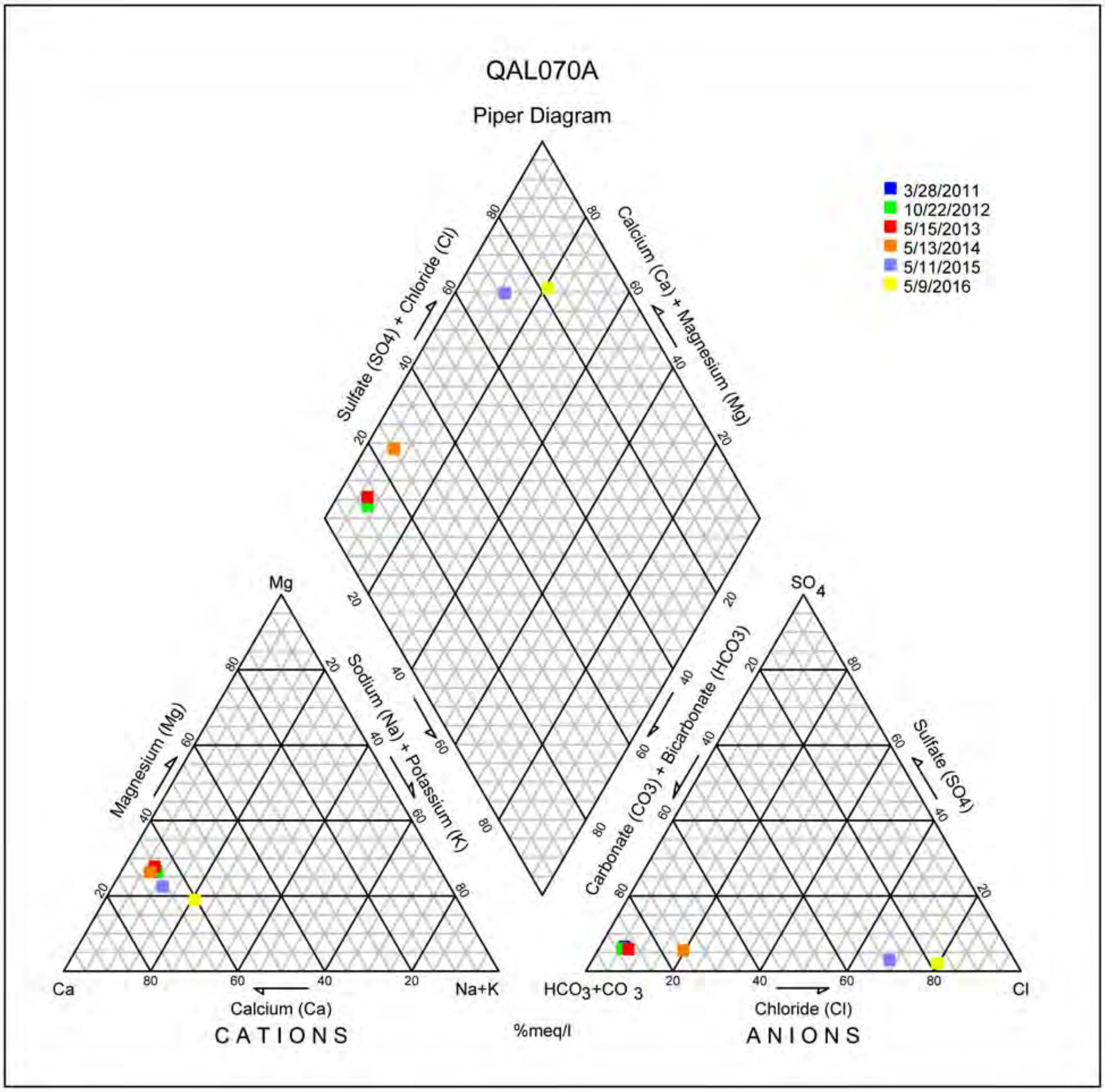

QAL067A
Piper Diagram
8/10/2011
9/12/2011
4/23/2012
5/15/2013
5/13/2014
11/4/2014
12/18/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
%meq/l
SO_4
Sulfate (SO4)
HCO_3+CO_3
Chloride (Cl)
Cl
ANIONS

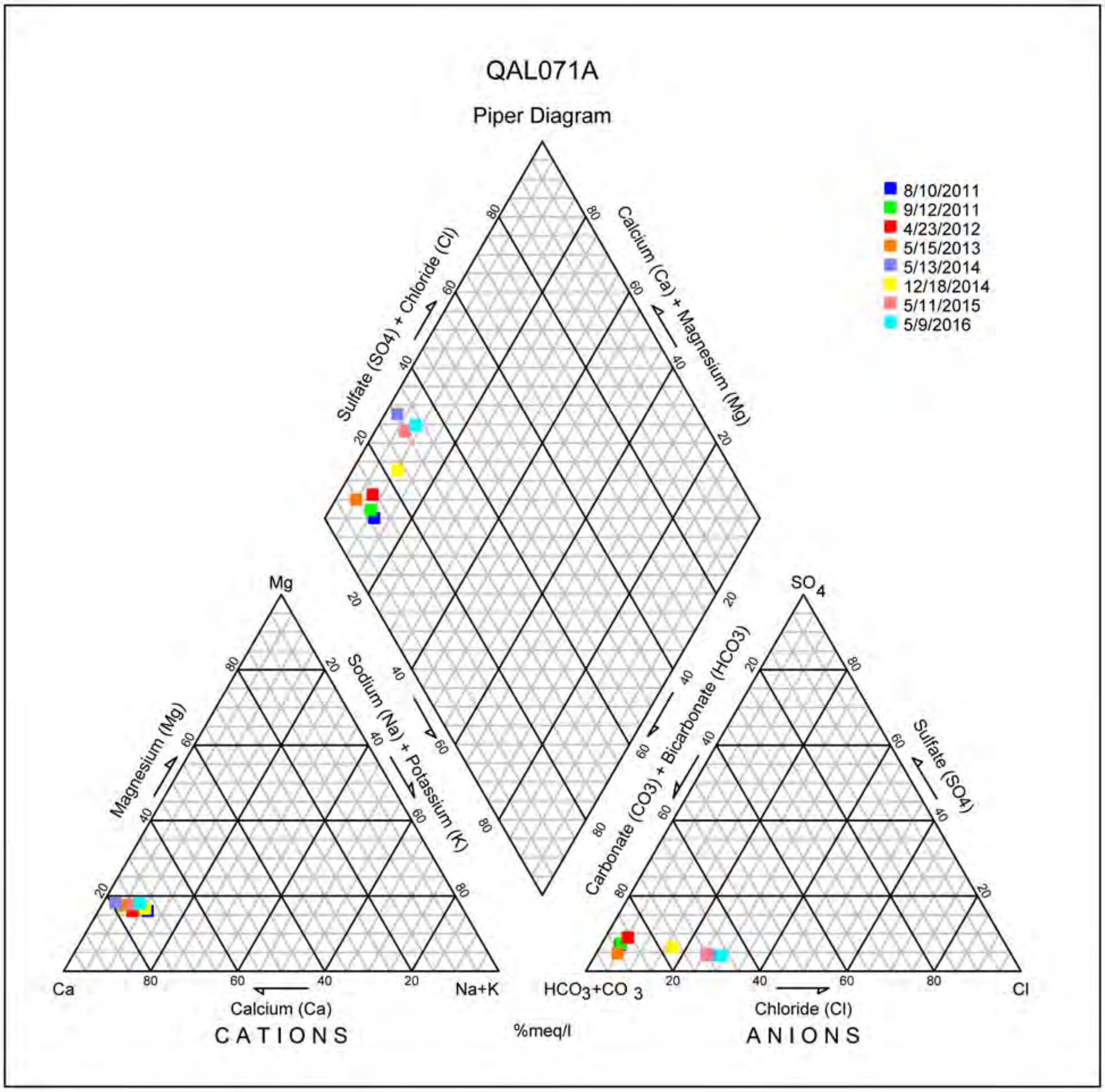


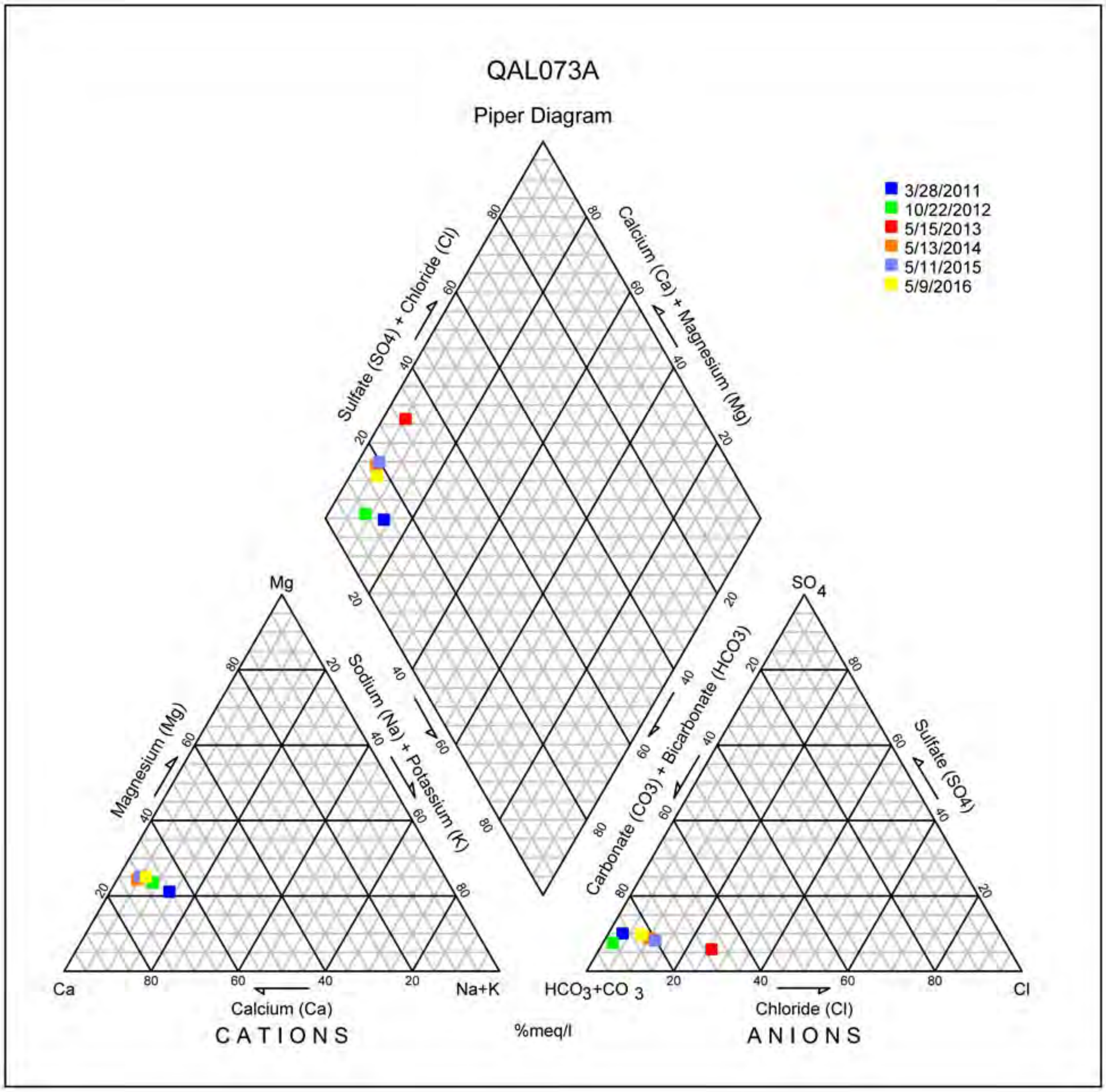
QAL068A
Piper Diagram
3/28/2011
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Sulfate (SO4)
Mg
SO4
Ca
Na+K
HCO3+CO3
Cl
Calcium (Ca)
Chloride (Cl)
CATIONS
%meq/l
ANIONS



QAL069A
Piper Diagram
3/28/2011
4/23/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Magnesium (Mg)
Sulfate (SO4)
Mg
SO4
Ca
Na+K
HCO3+CO3
Cl
Calcium (Ca)
Chloride (Cl)
CATIONS
%meq/l
ANIONS


QAL070A
Piper Diagram
3/28/2011
10/22/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Mg
Magnesium (Mg)
Ca
Na+K
Calcium (Ca)
CATIONS
%meq/l
SO_4
Sulfate (SO4)
HCO_3+CO_3
Cl
Chloride (Cl)
ANIONS


QAL071A
Piper Diagram
8/10/2011
9/12/2011
4/23/2012
5/15/2013
5/13/2014
12/18/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Magnesium (Mg)
Sulfate (SO4)
Mg
SO 4
Ca
Na+K
HCO3+CO 3
Cl
Calcium (Ca)
Chloride (Cl)
CATIONS
%meq/l
ANIONS

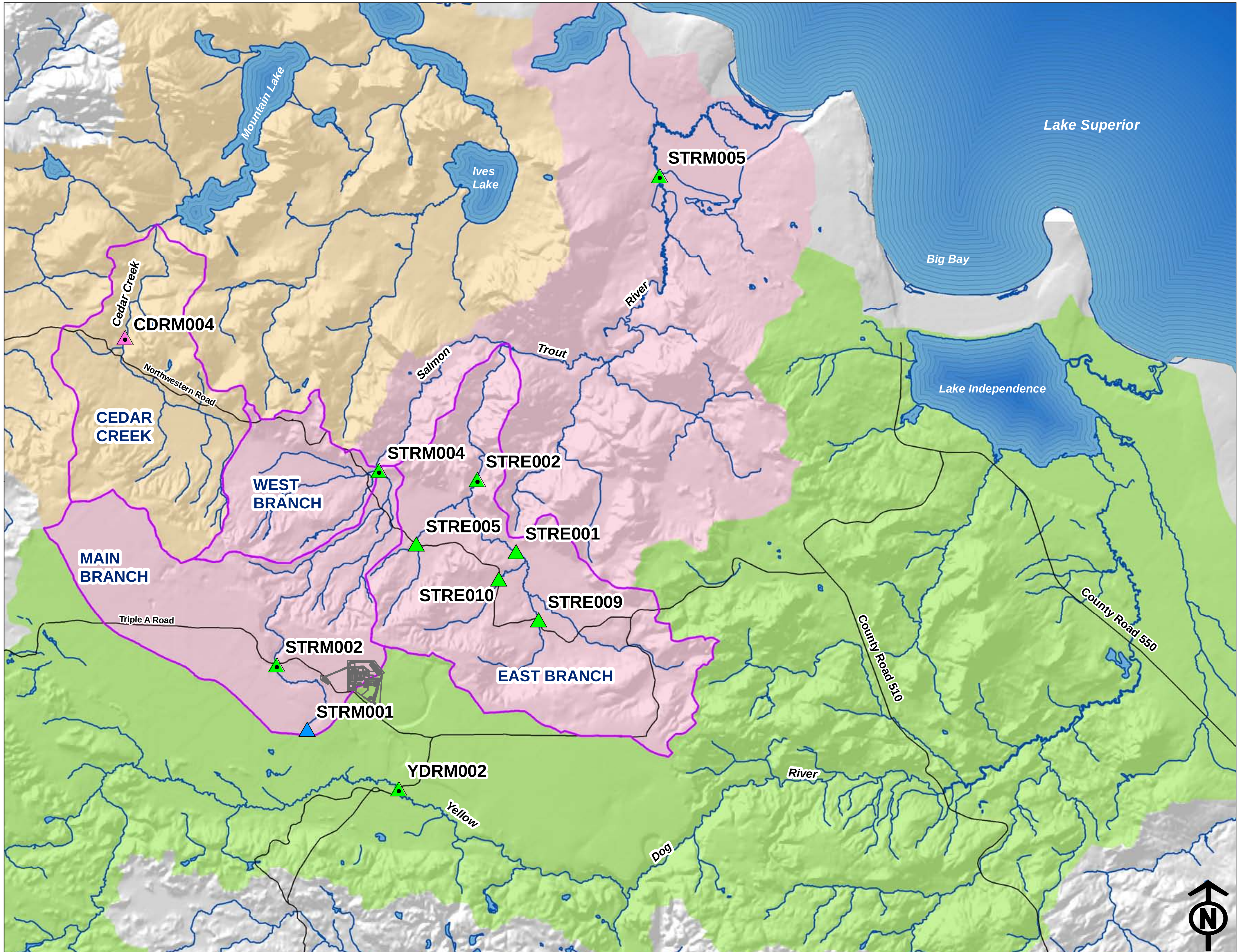

QAL073A
Piper Diagram
3/28/2011
10/22/2012
5/15/2013
5/13/2014
5/11/2015
5/9/2016
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Magnesium (Mg)
Sulfate (SO4)
Mg
SO4
Ca
Na+K
HCO3+CO3
Cl
Calcium (Ca)
Chloride (Cl)
CATIONS
%meq/l
ANIONS

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

Eagle Mine
2016 Mine Permit Surface Water Monitoring
Benchmark Comparison Summary

Location	Location Classification	Q1	Q2	Q3	Q4
STRM001	Background				
STRM002	Compliance				
STRM004	Compliance	iron, manganese, mercury		mercury	
STRM005	Compliance			**pH**	mercury
STRE001	Compliance			iron, mercury	**mercury**
STRE002	Compliance				
STRE005	Compliance	mercury		manganese, mercury	mercury
STRE009	Compliance				
STRE010	Compliance				
YDRM002	Compliance				
CDRM004	Reference			iron, mercury	mercury

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, Department notification is not required for an exceedance.

2016
Mine Permit Surface Water Quality Monitoring Data
STRM001 (Background)
Eagle Mine

Parameter	Unit	Permit RL	STRM001 Seasonal Benchmark				STRM001 Data (Q1-Q4 2014)							
			Q1	Q2	Q3	Q4	Q1 2016		Q2 2016		Q3 2016		Q4 2016	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/15/16		5/4/16		8/9/16		11/1/16	
Field														
D.O.	ppm	--	--	--	--	--	**6.9**		**7.1**		**3.4**		**6.7**	
Flow	cfs	--	--	--	--	--	<0.1		**0.4**		**0.1**		**0.4**	
pH	SU	--	6.2-7.2	6.2-7.2	6.2-7.2	6.0-7.0	**7.1**		**6.7**		**6.3**		**6.3**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**35**		**39**		**60**		**46**	
Temperature	°C	--	--	--	--	--	**0.0**		**5.0**		**16**		**7.9**	
Metals														
Aluminum	ug/L	50	--	200	--	--	--		<50		--		--	
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		<50	e	<50	e	<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	**300**		**350**	e	**840**		**500**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	44	179	392	40	**16**		**16**		**62**		**30**	e
Mercury	ng/L	0.500	2.00	3.58	2.85	2.00	**0.685**		**1.42**		**1.16**		**0.912**	a,e
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	e	<2.0	e	<2.0	
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	--	--	--		**18**		--		--	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	7.3	--	--	--		<1.0		--		--	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.050	--	0.20	--	--	--		<0.050	e	--		--	
Sulfate	mg/L	1.0	4.0	10	4.0	4.0	<1.0		<1.0	e	<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	11	--	--	--		**5.5**		--		--	
Magnesium	mg/L	0.50	--	2.4	--	--	--		**1.2**		--		--	
Potassium	mg/L	0.50	--	2.00	--	--	--		**0.52**		--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**0.82**		--		--	
General														
Hardness	mg/L	3	--	36	--	--	--		**19**		--		--	
TDS	mg/L	50	200	200	200	200	<50		<50		**50**	s	<100	e

2016
Mine Permit Surface Water Quality Monitoring Data
STRM002 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRM002 Seasonal Benchmark				STRM002 Data (Q1-Q4 2014)							
			Q1	Q2	Q3	Q4	Q1 2016		Q2 2016		Q3 2016		Q4 2016	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/15/16		4/20/16		8/9/16		11/1/16	
Field														
D.O.	ppm	--	--	--	--	--	**11**		**11**		**7.2**		**9.9**	
Flow	cfs	--	--	--	--	--	**1.5**		**3.8**		**1.1**		**1.9**	
pH	SU	--	6.8-7.8	6.5-7.5	6.3-7.3	6.5-7.5	**6.9**		**6.6**		**6.8**		**7.1**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**69**		**38**		**66**		**61**	
Temperature	°C	--	--	--	--	--	**0.2**		**6.1**		**18**		**6.8**	
Metals														
Aluminum	ug/L	50	--	200	--	--	--		**160**		--		--	
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		<50	e	<50	e	<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	**230**		**350**	e	**250**		**240**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	58	40	40	**12**		18		<10		**12**	e
Mercury	ng/L	0.500	2.00	5.77	2.36	2.79	**0.960**		**4.90**		**1.46**		**1.30**	a,e
Molybdenum	ug/L	10	--	40	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0		**3.4**		<1.0		<1.0	
Selenium	ug/L	2.0	8.0	8.0	8.0	8.0	<2.0		<2.0	e	<2.0	e	<2.0	
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	--	--	--		**18**		--		--	
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	0.050	--	0.20	--	--	--		<0.050	e	--		--	
Sulfate	mg/L	1.0	4.0	6.2	4.0	4.0	<1.0		<5.0	e	<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	10	--	--	--		**5.2**		--		--	
Magnesium	mg/L	0.50	--	2.0	--	--	--		**1.2**		--		--	
Potassium	mg/L	0.50	--	2.00	--	--	--		**0.54**		--		--	
Sodium	mg/L	0.50	--	2.00	--	--	--		**0.70**		--		--	
General														
Hardness	mg/L	3	--	32	--	--	--		**18**		--		--	
TDS	mg/L	50	200	200	200	200	<50		<50		**58**		<100	e

2016
Mine Permit Surface Water Quality Monitoring Data
STRM004 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRM004 Seasonal Benchmark				STRM004 Data (Q1-Q4 2014)							
			Q1	Q2	Q3	Q4	Q1 2016		Q2 2016		Q3 2016		Q4 2016	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/22/16		5/4/16		8/10/16		10/31/16	
Field														
D.O.	ppm	--	--	--	--	--	**14**		**12**		**9.2**		**12**	
Flow	cfs	--	--	--	--	--	**8.2**		**7.8**		**4.1**		**6.2**	
pH	SU	--	7.0-8.0	7.3-8.3	7.2-8.2	7.2-8.2	**7.6**		**7.4**		**7.4**		**7.5**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**85**		**73**		**91**		**95**	
Temperature	°C	--	--	--	--	--	**0.0**		**5.5**		**16**		**6.2**	
Metals														
Aluminum	ug/L	50	--	993	--	--	--		**120**		--		--	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	**1.2**		<1.0		**1.5**		<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		<50	e	<50	e	<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	**690**		**260**	e	**200**		**160**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	61	40	40	**46**		**16**		**14**		<10	e
Mercury	ng/L	0.500	2.49	14.15	3.47	2.91	**6.40**		**3.98**		**3.74**		**1.37**	a,e
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	e	<2.0	e	<2.0	
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	--	--	--		**40**		--		--	
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	0.050	--	0.20	--	--	--		**0.064**	e	--		--	
Sulfate	mg/L	1.0	4.5	4.0	4.0	4.0	<1.0		<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	--	--	--		**0.62**		--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**1.0**		--		--	
General														
Hardness	mg/L	3	--	54	--	--	--		**44**		--		--	
TDS	mg/L	50	200	200	200	200	**52**		**70**		**108**		**80**	e

2016
Mine Permit Surface Water Quality Monitoring Data
STRM005 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRM005 Seasonal Benchmark				STRM005 Data (Q1-Q4 2014)							
			Q1	Q2	Q3	Q4	Q1 2016		Q2 2016		Q3 2016		Q4 2016	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/17/16		4/20/16		8/9/16		11/1/16	
Field														
D.O.	ppm	--	--	--	--	--	**14**		**12**		**10**		**11**	
Flow	cfs	--	--	--	--	--	**38**		**110**		**27**		**49**	
pH	SU	--	7.1-8.1	6.6-7.6	6.6-7.6 p	7.2-8.2	**7.6**		**7.2**		**7.9**		**7.7**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**129**		**65**		**122**		**117**	
Temperature	°C	--	--	--	--	--	**0.0**		**5.5**		**18**		**8.2**	
Metals														
Aluminum	ug/L	50	--	--	--	--	--		**170**		--		--	
Antimony	ug/L	2.0	--	--	--	--	--		<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	--	--	--	--	--		<10		--		--	
Beryllium	ug/L	1.0	--	--	--	--	--		<1.0		--		--	
Boron	ug/L	50	200	200	200	200	<50		<50	e	<50	e	<50	
Cadmium	ug/L	0.20	--	--	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	--	--	--	--		<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		**1.4**		<1.0		<1.0	
Iron	ug/L	20	166	201	207 p	309	**150**		**200**	e	**160**		**220**	
Lead	ug/L	1.0	--	--	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	--	--	--	--		<10		--		--	
Manganese	ug/L	10	40	40	40	40	<10		**13**		**11**		**11**	e
Mercury	ng/L	0.500	2.00	2.00	1.91 p	2.46	**0.873**		**6.30**		**0.914**		**2.77**	a,e
Molybdenum	ug/L	10	--	--	--	--	--		<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	e	<2.0	e	<2.0	
Silver	ug/L	0.20	--	--	--	--	--		<0.20		--		--	
Zinc	ug/L	10	40	40	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	--	--	--	--		**32**		--		--	
Alkalinity, Carbonate	mg/L	2.0	--	--	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	--	--	--	--		**1.3**		--		--	
Fluoride	mg/L	0.10	--	--	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.050	--	--	--	--	--		<0.050	e	--		--	
Sulfate	mg/L	1.0	6.6	4.0	4.0	4.0	**4.6**		<1.0	e	**2.7**		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	--	--	--	--		**9.6**		--		--	
Magnesium	mg/L	0.50	--	--	--	--	--		**2.0**		--		--	
Potassium	mg/L	0.50	--	--	--	--	--		**0.55**		--		--	
Sodium	mg/L	0.50	--	--	--	--	--		**0.90**		--		--	
General														
Hardness	mg/L	3	--	--	--	--	--		**32**		--		--	
TDS	mg/L	50	200	200	200	200	**86**		**58**		**92**		**94**	e

2016
Mine Permit Surface Water Quality Monitoring Data
STRE001 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRE001 Seasonal Benchmark				STRE001 Data (Q1-Q4 2014)							
			Q1	Q2	Q3	Q4	Q1 2016		Q2 2016		Q3 2016		Q4 2016	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/22/16		5/5/16		8/12/16		11/2/16	
Field														
D.O.	ppm	--	--	--	--	--	**13**		**11**		**9.0**		**12**	
Flow	cfs	--	--	--	--	--	**16**		**17**		**18**		**14**	
pH	SU	--	7.3-8.3	7.0-8.0	7.1-8.1	7.2-8.2	**7.4**		**7.9**		**7.5**		**7.8**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**128**		**114**		**111**		**126**	
Temperature	°C	--	--	--	--	--	**0.9**		**9.6**		**14**		**6.1**	
Metals														
Aluminum	ug/L	50	--	339	--	--	--		**67**		--		--	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	**1.1**		**1.1**		**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		<50	e	<50	e	<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	**84**		**110**	e	**180**		**110**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	40	40	94	<10		**13**		**21**		**12**	e
Mercury	ng/L	0.500	2.00	8.59	2.00	2.24	**1.12**		**1.73**		**2.22**		**6.02**	a,e
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	e	<2.0	e	<2.0	
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	--	--	--		**59**		--		--	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		**1.1**		--		--	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.050	--	0.20	--	--	--		**0.061**	e	--		--	
Sulfate	mg/L	1.0	6.1	4.0	4.0	4.0	**4.1**		<1.0	e	<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	24	--	--	--		**17**		--		--	
Magnesium	mg/L	0.50	--	4.6	--	--	--		**3.5**		--		--	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.59**		--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**1.1**		--		--	
General														
Hardness	mg/L	3	--	78	--	--	--		**57**		--		--	
TDS	mg/L	50	200	200	200	200	**86**		**102**		**118**		**68**	e

2016
Mine Permit Surface Water Quality Monitoring Data
STRE002 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRE002 Seasonal Benchmark				STRE002 Data (Q1-Q4 2014)							
			Q1	Q2	Q3	Q4	Q1 2016		Q2 2016		Q3 2016		Q4 2016	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/22/16		5/5/16		8/10/16		11/2/16	
Field														
D.O.	ppm	--	--	--	--	--	**13**		**12**		**9.8**		**12**	
Flow	cfs	--	--	--	--	--	**15**		**22**		**12**		**17**	
pH	SU	--	7.3-8.3	7.6-8.6	7.4-8.4	7.2-8.2	**7.7**		**8.1**		**7.8**		**7.9**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**129**		**110**		**125**		**127**	
Temperature	°C	--	--	--	--	--	**0.8**		**6.3**		**15**		**5.5**	
Metals														
Aluminum	ug/L	50	--	200	--	--	--		**68**		--		--	
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**		**1.5**		<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		<50	e	<50	e	<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	**97**		**110**	e	**110**		**87**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	40	40	40	<10		**10**		**14**		<10	e
Mercury	ng/L	0.500	2.00	4.84	2.00	2.04	**1.21**		**2.13**		**1.06**		**1.43**	a,e
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	e	<2.0	e	<2.0	
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	--	--	--		**57**		--		--	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		**1.1**		--		--	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.050	--	0.20	--	--	--		**0.054**	e	--		--	
Sulfate	mg/L	1.0	5.7	4.0	4.0	4.0	**4.6**		<1.0	e	**3.4**		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	24	--	--	--		**16**		--		--	
Magnesium	mg/L	0.50	--	4.7	--	--	--		**3.4**		--		--	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.65**		--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**1.0**		--		--	
General														
Hardness	mg/L	3	--	80	--	--	--		**54**		--		--	
TDS	mg/L	50	200	200	200	200	**74**		**84**		**102**		**80**	e

2016
Mine Permit Surface Water Quality Monitoring Data
STRE005 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRE005 Seasonal Benchmark				STRE005 Data (Q1-Q4 2014)							
			Q1	Q2	Q3	Q4	Q1 2016		Q2 2016		Q3 2016		Q4 2016	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/22/16		4/26/16		8/10/16		10/31/16	
Field														
D.O.	ppm	--	--	--	--	--	**14**		**12**		**8.2**		**11**	
Flow	cfs	--	--	--	--	--	**1.4**		**3.0**		**0.2**		**0.8**	
pH	SU	--	7.1-8.1	6.8-7.8	7.3-8.3	7.0-8.0	**7.5**		**7.5**		**7.8**		**7.5**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**100**		**62**		**136**		**110**	
Temperature	°C	--	--	--	--	--	**0.0**		**5.1**		**18**		**6.7**	
Metals														
Aluminum	ug/L	50	--	1,722	--	--	--		**260**		--		--	
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		<50	e	<50	e	<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	**230**		**340**	e	**330**		**160**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	66	93	40	40	**27**		**23**		**47**		**21**	e
Mercury	ng/L	0.500	2.00	17.2	2.00	2.00	**2.40**		**8.35**		**2.47**		**3.48**	a,e
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	e	<2.0	e	<2.0	
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	--	--	--		**32**		--		--	
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	0.050	--	0.20	--	--	--		**0.052**	e	--		--	
Sulfate	mg/L	1.0	6.1	4.0	4.0	6.4	**1.5**		<1.0	e	<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	17	--	--	--		**10**		--		--	
Magnesium	mg/L	0.50	--	3.0	--	--	--		**2.0**		--		--	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.59**		--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**0.84**		--		--	
General														
Hardness	mg/L	3	--	55	--	--	--		**33**		--		--	
TDS	mg/L	50	200	200	200	200	**54**		**56**		**116**		**98**	e

2016
Mine Permit Surface Water Quality Monitoring Data
STRE009 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRE009 Seasonal Benchmark				STRE009 Data (Q1-Q4 2014)							
			Q1	Q2	Q3	Q4	Q1 2016		Q2 2016		Q3 2016		Q4 2016	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/17/16		4/26/16		8/10/16		10/31/16	
Field														
D.O.	ppm	--	--	--	--	--	**13**		**13**		**10**		**12**	
Flow	cfs	--	--	--	--	--	**3.9**		**6.7**		**3.8**		**4.6**	
pH	SU	--	7.1-8.1	6.9-7.9	7.2-8.2	6.8-7.8	**7.8**		**7.4**		**7.7**		**7.6**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**117**		**82**		**106**		**114**	
Temperature	°C	--	--	--	--	--	**0.9**		**3.8**		**15**		**6.1**	
Metals														
Aluminum	ug/L	50	--	405	--	--	--		**200**		--		--	
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		<50	e	<50	e	<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	**83**		**260**	e	**72**		**64**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	40	36	40	<10		13		<10		<10	e
Mercury	ng/L	0.500	2.00	6.58	2.85	2.00	**0.561**		**4.96**		**0.906**		**0.709**	a,e
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	e	<2.0	e	<2.0	
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	--	--	--		**43**		--		--	
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	--	--	--		**0.15**		--		--	
Nitrogen, Nitrate	mg/L	0.050	--	0.20	--	--	--		<0.050	e	--		--	
Sulfate	mg/L	1.0	4.8	4.0	4.0	10	**4.0**		<1.0	e	**2.2**		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	17	--	--	--		**13**		--		--	
Magnesium	mg/L	0.50	--	3.3	--	--	--		**3.0**		--		--	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.55**		--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**1.1**		--		--	
General														
Hardness	mg/L	3	--	56	--	--	--		**45**		--		--	
TDS	mg/L	50	200	200	200	200	<50		**58**		**84**		**80**	e

2016
Mine Permit Surface Water Quality Monitoring Data
STRE010 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	STRE010 Seasonal Benchmark				STRE010 Data (Q1-Q4 2014)							
			Q1	Q2	Q3	Q4	Q1 2016		Q2 2016		Q3 2016		Q4 2016	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/22/16		4/26/16		8/10/16		11/1/16	
Field														
D.O.	ppm	--	--	--	--	--	**13**		**12**		**11**		**11**	
Flow	cfs	--	--	--	--	--	**3.3**		**6.2**		**2.5**		**3.3**	
pH	SU	--	7.3-8.3	6.9-7.9	7.2-8.2	7.0-8.0	**8.0**		**7.4**		**7.7**		**7.7**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**117**		**74**		**110**		**114**	
Temperature	°C	--	--	--	--	--	**1.2**		**3.8**		**12**		**6.5**	
Metals														
Aluminum	ug/L	50	--	431	--	--	--		**180**		--		--	
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		<50	e	<50	e	<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	**180**		**210**	e	**86**		**69**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	43	40	40	**19**		**20**		**10**		<10	e
Mercury	ng/L	0.500	4.07	9.72	2.00	2.00	**2.28**		**6.21**		**0.908**		**0.934**	a,e
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	e	<2.0	e	<2.0	
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	--	--	--		**38**		--		--	
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	0.050	--	0.20	--	--	--		**0.072**	e	--		--	
Sulfate	mg/L	1.0	4.7	4.0	4.0	4.0	**3.1**		<1.0	e	<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	16	--	--	--		**12**		--		--	
Magnesium	mg/L	0.50	--	3.0	--	--	--		**2.3**		--		--	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.61**		--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**0.86**		--		--	
General														
Hardness	mg/L	3	--	52	--	--	--		**39**		--		--	
TDS	mg/L	50	200	200	200	200	**70**		**58**		**96**		**76**	e

2016
Mine Permit Surface Water Quality Monitoring Data
YDRM002 (Compliance)
Eagle Mine

Parameter	Unit	Permit RL	YDRM002 Seasonal Benchmark				YDRM002 Data (Q1-Q4 2014)							
			Q1	Q2	Q3	Q4	Q1 2016		Q2 2016		Q3 2016		Q4 2016	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/15/16		5/4/16		8/9/16		11/1/16	
Field														
D.O.	ppm	--	--	--	--	--	**11**		**10**		**7.9**		**10**	
Flow	cfs	--	--	--	--	--	**17**		**63**		**7.0**		**23**	
pH	SU	--	6.5-7.5	6.1-7.1	6.6-7.6	6.6-7.6	**6.9**		**6.4**		**7.1**		**6.9**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**68**		**31**		**70**		**48**	
Temperature	°C	--	--	--	--	--	**0.0**		**7.0**		**20**		**7.3**	
Metals														
Aluminum	ug/L	50	--	200	--	--	--		**99**		--		--	
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		<50	e	<50	e	<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	1231	1,192	1,270	1,207	**530**		**390**	e	**930**		**940**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	44	50	40	40	**28**		**18**		**27**		**35**	e
Mercury	ng/L	0.500	2.73	8.13	3.10	6.02	**1.50**		**6.28**		**1.92**		**3.43**	a,e
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	e	<2.0	e	<2.0	
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	--	--	--		**16**		--		--	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		**1.1**		--		--	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.050	--	0.20	--	--	--		<0.050	e	--		--	
Sulfate	mg/L	1.0	5.9	10	4.0	24	<1.0		<1.0	e	<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	10	--	--	--		**4.5**		--		--	
Magnesium	mg/L	0.50	--	2.1	--	--	--		**1.0**		--		--	
Potassium	mg/L	0.50	--	2.0	--	--	--		<0.50		--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**0.61**		--		--	
General														
Hardness	mg/L	3	--	32	--	--	--		**15**		--		--	
TDS	mg/L	50	200	200	200	200	**52**		<50		**62**		<100	e

2016
Mine Permit Surface Water Quality Monitoring Data
CDRM004 (Reference)
Eagle Mine

Parameter	Unit	Permit RL	CDRM004 Seasonal Benchmark				CDRM004 Data (Q1-Q4 2014)							
			Q1	Q2	Q3	Q4	Q1 2016		Q2 2016		Q3 2016		Q4 2016	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/25/16		5/5/16		8/12/16		11/2/16	
Field														
D.O.	ppm	--	--	--	--	--	**14**		**13**		**9.4**		**12**	
Flow	cfs	--	--	--	--	--	**15**		**17**		**25**		**14**	
pH	SU	--	7.1-8.1	7.2-8.2	7.2-8.2	7.2-8.2	**7.4**		**8.0**		**7.2**		**7.7**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**127**		**109**		**124**		**125**	
Temperature	°C	--	--	--	--	--	**0.3**		**4.2**		**15**		**5.3**	
Metals														
Aluminum	ug/L	50	--	258	--	--	--		<50		--		--	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	**1.2**		**1.0**		**3.2**		**1.3**	
Barium	ug/L	10	--	40	--	--	--		**10**		--		--	
Beryllium	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Boron	ug/L	50	200	200	200	200	<50		<50	e	<50	e	<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	**84**		**87**	e	**340**		**170**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	57	44	96	<10		**11**		**37**		**15**	e
Mercury	ng/L	0.500	2.00	8.12	2.00	2.00	**0.969**		**1.59**		**2.63**		**2.06**	a,e
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	e	<2.0	e	<2.0	
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	--	--	--		**59**		--		--	
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	0.050	--	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	--	--	--		**17**		--		--	
Magnesium	mg/L	0.50	--	4.0	--	--	--		**3.1**		--		--	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.61**		--		--	
Sodium	mg/L	0.50	--	2.0	--	--	--		**1.0**		--		--	
General														
Hardness	mg/L	3	--	80	--	--	--		**55**		--		--	
TDS	mg/L	50	200	200	200	200	**82**		**86**		**144**		**76**	e

2016
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. Trend analysis is recommended in adition to benchmark screening for parameters that appear to be trending (i.e., the data do not represent a random distribution about the baseline mean).
	Value is equal to or above site-specific benchmark.

Appendix K

Eagle Mine

Surface Water Monitoring

Trend Analysis Summary & Trending Charts

2016 Mine Permit Surface Water
Trend Analysis Summary
Eagle Mine

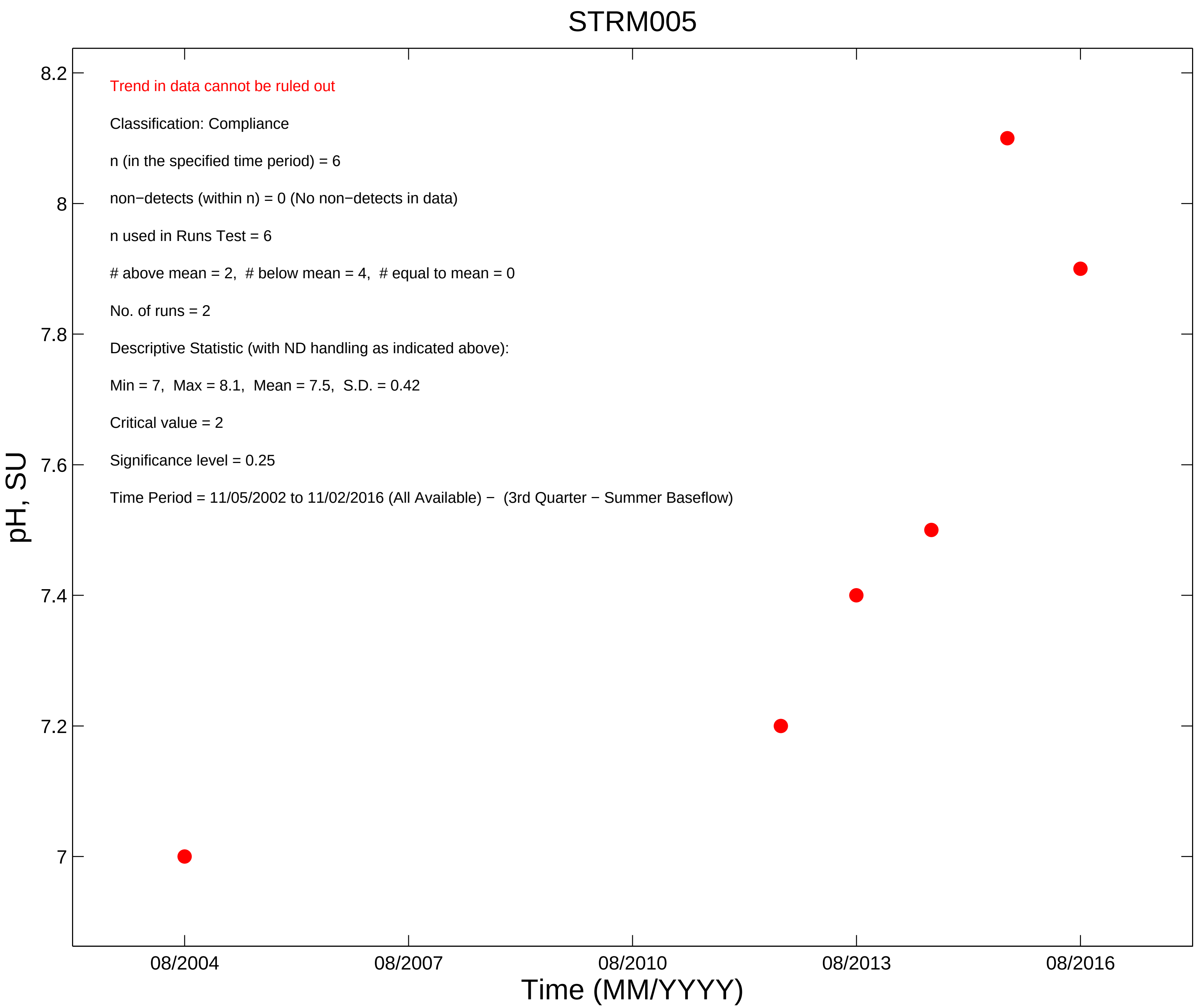
Location	Quarter	Classification	Parameter	Unit	# Samples	# NDs	Non-detects handling	# used in Runs Test	Min	Max	Mean	St. Dev.	# Above Mean	# Below Mean	# Equal Mean	# Runs	Criti- cal value	Sig level	Trend Present	Remarks
CDRM004	1	Reference	TDS	mg/L	8	0	No NDs	8	42	102	75	18.00	5	3	0	2	2	0.05	Y	Non-unique RL in data
STRE002	1	Compliance	Iron	ug/L	7	0	No NDs	7	68	150	97	30.90	2	5	0	2	2	0.10	Y	
STRE002	1	Compliance	TDS	mg/L	7	1	Included as RL	7	20	94	66	25.00	5	2	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	5	0	No NDs	5	54	82	71	11.00	3	2	0	2	2	0.25	Y	
STRE009	1	Compliance	TDS	mg/L	5	1	Included as RL	5	50	80	71	13.00	3	2	0	2	2	0.25	Y	
STRM001	1	Background	Specific Conductance	µS/cm @ 25°C	7	0	No NDs	7	16	43	37	9.70	5	2	0	2	2	0.10	Y	
STRM001	1	Background	Sulfate	mg/L	8	7	Included as RL	8	1.0	7.1	2.8	2.50	3	5	0	2	2	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRM005	1	Compliance	Specific Conductance	µS/cm @ 25°C	5	0	No NDs	5	121	136	131	6.10	3	2	0	2	2	0.25	Y	
CDRM004	2	Reference	Nitrogen, Nitrate	mg/L	9	4	Included as RL	9	0.050	0.10	0.072	0.02	4	5	0	2	2	0.05	Y	
STRE001	2	Compliance	Potassium	mg/L	9	4	Included as RL	9	0.50	0.59	0.53	0.03	3	6	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	9	8	Included as RL	9	1.0	5.0	2.0	2.00	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	Cadmium	ug/L	7	6	Included as RL	7	0.20	0.50	0.26	0.11	2	5	0	2	2	0.10	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE002	2	Compliance	Zinc	ug/L	7	5	Included as RL	7	10	25	13	5.70	2	5	0	2	2	0.10	Y	
STRE005	2	Compliance	Chloride	mg/L	5	2	Included as RL	5	1.0	1.3	1.1	0.14	2	3	0	2	2	0.25	Y	
STRE005	2	Compliance	pH	SU	5	0	No NDs	5	7.0	7.5	7.3	0.22	3	2	0	2	2	0.25	Y	
STRE009	2	Compliance	Alkalinity, Bicarbonate	mg/L	5	0	No NDs	5	31	51	40	8.30	3	2	0	2	2	0.25	Y	
STRE009	2	Compliance	Calcium	mg/L	5	0	No NDs	5	9.4	15	12	2.40	3	2	0	2	2	0.25	Y	
STRE009	2	Compliance	Magnesium	mg/L	5	0	No NDs	5	1.9	3.0	2.5	0.53	3	2	0	2	2	0.25	Y	
STRE009	2	Compliance	Manganese	ug/L	5	1	Included as RL	5	10	19	14	3.40	2	3	0	2	2	0.25	Y	
STRE009	2	Compliance	Specific Conductance	µS/cm @ 25°C	5	0	No NDs	5	61	99	79	16.00	3	2	0	2	2	0.25	Y	
STRE010	2	Compliance	Alkalinity, Bicarbonate	mg/L	5	0	No NDs	5	29	50	36	8.50	2	3	0	2	2	0.25	Y	
STRE010	2	Compliance	Aluminum	ug/L	5	0	No NDs	5	63	330	205	96.50	3	2	0	2	2	0.25	Y	
STRE010	2	Compliance	Calcium	mg/L	5	0	No NDs	5	8.6	14	12	1.96	3	2	0	2	2	0.25	Y	
STRE010	2	Compliance	Magnesium	mg/L	5	0	No NDs	5	1.6	2.7	2.2	0.40	3	2	0	2	2	0.25	Y	
STRE010	2	Compliance	pH	SU	5	0	No NDs	5	7.1	7.5	7.4	0.17	3	2	0	2	2	0.25	Y	
STRM001	2	Background	Sulfate	mg/L	11	9	Included as RL	11	1.0	8.4	2.9	2.80	4	7	0	2	3	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRM002	2	Compliance	Sulfate	mg/L	11	9	Included as RL	11	1.0	5.7	2.9	2.20	5	6	0	3	3	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRM002	2	Compliance	TDS	mg/L	11	5	Included as RL	11	38	110	59	19.70	4	7	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	8	0	No NDs	8	7.0	8.3	7.6	0.49	3	5	0	2	2	0.05	Y	
YDRM002	2	Compliance	Sulfate	mg/L	11	9	Included as RL	11	1.0	8.3	2.8	2.70	4	7	0	2	3	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
CDRM004	3	Reference	Arsenic	ug/L	7	0	No NDs	7	1.9	3.3	2.8	0.52	4	2	1	2	2	0.25	Y	
CDRM004	3	Reference	TDS	mg/L	7	0	No NDs	7	64	144	105	29.70	3	4	0	2	2	0.10	Y	Non-unique RL in data
STRE001	3	Compliance	Arsenic	ug/L	6	1	Included as RL	6	1.0	1.4	1.2	0.16	2	4	0	2	2	0.25	Y	
STRE001	3	Compliance	Manganese	ug/L	6	2	Included as RL	6	10	21	14	4.00	2	4	0	2	2	0.25	Y	
STRE001	3	Compliance	Specific Conductance	µS/cm @ 25°C	6	0	No NDs	6	111	136	130	10.20	4	2	0	2	2	0.25	Y	
STRE001	3	Compliance	Sulfate	mg/L	6	2	Included as RL	6	1.0	5.0	3.1	1.30	3	3	0	2	2	0.10	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE005	3	Compliance	pH	SU	5	0	No NDs	5	7.5	8.0	7.8	0.18	3	2	0	2	2	0.25	Y	
STRE009	3	Compliance	Specific Conductance	µS/cm @ 25°C	5	0	No NDs	5	75	122	108	19.40	3	2	0	2	2	0.25	Y	
STRE009	3	Compliance	TDS	mg/L	5	0	No NDs	5	52	84	69	11.00	2	3	0	2	2	0.25	Y	
STRE010	3	Compliance	TDS	mg/L	5	0	No NDs	5	58	96	74	17.00	2	3	0	2	2	0.25	Y	
STRM001	3	Background	Iron	ug/L	7	0	No NDs	7	700	5860	1997	1898.0	2	5	0	2	2	0.10	Y	
STRM001	3	Background	Manganese	ug/L	7	0	No NDs	7	40	369	121	122.00	2	5	0	2	2	0.10	Y	
STRM001	3	Background	Specific Conductance	µS/cm @ 25°C	7	0	No NDs	7	55	99	66	16.00	2	5	0	2	2	0.10	Y	
STRM002	3	Compliance	Iron	ug/L	7	0	No NDs	7	220	580	351	159.00	2	5	0	2	2	0.10	Y	
STRM002	3	Compliance	Manganese	ug/L	7	3	Included as RL	7	10	23	14	5.80	2	5	0	2	2	0.10	Y	
STRM005	3	Compliance	pH	SU	6	0	No NDs	6	7.0	8.1	7.5	0.42	2	4	0	2	2	0.25	Y	
STRE001	4	Compliance	Mercury	ng/L	8	0	No NDs	8	0.520	6.02	1.74	1.80	2	6	0	2	2	0.10	Y	Non-unique RL in data
STRE009	4	Compliance	pH	SU	6	0	No NDs	6	6.8	7.7	7.3	0.37	3	3	0	2	2	0.10	Y	
STRE010	4	Compliance	pH	SU	6	0	No NDs	6	7.1	7.8	7.5	0.24	2	4	0	2	2	0.25	Y	
STRM001	4	Background	Sulfate	mg/L	11	10	Included as RL	11	1.0	5.0	2.6	1.90	4	7	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 Mines

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:

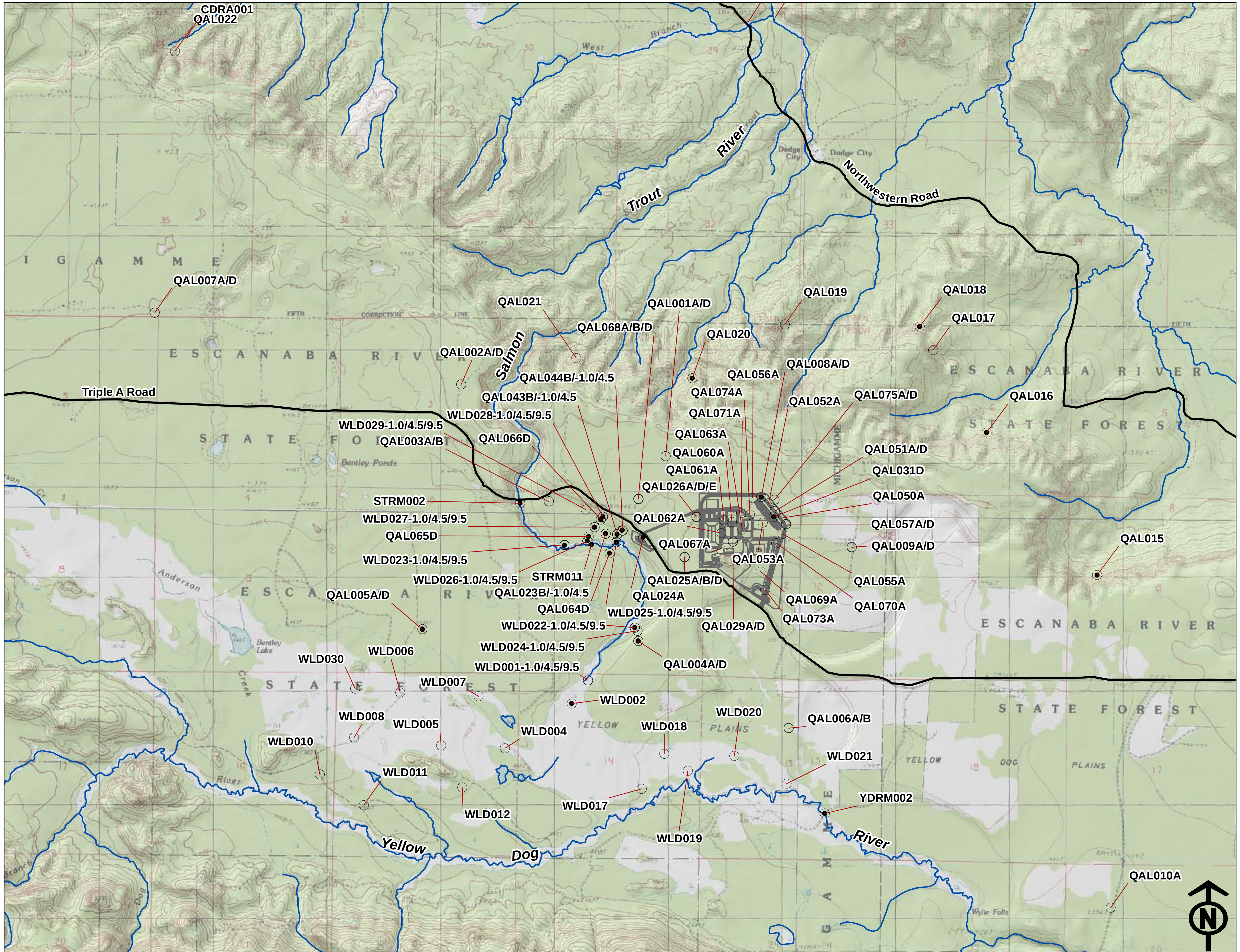
Trends that have inconsistent RLs or >50% NDs are typically rejected.
Trend analysis period is baseline through Q4 2016.


STRM005
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 6
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 6
above mean = 2, # below mean = 4, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 7, Max = 8.1, Mean = 7.5, S.D. = 0.42
Critical value = 2
Significance level = 0.25
Time Period = 11/05/2002 to 11/02/2016 (All Available) − (3rd Quarter − Summer Baseflow)
pH, SU
8.2
8
7.8
7.6
7.4
7.2
7
08/2004
08/2007
08/2010
08/2013
08/2016
Time (MM/YYYY)

Appendix L

Eagle Mine

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

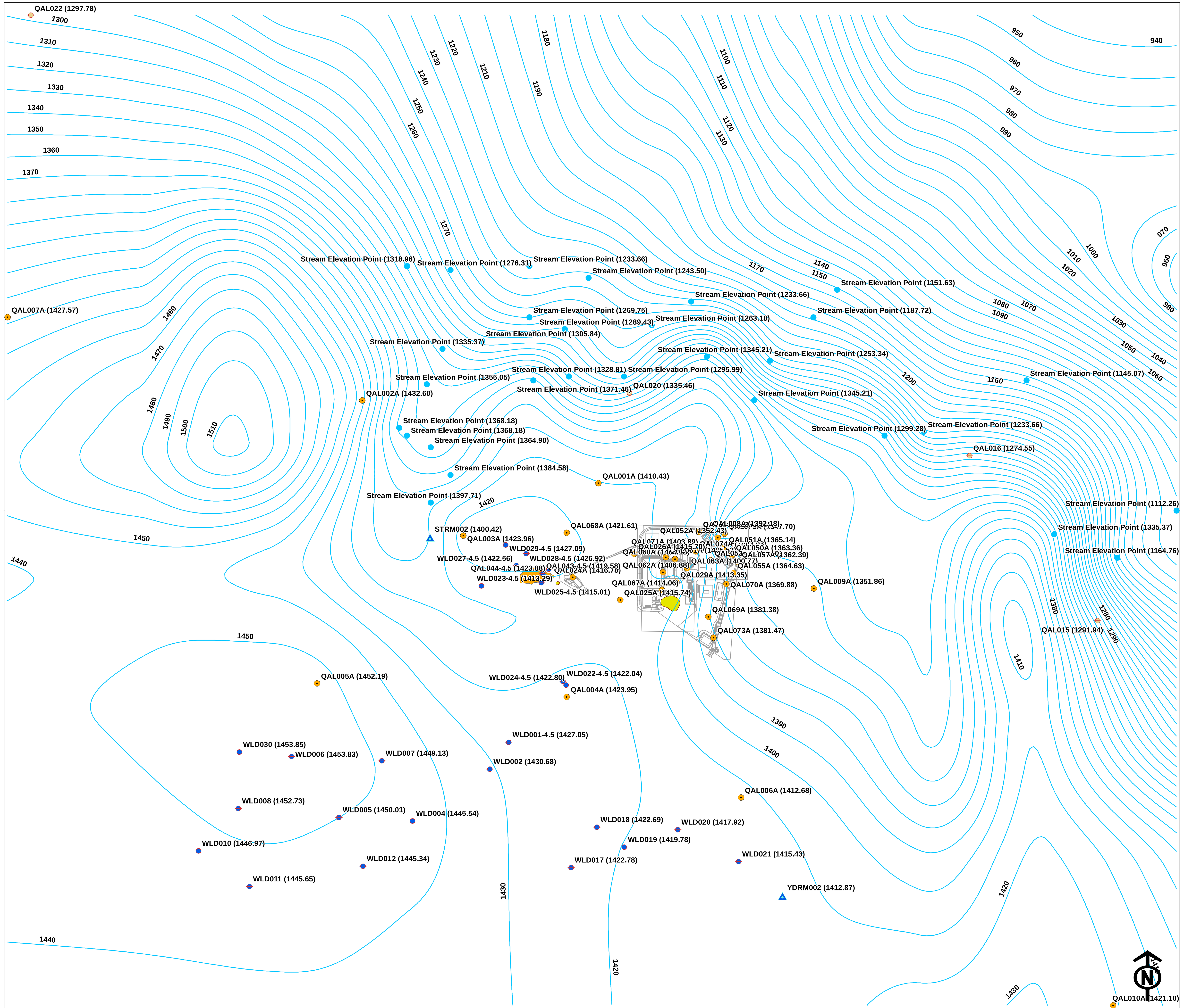
Eagle Mine
a subsidiary of lundin mining

North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Appendix M

Eagle Mine

Groundwater Contour Maps



A-ZONE GROUNDWATER ELEVATION CONTOURS
WINTER BASEFLOW, FEBRUARY- MARCH 2016
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

Eagle Mine
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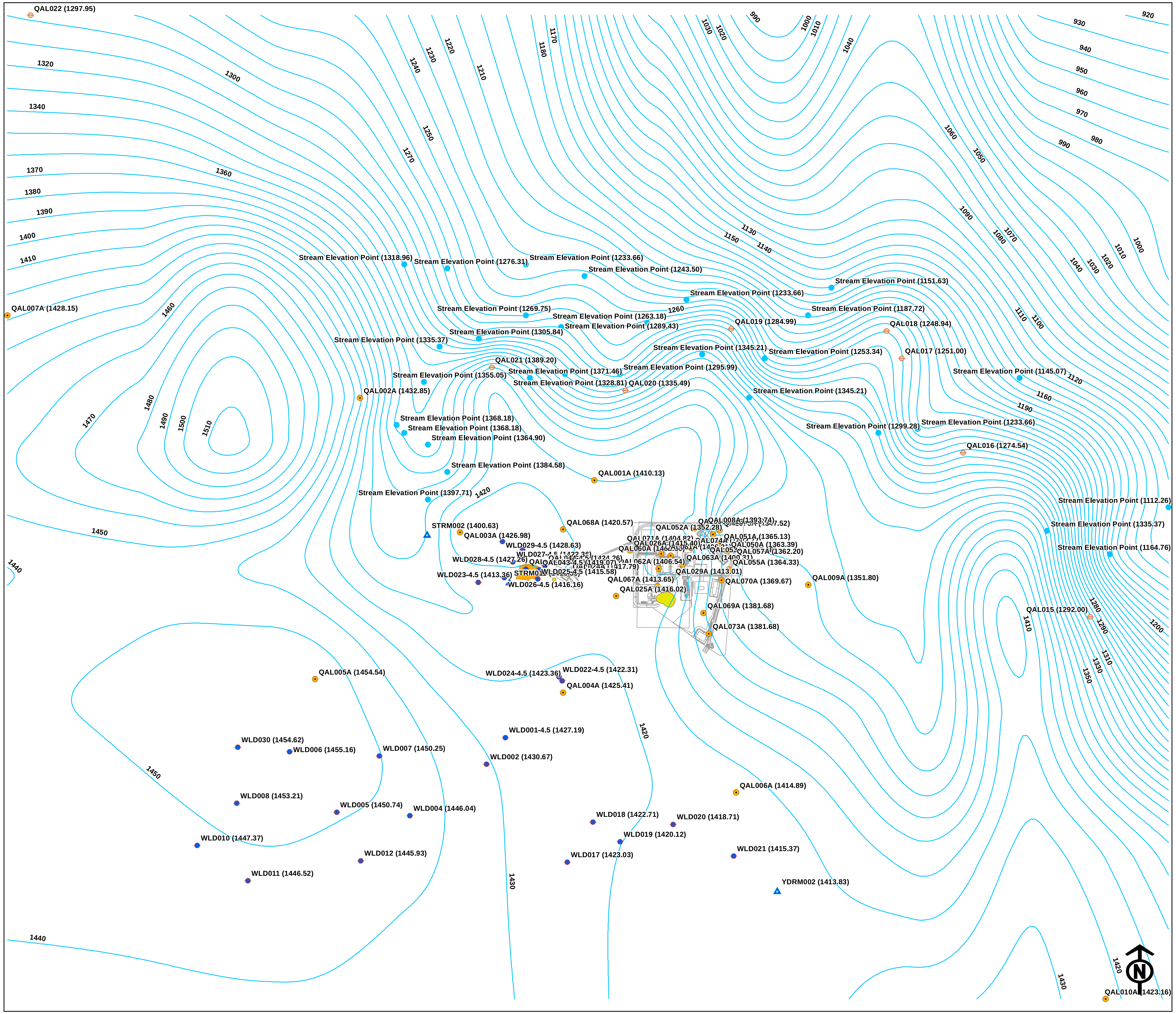
Figure: 1



A-ZONE GROUNDWATER ELEVATION CONTOURS
SPRING BASEFLOW, APRIL - MAY 2016
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

Eagle Mine
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North Jackson Company
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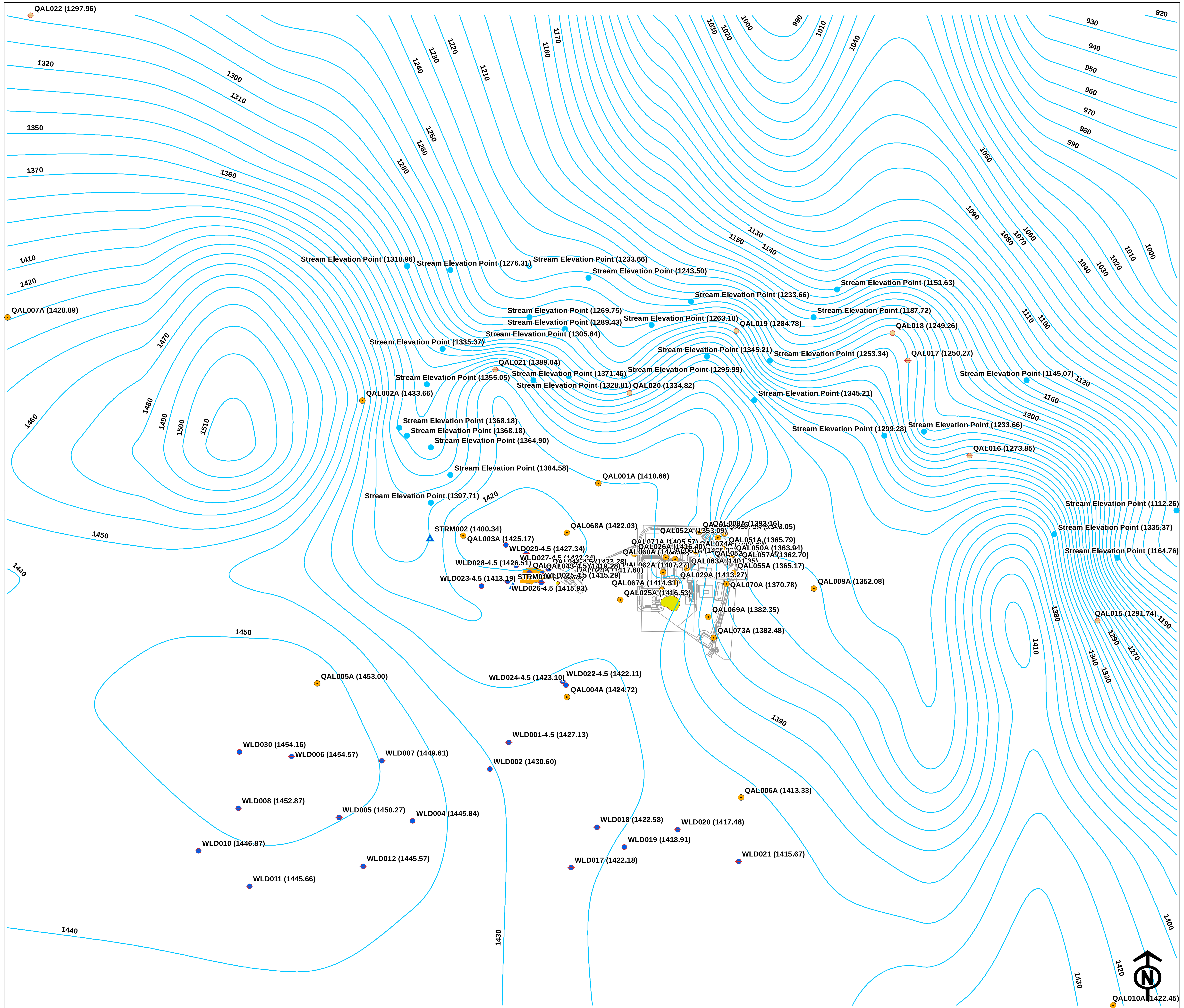
Figure: 1



A-ZONE GROUNDWATER ELEVATION CONTOURS
SUMMER BASEFLOW, AUGUST 2016
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

Eagle Mine
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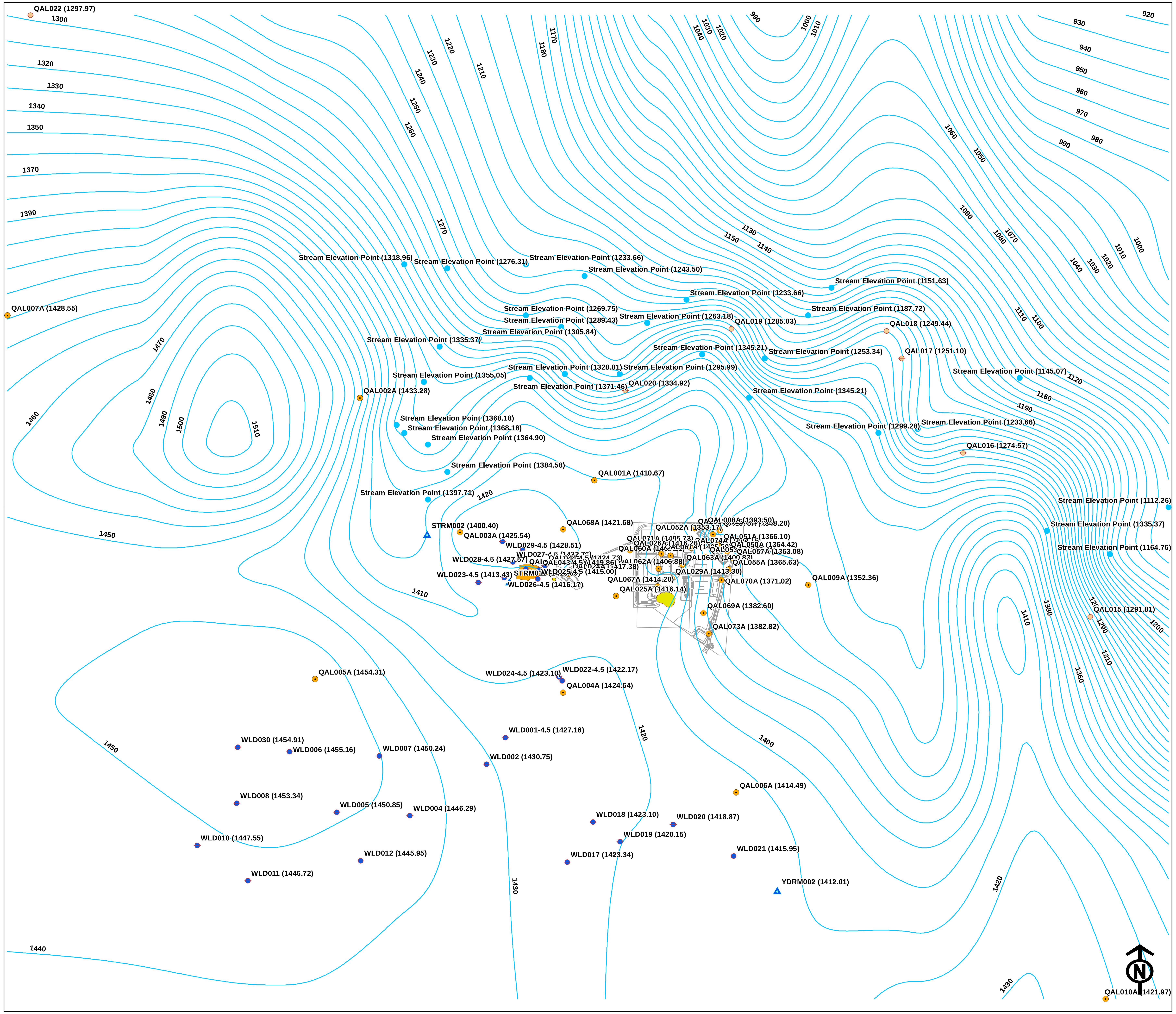
North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Figure: 1



A-ZONE GROUNDWATER ELEVATION CONTOURS
FALL BASEFLOW, OCTOBER - NOVEMBER 2016
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

Eagle Mine
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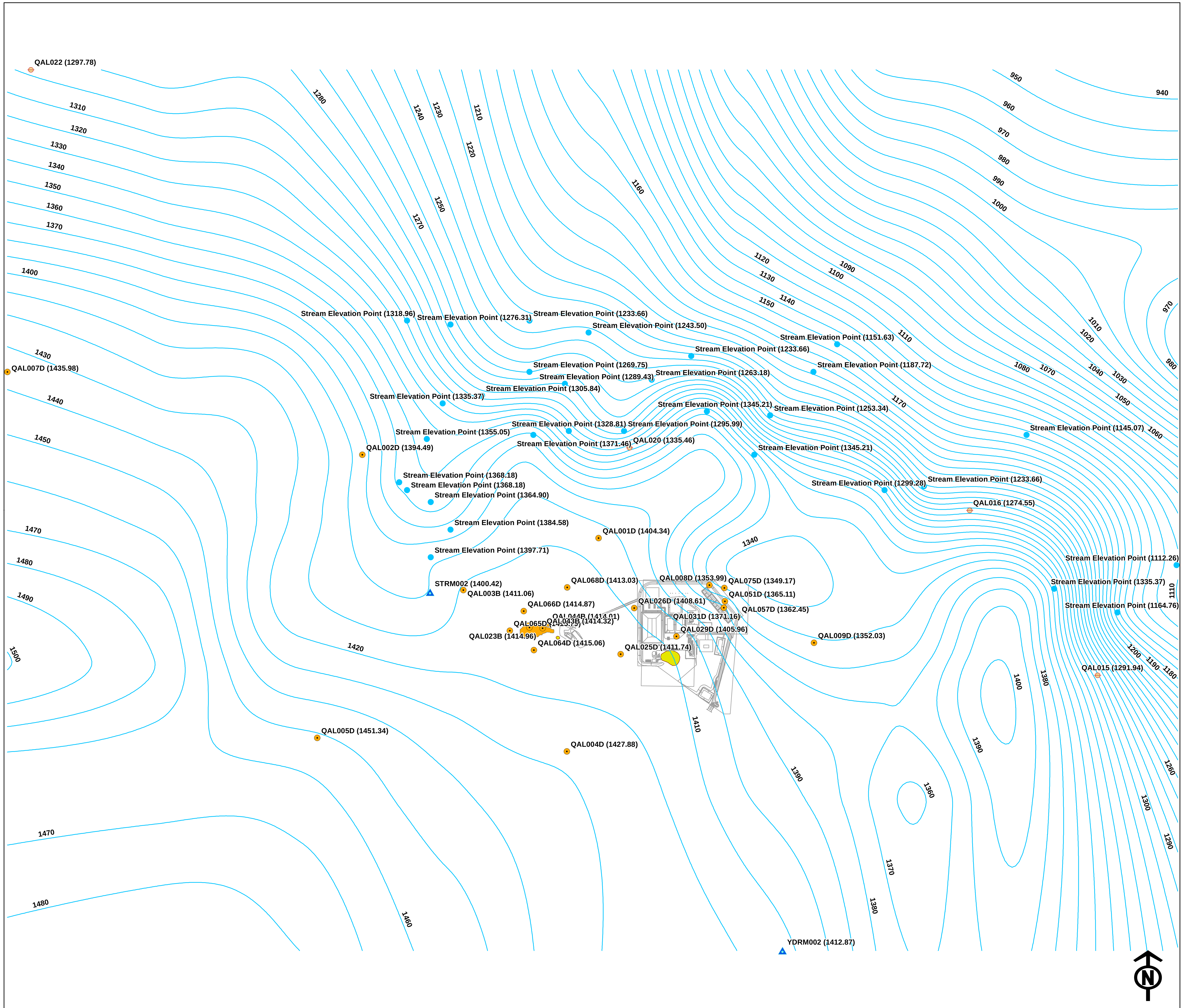
North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Figure: 1



D-ZONE GROUNDWATER ELEVATION CONTOURS
WINTER BASEFLOW, FEBRUARY- MARCH 2016
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

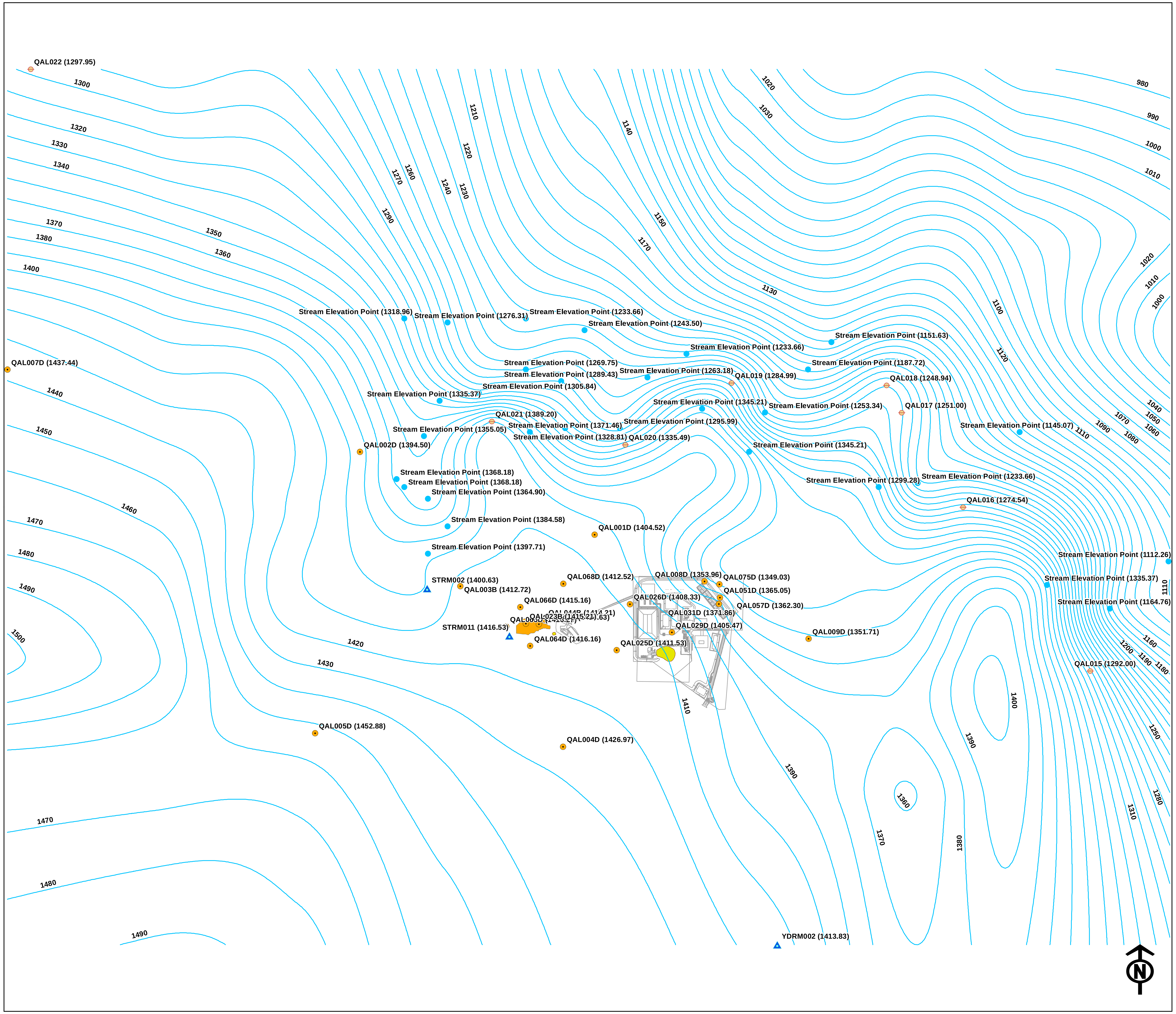
0 2,000 4,000 Feet

1:16,000

Eagle Mine
a subsidiary of lundin mining

North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Figure: 1



D-ZONE GROUNDWATER ELEVATION CONTOURS
SPRING BASEFLOW, APRIL - MAY 2016
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

Eagle Mine
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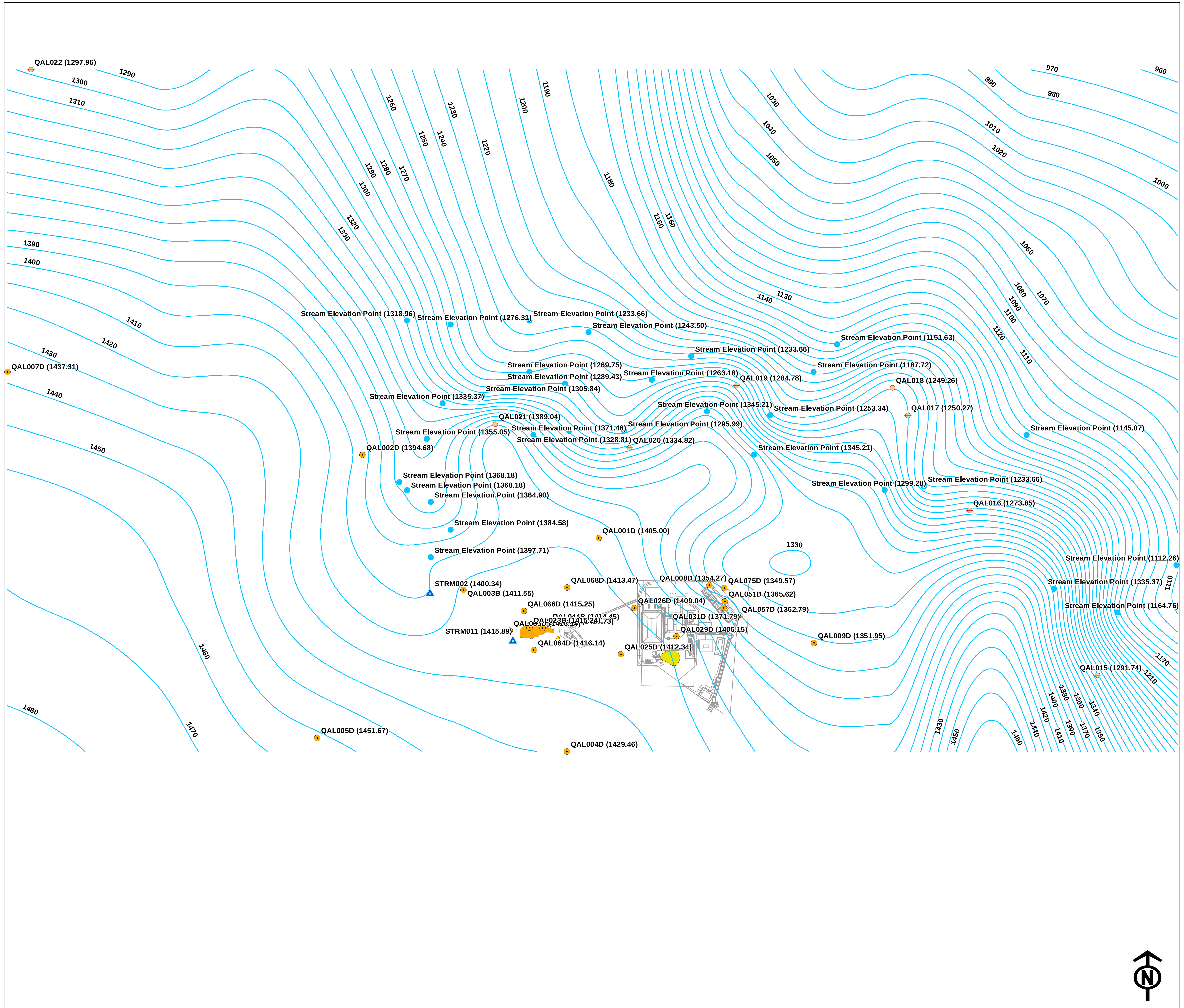
North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Figure: 1

D-ZONE GROUNDWATER ELEVATION CONTOURS
SUMMER BASEFLOW, AUGUST 2016
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

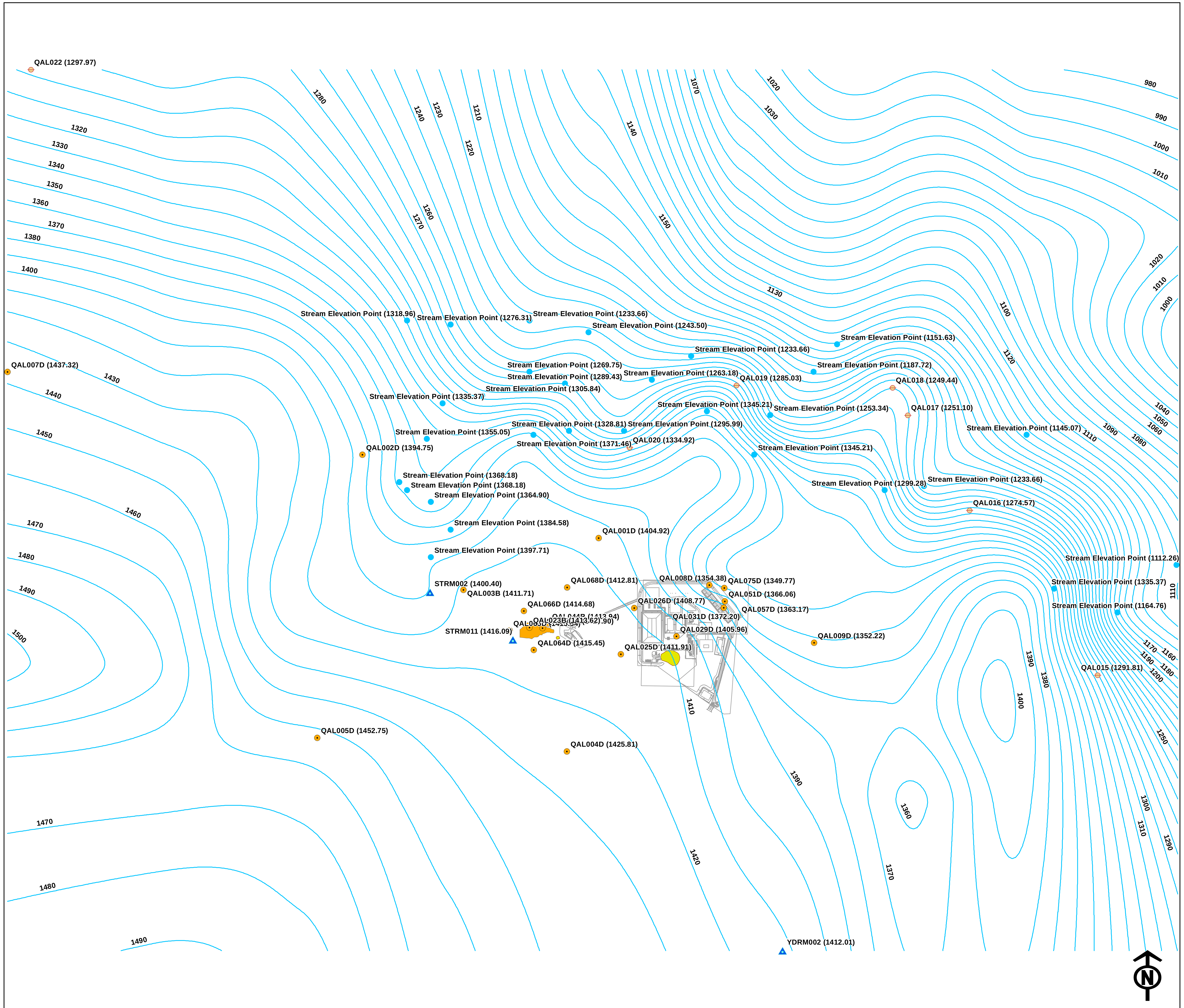
1:16,000

Eagle Mine
a subsidiary of lundin mining

North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Figure: 1

D-ZONE GROUNDWATER ELEVATION CONTOURS
FALL BASEFLOW, OCTOBER - NOVEMBER 2016
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

Eagle Mine
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North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Figure: 1

Appendix N

Eagle Mine

Continuous Groundwater Level Results

2016 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-15						
Mean	1415.3	1417.5	1414.7	1416.1	1415.8	1415.5
Minimum	1414.8	1417.4	1414.0	1415.2	1415.1	1414.8
Maximum	1415.5	1417.6	1414.9	1416.4	1416.0	1415.7
Nov-15						
Mean	1415.4	1417.2	1414.6	1416.2	1416.0	1415.4
Minimum	1415.3	1417.1	1414.5	1416.0	1415.8	1415.4
Maximum	1415.5	1417.4	1414.7	1416.4	1416.1	1415.6
Dec-15						
Mean	1415.4	1417.0	1414.5	1416.1	1416.0	1415.4
Minimum	1415.2	1416.9	1414.3	1415.4	1415.8	1415.3
Maximum	1415.5	1417.1	1414.6	1416.5	1416.2	1415.5
Jan-16						
Mean	1415.2	1416.8	1414.3	1416.0	1415.9	1415.2
Minimum	1414.9	1416.7	1413.9	1415.2	1415.8	1415.1
Maximum	1415.4	1416.9	1414.5	1416.5	1416.1	1415.4
Feb-16						
Mean	1415.1	1416.6	1414.1	1415.8	1415.8	1415.0
Minimum	1414.9	1416.5	1413.9	1415.3	1415.7	1414.9
Maximum	1415.2	1416.7	1414.3	1416.0	1415.9	1415.2
Mar-16						
Mean	1415.2	1416.4	1414.0	1415.8	1415.9	1415.0
Minimum	1415.0	1416.4	1413.8	1415.4	1415.7	1414.8
Maximum	1415.3	1416.5	1414.2	1416.1	1416.2	1415.1
Apr-16						
Mean	1415.3	1416.5	1414.1	1416.0	1416.2	1415.2
Minimum	1415.2	1416.4	1414.0	1415.9	1416.1	1415.0
Maximum	1415.5	1416.8	1414.3	1416.2	1416.5	1415.4
May-16						
Mean	1415.4	1417.3	1414.2	1416.0	1416.3	1415.2
Minimum	1415.2	1416.9	1413.9	1415.6	1416.1	1415.0
Maximum	1415.6	1417.7	1414.4	1416.3	1416.5	1415.3

2016 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
Jun-16						
Mean	1415.3	1417.6	1414.2	1415.9	1416.1	1415.1
Minimum	1415.0	1417.5	1413.9	1415.4	1415.9	1415.0
Maximum	1415.6	1417.7	1414.5	1416.4	1416.4	1415.4
Jul-16						
Mean	1415.4	1417.3	1414.4	1416.2	1416.1	1415.3
Minimum	1415.2	1417.3	1414.1	1415.7	1415.9	1415.1
Maximum	1415.7	1417.5	1414.7	1416.6	1416.4	1415.4
Aug-16						
Mean	1415.4	1417.2	1414.5	1416.2	1416.0	1415.2
Minimum	1415.2	1417.2	1414.3	1415.9	1415.8	1415.1
Maximum	1415.8	1417.3	1414.8	1416.6	1416.3	1415.5
Sep-16						
Mean	1415.5	1417.2	1414.6	1416.3	1416.2	1415.4
Minimum	1415.1	1417.2	1414.4	1416.0	1416.0	1415.3
Maximum	1415.7	1417.4	1414.7	1416.5	1416.3	1415.5

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.

2015 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-15										
Mean	1422.2	1413.1	1415.7	1415.6	1415.9	1416.0	1420.6	1420.6	1425.2	1425.5
Minimum	1422.1	1412.9	1415.6	1415.4	1415.8	1415.9	1420.2	1420.3	1425.1	1424.0
Maximum	1422.3	1413.4	1415.8	1415.7	1416.2	1416.2	1421.6	1421.7	1426.1	1426.6
Nov-15										
Mean	1422.1	1413.2	1415.6	1415.6	1416.2	1416.2	1422.0	1422.1	1426.5	1426.4
Minimum	1422.1	1413.1	1415.4	1415.4	1416.0	1416.0	1421.7	1421.7	1426.0	1426.1
Maximum	1422.3	1413.4	1415.7	1415.7	1416.4	1416.3	1422.4	1422.4	1427.0	1426.7
Dec-15										
Mean	1422.2	1413.3	1415.5	1415.6	1416.5	1416.5	1422.6	1422.6	1427.3	1427.0
Minimum	1422.1	1413.2	1415.4	1415.5	1416.3	1416.3	1422.3	1422.3	1426.5	1426.4
Maximum	1422.3	1413.5	1415.7	1415.7	1416.7	1416.7	1422.8	1422.8	1427.7	1427.4
Jan-16										
Mean	1422.0	NM	1415.3	1415.3	1416.4	1416.4	1422.4	1422.4	1427.2	1426.8
Minimum	1422.0	NM	1415.3	1415.1	1416.4	1416.4	1422.4	1422.4	1426.9	1426.6
Maximum	1422.1	NM	1415.4	1415.5	1416.5	1416.5	1422.5	1422.5	1427.6	1427.1
Feb-16										
Mean	1422.0	NM	1415.3	1415.3	NM	NM	1422.4	1422.4	1426.8	1426.5
Minimum	1422.0	NM	1415.2	1415.2	NM	NM	1422.4	1422.4	1426.5	1426.4
Maximum	1422.1	NM	1415.5	1415.6	NM	NM	1422.6	1422.6	1427.1	1426.7
Mar-16										
Mean	1422.1	1413.5	1415.3	1415.2	1416.6	1416.5	1422.7	1422.7	1427.6	1427.2
Minimum	1422.0	1413.5	1415.2	1415.1	1416.4	1416.3	1422.5	1422.4	1426.8	1426.5
Maximum	1422.2	1413.6	1415.4	1415.4	1416.8	1416.9	1422.9	1422.9	1428.1	1427.7
Apr-16										
Mean	1422.2	1413.6	1415.3	1415.4	1416.7	1416.7	1422.7	1422.7	1427.9	1427.5
Minimum	1422.1	1413.5	1415.2	1415.2	1416.5	1416.5	1422.6	1422.6	1427.8	1427.2
Maximum	1422.4	1413.7	1415.6	1415.6	1416.9	1417.0	1423.0	1423.0	1428.1	1427.9

2015 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-16										
Mean	1422.2	1413.5	1415.7	1415.6	1416.6	1416.8	1422.5	1422.5	1427.6	1427.3
Minimum	1422.2	1413.4	1415.6	1415.5	1416.5	1416.6	1422.3	1422.3	1427.3	1427.1
Maximum	1422.4	1413.6	1415.8	1415.8	1416.8	1416.9	1422.7	1422.7	1427.9	1427.5
Jun-16										
Mean	1422.2	1413.3	1415.4	1415.5	1416.4	1416.4	1422.3	1422.2	1427.2	1427.1
Minimum	1422.0	1413.0	1415.2	1415.1	1416.1	1416.1	1421.6	1421.6	1426.5	1426.6
Maximum	1422.3	1413.5	1415.7	1415.7	1416.6	1416.7	1422.6	1422.6	1427.6	1427.4
Jul-16										
Mean	1422.1	1413.3	1415.3	1415.3	1416.3	1416.2	1422.2	1422.2	1426.8	1426.8
Minimum	1422.0	1413.0	1415.2	1415.1	1416.1	1416.1	1421.5	1421.6	1426.2	1426.4
Maximum	1422.3	1413.5	1415.6	1415.6	1416.5	1416.5	1422.6	1422.6	1427.3	1427.1
Aug-16										
Mean	1422.0	1413.0	1415.4	1415.4	1416.2	1416.3	1421.9	1421.9	1426.6	1426.6
Minimum	1421.9	1412.3	1415.2	1415.2	1415.8	1415.9	1420.8	1420.8	1425.6	1425.8
Maximum	1422.2	1413.5	1415.8	1415.8	1416.8	1416.7	1422.9	1422.8	1427.7	1427.4
Sep-16										
Mean	NM	1413.4	1415.5	1415.5	1416.5	1416.6	1422.5	1422.5	1427.5	1427.2
Minimum	NM	1413.1	1415.4	1415.4	1416.3	1416.4	1421.8	1421.8	1426.6	1426.5
Maximum	NM	1413.5	1415.7	1415.8	1416.8	1416.9	1422.9	1422.9	1427.9	1427.7

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.

Appendix O

Eagle Mine

Groundwater and Wetland

Hydrographs

Mine Permit Groundwater Hydrograph
Water Year 2016
Water Elevation (ft MSL)
1416
1415.75
1415.5
1415.25
1415
1414.75
1414.5
1414.25
1414
1413.75
1413.5
1413.25
Oct '15
Nov '15
Dec '15
Jan '16
Feb '16
Mar '16
Apr '16
May '16
Jun '16
Jul '16
Aug '16
Sep '16
Oct '16
QAL023B Elevation
QAL044B Elevation

Mine Permit Groundwater Hydrograph
Water Year 2016
Water Elevation (ft MSL)
1417.8
1417.6
1417.4
1417.2
1417
1416.8
1416.6
1416.4
1416.2
Oct '15
Nov '15
Dec '15
Jan '16
Feb '16
Mar '16
Apr '16
May '16
Jun '16
Jul '16
Aug '16
Sep '16
Oct '16
QAL024A Elevation


Mine Permit Groundwater Hydrograph
Water Year 2016
Water Elevation (ft MSL)
1417
1416.75
1416.5
1416.25
1416
1415.75
1415.5
1415.25
1415
1414.75
1414.5
Oct '15
Nov '15
Dec '15
Jan '16
Feb '16
Mar '16
Apr '16
May '16
Jun '16
Jul '16
Aug '16
Sep '16
Oct '16
QAL064D Elevation
QAL065D Elevation
QAL066D Elevation

Mine Permit Groundwater Hydrograph
Water Year 2016
Water Elevation (ft MSL)
1423
1422
1421
1420
1419
1418
1417
1416
1415
1414
1413
1412
1411
Oct '15
Nov '15
Dec '15
Jan '16
Feb '16
Mar '16
Apr '16
May '16
Jun '16
Jul '16
Aug '16
Sep '16
Oct '16
WLD022-4.5 Elevation
WLD023-4.5 Elevation


Mine Permit Groundwater Hydrograph
Water Year 2016
Water Elevation (ft MSL)
1416
1415.9
1415.8
1415.7
1415.6
1415.5
1415.4
1415.3
1415.2
1415.1
1415
Oct '15
Nov '15
Dec '15
Jan '16
Feb '16
Mar '16
Apr '16
May '16
Jun '16
Jul '16
Aug '16
Sep '16
Oct '16
WLD025-4.5 Elevation
WLD025-9.5 Elevation


Mine Permit Groundwater Hydrograph
Water Year 2016
Water Elevation (ft MSL)
1417.2
1417
1416.8
1416.6
1416.4
1416.2
1416
1415.8
1415.6
Oct '15
Nov '15
Dec '15
Jan '16
Feb '16
Mar '16
Apr '16
May '16
Jun '16
Jul '16
Aug '16
Sep '16
Oct '16
WLD026-4.5 Elevation
WLD026-9.5 Elevation


Mine Permit Groundwater Hydrograph
Water Year 2016
Water Elevation (ft MSL)
1423.25
1423
1422.75
1422.5
1422.25
1422
1421.75
1421.5
1421.25
1421
1420.75
1420.5
1420.25
1420
Oct '15
Nov '15
Dec '15
Jan '16
Feb '16
Mar '16
Apr '16
May '16
Jun '16
Jul '16
Aug '16
Sep '16
Oct '16
WLD027-4.5 Elevation
WLD027-9.5 Elevation

Mine Permit Groundwater Hydrograph
Water Year 2016
1429
1428
1427
1426
1425
1424
1423
Water Elevation (ft MSL)
Oct '15
Nov '15
Dec '15
Jan '16
Feb '16
Mar '16
Apr '16
May '16
Jun '16
Jul '16
Aug '16
Sep '16
Oct '16
WLD028-4.5 Elevation
WLD028-9.5 Elevation

Appendix P

Eagle Mine

Discrete Water Level Results

2016 Mine Permit Discrete Groundwater Measurements
Eagle Mine

Location	1st Qtr 2016		2nd Qtr 2016		3rd Qtr 2016		4th Qtr 2016	
	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date
QAL001A	1410.43	03/02/16	1410.13	05/24/16	1410.66	08/15/16	1410.67	10/27/16
QAL001D	1404.34	03/02/16	1404.52	05/24/16	1405.00	08/15/16	1404.92	10/27/16
QAL002A	1432.60	03/02/16	1432.85	05/23/16	1433.66	08/05/16	1433.28	10/26/16
QAL002D	1394.49	03/02/16	1394.50	05/23/16	1394.68	08/05/16	1394.75	10/26/16
QAL003A	1423.96	03/01/16	1426.98	05/23/16	1425.17	08/15/16	1425.54	10/20/16
QAL003B	1411.06	03/01/16	1412.72	05/23/16	1411.55	08/15/16	1411.71	10/20/16
QAL004A	1423.95	03/02/16	1425.41	05/25/16	1424.72	08/17/16	1424.64	11/03/16
QAL004D	1427.88	03/02/16	1426.97	05/25/16	1429.46	08/17/16	1425.81	11/03/16
QAL005A	1452.19	03/02/16	1454.54	05/23/16	1453.00	08/05/16	1454.31	10/20/16
QAL005D	1451.34	03/02/16	1452.88	05/23/16	1451.67	08/05/16	1452.75	10/20/16
QAL006A	1412.68	03/02/16	1414.89	05/25/16	1413.33	08/17/16	1414.49	11/03/16
QAL006B	1397.36	03/02/16	1398.74	05/25/16	1398.49	08/17/16	1398.70	11/03/16
QAL007A	1427.57	03/03/16	1428.15	05/25/16	1428.89	08/11/16	1428.55	10/26/16
QAL007D	1435.98	03/03/16	1437.44	05/25/16	1437.31	08/11/16	1437.32	10/26/16
QAL008A	1392.18	02/11/16	1393.74	05/25/16	1393.16	08/15/16	1393.50	11/03/16
QAL008D	1353.99	02/11/16	1353.96	05/25/16	1354.27	08/15/16	1354.38	11/03/16
QAL009A	1351.86	03/02/16	1351.80	05/23/16	1352.08	08/15/16	1352.36	11/10/16
QAL009D	1352.03	03/02/16	1351.71	05/23/16	1351.95	08/15/16	1352.22	11/10/16
QAL010A	1421.10	03/02/16	1423.16	05/23/16	1422.45	08/11/16	1421.97	11/03/16
QAL015	1291.94	03/02/16	1292.00	05/25/16	1291.74	08/17/16	1291.81	11/03/16
QAL016	1274.55	03/03/16	1274.54	05/24/16	1273.85	08/16/16	1274.57	10/27/16
QAL017	F	03/03/16	1251.00	05/24/16	1250.27	08/16/16	1251.10	10/27/16
QAL018	F	03/03/16	1248.94	05/24/16	1249.26	08/16/16	1249.44	10/27/16
QAL019	F	03/03/16	1284.99	05/24/16	1284.78	08/16/16	1285.03	10/27/16
QAL020	1335.46	03/03/16	1335.49	05/24/16	1334.82	08/16/16	1334.92	10/27/16
QAL021	F	03/03/16	1389.20	05/24/16	1389.04	08/16/16	NM	10/27/16
QAL022	1297.78	03/03/16	1297.95	05/25/16	1297.96	08/17/16	1297.97	10/27/16
QAL023-1.0	F	03/01/16	1417.69	05/23/16	1418.22	08/15/16	1418.48	10/20/16
QAL023-4.5	F	03/01/16	1418.09	05/23/16	1418.17	08/15/16	1418.43	10/20/16
QAL023B	1414.96	03/01/16	1415.21	05/23/16	1415.24	08/15/16	1413.62	10/20/16
QAL024A	1416.78	02/16/16	1417.79	05/25/16	1417.60	08/05/16	1417.38	10/20/16
QAL025A	1415.74	02/08/16	1416.02	05/16/16	1416.53	08/04/16	1416.14	10/24/16
QAL025B	1415.61	02/08/16	1415.91	05/16/16	1416.41	08/04/16	1415.99	10/24/16
QAL025D	1411.74	02/02/16	1411.53	05/09/16	1412.34	08/02/16	1411.91	11/07/16
QAL026A	1415.70	02/02/16	<1415.4 BP	05/09/16	1416.40	08/02/16	1416.26	11/07/16
QAL026D	1408.61	02/02/16	1408.33	05/09/16	1409.04	08/02/16	1408.77	11/07/16
QAL026E	1408.71	02/08/16	1403.74	05/16/16	1409.14	08/04/16	1408.40	10/24/16
QAL029A	1413.35	02/02/16	1413.01	05/10/16	1413.27	08/03/16	1413.30	11/08/16
QAL029D	1405.96	02/02/16	1405.47	05/10/16	1406.15	08/03/16	1405.96	11/08/16
QAL031D	1371.16	02/11/16	1371.86	05/25/16	1371.79	08/15/16	1372.20	11/03/16
QAL043-1.0	1419.58	03/01/16	1419.07	05/23/16	1419.27	08/15/16	1419.86	10/20/16
QAL043-4.5	1419.58	03/01/16	1419.07	05/23/16	1419.28	08/15/16	1419.86	10/20/16
QAL043B	1414.32	03/01/16	1414.63	05/23/16	1414.73	08/15/16	1413.90	10/20/16
QAL044-1.0	1424.04	03/01/16	1424.20	05/23/16	D	08/05/16	1424.85	10/20/16
QAL044-4.5	1423.88	03/01/16	1424.26	05/23/16	1423.28	08/05/16	1424.73	10/20/16
QAL044B	1414.01	03/01/16	1414.21	05/23/16	1414.45	08/05/16	1413.94	10/20/16
QAL050A	1363.36	02/01/16	1363.39	05/09/16	1363.94	08/02/16	1364.42	11/07/16
QAL051A	1365.14	02/01/16	1365.13	05/10/16	1365.79	08/02/16	1366.10	11/08/16
QAL051D	1365.11	02/01/16	1365.05	05/10/16	1365.62	08/03/16	1366.06	11/08/16
QAL052A	1352.43	02/01/16	1352.28	05/10/16	1353.09	08/02/16	1353.17	11/08/16
QAL053A	1385.66	02/01/16	1385.68	05/10/16	1386.05	08/02/16	1386.41	11/07/16
QAL055A	1364.63	02/01/16	1364.33	05/09/16	1365.17	08/02/16	1365.63	11/07/16
QAL056A	1393.39	02/01/16	1394.28	05/10/16	1394.45	08/01/16	1394.80	11/07/16
QAL057A	1362.39	02/01/16	1362.20	05/10/16	1362.70	08/01/16	1363.08	11/08/16
QAL057D	1362.45	02/01/16	1362.30	05/10/16	1362.79	08/01/16	1363.17	11/08/16
QAL060A	1404.18	02/04/16	1403.86	05/16/16	1404.59	08/03/16	1404.21	10/24/16
QAL061A	1405.52	02/04/16	1406.21	05/16/16	1405.92	08/03/16	1405.59	10/25/16
QAL062A	1406.88	02/04/16	1406.54	05/16/16	1407.27	08/03/16	1406.88	10/24/16
QAL063A	1400.77	02/04/16	1400.31	05/17/16	1401.35	08/04/16	1400.83	10/24/16

2016 Mine Permit Discrete Groundwater Measurements
Eagle Mine

Location	1st Qtr 2016		2nd Qtr 2016		3rd Qtr 2016		4th Qtr 2016	
	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date
QAL064D	1415.06	02/11/16	1416.16	05/23/16	1416.14	08/05/16	1415.45	10/20/16
QAL065D	1415.79	03/01/16	1416.27	05/23/16	1416.14	08/15/16	1415.54	10/20/16
QAL066D	1414.87	03/01/16	1415.16	05/23/16	1415.25	08/05/16	1414.68	10/20/16
QAL067A	1414.06	02/04/16	1413.65	05/16/16	1414.31	08/03/16	1414.20	10/26/16
QAL068A	1421.61	02/08/16	1420.57	05/16/16	1422.03	08/04/16	1421.68	10/24/16
QAL068B	1412.87	02/08/16	1412.39	05/16/16	1413.42	08/04/16	1412.68	10/24/16
QAL068D	1413.03	02/08/16	1412.52	05/16/16	1413.47	08/04/16	1412.81	10/25/16
QAL069A	1381.38	02/08/16	1381.68	05/17/16	1382.35	08/03/16	1382.60	10/24/16
QAL070A	1369.88	03/03/16	1369.67	05/17/16	1370.78	08/15/16	1371.02	11/03/16
QAL071A	1403.89	02/08/16	1404.82	05/17/16	1405.57	08/03/16	1405.73	10/25/16
QAL073A	1381.47	03/03/16	1381.68	05/17/16	1382.48	08/15/16	1382.82	11/03/16
QAL074A	1403.03	02/16/16	1403.77	05/17/16	1404.69	08/08/16	1404.16	10/26/16
QAL075A	1347.70	02/02/16	1347.52	05/09/16	1348.05	08/02/16	1348.20	11/08/16
QAL075D	1349.17	02/02/16	1349.03	05/09/16	1349.57	08/02/16	1349.77	11/08/16
QAL076E	NI	NI	NI	NI	NM	NM	1330.18	11/07/16
QAL077E	NI	NI	NI	NI	NM	NM	1231.15	10/18/16
STRM002	1400.42	02/15/16	1400.63	04/20/16	1400.34	08/09/16	1400.40	11/01/16
STRM011	F	02/11/16	1416.53	05/23/16	1415.89	08/05/16	1416.09	10/20/16
WLD001-1.0	1427.98	03/02/16	1428.14	05/25/16	1428.04	08/17/16	1428.11	11/03/16
WLD001-4.5	1427.05	03/02/16	1427.19	05/25/16	1427.13	08/17/16	1427.16	11/03/16
WLD001-9.5	F	03/02/16	1428.66	05/25/16	1428.44	08/17/16	1428.49	11/03/16
WLD002	1430.68	03/02/16	1430.67	05/25/16	1430.60	08/17/16	1430.75	11/03/16
WLD004	1445.54	03/04/16	1446.04	05/25/16	1445.84	08/17/16	1446.29	11/03/16
WLD005	1450.01	03/04/16	1450.74	05/25/16	1450.27	08/17/16	1450.85	11/03/16
WLD006	1453.83	03/04/16	1455.16	05/25/16	1454.57	08/17/16	1455.16	11/03/16
WLD007	1449.13	03/04/16	1450.25	05/25/16	1449.61	08/17/16	1450.24	11/03/16
WLD008	1452.73	03/04/16	1453.21	05/25/16	1452.87	08/17/16	1453.34	11/03/16
WLD010	1446.97	03/04/16	1447.37	05/25/16	1446.87	08/17/16	1447.55	11/03/16
WLD011	1445.65	03/04/16	1446.52	05/25/16	1445.66	08/17/16	1446.72	11/03/16
WLD012	1445.34	03/04/16	1445.93	05/25/16	1445.57	08/17/16	1445.95	11/03/16
WLD017	1422.78	03/03/16	1423.03	05/25/16	1422.18	08/17/16	1423.34	11/03/16
WLD018	1422.69	03/03/16	1422.71	05/25/16	1422.58	08/17/16	1423.10	11/03/16
WLD019	1419.78	03/03/16	1420.12	05/25/16	1418.91	08/17/16	1420.15	11/03/16
WLD020	1417.92	03/03/16	1418.71	05/25/16	1417.48	08/17/16	1418.87	11/03/16
WLD021	1415.43	03/02/16	1415.37	05/25/16	1415.67	08/17/16	1415.95	11/03/16
WLD022-1.0	1422.07	03/02/16	1422.19	05/25/16	1422.05	08/17/16	1422.08	11/03/16
WLD022-4.5	1422.04	03/02/16	1422.31	05/25/16	1422.11	08/17/16	1422.17	11/03/16
WLD022-9.5	1422.23	03/02/16	1422.64	05/25/16	1422.43	08/17/16	1422.52	11/03/16
WLD023-1.0	1413.53	03/01/16	1413.61	05/23/16	1413.35	08/15/16	1413.64	10/20/16
WLD023-4.5	1413.29	03/01/16	1413.36	05/23/16	1413.19	08/15/16	1413.43	10/20/16
WLD023-9.5	F	03/01/16	1415.50	05/23/16	1415.18	08/15/16	1415.32	10/20/16
WLD024-1.0	1422.69	03/02/16	1423.12	05/25/16	1422.96	08/17/16	1422.93	11/03/16
WLD024-4.5	1422.80	03/02/16	1423.36	05/25/16	1423.10	08/17/16	1423.10	11/03/16
WLD024-9.5	F	03/02/16	1423.72	05/25/16	1423.27	08/17/16	1423.28	11/03/16
WLD025-1.0	1415.04	03/01/16	1415.63	05/23/16	1415.35	08/15/16	1415.02	10/20/16
WLD025-4.5	1415.01	03/01/16	1415.58	05/23/16	1415.29	08/15/16	1415.00	10/20/16
WLD025-9.5	1414.90	03/01/16	1415.33	05/23/16	1415.24	08/15/16	1414.85	10/20/16
WLD026-1.0	1415.47	03/01/16	1415.68	05/23/16	1415.45	08/15/16	1415.51	10/20/16
WLD026-4.5	F	03/01/16	1416.16	05/23/16	1415.93	08/15/16	1416.17	10/20/16
WLD026-9.5	F	03/01/16	1416.34	05/23/16	1416.00	08/15/16	1416.16	10/20/16
WLD027-1.0	F	03/01/16	1422.91	05/23/16	1422.61	08/15/16	1423.03	10/20/16
WLD027-4.5	1422.56	03/01/16	1422.36	05/23/16	1422.24	08/15/16	1422.76	10/20/16
WLD027-9.5	1422.53	03/01/16	1422.34	05/23/16	1422.23	08/15/16	1422.74	10/20/16
WLD028-1.0	F	03/01/16	1427.32	05/23/16	D	08/15/16	1427.59	10/20/16
WLD028-4.5	1426.92	03/01/16	1427.26	05/23/16	1426.51	08/15/16	1427.57	10/20/16
WLD028-9.5	1426.39	03/01/16	1426.90	05/23/16	1426.42	08/15/16	1427.11	10/20/16
WLD029-1.0	F	03/04/16	D	05/23/16	D	08/15/16	D	10/20/16
WLD029-4.5	1427.09	03/04/16	1428.63	05/23/16	1427.34	08/15/16	1428.51	10/20/16
WLD029-9.5	1427.13	03/04/16	1430.53	05/23/16	1427.67	08/15/16	1428.54	10/20/16
WLD030	1453.85	03/04/16	1454.62	05/25/16	1454.16	08/17/16	1454.91	11/03/16
YDRM002	1412.87	02/15/16	1413.83	05/04/16	NM	08/09/16	1412.01	11/01/16

2016 Mine Permit Discrete Groundwater Measurements
Eagle Mine

Footnote	Explanation
BP	Below pump. Maximum water elevation is shown.
D	Dry.
F	Frozen.
NI	Not installed.
NM	Not measured.

Appendix Q

Eagle Mine

Continuous Surface Water Monitoring Results

2016 Water Year
Continuous Monitoring Results
Surface Water Locations
Eagle Mine

STRE002								
Parameter	**Month**	**Background MEAN**	**Background Min**	**Background MAX**	**Background SD**	**Water Year MEAN**	**Water Year MIN**	**Water Year MAX**
Temperature	Oct-15	7.5	3.2	14.6	1.5	7.2	4.5	11.5
	Nov-15	3.4	-0.1	9.3	0.5	4.6	0.6	9.4
	Dec-15	0.8	-0.2	3.2	0.4	2.1	0.0	4.2
	Jan-16	0.6	-0.2	0.8	0.5	0.6	0.0	2.4
	Feb-16	0.5	-0.2	2.4	0.2	0.9	0.0	2.2
	Mar-16	1.5	-0.2	4.7	0.3	1.5	0.0	2.9
	Apr-16	4.2	-0.1	10.8	1.6	3.5	0.0	6.8
	May-16	9.7	1.3	17.8	1.0	10.3	6.2	14.4
	Jun-16	13.0	8.1	17.0	0.7	13.2	9.9	16.9
	Jul-16	14.1	10.6	18.2	1.0	14.8	12.3	17.8
	Aug-16	13.5	10.0	17.6	0.7	14.3	12.6	16.2
	Sep-16	11.4	7.0	16.6	0.8	12.6	10.3	15.7
Flow	Oct-15	22.9	12.0	119.0	7.1	NA	NA	NA
	Nov-15	18.5	12.4	37.8	3.1	15.7	11.1	36.5
	Dec-15	17.8	12.1	58.8	4.1	24.6	12.3	55.3
	Jan-16	18.1	12.0	45.0	3.5	NA	NA	NA
	Feb-16	17.3	12.0	50.0	5.6	NA	NA	NA
	Mar-16	23.3	12.0	110.9	5.7	NA	NA	NA
	Apr-16	37.0	12.0	131.5	10.3	NA	NA	NA
	May-16	22.2	11.8	160.6	6.3	NA	NA	NA
	Jun-16	18.0	12.0	90.1	3.5	NA	NA	NA
	Jul-16	14.0	11.8	33.0	1.5	NA	NA	NA
	Aug-16	14.5	11.8	74.4	2.3	NA	NA	NA
	Sep-16	16.9	11.7	69.8	3.2	NA	NA	NA
Specific Conductivity	Oct-15	127.8	70.0	146.0	14.4	NA	NA	NA
	Nov-15	130.2	80.0	148.0	9.2	122.3	110.2	128.0
	Dec-15	132.9	89.0	153.0	6.7	122.1	96.0	138.3
	Jan-16	133.3	115.0	145.0	3.9	144.0	134.3	150.4
	Feb-16	133.2	111.0	144.0	3.1	142.4	122.1	154.2
	Mar-16	122.0	54.0	148.0	13.6	109.7	63.0	137.9
	Apr-16	95.6	50.0	146.0	18.2	104.7	43.5	150.7
	May-16	122.0	37.0	149.0	9.3	125.5	96.0	140.9
	Jun-16	129.1	94.0	169.0	6.4	144.4	132.0	154.6
	Jul-16	146.4	119.0	165.0	7.4	149.2	133.9	159.0
	Aug-16	146.1	107.0	163.0	6.5	136.1	112.7	146.2
	Sep-16	138.2	80.0	149.0	6.0	109.4	67.3	138.3

2016 Water Year
Continuous Monitoring Results
Surface Water Locations
Eagle Mine

STRM004								
Parameter	**Month**	**Background MEAN**	**Background Min**	**Background MAX**	**Background SD**	**Water Year MEAN**	**Water Year MIN**	**Water Year MAX**
Temperature	Oct-15	7.5	2.3	15.2	1.6	7.4	4.8	11.7
	Nov-15	3.0	0.0	9.6	0.5	4.7	0.9	9.0
	Dec-15	0.3	-0.1	2.5	0.2	1.9	0.4	3.6
	Jan-16	0.2	-0.1	1.9	0.3	NA	NA	NA
	Feb-16	0.1	0.0	1.3	0.1	NA	NA	NA
	Mar-16	0.9	-0.1	5.0	0.4	NA	NA	NA
	Apr-16	4.2	-0.1	11.3	1.9	NA	NA	NA
	May-16	10.1	1.9	18.2	1.0	NA	NA	NA
	Jun-16	13.8	7.9	18.6	1.2	13.4	9.7	17.2
	Jul-16	14.8	11.0	19.0	1.3	15.4	12.6	18.5
	Aug-16	14.2	10.4	18.1	0.7	15.3	13.2	17.3
	Sep-16	11.8	7.3	17.3	4.5	13.2	10.7	16.2
Flow	Oct-15	7.7	3.9	41.1	2.2	4.3	4.0	5.8
	Nov-15	6.8	4.2	23.1	2.5	4.8	3.9	7.1
	Dec-15	6.7	4.6	18.9	1.6	6.2	4.6	10.7
	Jan-16	5.6	3.5	13.2	1.8	NA	NA	NA
	Feb-16	5.7	2.8	15.5	1.8	NA	NA	NA
	Mar-16	8.2	3.1	56.7	3.0	NA	NA	NA
	Apr-16	14.9	5.2	44.5	2.5	NA	NA	NA
	May-16	8.3	4.4	59.9	2.5	NA	NA	NA
	Jun-16	5.7	3.0	27.4	1.1	5.1	4.0	7.7
	Jul-16	4.6	2.8	9.9	0.4	5.6	4.3	9.6
	Aug-16	4.8	2.8	28.0	1.1	5.8	4.0	24.6
	Sep-16	5.2	2.8	24.0	2.2	7.9	4.1	30.2
Specific Conductivity	Oct-15	87.3	56.0	140.0	9.2	NA	NA	NA
	Nov-15	87.1	59.0	96.0	4.2	NA	NA	NA
	Dec-15	84.7	61.0	95.0	11.6	NA	NA	NA
	Jan-16	91.3	67.0	97.0	1.6	NA	NA	NA
	Feb-16	94.5	58.0	103.0	3.5	NA	NA	NA
	Mar-16	88.6	44.0	105.0	8.1	NA	NA	NA
	Apr-16	69.5	33.0	105.0	12.6	NA	NA	NA
	May-16	85.6	37.0	114.0	9.2	NA	NA	NA
	Jun-16	88.5	57.0	116.0	14.3	NA	NA	NA
	Jul-16	97.1	82.0	114.0	6.2	101.3	92.0	106.0
	Aug-16	100.6	70.0	119.0	9.2	97.6	78.9	106.5
	Sep-16	81.3	57.0	130.0	48.8	78.9	58.4	111.8

2016 Water Year
Continuous Monitoring Results
Surface Water Locations
Eagle Mine

STRM005								
Parameter	**Month**	**Background MEAN**	**Background Min**	**Background MAX**	**Background SD**	**Water Year MEAN**	**Water Year MIN**	**Water Year MAX**
Temperature	Oct-15	7.9	2.6	15.5	2.4	7.6	4.8	12.1
	Nov-15	3.1	0.0	7.6	0.2	4.4	0.0	9.1
	Dec-15	0.3	-0.1	2.2	0.2	1.5	0.0	4.0
	Jan-16	0.3	-0.1	2.6	0.2	0.0	0.0	0.4
	Feb-16	0.0	-0.1	1.4	0.1	0.0	0.0	1.0
	Mar-16	0.5	-0.1	3.7	0.3	1.1	0.0	3.2
	Apr-16	4.2	0.1	11.1	1.4	2.8	0.0	6.7
	May-16	10.4	2.1	17.5	1.0	11.2	7.3	15.6
	Jun-16	15.4	9.2	20.5	1.0	15.0	11.1	19.5
	Jul-16	17.2	11.9	21.3	1.1	17.4	14.6	20.6
	Aug-16	16.6	12.7	21.1	0.4	16.8	14.8	19.1
	Sep-16	13.1	9.2	18.7	1.1	13.9	11.5	16.6
Flow	Oct-15	64.2	29.2	346.6	29.2	27.1	24.0	38.1
	Nov-15	52.8	29.2	188.7	24.1	31.8	27.5	51.2
	Dec-15	55.7	33.6	131.3	17.6	NA	NA	NA
	Jan-16	44.9	38.0	83.3	2.7	NA	NA	NA
	Feb-16	59.6	40.7	119.3	0.0	NA	NA	NA
	Mar-16	126.0	36.0	456.2	115.0	NA	NA	NA
	Apr-16	126.8	41.7	459.4	21.5	127.9	59.3	309.9
	May-16	67.2	32.5	781.5	28.7	57.7	44.3	102.0
	Jun-16	40.5	26.3	164.1	9.9	45.9	37.7	66.9
	Jul-16	29.8	24.0	52.0	2.2	42.7	35.5	65.8
	Aug-16	28.8	23.2	82.0	4.0	50.7	33.5	276.8
	Sep-16	38.6	21.8	155.5	14.2	74.4	36.6	270.5
Specific Conductivity	Oct-15	112.0	29.0	147.0	26.8	132.2	121.6	136.1
	Nov-15	123.5	65.0	143.0	15.9	124.9	110.1	130.8
	Dec-15	126.6	79.0	145.0	8.4	101.4	62.1	126.2
	Jan-16	129.3	99.0	145.0	4.7	124.0	109.0	130.6
	Feb-16	128.1	91.0	143.0	5.3	116.2	91.0	124.9
	Mar-16	119.1	55.0	141.0	9.4	78.4	46.0	115.9
	Apr-16	77.5	36.0	121.0	11.3	72.1	46.0	90.7
	May-16	112.5	30.0	141.0	8.1	97.0	78.8	114.5
	Jun-16	130.9	78.0	149.0	4.2	114.2	100.4	124.7
	Jul-16	142.9	111.0	161.0	8.4	116.7	104.0	124.3
	Aug-16	145.0	101.0	163.0	11.4	113.5	62.5	126.8
	Sep-16	133.3	90.0	150.0	15.7	107.8	61.9	131.0

2016 Water Year
Continuous Monitoring Results
Surface Water Locations
Eagle Mine

YDRM002								
Parameter	**Month**	**Background MEAN**	**Background Min**	**Background MAX**	**Background SD**	**Water Year MEAN**	**Water Year MIN**	**Water Year MAX**
Temperature	Oct-15	8.5	2.7	17.2	1.9	7.7	5.0	12.1
	Nov-15	2.4	0.0	9.3	0.5	3.9	0.0	8.9
	Dec-15	0.1	0.0	1.4	0.0	0.6	0.0	2.3
	Jan-16	0.0	-0.1	1.0	0.1	0.0	0.0	-0.1
	Feb-16	0.0	0.0	0.2	0.0	0.0	0.0	-0.1
	Mar-16	0.4	-0.1	4.9	0.3	0.5	0.0	2.3
	Apr-16	4.3	0.0	11.4	2.1	3.2	0.0	7.9
	May-16	11.5	0.8	21.6	1.4	12.5	7.1	17.2
	Jun-16	16.5	9.8	22.2	1.2	16.5	11.8	21.1
	Jul-16	18.6	12.4	23.6	1.4	18.8	15.9	21.7
	Aug-16	17.9	11.7	23.2	0.9	18.2	14.8	21.3
	Sep-16	14.3	8.5	21.0	0.7	14.9	11.8	17.7
Flow	Oct-15	34.6	7.1	214.9	25.4	11.4	7.7	21.6
	Nov-15	26.8	10.0	94.0	9.9	18.7	11.6	33.3
	Dec-15	21.1	10.6	74.0	6.9	NA	NA	NA
	Jan-16	18.4	10.0	41.1	4.1	19.7	17.2	24.2
	Feb-16	16.8	12.2	29.7	2.9	18.7	17.5	19.9
	Mar-16	25.7	11.4	173.1	11.1	67.3	42.4	135.5
	Apr-16	91.8	14.9	306.2	29.0	72.0	37.9	144.3
	May-16	47.2	8.1	204.3	22.2	35.0	24.6	54.3
	Jun-16	21.2	8.0	61.2	8.6	22.0	12.6	38.0
	Jul-16	11.6	6.2	32.6	1.9	21.9	11.1	53.2
	Aug-16	9.0	4.3	45.6	2.7	30.9	7.7	146.2
	Sep-16	13.1	5.5	68.5	5.9	52.0	16.7	179.4
Specific Conductivity	Oct-15	61.3	30.0	102.0	18.8	87.6	77.4	99.9
	Nov-15	53.1	32.0	74.0	7.6	65.7	50.1	87.6
	Dec-15	62.0	32.0	91.0	9.0	49.2	36.3	60.0
	Jan-16	64.6	52.0	76.0	5.8	60.8	52.9	65.8
	Feb-16	69.6	55.0	79.0	5.6	65.6	64.0	68.0
	Mar-16	57.0	28.0	75.0	12.4	45.5	39.0	57.6
	Apr-16	35.2	19.0	72.0	7.1	40.6	23.2	60.2
	May-16	45.9	20.0	92.0	11.7	43.8	31.6	59.1
	Jun-16	67.1	44.0	94.0	4.6	56.7	43.1	69.7
	Jul-16	81.6	53.0	105.0	7.7	56.0	46.2	63.1
	Aug-16	87.4	47.0	107.0	10.2	54.9	29.0	70.9
	Sep-16	80.3	42.0	103.0	11.0	37.3	28.8	48.1

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 2016
Specific Conductivity (µS/cm@25°C)
Flow (cfs)
Temperature (°C)
165
150
135
120
105
90
75
60
45
30
60
54
48
42
36
30
24
18
12
6
20
17.5
15
12.5
10
7.5
5
2.5
0
-2.5
Oct '15
Nov '15
Dec '15
Jan '16
Feb '16
Mar '16
Apr '16
May '16
Jun '16
Jul '16
Aug '16
Sep '16
Oct '16
STRE002 Flow
STRE002 Temperature
STRE002 Specific_Conductivity


Mine Permit Surface Water Hydrograph
Water Year 2016
Specific Conductivity (µS/cm@25°C)
Flow (cfs)
Temperature (°C)
120
112
104
96
88
80
72
64
56
48
36
32
28
24
20
16
12
8
4
0
22.5
20
17.5
15
12.5
10
7.5
5
2.5
0
Oct '15
Nov '15
Dec '15
Jan '16
Feb '16
Mar '16
Apr '16
May '16
Jun '16
Jul '16
Aug '16
Sep '16
Oct '16
STRM004 Flow
STRM004 Temperature
STRM004 Specific_Conductivity

Mine Permit Surface Water Hydrograph
Water Year 2016
Specific Conductivity (µS/cm@25°C)
Flow (cfs)
Temperature (°C)
144
132
120
108
96
84
72
60
48
36
360
320
280
240
200
160
120
80
40
0
24
21
18
15
12
9
6
3
0
-3
Oct '15
Nov '15
Dec '15
Jan '16
Feb '16
Mar '16
Apr '16
May '16
Jun '16
Jul '16
Aug '16
Sep '16
Oct '16
STRM005 Flow
STRM005 Temperature
STRM005 Specific_Conductivity

Mine Permit Surface Water Hydrograph
Water Year 2016
Specific Conductivity (µS/cm@25°C)
Flow (cfs)
Temperature (°C)
180
160
140
120
100
80
60
40
20
0
225
200
175
150
125
100
75
50
25
0
24
21
18
15
12
9
6
3
0
-3
Oct '15
Nov '15
Dec '15
Jan '16
Feb '16
Mar '16
Apr '16
May '16
Jun '16
Jul '16
Aug '16
Sep '16
Oct '16
YDRM002 Flow
YDRM002 Temperature
YDRM002 Specific_Conductivity

Appendix S

Eagle Mine

Flora & Fauna Survey Location Map

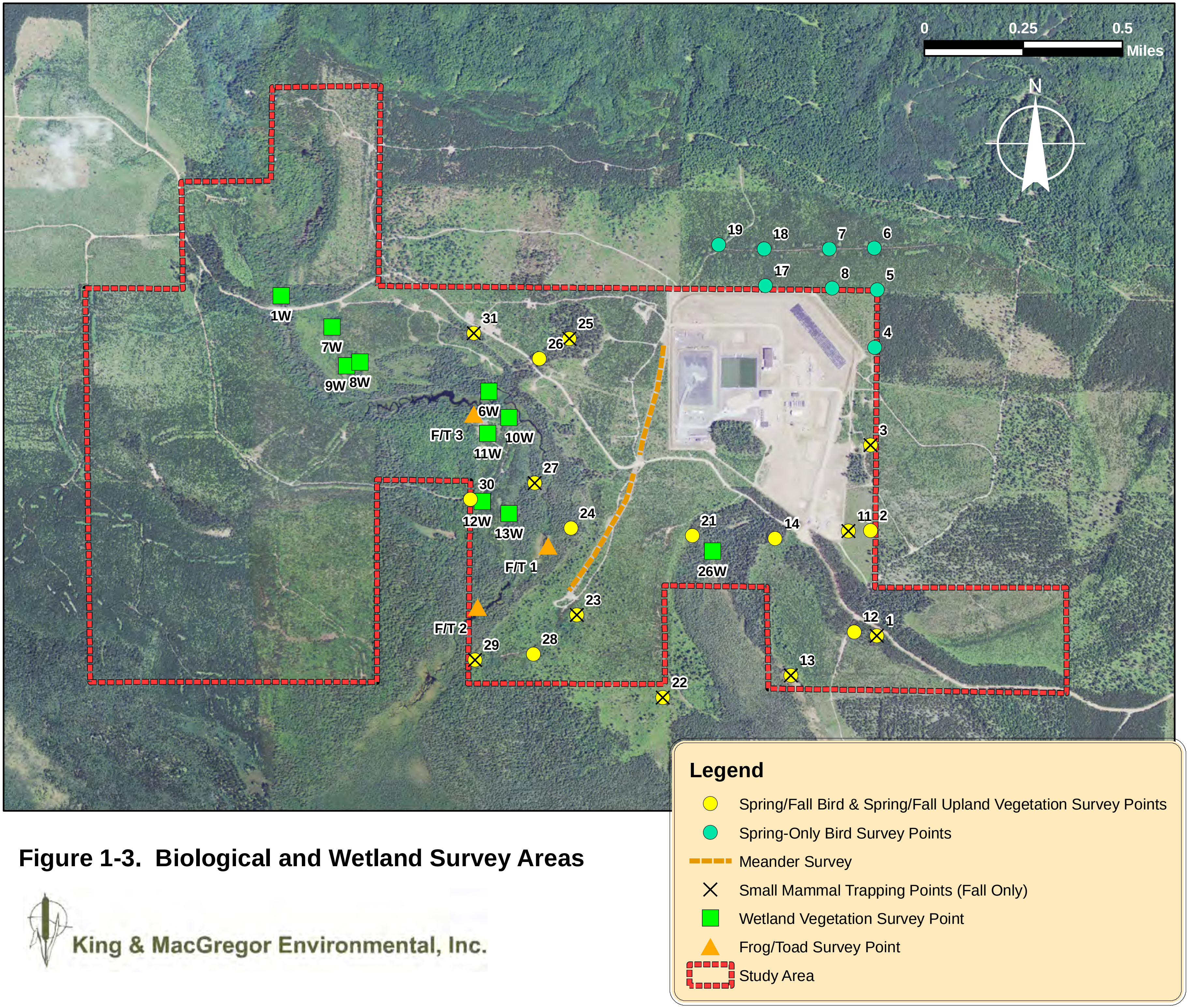


Figure 1-3. Biological and Wetland Survey Areas

King & MacGregor Environmental, Inc.

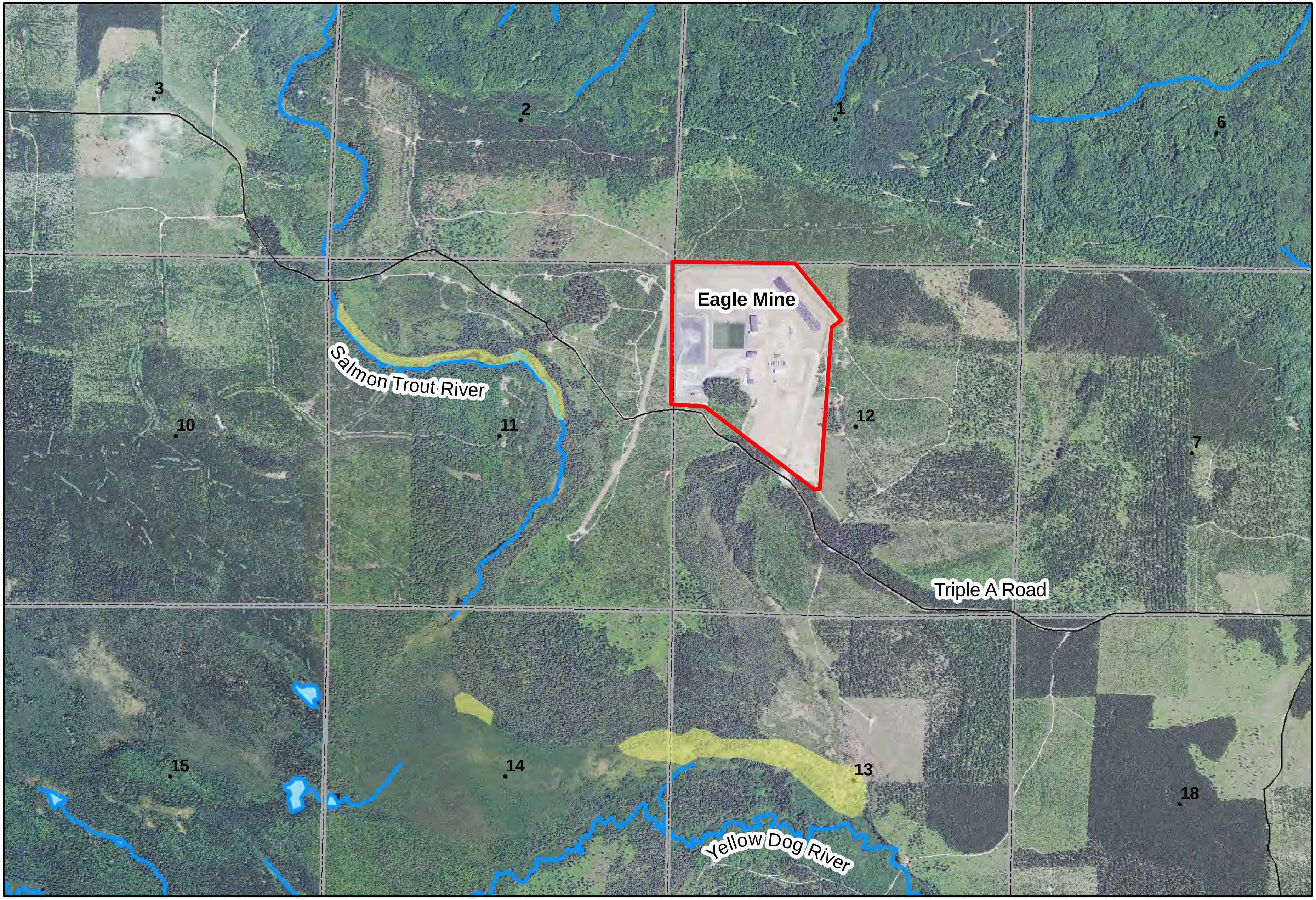


Figure 5-1. Narrow-leaved Gentian Survey (August 2016)

King & MacGregor Environmental, Inc.

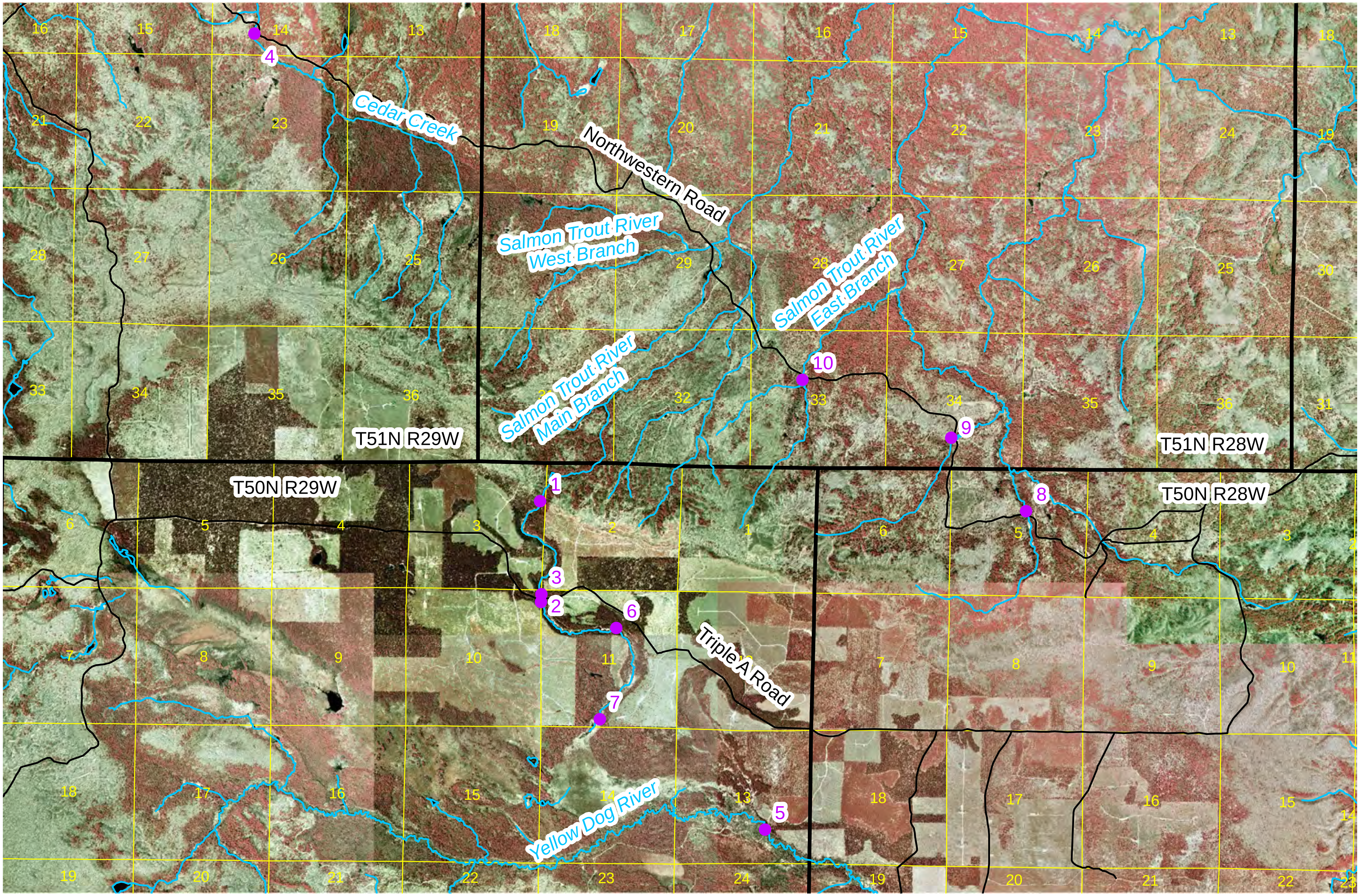
Legend

Narrow-leaved Gentian

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.

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 66 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 66 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 Acid Rock Drainage (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 explosives selected for use at the Eagle Mine are comprised of an emulsion of ammonium nitrate/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 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. Explosives are stored either underground or on the surface in an isolated magazine located at a secure site at the mine facility. Caps, primers, and detonating cord are stored in a separate magazine way from the emulsion mixture. Explosives are transported by a clearly marked truck via a dedicated road, from the explosives storage area to the mine portal for distribution and use in the mine.

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 560 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. 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 85,500 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.

<u>Bulk Tank Failure</u> - 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.

<u>Mishandling/Leaking Hoses</u> - 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.

<u>Construction/Reclamation Phase Release</u> - 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. 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.

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	Trade Name	CAS No.	Storage Volumes (pounds)	Storage Containers
1	sodium hydroxide	caustic soda	1310-73-2	64,000	Liquid
2	sodium hypochlorite	Chlorine Bleach	7681-52-9	2,000	Liquid
3	sodium carbonate anhydrous	soda ash	497-19-8	34,000	Solid
4	iron (III) chloride solution	Ferric Chloride	7705-08-0	7,400	Liquid
5	Antiscalant	Hydrex 4114	20592-85-2	500	Liquid
6	hydrochloric acid	HCl	7647-01-0	49,000	Liquid
7	Antifoam	Suppressor 1615	-	500	Liquid
8	nitric acid	Nitric acid, 34%	7697-37-2	4,400	Liquid
9	sulfuric acid	Hydrex 1925	7664-93-9	8,000	Liquid
10	polymer	Hydrex 6511	-	450	Liquid
11	Citric Acid	Hydrex 4702	-	400	Solid
12	RO Membrane Cleaner - Basic (Hydrex 4501)	Hydrex 4501	-	400	Solid

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, subsidence monitoring is being performed at two locations above the ore body, adjacent to the overlying wetland. 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, working 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 fifteen members making up two teams. that 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, fires and firefighting, 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
- Portable 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.

<u>Emergency Telephone Numbers</u> – 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

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. These individuals will include the Incident Commander, Safety Officer, Environmental Officer, Public Relations Officer and other individuals designated to respond to fires and participate in mine rescue. Individuals will receive appropriate information with respect to their specific roles, including procedures and use of certain emergency response equipment.

The second component of an effective Contingency Plan will be to conduct mock field tests. At least one mock field test will be performed each year. The Safety Officer will work with the Environmental Officer and the Incident Commander to first define the situation that will be tested. The types of test situations may include responding to a release of a hazardous substance, responding to a fire (aboveground or underground) or responding to a 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 ICS team and other Eagle Mine officials 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

Eagle Mine

Organizational Information Update

Eagle Mine
a subsidiary of lundin mining

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Organizational Information

Eagle Mine LLC

February 10, 2017

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McRae, Paul M.	4547 County Road 601 Champion, MI 49814
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Officers

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Lesley Duncan	Secretary	4547 County Road 601 Champion, MI 49814
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