Eagle Mine

hundin mining

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

Friday, March 13, 2015

Mr. Joe Maki
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 Mr. Maki:

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 2014 Annual Mining and Reclamation Report for the Eagle Mine.

Should you have any questions about this report, please do not hesitate to contact me at 906-339-7075.

Sincerely,

Kristen Mariuzza, P.E.
Environmental and Permitting Manager

Cc: Michigamme Township

enclosure

Eagle Mine

a subsidiary of lundin mining

2014 Annual Mining and Reclamation Report
Mine Permit MP 01 2007

March 15, 2015

Contents

Appendices

Acronyms and Abbreviations

AEM	Advanced Ecological Management
COSA	Coarse Ore Storage Area
CRF	Cemented Rock Fill
CWB	Contact Water Basin
DO	dissolved oxygen
Eagle	Eagle Mine, LLC.
gpd	gallons per day
gpm	gallons per minute
KME	King and MacGregor Environmental
LEPC	Local Emergency Planning Committee
m	meter
m^3	cubic meters
MCHD	Marquette County Health Department
MCL	maximum contaminant level
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
µg/L	micrograms per liter
mg/L	milligrams per liter
MNFI	Michigan Natural Features Inventory
MRR	Mining and Reclamation Report
MSHA	Mine Safety Health Administration
MVAR	Mine Ventilation Air Raise
NCWIB	Non-contact Water Infiltration Basin
NLG	Narrow-Leaved Gentian
NREPA	Natural Resources & Environmental Protection Act
ORP	Oxidation Reduction Potential
SESC	Soil Erosion and Sedimentation Control
SERC	State Emergency Response Commission
t	metric ton (tonne)
TDRSA	Temporary Development Rock Storage Area
UPL	Upper Prediction Limit
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	Kristen Mariuzza	Manager – Environmental, Health & Safety
Eagle Mine LLC	Amanda Zeidler	Environmental Compliance Supervisor
Report contributors		
Advanced Ecological Management, LLC.	Doug Workman	Aquatic Scientist
Eagle Mine LLC	Dave Bertucci	Environmental Field Technician
Eagle Mine LLC	Ruby Barickman	Mining Engineer
Eagle Mine LLC	Kristie Grimes	Water Treatment Plant Lab Technician
Eagle Mine LLC	Jason Evans	Land & Information Management Specialist
King & MacGregor Environmental, Inc.	Matt MacGregor	Wetland Scientist/Biologist
North Jackson Company	Dan Wiitala	Professional Geologist
North Jackson Company	Jessica Bleha	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, 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 MRR will provide a 2014 construction update to summarize the activities that have occurred since the 2013 MRR submittal and a look forward to 2015. The update will serve to memorialize all that has been completed and the decisions and/or modifications that have been approved throughout the process.

3. Surface Facilities and Construction Status

Construction of surface facilities which support mine development and operations were completed in the spring of 2014. Construction activities included the completion of the coarse ore storage area (COSA), backfill and aggregate storage facility, mine ventilation, emergency egress structures and underground heating system. A copy of the mine site map can be found in Appendix A.

Eagle Mine Site Aerial View of Completed Construction, May 2014

2.1 Soil Erosion Control Measures

In accordance with Part 91 (NREPA, 1994 PA 451, as amended), SESC measures installed around the perimeter of the mine ventilation area will remain in place until a sufficient amount of permanent vegetative growth is established. Although SESC measures related to the construction of mining facilities now fall under the purview of Part 632, Eagle Mine will maintain compliance with the requirements of Part 91 for the SESC permit that is currently in place for the mine ventilation area. To ensure the integrity of the installed controls, inspections occur 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.

2.2 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.

2.2.1 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. These benchmarks are based on a very small sample set of results and may not fully characterize the variations in groundwater quality present at these locations. In 2014, the results indicated a small number of cations and/or anions including nitrate were found to be outside of calculated benchmarks at each location. In addition, at location QAL071A copper was detected at a level greater than the established benchmark in Q3 and Q4 and pH was slightly below the benchmark range of 8.1 – 9.1 in Q3 and Q4. Results from QAL071A are further discussed in section 4.1 below and all results are summarized in Appendix F of this report.

2.2.2 Contact Water Basins

There are two contact water basins that collect storm water from the paved contact area, underground mine, temporary development rock storage area (TDRSA) and as needed from the COSA, fuel station and truck wash sumps.

In August 2014, a geo-membrane leak detection survey was performed by Leak Location Services, Inc. on both CWBs using the shallow water survey method. The leak detection survey consisted of personnel wading through the waters of the basins, systematically scanning the submerged geo-membrane liner using an electrical probe method to locate any leaks. No leaks were detected in the survey conducted in 2014.

CWB Leak Detection Survey, August 2014

2.3 Surface Facility Construction

Construction was completed on the following structures in 2014. These surface structures are necessary for mining operations and will provide additional environmental protection. These structures include:

- Mine Heater
- Coarse Ore storage building
- Aggregate storage building/backfill plant
- Mine ventilation system/emergency egress
- Additional utilities

2.3.1 Site Modifications and Amendments

In July 2013, the MDEQ approved the request to temporarily waive permit condition G1 (vehicle washing) while underground operations were stopped. This waiver was in place until January 8, 2014 when underground operations resumed.

On June 10, 2014, the MDEQ approved the use of monitoring location QAL024A as the down gradient monitoring point of NCWIB No.4 as required by permit condition L1.

A full summary of all Part 632 permit notifications, required submittals and approvals, can be found in Table 2.3.1 below.

Table 2.3.1 Notifications, Submittals, and Approvals

Date	Description	Approval
3/14/14	2013 Annual Mining and Reclamation Report	
1/8/14	Notification that underground operations resumed	
April 2014	Submitted Q1 groundwater and surface water monitoring data	
May/June 2014	Submitted Q2 groundwater and surface water monitoring data	
6/2/14	Requested approval for use of QAL024A as down gradient monitoring location of NCWIB NO. 4	6/10/14
September 2014	Submitted Q3 groundwater and surface water monitoring data	
November/December 2014	Submitted Q4 groundwater and surface water monitoring data	

2.3.2 Coarse Ore Storage Area (COSA)

The COSA is the area where all loading and unloading of ore occurs. It is an enclosed building to ensure control of all dust emissions associated with the transferring of material from the underground trucks and over the road haul trucks. Construction of the 36,000 square foot COSA commenced in July 2013 and was completed in the spring of 2014.

Coarse Ore Storage Building, May 2014

2.3.3 Aggregate Storage and Backfill Plant

The aggregate storage building is a 19,000 square foot facility in which quarry aggregate or crushed development rock is stored prior to being used as cemented rock fill (CRF) in the mine. Construction of the facility began in July 2013 and was completed in the spring of 2014.

In addition to the aggregate storage building, this area also houses a backfill plant and cement silos that generate cemented rock backfill for the underground. Construction of the backfill plant was completed in spring 2014.

Aggregate Storage and Backfill Plant, Spring 2014

2.3.4 Mine Ventilation and Emergency Egress

Construction of the mine ventilation and emergency egress was completed in the spring of 2014. The Alimak emergency egress construction began the previous year and was completed and in use by summer 2014. Additional surface facilities located in the mine ventilation area, and completed in 2014, include the permanent ventilation stack, collar and heater houses which contain the emergency egress and mine heater, and the E-House which feeds the ventilation system and underground with power. Commissioning of these facilities took place in spring 2014.

Mine Ventilation and Emergency Egress Area, September 2014

2.3.5 Onsite Utilities

Potable Water

Due to naturally occurring arsenic levels in excess of the maximum containment level (MCL) set by the EPA, an arsenic removal treatment system was required for the potable water system. Construction of the treatment system was completed in late 2013 and the final inspection, by the Marquette County Health Department, and subsequent approval occurred in January 2014.

Potable water arsenic treatment skid, January 2014

2.3.6 Miscellaneous

In fall 2014, construction of a sixth mine dry and a second emulsion tank commenced. Mine dry No. 6 is located east of existing mine dry No. 5 and the second emulsion tank is located directly south of the existing emulsion tank. Construction of the mine dry and second emulsion tank were completed in winter 2014. Mine dry No. 6 was occupied and in use by the end of 2014 while the second emulsion tank is expected to be operational in early 2015.

Second Emulsion Tank, December 2014

Mine Dry No. 6, December 2014

3. 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 4 of this MRR.

3.1 Underground Operations

Underground operations ceased in May 2013 and resumed in January 2014. The underground contractor, Cementation, began final mine development and preparation for mining ore. 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. The first ore was mined on June 16, 2014 and the first primary stope blast occurred on August 15, 2014. Once a primary stope is mined, it is backfilled with CRF that is made onsite at the batch plant. The CRF is currently comprised of development rock, cement, a concrete admixture, and water and is backfilled using underground haul trucks. The first truck to haul CRF underground occurred in September 2014.

3.1.1 Underground Development Progress

In 2014, construction of the primary decline, also referred to as the centerline, had progressed an additional 2,427 meters for a project total of approximately 4,579 meters (excluding the 78 meter portal entrance). In 2014, there was development on the down-ramp and levels 265, 250, 240, 215, 190, and 172. In addition, there was also off-centerline development which included muckbays, substation cutouts, stope accesses on all levels, emergency accesses, underground maintenance and wash bay, and sump and pump stations. A secure underground explosives magazine was also constructed in 2014, therefore with the exception of emulsion, all other explosives components are

now stored underground. Table 3.1.1 below summarizes the monthly progress of development and Appendix B contains a map which outlines the development positions for 2014.

Underground Maintenance and Wash Bay, December 2014

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

Table 3.1.1 Underground Advance

Month	Distance of Advance Centerline (m)
January	132
February	214
March	287
April	306
May	387
June	317
July	229
August	255
September	54
October	81
November	102
December	62
Total	**2,427**

Source: Mine Engineering Department 2014 Development Summary

Three 12 person, 36-hour self-contained, Mine Arc refuge chambers remained underground in 2014. They are currently located in muckbay No. 5, muckbay No. 10, and 215 level stope access 1445. Two four-person refuge chambers are also used underground. The locations of the chambers change as the development progresses with locations being updated on the mine map as required by MSHA. Each unit is inspected on a weekly basis with a more robust inspection completed three times per year.

Other underground operations included definition drilling of the ore body which is being completed by Boart Longyear. Drilling occurred through November 2014 and will recommence in Q1 2015.

3.1.2 Underground Ore Production – Stoping & Backfilling

In 2014, ore was encountered and mined in two ways; blasting of primary stopes and while developing stope access levels. Four primary stopes were mined with three of the four being backfilled with CRF in 2014. The fourth stope is scheduled to be backfilled in early 2015. As noted in Section 3.1, the CRF currently utilizes crushed development rock. A summary of active stopes and their status at the end of 2014 are listed in Table 3.1.2 below. In addition, the total tonnes of ore and backfill used in 2014 are listed in Table 3.1.2a.

Drilled Stope, September 2014

Table 3.1.2 Stopes Mined and Status at End of 2014

Mine Level	Stope Easting	Mined	Backfilled
215	1625	x	x
215	1605	x	x
240	1645	x	
172	1505	x	x

Table 3.1.2a 2014 Monthly Mining and Backfill Totals

Month	Mined Ore Total (tonnes)	Total Backfill (tonnes)
June	4,150	0
July	14,743	0
August	20,790	0
September	31,575	1,353
October	53,414	5,261
November	33,506	10,691
December	40,171	6,480
2014 Total	**198,349**	**23,785**

Source: Mine Engineering Department

3.1.3 Dewatering Volume and Quality

Water is required underground in order to complete drilling, bolting, and dust suppression activities. In 2014, the mine services well supplied all of the water needed to complete underground mining and development activities.

The lines both supplying and removing water to and from the underground are equipped with totalizer meters. These meters are monitored daily by the Environmental Department with the flows recorded in an electronic spreadsheet maintained by Environmental staff.

Water use was consistent in 2014 with underground operations continuing throughout the year. The amount of water supplied for underground operations in 2014 ranged from an average of 28,925 gallons per day (gpd) (20 gpm) in April to 48,984 gpd (34 gpm) in February. The total water pumped from the mine, including water supplied to the underground and natural inflow into the mine, ranged from an average of 40,918 gpd (48 gpm) in March to 60,655 gpd (45 gpm) in February.

Table 3.1.3 below summarizes the monthly average flow provided to the underground and the calculated natural infiltration dewatering volumes for 2014. Over time, these numbers may fluctuate due to an increase in groundwater infiltration into the mine. The current volumes, as well as visual inspections underground, indicate that very little groundwater infiltration is occurring at this time. The average dewatering volume ranged from 1,083 gpd (.75 gpm) in November to 13,666 (9.49 gpm) in January 2014. The dewatering volume of 2014 is lower than volumes reported in 2013.

As shown in Table 3.1.3 below, the dewatering totals decreased in late 2014. During this time a new underground sump system was brought online which facilitates the management of water underground. The sump has an estimated storage capacity of approximately 128,000 gallons (484.5 m^3) which may have impacted the totals late in the year as water was allowed to fill the sump rather than be immediately pumped to the surface. This should be a short term impact that will be rectified once the sumps are fully functional. In addition, with production of ore and mining stopes, water is needed to eliminate dust. Water used for dust suppression is retained in the fine particles of ore brought to the surface and stored in the COSA, resulting in lower dewatering volumes.

Table 3.1.3 Average Monthly Flow Provided and Dewatering Volume

Month	Average Water Supplied Underground (GPD)	Average Water Pumped from Underground (GPD)	Average Dewatering Volume* (GPD)	Average Dewatering Volume* (GPM)
January	44278	57943	13666	9.49
February	48984	60655	11671	8.1
March	29891	40918	11028	7.66
April	28925	42407	13482	9.36
May	38842	51400	12,558	8.72
June	36327	47750	11423	7.93
July	34522	45414	10891	7.56
August	45545	54918	9373	6.51
September	33772	42476	8705	6.04
October	41582	46393	4811	3.34
November	41651	42735	1083	.75
December	43112	45761	2649	1.84

* 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.

3.2 Temporary Development Rock Storage Area (TDRSA)

With underground activities resuming in January 2014, the geo membrane covering the TDRSA was removed in order to again utilize the TDRSA for storage of waste rock. In September 2014, a contractor, utilizing a portable crusher, began crushing development rock on the TDRSA to a size of three inch minus for use in backfill. Approximately 193,000 tonnes of development rock was crushed from September to November 2014.

Crushing of Development Rock on TDRSA, September 2014

3.2.1 Development Rock Storage Volume

Limestone Addition and Storage

As required by mining permit condition F23, all development rock is placed in the TDRSA during the underground mine development until it is reused as backfill in the open stopes. Limestone is also added to the TDRSA at a rate of 2 percent. This addition will raise the pH and provide acid-neutralizing capacity to the TDRSA minimizing the generation of low pH (acidic) water and help to maintain lower concentrations of pH-sensitive metals such as copper.

The volume of limestone required is determined monthly based upon the amount of mine development. In preparation for poor road conditions or restrictions, a greater volume than necessary is generally ordered. In addition, in preparation of covering the TDRSA in 2013, a greater volume than normal was applied to the TDRSA in October 2013. For these reasons, the volume of limestone added to the TDRSA fluctuated below the required 2 percent in 2014.

In 2013, the calculated volume of limestone required was 2,614 t and the actual volume delivered was 5,033 t which is approximately 48 percent greater than the required volume. In 2014, 3,414 tonnes of limestone was required with 1,290 tonnes being delivered. Although the volume delivered in 2014 was less than calculated, the overall limestone balance is still very close to required volumes. In addition, during the Q4 inspection, the MDEQ agreed that the application of limestone was no longer necessary as material is currently being removed from the facility for use as backfill. Any new development rock being added to the TDRSA will only be there for a short period of time before being removed for use as backfill. The 2014 limestone requirements and additions are summarized in Table 3.2.1 below.

Table 3.2.1 Volume of Limestone Added in 2014

Month	Limestone Required -2% (tonnes)	Limestone Delivered (tonnes)
January	250	0
February	367	0
March	445	0
April	488	0
May	574	0
June	466	0
July	334	1,018
August	410	272
September	80	0
October	0	0
November	0	0
December	0	0
YTD Total	**3,414**	**1,290**
PTD Total	**11,102**	**10,931**

Source: Mine Engineering Department 2014 Development Summary

In 2014, approximately 71,161 m^3 (192,133 t) of development rock was placed in the TDRSA. In addition to the development rock, 2,295 m^3 (1,290 tonnes) of limestone was delivered and placed in the TDRSA. Assuming a development rock swell factor of 1.3, approximately 92,509 m^3 of development rock and limestone were placed in the TDRSA in 2014. Table 3.2.1a below summarizes the monthly volume and tonnage of development rock mined in 2014 and Table 3.2.1b summarizes the project to date volume totals of development rock and limestone on the TDRSA.

Table 3.2.1a Volume of Waste Rock Mined in 2014

Month	Volume of Waste Rock Mined (m^3)	Tonnage of Waste Rock Mined (tonnes)
January	4,622	12,480
February	6,793	18,341
March	8,244	22,258
April	9,035	24,395
May	10,636	23,492
June	8,627	23,294
July	6,191	16,716
August	7,598	20,514
September	1,484	4,007
October	2,499	6,748
November	3,551	9,588
December	1,880	5,075
Total	**71,161**	**192,133**

Source: Mine Engineering Department 2014 Development Summary

Table 3.2.1b 2014 TDRSA Volume Totals – Project to Date

Month	Volume of Waste Rock Mined (m^3)	Limestone Delivered (m^3)	Swelled Volume (m^3)	Waste Rock Used as Backfill (m^3)	TDRSA Volume Project Total to Date (m^3)
Previous Total	**140,243***	**5,415**	**182,316**	**0**	**187,731**
January	4,622	0	6,009	0	193,740
February	6,793	0	8,831	0	202,570
March	8,244	0	10,717	0	213,287
April	9,035	0	11,746	0	225,033
May	10,636	0	13,827	0	238,860
June	8,627	0	11,215	0	250,076
July	6,191	1,812	8,048	0	259,936
August	7,598	484	9,877	0	270,297
September	1,484	0	1,929	586	271,640
October	2,499	0	3,249	2,280	272,609
November	3,551	0	4,616	4,633	272,593
December	1,880	0	2,443	2,808	272,229
2014 Total	**71,161**	**2,295**	**92,509**	**10,307**	**272,229**

*Note: an adjustment was made to year-end 2013 TDRSA tonnes (+~9000)
Source: Mine Engineering Department 2014 Development Summary

3.2.2 2015 Mining Forecast

The 2015 mining forecast calls for the continuation of developing the down-ramp, levels, stope accesses, and internal raises for a total of 1,286 meters of lateral advance and 89 meters of vertical advance which would result in an additional 37,140 m^3 (95,605 t) of development rock being removed and stored on the TDRSA. Assuming an estimate of 30 percent swell, approximately 48,282m^3 (95,605 t) of development rock will be placed on the TDRSA in 2015. Backfilling of stopes with CRF containing development rock will also continue and will result in the reduction of material stored on the TDRSA. Steady state production is also expected in 2015. All estimates are contingent upon the current production schedule and is subject to change.

3.2.3 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 liner 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 WTP operators and an additional weekly inspection by the Environmental Department. The water level is recorded in a compliance logbook that is kept on site 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 2014, approximately 4.4 million gallons of water was pumped from the TDRSA contact water sump to the CWBs for eventual treatment in the WTP. Quarterly water quality monitoring of the contact water sump was conducted in February, June, August, and November 2014. The majority of results were consistent with those previously reported. Results for boron, magnesium, nickel, selenium, and sulfate were slightly higher in 2014, while results for ammonia, nitrate, and nitrite decreased significantly from results reported in 2013. A summary of the 2014 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 2014, four samples were collected and the accumulation rates calculated. The average daily rate of accumulation ranged from a minimum of 0.007 gal/acre/day in November to a maximum of 0.03 gal/acre/day in August. All results were well below the 25 gal/acre/day threshold indicated in the permit. Table 3.2.3 below summarizes the calculated flow rate from the TDRSA leak detection sump for 2014. A total of 30 gallons of water was purged from the leak detection sump in 2014 which is down significantly from the 55 gallons removed in 2013. 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.

Samples were collected from the leak detection sump in February, June, August, and November 2014. 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 3.2.3 below summarizes the TDRSA leak detection sump analytical results for 2014. The pH results were fairly consistent and ranged from a low of 7.2 to a high of 7.8 which is neutral to slightly basic in nature. Sulfate results ranged from a minimum of 560 mg/L in February to 770 mg/L in November. The sulfate concentrations for each of the samples collected in 2014 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 2014 was approximately half of the volume present in 2013 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.

Table 3.2.3 TDRSA Leak Detection Sump Results for 2014

Parameter	2/25/14	6/3/14	8/27/14	11/24/14
Magnesium (mg/L)	11	11	11	14
Sodium (mg/L)	450	440	440	520
Chloride (mg/L)	9.4	10	13	13
Sulfate (mg/L)	560	660	710	770
Nitrate (mg/L)	5.3	9.2	20	26
Nitrite (mg/L)	0.39	0.46	0.35	0.81
Ammonia (mg/L)	0.095	0.1	<0.05	0.08
Average Daily Flow Rate (gal/acre/day)	0.008	0.01	0.03	0.007
Purged Volume (gal)	7	10	8	5*
pH	7.8	7.2	7.6	7.4
Specific Conductivity (uS/cm)	2,121	2,107	2,308	2,707

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

3.3 Site Water Usage, Treatment, and Discharge

Site wide water management includes three separate sources for supplying water to the mining activities and three primary sources that supply water to the CWBs for eventual treatment in the WTP. 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 TWIS.

3.3.1 Supply Water Sources and Usage

Three separate sources supply water to the mine site to support various development and 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 2014, the approximate water use was 12,367 gpd (8.6 gpm). This was up from the average of 6,821 gpd utilized in 2013.

The mine services well (QAL011D) is primarily used to supply water for exploration drilling, underground operations, and the fire water tank which supplies water to the network of fire hydrants onsite. Approximately 41,013 gpd (28 gpm) of water was utilized in 2014 which is up slightly from an average of 33,046 gpd supplied in 2013.

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 WTP, and subsequently recycled for on-site activities 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 2014, the total volume of utility water treated and recycled was approximately 48,750 gpd (34 gpm) which is down slightly from last year.

3.3.2 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 site wide storm water. Additional intermittent sources include dewatering from the COSA, fuel and/or truck wash sumps.

Immediately following the commencement of mining, CWB levels have been recorded daily by the WTP operators. This log is available on request. All rainfall and snow melt that occurred in 2014 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 Q2. The majority of the CWB monitoring results were consistent with those previously reported; chloride results were lower in 2014, while copper, nickel, and manganese increased slightly. A summary of the results can be found in Appendix D.

3.3.3 Water Treatment Plant Operations and Discharge

The WTP successfully treated and discharged more than 40 million gallons of water in 2014. A summary of the monthly discharge rates can be found in Table 3.3.3 below.

Effluent discharges to the treated water infiltration system (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 e2 electronic reporting system.

Table 3.3.3 Volume of Water Discharged in 2014

Month	Volume of Water Discharged (gal)
January	2,788,238
February	2,479,222
March	2,335,779
April	5,565,457
May	6,122,754
June	3,142,428
July	2,822,813
August	3,270,439
September	3,020,213
October	5,557,583
November	1,060,132
December	2,687,417
Total	**40,852,475**

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 multi-flow treatment process and is primarily comprised of calcium and magnesium, while the crystallizer waste is essentially sodium chloride. Samples of the waste streams are sent to the laboratory as required by the disposal landfill. All results indicate that the wastes are non-hazardous. In 2014, 568 tons of crystallizer waste was disposed at a Wisconsin landfill and approximately 191 tons of filter press waste was disposed at the Marquette County Landfill.

3.4 Materials Handling

3.4.1 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 2014, 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 certain threshold quantities. Due to the bulk chemical storage at the WTP, a Tier II Report was submitted in January 2014 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.

4. Additional Monitoring Activities

4.1 Water Quality Monitoring

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

4.1.1 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, July, and November 2014. The Eagle Mine Permit prescribes both a long parameter list for annual monitoring events (conducted in Q2 2014) and a short list to be used quarterly (Q1, Q3, Q4 2014). 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 2014 and with the exception of chloroform 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. It should be noted that due to the required

statistical nature of these benchmark values, the accuracy will improve over time as the quantity of data that becomes available increases. Results will be reviewed in 2015 and based on a statistical analysis may be included in the updated benchmark calculations.

Monitoring Results

Twenty-two monitoring well samples were collected during each of the four quarterly sampling events. A sample was not collected from background monitoring location QAL026A in Q2 2014 due to an insufficient water volume. Samples were collected using low-flow sampling techniques, and field parameters (DO, ORP, pH, specific conductivity, temperature, turbidity) are collected and analyzed using a flow-through cell and YSI probe. All samples are shipped overnight to TriMatrix Laboratories in Grand Rapids, Michigan, for analysis.

The majority of parameters analyzed reported values below the analytical reporting limit and calculated benchmark, and listed as non-detect. 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. Following is a summary of the 2014 events that occurred:

- Location QAL024A reported benchmark deviations for one or more of the following anions/cations during 2014; chloride, nitrate, sodium, potassium, magnesium, and alkalinity-bicarbonate. Although the results are greater than the established benchmarks they remained fairly consistent throughout the year and did not indicate that any significant trending was occurring. With the exception of iron, which was reported in Q1–Q3, no other metals were regularly detected in 2014.
- Location QAL067A, located on the southeast corner of the TDRSA, reported benchmark deviations for chloride and sodium during each of the 2014 sampling quarters and three of four quarters for nitrate. Additional parameters were detected for one sampling event and are summarized in Appendix G. The results for chloride and sodium were significantly higher in Q4 than those reported in Q1-Q3. The sharp increase is similar to those seen at GWDP background sampling location QAL029D in early 2014. Upon notification of the chloride results at QAL029D an extensive investigation was conducted to determine the potential source of the elevated results. The results of this investigation are also relevant to the elevated detections of sodium and chloride at location QAL067A since they sit in very close proximity to one another. In a letter to the Department dated April 24, 2014, Eagle outlined the following monitoring plan:

    1. *Increase monitoring to monthly throughout 3rd quarter* - The supplemental sampling effort at QAL029A/D provided additional data, but did not facilitate determining the source of the chloride. A supplemental sampling event was also conducted in December 2014 at location QAL067A. Results were consistent to those reported during the Q4 sampling event. Both locations will continue to be closely monitored in 2015.
    2. *Review the physical location of the decline in reference to the monitoring locations (i.e. distance & depth)* - The decline is approximately 200 feet below the surface at location QAL029D and even further below surface at location QAL067A due to the grade of the decline. The well depth is 80 feet at QAL029D and 84 feet at QAL067A.

3. *Determine the approximate date when the underground decline was developed in proximity to the contact area monitoring locations* - The decline was developed, near monitoring wells QAL029D and QAL067A in April 2012.

4. *Compare results from contact area monitoring locations to both upgradient and downgradient monitoring locations* - Results from wells both upgradient and downgradient of QAL067A and QAL029D were reviewed and showed no elevated results for sodium or chloride.

5. *Compare results from monitoring locations to underground, contact water basin (CWBs), and temporary development rock storage area (TDRSA) water quality results* - The CWBs are located downgradient of the monitoring locations and as expected no correlation in results exist. In addition, the CWBs were leak tested in October 2014 and no leaks were detected. Results from QAL067A and QAL029D were also compared to results from the TDRSA contact water and leak detection sumps. No correlations were found at either monitoring location as high concentrations of metals were detected in the TDRSA, but were non-detect at the monitoring well locations. In addition, the TDRSA is equipped with a leak detection sump; results from the sump do not indicate that a leak has occurred.

6. *Review the construction materials used during contact area construction activities* - An extensive review of chemicals and products used during construction was conducted. This included discussions with construction contractors and review of MSDSs. No chemicals were used in construction, nor was any sort of salt mixture applied to the contact area prior to paving that would have resulted in the elevated chloride levels. In addition, all materials used in the backfill process were reviewed to determine if they contributed to the elevated numbers at QAL067A. The review found that no products currently being used contain chloride as it is known to decrease the curing time of concrete which is undesirable.

7. *Confirm the depth and location of the double-walled piping from the underground to the CWBs* - Construction drawings were reviewed and all piping is double-walled and does not cross the contact area near either monitoring location. Discharge to the CWBs occurs downgradient of the monitoring points. In addition, as indicated above, a review of the data does not indicate any correlations between the monitoring wells and CWB.

8. *Review salt use and snow storage practices from 2011 to 2014* - Salt was used extensively in the winter of 2011 on the contact area. It was quickly determined the use of salt was negatively impacting the WTP treatment processes. In 2012, the decision was made to limit the use of salt on the contact area and use sand whenever possible. The exception is that a sand/salt mixture is used on the decline near the portal entrance, TDRSA ramp and on walkways near building entrances. This practice continues to be used to date. When salt was used extensively in 2011, construction was still active and certain sections of the contact area were not yet paved. Snow was not directly piled on these unpaved areas, but were piled in close proximity to these areas.

Water quality data from QAL067A and QAL029D continues to indicate a spatial trend that based on the results of the investigation, are most likely associated with the extensive use of salt on the contact area in 2011 combined with the construction activities in 2013-2014 that required the removal of pavement in many areas adjacent to these monitoring locations. Results will continue to be closely monitored and any trends noted.

- In 2014, QAL071A, located near the northwest corner of the septic drain field, reported detections of anions/cations, including alkalinity bicarbonate, chloride, nitrate, sulfate, sodium, calcium, magnesium, and hardness, that were greater than the established benchmarks. The majority of these parameters were also consistently reported above benchmarks in 2013, however concentrations increased in 2014. In addition, copper was detected at a value greater than the established benchmark in Q3 and Q4 2014 and was not detected in 2013.

  In order to better evaluate and understand the water quality at this monitoring location, supplementary sampling events were conducted in April, June, August, and December 2014. In addition, monitoring location QAL074A, located downgradient of the septic system was also sampled and results compared to those from QAL071A. A detailed summary of the results and their likely correlation to the septic system will be summarized and provided to the Department under a separate cover in April 2015.

- Benchmark deviations were also reported at locations QAL044B, QAL060A, QAL062A, QAL064D, QAL065D, QAL066D, QAL070A, and QAL073A and are summarized in Appendix H. The majority of the deviations were for anions and cations and results were only slightly greater than established benchmarks. In the majority of the locations, the benchmarks are based on a small sample set of between four to six results. With such a limited sample set, it is highly probable that the deviations being seen are consistent with natural groundwater variations. The benchmarks will be reviewed in 2015 and updated if appropriate.

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 thirteen compliance locations and eight background monitoring locations using data collected from baseline sampling events (2011) through December 2014. Alkalinity, sodium, and nitrate were the most frequently noted as possibly trending. It should be noted that due to the small sample size, the current trending results should all be considered preliminary.

A trend analysis will continue to be conducted after each quarterly monitoring event in 2015 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, QAL062A, QAL064A, QAL066D, QAL068A, QAL069A, QAL70A, 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 three samples collected during Q2, 2012 – 2014 were plotted. The water type was originally classified as calcium bicarbonate in 2012, then drifted into the sodium chloride classification in 2013, and in 2014 was classified as mixed-cation chloride. This change in chemistry may have been associated with construction of the vent raise as well as salt use and snow storage practices near monitoring well QAL024A. Due to the small sample size and shift back towards a mixed-cation classification further sampling is necessary in order to better understand the water chemistry at this location. Results will continue to be closely monitored.
- QAL067A – Water chemistry data from seven samples collected during 2011 – 2014 were plotted. All samples prior to May 2014 were classified as having a water type of calcium bicarbonate. However, since May 2014, the water chemistry has changed and is now classified as sodium chloride. 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. A similar shift in water chemistry is also observed in QAL029A/D which may be caused by the same source as these three wells cluster together geographically.

Piper Diagrams for each of the monitoring locations referenced above can be found in Appendix H. A copy of the Piper Diagram summary memo, drafted by North Jackson Company, is available upon request.

4.1.2 Quarterly Surface Water Quality Monitoring

Surface water sampling was conducted on a quarterly basis in 2014 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 March, April, August, and October in 2014. The spring runoff sample was collected in late April in order to best represent the peak flow rates of the spring runoff. A map of the surface water sampling locations is found in Appendix I. Samples are collected in accordance with the Eagle Project Quality Assurance Project Plan and Standard Operating Procedures (North Jackson, 2004a and 2004b) and the results are summarized and compared to benchmarks (i.e. UPLs) and are located in the tables found in Appendix J.

Monitoring Results

Grab samples were collected from each location during the quarterly sampling events completed in March, April, August, and October 2014. The Eagle Mine Permit prescribes a long parameter list for annual monitoring events (conducted in Q2 2014) and a short list to be used quarterly (Q1, Q3, and Q4 2014). In addition to the grab samples, field measurements (DO, pH, specific conductivity, temperature) were collected and determined through the use of an 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 TriMatrix Laboratories in Grand Rapids, Michigan, for analysis. Following is a summary of the 2014 events that occurred.

- At compliance monitoring locations STRE001 and STRE002, the Q1 results for sulfate were marginally above the established benchmarks for the two locations. The sulfate results returned to baseline levels for the remainder of the sampling quarters in 2014. The benchmarks at locations STRE001 and STRE002 are classified as pending because of the limited number of results that are available for these locations. In each case, the

benchmarks are calculated using only two to three sampling events which makes it very difficult to exclude natural variation as a potential cause. The benchmarks will be reviewed in 2015 and updated if appropriate. In addition, monitoring stations STRE001 and STRE002 are locations in which venting of WTP groundwater discharge would occur. With the exception of one sample, all WTP effluent results have been non-detect for sulfate since the start of operations in September 2011.

- At compliance monitoring location YDRM002, the pH result (6.6 SU) was slightly below established benchmarks (6.7-7.7 SU) in Q4 2013 and Q4 2014. The pH was well within established benchmarks during the rest of the year and the deviation is likely due to seasonal variation.
- Compliance monitoring locations STRM004, STRE001, and STRE002 reported results for pH and/or metals (i.e. aluminum, mercury, iron, manganese) that were outside of the established benchmarks for two consecutive Q2 sampling events. Elevated metals in Q2 were being seen throughout the monitoring network, including the reference location, and appear to be attributable to the 2014 spring melt.

A complete list of results and applicable benchmarks are found in Appendix J.

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 nine of the eleven monitoring locations using data collected from baseline sampling events (2011) through December 2014. pH and iron were the most frequently noted as possibly trending. The majority of the trends that were 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 after each quarterly monitoring event in 2015 and results reviewed to determine if the trends are attributable to mining operations. A table summarizing the potential surface water trends can be found in Appendix K. For compliance monitoring locations in which results were outside of established benchmarks for at least two consecutive seasonal quarters and a potential trend was identified, the trend charts are also provided in Appendix K. A full report outlining groundwater trending results for all parameters and locations, including graphs, is available upon request.

4.2 Regional Hydrologic Monitoring

4.2.1 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.

Calculated background water levels and monthly water level results are based on mean daily values and summarized in Appendix M. Monitoring well water level results for 2014 were found to be consistent with baseline data, with the exception of the following:

- QAL024A – The mean water level readings from February – May 2014 were reported at a maximum of 0.6 feet below the minimum baseline level calculated for this location. The lowest reading was recorded in April 2014 but returned to baseline levels by June.
- QAL044B - The mean water level readings from March - May 2014 were a maximum of 0.2 feet below the minimum baseline level calculated for this location. The lowest reading was recorded in April and increased in May until it returned to baseline levels in June.

The lower water level readings at locations QAL024A and QAL044B all occurred during late winter when little to no recharge from precipitation occurs due to frozen conditions. All water levels returned to baseline levels with the onset of spring melt.

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 WLD026 reported water levels slightly above baseline levels due to ponding which has resulted from beaver activity in the area. Hydrographs of each groundwater and wetland monitoring location can be found in Appendix N.

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 groundwater elevations are measured on a quarterly basis at 116 locations. During Q1 several wetland locations were unable to be monitored due to frozen conditions. In addition, in Q4 several wetland monitoring locations were not measured due to early snowfall which caused access issues. The ground was snow-covered, but wetland streams were still flowing making access via snowshoes or snowmobile impracticable.

A map of the hydrologic monitoring locations can be found in Appendix L. With the exception of monitoring wells located down gradient of the treated water infiltration system (TWIS), all discrete water elevations from 2014 were found to be consistent with pre-operation levels. Mounding has been noted at down gradient TWIS locations and is likely associated with the effluent discharge from the water treatment plant. A summary of the discrete water elevation results from Q1 – Q4 2014 are summarized in Appendix O.

4.2.2 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 2014 water year were averaged over each month of operation from October 1, 2013 thru September 30, 2014 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 P. Following is a summary of the findings:

- Continuous flow readings were not collected from location STRE002 in 2014 due to beaver activity. In addition, from December 2013 – March 2014 flow reading were not collected due to ice build-up at location STRM005.
- All flow measurements were found to be within historical minimum and maximum value readings at all locations.
- The mean stream temperature was slightly below baseline levels at location STRM004 in February 2014 and in December 2013 and February 2014 at location YDRM002.
- STRM004 reported specific conductance readings that were slightly above maximum baseline levels in November 2013.
- STRE002 reported specific conductance readings slightly below baseline levels in January 2014.
- YDRM002 reported specific conductance readings slightly above baseline levels in March 2014.

Although slightly outside of the baseline limits, the specific conductance readings were consistent for the stream conditions experienced in 2014. In general, specific conductance is generally lower when the stream flow is greater and increases as the stream flow decreases. Hydrographs clearly depicting the correlation between flow rate and specific conductivity readings, for each location, can be found in Appendix Q.

4.3 Biological Monitoring

Biological monitoring events conducted in 2014 included flora and fauna surveys, wetland monitoring, fish and macro invertebrate surveys, fish tissue analysis, 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.

4.3.1 Flora and Fauna/Wetland Monitoring Report

The 2014 flora, fauna, and wetland vegetation surveys were conducted by King & MacGregor Environmental, Inc. (KME). Table 4.3.1 below outlines the type and duration of the surveys that were conducted in 2014.

Table 4.3.1 Type and Duration of 2014 Flora, Fauna, and Wetland Surveying Events

Survey Type	Survey Date
Bird	June 10-11, September 16-18
Small Mammals	September 16-18
Large Mammals	June 10-11, September 16-18
Toads/Frogs	May 27, June 11
Wetland Vegetative Monitoring	June 10-11
Upland Vegetative Monitoring	June 10-11, August 27-28
Narrow-Leaved Gentian	August 27-28

The wildlife and plant species identified during the 2014 surveys within the Study Area are similar to those identified during previous KME surveys. However, in 2014 five survey points were unable to be surveyed or had a diminished survey due to a variety of site disturbances. Point 3 was inaccessible due to exploration drilling activity, Points 11W and 12W have become active roadways for logging and exploration drilling operations. Point 14 was not surveyed in June as a result of

clearing for Triple A Road improvements and Point 30 had a limited survey because the area was mostly devegetated due to logging activity. Following is a summary of the survey results:

- Forty species of birds, none of which are threatened or endangered, were observed during the bird surveys, and three additional bird species were identified during other KME surveys (e.g., vegetation surveys). In June, the Nashville warbler was the most abundant bird observed, while the Canada goose was the most abundant species observed during the September 2014 survey. The bird species identified during the 2014 bird surveys are similar to those bird species identified in previous surveys conducted within the Study Area and are consistent with the bird species expected to be found in the habitats present.
- Twenty small mammals representing seven species were collected during the September survey period. The most common small mammal identified during the survey was the least chipmunk. No threatened, endangered, or special Concern small mammals were observed during any of the surveys. The small mammals encountered within the Study Area during the 2014 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 2014 surveys. Deer were seen infrequently throughout the Study Area during the course of the ecological surveys. Fresh scat and tracks of moose and coyote were observed occasionally throughout the Study Area.
- Four frog species were heard during the survey; none of which are threatened or endangered. All three of the sampling points exhibited use by frogs for breeding. The most frequently heard species in 2014 was the northern spring peeper. The frog and toad species identified are typical of those expected in the habitats present in the Study Area. The 2014 survey results are similar to those of previous years.

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 2014 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-leafed gentian 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 8W, June 2014

Upland vegetation survey plot 12, August 2014

4.3.2 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 2014 ecological surveys. Scat and tracks of moose (State Special Concern) were observed occasionally in 2014 throughout the Study Area. No evidence of the gray wolf was discovered.

4.3.3 Narrow-Leaved Gentian (NLG)

The methods used to conduct the 2014 NLG field investigation were consistent with the previous NLG studies. Photographic and Global Positioning System documentation was collected on August 27-28, 2014. In addition, the local climate changes and overall health of the NLG colonies were assessed relative to previous years. The area of investigation was expanded in 2014 to include the area just North of the Yellow Dog River in addition to the main branch of the Salmon Trout River south of the Triple A Road. The area near the Yellow Dog was included as the information was required for an exploration survey.

According to National Oceanic and Atmospheric Administration data, precipitation totals were approximately 27% above the mean for the area during the 2014 water year and temperatures were near average. Flow in the Salmon Trout River and Yellow Dog River appeared normal. Therefore, the necessary hydrology to support the NLG population was present in 2014.

The NLG colonies appeared healthy in 2014 relative to previous observances. Flowering NLG were found in abundance (hundreds of individual plants) both along the Salmon Trout River in approximately the same areas where they were previously observed and in the expanded search area.

Narrow-leaved Gentian North of the Yellow Dog River, August 2014

4.3.4 Fisheries and Macro Invertebrate Report

The 2014 Fisheries and Macro-Invertebrate annual surveys were conducted by Advanced Ecological Management (AEM). A total of ten stations were surveyed during summer 2014, 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 total of 1,365 fish were collected in 2014 from all stations, up from 1,065 fish in 2013, with 93% of the total being captured at Station 6 located on the main branch of the Salmon Trout River. Among all stations, a total of six species of fish were observed during the aquatic survey. Northern redbelly dace (*Phoxinus eos*), brook trout (*Salvelinus fontinalis*), and brook sticklebacks (Culaea inconstans) 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 2014.

Using the P-51 protocol, a total of 1,630 macro-invertebrates, representing 52 taxa, were collected from all ten stations that were investigated in 2014, which is down from the 2,128 macro-invertebrates collected in 2013. 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. In most stations, the macro-invertebrate community rating was consistent with previous sampling efforts.

The aquatic and stream habitats were both rated as excellent or good by AEM and have remained consistent since 2011. A copy of the full report is available upon request.

Aquatics monitoring location Station 10, June 2014

4.3.5 Fish Tissue Survey

The 2014 brook trout fish tissue survey was conducted by Advanced Ecological Management (AEM) in September 2014. Brook trout tissue surveys are only required to be conducted every three years therefore this is the first survey conducted since operations began in 2011.

Ninety-six brook trout were collected on September 19-21, 2014, from nine sampling stations in the vicinity of the Eagle Mine. These sample stations are situated in the same sample locations, or close proximity, to those surveyed by AEM during the 2014 annual aquatic survey. Data from the 2014 survey does not include any fish from the Cedar River which serves as the reference site. Access to

this station was not possible due to a washed out road crossing caused by beaver activity. Of the fish collected, 17 brook trout, including nine males and eight females, were selected for metals analyses. Metals analyses was completed on both the fillets and liver of each fish. Copper concentrations reported in 2014 in the liver and fillets were generally consistent with previous surveys. Nickel concentrations were lower than observed in previous surveys and mercury was slightly higher in 2014 compared to previous surveys. A table summarizing the metals results, as well as, fish length, weight, sex, and age can be found in the 2014 Eagle Brook Trout Metals Report which is available upon request.

4.4 Miscellaneous Monitoring

4.4.1 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 2014 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 2014, two areas were identified as requiring repair; the north bank of NCWIB No. 1 which eroded during spring snowmelt and a section of the west perimeter berm near the TDRSA entrance which was disturbed during construction and eroded slightly from exposure to rainfall. The west berm was seeded and mulched to encourage vegetative growth and riprap was added to the north bank of NCWIB No. 1 to eliminate any further erosion of the bank. In addition to the two areas identified as requiring repair, seed and mulch was also applied to berms near the new snow storage location and embankments behind the portal to encourage vegetative growth and minimize the risk of erosion.

NCWIB No. 1 Erosion, June 4, 2014

NCWIB No. 1 Erosion Repaired, June 9, 2014

West Perimeter Berm, August 2014

West Perimeter Berm, October 2014

4.4.2 Impermeable Surface Inspections

The impermeable surfaces monitoring plan outlines the requirements of integrity monitoring of surfaces exposed to contact storm water. Areas inspected in 2014 include the WTP, truck wash and truck shop floors, sumps, and trench drains and 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 2014. Inspections of the contact area and travel ways were completed during the months of May through November. Per the monitoring plan, inspections of the contact area and travel ways are suspended during the months of November to May when 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.

In late 2014, indents to asphalt in the laydown area north of the TDRSA were identified. The weight of stored piping started to depress into the asphalt. To prevent the stored pipe from further damaging the contact area, the storage racks holding the pipe were lifted and stored on wooden beams to distribute the weight evenly. Due to winter approaching, no repairs were made at the time. Further examination of the laydown area will occur in early 2014 to assess any additional repairs that may be necessary.

4.4.3 Geochemistry Program

In late 2013, the determination was made that in 2014 the focus of the geochemistry program would shift from analysis of development rock, since sufficent data has been analyzed to confirm the modeled predictions, to water quality of the underground as it is representative of ore.

Four underground water quality samples were collected in February, June, August, and November 2014 from Jump Tank No. 1 located in the main decline underground. Water from the lower levels of the mine are pumped to Jump Tank No. 1 which then pumps the water to the CWBs. Samples were analyzed for the annual parameter list in Q2 and quarterly list in Q1, Q3, 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.

4.4.4 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 2014. With the exception of NCWIB No.2, located near the construction trailers, no reportable accumulation was observed at any of the locations. Approximately ten inches of sand has started to accumulate in the northwest

corner of NCWIB No. 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 2015. 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 No. 1 and 2 in August 2014. The first was conducted on August 6, 2014 when the basins were lowered to a level in which waders and a ruler could be utilized to perform the measurements. CWB No. 2 was found to have a maximum accumulation of 3.5 inches near the WTP outfall on the northwest corner, with the remainder of the basin averaging less than one inch of accumulation. CWB No. 1 was found to have a maximum sediment accumulation of approximately 50 inches at the south end of the basin with the north end averaging five inches or less of accumulation. The depth on the south end was estimated as the levels were unsafe to wade through to take accurate measurements. CWB No. 1 sediment accumulation was higher in 2014 due to solids pumped from underground accumulating on the southeast corner of the basin, the remainder of CWB No. 1 and 2 measurements were comparable to 2013 results.

A proactive approach was taken to remove the sediment buildup from CWB 1. The basins were lowered to a level under 24 inches which was maintained while sediment removal operations took place. Sediment from CWB 1 was removed using a vacuum truck and placed on the TDRSA. The operation removed a large portion, but not all of the sediment that has accumulated. A second sediment removal operation is being considered for 2015.

With the basin levels below 24 inches, the second sediment thickness measurement was completed in late August using the visual observation method outlined in the CWB Sediment Monitoring SOP. Only sediment in the southwest corner of CWB No. 1 was visible above the 24 inch water line with sediment removal plans set for 2015.

5. Reclamation Activities

No reclamation activities occurred in 2014 and there are currently no plans to conduct any reclamation activities in 2015. The Department will be notified, in advance, if any activities do commence in 2015.

6. Contingency Plan Update

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

7. Financial Assurance Update

A final estimate was conducted during Q4 2014 following the completion of construction. The 2014 update to the reclamation estimate can be found in Appendix S.

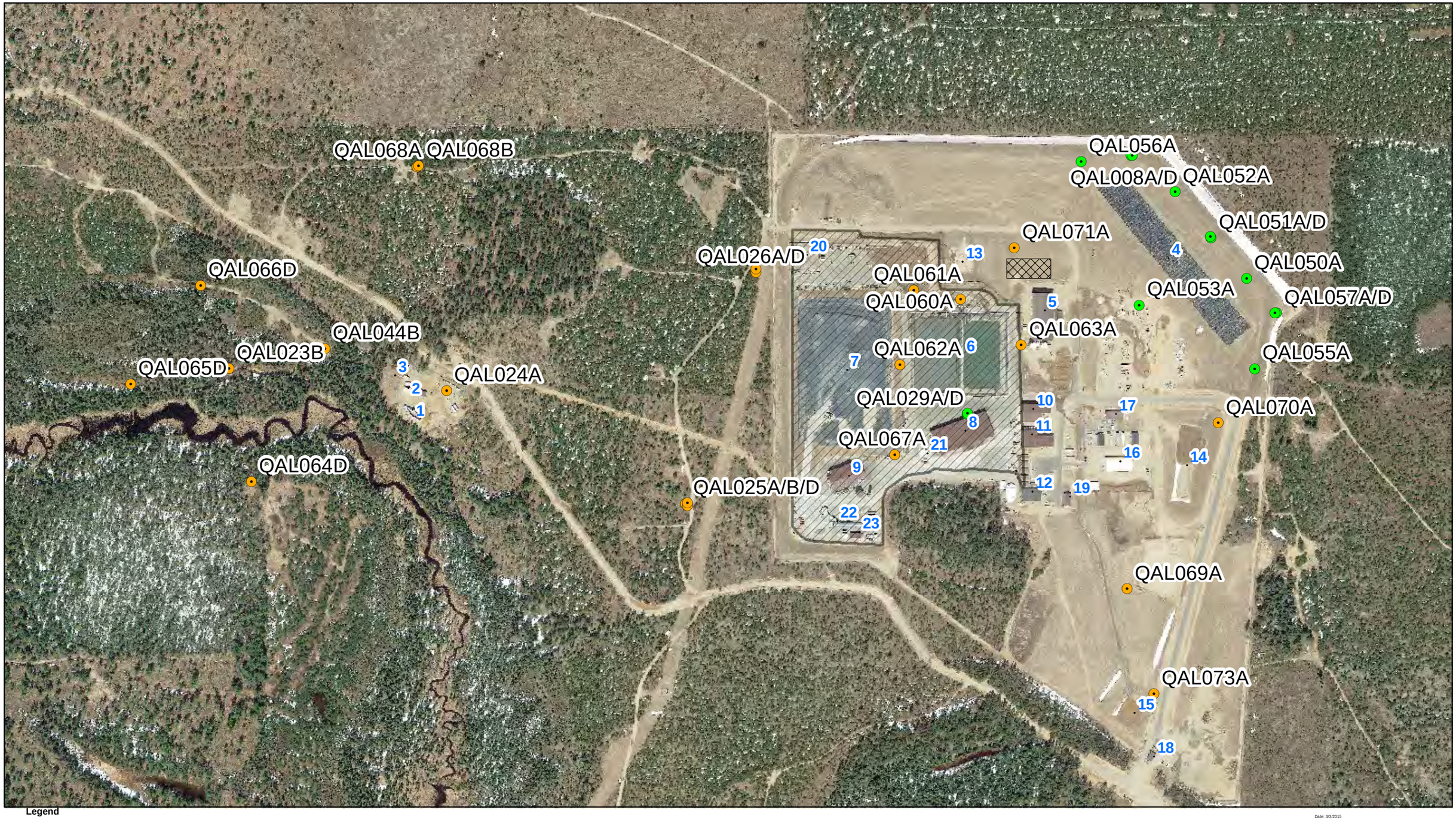
8. Organizational Information

An updated organization report can be found in Appendix T.

Appendix A

Eagle Mine Aerial 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

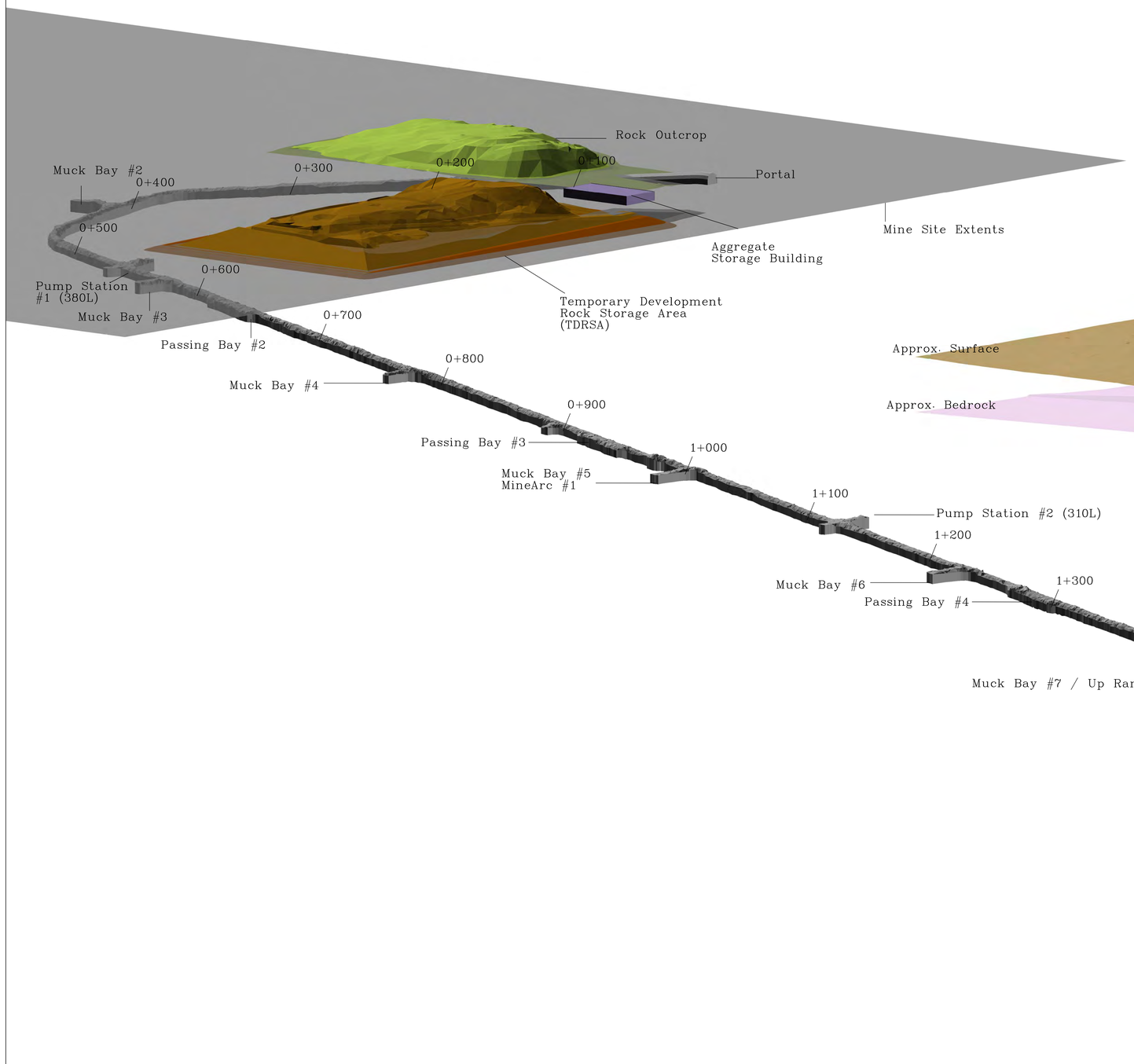
Date: 3/3/2015

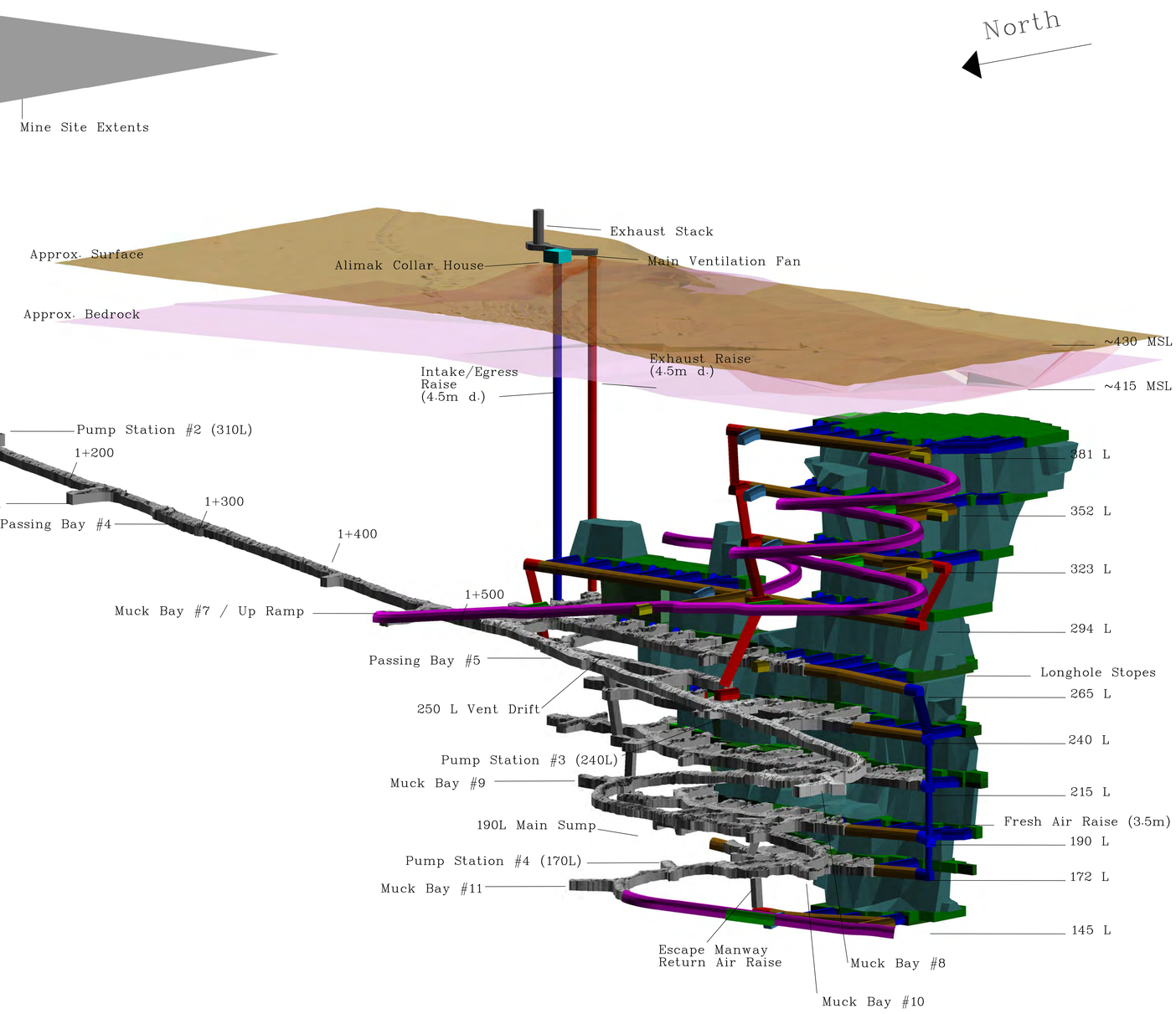
0 0.0375 0.075 0.15 0.225 0.3 0.375 Miles

N W E S

Appendix B

Map of Development Positions





	Sign-off	Date
Mine Manager		
Safety Manager		
Environmental Manager		
Operations Superintendent		
Engineer		
Redpath Superintendent		

20 0 10 20 30 40 50
Metres

Design By:
Drawn By: RLB
Check By:
Comp. File:
Scale: 1:1250
Draw Date: 26-Jan-2015
Sheet:
Dwg. No.:

Eagle Mine

3D Underground
Isometric
2014-12

MAPTEK Vulcan

Appendix C

Eagle Mine

Rock Stability Certification

Eagle Mine
a subsidiary of lundin mining

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

Thursday, February 26, 2015

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 2014. In addition, daily visual inspections are also conducted by Eagle Mine representatives and/or contractor mining personnel to verify ground stability.

Sincerely,

Colin Connors
Mine Manager
Eagle Mine, LLC.

Appendix D

Eagle Mine

Facilities Water Quality Monitoring Results

2014
Mine Permit Water Quality Monitoring Data
Contact Water Basins
Eagle Mine

Parameter	Unit	Q1 2014 2/25/2014	Q2 2014 6/3/2014	Q3 2014 8/27/2014	Q4 2014 11/24/2014
Field					
pH	SU	**9.5**	**8.8**	**9.1**	**10.4**
Specific Conductivity	µS/cm	**5629**	**5701**	**6594**	**2728**
Metals					
Aluminum, Total	mg/L	—	**2.4**	—	—
Antimony, Total	µg/L	—	**13**	—	—
Arsenic, Total	µg/L	**4.1**	**2.3**	**2.8**	**1.5**
Barium, Total	µg/L	—	**37**	—	—
Beryllium, Total	µg/L	—	<1.0	—	—
Boron, Total	µg/L	**1400**	**1600**	**1500**	**590**
Cadmium, Total	µg/L	—	<0.20	—	—
Chromium, Total	µg/L	—	**12**	—	—
Cobalt, Total	µg/L	—	2.4	—	—
Copper, Total	µg/L	**59**	**6.7**	**19**	**59**
Iron, Total	µg/L	**2100**	**3700**	**1000**	**3400**
Lead, Total	µg/L	—	<5.0	—	—
Lithium, Total	µg/L	—	**14**	—	—
Manganese, Total	µg/L	**26**	**49**	**26**	**54**
Mercury, Total	µg/L	**0.0024**	**0.0057**	**0.0021**	**0.0044**
Molybdenum, Total	µg/L	—	**28**	—	—
Nickel, Total	µg/L	**80**	**22**	**39**	**88**
Selenium, Total	µg/L	**4.1**	**3.8**	**8.0**	**3.4**
Silver, Total	µg/L	—	<0.20	—	—
Strontium, Total	µg/L	—	**600**	—	—
Thallium, Total	µg/L	—	<1.0	—	—
Vanadium, Total	µg/L	—	**7.3**	—	—
Zinc, Total	µg/L	**15**	**14**	**12**	**19**
Major Anions					
Alkalinity, Bicarbonate	mg/L	**120**	**96**	**190**	<2.0
Alkalinity, Carbonate	mg/L	**81**	**28**	**57**	**170**
Chloride	mg/L	**850**	**790**	**780**	**350**
Fluoride	µg/L	—	**370**	—	—
Nitrogen, Nitrate	mg/L	**150**	**150**	**200**	**81**
Sulfate	mg/L	**610**	**900**	**1200**	**380**
Major Cations					
Calcium, Total	mg/L	—	**49**	—	—
Magnesium, Total	mg/L	—	**29**	—	—
Potassium, Total	µg/L	—	**40000**	—	—
Sodium, Total	mg/L	**1100**	**1100**	**1200**	**510**

— Analyte not included in the quarterly parameter list.

2014
Mine Permit Water Quality Monitoring Data
TDRSA Contact Water Sump
Eagle Mine

Parameter	Unit	Q1 2014 2/25/2014	Q2 2014 6/3/2014	Q3 2014 8/27/2014	Q4 2014 11/24/2014
Field					
pH	SU	**6.8**	**6.3**	**6.6**	**6.8**
Specific Conductivity	µS/cm	**5303**	**4828**	**6179**	**4640**
Metals					
Aluminum, Total	mg/L	—	**0.13**	—	—
Antimony, Total	µg/L	—	<1.0	—	—
Arsenic, Total	µg/L	<1.0	**1.2**	<1.0	**1.2**
Barium, Total	µg/L	—	**57**	—	—
Beryllium, Total	µg/L	—	<1.0	—	—
Boron, Total	µg/L	**1200**	**1300**	**1200**	**1200**
Cadmium, Total	µg/L	—	**0.47**	—	—
Chromium, Total	µg/L	—	<1.0	—	—
Cobalt, Total	µg/L	—	**2.7**	—	—
Copper, Total	µg/L	**5.8**	**1.2**	**3.2**	**1.7**
Iron, Total	µg/L	**83**	**51**	**98**	<10
Lead, Total	µg/L	—	<5.0	—	—
Lithium, Total	µg/L	—	<8.0	—	—
Manganese, Total	µg/L	**330**	**460**	**520**	**350**
Mercury, Total	µg/L	**0.0016**	**0.0017**	**0.0012**	**0.0021**
Molybdenum, Total	µg/L	—	**6.9**	—	—
Nickel, Total	µg/L	**6.3**	**11**	**15**	**25**
Selenium, Total	µg/L	**14**	**12**	**19**	**11**
Silver, Total	µg/L	—	<0.20	—	—
Strontium, Total	µg/L	—	**3600**	—	—
Thallium, Total	µg/L	—	<1.0	—	—
Vanadium, Total	µg/L	—	<4.0	—	—
Zinc, Total	µg/L	**17**	**11**	**15**	**14**
Major Anions					
Alkalinity, Bicarbonate	mg/L	**43**	**18**	**20**	**19**
Alkalinity, Carbonate	mg/L	<2.0	<2.0	<2.0	<2.0
Chloride	mg/L	**150**	**95**	**100**	**76**
Fluoride	µg/L	—	<100	—	—
Nitrogen, Ammonia	mg/L	**0.14**	**0.45**	**0.16**	**0.56**
Nitrogen, Nitrate	mg/L	**320**	**330**	**520**	**330**
Nitrogen, Nitrite	mg/L	<0.050	<0.05	<0.05	**1.4**
Sulfate	mg/L	**1600**	**1600**	**1900**	**1500**
Major Cations				—	—
Calcium, Total	mg/L	—	**420**	**340**	**190**
Magnesium, Total	mg/L	**200**	**220**	**340**	**190**
Potassium, Total	µg/L	—	**54000**	—	—
Sodium, Total	mg/L	**450**	**370**	**430**	**290**

— Analyte not included in the quarterly parameter list.

2014
Mine Permit Water Quality Monitoring Data
TDRSA Leak Detection Sump
Eagle Mine

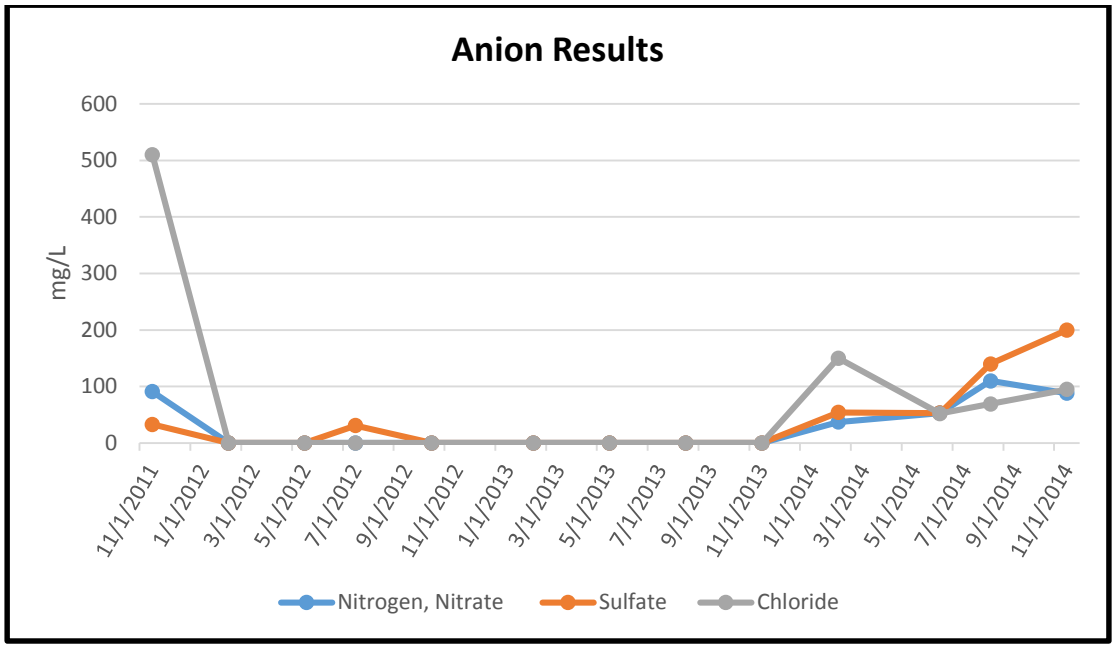
Parameter	Unit	Q1 2014 2/25/2014	Q2 2014 6/3/2014	Q3 2014 8/27/2014	Q4 2014 11/24/2014
Field					
pH	SU	**7.8**	**7.2**	**7.6**	**7.4**
Specific Conductivity	µS/cm	**2121**	**2107**	**2308**	**2707**
Major Anions					
Chloride	mg/L	**9.4**	**10**	**13**	**13**
Nitrogen, Ammonia	mg/L	**0.095**	**0.1**	<0.05	**0.083**
Nitrogen, Nitrate	mg/L	**5.3**	**9.2**	**20**	**26**
Nitrogen, Nitrite	mg/L	**0.39**	**0.46**	**0.35**	**0.81**
Sulfate	mg/L	**560**	**660**	**710**	**770**
Major Cations					
Magnesium, Total	mg/L	**11**	**11**	**11**	**14**
Sodium, Total	mg/L	**450**	**440**	**440**	**520**

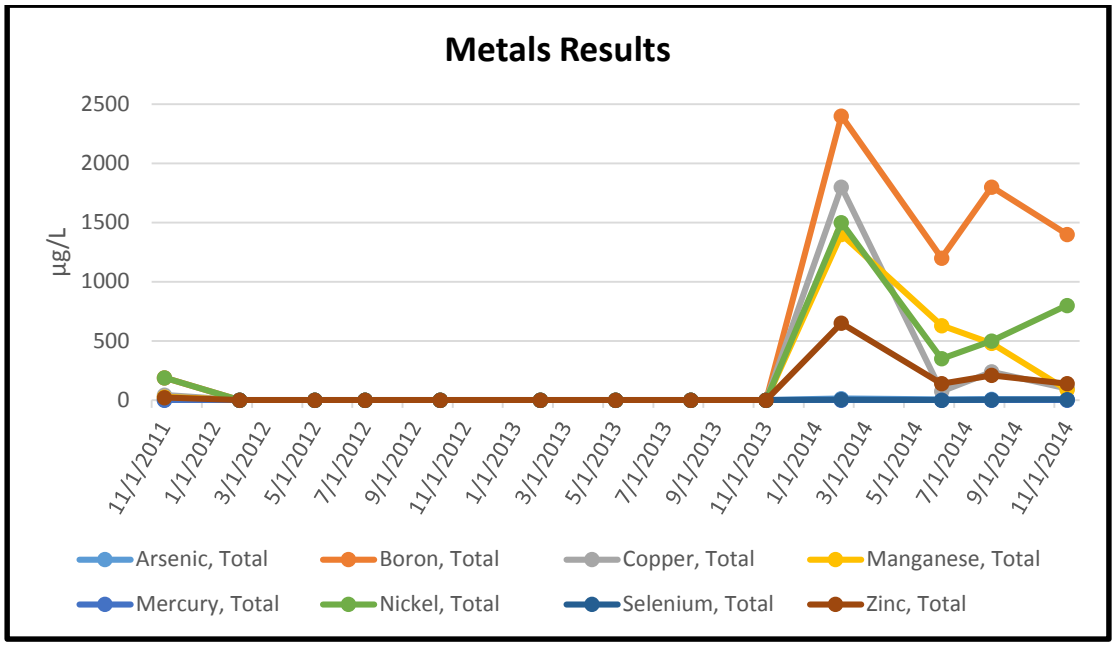
2014
Mine Permit Water Quality Monitoring Data
Underground Influent
Eagle Mine

Parameter	Unit	Q1 2014 2/25/2014	Q2 2014 6/3/2014	Q3 2014 8/27/2014	Q4 2014 11/24/2014
Field					
pH	SU	**7.1**	**9.1**	**8.7**	**8.9**
Specific Conductivity	µS/cm	**2066**	**938**	**1559**	**1448**
Metals					
Aluminum, Total	mg/L	—	**30**	—	—
Antimony, Total	µg/L	—	**3.7**	—	—
Arsenic, Total	µg/L	**14**	**5.9**	**8.2**	**6.7**
Barium, Total	µg/L	—	**93**	—	—
Beryllium, Total	µg/L	—	<1.0	—	—
Boron, Total	µg/L	**2400**	**1200**	**1800**	**1400**
Cadmium, Total	µg/L	—	**0.2**	—	—
Chromium, Total	µg/L	—	**140**	—	—
Cobalt, Total	µg/L	—	**36**	—	—
Copper, Total	µg/L	**1800**	**75**	**240**	**99**
Iron, Total	µg/L	**63000**	**56000**	**50000**	**16000**
Lead, Total	µg/L	—	**34**	—	—
Lithium, Total	µg/L	—	**51**	—	—
Manganese, Total	µg/L	**1400**	**630**	**480**	**88**
Mercury, Total	µg/L	**0.282**	**0.058**	**0.060**	**0.024**
Molybdenum, Total	µg/L	—	**21**	—	—
Nickel, Total	µg/L	**1500**	**350**	**500**	**800**
Selenium, Total	µg/L	**4.6**	**1.0**	**2.4**	**6.0**
Silver, Total	µg/L	—	**4.7**	—	—
Strontium, Total	µg/L	—	**270**	—	—
Thallium, Total	µg/L	—	<1.0	—	—
Vanadium, Total	µg/L	—	**39**	—	—
Zinc, Total	µg/L	**650**	**140**	**210**	**140**
Major Anions					
Alkalinity, Bicarbonate	mg/L	**190**	**37**	**98**	**51**
Alkalinity, Carbonate	mg/L	<2.0	**79**	<2.0	**14**
Chloride	mg/L	**150**	**52**	**69**	**95**
Fluoride	µg/L	—	**430**	—	—
Nitrogen, Ammonia	mg/L				
Nitrogen, Nitrate	mg/L	**37**	**53**	**110**	**88**
Nitrogen, Nitrite	mg/L				
Sulfate	mg/L	**54**	**53**	**140**	**200**
Major Cations					
Calcium, Total	mg/L	—	**34**	—	—
Magnesium, Total	mg/L	—	**51**	—	—
Potassium, Total	µg/L	—	**26000**	—	—
Sodium, Total	mg/L	—	**82**	—	—

— Analyte not included in the quarterly parameter list.

2014
Mine Permit Water Quality Monitoring Data
Underground Influent
Eagle Mine

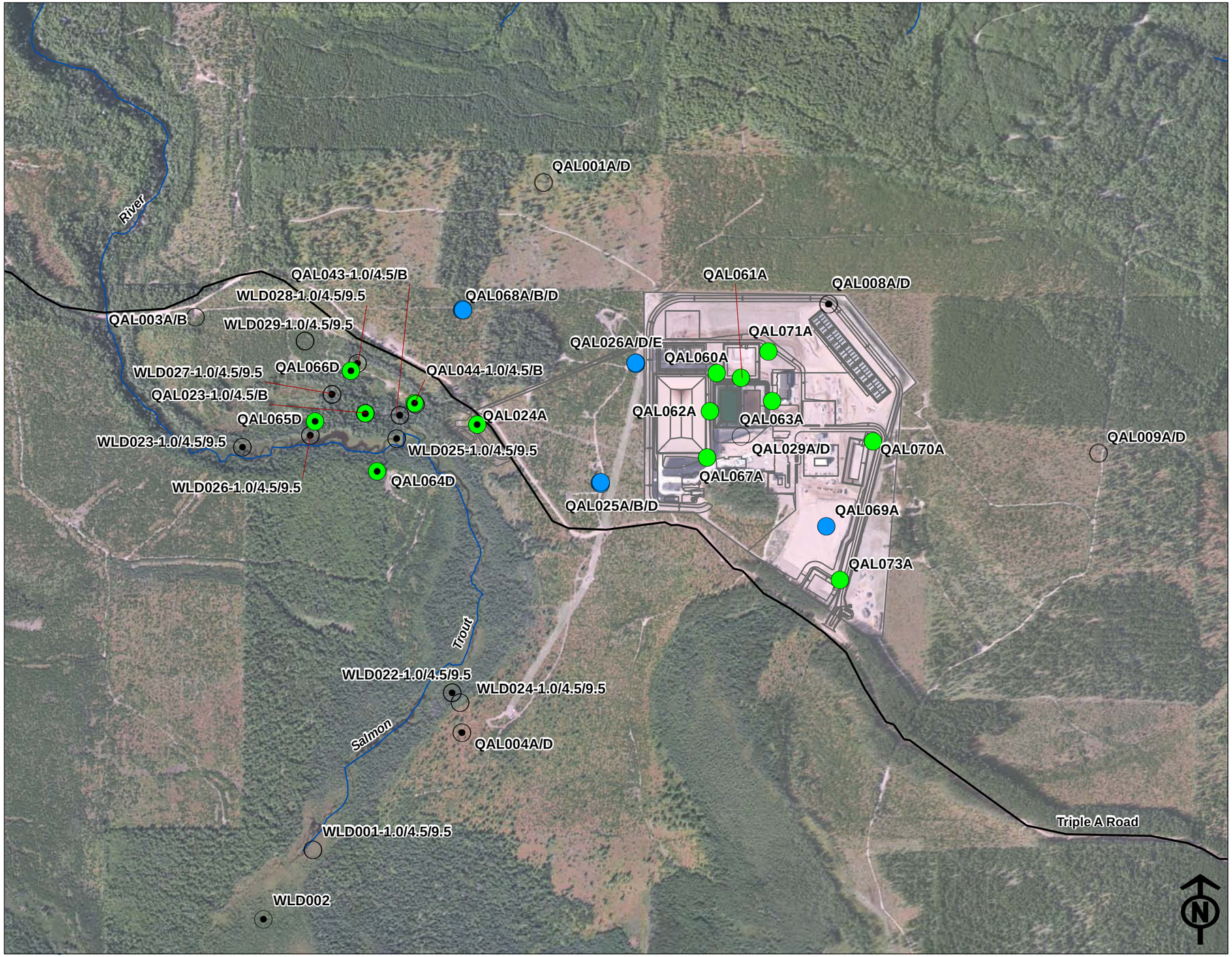




Appendix E

Eagle Mine

Groundwater Monitoring Well Location Map



MINE PERMIT GROUNDWATER MONITORING LOCATIONS Project View

- COMPLIANCE WATER QUALITY
- BACKGROUND WATER QUALITY
- 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 2,000 Feet

Scale: 1:12,000

Eagle Mine
a subsidiary of hudbay mining

North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Appendix F

Eagle Mine

Groundwater Monitoring Well Results

and

Benchmark Summary Table

Eagle Mine
2014 Mine Permit Groundwater Monitoring
Benchmark Comparison Summary

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

2014
Mine Permit Groundwater Quality Monitoring Data
QAL023B (UMB)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/31/14[D]	Q4 2014 11/10/14[T]
Field						
D.O.[1]	ppm	--	<0.1	**1.6**	**4.5**	**1.8**
ORP	mV	--	**-129**	**-71**	**44**	**-23**
pH	SU	8.1-9.1 t	**7.9**	**8.8**	**8.3**	**8.6**
Specific Conductance	µS/cm @ 25°C	--	**127**	**129**	**118**	**126**
Temperature	°C	--	**6.5**	**6.3**	**7.4**	**6.8**
Turbidity	NTU	--	<1	<1	**8**	**2**
Water Elevation	ft MSL	--	**1415.77**	**1415.93**	**1416.34**	**1417.02**
Metals						
Aluminum	ug/L	200	--	<50	--	--
Antimony	ug/L	5.5	--	<5.0	--	--
Arsenic	ug/L	6.0	<2.0	**2.7**	**3.3**	<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	5.0	<5.0	**32**	<5.0	<5.0
Iron	ug/L	192 p	**73**	**80**	<20	**97** e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	**50**	**--**	**--**
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	**19**	**18** e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	67 p	**65**	**59**	**61**	**60**
Alkalinity, Carbonate	mg/L	8.0	<2.0	**3.9**	<2.0	<2.0
Chloride	mg/L	4.0	**1.1**	<1.0	<1.0	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	<0.050 e	<0.050	<0.050 e	<0.050 e
Sulfate	mg/L	6.0 p	**5.4**	**4.6**	**5.3**	**5.0**
Major Cations						
Calcium	mg/L	18	--	**13**	**--**	**--**
Magnesium	mg/L	4.1	--	**3.2**	**--**	**--**
Potassium	mg/L	2.0	--	**0.62**	**--**	**--**
Sodium	mg/L	12	**8.5**	**7.6**	**6.7**	**6.9**
General						
Hardness	mg/L	62	--	**46**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL024A (UMB)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/14/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/13/14[T]
Field						
D.O.[1]	ppm	--	**12**	**11**	**11**	**11**
ORP	mV	--	**140**	**97**	**183**	**215**
pH	SU	6.2-7.2 t	**7.0**	**6.5**	**6.6**	**6.4**
Specific Conductance	µS/cm @	--	**255**	**441**	**459**	**479**
Temperature	°C	--	**9.9**	**8.1**	**8.0**	**7.4**
Turbidity	NTU	--	<1	<1	**1**	<1
Water Elevation	ft MSL	--	**1416.99**	**1417.14**	**1418.13**	**1417.65**
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	--	**34**	**--**	**--**
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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	97	**55**	**21**	**48**	<20 e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	**1.75**	<0.500	0.897	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	**72**	**--**	**--**
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	**12**
Major Anions						
Alkalinity, Bicarbonate	mg/L	24	**26**	**24**	**29**	**31**
Alkalinity, Carbonate	mg/L	8.0	<2.0	<2.0	<2.0	<2.0
Chloride	mg/L	1.4	**58**	**100**	**120**	**110**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	**0.27** e	**0.52**	**0.46** e	**1.3** e
Sulfate	mg/L	8.0	**4.1**	**2.6**	**5.2**	**5.9**
Major Cations						
Calcium	mg/L	5.4	--	**24**	**--**	**--**
Magnesium	mg/L	2.0	--	**4.7**	**--**	**--**
Potassium	mg/L	2.0	--	**2.3**	**--**	**--**
Sodium	mg/L	1.2 t	**28**	**35**	**61**	**38**
General						
Hardness	mg/L	17	--	**79**	**--**	**--**

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

2014
Mine Permit Groundwater Quality Monitoring Data
QAL025A (Background)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/13/14[T]
Field						
D.O.[1]	ppm	--	**11**	**12**	**13**	**11**
ORP	mV	--	**220**	**215**	**158**	**211**
pH	SU	6.4-7.4	**7.1**	**6.9**	**6.7**	**6.1**
Specific Conductance	µS/cm @	--	**69**	**61**	**55**	**68**
Temperature	°C	--	**7.2**	**7.7**	**7.5**	**7.2**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1415.91**	**1415.15**	**1417.25**	**1416.45**
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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	73	<20	<20	<20	<20 e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	**11**	<10	<10 e	18
Major Anions						
Alkalinity, Bicarbonate	mg/L	25	**29**	**24**	**25**	**29**
Alkalinity, Carbonate	mg/L	8.0	<2.0	<2.0	<2.0	<2.0
Chloride	mg/L	1.8	**1.3**	**1.8**	**1.5**	**1.8**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	1.1	**0.68** e	**0.88**	**0.64** e	**0.70** e
Sulfate	mg/L	8.0	**2.5**	**2.1**	**2.1**	<2.0
Major Cations						
Calcium	mg/L	7.6 p	--	**8.1**	**--**	**--**
Magnesium	mg/L	1.6 p	--	**1.6**	**--**	**--**
Potassium	mg/L	2.0	--	**0.83**	**--**	**--**
Sodium	mg/L	0.78	**1.0**	**0.69**	**1.1**	**0.96**
General						
Hardness	mg/L	26 p	--	**27**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL025B (Background)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/13/14[T]
Field						
D.O.[1]	ppm	--	**10**	**12**	**12**	**11**
ORP	mV	--	**126**	**174**	**127**	**159**
pH	SU	8.5-9.5	**8.9**	**9.0**	**8.9**	**9.0**
Specific Conductance	µS/cm @	--	**71**	**69**	**65**	**72**
Temperature	°C	--	**6.7**	**7.2**	**7.4**	**7.0**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1415.80**	**1415.43**	**1417.13**	**1416.34**
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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	61	<20	<20	<20	<20 e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	38 t	**24**	**28**	**30**	**29**
Alkalinity, Carbonate	mg/L	12	**9.8**	**6.8**	**4.8**	**4.3**
Chloride	mg/L	1.7	<1.0	**1.0**	<1.0	1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	**0.16** e	**0.18**	**0.16** e	**0.12** e
Sulfate	mg/L	3.5	**2.6**	**2.3**	**2.2**	<2.0
Major Cations						
Calcium	mg/L	11 p	--	**8.7**	**--**	**--**
Magnesium	mg/L	1.7 p	--	**1.5**	**--**	**--**
Potassium	mg/L	2.0	--	<0.50	--	--
Sodium	mg/L	5.6 p	**2.7**	**2.0**	**2.6**	**2.0**
General						
Hardness	mg/L	34 p	--	**28**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL025D (Background)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/13/14[T]
Field						
D.O.[1]	ppm	--	**4.9**	**5.9**	**5.9**	**5.3**
ORP	mV	--	**161**	**169**	**122**	**158**
pH	SU	8.4-9.4	**8.8**	**8.7**	**8.6**	**8.3**
Specific Conductance	µS/cm @	--	**95**	**92**	**87**	**94**
Temperature	°C	--	**6.6**	**7.2**	**7.3**	**7.1**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1411.87**	**1411.23**	**1412.91**	**1412.51**
Metals						
Aluminum	ug/L	200	--	<50	--	--
Antimony	ug/L	5.5	--	<5.0	--	--
Arsenic	ug/L	4.7 t	**2.9**	**2.7**	**3.0**	**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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	137 t	**52**	**38**	**63**	**61** e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	1.32	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	**10** s
Major Anions						
Alkalinity, Bicarbonate	mg/L	54	**45**	**40**	**42**	**41**
Alkalinity, Carbonate	mg/L	19 t	<2.0	**3.9**	**2.4**	**2.9**
Chloride	mg/L	2.2	**1.1**	<1.0	<1.0	**1.3**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.17	**0.12** e	**0.17**	**0.13** e	**0.15** e
Sulfate	mg/L	10 t	**5**	**4.5**	**4.8**	**4.6**
Major Cations						
Calcium	mg/L	12 p	--	**11**	**--**	**--**
Magnesium	mg/L	2.6 p	--	**2.5**	**--**	**--**
Potassium	mg/L	2.0	--	**0.56**	**--**	**--**
Sodium	mg/L	17 t	**5.0**	**4.1**	**5.1**	**4.7**
General						
Hardness	mg/L	40 p	--	**38**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL026A (Background)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/04/14[T]
Field						
D.O.[1]	ppm	--	**11**	i	**11**	**11**
ORP	mV	--	**192**	i	**150**	**189**
pH	SU	6.4-7.4 p	**7.1**	i	**6.6**	**6.2**
Specific Conductance	µS/cm @	--	**196**	i	**160**	**117**
Temperature	°C	--	**5.3**	i	NM	**8.2**
Turbidity	NTU	--	<1	i	<1	<1
Water Elevation	ft MSL	--	<1415.5 BP	<1461.1 BP	**1416.49**	**1416.17**
Metals						
Aluminum	ug/L	200	--	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	5.0	<5.0	i	<5.0	<5.0
Iron	ug/L	350	**200**	i	**120**	**320** e
Lead	ug/L	4.0	--	i	--	--
Lithium	ug/L	32	--	i	--	--
Manganese	ug/L	80	<20	i	<20	<20
Mercury	ng/L	2.0	<0.500	i	<0.500	<0.500
Molybdenum	ug/L	40	--	i	--	--
Nickel	ug/L	100	<25	i	<25	<25
Selenium	ug/L	4.0	<1.0	i	<1.0	<1.0 e
Silver	ug/L	0.80	--	i	--	--
Strontium	ug/L	200	--	i	--	--
Thallium	ug/L	2.0	--	i	--	--
Vanadium	ug/L	40	--	i	--	--
Zinc	ug/L	40	<10	i	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	117	**91**	i	**75**	**82**
Alkalinity, Carbonate	mg/L	8.0	<2.0	i	<2.0	<2.0
Chloride	mg/L	4.0	**2.9**	i	**4.2**	**1.9**
Fluoride	mg/L	0.40	--	i	--	--
Nitrogen, Nitrate	mg/L	0.73 t	**1.5** e	i	**1.3** e	**1.4** e
Sulfate	mg/L	4.7 t	**3.3**	i	<2.0	**5.8**
Major Cations						
Calcium	mg/L	p	--	i	--	--
Magnesium	mg/L	p	--	i	--	--
Potassium	mg/L	2.0	--	i	--	--
Sodium	mg/L	1.3	**1.5**	i	**2.3**	**2.4**
General						
Hardness	mg/L	p	--	i	--	--

2014
Mine Permit Groundwater Quality Monitoring Data
QAL026D (Background)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/04/14[T]
Field						
D.O.[1]	ppm	--	**11**	**12**	**12**	**12**
ORP	mV	--	**112**	**207**	**160**	**154**
pH	SU	8.3-9.3 t	**9.2**	**8.8**	**8.9**	**8.5**
Specific Conductance	µS/cm @	--	**64**	**61**	**63**	**42**
Temperature	°C	--	**7.3**	**7.3**	**7.8**	**7.4**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1408.77**	**1408.21**	**1409.54**	**1409.48**
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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	80	<20	**55**	<20	<20 e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	33	**25**	**28**	**28**	**28**
Alkalinity, Carbonate	mg/L	6.4	**6.4**	**6.3**	**3.9**	**3.0**
Chloride	mg/L	4.0	**1.0**	**1.2**	<1.0	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.10 t	**0.058** e	**0.11**	**0.073** e	**0.12** e
Sulfate	mg/L	8.0	**2.1**	<2.0	<2.0	<2.0
Major Cations						
Calcium	mg/L	15	--	**10**	--	--
Magnesium	mg/L	3.1	--	**1.4**	--	--
Potassium	mg/L	2.0	--	<0.50	--	--
Sodium	mg/L	0.73	**0.63**	<0.50	**0.71**	**0.73**
General						
Hardness	mg/L	51	--	**31**	--	--

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

2014
Mine Permit Groundwater Quality Monitoring Data
QAL026E (Background)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/13/14[T]
Field						
D.O.[1]	ppm	--	<0.1	<0.1	<0.1	<0.1
ORP	mV	--	**-86**	**-20**	**5**	**-34**
pH	SU	7.9-8.9 p	**8.7**	**8.4**	**8.3**	**8.7**
Specific Conductance	µS/cm @	--	**123**	**120**	**115**	**127**
Temperature	°C	--	**8.0**	**7.1**	**7.4**	**6.9**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1408.38**	**1407.95**	**1409.37**	**1409.24**
Metals						
Aluminum	ug/L	200	--	<50	--	--
Antimony	ug/L	5.5	--	<5.0	--	--
Arsenic	ug/L	7.8	**7.0**	**6.9**	**7.7**	**6.6**
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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	80	<20	<20	<20	<20 e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	**56**	**--**	**--**
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	136 p	**57**	**55**	**58**	**57**
Alkalinity, Carbonate	mg/L	8.0	<2.0	**2.4**	<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 e	<0.050	<0.050 e	<0.050 e
Sulfate	mg/L	8.6	**8.1**	**7.4**	**7.6**	**7.7**
Major Cations						
Calcium	mg/L	17	--	**16**	**--**	**--**
Magnesium	mg/L	4.3	--	**4.1**	**--**	**--**
Potassium	mg/L	2.0	--	**1.8**	**--**	**--**
Sodium	mg/L	2.0 p	**1.8**	**1.4**	**2.2**	**1.6**
General						
Hardness	mg/L	60	--	**57**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL044B (UMB)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/14/14[T]	Q3 2014 07/30/14[T]	Q4 2014 11/10/14[T]
Field						
D.O.[1]	ppm	--	<0.1	<0.1	**0.1**	<0.1
ORP	mV	--	**-139**	**-131**	**-112**	**-102**
pH	SU	8.0-9.0 p	**9.0**	**9.1**	**8.9**	**8.8**
Specific Conductance	µS/cm @	--	**121**	**119**	**109**	**114**
Temperature	°C	--	**7.1**	**7.7**	**8.5**	**7.6**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1414.97**	**1414.90**	**1415.44**	**1415.45**
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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	114 p	<20	<20	<20	**24** e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	58	**47**	**41**	**49**	**46**
Alkalinity, Carbonate	mg/L	8.0	<2.0	**5.3**	<2.0	<2.0
Chloride	mg/L	4.0	**1.1**	**1.6**	**1.1**	**1.1**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	**0.053** e	<0.050	<0.050 e	<0.050 e
Sulfate	mg/L	8.0	**12**	**11**	**11**	**9.6**
Major Cations						
Calcium	mg/L	18	--	**14**	**--**	**--**
Magnesium	mg/L	4.8	--	**2.9**	**--**	**--**
Potassium	mg/L	2.0	--	<0.50	--	--
Sodium	mg/L	2.6	**3.3**	**3.4**	**3.0**	**2.7**
General						
Hardness	mg/L	64	--	**47**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL060A (TDRSA-CWB)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/13/14[T]
Field						
D.O.[1]	ppm	--	**11**	**12**	**11**	**12**
ORP	mV	--	**98**	**190**	**25**	**107**
pH	SU	7.9-8.9	**8.9**	**8.6**	**8.2**	**8.9**
Specific Conductance	µS/cm @	--	**84**	**78**	**82**	**83**
Temperature	°C	--	**8.1**	**7.4**	**8.1**	**7.4**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1404.19**	**1404.05**	**1404.90**	**1404.84**
Metals						
Aluminum	ug/L	200	--	<50	--	--
Antimony	ug/L	5.5	--	<5.0	--	--
Arsenic	ug/L	4.7	**4.8**	**4.7**	**4.9**	**4.3**
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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	80	<20	<20	<20	<20 e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	0.788	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	56	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	**10** s
Major Anions						
Alkalinity, Bicarbonate	mg/L	58	**39**	**38**	**39**	**37**
Alkalinity, Carbonate	mg/L	8.0	<2.0	<2.0	<2.0	<2.0
Chloride	mg/L	1.6	**1.1**	**1.0**	<1.0	**1.1**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.12	**0.20** e	**0.23**	**0.20** e	**0.17** e
Sulfate	mg/L	4.2	**2.4**	**2.1**	**2.1**	<2.0
Major Cations						
Calcium	mg/L	16	--	**11**	**--**	**--**
Magnesium	mg/L	3.9	--	**2.5**	**--**	**--**
Potassium	mg/L	1.2	--	**0.85**	**--**	**--**
Sodium	mg/L	2.1	**1.5**	**1.2**	**1.3**	**1.1**
General						
Hardness	mg/L	55	--	**38**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL061A (TDRSA-CWB)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/13/14[T]
Field						
D.O.[1]	ppm	--	**11**	**11**	**11**	**11**
ORP	mV	--	**131**	**84**	**23**	**103**
pH	SU	8.1-9.1	**8.3**	**8.3**	**8.3**	**8.8**
Specific Conductance	µS/cm @	--	**73**	**70**	**75**	**76**
Temperature	°C	--	**6.3**	**8.0**	**8.1**	**7.6**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1405.68**	**1405.29**	**1406.30**	**1406.24**
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	89	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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	80	<20	<20	<20	<20 e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	**11** s
Major Anions						
Alkalinity, Bicarbonate	mg/L	41 t	**32**	**33**	**34**	**33**
Alkalinity, Carbonate	mg/L	4.6	**3.4**	**2.9**	<2.0	<2.0
Chloride	mg/L	1.6	<1.0	<1.0	<1.0	**1.1**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.27	**0.15** e	**0.19**	**0.23** e	**0.26** e
Sulfate	mg/L	2.8	**2.0**	<2.0	<2.0	<2.0
Major Cations						
Calcium	mg/L	15	--	**11**	**--**	**--**
Magnesium	mg/L	2.2 p	--	**1.9**	**--**	**--**
Potassium	mg/L	2.0	--	**0.52**	**--**	**--**
Sodium	mg/L	0.72	**0.69**	<0.50	**0.77**	**0.63**
General						
Hardness	mg/L	37 p	--	**35**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL062A (TDRSA-CWB)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/13/14[T]
Field						
D.O.[1]	ppm	--	**10**	**11**	**11**	**11**
ORP	mV	--	**178**	**64**	**12**	**109**
pH	SU	8.3-9.3	**8.8**	**8.4**	**8.3**	**8.4**
Specific Conductance	µS/cm @	--	**92**	**96**	**106**	**127**
Temperature	°C	--	**7.9**	**7.7**	**8.0**	**7.4**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1407.00**	**1406.58**	**1407.67**	**1407.52**
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	5.0	<5.0	<5.0	<5.0	**7.7**
Iron	ug/L	34	<20	<20	**26**	<20 e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	48 t	**41**	**47**	**55**	**58**
Alkalinity, Carbonate	mg/L	4.5 t	**4.4**	**3.4**	<2.0	<2.0
Chloride	mg/L	1.6	**1.2**	**1.2**	**1.0**	**2.3**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.43	**0.28** e	**0.25**	**0.21** e	**0.25** e
Sulfate	mg/L	2.8	**2.3**	**2.0**	**2.1**	<2.0
Major Cations						
Calcium	mg/L	12 p	--	**16**	**--**	**--**
Magnesium	mg/L	2.2 p	--	**2.8**	**--**	**--**
Potassium	mg/L	2.0	--	**0.82**	**--**	**--**
Sodium	mg/L	0.76 t	**0.80**	**0.53**	**0.91**	**0.79**
General						
Hardness	mg/L	40 p	--	**51**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL063A (TDRSA-CWB)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/13/14[T]
Field						
D.O.[1]	ppm	--	**9.4**	**11**	**11**	**11**
ORP	mV	--	**-18**	**57**	**70**	**116**
pH	SU	8.1-9.1 p	**8.6**	**8.5**	**8.0**	**8.8**
Specific Conductance	µS/cm @	--	**79**	**77**	**84**	**96**
Temperature	°C	--	**7.7**	**7.8**	**8.1**	**7.6**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1400.80**	**1400.71**	**1401.37**	**1401.40**
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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	52	<20	<20	<20	**30** e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	42 t	**37**	**39**	**37**	**42**
Alkalinity, Carbonate	mg/L	3.2 t	<2.0	<2.0	**3.9**	<2.0
Chloride	mg/L	1.7	<1.0	<1.0	<1.0	**1.3**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.26	**0.24** e	**0.25**	**0.24** e	**0.24** e
Sulfate	mg/L	2.8	**2.5**	**2.1**	**2.1**	<2.0
Major Cations						
Calcium	mg/L	12 p	--	**11**	**--**	**--**
Magnesium	mg/L	2.0 p	--	**1.9**	**--**	**--**
Potassium	mg/L	2.0	--	**0.63**	**--**	**--**
Sodium	mg/L	0.78	**0.76**	<0.50	**0.84**	**0.71**
General						
Hardness	mg/L	40 p	--	**35**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL064D (UMB)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/14/14[T]	Q3 2014 07/30/14[T]	Q4 2014 11/10/14[T]
Field						
D.O.[1]	ppm	--	**1.0**	<0.1	<0.1	<0.1
ORP	mV	--	**-159**	**-120**	**-84**	**-125**
pH	SU	8.0-9.0	**8.6**	**8.3**	**8.6**	**8.7**
Specific Conductance	µS/cm @	--	**144**	**140**	**135**	**147**
Temperature	°C	--	**6.5**	**7.0**	**7.3**	**6.6**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1417.25**	**1417.44**	**1417.96**	**1417.68**
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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	30 t	**26**	<20	**22** s	<20 e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	**90**	**--**	**--**
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	69	**68**	**72**	**73**	**72**
Alkalinity, Carbonate	mg/L	8.0	**4.4**	**3.9**	<2.0	<2.0
Chloride	mg/L	4.7	**2.9**	**2.5**	**2.7**	**2.2**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	<0.050 e	<0.050	<0.050 e	<0.050 e
Sulfate	mg/L	8.0	<2.0	<2.0	<2.0	<2.0
Major Cations						
Calcium	mg/L	22	--	**19**	**--**	**--**
Magnesium	mg/L	3.3 p	--	**3.9**	**--**	**--**
Potassium	mg/L	2.0	--	**1.2**	**--**	**--**
Sodium	mg/L	7.1 t	**5.3**	**4.7**	**4.5**	**4.2**
General						
Hardness	mg/L	51 p	--	**63**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL065D (UMB)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/31/14[T]	Q4 2014 11/10/14[T]
Field						
D.O.[1]	ppm	--	<0.1	**0.1**	**0.4**	<0.1
ORP	mV	--	**-116**	**-81**	**-109**	**-45**
pH	SU	8.0-9.0	**8.0**	**8.4**	**8.2**	**8.8**
Specific Conductance	µS/cm @	--	**152**	**143**	**137**	**147**
Temperature	°C	--	**6.5**	**6.9**	**8.4**	**6.5**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1416.68**	**1417.20**	**1416.92**	**1417.02**
Metals						
Aluminum	ug/L	200	--	<50	--	--
Antimony	ug/L	5.5	--	<5.0	--	--
Arsenic	ug/L	5.2	**3.5**	**2.4**	**2.3**	**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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	60 t	**49**	**33**	**40**	**39** e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	188 p	--	**200**	**--**	**--**
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	86	**72**	**76**	**79**	**76**
Alkalinity, Carbonate	mg/L	8.0	**5.4**	**3.4**	<2.0	<2.0
Chloride	mg/L	1.6	<1.0	<1.0	<1.0	<1.0
Fluoride	mg/L	0.40	--	**0.14**	**--**	**--**
Nitrogen, Nitrate	mg/L	0.20	<0.050 e	<0.050	<0.050 e	<0.050 e
Sulfate	mg/L	4.7	<2.0	<2.0	<2.0	<2.0
Major Cations						
Calcium	mg/L	14 p	--	**13**	**--**	**--**
Magnesium	mg/L	4.6 p	--	**4.6**	**--**	**--**
Potassium	mg/L	2.9 p	--	**2.8**	**--**	**--**
Sodium	mg/L	12	**12**	**9.4**	**11**	**9.5**
General						
Hardness	mg/L	54 p	--	**51**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL066D (UMB)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/14/14[T]	Q3 2014 07/30/14[T]	Q4 2014 11/10/14[T]
Field						
D.O.[1]	ppm	--	**1.0**	**1.0**	**0.4**	**7.0**
ORP	mV	--	**-6**	**42**	**-50**	**21**
pH	SU	10.4-11.4 p	**9.2**	**9.1**	**8.9**	**8.5**
Specific Conductance	µS/cm @	--	**100**	**108**	**105**	**110**
Temperature	°C	--	**7.2**	**8.0**	NM	**7.3**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1417.25**	**1416.42**	**1416.59**	**1416.58**
Metals						
Aluminum	ug/L	675 p	--	<50	--	--
Antimony	ug/L	5.5 p	--	<5.0	--	--
Arsenic	ug/L	9.7 p	**8.1**	**6.3**	**6.0**	**5.6**
Barium	ug/L	80 p	--	<20	--	--
Beryllium	ug/L	2.5 p	--	<1.0	--	--
Boron	ug/L	400 p	<100	<100	<100	<100 e
Cadmium	ug/L	2.0 p	--	<0.50	--	--
Chromium	ug/L	20 p	--	<5.0	--	--
Cobalt	ug/L	40 p	--	<10	--	--
Copper	ug/L	5.0 p	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	49 p	**140**	**46**	<20	**31** e
Lead	ug/L	4.0 p	--	<1.0	--	--
Lithium	ug/L	32 p	--	<8.0	--	--
Manganese	ug/L	80 p	<20	<20	<20	<20
Mercury	ng/L	1.37 p*	**0.967**	<0.500	<0.500	<0.500
Molybdenum	ug/L	40 p	--	<10	--	--
Nickel	ug/L	100 p	<25	<25	<25	<25
Selenium	ug/L	4.0 p	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80 p	--	<0.20	--	--
Strontium	ug/L	570 p	--	**61**	**--**	**--**
Thallium	ug/L	2.0 p	--	<2.0	--	--
Vanadium	ug/L	40 p	--	<10	--	--
Zinc	ug/L	40 p	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	45 p	**28**	**37**	**41**	**44**
Alkalinity, Carbonate	mg/L	65 p	**15**	**12**	**7.7**	**6.3**
Chloride	mg/L	2.0 p	**1.1**	**1.3**	<1.0	<1.0
Fluoride	mg/L	0.14 p	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20 p	<0.050 e	**0.089**	<0.050 e	<0.050 e
Sulfate	mg/L	11 p	**8.1**	**8.0**	**8.4**	**7.2**
Major Cations						
Calcium	mg/L	87 p	--	**14**	**--**	**--**
Magnesium	mg/L	2.0 p	--	**2.1**	**--**	**--**
Potassium	mg/L	3.6 p	--	**1.2**	**--**	**--**
Sodium	mg/L	7.6 p	**5.8**	**4.9**	**5.6**	**5.0**
General						
Hardness	mg/L	213 p	--	**44**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL067A (TDRSA-CWB)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/14/14[T]
Field						
D.O.[1]	ppm	--	**10**	**10**	**11**	**9.5**
ORP	mV	--	**140**	**116**	**75**	**233**
pH	SU	5.9-6.9	**6.0**	**6.2**	**6.0**	**5.7**
Specific Conductance	µS/cm @	--	**1,887**	**186**	**367**	**4888**
Temperature	°C	--	**8.4**	**8.1**	**8.4**	**7.8**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1414.92**	**1414.96**	**1415.50**	**1414.70**
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	--	**23**	**--**	**--**
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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	80	<20	<20	**21** s	**23** e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	**1.13**	<0.500	<0.500	**4.03**
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	**32**
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	**18**
Major Anions						
Alkalinity, Bicarbonate	mg/L	27	**11**	**58**	**18**	**14**
Alkalinity, Carbonate	mg/L	8.0	<2.0	<2.0	<2.0	<2.0
Chloride	mg/L	1.9	**560**	**25**	**96**	**1500**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.25 t	**0.65** e	**0.24**	**0.38** e	**1.6** e
Sulfate	mg/L	8.4 t	**2.9**	<2.0	<2.0	**13**
Major Cations						
Calcium	mg/L	8.2 p	--	**12**	**--**	**--**
Magnesium	mg/L	1.3 p	--	**2.4**	**--**	**--**
Potassium	mg/L	1.3 p	--	**1.6**	**--**	**--**
Sodium	mg/L	1.6 t	**170**	**23**	**9.3**	**740**
General						
Hardness	mg/L	26 p	--	**40**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL068A (Background)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/14/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/10/14[T]
Field						
D.O.[1]	ppm	--	**11**	**12**	**13**	**12**
ORP	mV	--	**259**	**87**	**216**	**205**
pH	SU	6.6-7.6 t	**6.7**	**6.7**	**6.2**	**6.4**
Specific Conductance	µS/cm @	--	**39**	**41**	**35**	**37**
Temperature	°C	--	**6.4**	**7.6**	**7.4**	**7.1**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1421.41**	**1420.61**	**1422.31**	**1421.83**
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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	80	<20	<20	<20	<20 e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	45 p	**18**	**22**	**19**	**20**
Alkalinity, Carbonate	mg/L	8.0	<2.0	<2.0	<2.0	<2.0
Chloride	mg/L	2.3	<1.0	<1.0	<1.0	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	**0.099** e	<0.050	<0.050 e	<0.050 e
Sulfate	mg/L	2.5	**2.2**	<2.0	<2.0	<2.0
Major Cations						
Calcium	mg/L	6.9	--	**5.9**	**--**	**--**
Magnesium	mg/L	2.0	--	**1.1**	**--**	**--**
Potassium	mg/L	2.0	--	**0.94**	**--**	**--**
Sodium	mg/L	1.0	**1.1**	**0.68**	**0.89**	**0.69**
General						
Hardness	mg/L	22	--	**19**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL068B (Background)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/14/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/10/14[T]
Field						
D.O.[1]	ppm	--	**11**	**12**	**12**	**11**
ORP	mV	--	**214**	**122**	**130**	**98**
pH	SU	8.4-9.4 t	**9.0**	**8.9**	**8.8**	**9.0**
Specific Conductance	µS/cm @	--	**62**	**60**	**57**	**61**
Temperature	°C	--	**8.0**	**7.5**	**7.7**	**7.4**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1413.19**	**1412.34**	**1414.07**	**1413.87**
Metals						
Aluminum	ug/L	200	--	<50	--	--
Antimony	ug/L	5.5	--	<5.0	--	--
Arsenic	ug/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	ug/L	80	--	<20	--	--
Beryllium	ug/L	2.5	--	<1.0	--	--
Boron	ug/L	400	<100	<100	<100	<100 e
Cadmium	ug/L	2.0	--	<0.50	--	--
Chromium	ug/L	20	--	<5.0	--	--
Cobalt	ug/L	40	--	<10	--	--
Copper	ug/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	237 p	**20**	<20	<20	<20 e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	31	**22**	**24**	**26**	**25**
Alkalinity, Carbonate	mg/L	8.3	**8.8**	**5.8**	**4.8**	**4.4**
Chloride	mg/L	1.5	<1.0	**1.1**	<1.0	**1.0**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.12	<0.050 e	**0.098**	**0.086** e	**0.083** e
Sulfate	mg/L	5.6 p	**2.4**	<2.0	**2.1**	<2.0
Major Cations						
Calcium	mg/L	10 p	--	**7.8**	**--**	**--**
Magnesium	mg/L	2.0 p	--	**1.5**	**--**	**--**
Potassium	mg/L	2.0	--	**0.50**	**--**	**--**
Sodium	mg/L	1.8 t	**1.2**	**0.93**	**1.2**	**0.97**
General						
Hardness	mg/L	33 p	--	**26**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL068D (Background)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/14/14[T]	Q3 2014 07/30/14[T]	Q4 2014 11/10/14[T]
Field						
D.O.[1]	ppm	--	**1.1**	**1.3**	**1.6**	**4.5**
ORP	mV	--	**-57**	**16**	**-4**	**18**
pH	SU	7.9-8.9 t	**8.7**	**8.7**	**8.4**	**8.5**
Specific Conductance	µS/cm @	--	**121**	**116**	**110**	**120**
Temperature	°C	--	NM	**8.1**	NM	**6.3**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1413.17**	**1412.49**	**1414.07**	**1413.97**
Metals						
Aluminum	ug/L	200	--	<50	--	--
Antimony	ug/L	5.5	--	<5.0	--	--
Arsenic	ug/L	5.7	**4.2**	**4.3**	**4.4**	**4.3**
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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	167	**21**	**27**	<20	**21** e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.17 t	<0.500	<0.500	<0.500	<0.500
Molybdenum	ug/L	40 p	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	**11** s
Major Anions						
Alkalinity, Bicarbonate	mg/L	61 p	**32**	**55**	**57**	**55**
Alkalinity, Carbonate	mg/L	8.4	<2.0	**2.4**	<2.0	<2.0
Chloride	mg/L	1.6	**1.4**	**1.2**	<1.0	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	<0.050 e	**0.16**	<0.050 e	<0.050 e
Sulfate	mg/L	12	**6.2**	**5.5**	**5.6**	**5.1**
Major Cations						
Calcium	mg/L	15 p	--	**13**	**--**	**--**
Magnesium	mg/L	3.9 p	--	**3.5**	**--**	**--**
Potassium	mg/L	2.2 p	--	**1.2**	**--**	**--**
Sodium	mg/L	6.7	**4.7**	**4.3**	**3.3**	**4.1**
General						
Hardness	mg/L	53 p	--	**47**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL069A (Background)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/13/14[T]
Field						
D.O.[1]	ppm	--	**7.9**	**8.0**	**5.2**	**5.5**
ORP	mV	--	**123**	**154**	**193**	**161**
pH	SU	7.8-8.8 t	**7.3**	**7.1**	**6.8**	**7.0**
Specific Conductance	µS/cm @	--	**469**	**442**	**576**	**516**
Temperature	°C	--	**8.0**	**8.0**	**8.3**	**7.7**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1381.34**	**1381.35**	**1382.37**	**1382.05**
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	5.0	<5.0	<5.0	<5.0	<5.0
Iron	ug/L	80	<20	<20	<20	<20 e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	**213**	**54.7**
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	**57**	**--**	**--**
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	138 t	**240**	**220**	**260**	**220**
Alkalinity, Carbonate	mg/L	8.0	<2.0	<2.0	<2.0	<2.0
Chloride	mg/L	2.6	**5.4**	**3.6**	**40**	**31**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.57	**1.4** e	**2.3**	**1.5** e	**1.8** e
Sulfate	mg/L	4.3	**5.2**	**5.3**	**5.8**	**5.1**
Major Cations						
Calcium	mg/L	35 p	--	**55**	**--**	**--**
Magnesium	mg/L	18 p	--	**23**	**--**	**--**
Potassium	mg/L	2.0	--	**1.3**	**--**	**--**
Sodium	mg/L	1.2 t	**3.0**	**3.2**	**6.3**	**14**
General						
Hardness	mg/L	162 p	--	**232**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL071A (TDRSA-CWB)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q1 2014 02/19/14[T]	Q2 2014 05/13/14[T]	Q3 2014 07/29/14[T]	Q4 2014 11/13/14[T]
Field						
D.O.[1]	ppm	--	**12**	**11**	**11**	**11**
ORP	mV	--	**104**	**128**	**198**	**124**
pH	SU	8.1-9.1	**8.3**	**8.4**	**8.1**	**7.7**
Specific Conductance	µS/cm @	--	**216**	**243**	**359**	**421**
Temperature	°C	--	**7.2**	**8.1**	**8.4**	NM
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1404.43**	**1405.59**	**1406.31**	**1405.47**
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	5.0	<5.0	<5.0	**5.2**	**7.8**
Iron	ug/L	44	<20	<20	<20	<20 e
Lead	ug/L	4.0	--	<1.0	--	--
Lithium	ug/L	32	--	<8.0	--	--
Manganese	ug/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	**1.37**
Molybdenum	ug/L	40	--	<10	--	--
Nickel	ug/L	100	<25	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0	<1.0 e
Silver	ug/L	0.80	--	<0.20	--	--
Strontium	ug/L	200	--	<50	--	--
Thallium	ug/L	2.0	--	<2.0	--	--
Vanadium	ug/L	40	--	<10	--	--
Zinc	ug/L	40	<10	<10	<10 e	**10** s
Major Anions						
Alkalinity, Bicarbonate	mg/L	44 t	**79**	**71**	**99**	**140**
Alkalinity, Carbonate	mg/L	6.0	<2.0	<2.0	<2.0	<2.0
Chloride	mg/L	1.5	**13**	**16**	**24**	**18**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.31	**1.5** e	**9.6**	**14** e	**14** e
Sulfate	mg/L	3.3	**3.6**	**3.6**	**7.5**	**8.7**
Major Cations						
Calcium	mg/L	12 p	--	**35**	**--**	**--**
Magnesium	mg/L	1.7 p	--	**4.9**	**--**	**--**
Potassium	mg/L	2.0	--	**0.84**	**--**	**--**
Sodium	mg/L	1.8	**1.3**	**0.94**	**3.3**	**9.6**
General						
Hardness	mg/L	38 p	--	**108**	**--**	**--**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL070A (NCWIB)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q4 2012 10/23/12[T]	Q2 2013 05/22/13[T]	Q2 2014 05/13/14[T]
Field					
D.O.[1]	ppm	--	**11**	**11**	**11**
ORP	mV	--	**56**	**147**	**121**
pH	SU	8.1-9.1 p	**8.7**	**9.1**	**9.0**
Specific Conductance	µS/cm @ 25°C	--	**76**	**82**	**106**
Temperature	°C	--	**9.2**	**7.2**	**8.4**
Turbidity	NTU	--	<1	<1	<1
Water Elevation	ft MSL	--	**1368.98**	**1369.45**	**1369.91**
Metals					
Aluminum	ug/L	200	<50	<50	<50
Antimony	ug/L	5.5	<5.0	<5.0	<5.0
Arsenic	ug/L	6.0	<2.0	<2.0	<2.0
Barium	ug/L	80	<20	<20	<20
Beryllium	ug/L	2.5	<1.0	<1.0	<1.0
Boron	ug/L	400	<100	<100	<100
Cadmium	ug/L	2.0	<0.50	<0.50	<0.50
Chromium	ug/L	20	<5.0	<5.0	<5.0
Cobalt	ug/L	40	<10	<10	<10
Copper	ug/L	5.0	<5.0	<5.0	<5.0
Iron	ug/L	80	<20	<20 e	<20
Lead	ug/L	4.0	<1.0	<1.0 e	<1.0
Lithium	ug/L	32	<8.0	<8.0	<8.0
Manganese	ug/L	80	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	<10	<10	<10
Nickel	ug/L	100	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0
Silver	ug/L	0.80	<0.20	<0.20	<0.20
Strontium	ug/L	200	<50	<50 e	<50
Thallium	ug/L	2.0	<2.0	<2.0	<2.0
Vanadium	ug/L	40	<10	<10	<10
Zinc	ug/L	40	<10	<10	<10
Major Anions					
Alkalinity, Bicarbonate	mg/L	42 p	**33**	**33**	**34**
Alkalinity, Carbonate	mg/L	8.0	**3.0**	**4.3** e	**4.3**
Chloride	mg/L	4.0	**1.4**	**1.9**	**6.5**
Fluoride	mg/L	0.40	<0.10	<0.10	<0.10
Nitrogen, Nitrate	mg/L	0.22 p	**0.17**	**0.24**	**0.38**
Sulfate	mg/L	8.0	**2.1**	**2.2**	**2.5**
Major Cations					
Calcium	mg/L	11 p	**8.5**	**12**	**13**
Magnesium	mg/L	3.0 p	**2.1**	**3.1**	**3.1**
Potassium	mg/L	2.0	**0.57**	**0.66** e	**0.68**
Sodium	mg/L	2.0	**0.89**	**1.1**	**1.1**
General					
Hardness	mg/L	40 p	**30**	**43**	**45**

2014
Mine Permit Groundwater Quality Monitoring Data
QAL073A (NCWIB)
Eagle Mine

Parameter	Unit	Recom-mended Benchmark 2014	Q4 2012 10/23/12[T]	Q2 2013 05/22/13[T]	Q2 2014 05/13/14[T]
Field					
D.O.[1]	ppm	--	**10**	**11**	**11**
ORP	mV	--	**123**	**219**	**168**
pH	SU	6.1-7.1 p	**6.6**	**6.9**	**6.7**
Specific Conductance	µS/cm @ 25°C	--	**73**	**219**	**190**
Temperature	°C	--	**9.3**	**8.0**	**8.8**
Turbidity	NTU	--	<1	<1	<1
Water Elevation	ft MSL	--	**1380.92**	**1381.59**	**1381.11**
Metals					
Aluminum	ug/L	200	<50	<50	<50
Antimony	ug/L	5.5	<5.0	<5.0	<5.0
Arsenic	ug/L	6.0	<2.0	<2.0	<2.0
Barium	ug/L	80	<20	<20	<20
Beryllium	ug/L	2.5	<1.0	<1.0	<1.0
Boron	ug/L	400	<100	<100	<100
Cadmium	ug/L	2.0	<0.50	<0.50	<0.50
Chromium	ug/L	20	<5.0	<5.0	<5.0
Cobalt	ug/L	40	<10	<10	<10
Copper	ug/L	5.0	<5.0	<5.0	<5.0
Iron	ug/L	70 p	**56**	**22** a,e	**43**
Lead	ug/L	4.0	<1.0	<1.0 e	<1.0
Lithium	ug/L	32	<8.0	<8.0	<8.0
Manganese	ug/L	80	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500
Molybdenum	ug/L	40	<10	<10	<10
Nickel	ug/L	100	<25	<25	<25
Selenium	ug/L	4.0	<1.0	<1.0	<1.0
Silver	ug/L	0.80	<0.20	<0.20	<0.20
Strontium	ug/L	200	<50	**86** e	**67**
Thallium	ug/L	2.0	<2.0	<2.0	<2.0
Vanadium	ug/L	40	<10	<10	<10
Zinc	ug/L	40	<10	<10	<10
Major Anions					
Alkalinity, Bicarbonate	mg/L	44 p	**33**	**71**	**69**
Alkalinity, Carbonate	mg/L	8.0	<2.0	<2.0 e	<2.0
Chloride	mg/L	4.0	<1.0	**16**	**5.0**
Fluoride	mg/L	0.40	<0.10	<0.10	<0.10
Nitrogen, Nitrate	mg/L	0.60 p	**0.43**	**1.9**	**4.8**
Sulfate	mg/L	8.0	**2.3**	**4.9**	**6.1**
Major Cations					
Calcium	mg/L	9.2 p	**9.0**	**31**	**26**
Magnesium	mg/L	2.5 p	**1.9**	**6.8**	**5.4**
Potassium	mg/L	2.0	**0.64**	**1.3** e	**1.1**
Sodium	mg/L	1.2 p	**0.93**	**1.9**	**1.3**
General					
Hardness	mg/L	33 p	**30**	**105**	**87**

2014
Mine Permit Groundwater Quality Monitoring Data
Abbreviations & Data Qualifiers
Eagle Mine

Abbreviation or Data Qualifier	Explanation
[1]	Many D.O. values are elevated due to well screen configuration and aquifer characteristics and the low-flow sampling method. Super-saturated DO values are rejected (see R data qualifier) as not being representative of true conditions.
[2]	Benchmarks for QAL066D are all pending due to the unreliability of data generated for this monitoring location.
[3]	QAL070A and QAL073A are only sampled annually (usually in Q2).
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.

Mine Permit
Supplemental Sampling Monitoring Data
QAL067A (TDRSA-CWB)
Eagle Mine

PARAMETER	UNIT	Recom-mended Benchmark 2014	Apr 2014 04/24/14	Jun 2014 06/12/14	Dec 2014 12/18/14
Field					
D.O.	ppm	NA	**10**	**12**	**9.4**
ORP	mV	NA	**261**	**268**	**140**
pH	SU	5.9-6.9	**6**	**5.7**	**5.7**
Specific Conductance	µS/cm @ 25°C	NA	**629**	**330**	**4596**
Temperature	°C	NA	**8.9**	**8.8**	**7.7**
Turbidity	NTU	NA		NM	<1
Water Elevation	ft MSL	NA		NM	**1414.54**
Metals					
Aluminum	ug/L	200	NM	NM	NM
Antimony	ug/L	5.5	NM	NM	NM
Arsenic	ug/L	6.0	NM	NM	<5.0
Barium	ug/L	80	NM	NM	NM
Beryllium	ug/L	2.5	NM	NM	NM
Boron	ug/L	400	NM	NM	<100
Cadmium	ug/L	2.0	NM	NM	NM
Chromium	ug/L	20	NM	NM	NM
Cobalt	ug/L	40	NM	NM	NM
Copper	ug/L	5.0	NM	NM	**63**
Iron	ug/L	80	NM	NM	<20
Lead	ug/L	4.0	NM	NM	NM
Lithium	ug/L	32	NM	NM	NM
Manganese	ug/L	80	NM	NM	<20
Mercury	ng/L	2.00	NM	NM	**3.62**
Molybdenum	ug/L	40	NM	NM	NM
Nickel	ug/L	100	NM	NM	**31**
Selenium	ug/L	4.0	NM	NM	<1.0
Silver	ug/L	0.8	NM	NM	NM
Strontium	ug/L	200	NM	NM	NM
Thallium	ug/L	2.0	NM	NM	NM
Vanadium	ug/L	40	NM	NM	NM
Zinc	ug/L	40	NM	NM	**150**
Major Anions					
Alkalinity, Bicarbonate	mg/L	27	NM	NM	**17**
Alkalinity, Carbonate	mg/L	8.0	NM	NM	<2.0
Chloride	mg/L	1.9	**98**	**38**	**1600**
Fluoride	mg/L	0.4	NM	NM	NM
Nitrogen, Nitrate	mg/L	0.25	**0.49**	**0.18**	**1.7**
Sulfate	mg/L	8.0	**5**	**2.4**	**14**
Major Cations					
Calcium	mg/L	8.0	NM	NM	**110**
Magnesium	mg/L	1.0	NM	NM	**53**
Potassium	mg/L	1.0	NM	NM	**9.2**
Sodium	mg/L	2.0	**32**	**21**	**730**
General					
Hardness	mg/L	26	NM	NM	**492**
TDS	mg/L	NA	NM	NM	NM

Mine Permit
Supplemental Sampling Monitoring Data
QAL071A (TDRSA-CWB)
Eagle Mine

PARAMETER	UNIT	Recom-mended Benchmark 2014	Apr 2014 04/24/14	Jun 2014 06/12/14	Dec 2014 12/18/14
Field					
D.O.	ppm	NA	**11**	**12**	**11**
ORP	mV	NA	**173**	**215**	**96**
pH	SU	8.1-9.1	**7.8**	**7.4**	**7.3**
Specific Conductance	µS/cm @ 25°C	NA	**274**	**469**	**402**
Temperature	°C	NA	**9.9**	**9.2**	**7.8**
Turbidity	NTU	NA		NM	<1
Water Elevation	ft MSL	NA		NM	**1405.22**
Metals					
Aluminum	ug/L	200	NM	NM	NM
Antimony	ug/L	5.5	NM	NM	NM
Arsenic	ug/L	6	NM	NM	<2.0
Barium	ug/L	80	NM	NM	NM
Beryllium	ug/L	2.5	NM	NM	NM
Boron	ug/L	400	NM	NM	<100
Cadmium	ug/L	2.0	NM	NM	NM
Chromium	ug/L	20	NM	NM	NM
Cobalt	ug/L	40	NM	NM	NM
Copper	ug/L	5.0	NM	NM	**8.8**
Iron	ug/L	44	NM	NM	<20
Lead	ug/L	4.0	NM	NM	NM
Lithium	ug/L	32	NM	NM	NM
Manganese	ug/L	80	NM	NM	<20
Mercury	ng/L	2.00	NM	NM	**0.602**
Molybdenum	ug/L	40	NM	NM	NM
Nickel	ug/L	100	NM	NM	<25
Selenium	ug/L	4.0	NM	NM	<1.0
Silver	ug/L	0.8	NM	NM	NM
Strontium	ug/L	200	NM	NM	NM
Thallium	ug/L	2.0	NM	NM	NM
Vanadium	ug/L	40	NM	NM	NM
Zinc	ug/L	40	NM	NM	**12**
Major Anions					
Alkalinity, Bicarbonate	mg/L	44	NM	NM	**140**
Alkalinity, Carbonate	mg/L	6	NM	NM	<2.0
Chloride	mg/L	1.5	**6.9**	**21**	**18**
Fluoride	mg/L	0.4	NM	NM	NM
Nitrogen, Nitrate	mg/L	0.31	**2.3**	**7.3**	**12**
Sulfate	mg/L	3.3	**3.6**	**5.1**	**9.3**
Major Cations					
Calcium	mg/L	12	NM	NM	**62**
Magnesium	mg/L	1.7	NM	NM	**8.6**
Potassium	mg/L	2.0	NM	NM	**1.4**
Sodium	mg/L	1.8	**1.2**	**1.7**	**9.3**
General					
Hardness	mg/L	38	NM	NM	**190**
TDS	mg/L	NA	NM	NM	NM

Mine Permit Groundwater Quality Monitoring Data
Supplemental Volatile Organic Compounds Monitoring Results
QAL061A (TDRSA-CWB)
Eagle Mine

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

Mine Permit Groundwater Quality Monitoring Data
Supplemental Volatile Organic Compounds Monitoring Results
QAL062A (TDRSA-CWB)
Eagle Mine

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

Mine Permit Groundwater Quality Monitoring Data
Supplemental Volatile Organic Compounds Monitoring Results
QAL067A (TDRSA-CWB)
Eagle Mine

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

Appendix G

Eagle Mine

Groundwater Monitoring

Trend Analysis Summary & Trending Charts

2014 Mine Permit Groundwater Monitoring
Trend Analysis Summary
Eagle Mine

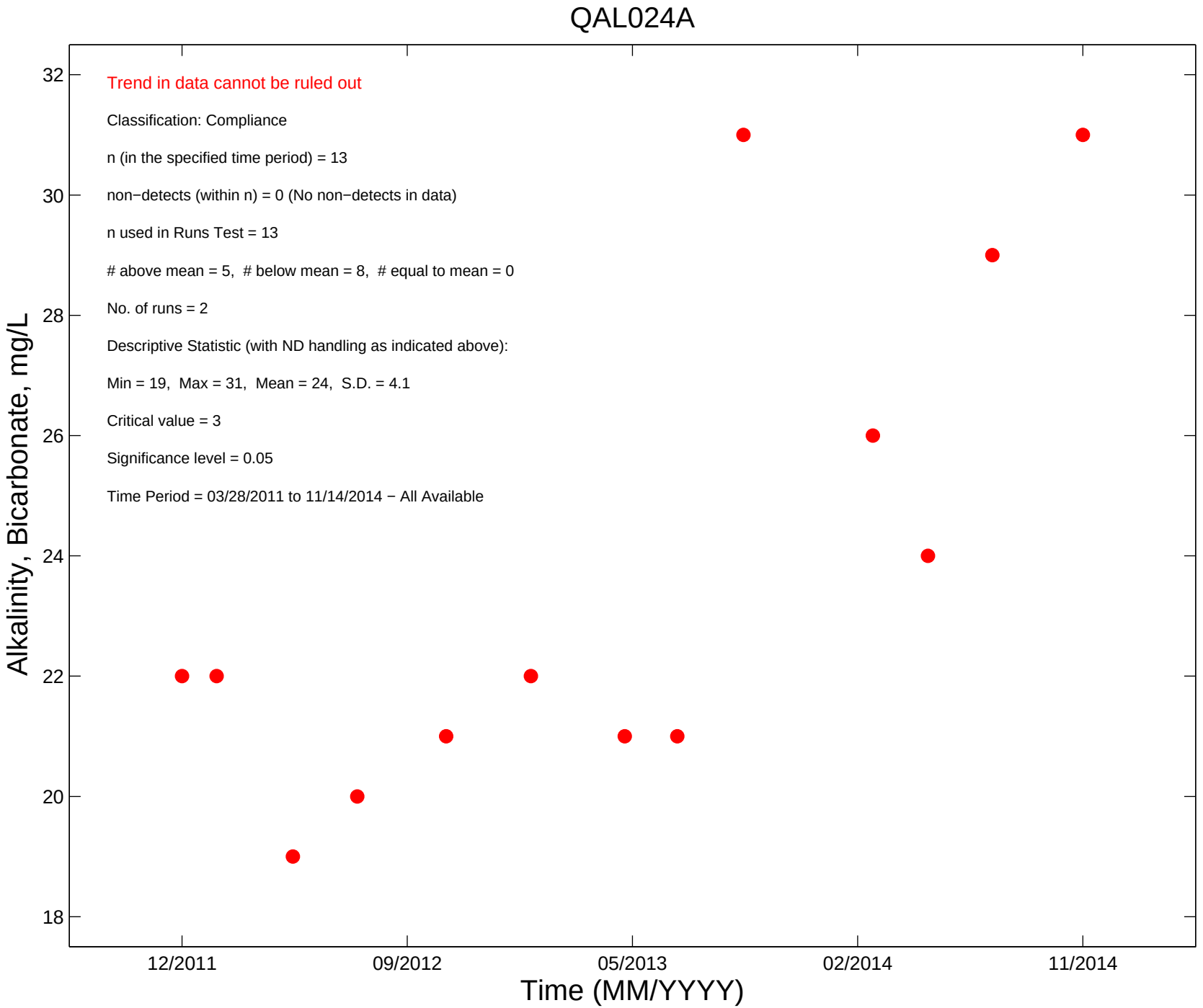
Location	Classi-fication	Parameter	Unit	# Samples	# NDs	Non-detects handling	# Used in Runs Test	Min	Max	Mean	St. Dev.	# Above Mean	# Below Mean	# Equal Mean	# Runs	Critical value	Statistical Significance Level	Trend Present	Remarks
QAL023B	Compliance	Iron	ug/L	13	1	Included as RL	13	20	150	95	38.40	6	7	0	4	4	0.05	Y	
QAL023B	Compliance	Sodium	mg/L	13	0	No NDs	13	6.7	11	8.7	1.55	6	7	0	2	4	0.05	Y	
QAL024A	Compliance	Alkalinity, Bicarbonate	mg/L	13	0	No NDs	13	19	31	24	4.10	5	8	0	2	3	0.05	Y	
QAL024A	Compliance	Chloride	mg/L	13	2	Included as RL	13	1.0	340	80	99.95	6	7	0	4	4	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL024A	Compliance	Specific Conductance	µS/cm @ 25°C	13	0	No NDs	13	33	1127	318	314.30	6	7	0	4	4	0.05	Y	
QAL025A	Background	Sodium	mg/L	15	0	No NDs	15	0.62	1.1	0.81	0.16	6	9	0	4	4	0.05	Y	
QAL025A	Background	Sulfate	mg/L	15	8	Included as RL	15	1.2	2.5	2.0	0.31	13	2	0	2	2	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL025B	Background	Alkalinity, Bicarbonate	mg/L	15	0	No NDs	15	24	37	30	3.00	4	11	0	2	3	0.05	Y	
QAL025B	Background	Iron	ug/L	15	9	Included as RL	15	20	53	25	9.90	4	11	0	3	3	0.05	Y	
QAL025B	Background	Mercury	ng/L	15	13	Included as RL	15	0.500	0.807	0.531	0.09	2	13	0	2	2	0.05	Y	
QAL025B	Background	Sodium	mg/L	15	0	No NDs	15	1.8	5.6	2.9	0.89	5	10	0	4	4	0.05	Y	
QAL025D	Background	Alkalinity, Bicarbonate	mg/L	15	0	No NDs	15	40	53	45	3.50	8	7	0	4	4	0.05	Y	
QAL025D	Background	Alkalinity, Carbonate	mg/L	15	2	Included as RL	15	2.0	16	5.5	4.10	5	10	0	2	4	0.05	Y	
QAL025D	Background	Iron	ug/L	15	4	Included as RL	15	20	100	49	22.20	10	5	0	4	4	0.05	Y	
QAL025D	Background	Sodium	mg/L	15	0	No NDs	15	4.1	15	6.6	3.16	4	11	0	2	3	0.05	Y	
QAL026A	Background	Chloride	mg/L	10	1	Included as RL	10	1.0	4.2	2.2	1.10	5	5	0	3	3	0.05	Y	
QAL026A	Background	Nitrogen, Nitrate	mg/L	10	0	No NDs	10	0.49	3.2	1.2	0.81	4	6	0	2	3	0.05	Y	Non-unique RL in data
QAL044B	Compliance	Chloride	mg/L	13	1	Included as RL	13	1.0	3.2	1.7	0.76	5	8	0	3	3	0.05	Y	
QAL060A	Compliance	Alkalinity, Bicarbonate	mg/L	15	0	No NDs	15	37	56	47	7.90	9	6	0	2	4	0.05	Y	
QAL060A	Compliance	Nitrogen, Nitrate	mg/L	15	0	No NDs	15	0.063	0.23	0.13	0.05	6	9	0	2	4	0.05	Y	
QAL060A	Compliance	Sodium	mg/L	15	0	No NDs	15	1.1	2.2	1.7	0.35	8	7	0	4	4	0.05	Y	
QAL060A	Compliance	Strontium	ug/L	5	3	Included as RL	5	50	54	51	1.80	2	3	0	2	2	0.25	Y	
QAL060A	Compliance	Sulfate	mg/L	15	1	Included as RL	15	2.0	4.1	3.1	0.78	9	6	0	2	4	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL061A	Compliance	Alkalinity, Bicarbonate	mg/L	15	0	No NDs	15	31	39	35	2.50	7	8	0	2	4	0.05	Y	
QAL062A	Compliance	Alkalinity, Bicarbonate	mg/L	15	0	No NDs	15	29	58	40	8.20	5	10	0	3	4	0.05	Y	
QAL062A	Compliance	Calcium	mg/L	5	0	No NDs	5	11	16	13	2.10	2	3	0	2	2	0.25	Y	
QAL062A	Compliance	Magnesium	mg/L	5	0	No NDs	5	2.0	2.8	2.3	0.33	2	3	0	2	2	0.25	Y	
QAL063A	Compliance	Alkalinity, Bicarbonate	mg/L	15	0	No NDs	15	33	42	37	2.80	8	7	0	3	4	0.05	Y	
QAL064D	Compliance	Sodium	mg/L	15	0	No NDs	15	4.2	6.9	5.5	0.77	7	8	0	4	4	0.05	Y	
QAL066D	Compliance	Arsenic	ug/L	15	0	No NDs	15	5.6	12	8.3	1.86	8	7	0	3	4	0.05	Y	
QAL066D	Compliance	Mercury	ng/L	15	5	Included as RL	15	0.500	12.0	2.66	3.81	3	12	0	3	3	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL067A	Compliance	Iron	ug/L	15	13	Included as RL	15	20	23	20	0.80	2	13	0	2	2	0.05	Y	
QAL067A	Compliance	Nitrogen, Nitrate	mg/L	17	0	No NDs	17	0.067	1.6	0.39	0.38	5	12	0	4	4	0.05	Y	Non-unique RL in data
QAL067A	Compliance	Specific Conductance	µS/cm @ 25°C	17	0	No NDs	17	27	4888	616	1231.00	4	13	0	4	4	0.05	Y	
QAL068A	Background	pH	SU	15	0	No NDs	15	6.0	8.0	6.7	0.51	5	10	0	4	4	0.05	Y	
QAL068B	Background	Sodium	mg/L	15	0	No NDs	15	0.93	1.6	1.2	0.21	4	11	0	2	3	0.05	Y	
QAL068B	Background	Specific Conductance	µS/cm @ 25°C	15	0	No NDs	15	46	131	68	19.40	5	10	0	4	4	0.05	Y	
QAL068D	Background	Arsenic	ug/L	15	0	No NDs	15	3.5	5.6	4.4	0.47	5	10	0	4	4	0.05	Y	
QAL068D	Background	Mercury	ng/L	15	11	Included as RL	15	0.500	1.72	0.680	0.40	3	12	0	2	3	0.05	Y	
QAL068D	Background	Sulfate	mg/L	15	0	No NDs	15	5.0	12	6.6	1.86	5	10	0	4	4	0.05	Y	Non-unique RL in data
QAL069A	Background	Alkalinity, Bicarbonate	mg/L	15	0	No NDs	15	49	260	163	80.40	9	6	0	2	4	0.05	Y	
QAL069A	Background	Mercury	ng/L	15	12	Included as RL	15	0.500	213	18.3	55.64	2	13	0	2	2	0.05	Y	Non-unique RL in data (NDs included as RL)
QAL069A	Background	Nitrogen, Nitrate	mg/L	15	0	No NDs	15	0.083	2.3	0.96	0.80	6	9	0	2	4	0.05	Y	Non-unique RL in data
QAL069A	Background	pH	SU	15	0	No NDs	15	6.8	8.7	7.6	0.67	5	10	0	2	4	0.05	Y	
QAL069A	Background	Sodium	mg/L	15	0	No NDs	15	0.71	14	2.9	3.45	5	10	0	2	4	0.05	Y	
QAL069A	Background	Specific Conductance	µS/cm @ 25°C	15	0	No NDs	15	99	576	327	155.00	8	7	0	2	4	0.05	Y	
QAL070A	Compliance	Alkalinity, Carbonate	mg/L	5	0	No NDs	5	2.2	4.3	3.2	1.10	2	3	0	2	2	0.25	Y	
QAL070A	Compliance	Iron	ug/L	5	3	Included as RL	5	20	35	26	7.90	2	3	0	2	2	0.25	Y	
QAL070A	Compliance	Nitrogen, Nitrate	mg/L	5	0	No NDs	5	0.055	0.38	0.18	0.14	2	3	0	2	2	0.25	Y	
QAL070A	Compliance	pH	SU	5	0	No NDs	5	8.5	9.1	8.8	0.26	2	3	0	2	2	0.25	Y	
QAL070A	Compliance	Sodium	mg/L	5	0	No NDs	5	0.85	1.1	0.97	0.12	2	3	0	2	2	0.25	Y	
QAL070A	Compliance	Specific Conductance	µS/cm @ 25°C	5	0	No NDs	5	61	106	78	17.90	2	3	0	2	2	0.25	Y	

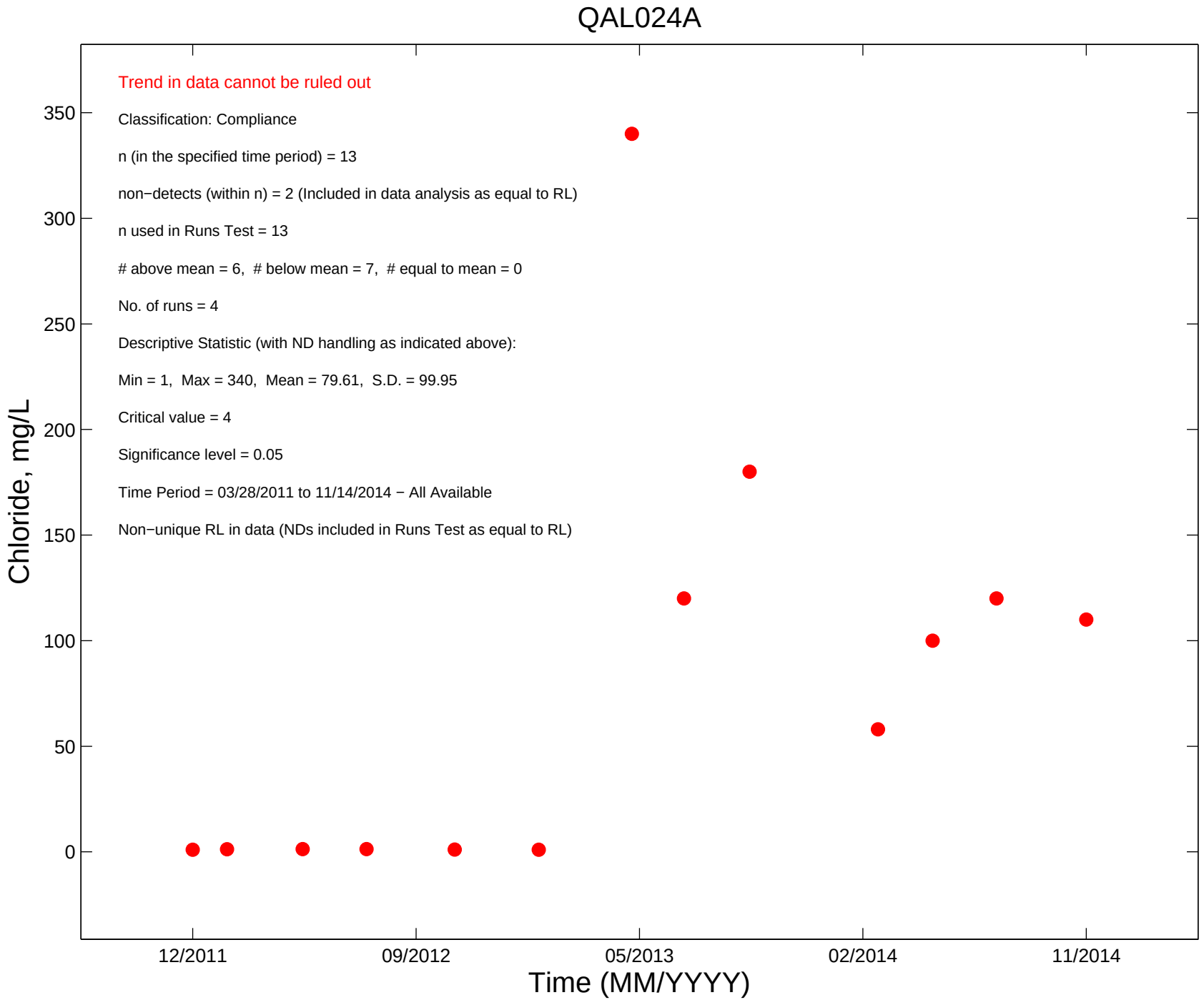
Explanations of abbrevations provided as the last page of this table.

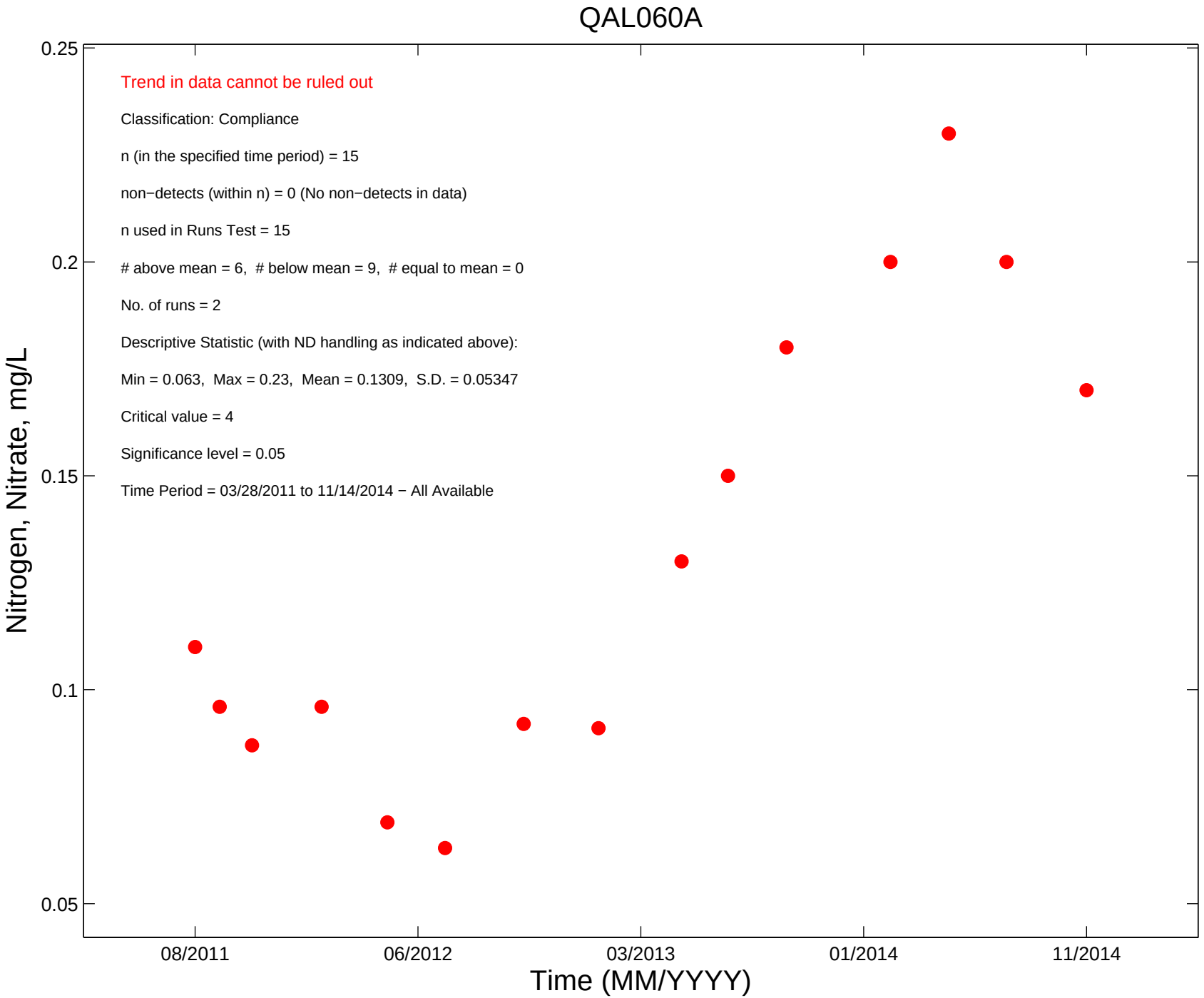
2014 Mine Permit Groundwater Monitoring
Trend Analysis Summary
Eagle Mine

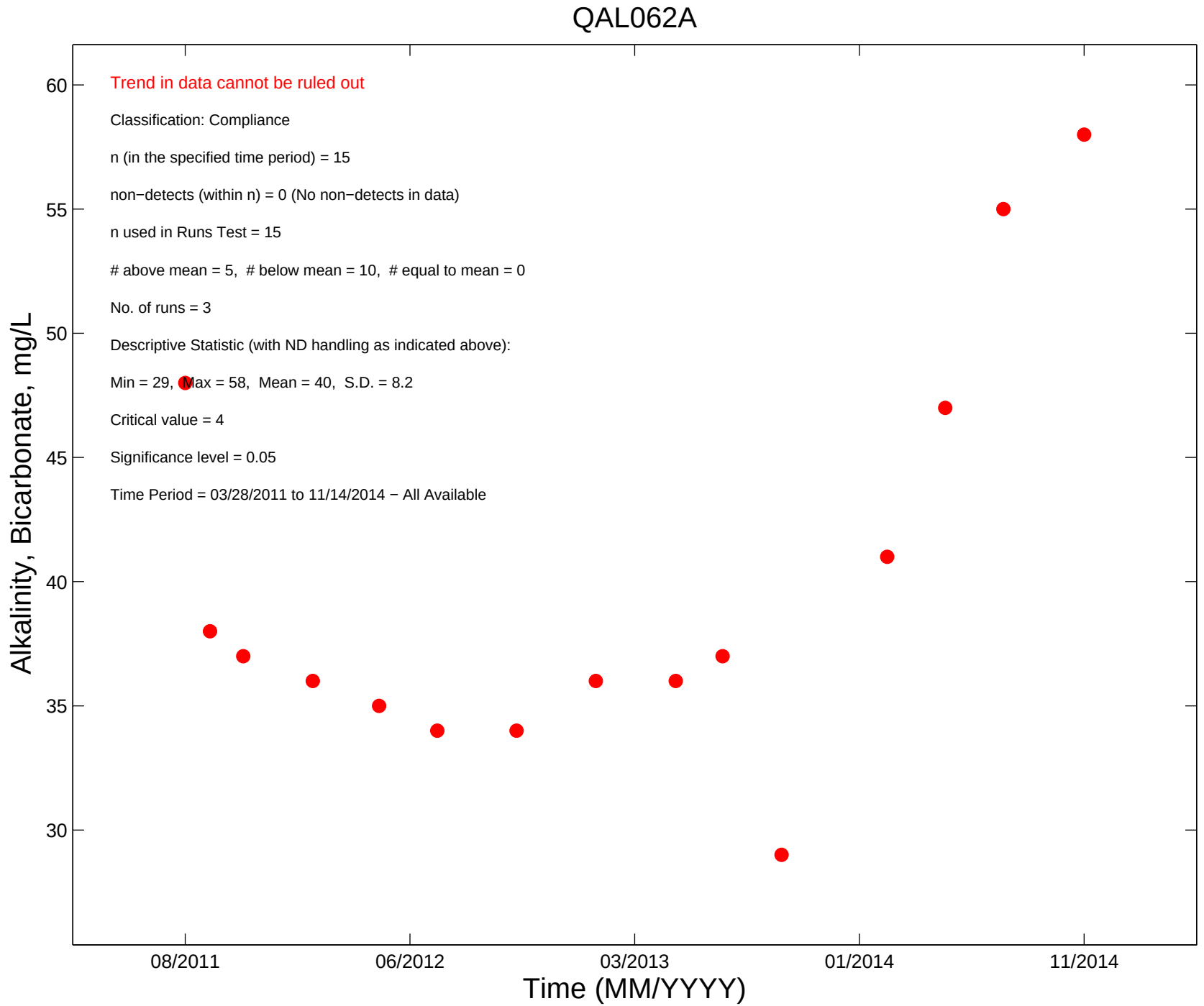
Location	Classi-fication	Parameter	Unit	# Samples	# NDs	Non-detects handling	# Used in Runs Test	Min	Max	Mean	St. Dev.	# Above Mean	# Below Mean	# Equal Mean	# Runs	Critical value	Statistical Significance Level	Trend Present	Remarks
QAL071A	Compliance	Alkalinity, Bicarbonate	mg/L	15	0	No NDs	15	30	140	59	30.10	6	9	0	2	4	0.05	Y	
QAL071A	Compliance	Calcium	mg/L	5	0	No NDs	5	11	35	18	10.00	2	3	0	2	2	0.25	Y	
QAL071A	Compliance	Chloride	mg/L	17	1	Included as RL	17	1.0	24	6.9	8.08	6	11	0	2	5	0.05	Y	
QAL071A	Compliance	Magnesium	mg/L	5	0	No NDs	5	1.4	4.9	2.4	1.50	2	3	0	2	2	0.25	Y	
QAL071A	Compliance	Nitrogen, Nitrate	mg/L	17	0	No NDs	17	0.15	14	3.0	4.95	4	13	0	2	4	0.05	Y	Non-unique RL in data
QAL071A	Compliance	pH	SU	17	0	No NDs	17	7.4	8.8	8.3	0.41	10	7	0	4	5	0.05	Y	
QAL071A	Compliance	Sodium	mg/L	17	0	No NDs	17	0.87	9.6	1.8	2.10	2	15	0	2	2	0.05	Y	
QAL071A	Compliance	Specific Conductance	µS/cm @ 25°C	17	0	No NDs	17	53	469	186	133.00	7	10	0	4	5	0.05	Y	
QAL071A	Compliance	Sulfate	mg/L	17	0	No NDs	17	2.0	8.7	3.5	1.90	6	11	0	2	5	0.05	Y	Non-unique RL in data
QAL073A	Compliance	Alkalinity, Bicarbonate	mg/L	5	0	No NDs	5	20	71	43	25.00	2	3	0	2	2	0.25	Y	
QAL073A	Compliance	Chloride	mg/L	5	3	Included as RL	5	1.0	16	4.8	6.50	2	3	0	2	2	0.25	Y	
QAL073A	Compliance	Nitrogen, Nitrate	mg/L	5	0	No NDs	5	0.097	4.8	1.5	2.01	2	3	0	2	2	0.25	Y	Non-unique RL in data
QAL073A	Compliance	pH	SU	5	0	No NDs	5	6.6	6.9	6.7	0.13	2	3	0	2	2	0.25	Y	
QAL073A	Compliance	Sodium	mg/L	5	0	No NDs	5	0.93	1.9	1.2	0.40	2	3	0	2	2	0.25	Y	
QAL073A	Compliance	Specific Conductance	µS/cm @ 25°C	5	0	No NDs	5	50	219	117	81.20	2	3	0	2	2	0.25	Y	
QAL073A	Compliance	Sulfate	mg/L	5	0	No NDs	5	1.9	6.1	3.5	1.90	2	3	0	2	2	0.25	Y	Non-unique RL in data

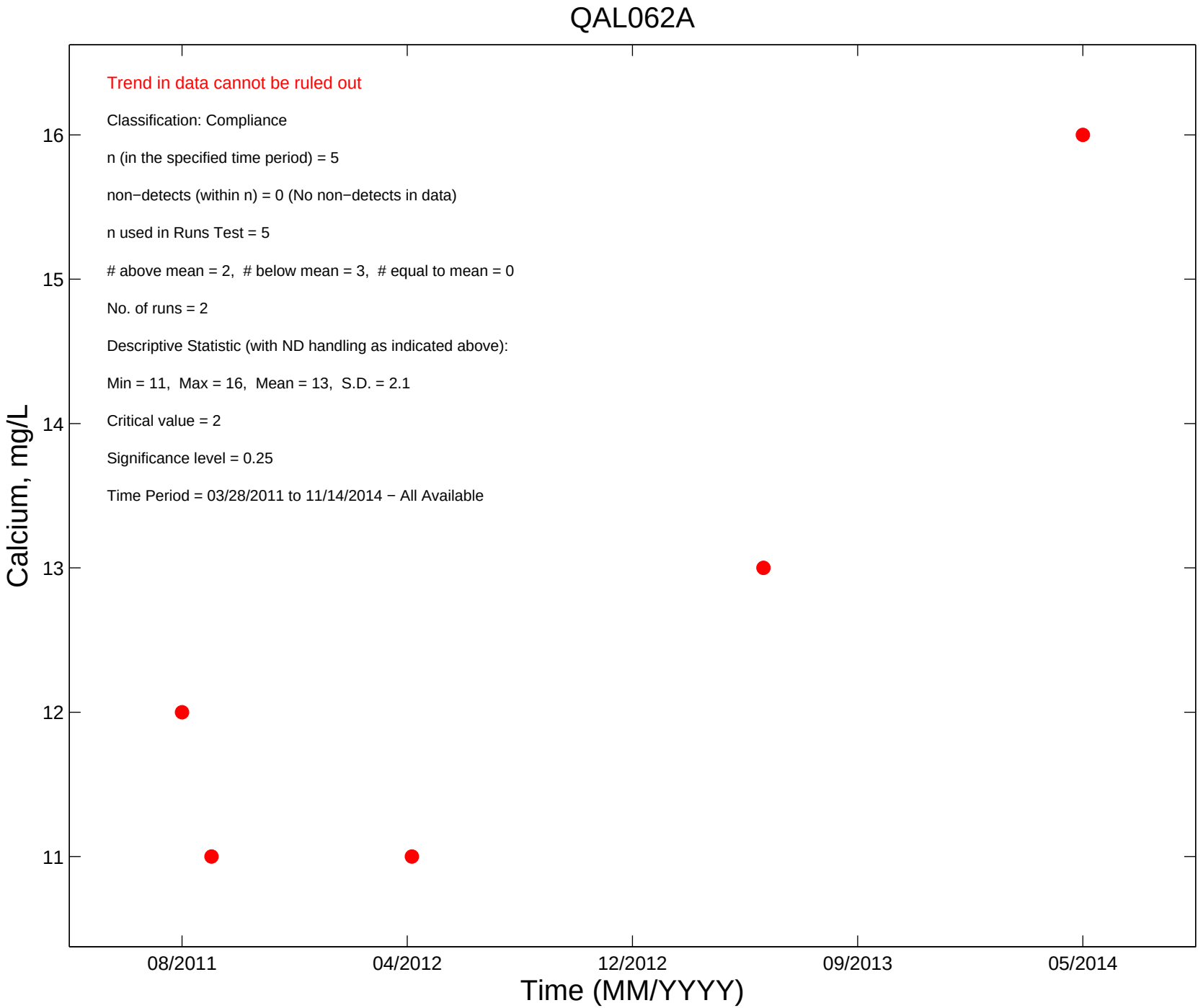
Explanations of abbrevations provided as the last page of this table.

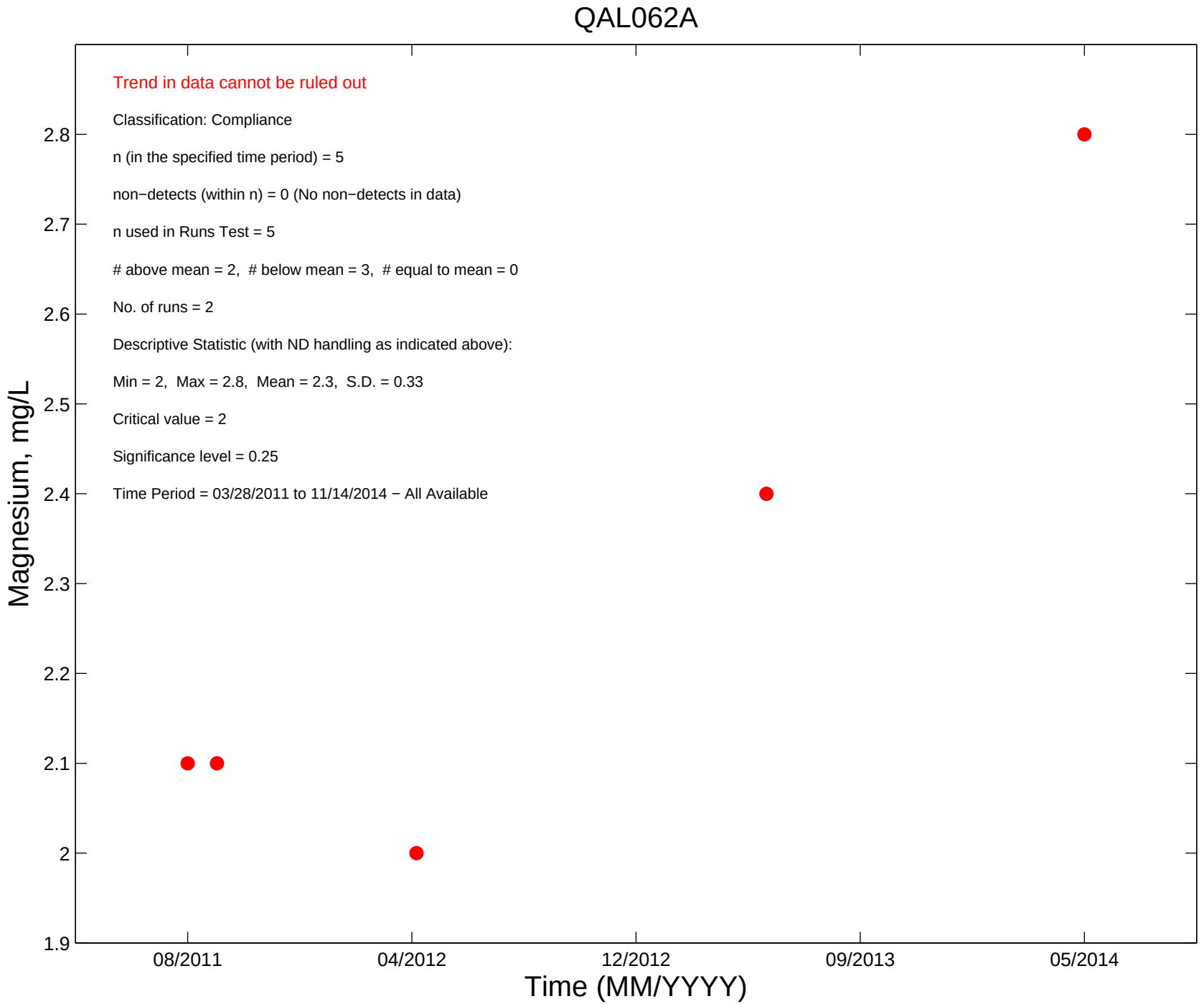

QAL024A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 13
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 13
above mean = 5, # below mean = 8, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 19, Max = 31, Mean = 24, S.D. = 4.1
Critical value = 3
Significance level = 0.05
Time Period = 03/28/2011 to 11/14/2014 − All Available
Alkalinity, Bicarbonate, mg/L
32
30
28
26
24
22
20
18
12/2011
09/2012
05/2013
02/2014
11/2014
Time (MM/YYYY)

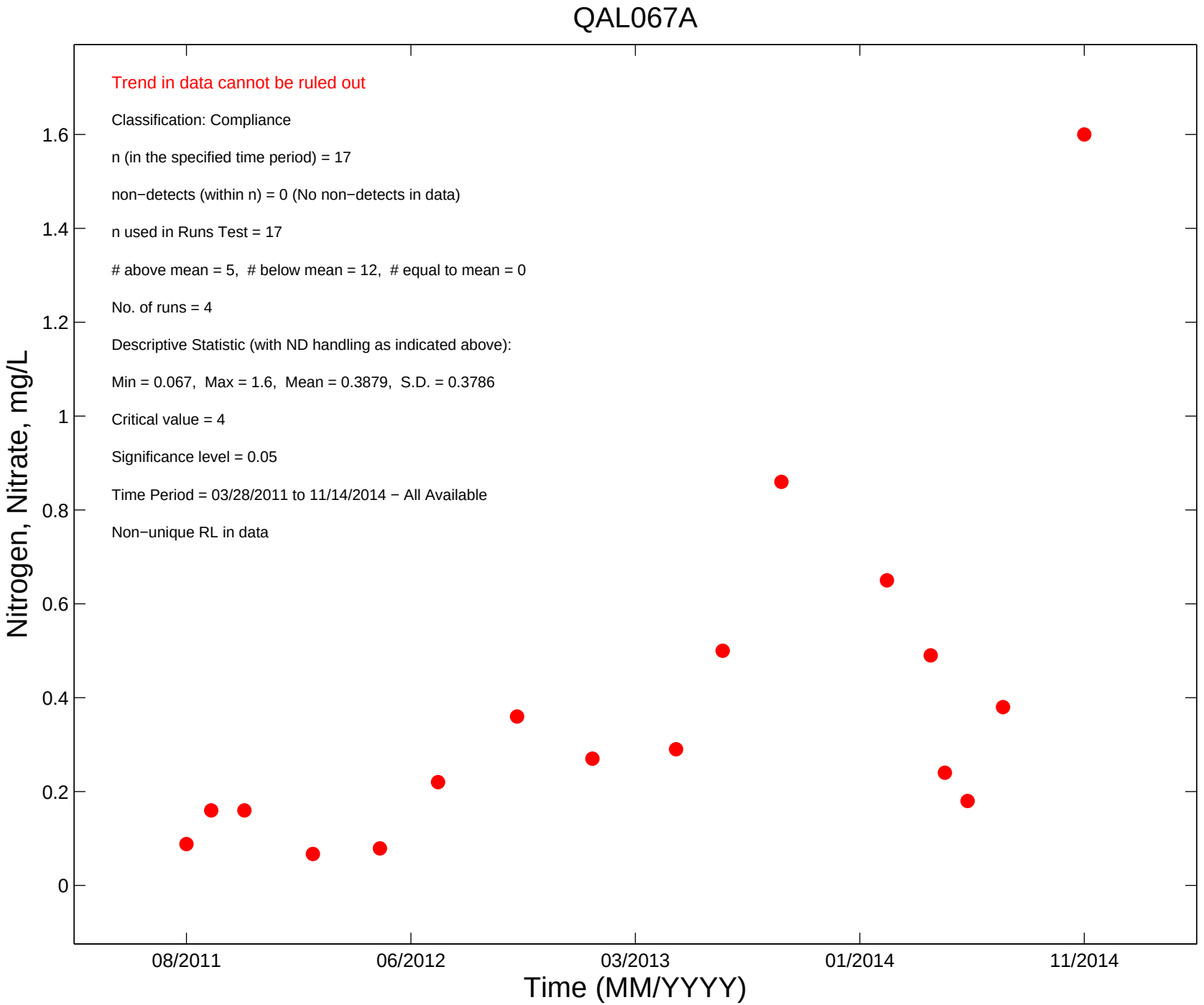

QAL024A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 13
non−detects (within n) = 2 (Included in data analysis as equal to RL)
n used in Runs Test = 13
above mean = 6, # below mean = 7, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 340, Mean = 79.61, S.D. = 99.95
Critical value = 4
Significance level = 0.05
Time Period = 03/28/2011 to 11/14/2014 − All Available
Non−unique RL in data (NDs included in Runs Test as equal to RL)
Chloride, mg/L
350
300
250
200
150
100
50
0
12/2011
09/2012
05/2013
02/2014
11/2014
Time (MM/YYYY)

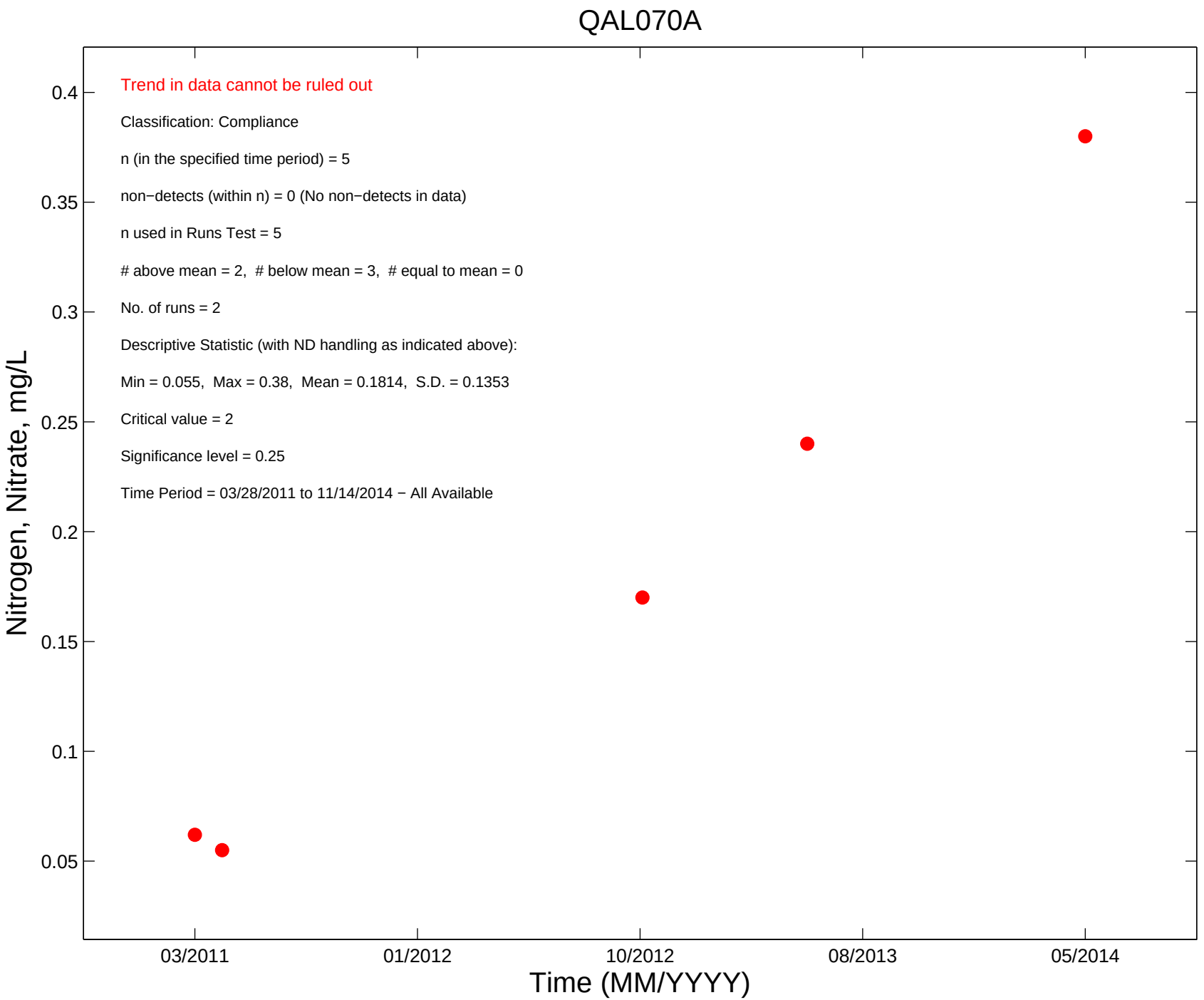

QAL060A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 15
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 15
above mean = 6, # below mean = 9, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.063, Max = 0.23, Mean = 0.1309, S.D. = 0.05347
Critical value = 4
Significance level = 0.05
Time Period = 03/28/2011 to 11/14/2014 − All Available
Nitrogen, Nitrate, mg/L
0.25
0.2
0.15
0.1
0.05
08/2011
06/2012
03/2013
01/2014
11/2014
Time (MM/YYYY)

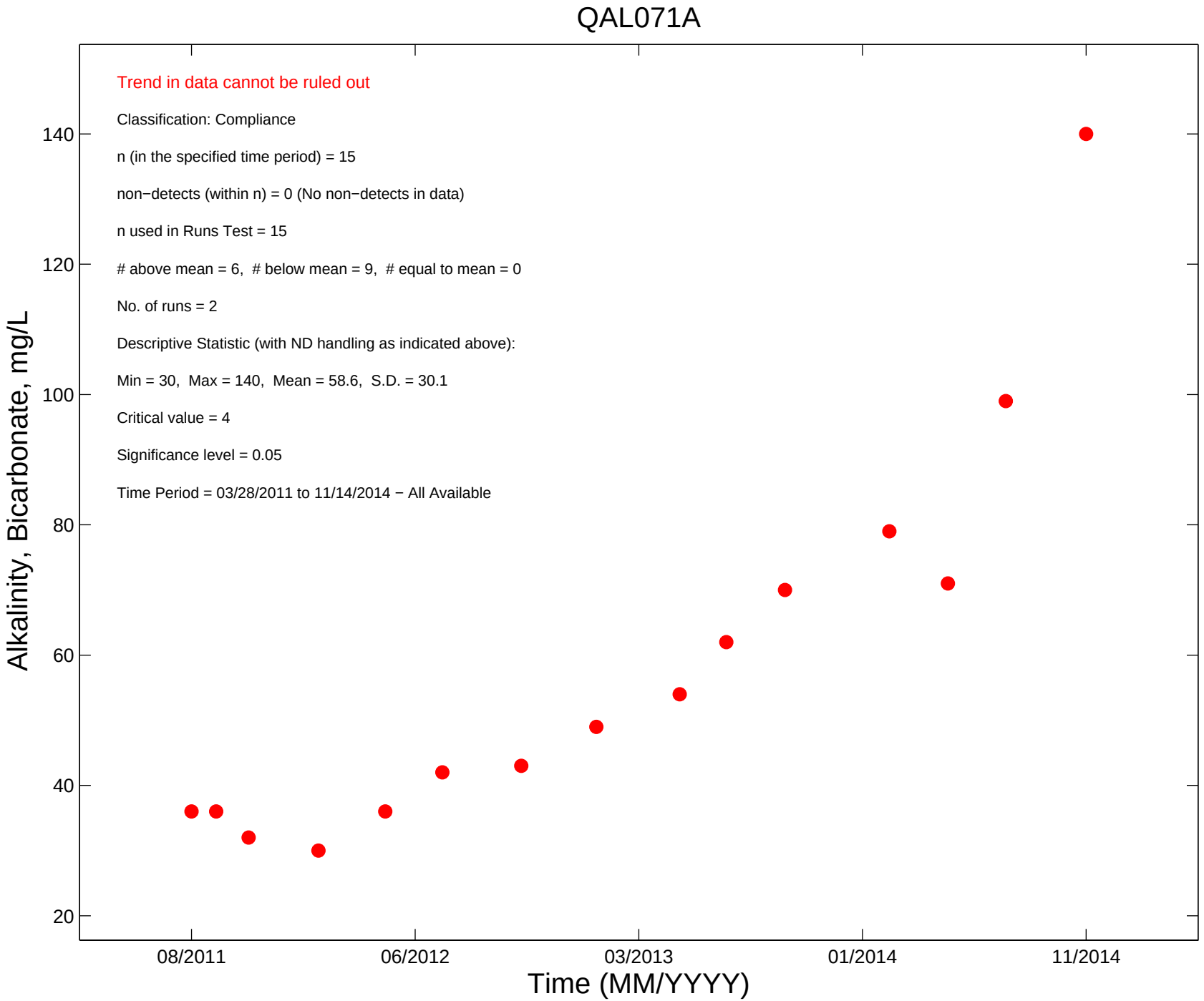

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 15
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 15
above mean = 5, # below mean = 10, # equal to mean = 0
No. of runs = 3
Descriptive Statistic (with ND handling as indicated above):
Min = 29, Max = 58, Mean = 40, S.D. = 8.2
Critical value = 4
Significance level = 0.05
Time Period = 03/28/2011 to 11/14/2014 − All Available
Alkalinity, Bicarbonate, mg/L
60
55
50
45
40
35
30
08/2011
06/2012
03/2013
01/2014
11/2014
Time (MM/YYYY)

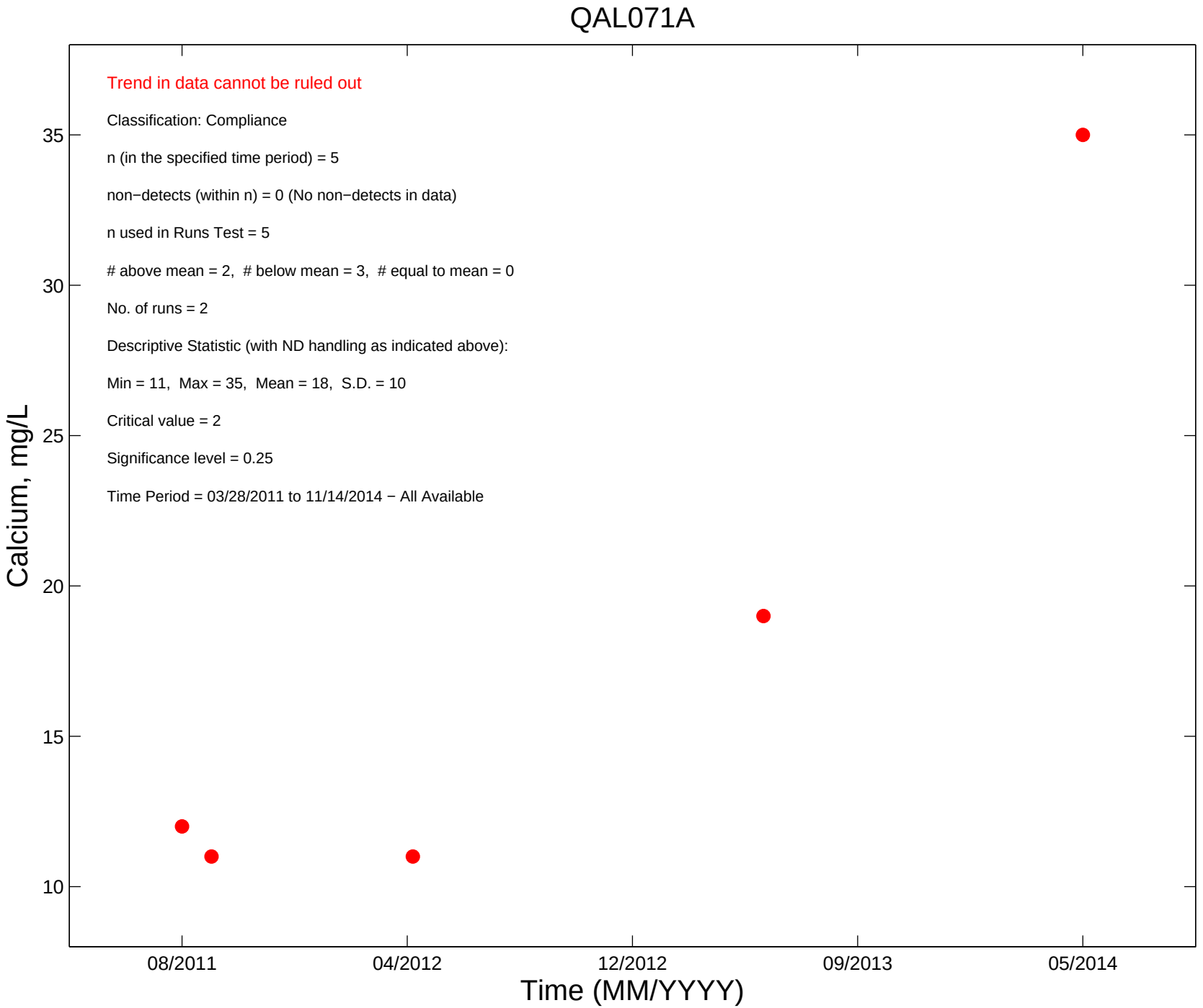

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 5
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 5
above mean = 2, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 11, Max = 16, Mean = 13, S.D. = 2.1
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/14/2014 − All Available
Calcium, mg/L
16
15
14
13
12
11
08/2011
04/2012
12/2012
09/2013
05/2014
Time (MM/YYYY)

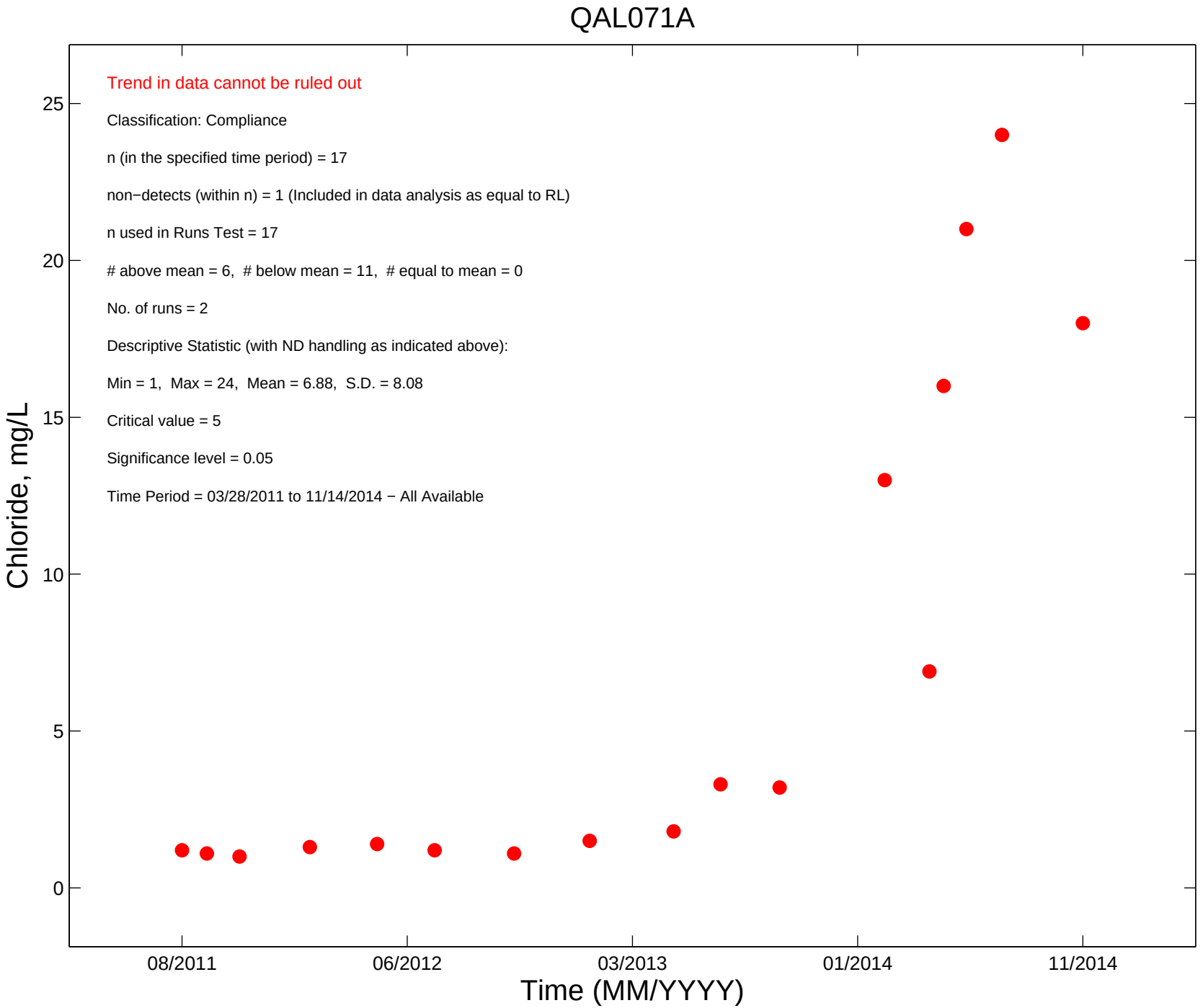

QAL062A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 5
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 5
above mean = 2, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 2, Max = 2.8, Mean = 2.3, S.D. = 0.33
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/14/2014 − All Available
Magnesium, mg/L
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
08/2011
04/2012
12/2012
09/2013
05/2014
Time (MM/YYYY)

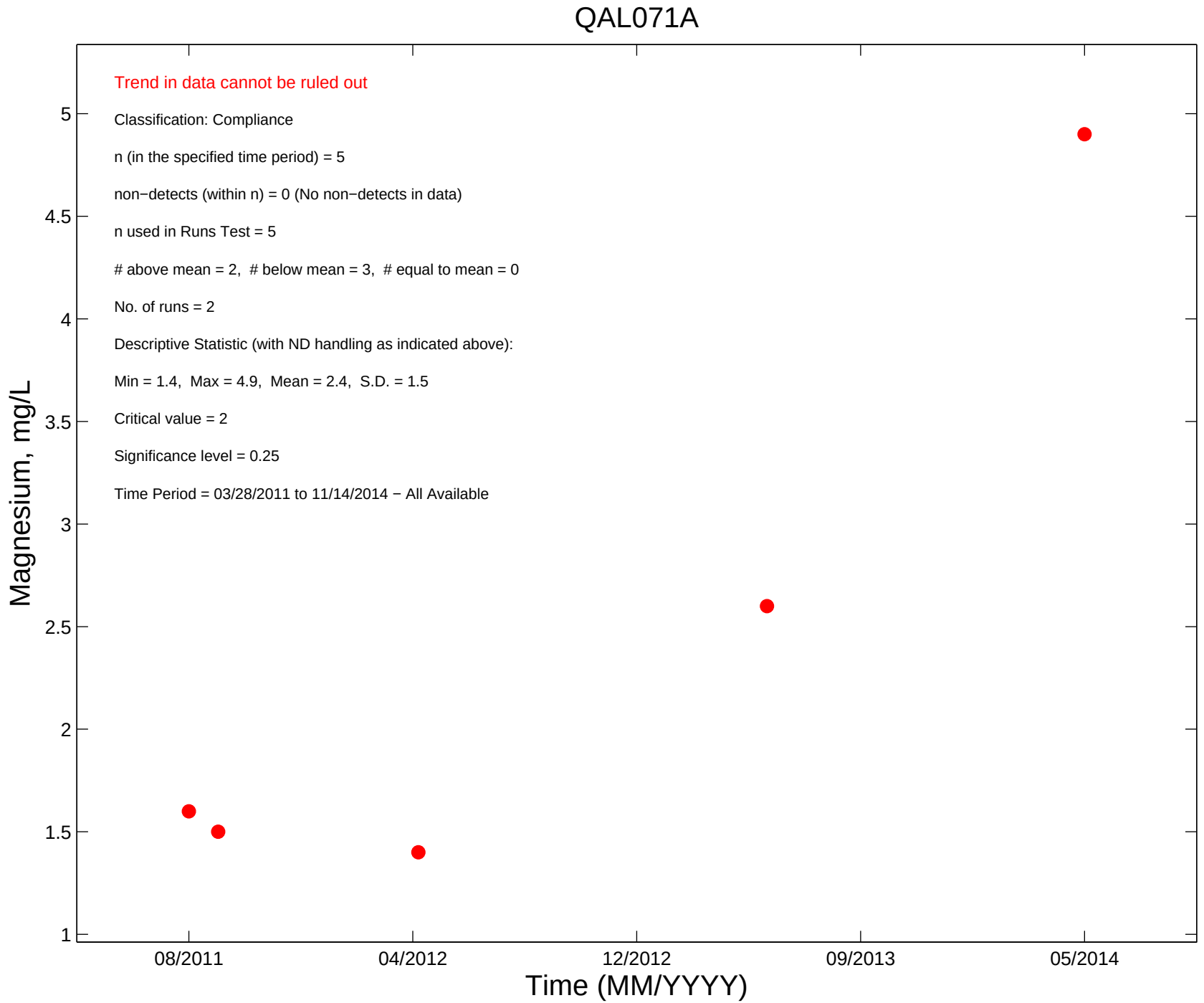

QAL067A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 17
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 17
above mean = 5, # below mean = 12, # equal to mean = 0
No. of runs = 4
Descriptive Statistic (with ND handling as indicated above):
Min = 0.067, Max = 1.6, Mean = 0.3879, S.D. = 0.3786
Critical value = 4
Significance level = 0.05
Time Period = 03/28/2011 to 11/14/2014 − All Available
Non−unique RL in data
Nitrogen, Nitrate, mg/L
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
08/2011
06/2012
03/2013
01/2014
11/2014
Time (MM/YYYY)

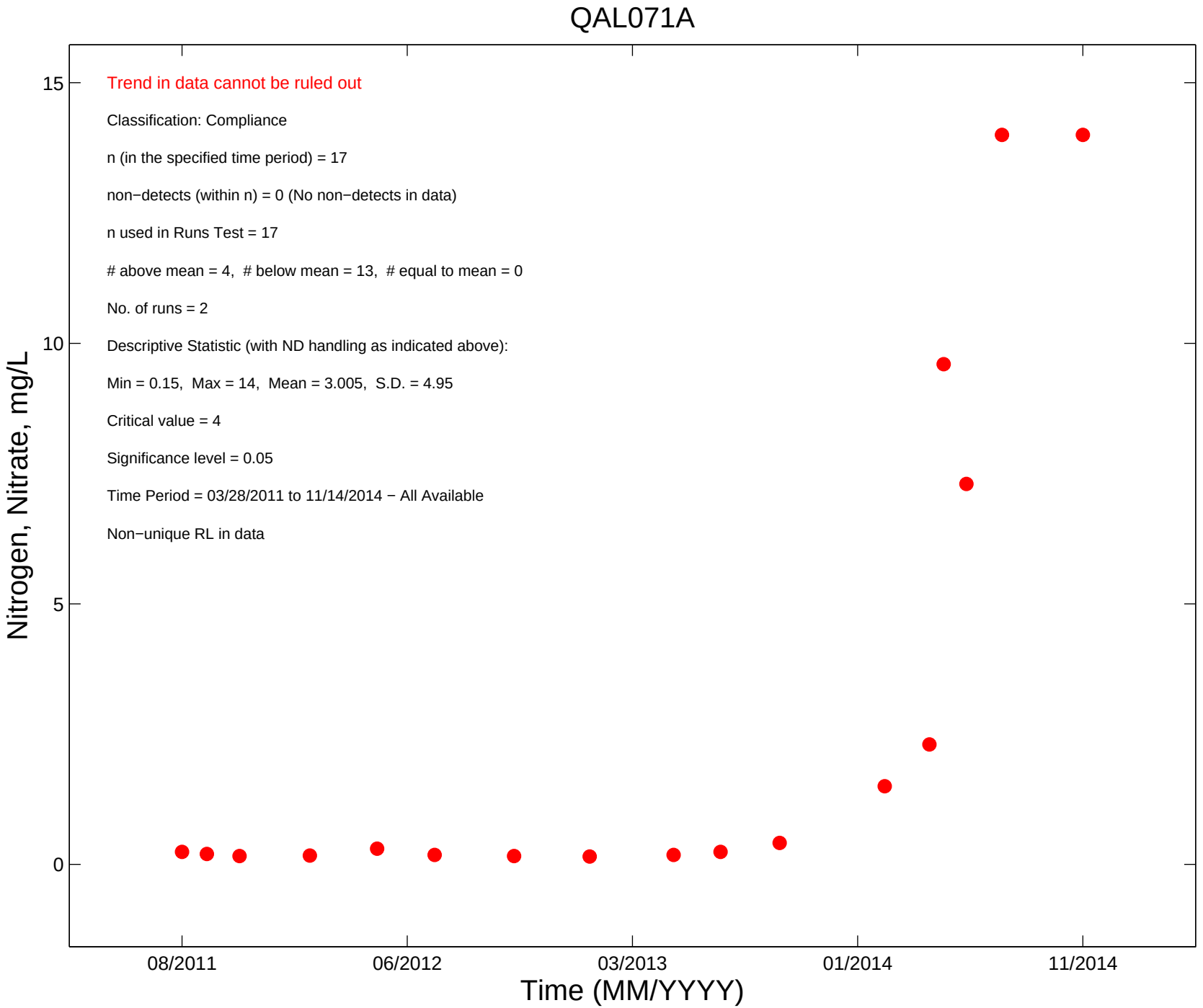

QAL070A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 5
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 5
above mean = 2, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.055, Max = 0.38, Mean = 0.1814, S.D. = 0.1353
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/14/2014 − All Available
Nitrogen, Nitrate, mg/L
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
03/2011
01/2012
10/2012
08/2013
05/2014
Time (MM/YYYY)

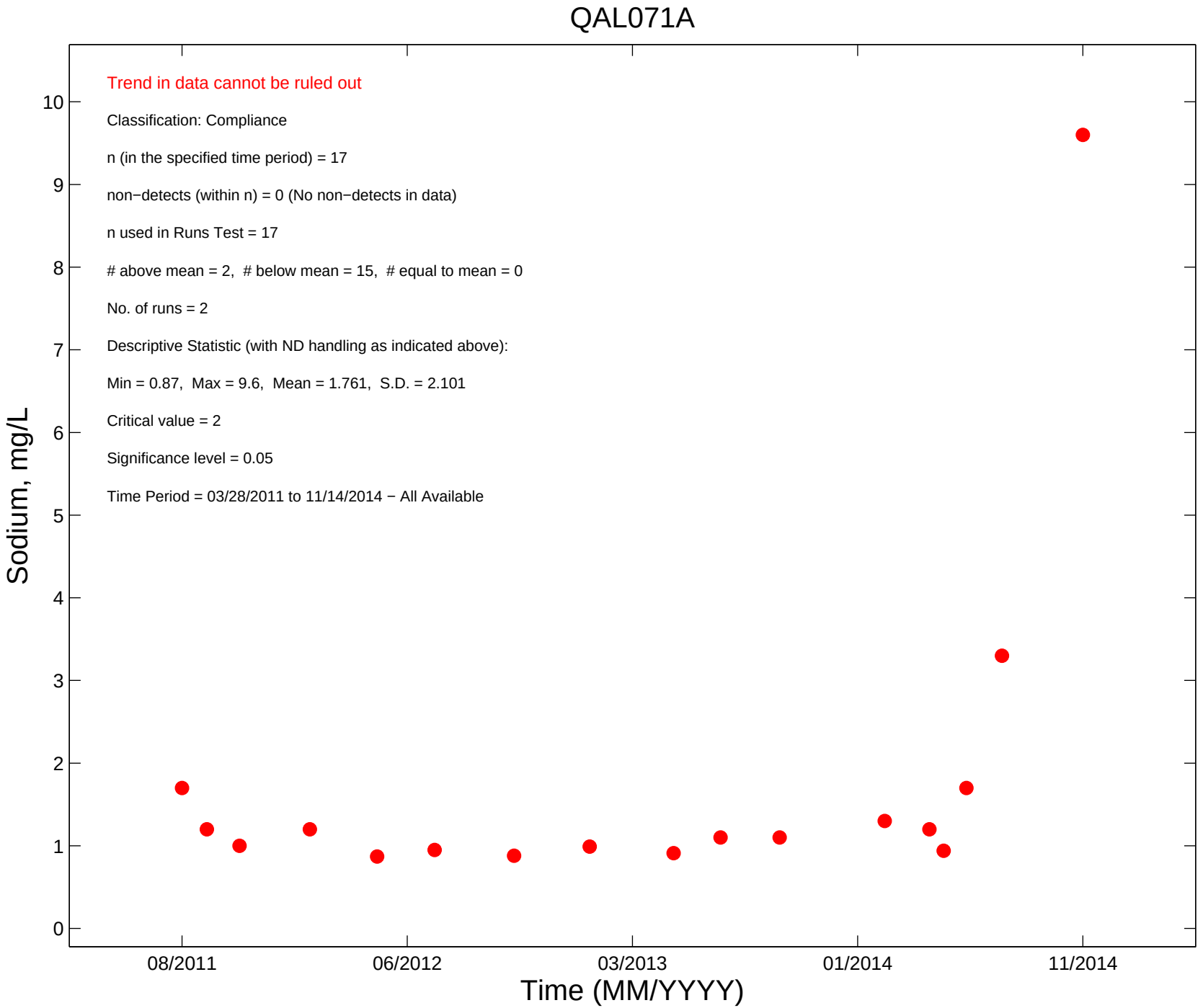

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 15
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 15
above mean = 6, # below mean = 9, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 30, Max = 140, Mean = 58.6, S.D. = 30.1
Critical value = 4
Significance level = 0.05
Time Period = 03/28/2011 to 11/14/2014 − All Available
Alkalinity, Bicarbonate, mg/L
140
120
100
80
60
40
20
08/2011
06/2012
03/2013
01/2014
11/2014
Time (MM/YYYY)

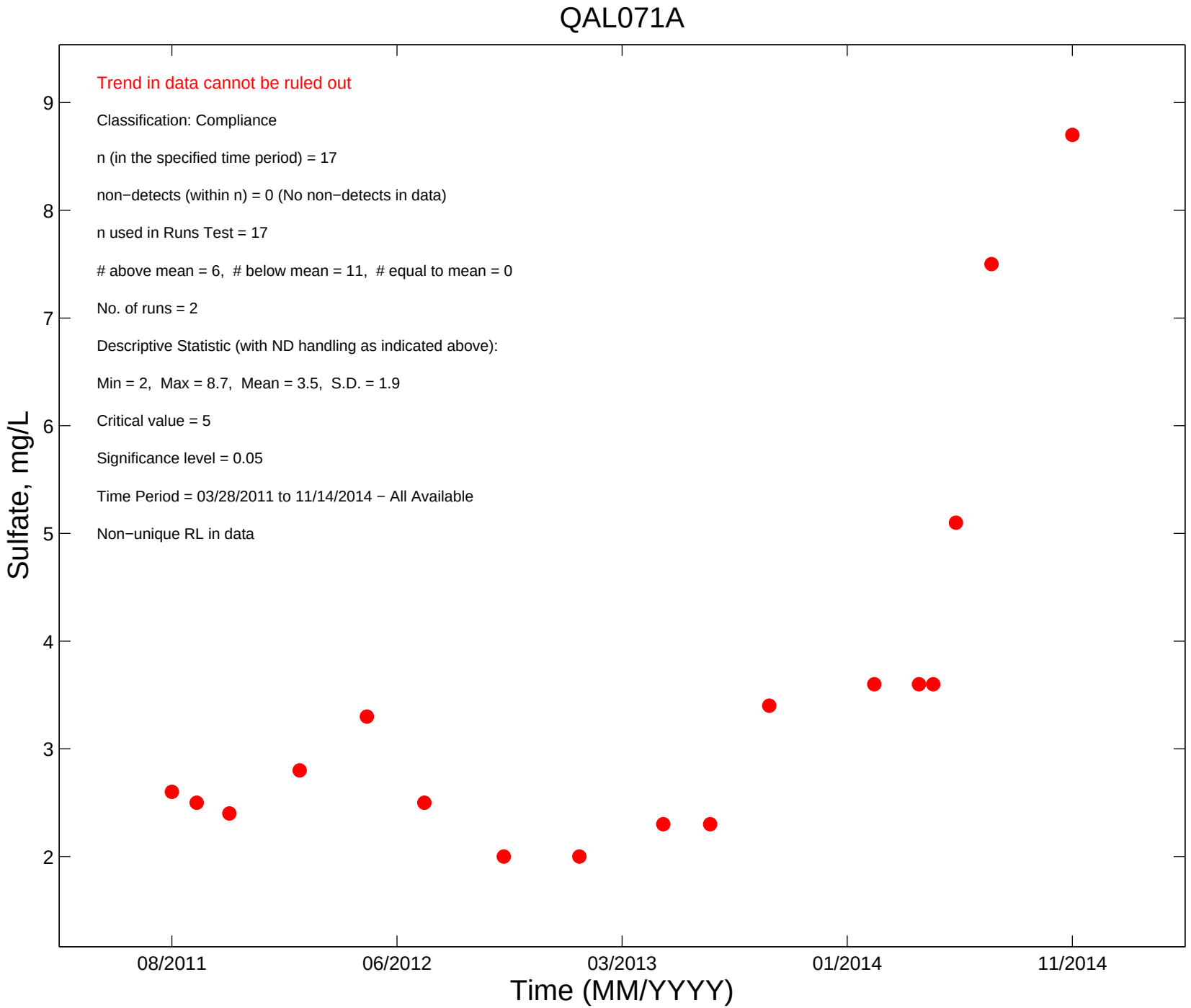

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 5
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 5
above mean = 2, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 11, Max = 35, Mean = 18, S.D. = 10
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/14/2014 − All Available
Calcium, mg/L
35
30
25
20
15
10
08/2011
04/2012
12/2012
09/2013
05/2014
Time (MM/YYYY)

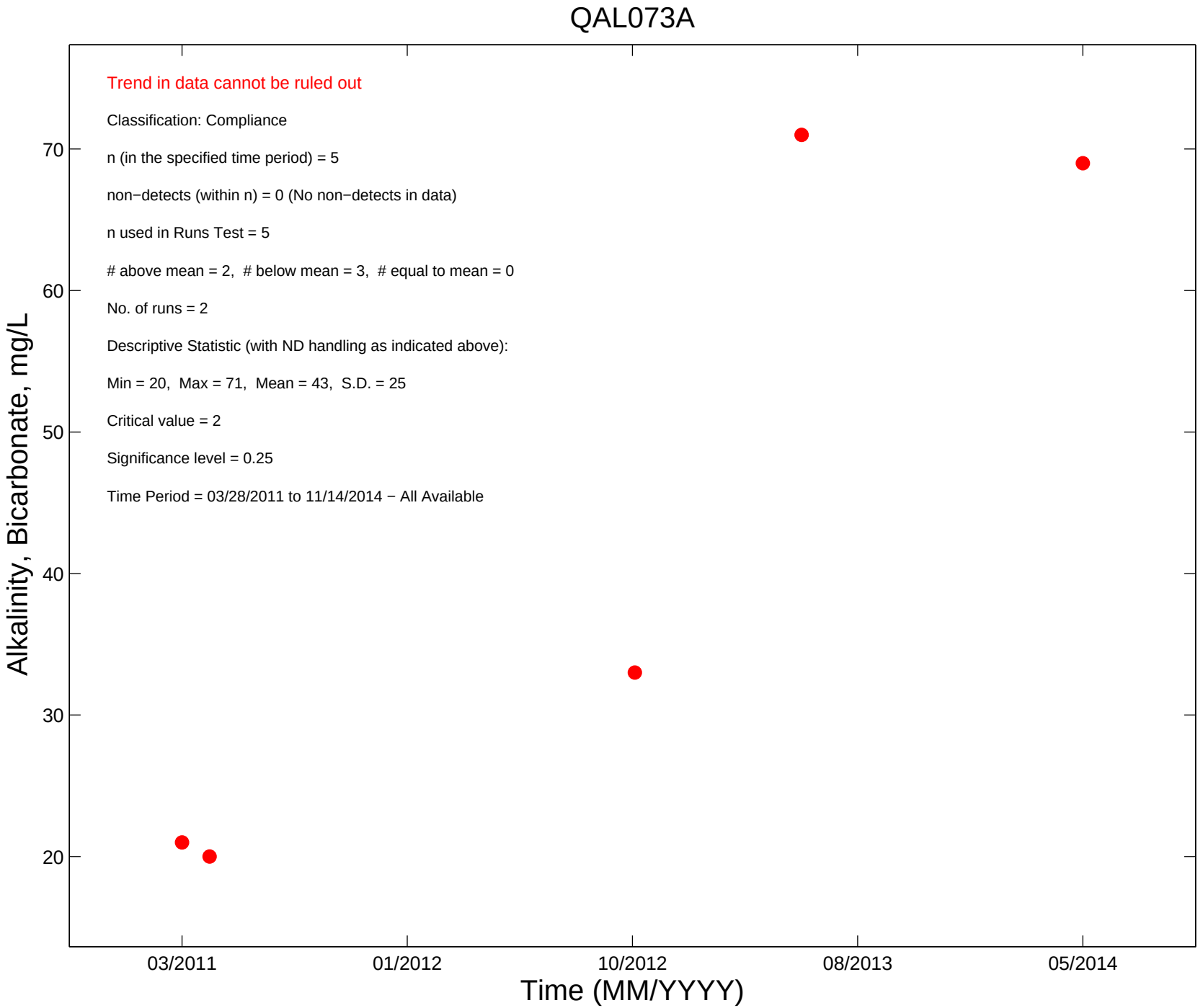

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 17
non−detects (within n) = 1 (Included in data analysis as equal to RL)
n used in Runs Test = 17
above mean = 6, # below mean = 11, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 24, Mean = 6.88, S.D. = 8.08
Critical value = 5
Significance level = 0.05
Time Period = 03/28/2011 to 11/14/2014 − All Available
Chloride, mg/L
0
5
10
15
20
25
08/2011
06/2012
03/2013
01/2014
11/2014
Time (MM/YYYY)

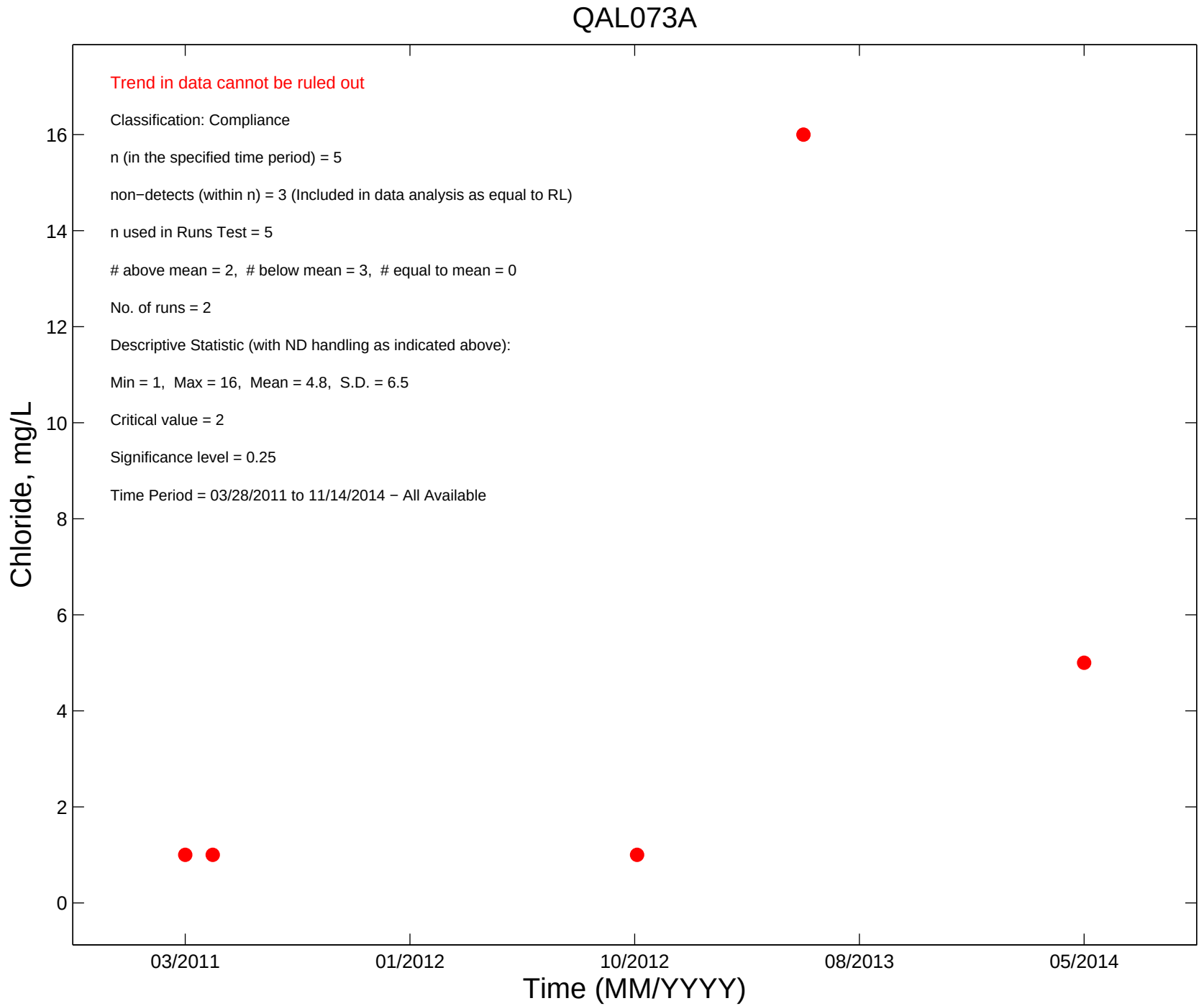

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 5
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 5
above mean = 2, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.4, Max = 4.9, Mean = 2.4, S.D. = 1.5
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/14/2014 − All Available
Magnesium, mg/L
5
4.5
4
3.5
3
2.5
2
1.5
1
08/2011
04/2012
12/2012
09/2013
05/2014
Time (MM/YYYY)

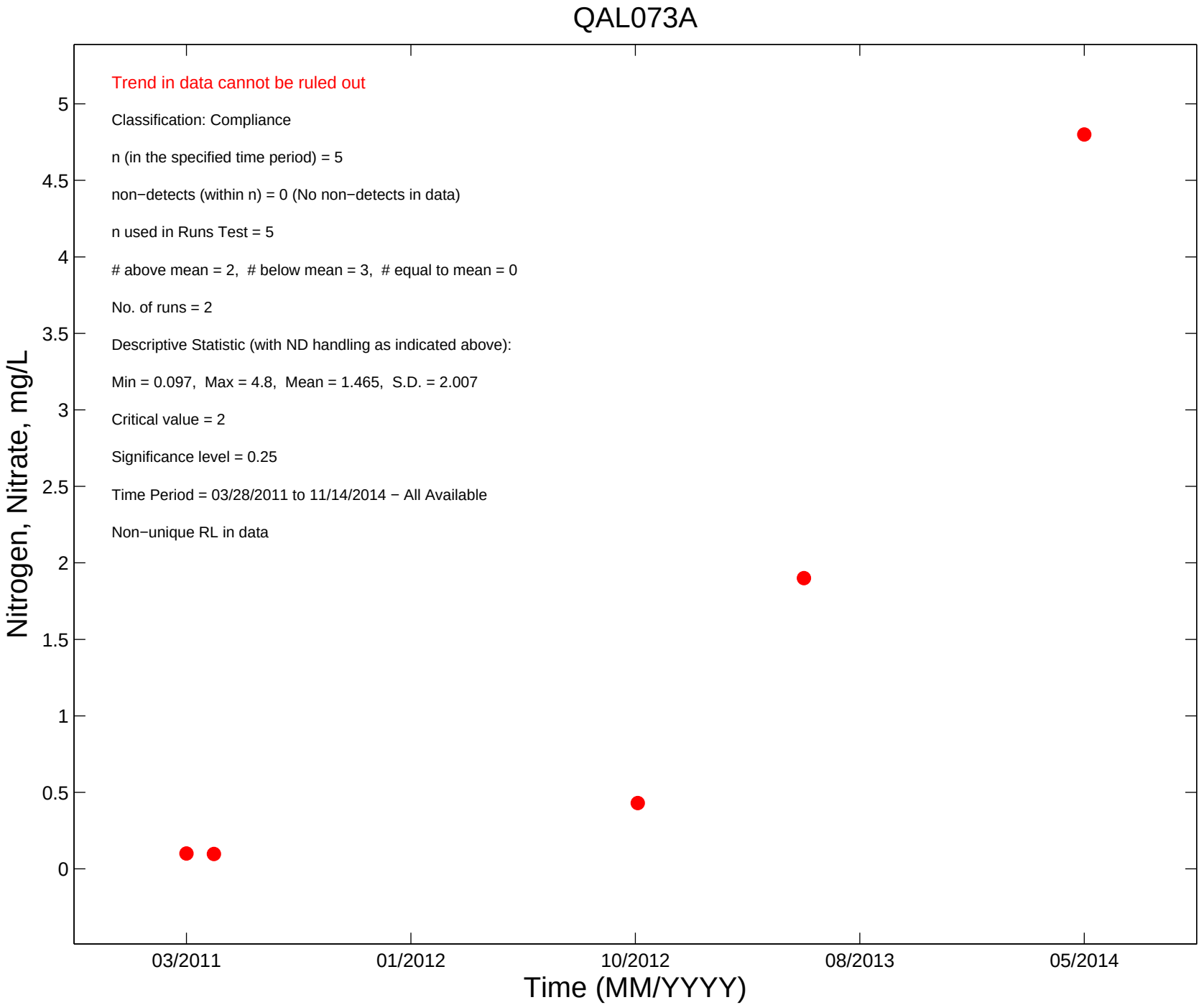

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 17
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 17
above mean = 4, # below mean = 13, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.15, Max = 14, Mean = 3.005, S.D. = 4.95
Critical value = 4
Significance level = 0.05
Time Period = 03/28/2011 to 11/14/2014 − All Available
Non−unique RL in data
15
10
5
0
Nitrogen, Nitrate, mg/L
08/2011
06/2012
03/2013
01/2014
11/2014
Time (MM/YYYY)

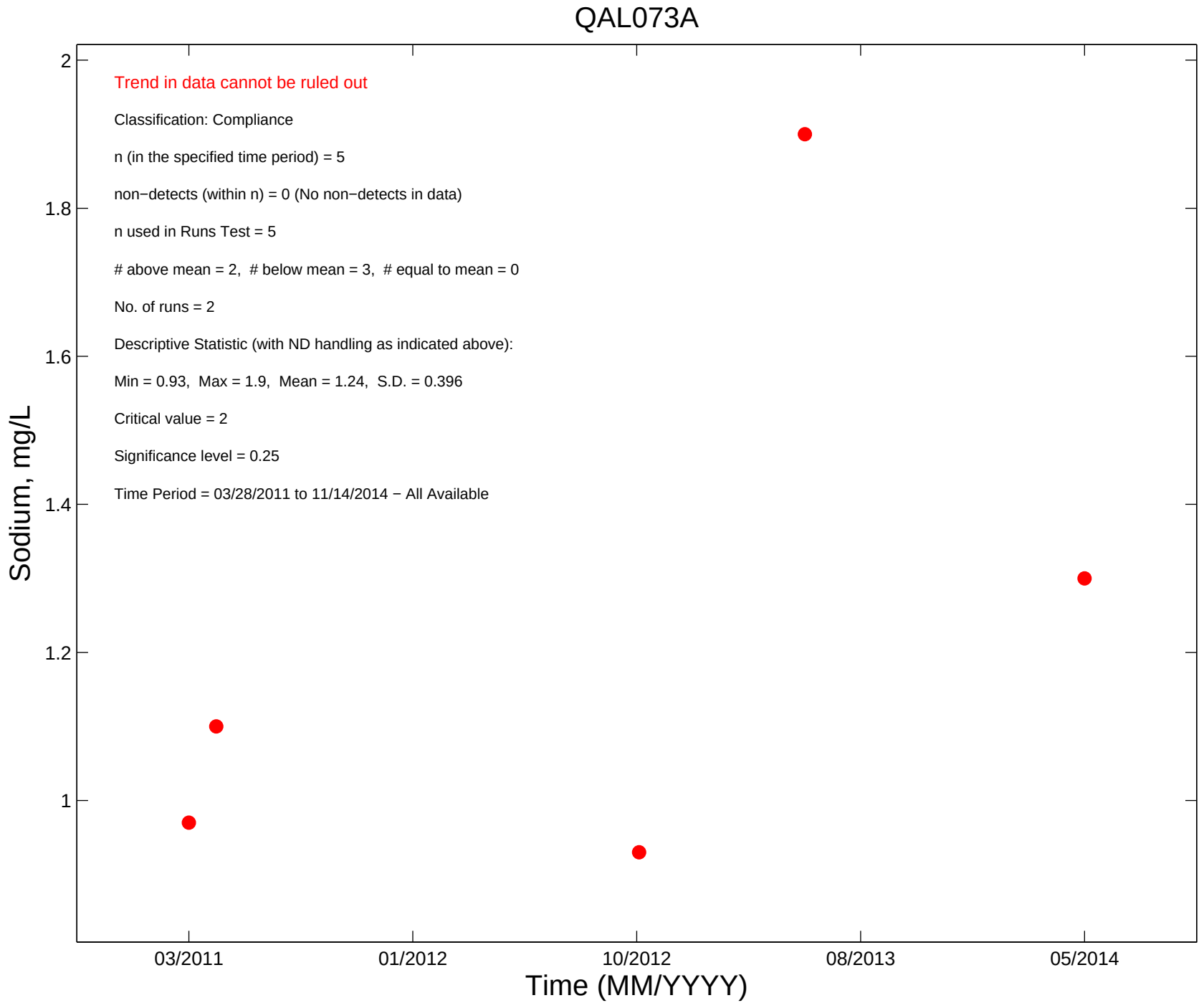

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 17
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 17
above mean = 2, # below mean = 15, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.87, Max = 9.6, Mean = 1.761, S.D. = 2.101
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/14/2014 − All Available
Sodium, mg/L
0
1
2
3
4
5
6
7
8
9
10
08/2011
06/2012
03/2013
01/2014
11/2014
Time (MM/YYYY)


QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 17
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 17
above mean = 6, # below mean = 11, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 2, Max = 8.7, Mean = 3.5, S.D. = 1.9
Critical value = 5
Significance level = 0.05
Time Period = 03/28/2011 to 11/14/2014 − All Available
Non−unique RL in data
Sulfate, mg/L
9
8
7
6
5
4
3
2
08/2011
06/2012
03/2013
01/2014
11/2014
Time (MM/YYYY)


QAL073A
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 = 2, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 20, Max = 71, Mean = 43, S.D. = 25
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/14/2014 − All Available
Alkalinity, Bicarbonate, mg/L
70
60
50
40
30
20
03/2011
01/2012
10/2012
08/2013
05/2014
Time (MM/YYYY)


QAL073A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 5
non−detects (within n) = 3 (Included in data analysis as equal to RL)
n used in Runs Test = 5
above mean = 2, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 16, Mean = 4.8, S.D. = 6.5
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/14/2014 − All Available
Chloride, mg/L
0
2
4
6
8
10
12
14
16
03/2011
01/2012
10/2012
08/2013
05/2014
Time (MM/YYYY)

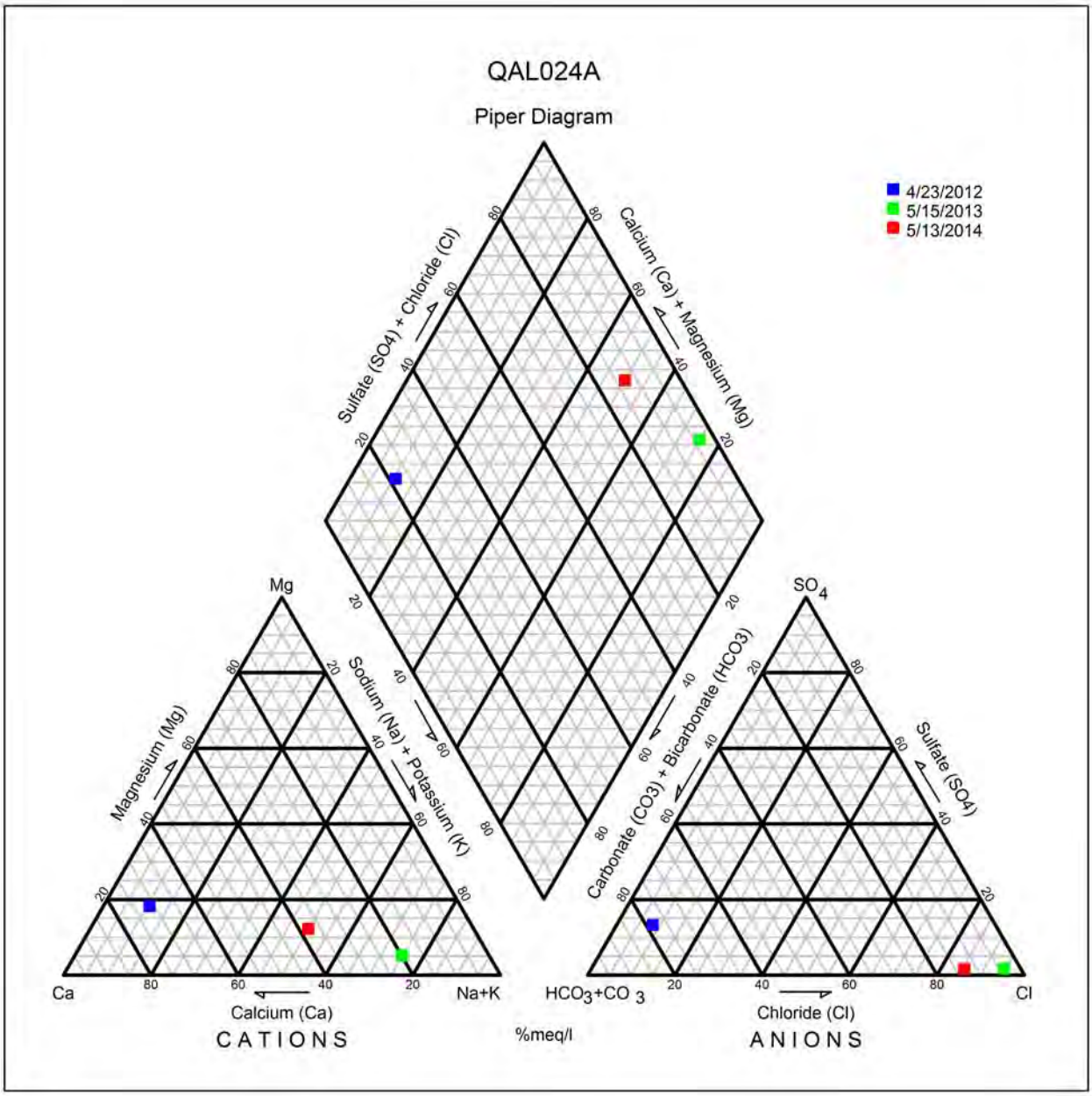

QAL073A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 5
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 5
above mean = 2, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.097, Max = 4.8, Mean = 1.465, S.D. = 2.007
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/14/2014 − 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
01/2012
10/2012
08/2013
05/2014
Time (MM/YYYY)

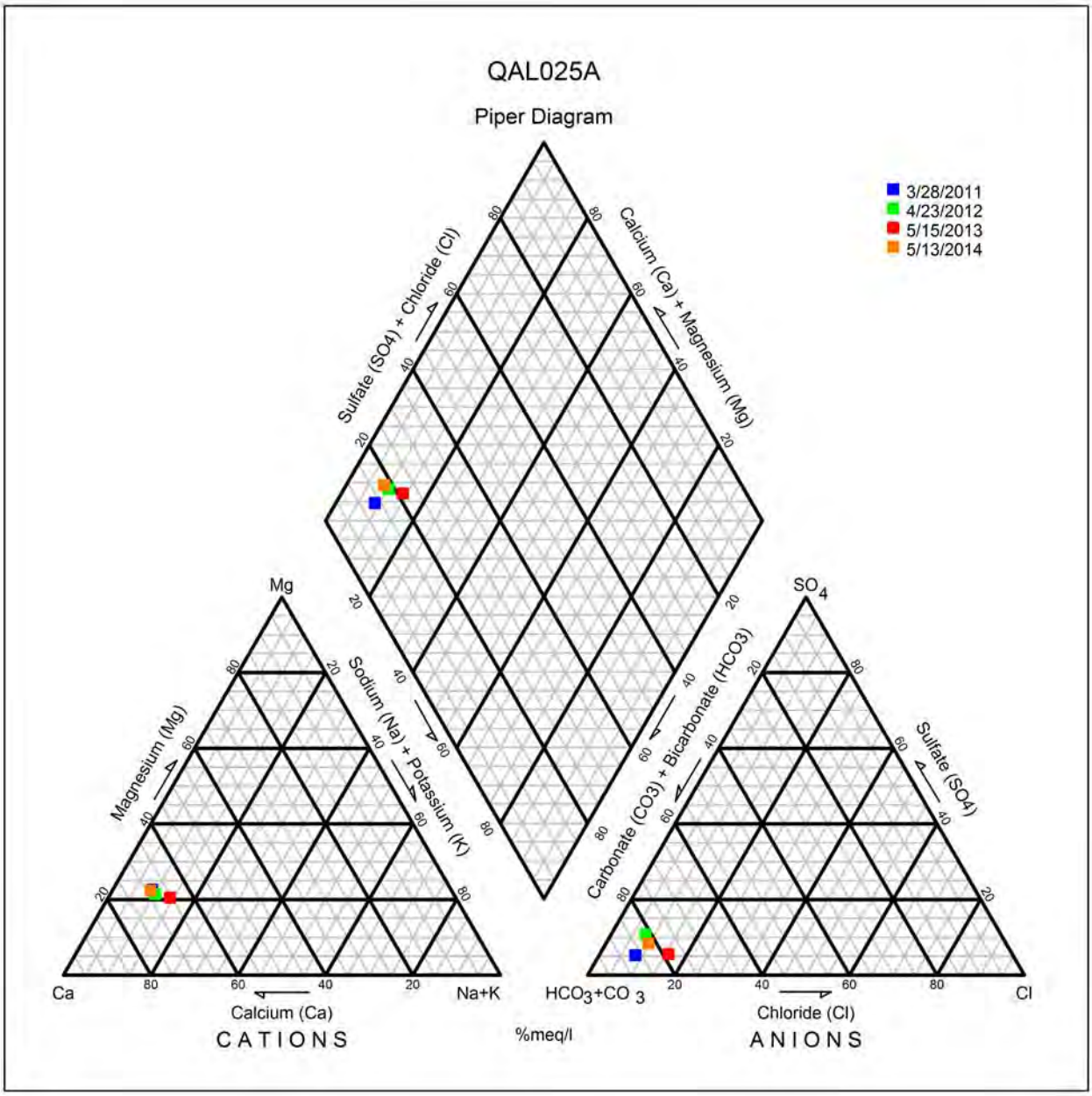

QAL073A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 5
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 5
above mean = 2, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.93, Max = 1.9, Mean = 1.24, S.D. = 0.396
Critical value = 2
Significance level = 0.25
Time Period = 03/28/2011 to 11/14/2014 − All Available
Sodium, mg/L
2
1.8
1.6
1.4
1.2
1
03/2011
01/2012
10/2012
08/2013
05/2014
Time (MM/YYYY)

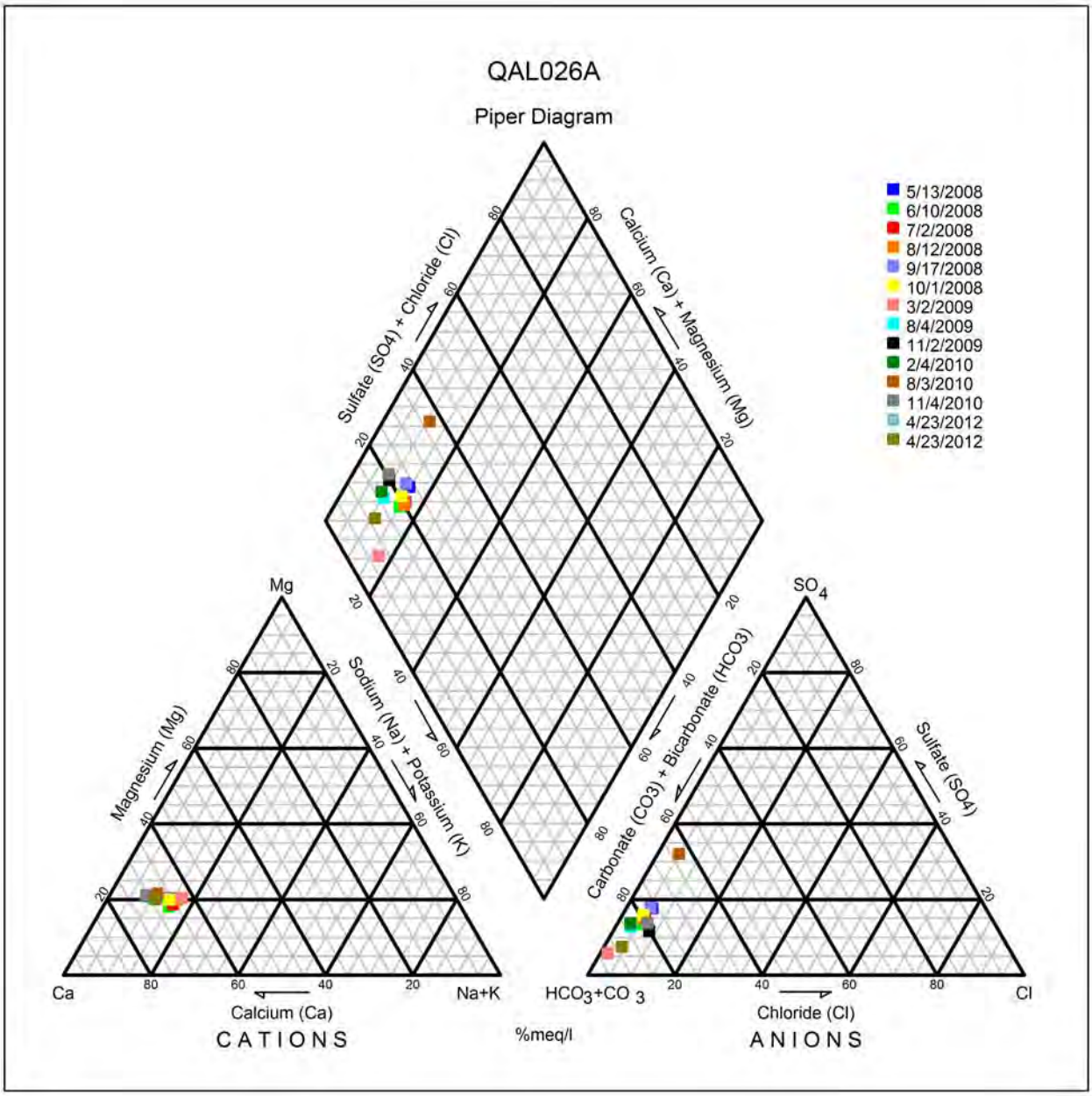
Appendix H

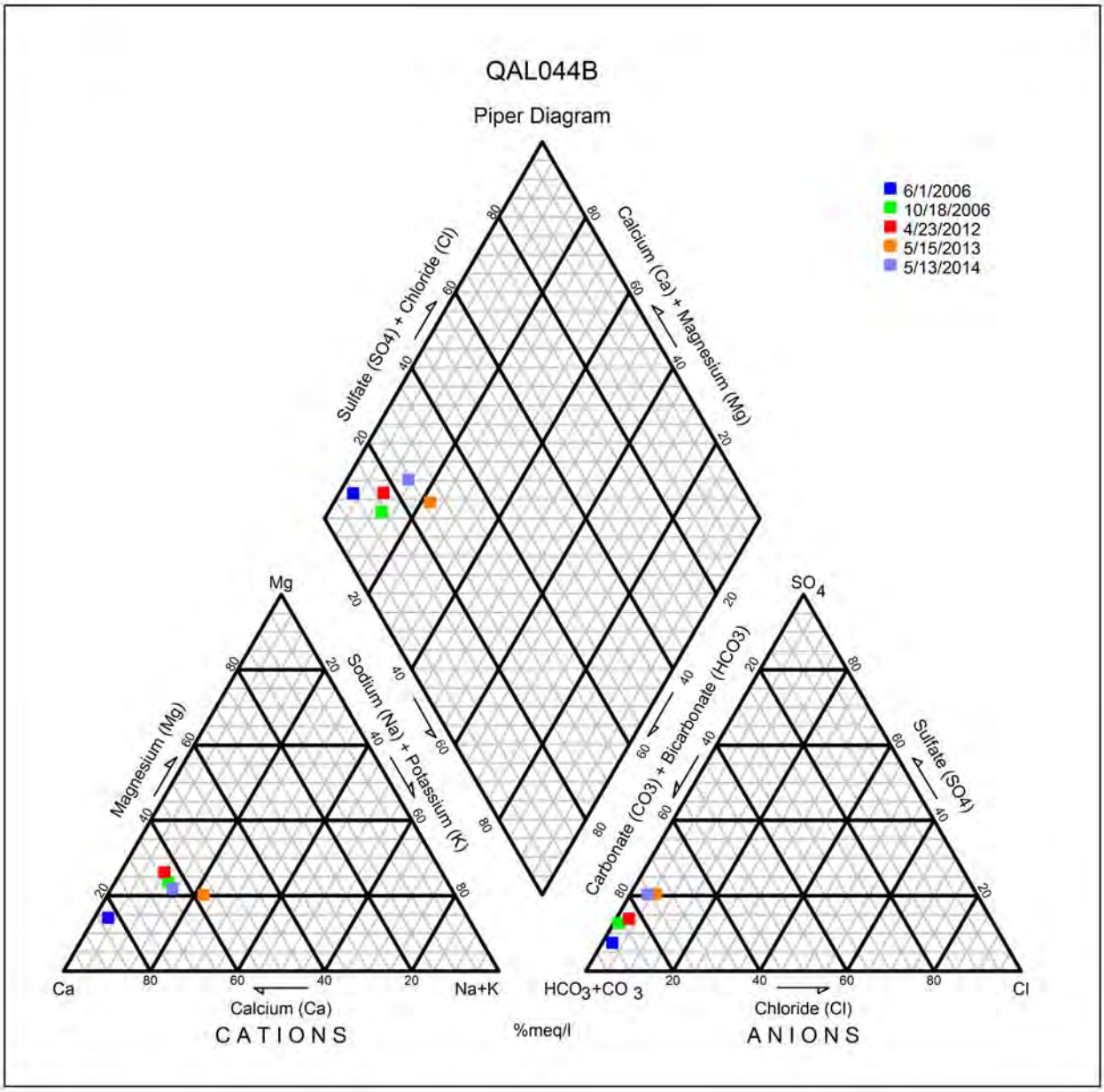
Eagle Mine

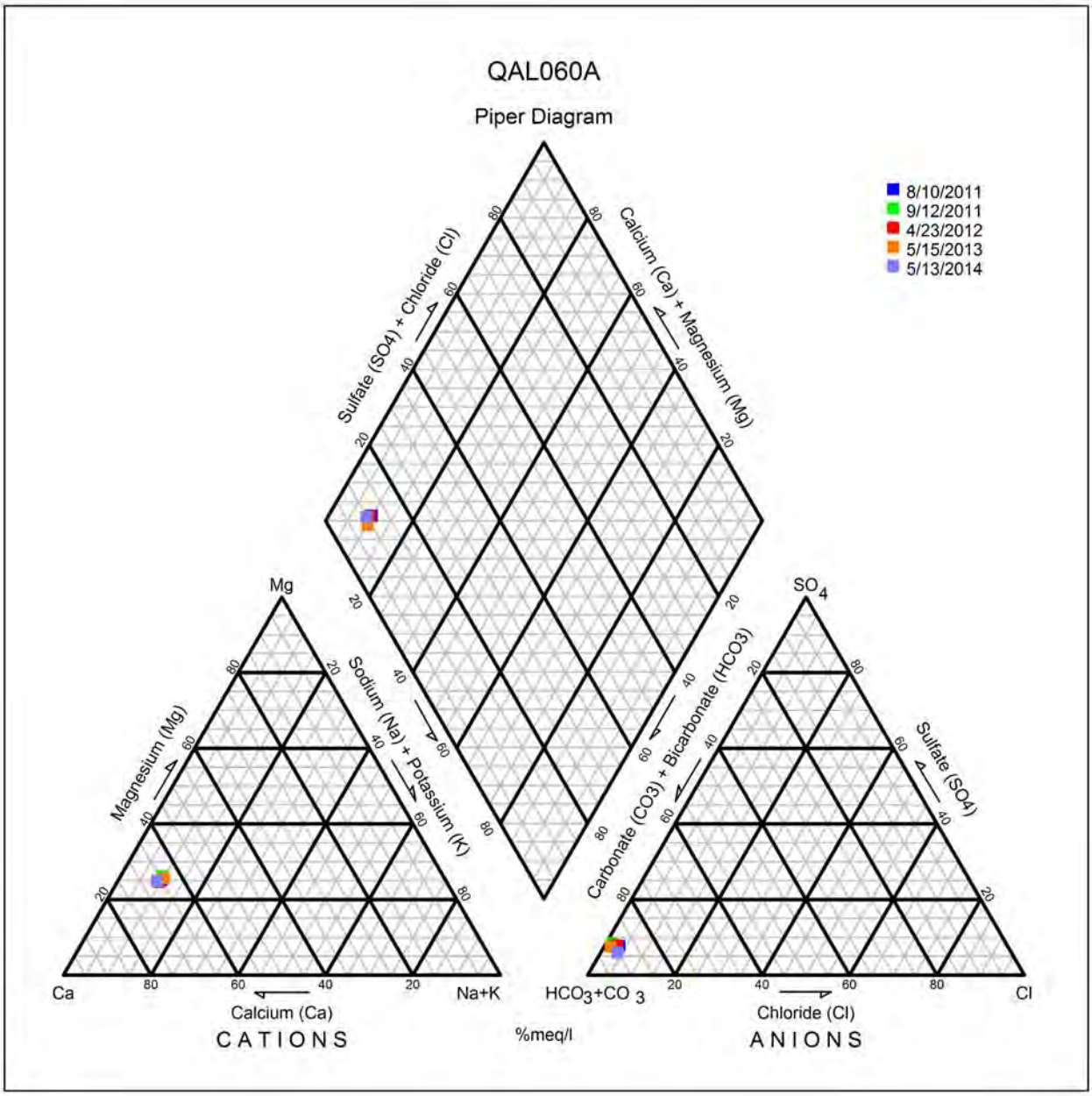
Groundwater Piper Diagrams

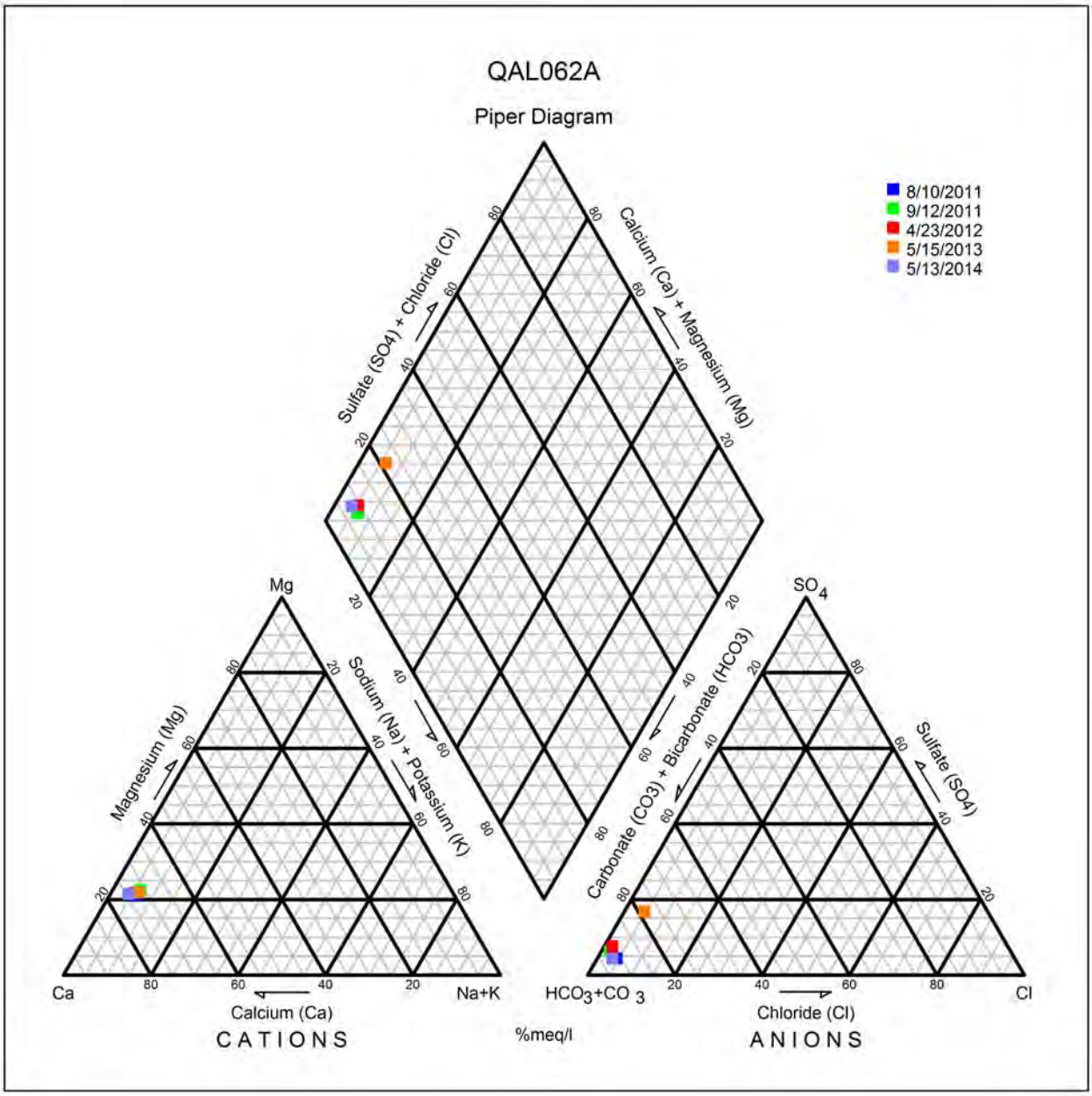

QAL024A
Piper Diagram
4/23/2012
5/15/2013
5/13/2014
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
Cl
Chloride (Cl)
HCO3+CO 3
ANIONS
%meq/l
20
40
60
80

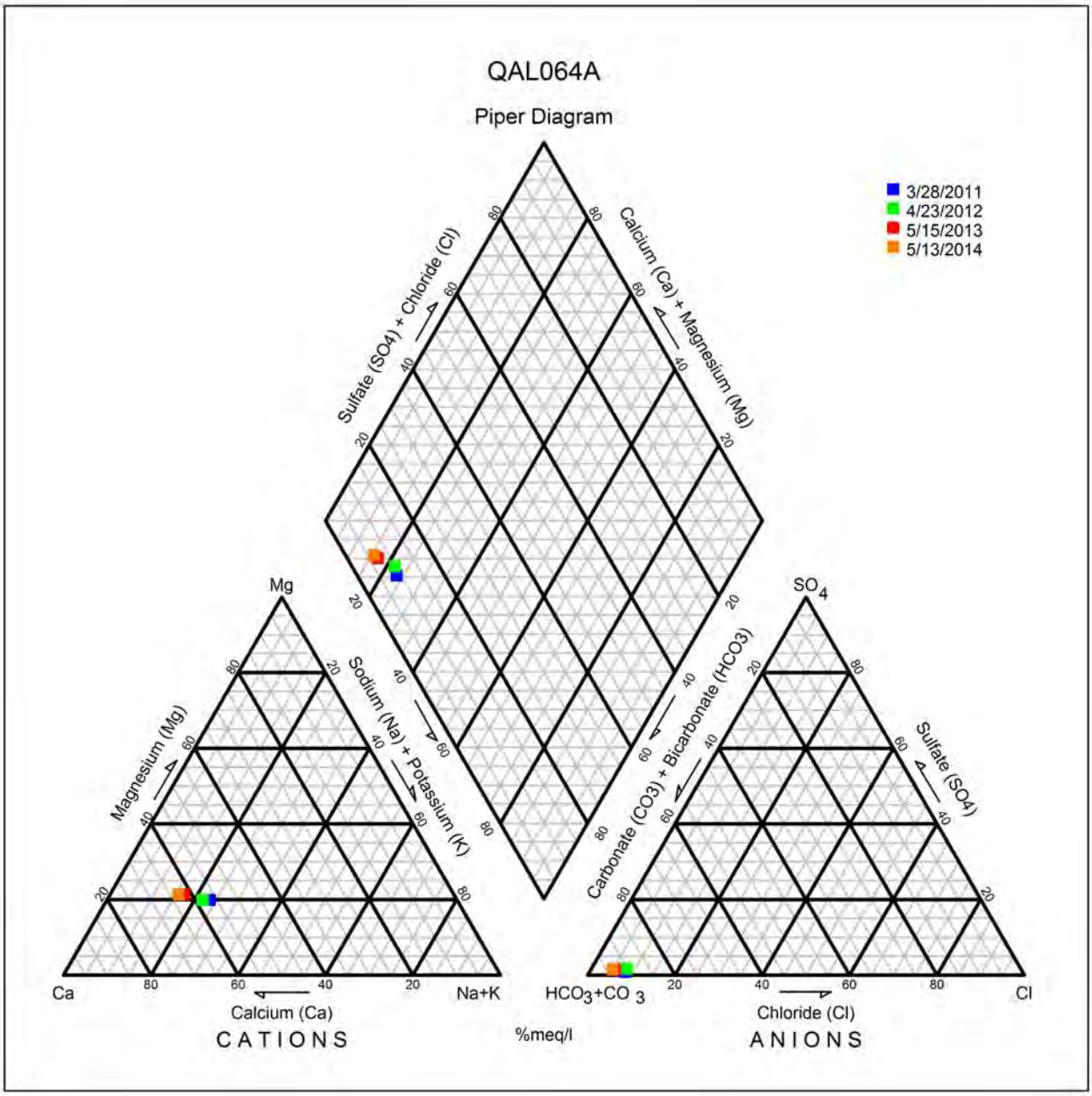

QAL025A
Piper Diagram
3/28/2011
4/23/2012
5/15/2013
5/13/2014
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Mg
Magnesium (Mg)
Sodium (Na) + Potassium (K)
Ca
Na+K
Calcium (Ca)
CATIONS
SO4
Carbonate (CO3) + Bicarbonate (HCO3)
Sulfate (SO4)
HCO3+CO 3
Cl
Chloride (Cl)
ANIONS
%meq/l

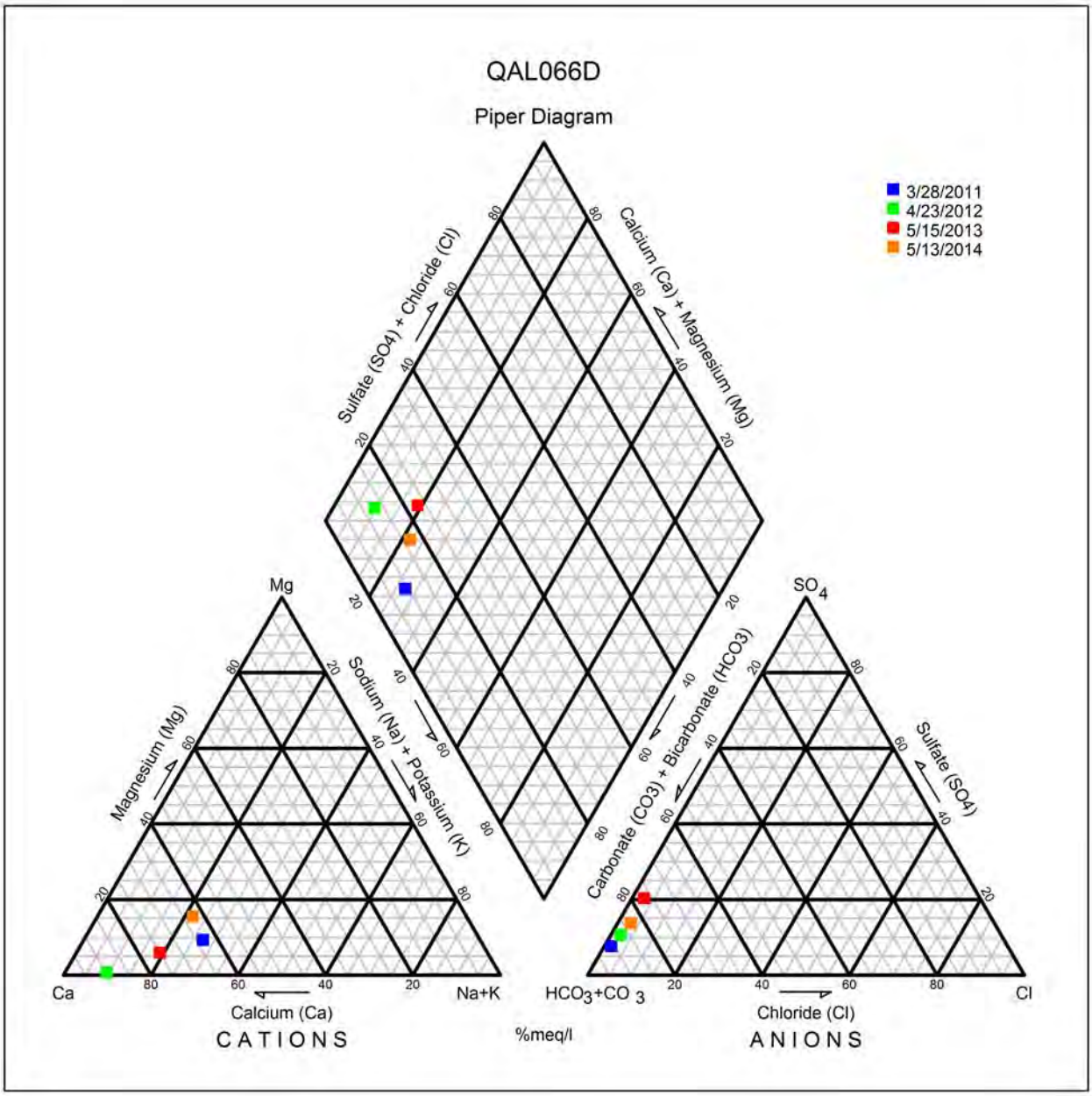

QAL026A
Piper Diagram
5/13/2008
6/10/2008
7/2/2008
8/12/2008
9/17/2008
10/1/2008
3/2/2009
8/4/2009
11/2/2009
2/4/2010
8/3/2010
11/4/2010
4/23/2012
4/23/2012
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca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

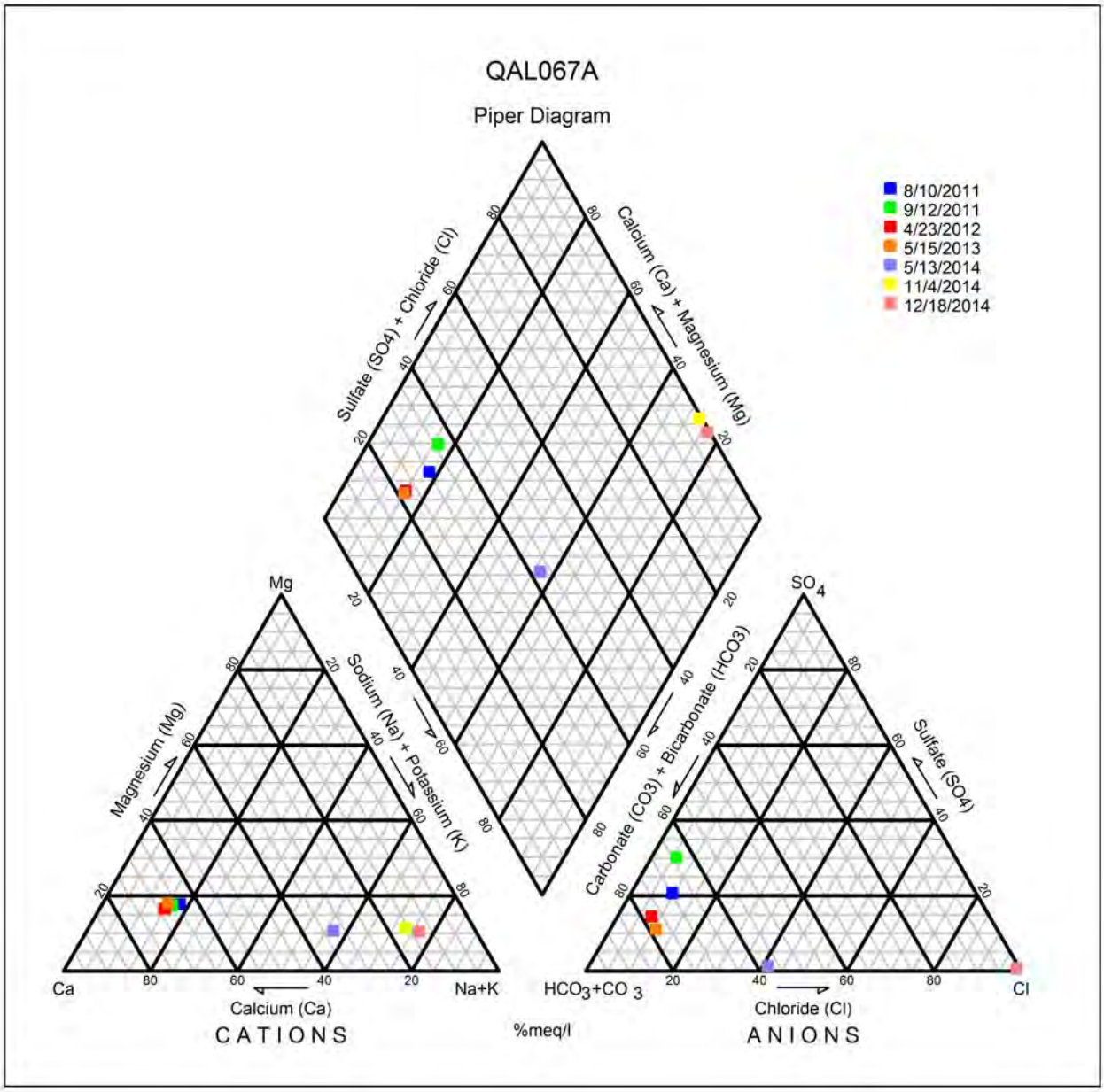

QAL044B
Piper Diagram
6/1/2006
10/18/2006
4/23/2012
5/15/2013
5/13/2014
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
Cl
Chloride (Cl)
HCO3+CO 3
ANIONS
%meq/l
20
40
60
80

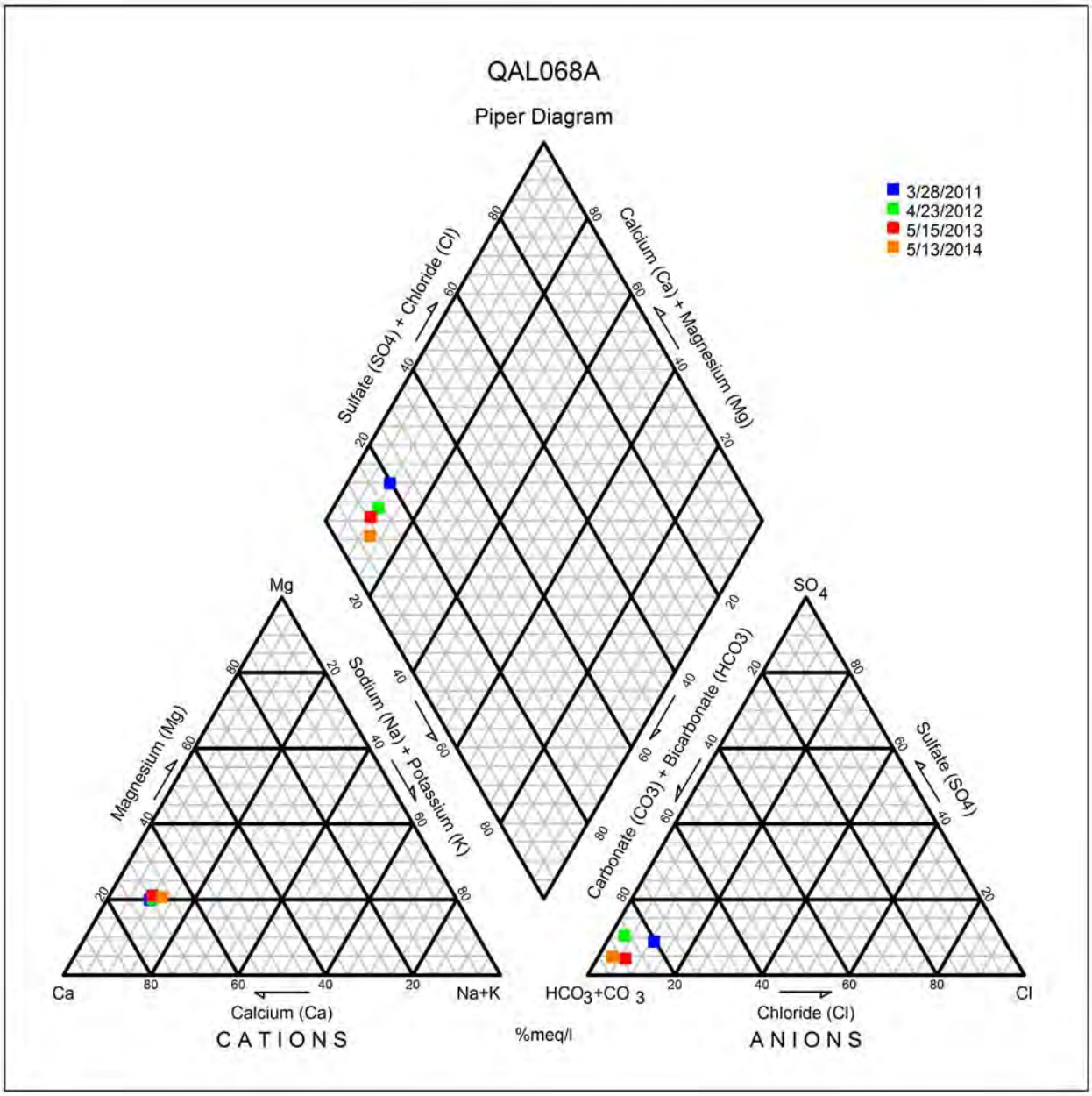

QAL060A
Piper Diagram
8/10/2011
9/12/2011
4/23/2012
5/15/2013
5/13/2014
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
HCO3+CO 3
Chloride (Cl)
Cl
ANIONS
%meq/l
80
60
40
20

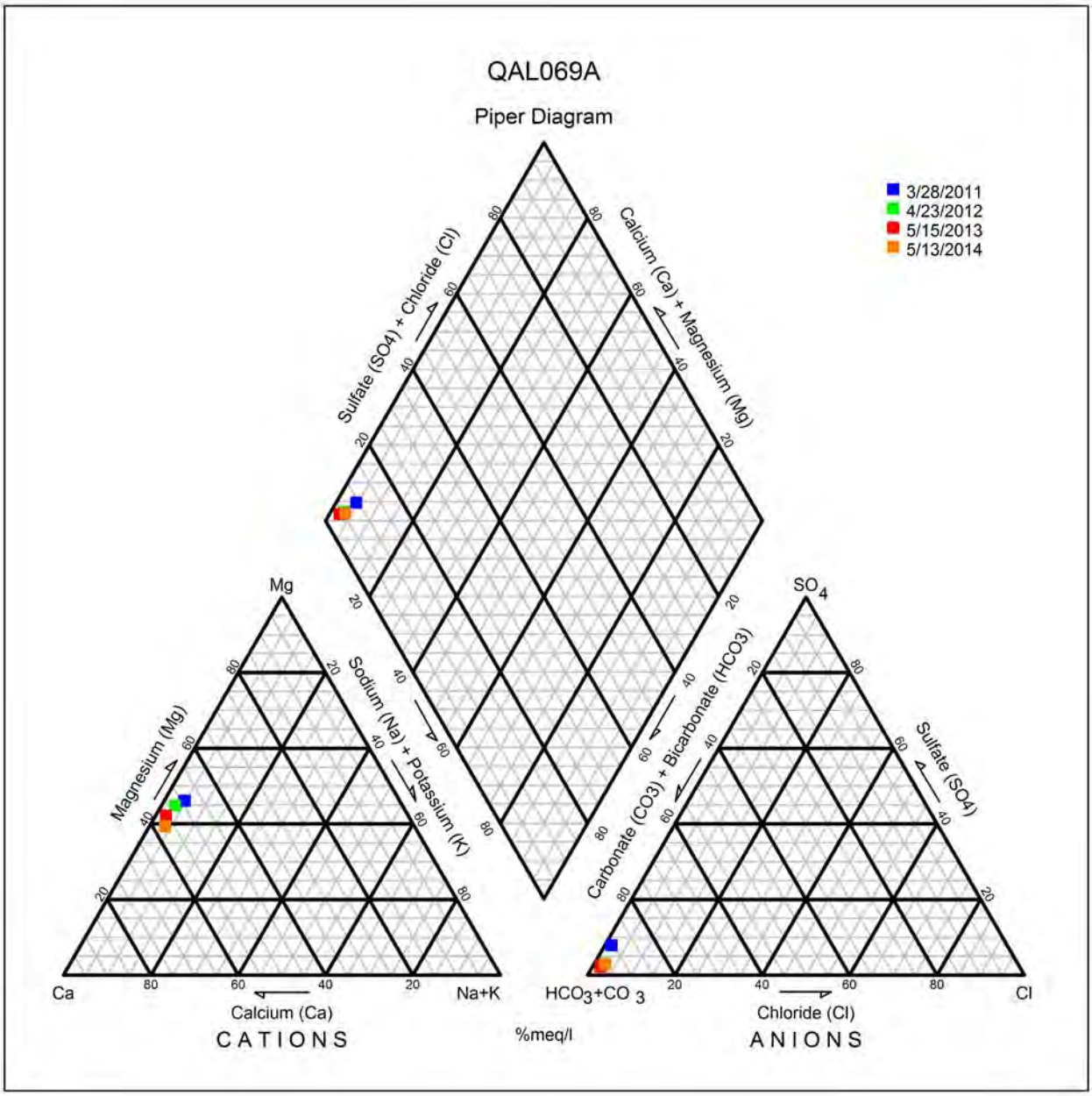

QAL062A
Piper Diagram
8/10/2011
9/12/2011
4/23/2012
5/15/2013
5/13/2014
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
HCO3+CO 3
Chloride (Cl)
Cl
ANIONS
%meq/l

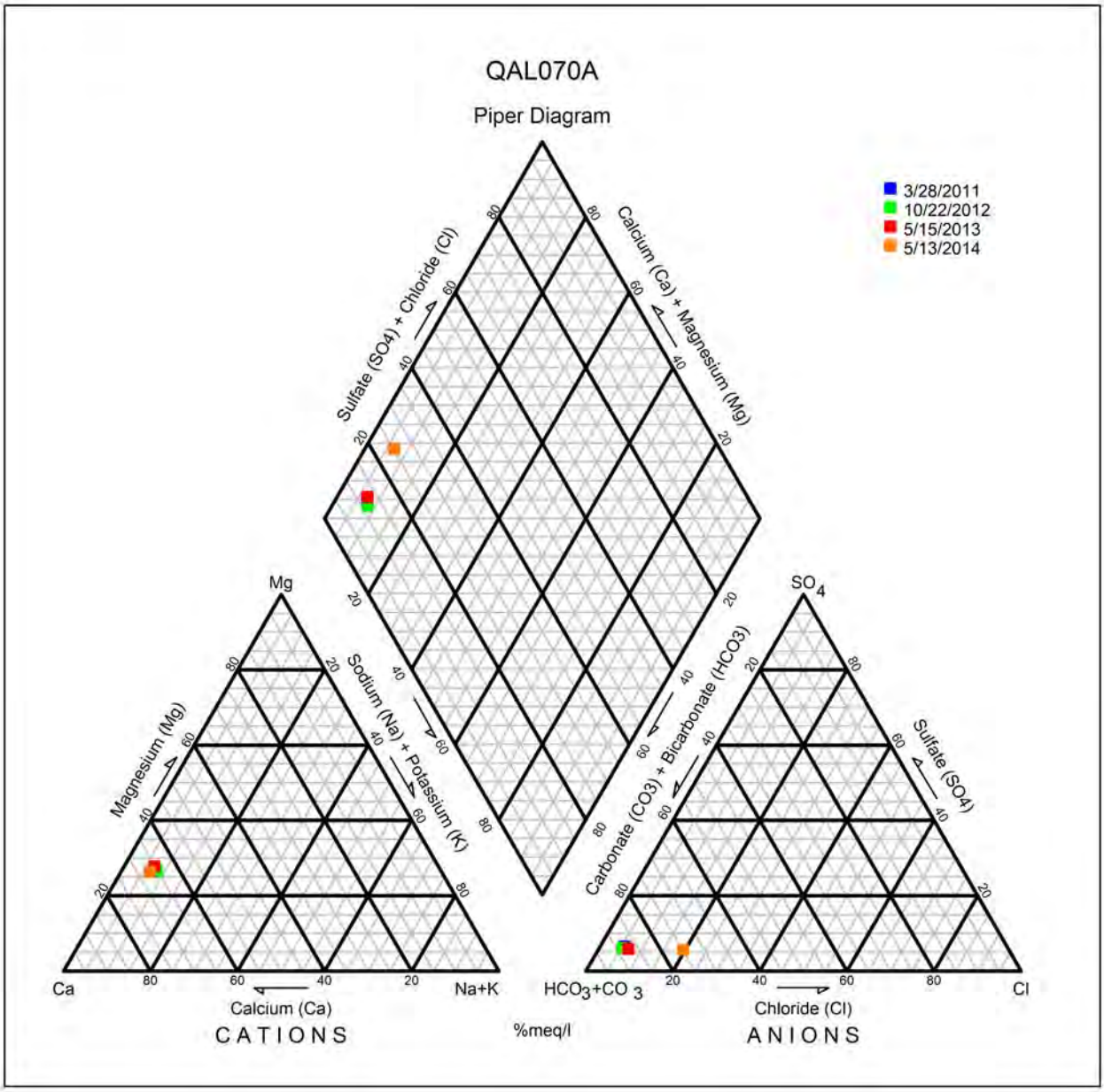

QAL064A
Piper Diagram
3/28/2011
4/23/2012
5/15/2013
5/13/2014
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
HCO3+CO 3
Chloride (Cl)
Cl
ANIONS
%meq/l

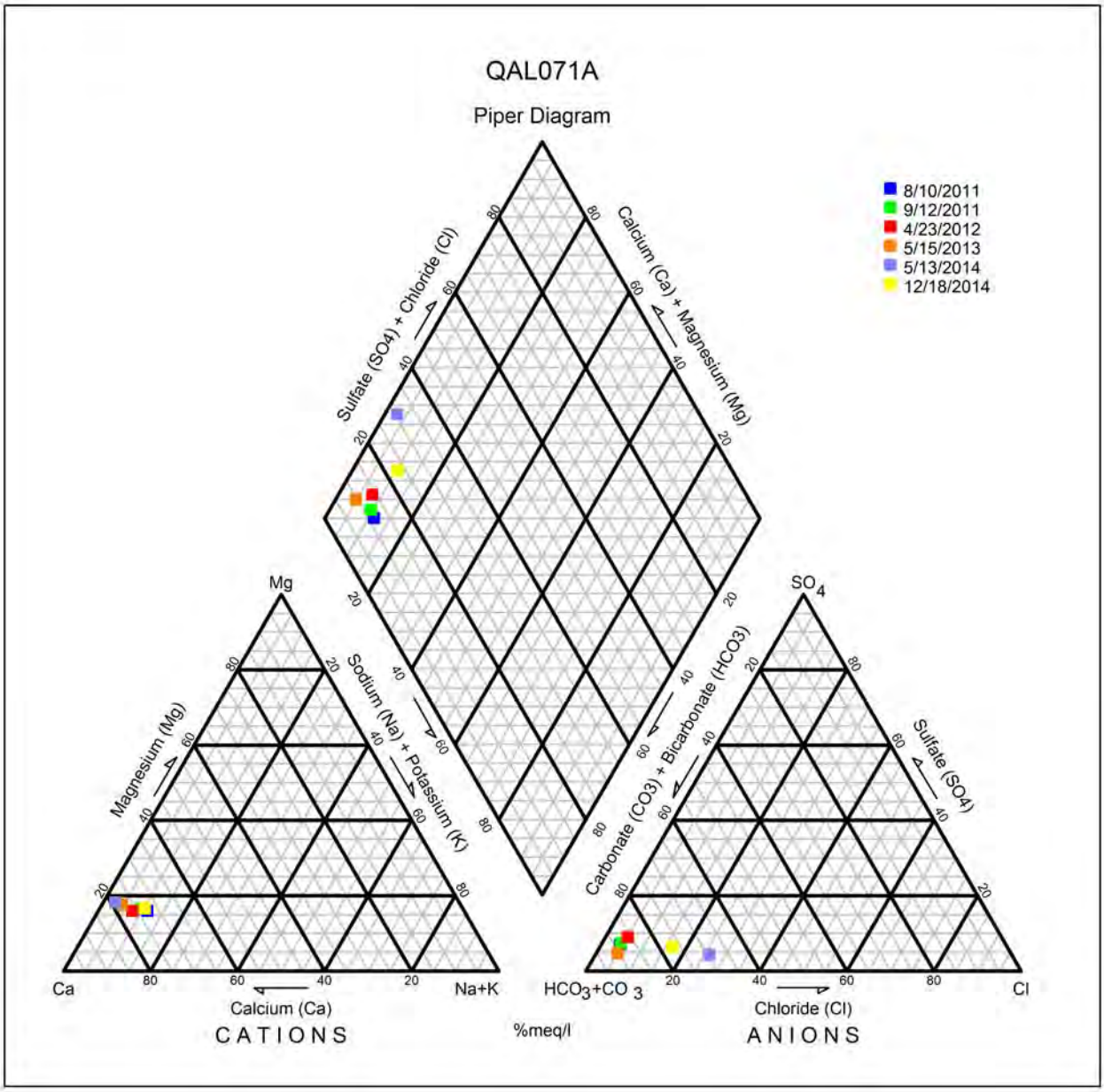

QAL066D
Piper Diagram
3/28/2011
4/23/2012
5/15/2013
5/13/2014
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
HCO3+CO 3
Chloride (Cl)
Cl
ANIONS
%meq/l

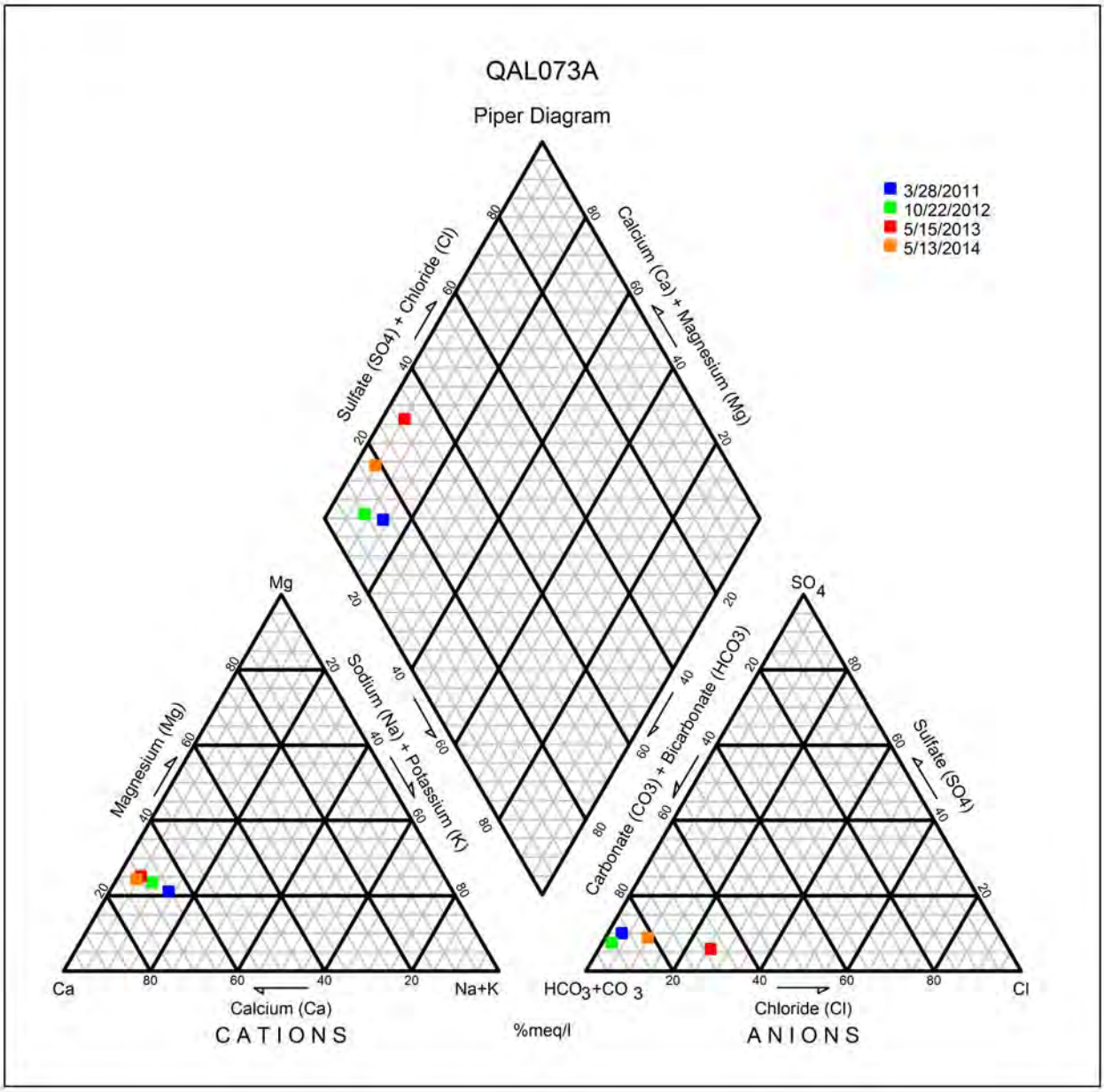

QAL067A
Piper Diagram
8/10/2011
9/12/2011
4/23/2012
5/15/2013
5/13/2014
11/4/2014
12/18/2014
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
HCO3+CO 3
Chloride (Cl)
Cl
ANIONS
%meq/l
80
60
40
20


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


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


QAL070A
Piper Diagram
3/28/2011
10/22/2012
5/15/2013
5/13/2014
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Sodium (Na) + Potassium (K)
Carbonate (CO3) + Bicarbonate (HCO3)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
Cl
Chloride (Cl)
HCO3+CO 3
ANIONS
%meq/l
80
60
40
20

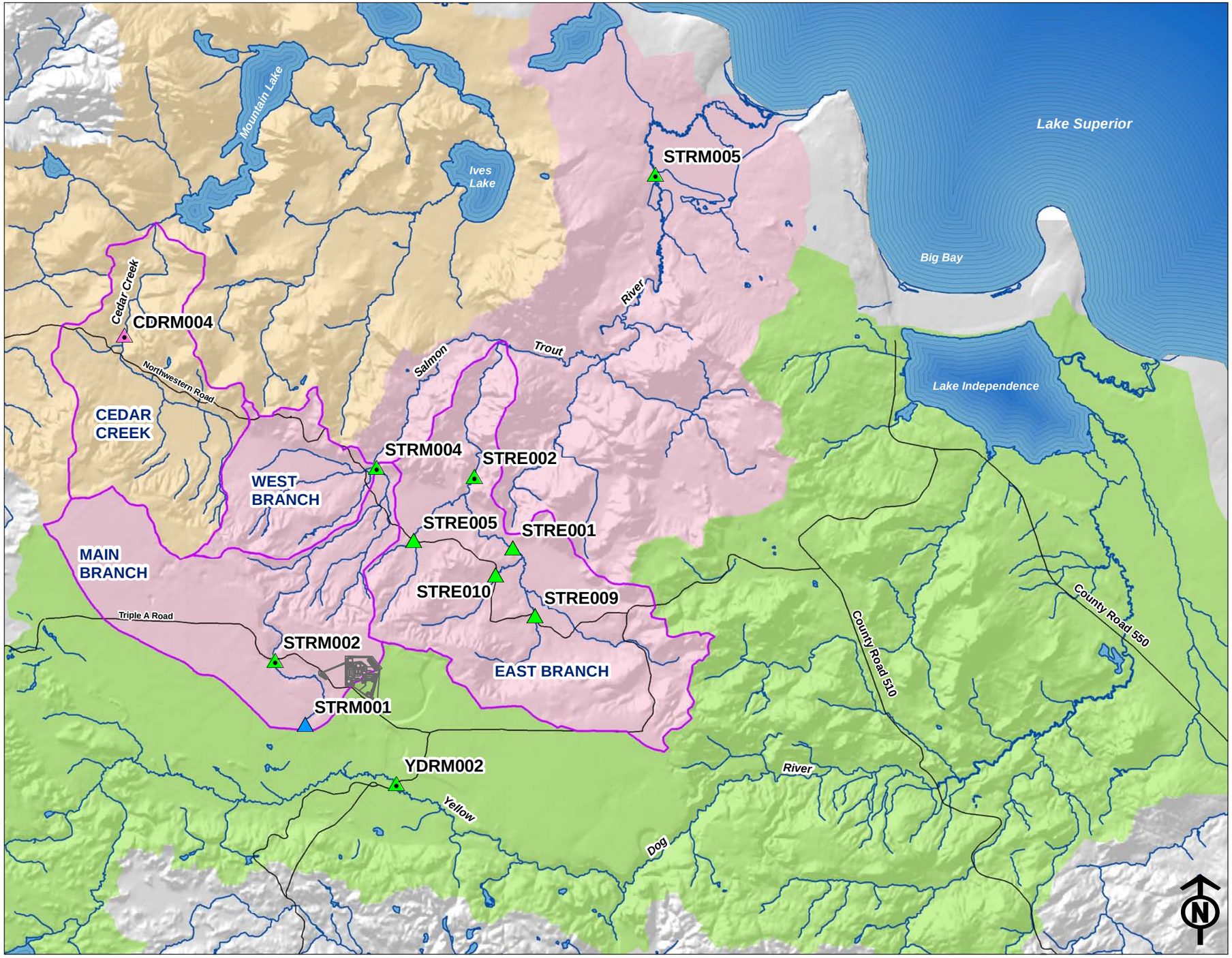

QAL071A
Piper Diagram
8/10/2011
9/12/2011
4/23/2012
5/15/2013
5/13/2014
12/18/2014
Sulfate (SO4) + Chloride (Cl)
Calcium (Ca) + Magnesium (Mg)
Carbonate (CO3) + Bicarbonate (HCO3)
Sodium (Na) + Potassium (K)
Mg
Magnesium (Mg)
Ca
Calcium (Ca)
Na+K
CATIONS
SO4
Sulfate (SO4)
Cl
Chloride (Cl)
HCO3+CO 3
ANIONS
%meq/l
80
60
40
20


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

Appendix I

Eagle Mine

Surface water Location Map



MINE PERMIT SURFACE WATER MONITORING LOCATIONS

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

Reference

Data provided by: Eagle Mine and North Jackson Company

Projection & Datum: UTM NAD 83 Zone 16N

0 1 2 Miles

Scale: 1:90,000

Eagle Mine
a subsidiary of lundin mining

North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Appendix J

Eagle Mine

Surface Water Results

and

Benchmark Summary Table

Eagle Mine
2014 Mine Permit Surface Water Monitoring
Benchmark Comparison Summary

Location	Location Classification	Q1	Q2	Q3	Q4
STRM001	Background	pH			
STRM002	Compliance				
STRM004	Compliance		**aluminum**, **iron, manganese**, **mercury,** nitrate	iron, manganese, mercury	
STRM005	Compliance				iron
STRE001	Compliance	**sulfate**	**aluminum**, **mercury**, nitrate		pH, iron
STRE002	Compliance	**sulfate**	**pH**, **aluminum**, iron, **mercury**		iron, TDS
STRE005	Compliance				
STRE009	Compliance		alkalinity-bicarbonate, calcium, magnesium		pH
STRE010	Compliance	iron, mercury			iron
YDRM002	Compliance	iron, manganese	chloride		**pH**
CDRM004	Reference		aluminum, iron, manganese, mercury	iron	iron

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

2014
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 2014	Q2 2014	Q3 2014	Q4 2014
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain
							3/4/14	4/23/14	8/13/14	10/16/14
Field										
D.O.	ppm	--	--	--	--	--	**6.2**	**7.8**	**4.6**	**6.3**
Flow	cfs	--	--	--	--	--	**0.3**	**1.0**	**0.2**	**0.7**
pH	SU	--	6.5-7.5 p	6.4-7.4	6.1-7.1 p	6.0-7.0	**6.3**	**6.6**	**6.9**	**6.3**
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**42**	**27**	**56**	**33**
Temperature	°C	--	--	--	--	--	**0.1**	**1.7**	**16**	**8.4**
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	--	25	--	--	--	<10	--	--
Beryllium	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Boron	ug/L	50	200	200	200	200	<50	<50	<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	1521 p	1,861	8077 p	760	**680**	**350**	**700** e	**340**
Lead	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Lithium	ug/L	10	--	40	--	--	--	<10 e	--	--
Manganese	ug/L	10	149 p	187	508 p	33	**37**	<10	**40** e	**16**
Mercury	ng/L	0.500	2.80 p	3.41	3.89 p	1.07	**1.05**	**2.31** e	**0.806**	<0.500 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	<2.0	<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	--	42	--	--	--	**9.8**	**--**	--
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--	<2.0	--	--
Chloride	mg/L	1.0	--	8.6 p	--	--	--	**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	4.0	10 p	4.0	4.0	<1.0	<1.0 e	<1.0	<1.0
Major Cations										
Calcium	mg/L	0.50	--	12	--	--	--	**3.5**	**--**	--
Magnesium	mg/L	0.50	--	2.6	--	--	--	**0.81**	**--**	--
Potassium	mg/L	0.50	--	0.77	--	--	--	<0.50	--	--
Sodium	mg/L	0.50	--	1.1	--	--	--	**0.51**	--	--
General										
Hardness	mg/L	3	--	40	--	--	--	**12**	**--**	--
TDS	mg/L	50	125 p	127	200	66	<50	<50	<50 e	<50 e

2014
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 2014	Q2 2014	Q3 2014	Q4 2014
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain
							3/5/14	4/24/14	8/13/14	10/16/14
Field										
D.O.	ppm	--	--	--	--	--	**12**	**11**	**9.4**	**11**
Flow	cfs	--	--	--	--	--	**1.3**	**3.9**	**1.8**	**2.3**
pH	SU	--	6.8-7.8	6.7-7.7	6.3-7.3 p	6.6-7.6	**7.2**	**7.1**	**6.5**	**6.8**
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**35**	**37**	**68**	**48**
Temperature	°C	--	--	--	--	--	**0.1**	**3.7**	**15**	**7.8**
Metals										
Aluminum	ug/L	50	--	200	--	--	--	**65**	--	**--**
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	<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	329	720	794 p	540	**220**	**260**	**220** e	**390**
Lead	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Lithium	ug/L	10	--	40	--	--	--	<10 e	--	--
Manganese	ug/L	10	15	62	31 p	20	**11**	<10	<10 e	<10
Mercury	ng/L	0.500	1.76	4.77 t	2.79 p	3.19	**1.23**	**4.74** e	**0.967**	**1.33** 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	<2.0	<2.0
Silver	ug/L	0.20	--	0.80	--	--	--	<0.20	--	--
Zinc	ug/L	10	40	40	40	40	**30**	<10	<10	<10
Major Anions										
Alkalinity, Bicarbonate	mg/L	2.0	--	35	--	--	--	**14**	**--**	**--**
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--	<2.0	--	--
Chloride	mg/L	1.0	--	1.7	--	--	--	**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 p	4.0	4.0	<1.0	<1.0 e	<1.0	<1.0
Major Cations										
Calcium	mg/L	0.50	--	10	--	--	--	**5.0**	**--**	**--**
Magnesium	mg/L	0.50	--	2.1	--	--	--	**1.1**	**--**	**--**
Potassium	mg/L	0.50	--	0.87	--	--	--	**0.52**	--	**--**
Sodium	mg/L	0.50	--	0.91	--	--	--	**0.79**	--	--
General										
Hardness	mg/L	3	--	34	--	--	--	**17**	**--**	**--**
TDS	mg/L	50	79	123	200	73	**52**	**52**	<50 e	<100 e

2014
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 2014	Q2 2014	Q3 2014	Q4 2014
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain
							3/6/14	4/21/14	8/12/14	10/20/14
Field										
D.O.	ppm	--	--	--	--	--	**14**	**12**	**10**	**12**
Flow	cfs	--	--	--	--	--	**4.9**	**23**	**6.1**	**8.5**
pH	SU	--	6.9-7.9 p	7.3-8.3 p	7.2-8.2 p	7.2-8.2 p	**7.8**	**7.3**	**7.7**	**7.5**
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**101**	**48**	**100**	**77**
Temperature	°C	--	--	--	--	--	**0.0**	**4.1**	**12**	**7.0**
Metals										
Aluminum	ug/L	50	--	444 p	--	--	--	**750**	--	**--**
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	--	--	--	**11**	--	**--**
Beryllium	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Boron	ug/L	50	200	200	200	200	<50	<50	<50 e	<50
Cadmium	ug/L	0.20	--	0.80	--	--	--	<0.20	--	--
Chromium	ug/L	1.0	--	4.0	--	--	--	**1.2**	--	**--**
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	**1.3**	<1.0	<1.0
Iron	ug/L	20	362 p	555 p	336 p	472	**240**	**800**	**460** e	**290**
Lead	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Lithium	ug/L	10	--	40	--	--	--	<10 e	--	--
Manganese	ug/L	10	40	37 p	30 p	50 p	**15**	**55**	**32** e	**13**
Mercury	ng/L	0.500	2.80 p	8.34 p	1.62 p	3.67	**1.95**	**13** e	**2.99**	**1.36** 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	<2.0	<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	--	53 p	--	--	--	**24**	**--**	**--**
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	--	0.12 p	--	--	--	**0.16** e	--	**--**
Sulfate	mg/L	1.0	4.0	4.0	4.0	4.0	**2.9**	<1.0 e	<1.0	<1.0
Major Cations										
Calcium	mg/L	0.50	--	18 p	--	--	--	**9.5**	**--**	**--**
Magnesium	mg/L	0.50	--	3.2 p	--	--	--	**2.2**	**--**	**--**
Potassium	mg/L	0.50	--	2.0	--	--	--	**0.73**	--	**--**
Sodium	mg/L	0.50	--	1.0 p	--	--	--	**0.85**	--	**--**
General										
Hardness	mg/L	3	--	58 p	--	--	--	**33**	**--**	**--**
TDS	mg/L	50	200	200	200	87	**66**	**64**	**80** e	**70** e

2014
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 2014	Q2 2014	Q3 2014	Q4 2014
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain
							3/5/14	4/24/14	8/13/14	10/15/14
Field										
D.O.	ppm	--	--	--	--	--	**14**	**13**	**11**	**11**
Flow	cfs	--	--	--	--	--	**29**	**215**	**32**	**74**
pH	SU	--	7.1-8.1 p	7.0-8.0 p	6.6-7.6 p	7.4-8.4 p	**7.6**	**7.2**	**7.5**	**7.5**
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**136**	**51**	**131**	**90**
Temperature	°C	--	--	--	--	--	**0.0**	**2.5**	**14**	**7.6**
Metals										
Aluminum	ug/L	50	--	395 p	--	--	--	**300**	--	**--**
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	<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	**1.4**	<1.0	<1.0
Iron	ug/L	20	187 p	423 p	207 p	265 p	**130**	**280**	**180** e	**300**
Lead	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Lithium	ug/L	10	--	40	--	--	--	<10 e	--	--
Manganese	ug/L	10	40	40	40	40	**11**	**17**	**12** e	**16**
Mercury	ng/L	0.500	1.31 p	9.64 p	1.91 p	3.28 p	**0.970**	**8.16** e	**1.19**	**1.63** 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	<2.0	<2.0
Silver	ug/L	0.20	--	0.80	--	--	--	<0.20	--	--
Zinc	ug/L	10	40	89 p	40	40	<10	<10	<10	<10
Major Anions										
Alkalinity, Bicarbonate	mg/L	2.0	--	73 p	--	--	--	**19**	**--**	**--**
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--	<2.0	--	--
Chloride	mg/L	1.0	--	4.0	--	--	--	**1.4**	**--**	**--**
Fluoride	mg/L	0.10	--	0.40	--	--	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.050	--	0.20	--	--	--	**0.080** e	--	**--**
Sulfate	mg/L	1.0	6.6 p	4.0	4.0	4.0	**5.1**	<1.0 e	**1.4**	<1.0
Major Cations										
Calcium	mg/L	0.50	--	23 p	--	--	--	**7.1**	**--**	**--**
Magnesium	mg/L	0.50	--	4.6 p	--	--	--	**1.5**	**--**	**--**
Potassium	mg/L	0.50	--	1.5 p	--	--	--	<0.50	--	**--**
Sodium	mg/L	0.50	--	1.4 p	--	--	--	**0.70**	--	--
General										
Hardness	mg/L	3	--	76 p	--	--	--	**24**	**--**	**--**
TDS	mg/L	50	200	200	200	200	<50	<50	<50 e	**74** e

2014
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 2014	Q2 2014	Q3 2014	Q4 2014
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain
							3/6/14	4/22/14	8/13/14	10/15/14
Field										
D.O.	ppm	--	--	--	--	--	**12**	**12**	**10**	**9.9**
Flow	cfs	--	--	--	--	--	**14**	**43**	**10**	NM
pH	SU	--	7.3-8.3 p	7.2-8.2	7.1-8.1 p	7.4-8.4 p	**7.7**	**7.3**	**7.6**	**7.1**
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**136**	**66**	**136**	**106**
Temperature	°C	--	--	--	--	--	**2.3**	**2.3**	**11**	**7.4**
Metals										
Aluminum	ug/L	50	--	149 p	--	--	--	**170**	--	--
Antimony	ug/L	2.0	--	8.0	--	--	--	<2.0	--	--
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	**1.1**	<1.0	**1.2**	<1.0
Barium	ug/L	10	--	40	--	--	--	<10	--	--
Beryllium	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Boron	ug/L	50	200	200	200	200	<50	<50	<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	102 p	235	105 p	160 p	**57**	**220**	**72** e	**260**
Lead	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Lithium	ug/L	10	--	40	--	--	--	<10 e	--	--
Manganese	ug/L	10	40	40	40	151 p	<10	**13**	<10 e	**11**
Mercury	ng/L	0.500	2.00	6.05	2.00	1.83 p	**1.03**	**6.83** e	<0.500	**1.46** 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	<2.0	<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	--	82	--	--	--	**27**	**--**	--
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--	<2.0	--	--
Chloride	mg/L	1.0	--	3.9 p	--	--	--	**1.2**	**--**	--
Fluoride	mg/L	0.10	--	0.40	--	--	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.050	--	0.091	--	--	--	**0.094** e	--	--
Sulfate	mg/L	1.0	4.9 p	4.0	4.0	4.0	**5.6**	<1.0 e	**2.9**	<1.0
Major Cations										
Calcium	mg/L	0.50	--	25	--	--	--	**11**	**--**	--
Magnesium	mg/L	0.50	--	4.7	--	--	--	**2.2**	**--**	--
Potassium	mg/L	0.50	--	2.0	--	--	--	**0.54**	--	--
Sodium	mg/L	0.50	--	1.1	--	--	--	**0.9**	--	--
General										
Hardness	mg/L	3	--	82	--	--	--	**37**	**--**	--
TDS	mg/L	50	200	133	200	200	**68**	**70**	**52** e	**82** e

2014
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 2014	Q2 2014	Q3 2014	Q4 2014
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain
							3/7/14	4/22/14	8/12/14	10/20/14
Field										
D.O.	ppm	--	--	--	--	--	**14**	**13**	**10**	**11**
Flow	cfs	--	--	--	--	--	**14**	NM	**13**	**26**
pH	SU	--	7.3-8.3 p	7.6-8.6 p	7.5-8.5 p	7.3-8.3 t	**7.8**	**7.4**	**7.7**	**7.3**
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**110**	**59**	**137**	**99**
Temperature	°C	--	--	--	--	--	**0.0**	**1.1**	**12**	**6.6**
Metals										
Aluminum	ug/L	50	--	200	--	--	--	**200**	--	--
Antimony	ug/L	2.0	--	8.0	--	--	--	<2.0	--	--
Arsenic	ug/L	1.0	4.0	4.0	4.0	3.0 p	**1.1**	<1.0	**1.4**	<1.0
Barium	ug/L	10	--	40	--	--	--	<10	--	--
Beryllium	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Boron	ug/L	50	200	200	200	200	<50	<50	<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	202 p	194 p	185 p	155	**76**	**240**	**170** e	**160**
Lead	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Lithium	ug/L	10	--	40	--	--	--	<10 e	--	--
Manganese	ug/L	10	40	40	40	40	<10	**15**	**14** e	<10
Mercury	ng/L	0.500	2.31 p	4.84 p	2.00	2.22	**1.07**	**8.46** e	**1.10**	**1.46** 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	<2.0	<2.0
Silver	ug/L	0.20	--	0.80	--	--	--	<0.20	--	--
Zinc	ug/L	10	40	34 p	40	40	<10	<10	<10	<10
Major Anions										
Alkalinity, Bicarbonate	mg/L	2.0	--	82 p	--	--	--	**23**	**--**	--
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--	<2.0	--	--
Chloride	mg/L	1.0	--	4.0	--	--	--	**1.4**	**--**	--
Fluoride	mg/L	0.10	--	0.40	--	--	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.050	--	0.20	--	--	--	**0.10** e	--	--
Sulfate	mg/L	1.0	5.1 p	4.0	4.0	4.0	**5.2**	<1.0 e	<1.0	<1.0
Major Cations										
Calcium	mg/L	0.50	--	25 p	--	--	--	**9.1**	**--**	--
Magnesium	mg/L	0.50	--	4.8 p	--	--	--	**1.9**	**--**	--
Potassium	mg/L	0.50	--	2.0	--	--	--	**0.50**	--	--
Sodium	mg/L	0.50	--	1.4 p	--	--	--	**0.74**	--	--
General										
Hardness	mg/L	3	--	82 p	--	--	--	**31**	**--**	--
TDS	mg/L	50	200	200	200	87	**78**	**56**	**98** e	**98** e

2014
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 2014	Q2 2014	Q3 2014	Q4 2014
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain
							3/6/14	4/22/14	8/13/14	10/15/14
Field										
D.O.	ppm	--	--	--	--	--	**14**	**13**	**9.7**	**11**
Flow	cfs	--	--	--	--	--	**0.8**	**4.5**	**0.4**	**1.8**
pH	SU	--	7.0-8.0	6.6-7.6	7.1-8.1	6.8-7.8	**7.5**	**7.4**	**7.8**	**7.4**
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**123**	**56**	**132**	**98**
Temperature	°C	--	--	--	--	--	**0.0**	**1.2**	**14**	**8.0**
Metals										
Aluminum	ug/L	50	--	2,239	--	--	--	**270**	--	**--**
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	<50 e	<50
Cadmium	ug/L	0.20	--	0.80	--	--	--	<0.20	--	--
Chromium	ug/L	1.0	--	4.0	--	--	--	**1.3**	--	**--**
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	649	1,731	503	253	**190**	**340**	**250** e	**180**
Lead	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Lithium	ug/L	10	--	40	--	--	--	<10 e	--	--
Manganese	ug/L	10	88	136	40	40	**21**	**23**	**22** e	**10**
Mercury	ng/L	0.500	2.00	23.0	2.00	2.16	**1.50**	**7.82** e	**0.813**	**1.15** 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 e	<2.0	<2.0	<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	--	50	--	--	--	**24**	**--**	**--**
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	--	--	--	**0.13** e	--	**--**
Sulfate	mg/L	1.0	5.2	4.0	4.0	p	**4.2**	<1.0 e	<1.0	<1.0
Major Cations										
Calcium	mg/L	0.50	--	16	--	--	--	**9.3**	**--**	**--**
Magnesium	mg/L	0.50	--	2.6	--	--	--	**1.8**	**--**	**--**
Potassium	mg/L	0.50	--	2.0	--	--	--	**0.52**	--	**--**
Sodium	mg/L	0.50	--	2.0	--	--	--	**0.64**	--	--
General										
Hardness	mg/L	3	--	51	--	--	--	**31**	**--**	**--**
TDS	mg/L	50	200	200	200	200	**80**	**68**	<50 e	**74** e

2014
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 2014	Q2 2014	Q3 2014	Q4 2014
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain
							3/3/14	4/23/14	8/13/14	10/15/14
Field										
D.O.	ppm	--	--	--	--	--	**13**	**12**	**10**	**11**
Flow	cfs	--	--	--	--	--	**4.1**	**6.1**	**3.5**	**4.7**
pH	SU	--	7.2-8.2	6.7-7.7	6.8-7.8	6.5-7.5	**7.3**	**7.6**	**7.5**	**7.6**
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**118**	**89**	**119**	**110**
Temperature	°C	--	--	--	--	--	**0**	**5.5**	**11**	**7.6**
Metals										
Aluminum	ug/L	50	--	393	--	--	--	**140**	--	**--**
Antimony	ug/L	2.0	--	8.0	--	--	--	<2.0	--	--
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	<1.0	<1.0	**1.3**	<1.0
Barium	ug/L	10	--	40	--	--	--	**13**	--	--
Beryllium	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Boron	ug/L	50	200	200	200	200	<50	<50	<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	**2.1**	<1.0	<1.0
Iron	ug/L	20	86	393	264	94	**55**	**150**	**100** e	**89**
Lead	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Lithium	ug/L	10	--	40	--	--	--	<10 e	--	--
Manganese	ug/L	10	40	40	35	40	<10	**12**	**13** e	<10
Mercury	ng/L	0.500	2.00	5.98	3.09	2.00	**1.10**	**4.06** e	**0.718**	**0.775** 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 e	<2.0	<2.0	<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	--	33	--	--	--	**41**	**--**	**--**
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	--	--	--	<0.050 e	--	**--**
Sulfate	mg/L	1.0	4.8	4.0	4.0	4.0	**4.6**	<1.0 e	**1.4**	<1.0
Major Cations										
Calcium	mg/L	0.50	--	10	--	--	--	**13**	**--**	**--**
Magnesium	mg/L	0.50	--	2.0	--	--	--	**2.6**	**--**	**--**
Potassium	mg/L	0.50	--	2.0	--	--	--	<0.50	--	**--**
Sodium	mg/L	0.50	--	2.0	--	--	--	**0.82**	--	**--**
General										
Hardness	mg/L	3	--	33	--	--	--	**43**	**--**	**--**
TDS	mg/L	50	200	200	200	200	**80**	**58**	**68** e	**72** e

2014
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 2014	Q2 2014	Q3 2014	Q4 2014
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain
							3/3/14	4/22/14	8/13/14	10/15/14
Field										
D.O.	ppm	--	--	--	--	--	**13**	**13**	**11**	**11**
Flow	cfs	--	--	--	--	--	**2.7**	**7.0**	**2.2**	**3.6**
pH	SU	--	7.3-8.3	6.7-7.7	7.1-8.1	6.9-7.9	**7.8**	**7.5**	**7.7**	**7.5**
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**123**	**73**	**124**	**93**
Temperature	°C	--	--	--	--	--	**2.9**	**2.4**	**9.9**	**7.5**
Metals										
Aluminum	ug/L	50	--	421	--	--	--	**220**	--	**--**
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	<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	168	555	104	80	**250**	**320**	**98** e	**90**
Lead	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Lithium	ug/L	10	--	40	--	--	--	<10 e	--	--
Manganese	ug/L	10	40	46	40	40	**29**	**30**	**17** e	<10
Mercury	ng/L	0.500	2.67	8.07	2.00	2.00	**3.44**	**7.60** e	**1.18**	**0.769** 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	<2.0	<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	--	33	--	--	--	**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	--	--	--	**0.087** e	--	**--**
Sulfate	mg/L	1.0	4.6	4.0	4.0	4.0	**4.2**	<1.0 e	<1.0	<1.0
Major Cations										
Calcium	mg/L	0.50	--	13	--	--	--	**12**	**--**	**--**
Magnesium	mg/L	0.50	--	2.4	--	--	--	**2.2**	**--**	**--**
Potassium	mg/L	0.50	--	2.0	--	--	--	**0.56**	--	**--**
Sodium	mg/L	0.50	--	2.0	--	--	--	**0.73**	--	**--**
General										
Hardness	mg/L	3	--	43	--	--	--	**39**	**--**	**--**
TDS	mg/L	50	200 p	200	200	200	**68**	**70**	**70** e	**78** e

2014
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 2014	Q2 2014	Q3 2014	Q4 2014
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain
							3/4/14	4/24/14	8/13/14	10/16/14
Field										
D.O.	ppm	--	--	--	--	--	**11**	**12**	**7.7**	**10**
Flow	cfs	--	--	--	--	--	**17**	**127**	**12**	**38**
pH	SU	--	6.5-7.5 p	6.3-7.3	6.7-7.7 p	6.7-7.7	**6.8**	**6.7**	**7.1**	**6.6**
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**74**	**25**	**81**	**43**
Temperature	°C	--	--	--	--	--	**0.0**	**0.8**	**16**	**7.4**
Metals										
Aluminum	ug/L	50	--	155 p	--	--	--	**140**	**--**	**--**
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	<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	711	1,352	1172 p	1,200	**1,400**	**390**	**820** e	**760**
Lead	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Lithium	ug/L	10	--	40	--	--	--	<10 e	--	--
Manganese	ug/L	10	40 t	57	38 p	41	**43**	**22**	**24** e	**27**
Mercury	ng/L	0.500	2.86 p	7.86	3.40 p	5.67	**1.76**	**7.00** e	**1.52**	**2.25** 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	<2.0	<2.0
Silver	ug/L	0.20	--	0.80	--	--	--	<0.20	--	--
Zinc	ug/L	10	114 p	40	40	40	<10	<10	<10	<10
Major Anions										
Alkalinity, Bicarbonate	mg/L	2.0	--	35	--	--	--	**5.2**	**--**	**--**
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--	<2.0	--	--
Chloride	mg/L	1.0	--	1.4	--	--	--	**1.5**	**--**	**--**
Fluoride	mg/L	0.10	--	0.40	--	--	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.050	--	0.16	--	--	--	**0.13** e	**--**	**--**
Sulfate	mg/L	1.0	6.7	10 p	4.0	4.0	**3.9**	<1.0 e	**2.9**	<1.0
Major Cations										
Calcium	mg/L	0.50	--	11	--	--	--	**3.4**	**--**	**--**
Magnesium	mg/L	0.50	--	2.3	--	--	--	**0.78**	**--**	**--**
Potassium	mg/L	0.50	--	0.67	--	--	--	<0.50	--	--
Sodium	mg/L	0.50	--	1.2	--	--	--	**0.53**	--	--
General										
Hardness	mg/L	3	--	36	--	--	--	**12**	**--**	**--**
TDS	mg/L	50	200	86	200	97	**66**	**58**	<50 e	<100 e

2014
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 2014	Q2 2014	Q3 2014	Q4 2014
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain
							3/7/14	4/21/14	8/12/14	10/20/14
Field										
D.O.	ppm	--	--	--	--	--	**14**	**13**	**10**	**12**
Flow	cfs	--	--	--	--	--	**11**	**52**	**15**	**25**
pH	SU	--	7.3-8.3 p	7.3-8.3	7.1-8.1 p	7.2-8.2 p	**7.4**	**7.4**	**7.7**	**7.6**
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**136**	**73**	**147**	**96**
Temperature	°C	--	--	--	--	--	**0.6**	**2.2**	**12**	**6.8**
Metals										
Aluminum	ug/L	50	--	200	--	--	--	**220**	**--**	--
Antimony	ug/L	2.0	--	8.0	--	--	--	<2.0	--	--
Arsenic	ug/L	1.0	1.5	2.4	3.7 p	2.5	**1.3**	<1.0	**2.8**	**1.0**
Barium	ug/L	10	--	15	--	--	--	<10	--	--
Beryllium	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Boron	ug/L	50	200	200	200	200	<50	<50	<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	102 p	177	264 p	168	**95**	**310**	**290** e	**180**
Lead	ug/L	1.0	--	4.0	--	--	--	<1.0	--	--
Lithium	ug/L	10	--	40	--	--	--	<10 e	--	--
Manganese	ug/L	10	13	19	46 p	129 p	**12**	**48**	**33** e	**12**
Mercury	ng/L	0.500	2.00	4.62	2.00	1.90 t	**1.10**	**7.63** e	**1.45**	**1.15** 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	<2.0	<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	--	88	--	--	--	**31**	**--**	--
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	5.8	4.0	4.0 p	4.0	**2.6**	<1.0 e	<1.0	<1.0
Major Cations										
Calcium	mg/L	0.50	--	26	--	--	--	**11**	**--**	--
Magnesium	mg/L	0.50	--	4.0	--	--	--	**2.0**	**--**	--
Potassium	mg/L	0.50	--	0.63	--	--	--	**0.55**	--	--
Sodium	mg/L	0.50	--	1.2	--	--	--	**0.89**	--	--
General										
Hardness	mg/L	3	--	81	--	--	--	**36**	**--**	--
TDS	mg/L	50	118 p	128	200	102	**86**	**98**	**106** e	**88** e

2014
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

Surface Water Monitoring

Trend Analysis Summary & Trending Charts

2014 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	Statistical Significance Level	Trend Present	Remarks
CDRM004	Q1	Reference	TDS	mg/L	7	0	No NDs	7	42	102	75	19.70	4	3	0	2	2	0.10	Y	Non-unique RL in data
STRE001	Q1	Compliance	Arsenic	ug/L	5	3	Included as RL	5	1	1.2	1.1	0.09	2	3	0	2	2	0.25	Y	
STRE001	Q1	Compliance	Iron	ug/L	6	0	No NDs	6	57	92	69	13.00	3	3	0	2	2	0.10	Y	
STRE002	Q1	Compliance	Iron	ug/L	6	0	No NDs	6	68	150	96.5	34.50	2	4	0	2	2	0.25	Y	
STRE002	Q1	Compliance	Manganese	ug/L	6	4	Included as RL	6	10	14	11	1.60	2	4	0	2	2	0.25	Y	
STRE002	Q1	Compliance	TDS	mg/L	6	1	Included as RL	6	20	94	66	27.00	4	2	0	2	2	0.25	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRM001	Q1	Background	pH	SU	6	0	No NDs	6	6.1	7.8	6.8	0.67	2	4	0	2	2	0.25	Y	
STRM001	Q1	Background	Sulfate	mg/L	7	6	Included as RL	7	1.0	7.1	3.0	2.60	3	4	0	2	2	0.10	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRM005	Q1	Compliance	TDS	mg/L	5	2	Included as RL	5	50	88	68	18.00	3	2	0	2	2	0.25	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
YDRM002	Q1	Compliance	Iron	ug/L	9	0	No NDs	9	510	1400	767.8	361.80	2	7	0	2	2	0.10	Y	
YDRM002	Q1	Compliance	pH	SU	8	0	No NDs	8	6.6	7.5	7	0.28	2	4	2	2	2	0.25	Y	
CDRM004	Q2	Reference	Aluminum	ug/L	5	3	Included as RL	5	50	240	122	98.80	2	3	0	2	2	0.25	Y	
CDRM004	Q2	Reference	Iron	ug/L	7	0	No NDs	7	110	330	184	94.80	2	5	0	2	2	0.10	Y	Non-unique RL in data
CDRM004	Q2	Reference	Manganese	ug/L	7	1	Included as RL	7	10	48	23	17.00	2	5	0	2	2	0.10	Y	
CDRM004	Q2	Reference	Nitrogen, Nitrate	mg/L	7	4	Included as RL	7	0.050	0.10	0.065	0.02	2	5	0	2	2	0.10	Y	
STRE001	Q2	Compliance	Aluminum	ug/L	5	1	Included as RL	5	50	310	160	94.90	2	3	0	2	2	0.25	Y	
STRE001	Q2	Compliance	Magnesium	mg/L	7	0	No NDs	7	1.3	4.0	2.6	0.97	3	3	1	2	2	0.10	Y	
STRE001	Q2	Compliance	Mercury	ng/L	7	0	No NDs	7	1.10	7.35	4.01	2.50	3	4	0	2	2	0.10	Y	Non-unique RL in data
STRE001	Q2	Compliance	Specific Conductance	µS/cm @ 25°C	7	0	No NDs	7	38	127	80	28.70	4	3	0	2	2	0.10	Y	
STRE001	Q2	Compliance	Sulfate	mg/L	7	6	Included as RL	7	1.0	5.0	2.0	2.00	2	5	0	2	2	0.10	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE002	Q2	Compliance	Alkalinity, Bicarbonate	mg/L	6	0	No NDs	6	23	67	45	19.00	3	3	0	2	2	0.10	Y	
STRE002	Q2	Compliance	Aluminum	ug/L	5	1	Included as RL	5	50	210	118	80.10	2	3	0	2	2	0.25	Y	
STRE002	Q2	Compliance	Barium	ug/L	6	3	Included as RL	6	10	11	11	0.55	3	3	0	2	2	0.10	Y	
STRE002	Q2	Compliance	Cadmium	ug/L	5	4	Included as RL	5	0.2	0.5	0.3	0.13	2	3	0	2	2	0.25	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE002	Q2	Compliance	Calcium	mg/L	6	0	No NDs	6	8.1	21	15	5.42	3	3	0	2	2	0.10	Y	
STRE002	Q2	Compliance	Chloride	mg/L	6	2	Included as RL	6	1.0	1.4	1.2	0.16	3	3	0	2	2	0.10	Y	
STRE002	Q2	Compliance	Iron	ug/L	6	0	No NDs	6	76	240	144	63.40	3	3	0	2	2	0.10	Y	Non-unique RL in data
STRE002	Q2	Compliance	Magnesium	mg/L	6	0	No NDs	6	1.7	4.1	2.9	1.00	3	3	0	2	2	0.10	Y	
STRE002	Q2	Compliance	Mercury	ng/L	6	0	No NDs	6	0.885	8.46	3.89	3.09	3	3	0	2	2	0.10	Y	Non-unique RL in data
STRE002	Q2	Compliance	Nitrogen, Nitrate	mg/L	6	3	Included as RL	6	0.050	0.10	0.061	0.02	2	4	0	2	2	0.25	Y	
STRE002	Q2	Compliance	pH	SU	6	0	No NDs	6	7.1	8.9	7.8	0.73	3	3	0	2	2	0.10	Y	
STRE002	Q2	Compliance	Specific Conductance	µS/cm @ 25°C	6	0	No NDs	6	59	131	89	26.60	3	3	0	2	2	0.10	Y	
STRE002	Q2	Compliance	Zinc	ug/L	5	3	Included as RL	5	10	25	14	6.50	2	3	0	2	2	0.25	Y	
STRM001	Q2	Background	Sulfate	mg/L	9	7	Included as RL	9	1.0	8.4	3.3	3.00	4	5	0	2	2	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRM002	Q2	Compliance	Aluminum	ug/L	5	2	Included as RL	5	50	89	65	16.00	3	2	0	2	2	0.25	Y	
STRM002	Q2	Compliance	Sulfate	mg/L	9	7	Included as RL	9	1.0	5.7	2.9	2.20	4	5	0	2	2	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRM004	Q2	Compliance	Alkalinity, Bicarbonate	mg/L	6	0	No NDs	6	18	44	32	10.00	3	3	0	2	2	0.10	Y	
STRM004	Q2	Compliance	Aluminum	ug/L	5	0	No NDs	5	51	750	400	334.00	2	3	0	2	2	0.25	Y	
STRM004	Q2	Compliance	Barium	ug/L	6	4	Included as RL	6	10	11	10	0.52	2	4	0	2	2	0.25	Y	
STRM004	Q2	Compliance	Copper	ug/L	6	3	Included as RL	6	1.0	1.5	1.2	0.21	3	3	0	2	2	0.10	Y	
STRM004	Q2	Compliance	Iron	ug/L	6	0	No NDs	6	260	840	502	260.00	2	4	0	2	2	0.25	Y	Non-unique RL in data
STRM004	Q2	Compliance	Mercury	ng/L	6	0	No NDs	6	2.10	13.0	6.27	4.40	3	3	0	2	2	0.10	Y	Non-unique RL in data
STRM004	Q2	Compliance	pH	SU	6	0	No NDs	6	7.0	8.3	7.6	0.56	3	3	0	2	2	0.10	Y	
STRM005	Q2	Compliance	Alkalinity, Bicarbonate	mg/L	5	0	No NDs	5	9.7	57	28	18.00	2	3	0	2	2	0.25	Y	
STRM005	Q2	Compliance	Aluminum	ug/L	5	0	No NDs	5	69	510	266	167.00	3	2	0	2	2	0.25	Y	
STRM005	Q2	Compliance	Calcium	mg/L	5	0	No NDs	5	4.1	18	9.4	5.24	2	3	0	2	2	0.25	Y	
STRM005	Q2	Compliance	Magnesium	mg/L	5	0	No NDs	5	0.87	3.6	1.9	1.04	2	3	0	2	2	0.25	Y	
STRM005	Q2	Compliance	Mercury	ng/L	5	0	No NDs	5	2.11	9.03	6.33	2.70	3	2	0	2	2	0.25	Y	Non-unique RL in data
STRM005	Q2	Compliance	TDS	mg/L	5	2	Included as RL	5	50	64	57	6.70	3	2	0	2	2	0.25	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
YDRM002	Q2	Compliance	Sulfate	mg/L	9	7	Included as RL	9	1.0	8.3	3.3	2.80	4	5	0	2	2	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)

Explanations of abbreviations provided at the end of this table.

2014 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	Statistical Significance Level	Trend Present	Remarks
CDRM004	Q3	Reference	Arsenic	ug/L	5	0	No NDs	5	1.9	3.3	2.7	0.58	3	2	0	2	2	0.25	Y	
CDRM004	Q3	Reference	Specific Conductance	µS/cm @ 25°C	5	0	No NDs	5	116	153	135	18.00	3	2	0	2	2	0.25	Y	
STRM001	Q3	Background	Iron	ug/L	5	0	No NDs	5	700	5860	2476	2098.00	2	3	0	2	2	0.25	Y	
STRM001	Q3	Background	Manganese	ug/L	5	0	No NDs	5	40	369	147	140.00	2	3	0	2	2	0.25	Y	
STRM001	Q3	Background	Specific Conductance	µS/cm @ 25°C	5	0	No NDs	5	55	99	69	18.00	2	3	0	2	2	0.25	Y	
STRM001	Q3	Background	TDS	mg/L	5	2	Included as RL	5	50	91	62	17.00	2	3	0	2	2	0.25	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRM002	Q3	Compliance	Iron	ug/L	5	0	No NDs	5	220	580	388	179.00	2	3	0	2	2	0.25	Y	
STRM002	Q3	Compliance	Manganese	ug/L	5	2	Included as RL	5	10	23	15	6.40	2	3	0	2	2	0.25	Y	
STRM002	Q3	Compliance	TDS	mg/L	5	2	Included as RL	5	50	67	55	7.80	2	3	0	2	2	0.25	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
YDRM002	Q3	Compliance	Sulfate	mg/L	5	4	Included as RL	5	1.0	5.0	3.0	2.00	2	3	0	2	2	0.25	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE001	Q4	Compliance	Specific Conductance	µS/cm @ 25°C	6	0	No NDs	6	106	136	124	12.40	4	2	0	2	2	0.25	Y	
STRE002	Q4	Compliance	pH	SU	7	0	No NDs	7	7.3	8.2	7.7	0.35	3	4	0	2	2	0.10	Y	
STRE002	Q4	Compliance	Specific Conductance	µS/cm @ 25°C	7	0	No NDs	7	99	137	124	13.90	5	2	0	2	2	0.10	Y	
STRM002	Q4	Compliance	pH	SU	10	0	No NDs	10	6.2	7.8	7.0	0.48	5	5	0	3	3	0.05	Y	
STRM004	Q4	Compliance	pH	SU	6	0	No NDs	6	7.5	8.0	7.7	0.19	3	3	0	2	2	0.10	Y	
YDRM002	Q4	Compliance	pH	SU	10	0	No NDs	10	5.2	7.6	6.9	0.68	5	5	0	3	3	0.05	Y	
YDRM002	Q4	Compliance	Sulfate	mg/L	10	9	Included as RL	10	1.0	15	4.1	4.30	5	5	0	2	3	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)

Explanations of abbreviations provided at the end of this table.

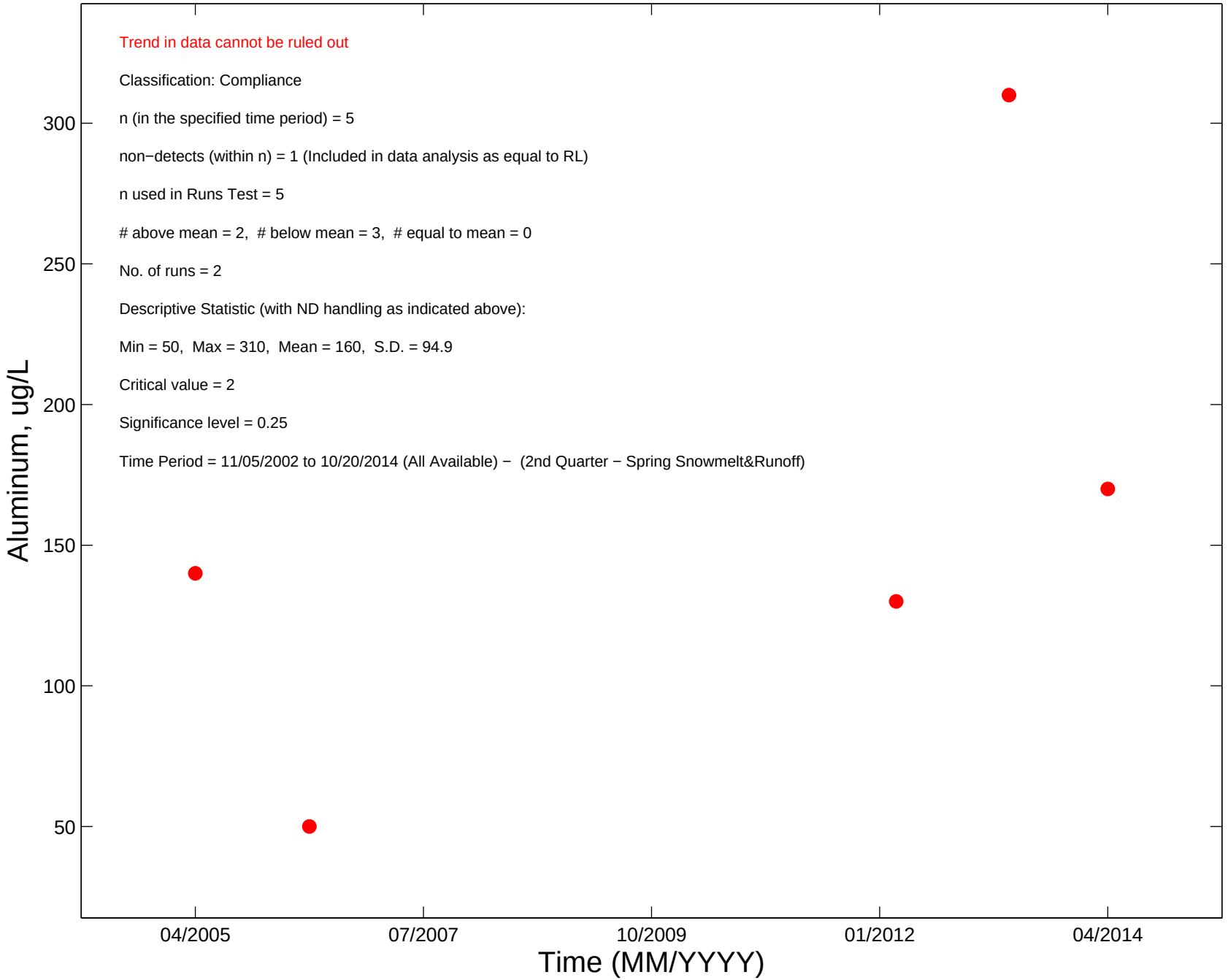
Mine Permit Surface Water Trend Analysis
Notes and Abbreviations Used in Statistical Summary Tables
Eagle Mine

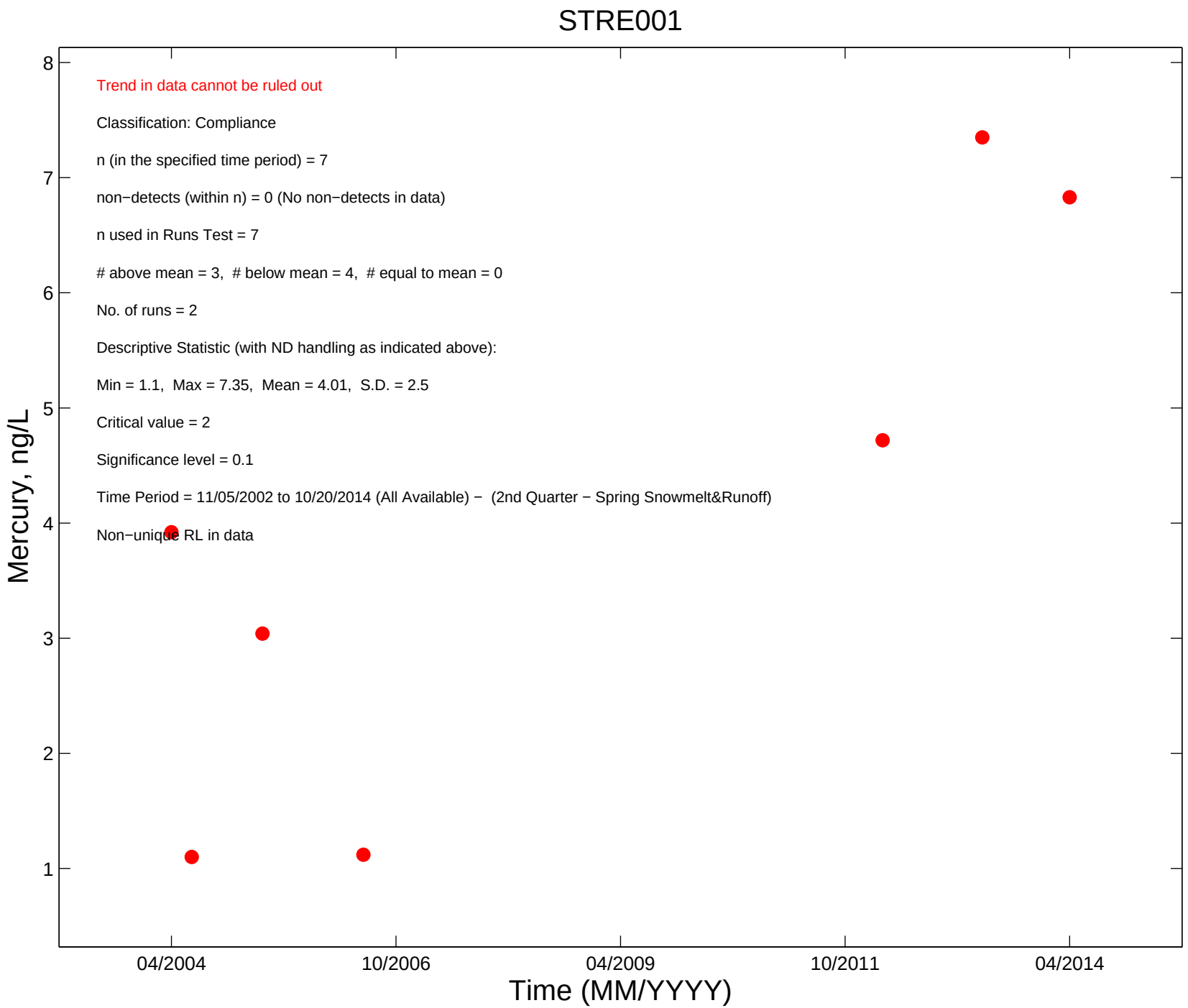
Abbreviation	Explanation
Y	Null hypothesis that the sequence was produced in a random manner cannot be accepted at the indicated significance level (i.e., a trend in data cannot be ruled out).
N	Null hypothesis that the sequence was produced in a random manner cannot be rejected at the indicated significance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

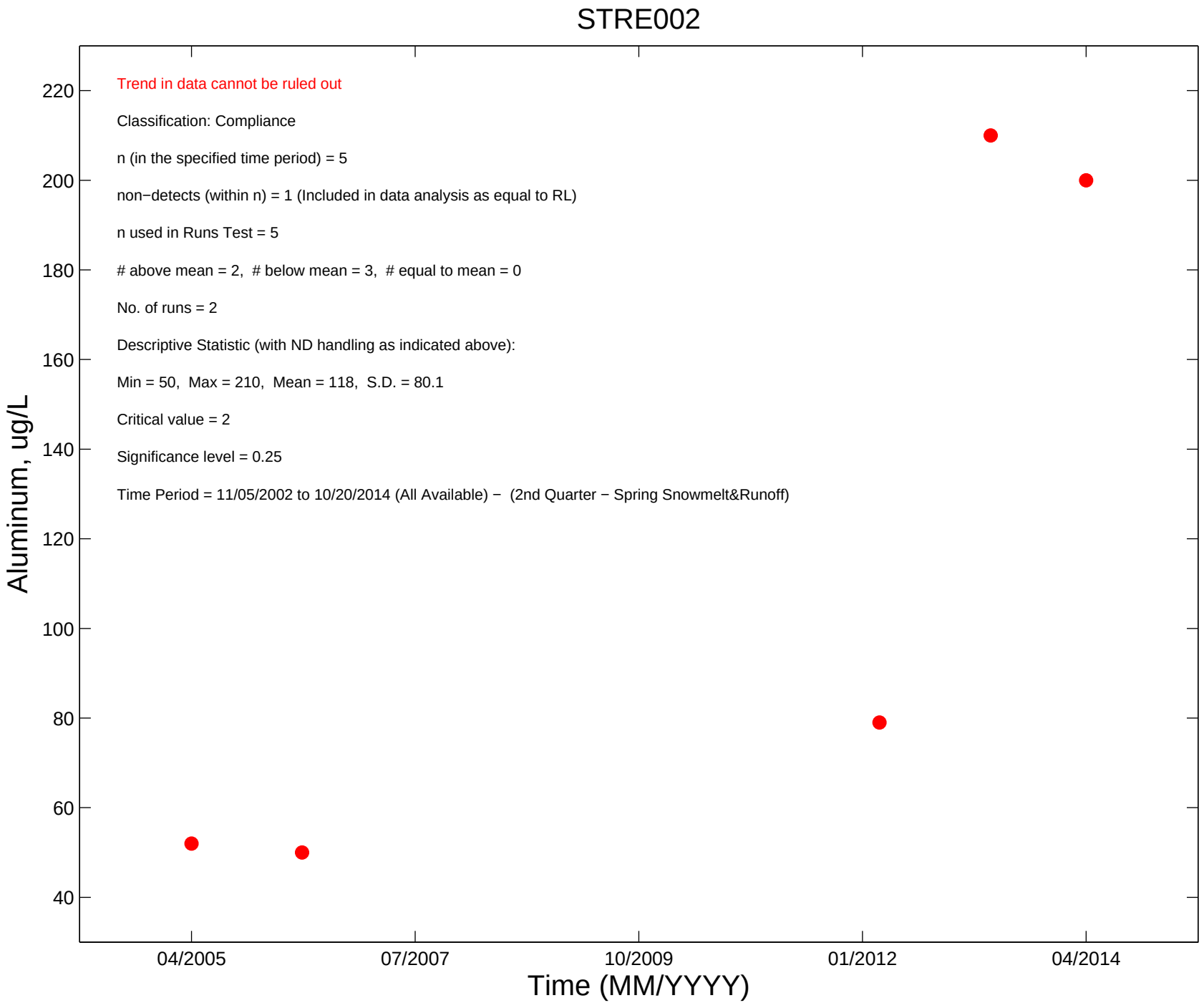
Notes:

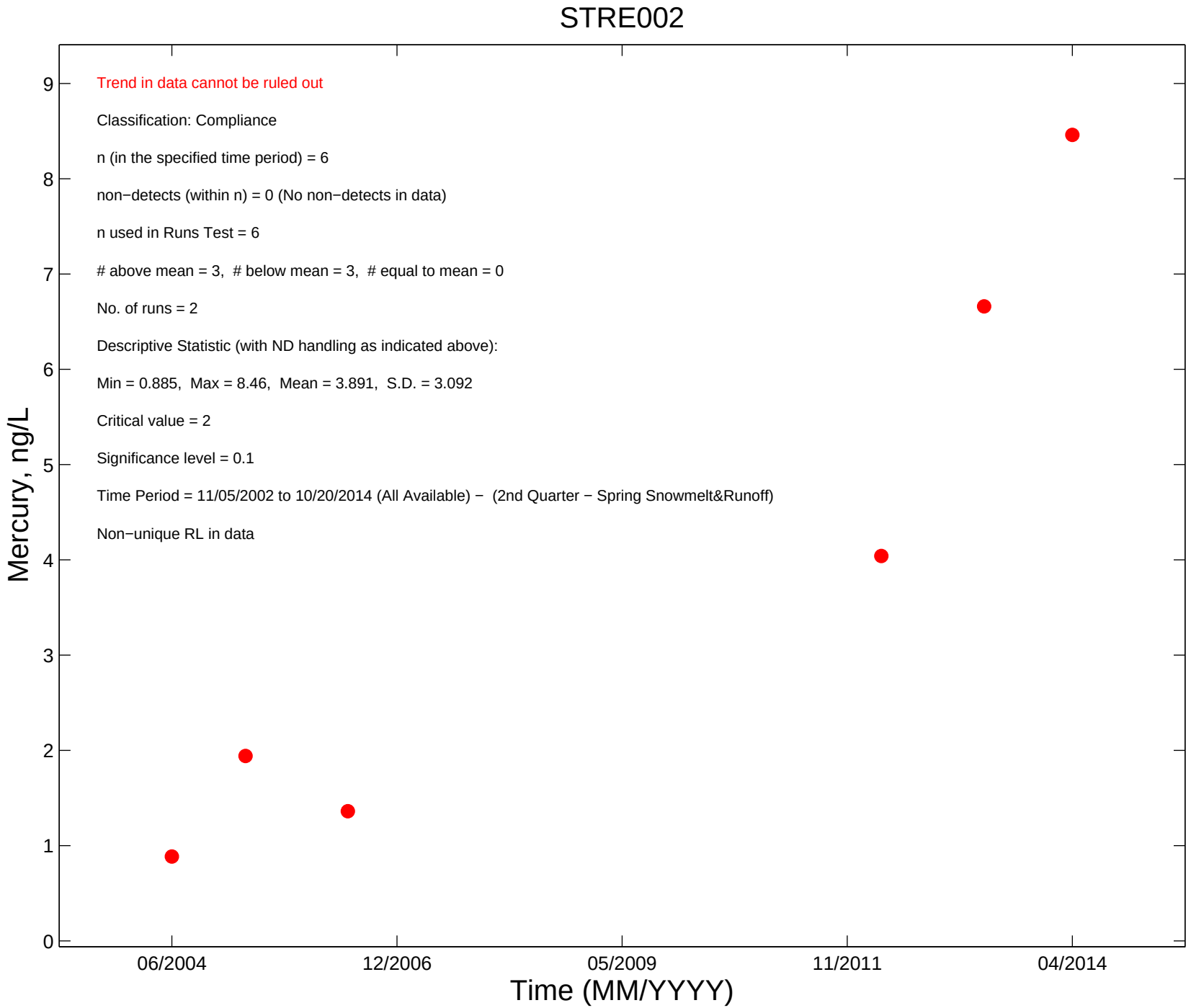
Trends that have inconsistent RLs or >50% NDs are typically rejected.
Trend analysis period is baseline through Q4 2014.

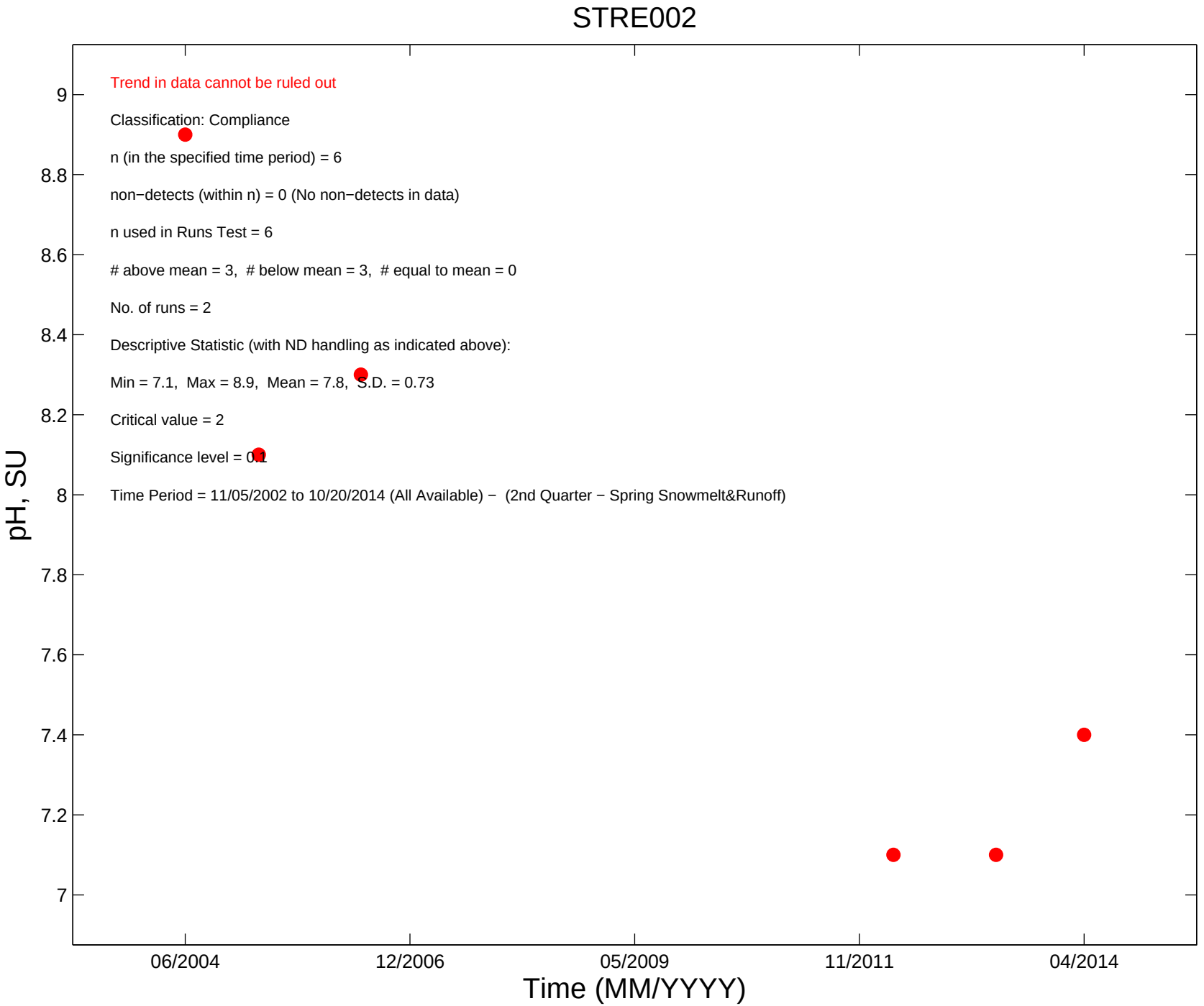
STRE001

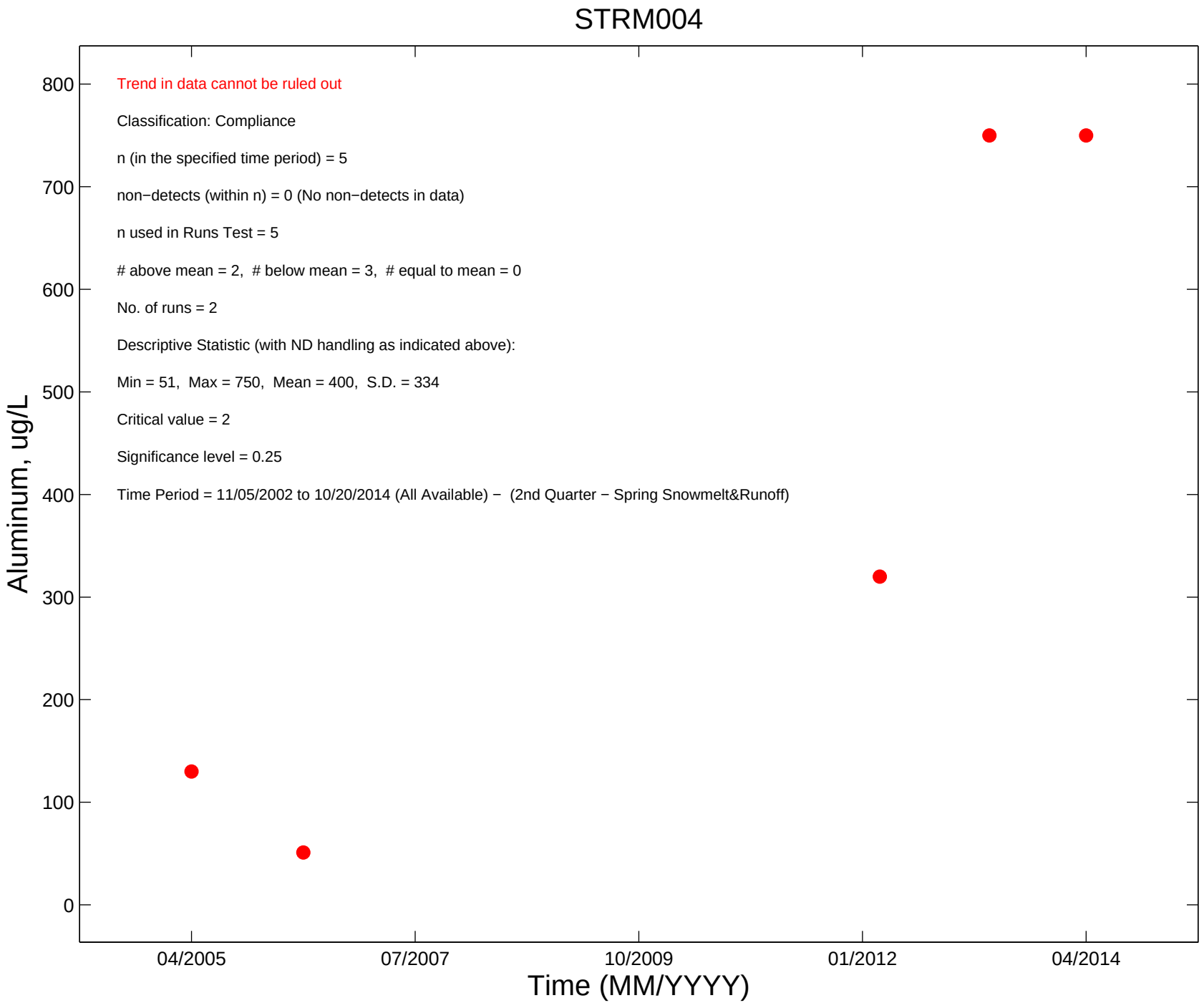

Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 5
non−detects (within n) = 1 (Included in data analysis as equal to RL)
n used in Runs Test = 5
above mean = 2, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 50, Max = 310, Mean = 160, S.D. = 94.9
Critical value = 2
Significance level = 0.25
Time Period = 11/05/2002 to 10/20/2014 (All Available) − (2nd Quarter − Spring Snowmelt&Runoff)
Aluminum, ug/L
300
250
200
150
100
50
04/2005
07/2007
10/2009
01/2012
04/2014
Time (MM/YYYY)

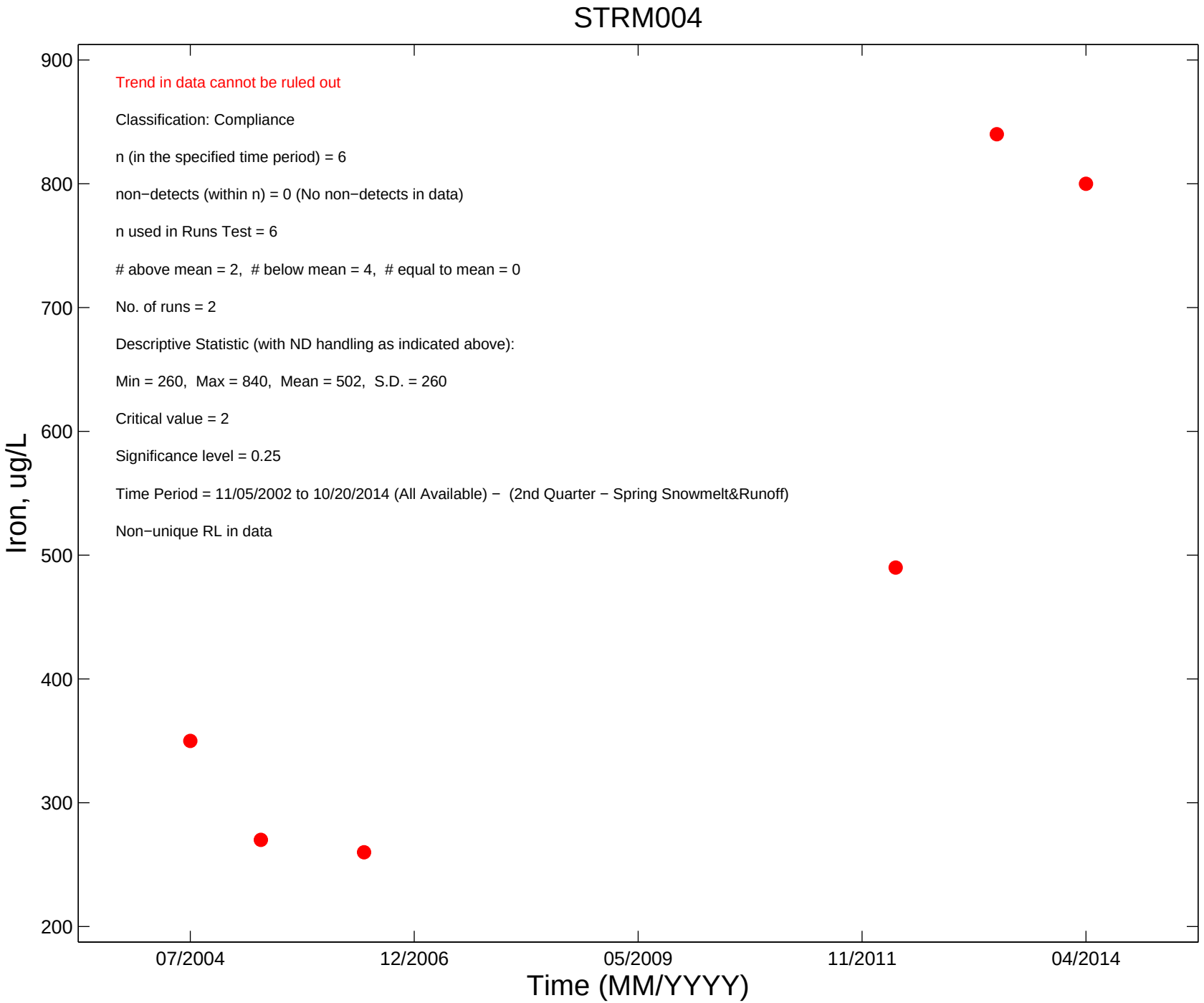

STRE001
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 7
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 7
above mean = 3, # below mean = 4, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1.1, Max = 7.35, Mean = 4.01, S.D. = 2.5
Critical value = 2
Significance level = 0.1
Time Period = 11/05/2002 to 10/20/2014 (All Available) − (2nd Quarter − Spring Snowmelt&Runoff)
Non−unique RL in data
Mercury, ng/L
8
7
6
5
4
3
2
1
04/2004
10/2006
04/2009
10/2011
04/2014
Time (MM/YYYY)

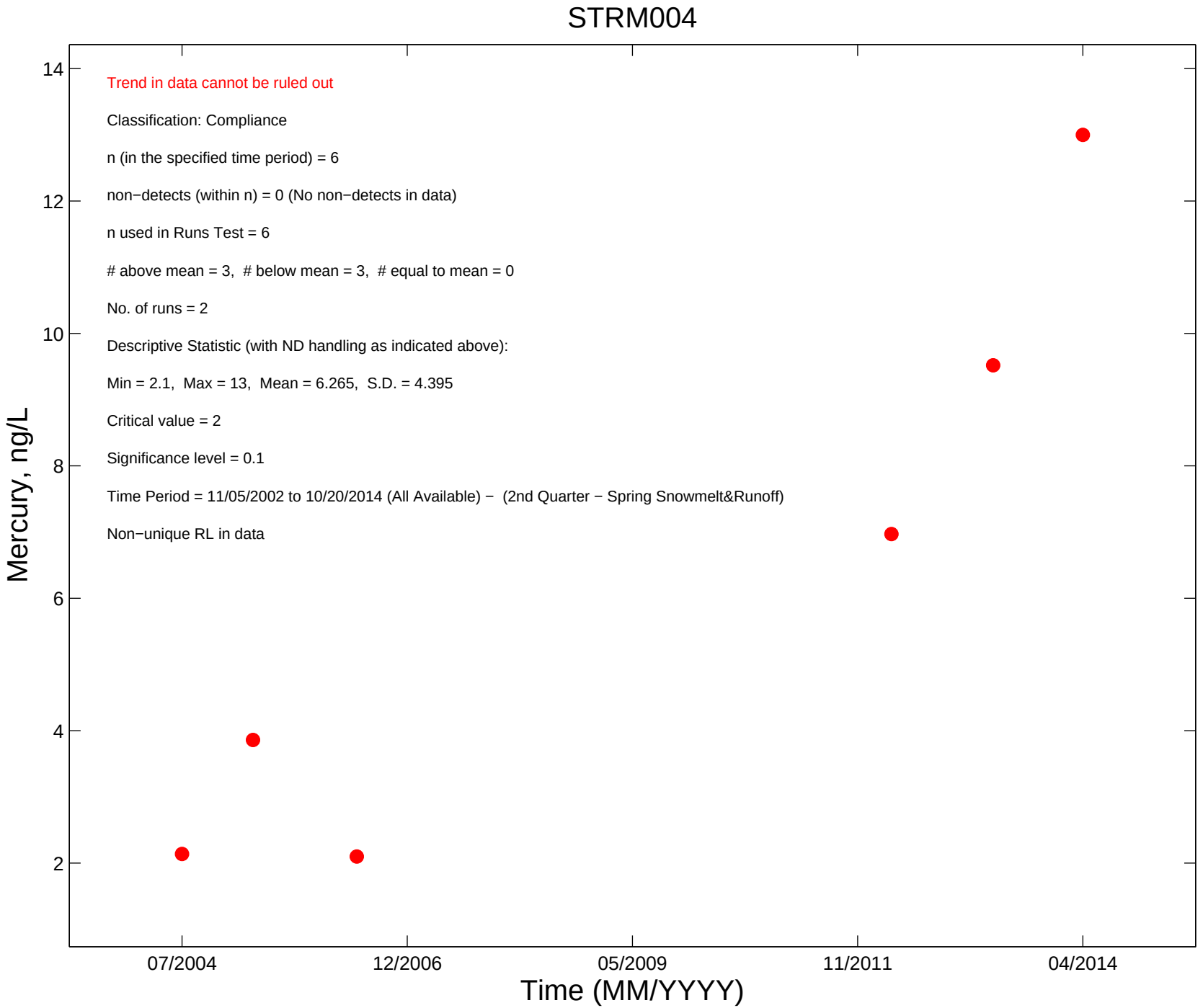

STRE002
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 5
non−detects (within n) = 1 (Included in data analysis as equal to RL)
n used in Runs Test = 5
above mean = 2, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 50, Max = 210, Mean = 118, S.D. = 80.1
Critical value = 2
Significance level = 0.25
Time Period = 11/05/2002 to 10/20/2014 (All Available) − (2nd Quarter − Spring Snowmelt&Runoff)
Aluminum, ug/L
220
200
180
160
140
120
100
80
60
40
04/2005
07/2007
10/2009
01/2012
04/2014
Time (MM/YYYY)

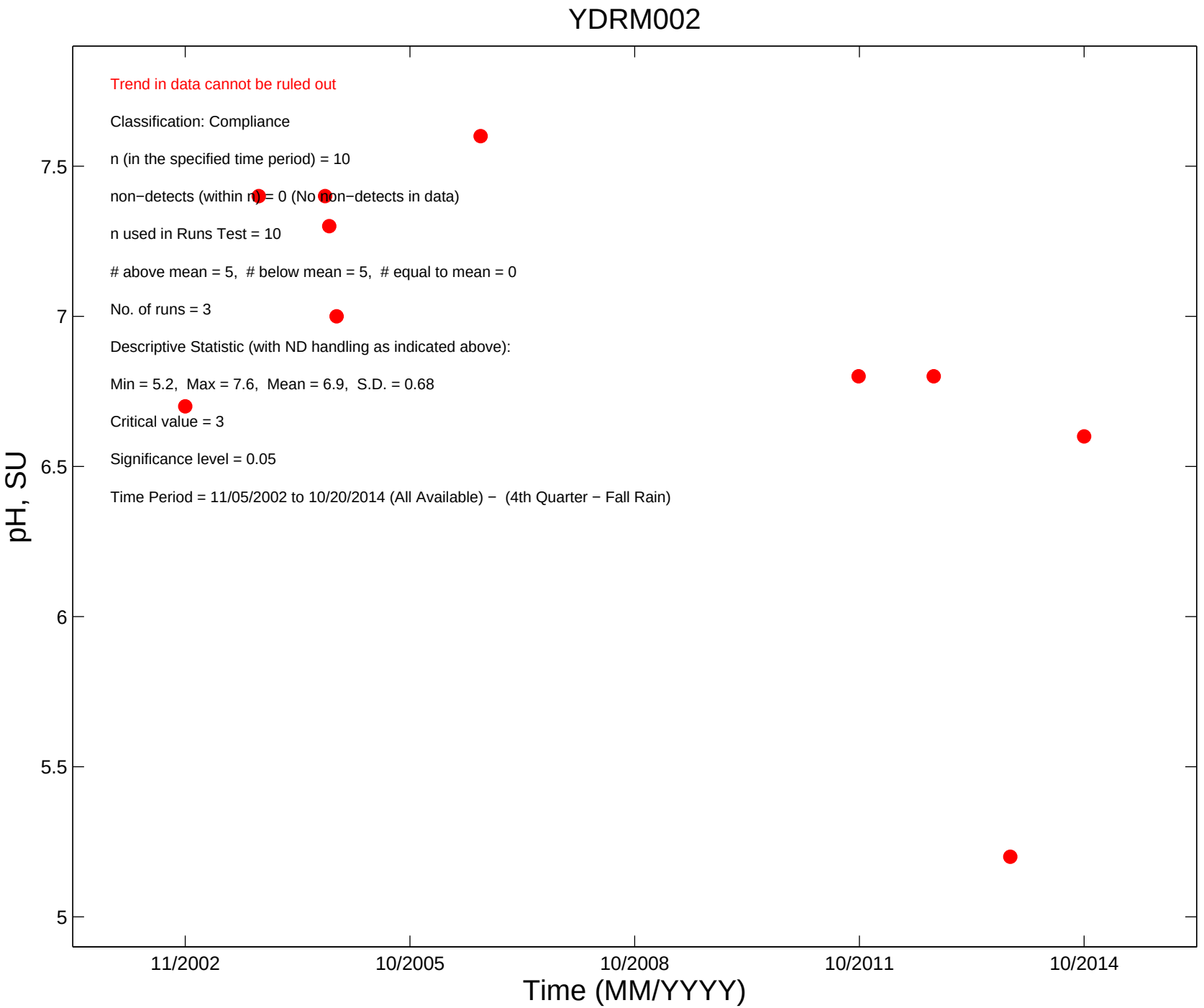

STRE002
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 6
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 6
above mean = 3, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 0.885, Max = 8.46, Mean = 3.891, S.D. = 3.092
Critical value = 2
Significance level = 0.1
Time Period = 11/05/2002 to 10/20/2014 (All Available) − (2nd Quarter − Spring Snowmelt&Runoff)
Non−unique RL in data
Mercury, ng/L
0
1
2
3
4
5
6
7
8
9
06/2004
12/2006
05/2009
11/2011
04/2014
Time (MM/YYYY)


STRE002
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 = 3, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 7.1, Max = 8.9, Mean = 7.8, S.D. = 0.73
Critical value = 2
Significance level = 0.1
Time Period = 11/05/2002 to 10/20/2014 (All Available) − (2nd Quarter − Spring Snowmelt&Runoff)
pH, SU
9
8.8
8.6
8.4
8.2
8
7.8
7.6
7.4
7.2
7
06/2004
12/2006
05/2009
11/2011
04/2014
Time (MM/YYYY)


STRM004
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 = 2, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 51, Max = 750, Mean = 400, S.D. = 334
Critical value = 2
Significance level = 0.25
Time Period = 11/05/2002 to 10/20/2014 (All Available) − (2nd Quarter − Spring Snowmelt&Runoff)
Aluminum, ug/L
800
700
600
500
400
300
200
100
0
04/2005
07/2007
10/2009
01/2012
04/2014
Time (MM/YYYY)


STRM004
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 = 260, Max = 840, Mean = 502, S.D. = 260
Critical value = 2
Significance level = 0.25
Time Period = 11/05/2002 to 10/20/2014 (All Available) − (2nd Quarter − Spring Snowmelt&Runoff)
Non−unique RL in data
900
800
700
600
500
400
300
200
Iron, ug/L
07/2004
12/2006
05/2009
11/2011
04/2014
Time (MM/YYYY)


STRM004
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 = 3, # below mean = 3, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 2.1, Max = 13, Mean = 6.265, S.D. = 4.395
Critical value = 2
Significance level = 0.1
Time Period = 11/05/2002 to 10/20/2014 (All Available) − (2nd Quarter − Spring Snowmelt&Runoff)
Non−unique RL in data
Mercury, ng/L
14
12
10
8
6
4
2
07/2004
12/2006
05/2009
11/2011
04/2014
Time (MM/YYYY)

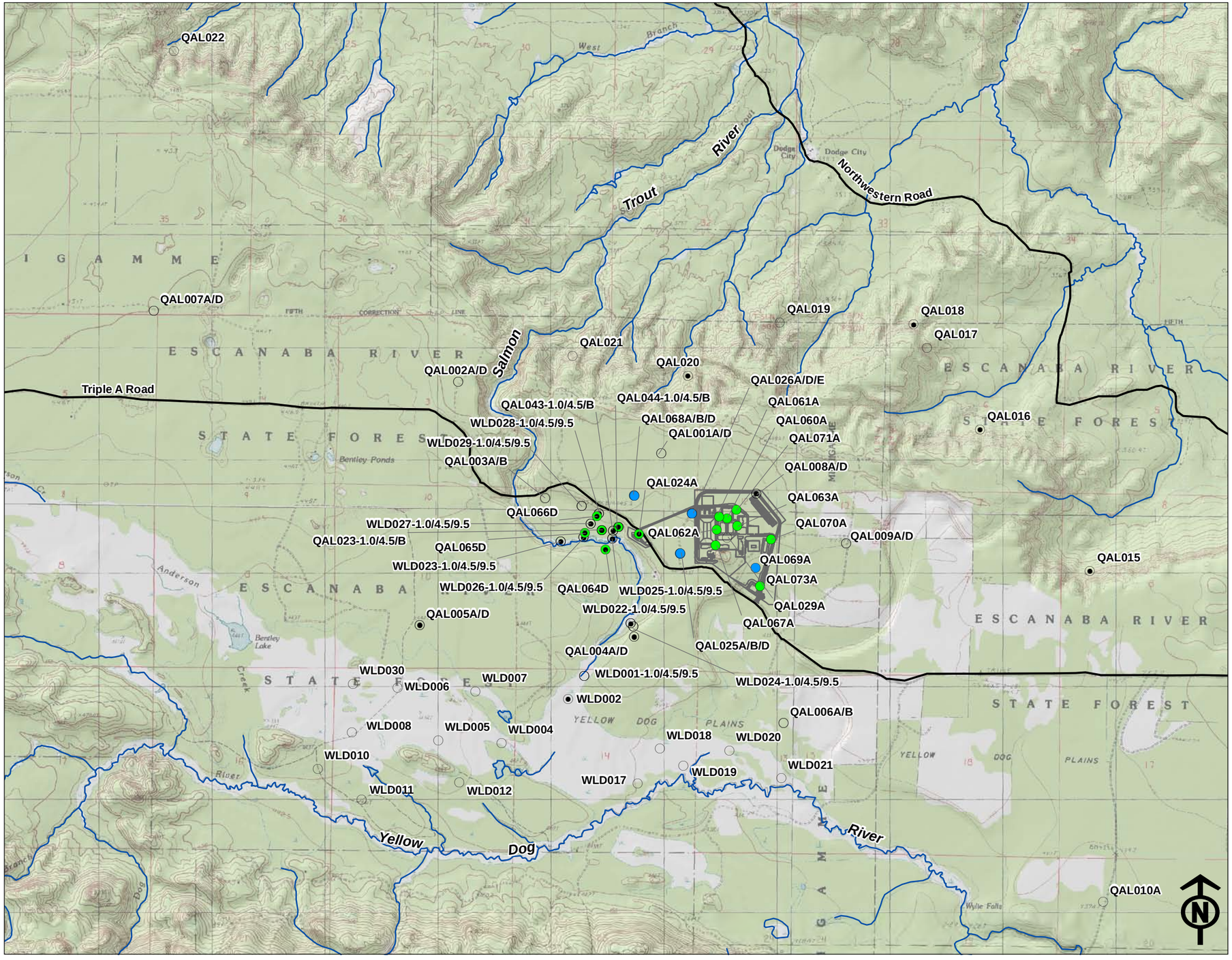

YDRM002
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 10
non−detects (within n) = 0 (No non−detects in data)
n used in Runs Test = 10
above mean = 5, # below mean = 5, # equal to mean = 0
No. of runs = 3
Descriptive Statistic (with ND handling as indicated above):
Min = 5.2, Max = 7.6, Mean = 6.9, S.D. = 0.68
Critical value = 3
Significance level = 0.05
Time Period = 11/05/2002 to 10/20/2014 (All Available) − (4th Quarter − Fall Rain)
pH, SU
7.5
7
6.5
6
5.5
5
11/2002
10/2005
10/2008
10/2011
10/2014
Time (MM/YYYY)

Appendix L

Eagle Mine

Water Level Monitoring Location Map

MINE PERMIT GROUNDWATER MONITORING LOCATIONS Regional View



- COMPLIANCE WATER QUALITY
- BACKGROUND WATER QUALITY
- 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 hudbay mining

North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Appendix M

Eagle Mine

Continuous Groundwater Level Results

2014 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-13						
Mean	1416.6	1417.8	1415.7	1418.2	1417.1	1416.9
Minimum	1416.4	1417.7	1415.6	1418.0	1416.9	1416.8
Maximum	1416.7	1418.0	1415.8	1418.4	1417.2	1417.0
Nov-13						
Mean	1416.7	1417.6	1415.7	1418.3	1417.1	1416.9
Minimum	1416.6	1417.5	1415.6	1418.0	1417.1	1416.9
Maximum	1416.7	1417.7	1415.8	1418.5	1417.2	1417.1
Dec-13						
Mean	1416.4	1417.4	1415.5	1417.8	1417.0	1416.8
Minimum	1416.2	1417.3	1415.0	1416.8	1416.8	1416.6
Maximum	1416.7	1417.5	1415.7	1418.4	1417.2	1417.0
Jan-14						
Mean	1416.3	1417.2	1415.2	1417.6	1416.9	1416.5
Minimum	1416.2	1417.1	1415.0	1417.0	1416.8	1416.4
Maximum	1416.5	1417.3	1415.5	1418.2	1417.0	1416.8
Feb-14						
Mean	1416.1	**1417.0**	1415.0	1417.3	1416.7	1416.3
Minimum	1415.6	1416.9	1414.4	1415.8	1416.4	1416.0
Maximum	1416.2	1417.1	1415.2	1417.8	1416.8	1416.5
Mar-14						
Mean	1416.0	**1416.7**	**1414.8**	1417.2	1416.6	1416.1
Minimum	1415.7	1416.6	1414.6	1416.6	1416.4	1416.0
Maximum	1416.1	1416.9	1415.0	1417.5	1416.7	1416.3
Apr-14						
Mean	1416.0	**1416.6**	**1414.7**	1417.2	1416.8	1416.1
Minimum	1415.9	1416.6	1414.6	1417.0	1416.6	1416.0
Maximum	1416.2	1416.7	1414.8	1417.5	1417.1	1416.4
May-14						
Mean	1416.2	**1417.0**	**1414.8**	1417.3	1417.1	1416.4
Minimum	1415.8	1416.7	1414.5	1416.4	1416.8	1416.1
Maximum	1416.3	1417.6	1415.0	1417.5	1417.3	1416.6
Jun-14						
Mean	1416.0	1417.9	1414.9	1417.3	1416.8	1416.3
Minimum	1415.8	1417.7	1414.5	1416.5	1416.7	1416.1

2014 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
Maximum	1416.2	1418.1	1415.2	1417.6	1417.0	1416.5
Jul-14						
Mean	1416.2	1418.0	1415.3	1417.8	1416.9	1416.6
Minimum	1416.1	1417.9	1415.1	1417.5	1416.8	1416.4
Maximum	1416.4	1418.1	1415.5	1418.0	1417.0	1416.7
Aug-14						
Mean	1416.3	1417.6	1415.5	1417.7	1416.8	1416.6
Minimum	1416.2	1417.5	1415.4	1417.5	1416.7	1416.5
Maximum	1416.4	1417.9	1415.6	1417.9	1416.9	1416.7
Sep-14						
Mean	1416.4	1417.4	1415.5	1417.7	1416.9	1416.7
Minimum	1416.2	1417.3	1415.2	1417.0	1416.8	1416.5
Maximum	1416.6	1417.5	1415.6	1418.0	1417.0	1416.8

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 **bold** indicate values outside of the background range.

2014 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	1416.1	1405.9	1408.8	1409.1	1409.8	1409.8	1414.3	1414.3	1419.0	1419.2
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-13										
Mean	1422.3	1414.0	1416.1	1416.1	1416.5	1416.7	1422.3	1422.3	1426.8	1426.7
Minimum	1422.3	1414.0	1416.0	1416.0	1416.3	1416.5	1421.2	1421.3	1425.8	1426.1
Maximum	1422.5	1414.1	1416.2	1416.2	1416.6	1416.9	1422.6	1422.7	1427.3	1427.0
Nov-13										
Mean	1422.3	1414.0	1416.0	1416.0	1416.6	**1416.9**	1422.6	1422.7	1427.5	1427.2
Minimum	1422.3	1414.0	1416.0	1416.0	1416.6	1416.8	1422.6	1422.6	1427.4	1427.1
Maximum	1422.5	1414.1	1416.1	1416.1	1416.8	1417.1	1422.8	1422.9	1427.7	1427.5
Dec-13										
Mean	1422.3	NM	1415.9	1415.9	1416.6	**1416.8**	1422.5	1422.5	1427.2	1426.9
Minimum	1422.3	NM	1415.9	1415.9	1416.6	1416.8	1422.5	1422.5	1427.0	1426.7
Maximum	1422.3	NM	1416.0	1416.0	1416.6	1416.8	1422.6	1422.6	1427.5	1427.1
Jan-14										
Mean	1422.2	NM	NM	1416.0	NM	NM	NM	1422.4	1426.6	1426.5
Minimum	1422.2	NM	NM	1415.8	NM	NM	NM	1422.4	1426.5	1426.4
Maximum	1422.3	NM	NM	1416.1	NM	NM	NM	1422.5	1426.9	1426.7
Feb-14										
Mean	1422.2	NM	NM	1415.9	NM	NM	NM	1422.4	1426.3	1426.2
Minimum	1422.2	NM	NM	1415.6	NM	NM	NM	1422.4	1426.2	1426.1
Maximum	1422.2	NM	NM	1416.1	NM	NM	NM	1422.4	1426.4	1426.4
Mar-14										
Mean	1422.1	1413.6	1415.8	1415.9	1416.5	1416.5	1422.4	1422.4	1426.3	1426.1
Minimum	1422.1	1413.6	1415.8	1415.7	1416.5	1416.5	1422.3	1422.3	1426.1	1426.0
Maximum	1422.2	1413.7	1415.9	1416.0	1416.5	1416.6	1422.5	1422.5	1426.6	1426.3
Apr-14										
Mean	1422.3	1413.8	1415.8	1415.9	1416.8	**1416.9**	1422.8	1422.8	1427.9	1427.4
Minimum	1422.2	1413.7	1415.8	1415.8	1416.6	1416.7	1422.6	1422.6	1427.4	1426.7
Maximum	1422.5	1414.0	1416.0	1416.0	1417.0	1417.2	1423.0	1423.0	1428.2	1427.8
May-14										
Mean	1422.5	1413.9	1415.9	1415.9	1416.8	**1417.1**	1422.8	1422.8	1427.9	1427.6
Minimum	1422.5	1413.8	1415.8	1415.8	1416.6	1416.8	1422.5	1422.5	1427.6	1427.3
Maximum	1422.6	1414.1	1416.0	1416.0	1417.1	1417.4	1423.1	1423.1	1428.2	1427.9

2014 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	1416.1	1405.9	1408.8	1409.1	1409.8	1409.8	1414.3	1414.3	1419.0	1419.2
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
Jun-14										
Mean	1422.4	1413.7	1415.7	1415.8	1416.4	1416.6	1422.2	1422.2	1427.2	1427.1
Minimum	1422.3	1413.6	1415.6	1415.7	1416.3	1416.4	1421.7	1421.8	1426.7	1426.8
Maximum	1422.5	1413.8	1415.9	1415.9	1416.6	1416.8	1422.5	1422.5	1427.6	1427.3
Jul-14										
Mean	1422.3	1413.7	1415.8	1415.9	1416.2	1416.4	1421.6	1421.7	1426.3	1426.5
Minimum	1422.2	1413.6	1415.6	1415.7	1416.1	1416.3	1421.2	1421.3	1426.0	1426.3
Maximum	1422.3	1413.8	1416.0	1416.1	1416.4	1416.5	1422.0	1422.0	1426.7	1426.8
Aug-14										
Mean	1422.2	1413.6	1416.0	1416.0	1416.2	1416.2	1421.3	1421.3	1425.9	1426.2
Minimum	1422.2	1413.5	1415.9	1415.9	1416.0	1416.0	1420.7	1420.8	1425.5	1425.9
Maximum	1422.3	1413.8	1416.1	1416.1	1416.4	1416.4	1421.9	1422.0	1426.4	1426.5
Sep-14										
Mean	1422.2	1413.5	1416.0	1416.1	1416.5	1416.3	1422.2	1422.2	1426.8	1426.7
Minimum	1422.2	1413.3	1416.0	1416.0	1416.3	1416.2	1421.6	1421.6	1426.1	1426.3
Maximum	1422.5	1413.8	1416.1	1416.2	1416.7	1416.5	1422.7	1422.7	1427.5	1427.2

Source: North Jackson Company, REACH System

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

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

Results in **bold** indicate values outside of the background range.

2014 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-13						
Mean	1416.6	1417.8	1415.7	1418.2	1417.1	1416.9
Minimum	1416.4	1417.7	1415.6	1418.0	1416.9	1416.8
Maximum	1416.7	1418.0	1415.8	1418.4	1417.2	1417.0
Nov-13						
Mean	1416.7	1417.6	1415.7	1418.3	1417.1	1416.9
Minimum	1416.6	1417.5	1415.6	1418.0	1417.1	1416.9
Maximum	1416.7	1417.7	1415.8	1418.5	1417.2	1417.1
Dec-13						
Mean	1416.4	1417.4	1415.5	1417.8	1417.0	1416.8
Minimum	1416.2	1417.3	1415.0	1416.8	1416.8	1416.6
Maximum	1416.7	1417.5	1415.7	1418.4	1417.2	1417.0
Jan-14						
Mean	1416.3	1417.2	1415.2	1417.6	1416.9	1416.5
Minimum	1416.2	1417.1	1415.0	1417.0	1416.8	1416.4
Maximum	1416.5	1417.3	1415.5	1418.2	1417.0	1416.8
Feb-14						
Mean	1416.1	**1417.0**	1415.0	1417.3	1416.7	1416.3
Minimum	1415.6	1416.9	1414.4	1415.8	1416.4	1416.0
Maximum	1416.2	1417.1	1415.2	1417.8	1416.8	1416.5
Mar-14						
Mean	1416.0	**1416.7**	**1414.8**	1417.2	1416.6	1416.1
Minimum	1415.7	1416.6	1414.6	1416.6	1416.4	1416.0
Maximum	1416.1	1416.9	1415.0	1417.5	1416.7	1416.3
Apr-14						
Mean	1416.0	**1416.6**	**1414.7**	1417.2	1416.8	1416.1
Minimum	1415.9	1416.6	1414.6	1417.0	1416.6	1416.0
Maximum	1416.2	1416.7	1414.8	1417.5	1417.1	1416.4
May-14						
Mean	1416.2	**1417.0**	**1414.8**	1417.3	1417.1	1416.4
Minimum	1415.8	1416.7	1414.5	1416.4	1416.8	1416.1
Maximum	1416.3	1417.6	1415.0	1417.5	1417.3	1416.6
Jun-14						
Mean	1416.0	1417.9	1414.9	1417.3	1416.8	1416.3
Minimum	1415.8	1417.7	1414.5	1416.5	1416.7	1416.1

2014 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
Maximum	1416.2	1418.1	1415.2	1417.6	1417.0	1416.5
Jul-14						
Mean	1416.2	1418.0	1415.3	1417.8	1416.9	1416.6
Minimum	1416.1	1417.9	1415.1	1417.5	1416.8	1416.4
Maximum	1416.4	1418.1	1415.5	1418.0	1417.0	1416.7
Aug-14						
Mean	1416.3	1417.6	1415.5	1417.7	1416.8	1416.6
Minimum	1416.2	1417.5	1415.4	1417.5	1416.7	1416.5
Maximum	1416.4	1417.9	1415.6	1417.9	1416.9	1416.7
Sep-14						
Mean	1416.4	1417.4	1415.5	1417.7	1416.9	1416.7
Minimum	1416.2	1417.3	1415.2	1417.0	1416.8	1416.5
Maximum	1416.6	1417.5	1415.6	1418.0	1417.0	1416.8

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 **bold** indicate values outside of the background range.

2014 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	1416.1	1405.9	1408.8	1409.1	1409.8	1409.8	1414.3	1414.3	1419.0	1419.2
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-13										
Mean	1422.3	1414.0	1416.1	1416.1	1416.5	1416.7	1422.3	1422.3	1426.8	1426.7
Minimum	1422.3	1414.0	1416.0	1416.0	1416.3	1416.5	1421.2	1421.3	1425.8	1426.1
Maximum	1422.5	1414.1	1416.2	1416.2	1416.6	1416.9	1422.6	1422.7	1427.3	1427.0
Nov-13										
Mean	1422.3	1414.0	1416.0	1416.0	1416.6	**1416.9**	1422.6	1422.7	1427.5	1427.2
Minimum	1422.3	1414.0	1416.0	1416.0	1416.6	1416.8	1422.6	1422.6	1427.4	1427.1
Maximum	1422.5	1414.1	1416.1	1416.1	1416.8	1417.1	1422.8	1422.9	1427.7	1427.5
Dec-13										
Mean	1422.3	NM	1415.9	1415.9	1416.6	**1416.8**	1422.5	1422.5	1427.2	1426.9
Minimum	1422.3	NM	1415.9	1415.9	1416.6	1416.8	1422.5	1422.5	1427.0	1426.7
Maximum	1422.3	NM	1416.0	1416.0	1416.6	1416.8	1422.6	1422.6	1427.5	1427.1
Jan-14										
Mean	1422.2	NM	NM	1416.0	NM	NM	NM	1422.4	1426.6	1426.5
Minimum	1422.2	NM	NM	1415.8	NM	NM	NM	1422.4	1426.5	1426.4
Maximum	1422.3	NM	NM	1416.1	NM	NM	NM	1422.5	1426.9	1426.7
Feb-14										
Mean	1422.2	NM	NM	1415.9	NM	NM	NM	1422.4	1426.3	1426.2
Minimum	1422.2	NM	NM	1415.6	NM	NM	NM	1422.4	1426.2	1426.1
Maximum	1422.2	NM	NM	1416.1	NM	NM	NM	1422.4	1426.4	1426.4
Mar-14										
Mean	1422.1	1413.6	1415.8	1415.9	1416.5	1416.5	1422.4	1422.4	1426.3	1426.1
Minimum	1422.1	1413.6	1415.8	1415.7	1416.5	1416.5	1422.3	1422.3	1426.1	1426.0
Maximum	1422.2	1413.7	1415.9	1416.0	1416.5	1416.6	1422.5	1422.5	1426.6	1426.3
Apr-14										
Mean	1422.3	1413.8	1415.8	1415.9	1416.8	**1416.9**	1422.8	1422.8	1427.9	1427.4
Minimum	1422.2	1413.7	1415.8	1415.8	1416.6	1416.7	1422.6	1422.6	1427.4	1426.7
Maximum	1422.5	1414.0	1416.0	1416.0	1417.0	1417.2	1423.0	1423.0	1428.2	1427.8
May-14										
Mean	1422.5	1413.9	1415.9	1415.9	1416.8	**1417.1**	1422.8	1422.8	1427.9	1427.6
Minimum	1422.5	1413.8	1415.8	1415.8	1416.6	1416.8	1422.5	1422.5	1427.6	1427.3
Maximum	1422.6	1414.1	1416.0	1416.0	1417.1	1417.4	1423.1	1423.1	1428.2	1427.9

2014 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	1416.1	1405.9	1408.8	1409.1	1409.8	1409.8	1414.3	1414.3	1419.0	1419.2
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
Jun-14										
Mean	1422.4	1413.7	1415.7	1415.8	1416.4	1416.6	1422.2	1422.2	1427.2	1427.1
Minimum	1422.3	1413.6	1415.6	1415.7	1416.3	1416.4	1421.7	1421.8	1426.7	1426.8
Maximum	1422.5	1413.8	1415.9	1415.9	1416.6	1416.8	1422.5	1422.5	1427.6	1427.3
Jul-14										
Mean	1422.3	1413.7	1415.8	1415.9	1416.2	1416.4	1421.6	1421.7	1426.3	1426.5
Minimum	1422.2	1413.6	1415.6	1415.7	1416.1	1416.3	1421.2	1421.3	1426.0	1426.3
Maximum	1422.3	1413.8	1416.0	1416.1	1416.4	1416.5	1422.0	1422.0	1426.7	1426.8
Aug-14										
Mean	1422.2	1413.6	1416.0	1416.0	1416.2	1416.2	1421.3	1421.3	1425.9	1426.2
Minimum	1422.2	1413.5	1415.9	1415.9	1416.0	1416.0	1420.7	1420.8	1425.5	1425.9
Maximum	1422.3	1413.8	1416.1	1416.1	1416.4	1416.4	1421.9	1422.0	1426.4	1426.5
Sep-14										
Mean	1422.2	1413.5	1416.0	1416.1	1416.5	1416.3	1422.2	1422.2	1426.8	1426.7
Minimum	1422.2	1413.3	1416.0	1416.0	1416.3	1416.2	1421.6	1421.6	1426.1	1426.3
Maximum	1422.5	1413.8	1416.1	1416.2	1416.7	1416.5	1422.7	1422.7	1427.5	1427.2

Source: North Jackson Company, REACH System

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

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

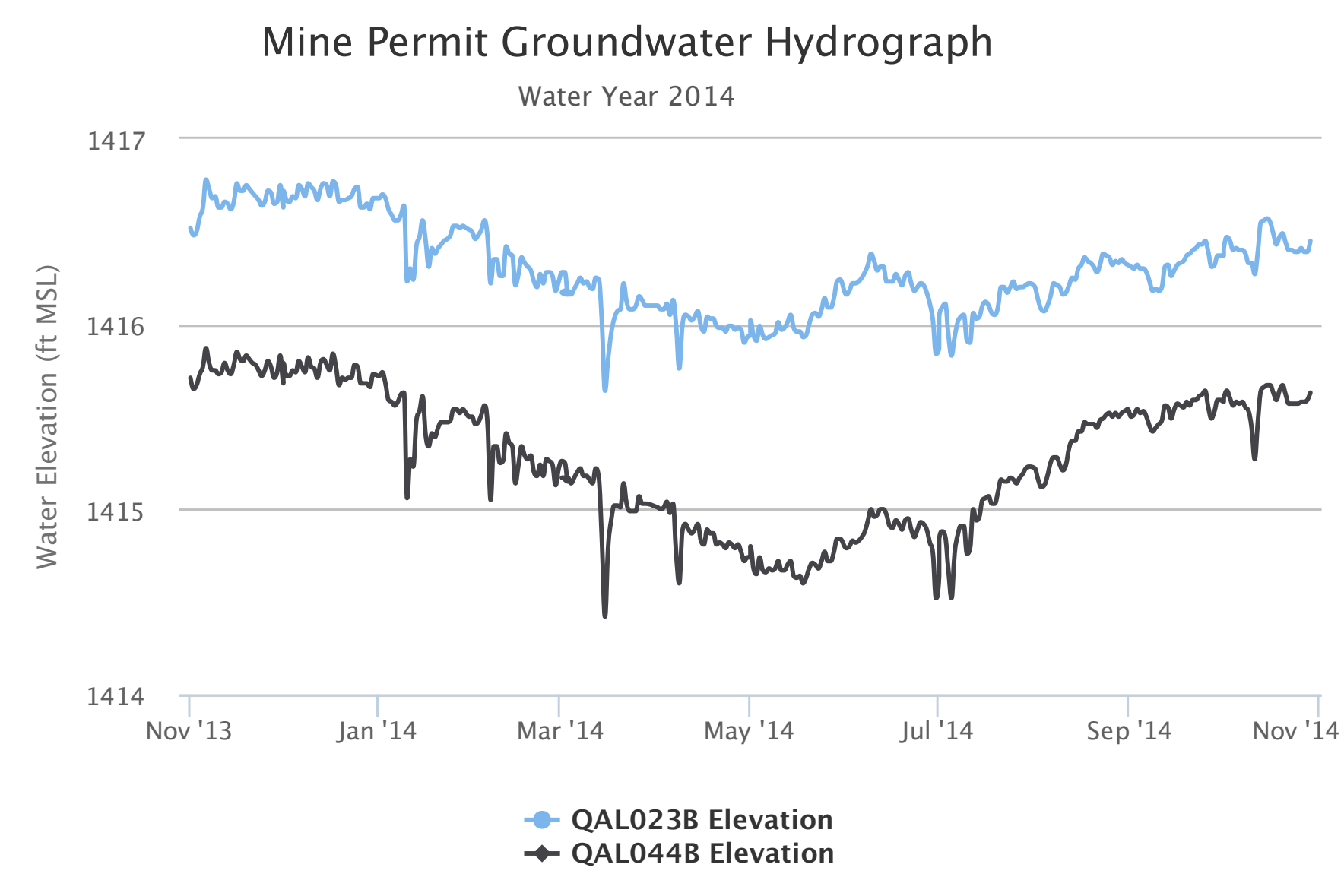
Results in **bold** indicate values outside of the background range.

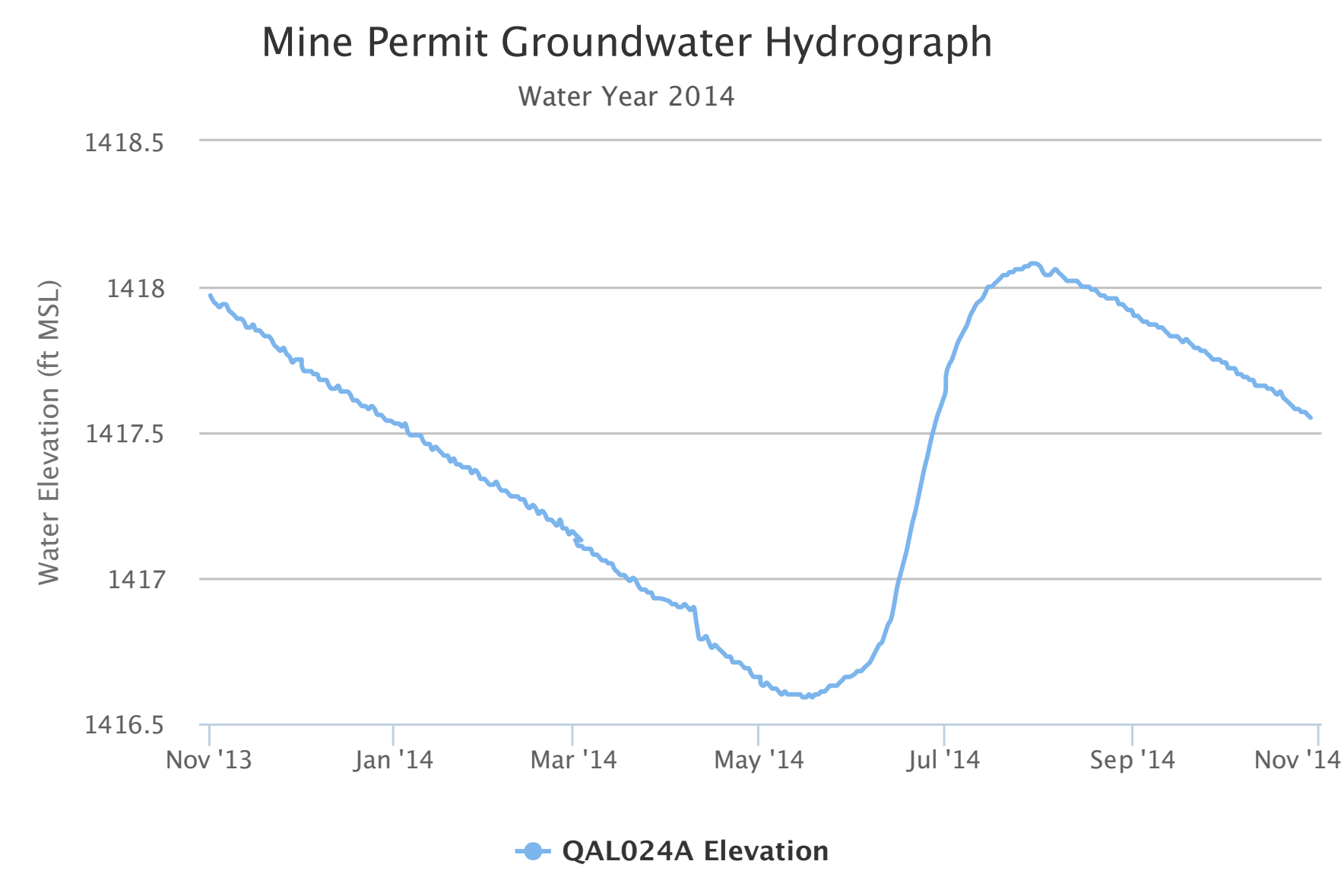
Appendix N

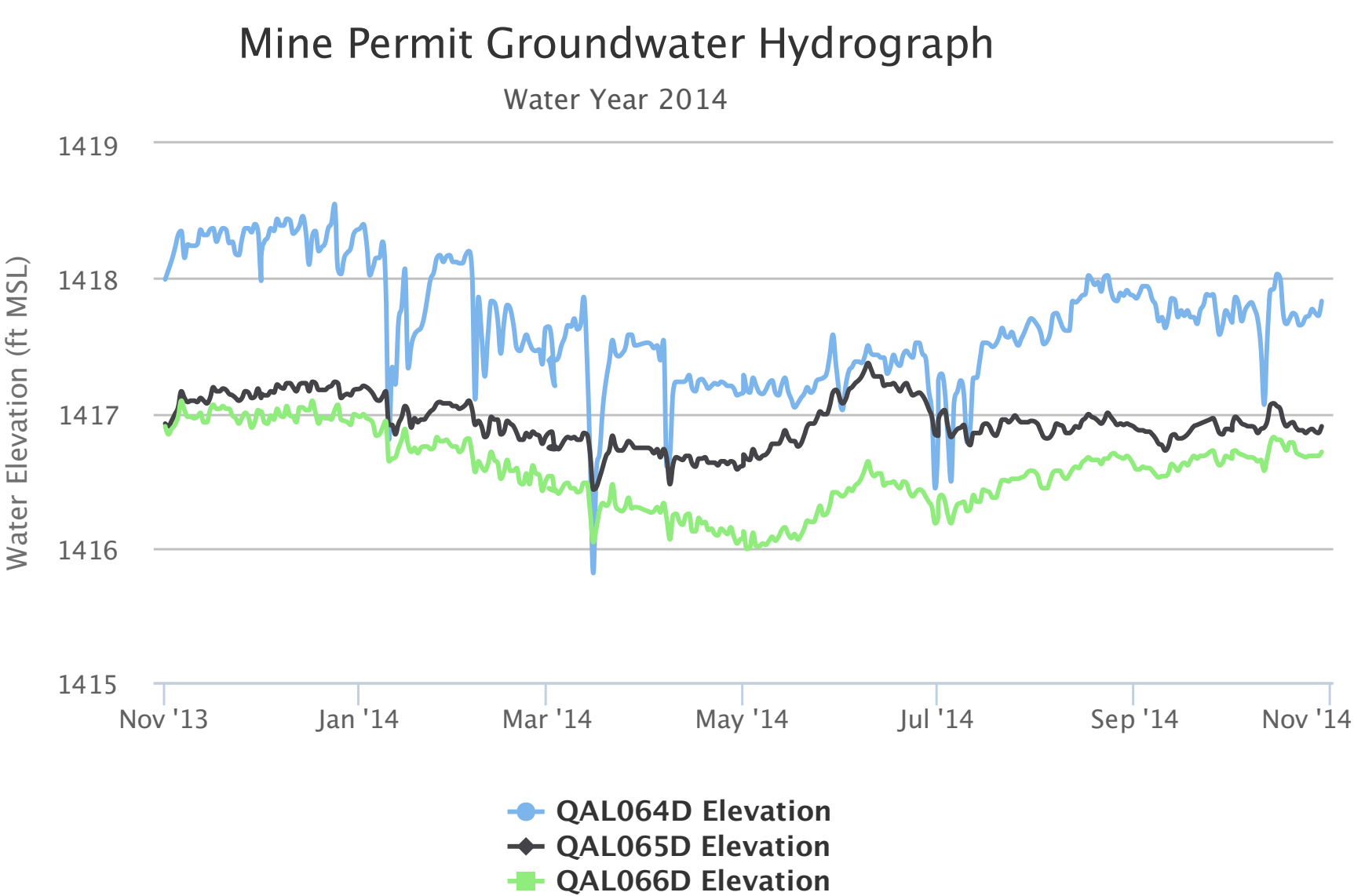
Eagle Mine

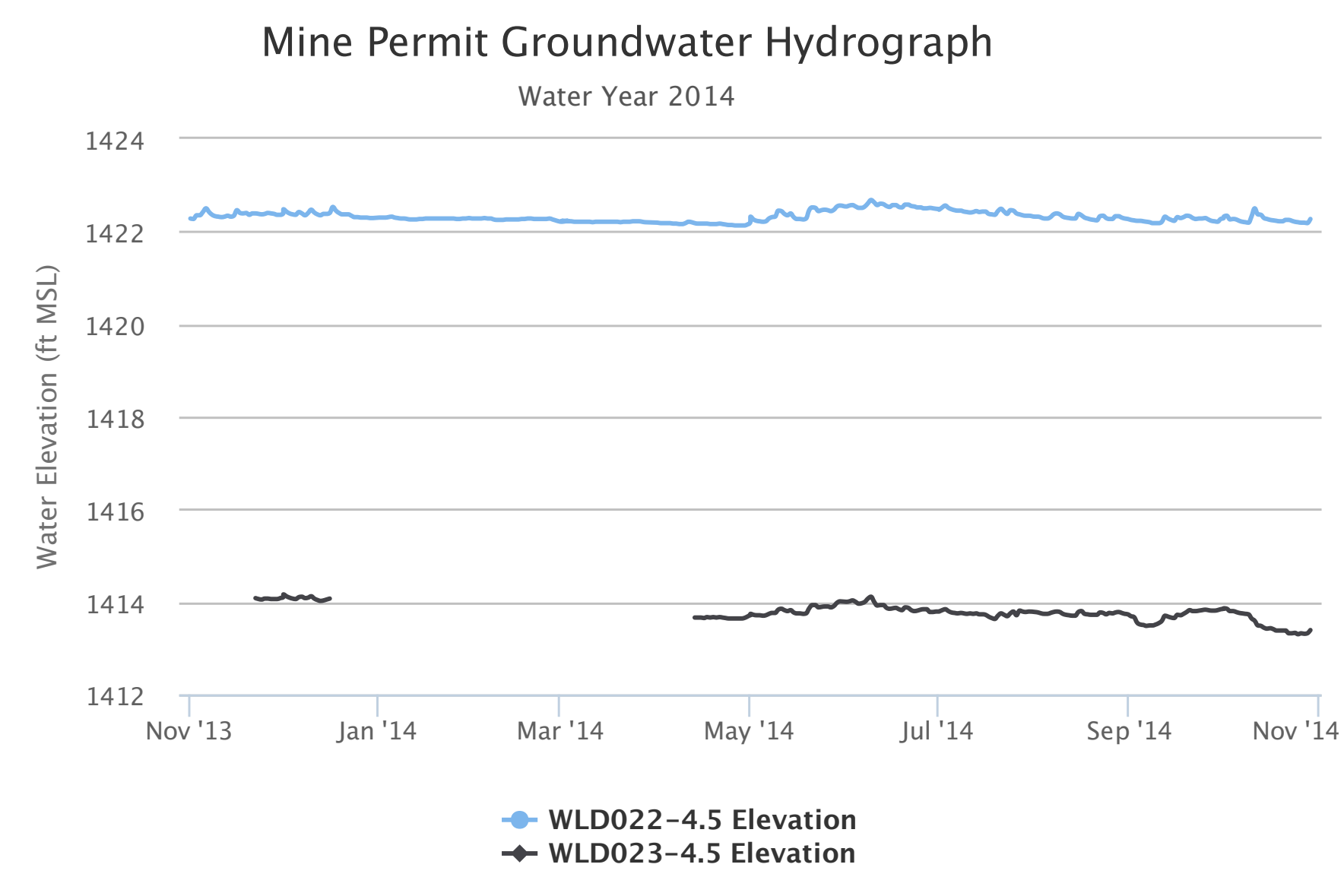
Groundwater and Wetland

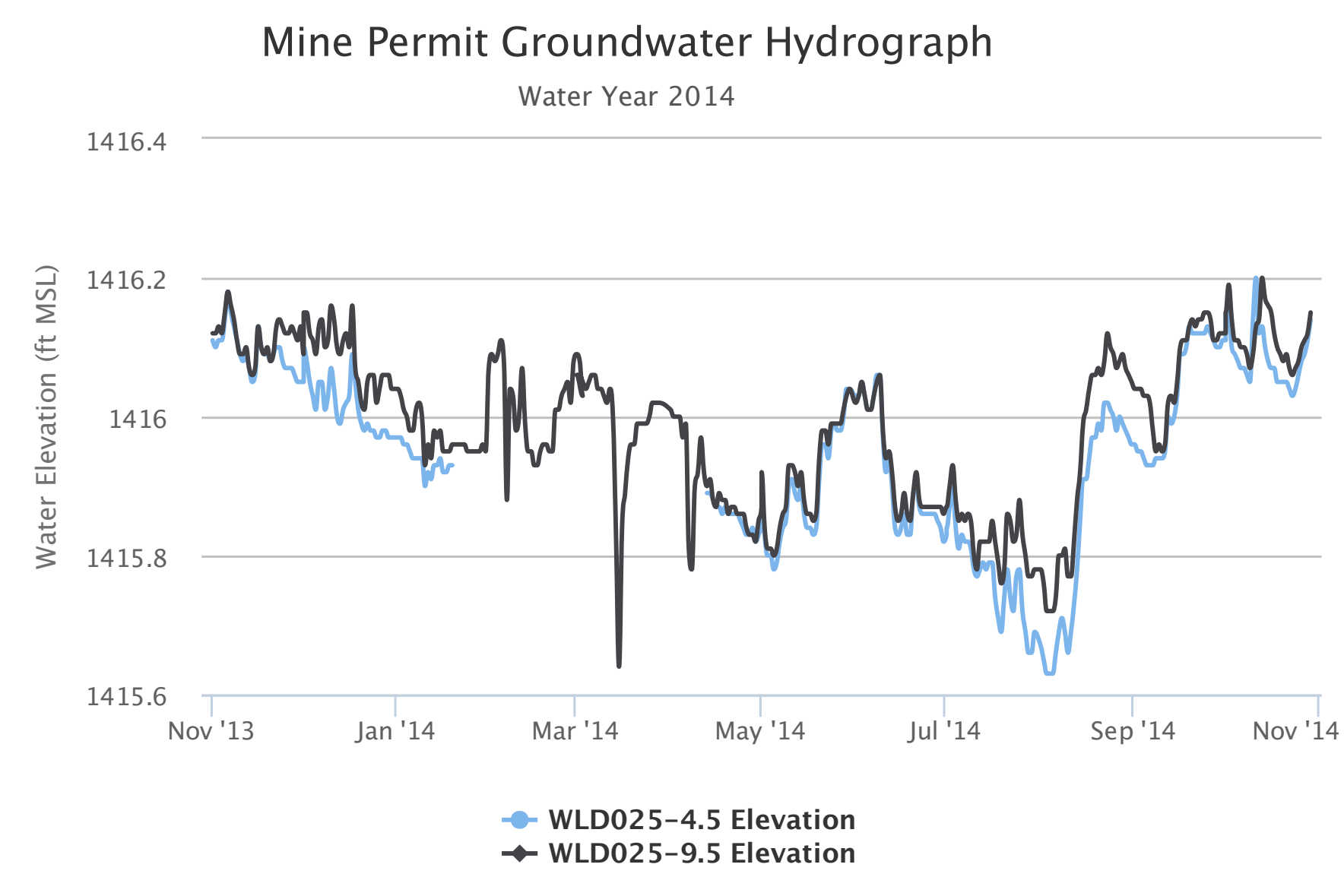
Hydrographs

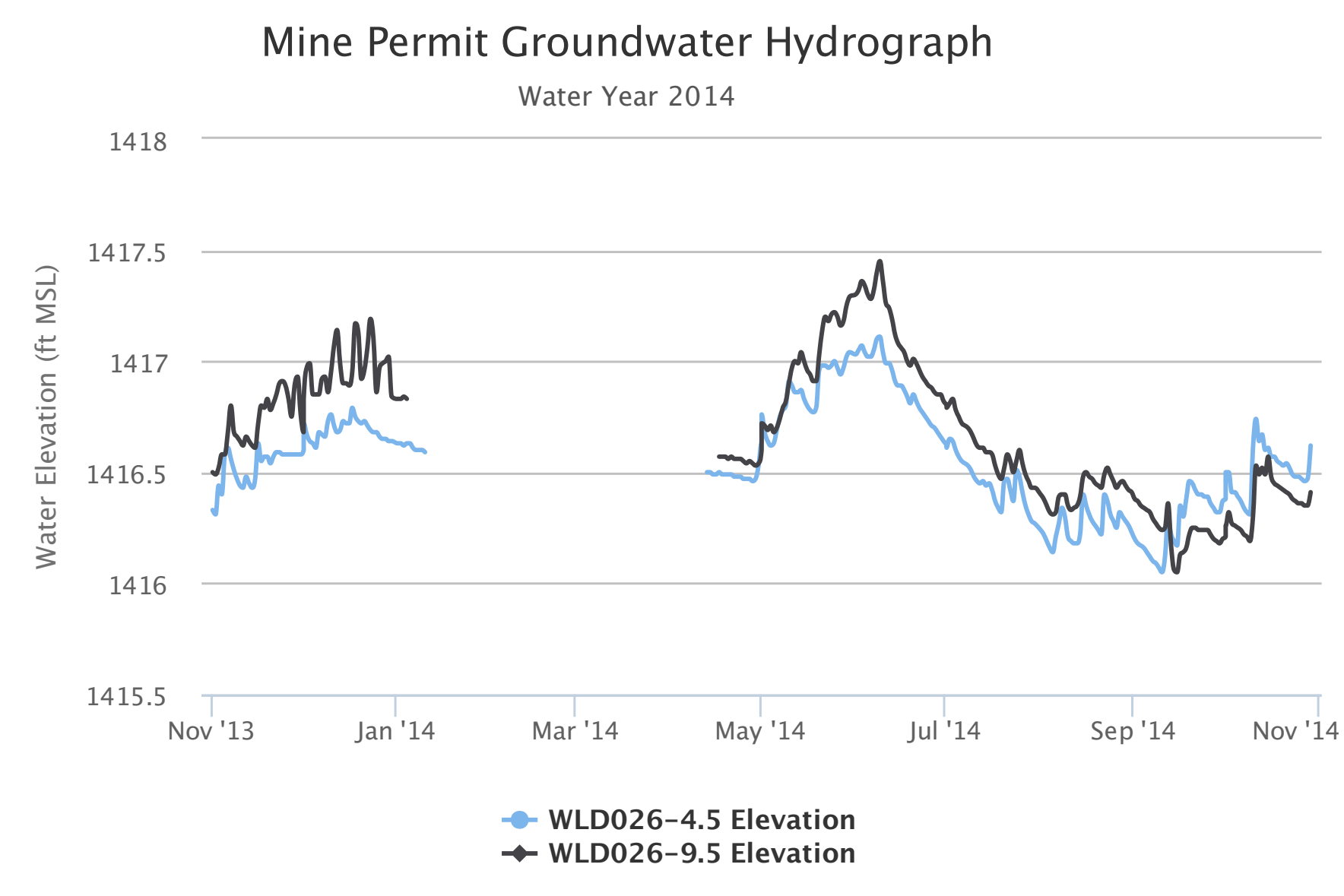

Mine Permit Groundwater Hydrograph
Water Year 2014
Water Elevation (ft MSL)
1417
1416
1415
1414
Nov '13
Jan '14
Mar '14
May '14
Jul '14
Sep '14
Nov '14
QAL023B Elevation
QAL044B Elevation


Mine Permit Groundwater Hydrograph
Water Year 2014
1418.5
1418
1417.5
1417
1416.5
Water Elevation (ft MSL)
Nov '13
Jan '14
Mar '14
May '14
Jul '14
Sep '14
Nov '14
QAL024A Elevation


Mine Permit Groundwater Hydrograph
Water Year 2014
Water Elevation (ft MSL)
1419
1418
1417
1416
1415
Nov '13
Jan '14
Mar '14
May '14
Jul '14
Sep '14
Nov '14
QAL064D Elevation
QAL065D Elevation
QAL066D Elevation


Mine Permit Groundwater Hydrograph
Water Year 2014
Water Elevation (ft MSL)
1424
1422
1420
1418
1416
1414
1412
Nov '13
Jan '14
Mar '14
May '14
Jul '14
Sep '14
Nov '14
WLD022-4.5 Elevation
WLD023-4.5 Elevation


Mine Permit Groundwater Hydrograph
Water Year 2014
Water Elevation (ft MSL)
1416.4
1416.2
1416
1415.8
1415.6
Nov '13
Jan '14
Mar '14
May '14
Jul '14
Sep '14
Nov '14
WLD025-4.5 Elevation
WLD025-9.5 Elevation

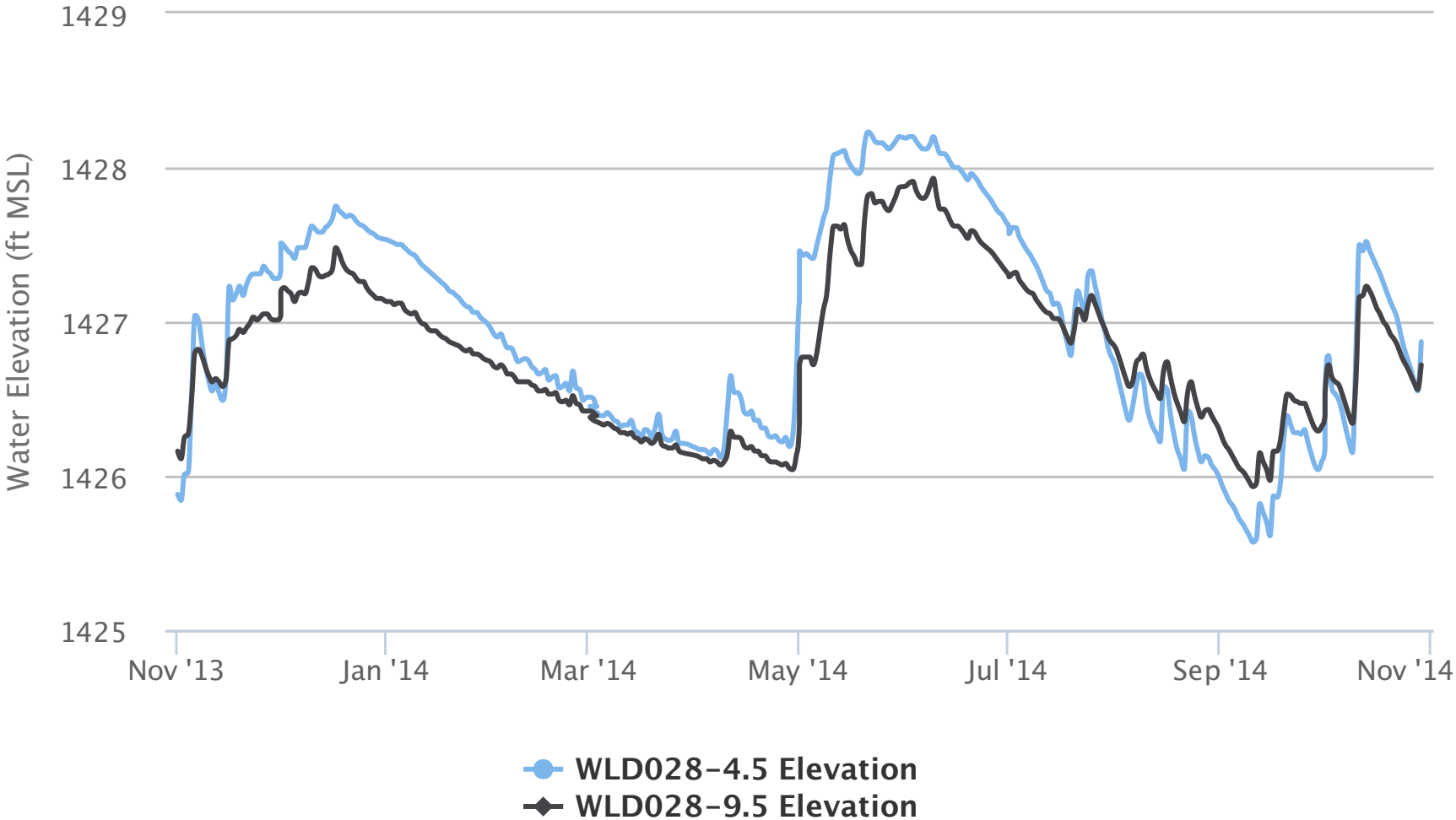

Mine Permit Groundwater Hydrograph
Water Year 2014
Water Elevation (ft MSL)
1418
1417.5
1417
1416.5
1416
1415.5
Nov '13
Jan '14
Mar '14
May '14
Jul '14
Sep '14
Nov '14
WLD026-4.5 Elevation
WLD026-9.5 Elevation

Mine Permit Groundwater Hydrograph

Water Year 2014

Mine Permit Groundwater Hydrograph

Water Year 2014



Appendix O

Eagle Mine

Discrete Water Level Results

Mine Permit Water Elevation Data
2014 Full Network Quarterly Discrete Measurements
Eagle Mine

Location	1st Qtr 2014		2nd Qtr 2014		3rd Qtr 2014		4th Qtr 2014	
	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date
QAL001A	1410.00	03/12/14	1409.58	05/29/14	1410.45	08/07/14	1410.53	12/02/14
QAL001D	1404.51	03/12/14	1404.30	05/29/14	1405.21	08/07/14	1404.67	12/02/14
QAL002A	1432.24	03/14/14	1432.24	05/28/14	1433.84	08/07/14	1433.05	12/04/14
QAL002D	1394.22	03/14/14	1394.00	05/28/14	1394.48	08/07/14	1394.40	12/04/14
QAL003A	1424.19	03/13/14	1427.81	05/28/14	1425.65	08/07/14	1426.09	12/03/14
QAL003B	1411.57	03/13/14	1413.96	05/28/14	1412.02	08/07/14	1412.58	12/03/14
QAL004A	1424.29	03/13/14	1426.04	05/28/14	1425.20	08/07/14	1424.69	12/03/14
QAL004D	1430.68	03/13/14	1428.06	05/28/14	1425.07	08/07/14	1430.89	12/03/14
QAL005A	1452.04	03/14/14	1455.54	05/28/14	1452.75	08/07/14	1454.29	12/04/14
QAL005D	1451.09	03/14/14	1453.40	05/28/14	1451.33	08/07/14	1452.71	12/04/14
QAL006A	1412.67	03/12/14	1415.68	05/28/14	1413.53	08/07/14	1414.72	12/03/14
QAL006B	1396.87	03/12/14	1398.50	05/28/14	1398.61	08/07/14	1398.17	12/03/14
QAL007A	1426.63	03/14/14	1426.71	05/28/14	1428.37	08/07/14	1427.54	12/03/14
QAL007D	1435.36	03/14/14	1436.67	05/28/14	1437.05	08/07/14	1436.50	12/03/14
QAL008A	1391.85	03/12/14	1393.74	05/28/14	1393.57	08/07/14	NM	12/04/14
QAL008D	1354.23	03/12/14	1354.07	05/28/14	1354.71	08/07/14	1354.84	12/04/14
QAL009A	1351.49	03/12/14	1351.09	05/28/14	1351.53	08/07/14	1352.13	12/02/14
QAL009D	1351.36	03/12/14	1350.95	05/28/14	1351.39	08/07/14	1352.03	12/02/14
QAL010A	1421.04	03/12/14	1423.33	05/28/14	1422.99	08/07/14	1422.45	12/02/14
QAL015	1291.87	03/12/14	1291.99	05/28/14	1291.65	08/07/14	1291.86	12/02/14
QAL016	NM	03/12/14	1274.07	05/28/14	1274.18	08/07/14	1274.47	12/02/14
QAL017	F	03/14/14	1251.35	05/28/14	1249.46	08/07/14	1251.38	12/02/14
QAL018	F	03/12/14	1249.48	05/28/14	1249.11	08/07/14	F	12/02/14
QAL019	1285.00	03/12/14	1284.86	05/28/14	NM	08/07/14	1285.16	12/02/14
QAL020	1335.30	03/12/14	1335.43	05/28/14	1335.01	08/07/14	1335.41	12/02/14
QAL021	F	03/12/14	1388.88	05/28/14	1388.88	08/07/14	1389.33	12/02/14
QAL022	1298.03	03/14/14	1297.92	05/28/14	1298.24	08/07/14	F	12/03/14
QAL023-1.0	F	03/13/14	1418.38	05/28/14	D	08/07/14	F	12/03/14
QAL023-4.5	F	03/13/14	1418.34	05/28/14	1416.61	08/07/14	1418.43	12/05/14
QAL023B	1416.02	03/13/14	1416.08	05/28/14	1416.17	08/07/14	1416.45	12/05/14
QAL024A	1416.98	03/10/14	1417.72	05/28/14	1418.05	08/07/14	1417.61	12/03/14
QAL025A	1415.91	02/24/14	1416.29	05/28/14	1417.25	07/29/14	1416.38	12/03/14
QAL025B	1415.80	02/25/14	1416.16	05/28/14	1417.13	07/29/14	1416.26	12/03/14
QAL025D	1411.87	02/25/14	1411.75	05/28/14	1412.91	07/29/14	1412.48	12/03/14
QAL026A	1415.50	02/19/14	<1415.4 BP	05/28/14	1416.49	08/05/14	1415.74	12/03/14
QAL026D	1408.77	02/19/14	1408.39	05/28/14	1409.54	08/05/14	1409.30	12/03/14
QAL026E	1408.38	02/24/14	1408.18	05/28/14	1409.37	07/29/14	1409.21	12/03/14
QAL029A	1415.49	02/18/14	1415.11	05/28/14	1415.09	08/05/14	1414.23	12/03/14
QAL029D	1406.32	02/18/14	1405.71	05/28/14	1406.71	08/05/14	1406.40	12/03/14
QAL031D	1371.59	03/12/14	1371.83	05/28/14	1372.29	08/06/14	1372.58	12/05/14
QAL043-1.0	1419.42	03/13/14	1419.37	05/28/14	D	08/07/14	1419.77	12/03/14
QAL043-4.5	1419.45	03/13/14	1419.39	05/28/14	1418.13	08/07/14	1419.73	12/05/14
QAL043B	1415.33	03/13/14	1415.34	05/28/14	1415.70	08/07/14	1415.85	12/05/14
QAL044-1.0	1423.85	03/10/14	1424.47	05/28/14	D	08/07/14	1424.74	12/03/14
QAL044-4.5	1423.26	03/10/14	1424.59	05/28/14	1423.14	08/07/14	1424.62	12/03/14
QAL044B	1414.89	03/10/14	1414.84	05/28/14	1415.35	08/07/14	1415.43	12/05/14
QAL050A	1364.15	02/19/14	1363.48	05/28/14	1364.09	08/06/14	1364.44	12/03/14
QAL051A	1366.16	02/18/14	1365.10	05/28/14	1366.11	08/05/14	1366.41	12/05/14
QAL051D	1366.14	02/18/14	1365.08	05/28/14	1366.04	08/05/14	1366.37	12/05/14
QAL052A	1353.28	02/18/14	1352.41	05/28/14	1353.28	08/05/14	1353.50	12/05/14
QAL053A	1386.55	02/18/14	1385.78	05/28/14	1386.28	08/06/14	1386.57	12/03/14
QAL055A	1365.32	02/19/14	1364.47	05/28/14	1365.22	08/06/14	1365.57	12/03/14
QAL056A	1393.32	02/18/14	1394.35	05/28/14	1394.79	08/06/14	1394.81	12/05/14
QAL057A	1363.34	02/18/14	1362.30	05/28/14	1362.93	08/05/14	1363.37	12/05/14
QAL057D	1363.45	02/18/14	1362.39	05/28/14	1363.02	08/05/14	1363.44	12/05/14
QAL060A	1404.19	02/24/14	1403.99	05/28/14	1404.90	07/29/14	1404.85	12/03/14
QAL061A	1405.68	02/25/14	1405.30	05/28/14	1406.30	07/29/14	1406.16	12/03/14
QAL062A	1407.00	02/25/14	1406.63	05/28/14	1407.67	07/29/14	1407.49	12/03/14
QAL063A	1400.80	02/24/14	1400.58	05/28/14	1401.37	07/29/14	1401.47	12/03/14
QAL064D	1417.22	03/14/14	1417.08	05/28/14	1417.96	08/07/14	1417.68	12/04/14
QAL065D	1416.73	03/13/14	1417.02	05/28/14	1416.81	08/07/14	1417.04	12/04/14
QAL066D	1417.25	03/10/14	1416.35	05/28/14	1416.53	08/07/14	1416.75	12/03/14
QAL067A	1414.92	02/25/14	1415.09	05/28/14	1415.50	07/29/14	1414.58	12/03/14
QAL068A	1421.41	02/24/14	1420.60	05/28/14	1422.31	07/29/14	1419.57	12/03/14

Mine Permit Water Elevation Data
2014 Full Network Quarterly Discrete Measurements
Eagle Mine

Location	1st Qtr 2014		2nd Qtr 2014		3rd Qtr 2014		4th Qtr 2014	
	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date
QAL068B	1413.19	02/24/14	1412.74	05/28/14	1414.07	07/29/14	1413.78	12/03/14
QAL068D	1413.17	03/05/14	1412.80	05/28/14	1414.07	07/30/14	1413.85	12/03/14
QAL069A	1381.34	02/24/14	1381.77	05/28/14	1382.37	07/29/14	1382.00	12/04/14
QAL070A	1370.52	03/13/14	1370.04	05/28/14	1370.99	08/07/14	1371.04	12/03/14
QAL071A	1404.43	02/24/14	1406.41	05/28/14	1406.31	07/29/14	1405.40	12/03/14
QAL073A	1381.44	03/13/14	1381.73	05/28/14	1382.53	08/07/14	1382.20	12/03/14
QAL074A	1402.72	03/13/14	1404.65	05/28/14	1404.25	07/29/14	1403.33	12/03/14
STRM002	1400.62	03/05/14	1400.47	05/28/14	1400.41	08/07/14	1400.54	12/03/14
STRM011	F	03/13/14	1416.54	05/28/14	1416.61	08/07/14	NM	12/04/14
WLD001-1.0	F	03/13/14	1428.98	05/28/14	1428.93	08/07/14	1428.34	12/05/14
WLD001-4.5	F	03/13/14	1428.05	05/28/14	1428.01	08/07/14	1427.46	12/05/14
WLD001-9.5	F	03/13/14	1429.52	05/28/14	1429.25	08/07/14	F	12/05/14
WLD002	1430.72	03/13/14	1430.78	05/28/14	1430.41	08/07/14	1430.80	12/05/14
WLD004	1445.68	03/14/14	1446.29	05/28/14	1444.72	08/07/14	NM	12/03/14
WLD005	1450.01	03/14/14	1450.92	05/28/14	1449.33	08/07/14	NM	12/03/14
WLD006	1453.73	03/14/14	1455.36	05/28/14	1453.10	08/07/14	1455.35	12/03/14
WLD007	1449.11	03/14/14	1450.52	05/28/14	1448.68	08/07/14	1450.46	12/03/14
WLD008	1452.51	03/14/14	1453.45	05/28/14	1451.50	08/07/14	F	12/03/14
WLD010	1446.39	03/14/14	1447.51	05/28/14	1445.09	08/07/14	NM	12/03/14
WLD011	1445.46	03/14/14	1446.73	05/28/14	1444.35	08/07/14	NM	12/03/14
WLD012	1445.43	03/14/14	1446.11	05/28/14	1444.39	08/07/14	NM	12/03/14
WLD017	1423.08	03/12/14	1423.06	05/28/14	1421.61	08/07/14	NM	12/03/14
WLD018	F	03/12/14	1422.82	05/28/14	1421.13	08/07/14	NM	12/03/14
WLD019	1419.44	03/12/14	1420.39	05/28/14	1418.14	08/07/14	NM	12/03/14
WLD020	1417.51	03/12/14	1419.08	05/28/14	1416.77	08/07/14	NM	12/03/14
WLD021	1414.99	03/12/14	1415.54	05/28/14	1414.20	08/07/14	NM	12/03/14
WLD022-1.0	F	03/13/14	1422.25	05/28/14	1422.04	08/07/14	1422.19	12/03/14
WLD022-4.5	1422.14	03/13/14	1422.51	05/28/14	1422.22	08/07/14	1422.29	12/03/14
WLD022-9.5	F	03/13/14	1423.05	05/28/14	1422.65	08/07/14	1422.63	12/03/14
WLD023-1.0	F	03/13/14	1414.04	05/28/14	1413.88	08/07/14	F	12/04/14
WLD023-4.5	F	03/13/14	1413.78	05/28/14	1413.49	08/07/14	F	12/04/14
WLD023-9.5	F	03/13/14	1415.91	05/28/14	1415.49	08/07/14	F	12/04/14
WLD024-1.0	F	03/13/14	1423.25	05/28/14	1423.04	08/07/14	1422.99	12/03/14
WLD024-4.5	1423.00	03/13/14	1423.59	05/28/14	1423.30	08/07/14	1423.22	12/03/14
WLD024-9.5	F	03/13/14	1424.23	05/28/14	1423.65	08/07/14	F	12/03/14
WLD025-1.0	F	03/13/14	1415.63	05/28/14	1415.71	08/07/14	F	12/03/14
WLD025-4.5	F	03/13/14	1415.65	05/28/14	1415.70	08/07/14	F	12/05/14
WLD025-9.5	F	03/13/14	1415.63	05/28/14	1415.77	08/07/14	F	12/05/14
WLD026-1.0	F	03/13/14	1415.73	05/28/14	1415.70	08/07/14	F	12/04/14
WLD026-4.5	F	03/13/14	1416.32	05/28/14	1415.75	08/07/14	F	12/04/14
WLD026-9.5	F	03/13/14	F	05/28/14	1415.99	08/07/14	F	12/04/14
WLD027-1.0	F	03/13/14	1423.00	05/28/14	D	08/07/14	1422.99	12/04/14
WLD027-4.5	1422.54	03/13/14	1422.60	05/28/14	1420.99	08/07/14	1422.71	12/04/14
WLD027-9.5	1422.56	03/13/14	1422.57	05/28/14	1420.99	08/07/14	1422.74	12/04/14
WLD028-1.0	F	03/10/14	F	05/28/14	D	08/07/14	1427.79	12/03/14
WLD028-4.5	1426.15	03/10/14	1427.66	05/28/14	1425.63	08/07/14	1427.77	12/05/14
WLD028-9.5	1425.91	03/10/14	1428.08	05/28/14	1425.81	08/07/14	1427.20	12/05/14
WLD029-1.0	F	03/13/14	1429.29	05/28/14	D	08/07/14	1429.14	12/03/14
WLD029-4.5	1426.95	03/13/14	1429.33	05/28/14	1427.14	08/07/14	1428.85	12/03/14
WLD029-9.5	1427.09	03/14/14	1429.53	05/28/14	1427.56	08/07/14	1429.48	12/03/14
WLD030	1453.48	03/14/14	1454.90	05/28/14	1452.71	08/07/14	1454.93	12/03/14
YDRM002	1412.82	03/04/14	1413.20	05/28/14	1412.59	08/07/14	1413.29	12/05/14

Notes:

BP = Below pump. Maxiumum water elevation is shown.

D = Dry

F = Frozen

NM = Not measured

Appendix P

Eagle Mine

Continuous Surface Water Monitoring Results

2014 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-13	7.5	3.2	14.6	1.5	7.5	2.8	11.5
	Nov-13	3.4	-0.1	9.3	0.5	2.8	-0.1	6.2
	Dec-13	0.8	-0.2	3.2	0.4	0.4	-0.1	2.2
	Jan-14	0.6	-0.2	0.8	0.5	0.1	-0.1	1.7
	Feb-14	0.5	-0.2	2.4	0.2	0.1	-0.1	1.8
	Mar-14	1.5	-0.2	4.7	0.3	0.8	-0.1	2.9
	Apr-14	4.2	-0.1	10.8	1.6	1.7	0.2	3.3
	May-14	9.7	1.3	17.8	1.0	8.3	2.0	15.0
	Jun-14	13.0	8.1	17.0	0.7	12.8	9.4	16.6
	Jul-14	14.1	10.6	18.2	1.0	13.4	11.2	16.3
	Aug-14	13.5	10.0	17.6	0.7	12.7	10.7	15.8
	Sep-14	11.4	7.0	16.6	0.8	10.8	8.1	13.7
Flow	Oct-13	22.9	12.0	119.0	7.1	NA	NA	NA
	Nov-13	18.5	12.4	37.8	3.1	NA	NA	NA
	Dec-13	17.8	12.1	58.8	4.1	NA	NA	NA
	Jan-14	18.1	12.0	45.0	3.5	NA	NA	NA
	Feb-14	17.3	12.0	50.0	5.6	NA	NA	NA
	Mar-14	23.3	12.0	110.9	5.7	NA	NA	NA
	Apr-14	37.0	12.0	131.5	10.3	NA	NA	NA
	May-14	22.2	11.8	160.6	6.3	NA	NA	NA
	Jun-14	18.0	12.0	90.1	3.5	NA	NA	NA
	Jul-14	14.0	11.8	33.0	1.5	NA	NA	NA
	Aug-14	14.5	11.8	74.4	2.3	NA	NA	NA
	Sep-14	16.9	11.7	69.8	3.2	NA	NA	NA
Specific Conductivity	Oct-13	127.8	70.0	146.0	14.4	114.9	113.5	117.8
	Nov-13	130.2	80.0	148.0	9.2	105.4	95.8	112.7
	Dec-13	132.9	89.0	153.0	6.7	108.9	105.8	116.0
	Jan-14	133.3	115.0	145.0	3.9	**109.9**	108.0	112.3
	Feb-14	133.2	111.0	144.0	3.1	112.4	110.0	114.7
	Mar-14	122.0	54.0	148.0	13.6	107.7	98.7	112.5
	Apr-14	95.6	50.0	146.0	18.2	74.4	54.9	95.6
	May-14	122.0	37.0	149.0	9.3	91.8	50.5	128.3
	Jun-14	129.1	94.0	169.0	6.4	132.2	122.2	142.7
	Jul-14	146.4	119.0	165.0	7.4	139.6	129.0	151.4
	Aug-14	146.1	107.0	163.0	6.5	139.0	129.2	154.5
	Sep-14	138.2	80.0	149.0	6.0	129.0	92.4	143.7

Source: North Jackson Company, REACH System

NA =Continuous record suppressed where it failed to meet quality control measures (e.g., due to ice or beaver activity).

Results in **bold** indicate mean monthly value is outside background range.

2014 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-13	7.5	2.3	15.2	1.6	7.6	1.9	12.2
	Nov-13	3.0	0.0	9.6	0.5	2.2	-0.1	6.1
	Dec-13	0.3	-0.1	2.5	0.2	0.0	-0.1	1.1
	Jan-14	0.2	-0.1	1.9	0.3	-0.1	-0.1	0.3
	Feb-14	0.1	0.0	1.3	0.1	**-0.1**	-0.1	0.0
	Mar-14	0.9	-0.1	5.0	0.4	0.0	-0.1	0.7
	Apr-14	4.2	-0.1	11.3	1.9	1.1	-0.1	3.3
	May-14	10.1	1.9	18.2	1.0	9.0	2.7	16.0
	Jun-14	13.8	7.9	18.6	1.2	13.3	9.6	17.4
	Jul-14	14.8	11.0	19.0	1.3	14.0	11.8	17.2
	Aug-14	14.2	10.4	18.1	0.7	13.4	11.1	16.6
	Sep-14	11.8	7.3	17.3	4.5	11.4	8.4	14.8
Flow	Oct-13	7.7	3.9	41.1	2.2	5.8	4.5	9.5
	Nov-13	6.8	4.2	23.1	2.5	6.1	5.0	8.3
	Dec-13	6.7	4.6	18.9	1.6	5.3	5.1	5.6
	Jan-14	5.6	3.5	13.2	1.8	4.7	4.2	5.2
	Feb-14	5.7	2.8	15.5	1.8	4.3	4.1	4.5
	Mar-14	8.2	3.1	56.7	3.0	5.0	3.9	8.0
	Apr-14	14.9	5.2	44.5	2.5	12.5	4.5	25.3
	May-14	8.3	4.4	59.9	2.5	11.0	4.9	27.3
	Jun-14	5.7	3.0	27.4	1.1	5.3	4.3	13.5
	Jul-14	4.6	2.8	9.9	0.4	5.0	4.2	6.1
	Aug-14	4.8	2.8	28.0	1.1	4.9	4.2	7.0
	Sep-14	5.2	2.8	24.0	2.2	6.5	4.4	15.8
Specific Conductivity	Oct-13	87.3	56.0	140.0	9.2	99.5	95.5	103.1
	Nov-13	87.1	59.0	96.0	4.2	**96.6**	89.5	101.6
	Dec-13	84.7	61.0	95.0	11.6	91.4	87.8	94.0
	Jan-14	91.3	67.0	97.0	1.6	92.9	89.8	97.0
	Feb-14	94.5	58.0	103.0	3.5	99.3	95.3	105.0
	Mar-14	88.6	44.0	105.0	8.1	92.0	87.1	102.9
	Apr-14	69.5	33.0	105.0	12.6	85.1	74.7	91.9
	May-14	85.6	37.0	114.0	9.2	104.0	93.0	117.4
	Jun-14	88.5	57.0	116.0	14.3	99.1	88.5	111.5
	Jul-14	97.1	82.0	114.0	6.2	110.9	93.7	124.5
	Aug-14	100.6	70.0	119.0	9.2	96.2	93.0	99.3
	Sep-14	81.3	57.0	130.0	48.8	92.8	91.3	94.3

Source: North Jackson Company, REACH System

NA =Continuous record suppressed where it failed to meet quality control measures (e.g., due to ice or beaver activity).

Results in **bold** indicate mean monthly value is outside background range.

2014 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-13	7.9	2.6	15.5	2.4	8.1	2.8	12.9
	Nov-13	3.1	0.0	7.6	0.2	2.5	-0.1	6.4
	Dec-13	0.3	-0.1	2.2	0.2	0.0	0.0	0.4
	Jan-14	0.3	-0.1	2.6	0.2	-0.1	-0.1	0.0
	Feb-14	0.0	-0.1	1.4	0.1	0.0	-0.1	0.0
	Mar-14	0.5	-0.1	3.7	0.3	0.0	-0.1	0.0
	Apr-14	4.2	0.1	11.1	1.4	1.1	-0.1	3.8
	May-14	10.4	2.1	17.5	1.0	9.4	2.7	16.5
	Jun-14	15.4	9.2	20.5	1.0	14.8	11.1	20.0
	Jul-14	17.2	11.9	21.3	1.1	16.2	13.6	19.4
	Aug-14	16.6	12.7	21.1	0.4	15.1	12.5	18.1
	Sep-14	13.1	9.2	18.7	1.1	12.2	9.1	16.0
Flow	Oct-13	64.2	29.2	346.6	29.2	33.4	24.5	46.4
	Nov-13	52.8	29.2	188.7	24.1	50.2	36.7	75.2
	Dec-13	55.7	33.6	131.3	17.6	NA	NA	NA
	Jan-14	44.9	38.0	83.3	2.7	NA	NA	NA
	Feb-14	59.6	40.7	119.3	0.0	NA	NA	NA
	Mar-14	126.0	36.0	456.2	115.0	NA	NA	NA
	Apr-14	126.8	41.7	459.4	21.5	185.3	74.1	354.8
	May-14	67.2	32.5	781.5	28.7	110.2	47.9	236.4
	Jun-14	40.5	26.3	164.1	9.9	45.7	40.6	62.0
	Jul-14	29.8	24.0	52.0	2.2	41.0	36.9	57.6
	Aug-14	28.8	23.2	82.0	4.0	39.5	35.5	55.6
	Sep-14	38.6	21.8	155.5	14.2	49.0	36.9	171.8
Specific Conductivity	Oct-13	112.0	29.0	147.0	26.8	109.4	98.5	114.6
	Nov-13	123.5	65.0	143.0	15.9	99.9	82.4	110.9
	Dec-13	126.6	79.0	145.0	8.4	113.7	107.4	118.4
	Jan-14	129.3	99.0	145.0	4.7	117.8	114.9	122.9
	Feb-14	128.1	91.0	143.0	5.3	119.6	112.7	125.0
	Mar-14	119.1	55.0	141.0	9.4	121.9	112.8	129.8
	Apr-14	77.5	36.0	121.0	11.3	77.6	46.3	107.5
	May-14	112.5	30.0	141.0	8.1	78.8	48.7	118.1
	Jun-14	130.9	78.0	149.0	4.2	127.1	107.3	138.9
	Jul-14	142.9	111.0	161.0	8.4	139.0	116.0	145.2
	Aug-14	145.0	101.0	163.0	11.4	140.3	125.2	145.2
	Sep-14	133.3	90.0	150.0	15.7	130.2	82.1	141.9

Source: North Jackson Company, REACH System

NA =Continuous record suppressed where it failed to meet quality control measures (e.g., due to ice or beaver activity).

2014 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-13	8.5	2.7	17.2	1.9	8.0	2.1	13.6
	Nov-13	2.4	0.0	9.3	0.5	1.6	-0.1	5.2
	Dec-13	0.1	0.0	1.4	0.0	**-0.1**	-0.1	0.0
	Jan-14	0.0	-0.1	1.0	0.1	-0.1	-0.1	-0.1
	Feb-14	0.0	0.0	0.2	0.0	**-0.1**	-0.1	-0.1
	Mar-14	0.4	-0.1	4.9	0.3	-0.1	-0.1	-0.1
	Apr-14	4.3	0.0	11.4	2.1	0.6	-0.1	2.5
	May-14	11.5	0.8	21.6	1.4	10.0	1.8	19.0
	Jun-14	16.5	9.8	22.2	1.2	16.7	13.0	21.1
	Jul-14	18.6	12.4	23.6	1.4	17.7	14.7	21.1
	Aug-14	17.9	11.7	23.2	0.9	16.8	14.6	19.3
	Sep-14	14.3	8.5	21.0	0.7	13.2	9.1	16.9
Flow	Oct-13	34.6	7.1	214.9	25.4	17.7	7.5	30.6
	Nov-13	26.8	10.0	94.0	9.9	32.3	25.1	48.3
	Dec-13	21.1	10.6	74.0	6.9	18.8	15.9	26.4
	Jan-14	18.4	10.0	41.1	4.1	15.6	13.9	17.8
	Feb-14	16.8	12.2	29.7	2.9	13.8	11.7	17.8
	Mar-14	25.7	11.4	173.1	11.1	13.1	10.5	21.2
	Apr-14	91.8	14.9	306.2	29.0	64.6	17.7	136.6
	May-14	47.2	8.1	204.3	22.2	111.4	32.5	221.9
	Jun-14	21.2	8.0	61.2	8.6	20.3	9.4	35.2
	Jul-14	11.6	6.2	32.6	1.9	7.8	5.5	13.3
	Aug-14	9.0	4.3	45.6	2.7	11.3	5.1	21.0
	Sep-14	13.1	5.5	68.5	5.9	18.3	10.0	44.5
Specific Conductivity	Oct-13	61.3	30.0	102.0	18.8	52.7	45.2	70.2
	Nov-13	53.1	32.0	74.0	7.6	38.8	31.2	46.4
	Dec-13	62.0	32.0	91.0	9.0	47.4	40.2	51.3
	Jan-14	64.6	52.0	76.0	5.8	69.7	69.0	70.8
	Feb-14	69.6	55.0	79.0	5.6	73.8	69.8	76.7
	Mar-14	57.0	28.0	75.0	12.4	**86.2**	76.0	101.1
	Apr-14	35.2	19.0	72.0	7.1	50.5	25.0	77.3
	May-14	45.9	20.0	92.0	11.7	31.5	20.2	54.2
	Jun-14	67.1	44.0	94.0	4.6	69.1	58.6	76.5
	Jul-14	81.6	53.0	105.0	7.7	82.4	75.9	87.7
	Aug-14	87.4	47.0	107.0	10.2	81.8	72.1	89.2
	Sep-14	80.3	42.0	103.0	11.0	69.8	49.5	94.2

Source: North Jackson Company, REACH System

NA =Continuous record suppressed where it failed to meet quality control measures (e.g., due to ice or beaver activity).

Results in **bold** indicate mean monthly value is outside background range.

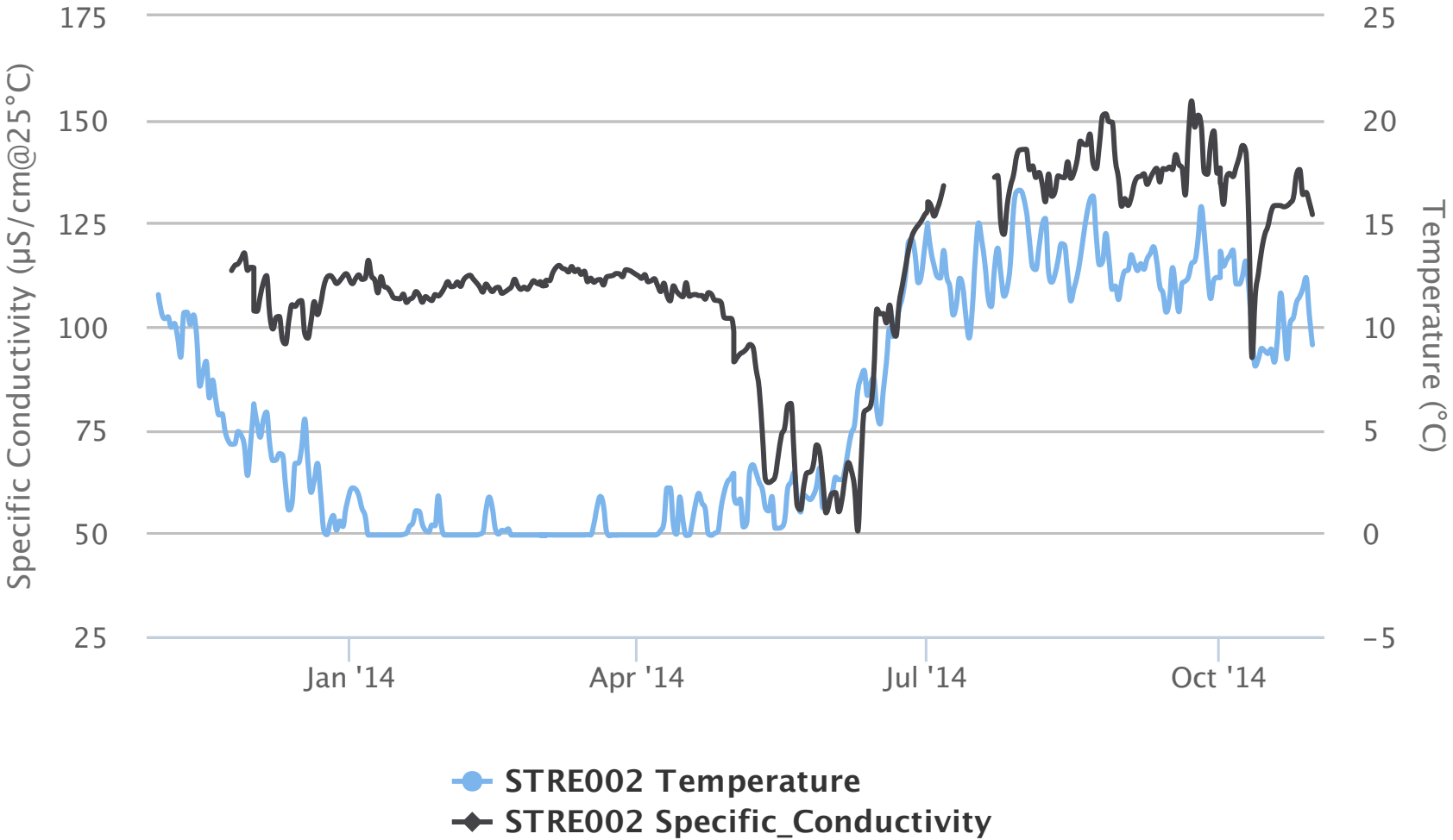
Appendix Q

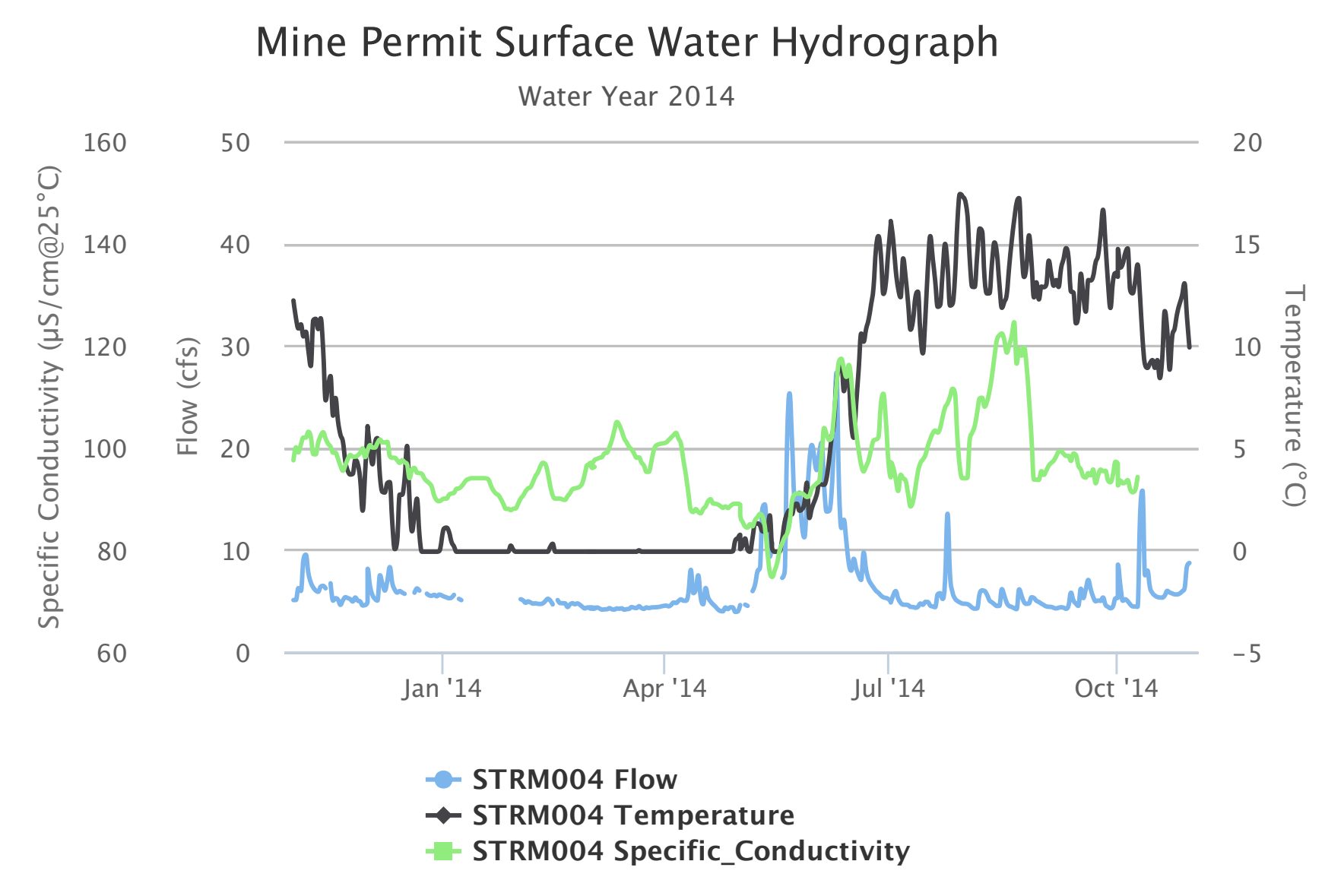
Eagle Mine

Surface Water Hydrographs

Mine Permit Surface Water Hydrograph

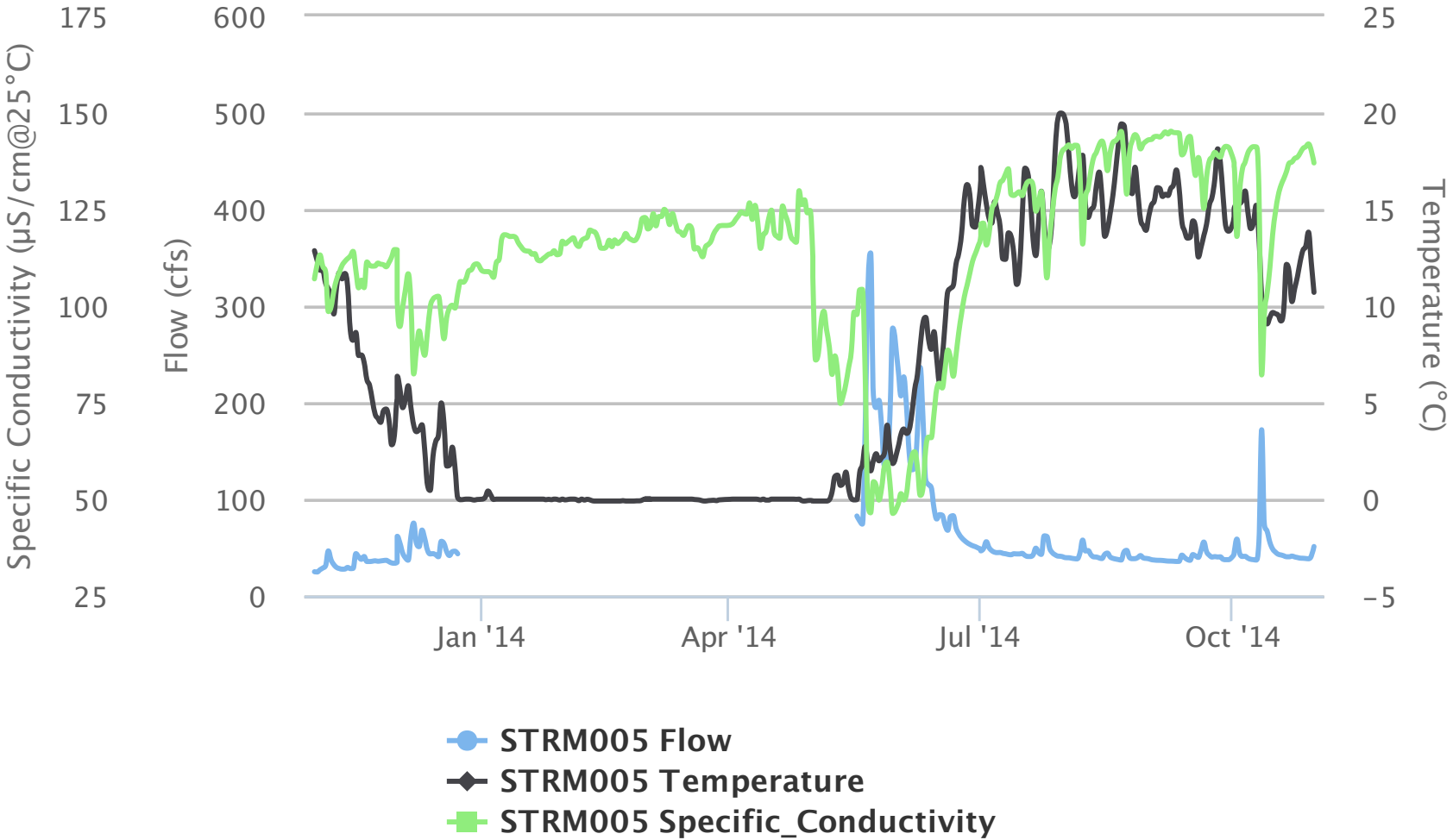
Water Year 2014




Mine Permit Surface Water Hydrograph
Water Year 2014
Specific Conductivity (µS/cm@25°C)
160
140
120
100
80
60
Flow (cfs)
50
40
30
20
10
0
Temperature (°C)
20
15
10
5
0
-5
Jan '14
Apr '14
Jul '14
Oct '14
STRM004 Flow
STRM004 Temperature
STRM004 Specific_Conductivity

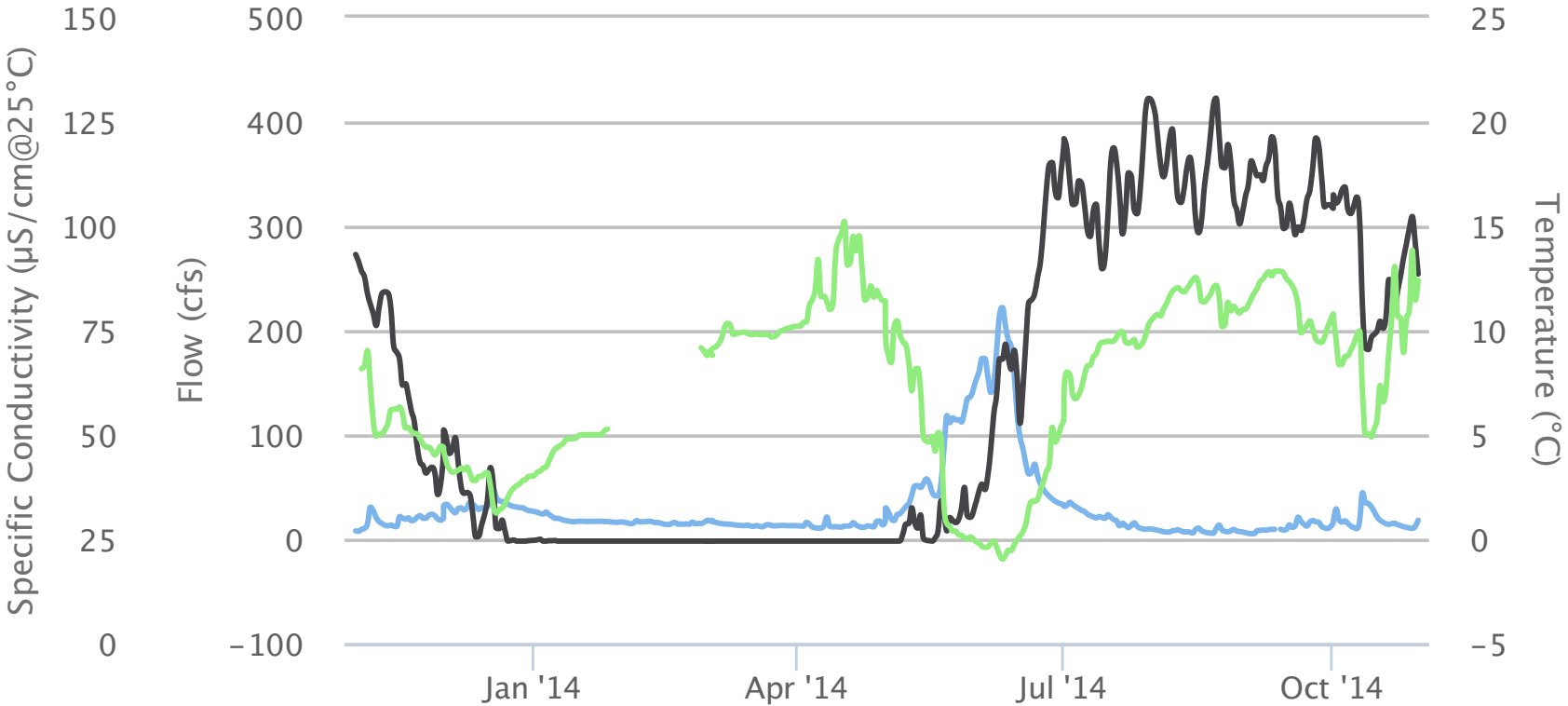
Mine Permit Surface Water Hydrograph

Water Year 2014



Mine Permit Surface Water Hydrograph

Water Year 2014



Appendix R

Eagle Mine

Updated Contingency Plan

Eagle Mine
a subsidiary of lundin mining

1 Contingency Plan

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 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 watering program 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 surrounding rock is known as "development rock." The development rock from these excavations is being temporarily stored at the surface in the TDRSA. As mining progresses, the development rock stored on the TDRSA will be returned underground to backfill areas where the ore has been removed.

Most of the development rock will be 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 water that comes in contact with the development rock does become acidic, it will not be exposed to the environment due to the design of the TDRSA. Further, 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 and undercarriages 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 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 will be 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

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
- 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 PIPP has been prepared which addresses potential spillage of fuels and other polluting materials.

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

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

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

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

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

Absorptive materials may be used initially to contain a potential spill. After the initial response, soil impacted with residual fuel would be addressed. Remedial efforts could include, if necessary, the removal of soil to preclude migration of fuel to groundwater or surface water. The project's PIPP and SPCC plans addresses fueling operations, fuel spill prevention measures, inspections, training, security, spill reporting, and equipment needs. In addition standard operating procedures have been developed which cover

fueling operations and spill response activities. All responses to a fuel spill, both large and small, will follow the guidelines dictated by the spill response plan and be reported internally. The tanks will be inspected regularly, and records of spills will be kept and reported to MDEQ and other agencies as required.

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

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

1.1.4 Fires

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

1.1.4.1 Mine Fire

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

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

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 will only be 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. 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, contact water from the TDRSA, 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 peak snow melt and rain events that exceed the 100-yr, 24-hr precipitation 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 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 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. 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 onsite, 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. 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 an undercarriage and side 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 planned for use at the 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	Storage Containers
1	sodium hydroxide	caustic soda; Hydrex 1565	1310-73-2	5,000 gal	Liquid
2	sodium hypochlorite	Chlorine Bleach	7681-52-9	7,500 gal	Liquid
3	sodium carbonate anhydrous	soda ash; Hydrex 1564	497-19-8	22,000 lbs	Solid
4	sodium bisulfite	Hydrex 1321	7631-90-5	5400 gal	Liquid
5	sodium metabisulfite	Sodium bisulfite, dry	7681-57-4	1,000 lbs	Solid
6	iron (III) chloride solution	Ferric Chloride; Hydrex 3250	7705-08-0	900 gal	Liquid
7	Antiscalant	Hydrex 4114	20592-85-2	330 gal	Liquid
8	hydrochloric acid	Hydrex 4507	7647-01-0	5,000 gal	Liquid
9	Antifoam	Suppressor 1615		110 gal	Liquid
10	nitric acid	Nitric acid, 34%	7697-37-2	900 gal	Liquid
11	sulfuric acid	Hydrex 1925	7664-93-9	880 gal	Liquid
12	polymer	Hydrex 6511	-	125 gal	Liquid
13	Citric Acid	Hydrex 4702	-	Up to 1600 lbs	Solid
14	RO Membrane Cleaner - Basic (Hydrex 4501)	Hydrex 4501	-	800 lbs	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 will be backfilled using an engineered cemented development rock or aggregate fill. A Portland cement binder is planned to be used to prepare the backfill. The quantity of binder required is estimated at approximately four percent by weight. The secondary stopes will be 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 on an annual basis 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. Eagle Mine has adopted an Incident Command System (ICS) structure to respond to such emergencies. The ICS structure 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 ICS structure is as follows:

- Incident Commander (IC): The General Manager at the facility will be designated the IC and will be responsible to ensure that emergency response actions are carried out in an appropriate and timely manner. The IC will ensure that appropriate resources are available, ensure the incident is secured, and release resources in an orderly manner. The IC will also ensure appropriate notification is made to all required regulatory agencies and necessary emergency response agencies.

- Safety Officer: The facility safety officer and staff are responsible for ongoing review of ICS structures and will monitor activities in response to any emergencies. During an emergency, the safety officer 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 work with the IC to 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 the IC 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 human relations manager will be responsible for managing all contacts with the public and will coordinate with the IC and the safety and environmental officers to provide appropriate information to the general public. This individual will also meet all arriving outside response agencies and pass on instructions from the IC. This individual will also immediately notify families of employees injured or affected.

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 IC 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 faculties. All evacuation procedures were developed in compliance with MSHA regulations.

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
- 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.

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

- Operator and Emergency Management Coordinator: Mike Welch – (906) 339-7052

- 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
  Humboldt Township - 911
  - Due to the location of the Eagle Mine, Powell Township will be the first contact. Humboldt Township will be the first contact for the Mill Site

- Local Police: Marquette County Central Dispatch – 911
  Marquette County Sheriff Department – (906) 225-8435
  Michigan State Police – (906) 475-9922 (direct line)

- MDEQ Marquette Office – (906) 228-4853

- Pollution Emergency Alerting System (in Michigan) - 1-800-292-4706

- Federal Agencies: EPA Region 5 Environmental Hotline – 1-800-621-8431
  EPA National Response Center – 1-800-424-8802
  MSHA North Central District – (218) 720-5448

- MDNR Marquette Field Office – (906) 228-6561

- Michigamme Township Supervisor: Alvar Maki – (906) 323-6547
  Humboldt Township Supervisor: Tom Prophet - (906) 339-4477

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 S

Eagle Mine

Financial Assurance Update

EAGLE MINE LLC CLOSURE AND POST-CLOSURE COST ESTIMATE

	Description	Units	Humboldt Mill	Eagle Mine	Totals	Comments
1	Operation / Site		Humboldt Mill	Eagle Mine		
2	Business Unit		Eagle Mine LLC	Eagle Mine LLC		
3	Functional Currency		USD	USD		
4	Current Day Cost		2014	2014		
5	Expected Operations Completion Date		2022	2022		8.5 years of operations from late 2014 through mid-year (i.e., summer) 2022
6	Expected Closure Completion Date		2024	2024		Minor closure activities to commence mid-year 2021; 2 years of full-time closure activities from mid-year 2022 through mid-year 2024
7	Expected Post-Closure Completion Date		2027	2027		3 years of post-closure activities from mid-year 2024 through 2027
8	Post-Closure Monitoring Completion Date		2044	2044		20 years of post-closure monitoring from through 2044
	Closure Costs					
A	Structural and Equipment Demolition	LS	$ 3,857,433	$ 1,847,081	$ 5,704,514	Includes shut down and removal of equipment utilities; removal of salvageable material from buildings; removal of equipment within buildings; and demolition of structures and buildings to grade
B	Slab and Foundation Excavation	LS	$ 1,229,574	$ 1,035,513	$ 2,265,086	Break-out the slab and foundations (assumes average building slabs of 1 ft and average foundations of 2-3 ft (4-ft max.)) and transport and dispose off-site
C	Equipment and Facilities Decontamination	5%	$ 176,681	$ 89,423	$ 266,103	Assumes 5% of demolition cost for wash-down of equipment and facilities prior to demolition
D	Demolition Debris Transport and Off-site Disposal	LS	$ 258,318	$ 285,634	$ 543,952	Transport & off-site disposal of generated demolition debris (non-slab & foundation)
E	Asphalt and Concrete Removal, Transport and Off-site Disposal	LS	$ 472,742	$ 1,507,438	$ 1,980,180	Asphalt and concrete transport and off-site disposal costs (includes excavation, load, transfer to off-site disposal, and cover to grade)
F	Remediation & Reclamation	LS	$ 545,366	$ 981,989	$ 1,527,355	Subsurface remediation and reclamation costs
G	EPCM (A through F)	10%	$ 654,000	$ 574,700	$ 1,228,700	Engineering, Procurement & Construction Management
H	Monitoring	LS	$ 523,333	$ 1,117,333	$ 1,640,667	2 years based on current annual environmental monitoring budget
I	WTP Operation Labor	LS	$ 520,080	$ 520,080	$ 1,040,160	2 years of wages/benefits based on HR closure costs
J	WTP Operation Materials / Supplies	LS	$ 2,679,920	$ 879,920	$ 3,559,840	2 years of reagents, power, and materials based on operations costs
	Subtotal (A through J)		$ 10,917,447	$ 8,839,110	$ 19,756,557	
	Post-Closure Costs					
K	Monitoring	LS	$ 3,797,000	$ 9,004,000	$ 12,801,000	20 years based on current annual environmental monitoring budget
L	Monitoring System Abandonment	LS	$ 99,965	$ 106,594	$ 206,559	Abandonment of monitoring wells at completion of post-closure monitoring
M	WTP Operation Labor	LS	$ 780,120	$ 780,120	$ 1,560,240	3 years of wages/benefits based on HR closure costs
N	WTP Operation Materials / Supplies	LS	$ 4,019,880	$ 1,319,880	$ 5,339,760	3 years of reagents, power, and materials based on operations costs
	Subtotal (K through N)		$ 8,696,965	$ 11,210,594	$ 19,907,559	
	Total for Project		$ 19,614,412	$ 20,049,704	$ 39,664,116	
O	Contingency (A through N)	10%	$ 1,961,441	$ 2,004,970	$ 3,966,412	Contingency costs for data gaps and unknowns
	Total for Project (includes O)		**$ 21,575,853**	**$ 22,054,675**	**$ 43,630,527**	

ERM

Appendix T

Eagle Mine

Organizational Report

Eagle Mine
a subsidiary of lundin mining

Eagle Mine
4547 County Road 601
Champion, MI 49814, US
P 906-339-7000
F 906-339-7005

Organizational Information

Eagle Mine LLC

March 7, 2014

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

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

Board of Directors

Inkster, Marie
70 Rose Way
Markham, ON
L3P 3S6
Canada

McRae, Paul M.
11 Pulborough Road
Wandsworth
London
SW18 5UN
United Kingdom

Welch, Michael J.
4547 County Road 601
Champion, MI 49814

EAGLE MINE LLC
OFFICERS
SCHEDULE B

Name	Office	Residential Address	Date Appointed
INKSTER, V. Marie	President	70 Rose Way Markham, ON L3P 3S6	July 17, 2013
ROSE, Benjamin D.	Chief Financial Officer	4547 County Road 601 Champion, MI 49814 USA	August 12, 2013
MAGIE, Jinhee	Treasurer	1487 Briarwood Crescent Oakville, ON L6J 2S8	July 17, 2013
DUNCAN, Lesley R.	Interim Secretary	9 Crestwood Dr. Scarborough, ON M1E 1E6	December 4, 2014
WELCH, Mike	General Manager	25 Oak Hill Drive Marquette, Michigan, USA 49855	January 30, 2014