Eagle Mine
lundin mining

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Thursday, March 13, 2014

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 2013 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

2013 Annual Mining and Reclamation Report
Mine Permit MP 01 2007

March 15, 2014

Contents page

Contents page continued

Appendices

Acronyms and Abbreviations

AEM	Advanced Ecological Management
BCA	Bilateral Compliance Agreement
COC	Certificate of Completion
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
MCCD	Marquette County Conservation District
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
MMBTU	one million BTU
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. 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 (MRR).

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 2013 construction update to summarize the activities that have occurred since the 2012 MRR submittal and a look forward to 2014. The update will serve to memorialize all that has been completed and the decisions and/or modifications that have been approved throughout the process.

On July 17, 2013 the name of the mine changed from Rio Tinto Eagle Mine LLC to Eagle Mine LLC after Lundin Mining Corporation purchased 100% membership interest in the project. Aside from the name change all other aspects of Eagle Mine LLC remained unchanged. In a letter dated July 3, 2013 the Michigan Department of Environmental Quality (MDEQ) Office of Oil, Gas, and Minerals acknowledged the transaction and determined that no transfer of permits was required under the terms of Part 632, Nonferrous Metallic Minerals, of the Natural Resources Environmental Protection Act, 1994 PA 451, as amended.

2. Site Development and Construction Status

Construction of surface facilities which support mine development and future operations continued throughout 2013. Construction activities included the completion of the truck shop and start of several surface structures including, the coarse ore storage area (COSA), backfill and aggregate storage facility, mine heating system, mine ventilation and emergency egress structures, and paving of parking areas and roadways. All the surface facilities in which construction was started in 2013 will be completed in 2014. A copy of the mine site general arrangement can be found in Appendix A.

Eagle Mine Site Aerial View of Construction, October 2013

2.1 Soil Erosion Control Measures

On June 11, 2013, the Marquette County Conservation District (MCCD) made the determination that a sufficient amount of permanent vegetative growth had developed on the berms surrounding the perimeter of the mine site facility thus minimizing the potential for soil erosion. As such, Eagle Mine was granted a Certificate of Completion (COC) from MCCD which granted approval to remove the Soil Erosion and Sediment Control (SESC) measures located around the perimeter of the main facility. These SESC measures were also permitted through the MDEQ NPDES Permit MIR111489. Upon receipt of the COC, a notice of termination for the NPDES Permit was also submitted to the MDEQ on July 23, 2013.

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 construction is complete and permanent vegetation is in place. 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 at the mine site guardhouse.

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 on at least an annual basis 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 well QAL071A is located down gradient of NCWIB 1 and is monitored on a quarterly basis as part of the overall mine monitoring well network. NCWIB 4 is currently located in an active construction area and the final location of the down gradient well will be assessed in 2014 once construction is complete.

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 2013, the results indicated a small number of cations and/or anions were found to be outside of calculated benchmarks at each location. These results will continue to be closely monitored and are summarized in Appendix G of this report.

2.2.2 Contact Water Basins and Storm Water Catchment

There are two contact water basins that collect storm water from the paved contact area, from the underground mine, from the temporary development rock storage area (TDRSA) and as needed from the fuel station and truck wash sumps. In 2013, three sections within the contact area were under construction; the coarse ore storage area (COSA), mine heater, and backfill plant.

The asphalt located within the footprint of these buildings was removed in late July in order to facilitate the construction of these structures. Prior to removing asphalt and curbing, a request was submitted and approved by the MDEQ making the contact area a non-contact area while underground development was suspended. Although development was suspended, routine inspections and maintenance tasks continued. Therefore, the washing station for underground equipment was moved into the portal to ensure material from the underground wasn't tracked to the surface where construction was occurring. Once construction of the foundations and sidewalls was completed, asphalt was re-applied around the buildings to again seal the contact area. This allowed all storm water to once again flow towards and discharge into the contact water basins.

Asphalt removed prior to construction, July 2013

Paving applied to re-seal contact area, November 2013

2.3 Surface Facility Construction

During final design and throughout construction of the Eagle Mine site, modifications have been implemented to improve overall environmental control, safety and project efficiency. These modifications were communicated in the form of Part 632 mine permit amendment requests or construction notifications and have been approved by MDEQ. A summary of all 2013 approvals is discussed below.

The additional structures that were constructed in 2013 are necessary to support the mining operation and will provide additional environmental protection. These structures include:

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

2.3.1 Site Modifications and Amendments

Since underground development temporarily stopped in June 2013 and a significant amount of construction was commencing, a request was submitted for a temporary waiver of permit condition G1 (vehicle washing). This request was approved by MDEQ on July 11, 2013 and will be in effect until underground development resumes. The request was submitted to facilitate the movement of equipment during the surface construction process. The waiver only applied to vehicles entering the contact area that were associated with the construction activities and not to vehicles traveling underground. Vehicles or equipment traveling underground were still required to wash their vehicles using a temporary wash station located just inside the portal. The temporary wash station met the requirements of permit condition G1 while eliminating the potential for tracking material from the underground to the surface where construction vehicles were operating. The temporary waiver will be in effect until mining resumes in January 2014.

In September 2013 notifications were sent to the MDEQ requesting approval to pave the parking areas and roadways connecting the mine development office and water treatment plant. The paving project resulted in an additional environmental improvement at the site due to another considerable reduction in the fugitive dust emissions associated with vehicle traffic. MDEQ approved the request on September 25, 2013.

On October 7, 2013, Eagle Mine received approval from the MDEQ to pave approximately 1.82 acres north of the contact water basins for snow storage. This addition did not increase the contact area from the original scale that was approved for permit. The permitted contact area was originally designed to be 35.3 acres, but due to changes in the layout of surface facilities the as-built contact area is actually 31.4 acres, so the addition of 1.82 acres for snow storage is still within the originally permitted scope.

A full summary of all Part 632 permit notifications, required submittals and approvals, can be found in Table 2.4.1 below.

Table 2.4.1 Notifications, Submittals, and Approvals

Date	Description	Approval
3/15/13	2012 Annual Mining and Reclamation Report	
	Transfer of ownership notification	7/3/13
7/11/13	Temporary waiver of Permit Condition G1 (vehicle washing)	7/11/13
	Notification of legal name change	7/22/13
9/5/13	Construction notification – parking lot and roadways from office to WTP	9/25/13
10/4/13	Construction notification – paving on contact area for snow storage	10/7/13

2.3.2 Mine Heater

The purpose of the Mine Heater is to provide warm air via a 250 HP fan to the underground workings during the winter months. Construction was completed in November 2013 and included the foundations, heating ducts, control room, and a heater room. The heater house is comprised of two burners fueled by propane for a combined output of 20 MMBTU. The two 18,000 gallon propane tanks that feed the burners are located on the north side of the portal at a distance greater than 100 feet from the opening as mandated by the Mine Safety Health Administration (MSHA).

Portal heater house and ducting, Dec. 2013

Aerial view of heater and propane tanks, Nov. 2013

2.3.3 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 to the over the road haul trucks. Construction of the 36,000 square foot COSA commenced in July 2013. A total of 4,500 cubic yards of concrete was utilized to form the concrete foundations, sixteen-foot walls, and slab on grade that supports the pre-engineered steel structure. The concrete work was completed in the fall of 2013 and by late December 2013 the steel for the COSA was erected with about 15% of the cladding complete. Construction of the COSA is slated for completion in the spring of 2014.

COSA site preparation, July 2013

COSA concrete foundation & sidewalls, October 2013

COSA steel erected, November 2013

COSA, steel cladding, December 2013

2.3.4 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. A summary qualifying the use of development rock as CRF is found in Appendix B. Construction of the building began in July 2013 where approximately 2,600 cubic yards of concrete was utilized for foundation work. This was completed in October 2013 with steel erection completed in November 2013.

In addition to the aggregate storage building, this area also houses a backfill plant that will generate cemented rock backfill for the underground. The foundations for this plant and two corresponding cement silos were completed in late October 2013.

Aggregate storage site preparation, July 2013

Aggregate storage foundation work, Sept. 2013

Aggregate Storage, November 2013

Cement silos & aggregate storage, December 2013

2.3.5 Mine Ventilation and Emergency Egress

Construction of the mine ventilation and emergency egress is comprised of three phases;

- Drilling and reaming of the two raises – the mine ventilation air raise (MVAR) and the emergency egress/fresh air intake;
- Construction of the emergency elevator (Alimak); and
- Construction of surface facilities to support the equipment associated with the raises.

Drilling/Reaming Activities

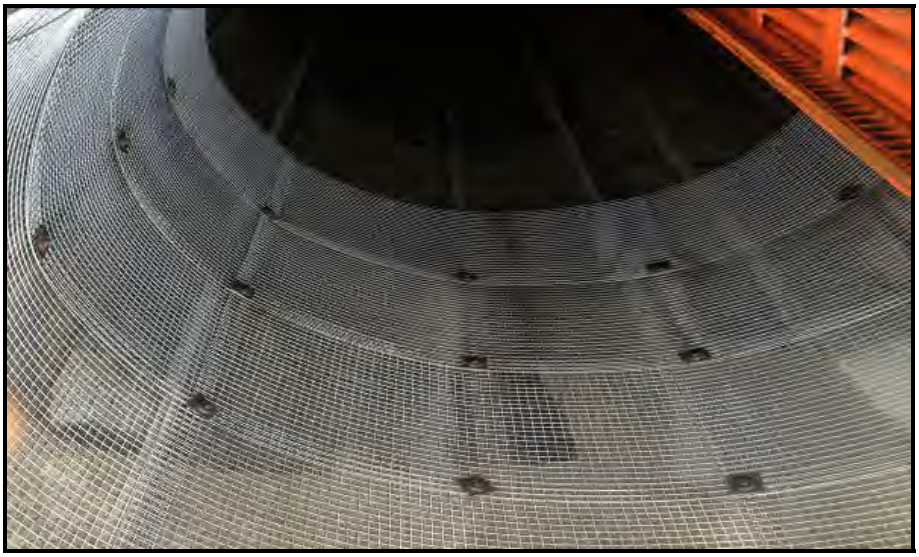
The first stage of construction was to complete drilling of both the MVAR and emergency egress/ventilation intake holes (i.e. raises). Raise bore drilling contractor, Cementation, mobilized in November 2012 to complete a 15" pilot holes prior to the reaming of the intake raises. Once the pilot hole was completed in early 2013, the drill bit was replaced with a 4.5 m (14.9 ft) reamer bit which bores the hole from the bottom up. The reaming of the two raises was completed in April 2013. Upon completion of the MVAR, a temporary ventilation fan was moved into place.

Reamer bit, January 2013

Temporary air ventilation exhaust fan, June 2013

Alimak Construction

Before the Alimak could be placed in the emergency egress/ventilation intake raise by Cementation, additional work was required. A temporary system was constructed and included an underground bulkhead to aide ventilation, a temporary head frame, and surface infrastructure for the Alimak. Using this temporary system, the raise was screened and bolted for safety purposes and the brackets for the permanent rails and utilities were set and the cage installed on the Alimak. Final construction will be completed in 2014.



Screened & bolted emergency egress, May 2013

Surface Facility Construction

Construction of the surface facilities associated with the vent raise and emergency egress were started in 2013 and consist of three main structures; the collar house and the heater house, propane tanks, and electrical house (E-house).

The collar house is the structure that covers the emergency egress/ventilation intake hole and ties in the heating system to the underground. Construction of the 1,000 square foot collar house commenced in August 2013. The concrete foundations were completed in the fall and the erection of the steel was completed December 2013.

The heater house is connected to the collar house and was also installed in December 2013. Like the portal heater, this heater is comprised of two burners fed by propane for a combined total of 25.4 MMBTU of heat.

The construction of the propane tanks and related piping to the heater house was completed in November 2013. The construction included two 18,000 gallon propane tanks and the 6" underground propane line that runs to the heaters.

The construction of the vent raise electrical house foundations was completed in October 2013. The foundations support the E-House which will feed the mine ventilation and the underground mine with power.

Installation of the permanent ventilation stack commenced in December of 2013 and will be completed in 2014. Additional work to be completed in 2014 includes, the completion of the Alimak and collar house, electrical and utilities, and commissioning of the heating and ventilation systems.

Aerial view of vent raise construction, Oct. 2013

Vent raise utilities & foundations, November 2013

Electrical House, December 2013

Ventilation stack construction, December 2013

2.3.6 Onsite Utilities

Electrical

The electrical work related to feeding the underground mine and its supporting structures with 13.8 KV power was completed in December 2013. The work included installation of new transformers and installation of a switch gear house at the portal.

Potable Water

Due to naturally occurring arsenic levels in excess of the maximum contaminant level (MCL) set by the EPA, the water supply was not fully approved as a Type II non-community, non-transient public water supply. As such, the Eagle Mine entered into a bilateral compliance agreement (BCA) on May 24, 2013 with the Marquette County Health Department (MCHD) and MDEQ Office of Drinking Water and Municipal Assistance for interim operation of the water supply serving the Eagle Mine Site. The purpose of the BCA was to establish a timeline for the installation and operation of an arsenic removal treatment system and to establish interim measures to ensure public health during operations prior to treatment system installation. Bottled water was provided to all employees and all faucets labeled as non-potable while the engineering and construction of the arsenic treatment system was completed. Construction of the arsenic treatment skid was completed in late November and initial commissioning occurred in December 2013. The final inspection of the treatment system is scheduled for January 2014.

Potable water arsenic treatment skid, December 2013

2.3.7 Miscellaneous

In early 2013, the final commissioning of the truck wash was completed and the fully automated system put into operation. The truck shop was also completed and commissioned in October 2013. In addition, as noted in section 2.4.1, the expanded snow storage area north of the contact water basins and the parking areas and roadways connecting the administration office and water treatment plant were paved in early November.

Truck Shop, December 2013

2.4 Upcoming 2014 Work

In 2014, Eagle Mine intends to complete the remainder of surface construction including the coarse ore storage building (with truck scale), aggregate storage and backfill plant, MVAR and Alimak.

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

The underground contractor, Red Path, demobilized in early June after completing their anticipated portion of the underground development in May 2013. At this time, underground activities ceased with the exception of routine inspections and maintenance requirements. In October 2013, Cementation was awarded the underground contract to complete the remainder of the mine development and subsequent mining of ore. Cementation will begin final mine development in January 2014 in preparation for mining ore in late 2014.

3.1.1 Underground Development Progress

In 2013, construction of the primary decline, also referred to as the centerline, had progressed an additional 363 meters for a project total of approximately 2,152 meters (excluding the 78 meter portal entrance). In addition to the centerline advance an additional 823 meters were developed off-centerline. The off-centerline advance included muckbays, passing bays, substation cutouts, level accesses (215 and 190), level footwall drives (265, 250, 215) and stope accesses on the 265 and 215 levels. Table 3.1.1 below summarizes the monthly progress of both centerline and off-centerline underground advance and Appendix C contains a map which outlines the development positions for 2013.

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 D.

Table 3.1.1 Underground Advance

Month	Distance of Advance Centerline (m)	Distance of Advance Off-Centerline (m)
January	56.6	180.1
February	70.1	145.1
March	77.7	131.2
April	78.0	176.8
May	80.6	190.1
June	0	0
July	0	0
August	0	0
September	0	0
October	0	0
November	0	0
December	0	0
Total	**363.0**	**823.3**

Source: Mine Engineering Department 2013 Development Summary

Three 12 person, 36-hour self-contained, Mine Arc refuge chambers remained underground in 2013. They are currently located in muckbay No. 5, muckbay No. 8, and 265 level stope access 1665. 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.

Applying shotcrete for ground support

Drilling for explosives placement

Other underground operations included definition drilling of the ore body which is being completed by Boart Longyear. Drilling occurred from January through April 2013 and then re-commenced in September 2013 and will continue into 2014.

3.1.2 Dewatering Volume and Quality

Water is required underground in order to complete drilling, bolting, and dust suppression activities. In 2013, the mine services well supplied all of the water needed underground to complete 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 Eagle Mine owner's representatives and the flows recorded in the shifters logbook. On a weekly basis, the flow readings are transcribed to the electronic mine water utilization log which aids in the reviewing and reporting process.

Water use was down in 2013 due to underground operations being suspended for half of the year. The amount of water supplied for underground operations in 2013 ranged from an average of approximately 6,930 gallons per day (gpd) (4.8 gpm) in September to 99,426 gpd (69 gpm) in January. The total water pumped from the mine, including water supplied to the underground and natural inflow into the mine, ranged from an average of 23,094 gpd (16 gpm) in October to 109,539 gpd (76 gpm) in February.

Table 3.1.2 below summarizes the monthly average flow provided to the underground and the calculated natural infiltration dewatering volumes for 2013. 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 6,641 gpd (4.6 gpm) in January to 18,951 gpd (13.2 gpm) in July 2013

Table 3.1.2 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	99,426	106,067	6,641	4.6
February	97,046	109,539	12,493	8.7
March	81,377	90,451	9,074	6.3
April	53,949	67,892	13,943	9.7
May	63,821	76,474	12,654	8.8
June	32,852	50,144	17,292	12.0
July	13,803	32,753	18,951	13.2
August	9,550	28,206	18,656	13.0
September	6,930	24,116	17,190	11.9
October	8,041	23,094	15,053	10.5
November	15,877	33,169	17,292	12.0
December	32,149	51,035	18,886	13.1

* 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.

In addition to monitoring water volumes from the underground mine, the water is sampled and characterized quarterly to further understand how the water chemistry is changing over the course of operations and to identify potential trends that may result in modifying process controls at the water treatment plant (WTP). This data will also be utilized in the ongoing geochemistry assessment.

Samples were collected in February, May, August, and November 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, does not indicate any apparent trending. A summary of the results are available in Appendix E.

3.2 Temporary Development Rock Storage Area (TDRSA)

Since underground activities ceased and the TDRSA was not being used for an extended period of time, the storage area was covered to minimize the exposure of the development rock. The first step of the process was to grade the TDRSA so that all water would drain towards the north end. Next, approximately 4,500 tonnes (t) of limestone was spread over the entire surface to provide neutralization. Finally, a geo-membrane cover was rolled out and sewn and/or fusion welded together while ropes and sandbags were deployed for anchoring. Covering was complete in October 2013 and will remain in place under underground operations recommence and the storage facility is returned to operation.

Rolling out the geo-membrane for cover, Oct. 2013

Fully covered TDRSA, October 2013

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.

Limestone being applied to TDRSA in preparation of covering, October 2013

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, a greater volume than normal was applied to the TDRSA in October 2013. For these reasons, the volume of limestone may fluctuate above or below the required 2 percent over the course of the year. In 2013, the calculated volume of limestone required was 1,467 m^3 (2,614 t) and the actual volume delivered was 2,827 m^3 (5,033 t) which is approximately 48 percent greater than the required volume. Table 3.2.1 below summarizes the calculated and actual limestone volumes and tonnage for 2013.

Table 3.2.1 Volume of Limestone Added in 2013

Month	Limestone Required - 2% (tonnes)	Limestone Delivered (tonnes)
January	681	0
February	385	588
March	643	0
April	435	0
May	470	0
June	0	0
July	0	0
August	0	0
September	0	0
October	0	4,445
November	0	0
December	0	0
Total	**2,614**	**5,033**

Source: Mine Engineering Department 2013 Development Summary

In 2013, approximately 48,395 m^3 (130,665 t) of development rock was placed in the TDRSA. In addition to the development rock, 2,827 m^3 (5,033 t) of limestone was delivered and placed in the TDRSA. Assuming a development rock swell factor of 1.3, approximately 62,913 m^3 of development

rock and limestone were placed in the TDRSA in 2013. Table 3.2.1a below summarizes the monthly volume and tonnage of development rock mined in 2013 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 Rock Mined in 2013

Month	Volume of Rock Mined (m^3)	Tonnage Mined (tonnes)
January	12,607	34,039
February	7,129	19,248
March	11,907	32,148
April	8,051	21,738
May	8,701	23,492
June	0	0
July	0	0
August	0	0
September	0	0
October	0	0
November	0	0
December	0	0
Total	**48,395**	**130,665**

Source: Mine Engineering Department 2013 Development Summary

Table 3.2.1b TDRSA Volume Totals – Project to Date

Month	Volume of Rock Mined (m^3)	Limestone Delivered (m^3)	Swelled Volume (m^3)	TDRSA Volume Project Total to Date (m^3)
Previous Total	**80,929**	**2,332**	**105,208**	**107,541**
January 2013	12,607		16,389	123,930
February 2013	7,129	330	9,268	133,528
March 2013	11,907		15,479	149,006
April 2013	8,051		10,466	159,472
May 2013	8,701		11,311	170,784
June 2013				
July 2013				
August 2013				
September 2013				
October 2013		2,497	2,497	173,280
November 2013				
December 2013				
2013 Total	**48,395**	**2,827**	**62,913**	

Source: Mine Engineering Department 2013 Development Summary

3.2.2 2014 Mining Forecast

The 2014 mining forecast calls for the continuation of developing the down-ramp, levels, stope accesses, and internal raises for a total of 1,974 meters of lateral advance and 81 meters of vertical advance which would result in an additional 63,311 m^3 (162,348 t) of development rock being removed and stored on the TDRSA. Assuming an estimate of 30 percent swell, approximately 82,304 m^3 (162,348 t) of development rock will be placed on the TDRSA in 2014. An additional 1,824 swelled m^3 (1,748 t) of limestone will be required for this amount of development rock. Production is slated to begin in late 2014, and an estimated 40,000 m^3 of ore will be removed and transported to the Humboldt mill for processing. This estimate is 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 sealed off from the primary liner system. This water is rain water that was encapsulated in the secondary liner system during 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 2013, approximately 4,614,169 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, May, August, and November 2013. An additional sample was collected in March for limited parameters in order to compare results with the leak detection sump. A summary of the results can be found in Appendix E.

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 2013, five separate samples were collected and the accumulation rates calculated. The average daily rate of accumulation ranged from a minimum of 0.015 gal/acre/day in May to a maximum of 0.1 gal/acre/day in February. 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 2013. A total of 55 gallons of water was purged from the leak detection sump in 2013 which is down significantly from the 534 gallons removed in 2012. 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, March, May, August, and November 2013. 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 3.2.3.2 below summarizes the TDRSA leak detection sump analytical results for 2013. The pH results were fairly consistent and ranged from a low of 7.3 to a high of 7.8 which is neutral to slightly basic in nature. Sulfate results ranged from a minimum of 410 mg/L in May to 540 mg/L in November. The sulfate concentration from November was above the 500 mg/L threshold identified in the permit.

As required, the MDEQ was notified of the sulfate result in a letter sent in December 2013. 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, the volume of water present in the sump actually decreased in November 2013 also demonstrating that the liner has not been compromised. The source of sulfate was likely introduced during construction of the lining system. Results will continue to be reviewed and any potential trends documented. Any upward trending will be reported to the Department.

Table 3.2.3 TDRSA Leak Detection Sump Results for 2013

Parameter	2/11/13	3/13/13	5/29/13	8/6/13	11/14/13
Magnesium (mg/L)	7.0	NM	7.6	8.4	9.4
Sodium (mg/L)	320	NM	350	340	370
Chloride (mg/L)	5.7	5.7	6.2	6.6	7.8
Sulfate (mg/L)	450	430	410	480	540
Nitrate (mg/L)	2.7	3.3	4.4	5.4	6.0
Nitrite (mg/L)	0.64	0.3	0.42	0.67	0.47
Ammonia (mg/L)	0.31	0.64	0.16	0.15	0.13
Average Daily Flow Rate (gal/acre/day)	0.1	0.03	0.015	0.028	0.016
Purged Volume (gal)	28	7	8	8	4
pH	7.8	7.7	7.4	7.3	7.7
Specific Conductivity (uS/cm)	1,639	2,420	1,686	1,874	2,013

Notes: NM = Not Measured

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 2013, the approximate water use was 6,821 gpd (4.7 gpm). This was down from the average of 10,656 gpd utilized in 2012.

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 33,046 gpd (23 gpm) of water was utilized in 2013 which is up slightly from an average of 24,395 gpd supplied in 2012.

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 2013, the total volume of utility water treated and recycled was approximately 63,051 gpd (43.8 gpm) which is down significantly from last year. This is in large part due to not using the water in the underground.

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 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 2013 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, May, August, and November with the annual parameter list collected in Q2. A summary of the results can be found in Appendix E.

3.3.3 Water Treatment Plant Operations and Discharge

Due to minimal water on-site, no water was discharged from the WTP in January 2013. During this time, all water treated in the plant was either recycled back into the CWBs or used in WTP processes.

The WTP successfully treated and discharged more than 38,000,000 gallons of water in 2013. A summary of the monthly discharge rates can be found in Table 3.3.3 below.

Two events occurred in 2013 which caused water to be discharged that was outside of the permitted acceptable range of 6.5-9.0 for pH.

Approximately 83,320 gallons of water was discharged on August 19th-20th at a pH range of 9.4-9.8. The WTP immediately ceased discharge upon discovery of the elevated pH and did not discharge again until August 28th after an investigation could be completed. The investigation determined a vacuum breaker cap on the sampling unit was faulty which caused inaccurate pH readings. This resulted in a discharge of off-spec pH water. During a routine calibration check, the situation was discovered and discharge immediately ceased. MDEQ Water Division was notified per permit requirements. A second in-line pH meter was installed in series with the current probe to ensure a redundant reading prior to discharge. Product water neutralization is now controlled with the first meter, while the second meter controls the discharge valve.

The second event resulted in approximately 1,465 gallons of water being discharged outside of the acceptable range for pH over the course of the three days. While discharging on November 11th, 13th, and 14th, the pH was detected at levels outside of the designated set points and as required the discharge valve started to close. Due to a recent programming change to the discharge valve control loop, the valve was closing too slowly allowing the discharge of off-spec water for a short period of time.

The programming associated with the discharge valve control loop was modified to increase the reaction time of the discharge valve, thus allowing it to close faster. In addition, in order to minimize pH fluctuations in the product water, a weaker pH modifier (carbon dioxide) was tested and implemented in December 2013. Previously hydrochloric acid was used to neutralize the product water prior to discharge, due to the purity of the water, small additions of acid could result in significant changes to the pH of the water. The carbon dioxide is added in the gaseous form at the product water tank and flow is regulated by the WTP operators. A fully automated system is scheduled for installation in 2014. This modification has resulted in steadier pH levels in the product water, has reduced the amount of chemical usage on site, and should result in additional protection against future pH discharge events.

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 2013

Month	Volume of Water Discharged (gal)
January	0
February	476,447
March	6,194,184
April	5,708,709
May	8,168,501
June	3,968,299
July	3,531,133
August	2,290,855
September	1,375,752
October	2,640,662
November	1,671,944
December	2,614,387
Total	**38,640,873**

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. From January through March 2013 approximately 101 tonnes of crystallizer waste and 44 tonnes of filter press waste was disposed at the Marquette County Landfill. From June through December 2013, 312 tonnes of crystallizer waste and 145 tonnes of filter press waste was disposed at a landfill located in Wisconsin.

Filter Press Waste

Crystallizer Waste

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 2013, 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 2013 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 F.

Four rounds of quarterly sampling were completed in January/February, May, July, and October 2013. The Eagle Mine Permit prescribes both a long parameter list for annual monitoring events (conducted in Q2 2013) and a short list to be used quarterly (Q1, Q3, Q4 2013). 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 2013 and all results were found to be non-detect. Samples are collected in accordance with the Eagle Project Quality Assurance Project Plan and Standard Operating Procedures (North Jackson, 2004a and 2004b) and the results are summarized and compared to benchmarks in the tables found in Appendix G.

Benchmark Calculations

In 2012, 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. 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. Therefore, all benchmarks which are noted as “pending” will likely be revised. Following is a description of the current calculated benchmarks:

- Upper prediction limit (UPL) benchmark: Per reporting requirements under R 426.406(6) and General Condition N2 of the mine permit, the UPL has been developed as the upper threshold limit for increased monitoring and is based on a statistical analysis of qualified baseline data. Data outliers are not included in the baseline information. The UPL benchmark represents a value that is two standard deviations above the long-term average. Again, as the data set increases over time, the long term average and standard deviations may need to be adjusted for improved accuracy.

- Maximum contaminant level (MCL) derived benchmark: Per reporting requirements under R 426.406(7a), the MCL benchmark was developed as an upper threshold action limit and is represents the value ½ way between the long-term average and the drinking water standard (MCL) determined by US EPA. These values may also be reviewed and adjusted as the data set increases over time.

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 Q1 or Q2 2013 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 G.

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 2013 events that occurred:

- During Q3, at location QAL024A, sodium, chloride, and magnesium were reported at levels greater than the established benchmarks for two consecutive quarters. The Department was also notified in Q2 of elevated results for these parameters. QAL024A is located within the fence line of the vent raise area and during the winter months a sand and salt mixture was used in the area to minimize ice buildup. The snow was plowed and stockpiled in an area directly adjacent to the well. The snowmelt occurred approximately one week prior to the sampling event and may have introduced the sodium chloride into the well. Q3 and Q4 results for sodium, chloride, and magnesium decreased significantly are expected to continue to decrease as fresh water is naturally introduced into the well.

- Deviations from a benchmark also occurred for two consecutive sampling events at monitoring location QAL067A (located on the southeast corner of the TDRSA) which reported results for nitrate that were greater than the established benchmark during each of the quarterly sampling events in 2013. Chloride was also above the benchmark in Q3 and Q4. Water quality data from this location and QAL029A (groundwater discharge permit well) indicate a spatial trend likely associated with construction activities near the coarse ore storage area (COSA) and backfill plant. Results will continue to be closely monitored to determine if the deviations are temporary and associated with current construction activities or are the result of mining activities. In addition, a review of laboratory results for locations QAL067A and QAL029A/D indicate no evidence that the deviations are a result of liner leakage from the TDRSA or CWBs.

- Benchmark deviations were also reported at locations QAL044B, QAL060A, QAL063A, QAL066D, and QAL071A and are summarized in Appendix H. Benchmarks at these locations are based on a small sample set of between 4-6 results. With such a limited sample set, it is highly probable that the deviations being seen are consistent with natural groundwater variations. The future quarterly results will continue to be closely monitored for trending to determine if the deviations are temporary or the result of construction or mining operations.

A summary of sample results and benchmark deviations can be found in Appendix G. A comprehensive full data report will be made available upon request.

As required by MP 01 2007 special condition N2, a statistical trend analysis has been conducted for all monitoring locations/parameters. It should be noted that due to the small sample size, the current trending results should all be considered preliminary.

Possible trends were identified for one or more parameters at ten compliance locations and seven background monitoring locations using data collected from baseline sampling events (2011) through December 2013. Alkalinity, bicarbonate and sodium were the most frequently noted as possibly trending. A table summarizing the potential groundwater trends can be found in Appendix H.

Trend charts are also provided in Appendix H for compliance monitoring locations in which results were outside of established benchmarks for at least two consecutive quarters and a potential trend was identified. A full report outlining groundwater trending results for all parameters and locations, including graphs, is available upon request.

These analyses will continue to be conducted after each quarterly monitoring event in 2014 and results reviewed to determine if the trends are attributable to mining operations.

Monitoring well sampling set-up Photo Courtesy of North Jackson Company

4.1.2 Quarterly Surface Water Quality Monitoring

Surface water sampling was conducted on a quarterly basis in 2013 at eleven locations; nine on the Salmon-Trout River and one each on the Yellow Dog River and Cedar Creek. The samples collected represent winter base flow, spring snowmelt/runoff, summer base flow, and the fall rain season. Samples were collected in February, April/May, August, and October in 2013. The spring runoff sample was collected in late April/early May in order to best represent the peak flow rates of the spring runoff. A map of the surface water sampling locations is found in Appendix I. Samples are collected in accordance with the Eagle Project Quality Assurance Project Plan and Standard Operating Procedures (North Jackson, 2004a and 2004b) and the results are summarized and compared to benchmarks (i.e. UPLs) and are located in the tables found in Appendix J.

Benchmark Calculations

Similar to the groundwater benchmarks discussed in section 4.1.1, upper prediction limits (UPLs) were calculated for all surface water monitoring locations in 2012 based on the guidance provided by MP 01 2007 and Part 632. The UPL, which follows Part 632 R 426.406 (6), was calculated by adding two standard deviations to the baseline mean. In addition, as required by MP 01 2007 N2, in order to account for seasonal variability, UPLs were calculated for each of the four monitoring seasons. This allows for some statistical control over seasonal variations. Since seasonal variations are taken into consideration for surface water sampling locations, benchmark deviations are reported when results are outside of the benchmark for two seasonal quarters, for example Q1 2012 and Q1 2013, rather than two consecutive quarters as is the case with groundwater.

Monitoring Results

Grab samples were collected from each location during the quarterly sampling events completed in February, April/May, August, and October 2013. The Eagle Mine Permit prescribes a long parameter list for annual monitoring events (conducted in Q2 2013) and a short list to be used quarterly (Q1, Q3, and Q4 2013). 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 2013 events that occurred.

- At compliance monitoring locations STRM004 and STRE001, pH results were slightly below established benchmarks in Q2 2012 and Q2 2013. At both locations the pH returned to baseline levels in Q3 and Q4 indicating that the lower pH levels were likely due to the spring snow melt.

- Compliance monitoring locations reported results for pH, chloride, sulfate, or metals (i.e. aluminum, arsenic, mercury, iron, manganese) that were outside of the established benchmarks for a single quarter. This was the first instance in which the results were greater than established benchmarks for the respective seasonal quarter, therefore reporting was not required at these locations. Elevated metals in Q2 were being seen throughout the monitoring network, including the reference location, and appear to be attributable to the 2013 spring melt.

Benchmarks are based on a very limited sample set from 2004-2005, so seasonal variations may not be fully incorporated into the benchmarks at this time. In 2014, benchmarks at the Salmon Trout East Branch stations (STRE005, STRE009 and STRE010) will be updated since they are currently calculated using lumped datasets and now can be calculated using the two measurements available for each quarter (2012 & 2013).

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. Again, it should be noted that due to the small sample size, the current trending results should all be considered preliminary.

Using data from baseline sampling events through December 2013, the following was determined:

- No trends were reported for the Q3 sampling period;
- Sulfate and pH were noted as possibly trending in Q1 and Q4 at one compliance and/or background monitoring location;
- Locations STRE002 and STRM004 reported possible trending of pH and several metals in Q2. These two locations are located several miles north of the mine site and are not directly influenced by mining operations; and
- Locations within closer proximity to the mine site reported minimal to no trending in Q2 2013.

A table summarizing the possible surface water trends can be found in Appendix K. In addition, a trend chart has been included in Appendix K for pH at location STRM004 which was reported at levels outside of the benchmarks in the last two Q2 monitoring events. A full report outlining results for each parameter, quarter, and location, including graphs, is available upon request.

A trend analysis will continue to be conducted after each quarterly monitoring event in 2014 and results reviewed to determine if the trends are attributable to mining operations.

Surface Water Sampling Photo Courtesy of North Jackson Company

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.

In the 2013, the determination was made to begin reporting continuous monitoring data by water year (October 1, 2012 - September 30, 2013) rather than calendar year. Water year is the preferred approach for reporting continuous readings, especially water levels, because the hydrographs demonstrate the effect of late fall and winter precipitation, which melts and drains in spring, in one 12-month hydrologic cycle.

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 2013 were found to be consistent with baseline data, with the exception of the following:

- QAL023B – The mean water level readings in March and April 2013 were a maximum of 0.2 feet below the minimum baseline level calculated for this location. The lowest reading was recorded in March and returned to levels above the baseline minimum in May.

- QAL024A – The mean water level readings from October 2012 – April 2013 were reported at a maximum of 1.1 feet below the minimum baseline level calculated for this location. The period of time in which these water levels were recorded coincide with the period of time in which the vent raise and emergency egress were being drilled and reamed. Water levels returned to baseline levels in May.

- QAL044B - The mean water level readings from February - May 2013 were a maximum of 0.6 feet below the minimum baseline level calculated for this location. The lowest reading was recorded in March/April and increased in May until it returned to baseline levels in June.

- QAL066D - The mean water level readings from January - April 2013 were a maximum of 0.8 feet below the minimum baseline level calculated for this location. The lowest reading was recorded in March and increased in April until it returned to baseline levels in May.

The lower water level readings at locations QAL023B, QAL044B, and QAL066D 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. A map of the hydrologic monitoring locations can be found in Appendix L. All discrete water elevations from Q4 were found to be consistent with pre-operation levels. This monitoring network also identified some hydrographic trends. For example, the water level at location QAL004D fluctuates when the mine supply well (QAL011D) is in operation and, as expected, some minor mounding has been noted at locations QAL008A and QAL008D which is likely associated with effluent discharge to the treated water infiltration system (TWIS). A summary of the discrete water elevation results from Q1 – Q4 2013 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

2013 water year were averaged over each month of operation from October 1, 2012 thru September 30, 2013 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:

- All mean stream temperature and flow measurements were found to be within historical minimum and maximum value readings at all four locations.
- STRM004 reported specific conductance readings that were slightly above maximum baseline levels in January, February, and March.
- STRM005 reported specific conductance readings slightly below baseline levels in July and August.
- YDRM002 reported specific conductance readings slightly below baseline levels in June and July.

Although slightly outside of the baseline limits, the specific conductance readings were consistent for the stream conditions experienced in 2013. 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 2013 included flora and fauna surveys, wetland monitoring, fish and macro invertebrate surveys, and a narrow-leaved gentian survey. Results from each survey have been compiled into annual reports which are available upon request. A brief summary of each survey is provided below.

4.3.1 Flora and Fauna/Wetland Monitoring Report

The 2013 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 2013.

Table 4.3.1 Type and Duration of 2013 Flora, Fauna, and Wetland Surveying Events

Survey Type	Survey Date
Bird	June 11-13, September 17-19
Small Mammals	September 17-19
Large Mammals	June 11-13, September 17-19
Toads/Frogs	May 15, June 10 & 24
Threatened and Endangered Species	December 4
Wetland Vegetative Monitoring	June 11-12
Upland Vegetative Monitoring	June 11-12, August 22
Narrow-Leaved Gentian	July 16

The wildlife and plant species identified during the 2013 surveys within the Study Area are similar to those identified during previous KME surveys with exception of the physical removal of vegetation at survey points 3 and 14. Following is a summary of the survey results:

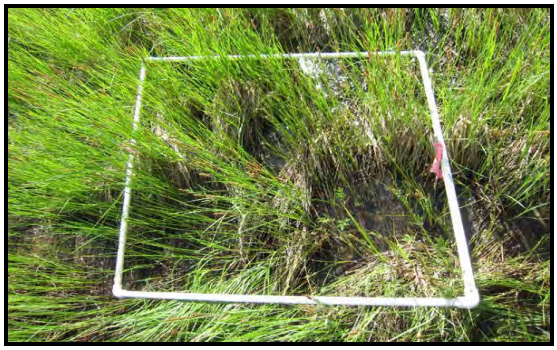
- Forty-two species of birds, none of which are threatened or endangered, were observed during the bird surveys, and seven additional bird species were identified during other KME surveys (e.g., vegetation surveys). The bird species identified during the 2013 bird surveys are similar to those bird species 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-seven small mammals representing four species were collected during the September survey period. 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 2013 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 2013 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.

- Five frog species and one species of toad were identified; none of them are threatened or endangered. All three of the sampling points exhibited use by frogs and/or toads for breeding. The frog and toad species identified are typical of those expected in the habitats present in the Study Area. The 2013 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 2013 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 revised 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 6W, June 2013

Upland vegetation survey plot 1, August 2013

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.

Spruce grouse is a state special concern species; this species was occasionally observed in 2013 during the seasonal vegetative, bird, and small mammal surveys south and east of the Salmon Trout River. Scat and tracks of moose (State Special Concern) were observed occasionally in 2013 throughout the Study Area. A single bald eagle (state special concern) was observed soaring over the southern portion of the study area.

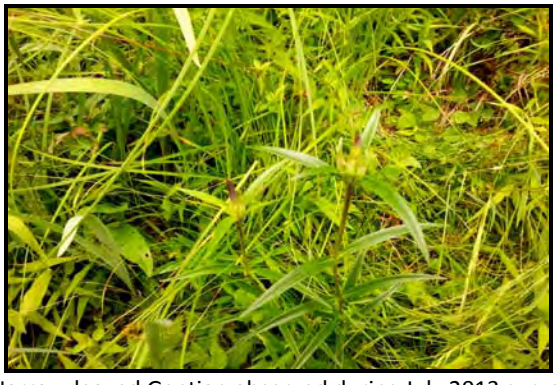
Moose outside of main gate, September 2013

4.3.3 Narrow-Leaved Gentian (NLG)

The 2013 NLG survey was conducted on July 16, 2013. The NLG colonies appeared healthy in 2013 relative to previous observances. According to National Oceanic and Atmospheric Administration data, precipitation totals were between 50% and 75% of normal for the area during the 2013 water year and temperatures were near average. Flow in the Salmon-Trout River appeared normal. Therefore, the necessary hydrology to support the NLG population appears to have been present in 2013.

The methods used to conduct the 2013 narrow-leaved gentian (NLG) field investigation were consistent with the previous NLG studies. However, in 2013, the area of investigation was modified to focus on the Main Branch Salmon Trout River south of Triple A Road in accordance with the locations specified in the Part 632 Mining Permit. Local climate changes and overall health of the NLG colonies were assessed relative to previous years, and photographic documentation was collected.

The 2013 NLG survey results were similar to those of the 2010-2012 surveys. Budding NLG were found in abundance (hundreds of individual plants) along the Salmon Trout River in approximately the same areas where they were previously observed in previous years.


Narrow-leaved Gentian observed during July 2013 survey

4.3.4 Fisheries and Macro Invertebrate Report

The 2013 Fisheries and Macro-Invertebrate annual surveys were conducted by Advanced Ecological Management (AEM). A total of ten stations were surveyed during summer 2013, 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 1,065 fish representing six species were collected from all stations; up from 359 fish in 2012. 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 2013.

Using the P-51 protocol, a total of 2,128 macro-invertebrates were collected from all ten stations that were investigated in 2013, which is up from the 1,669 macro-invertebrates collected in 2012. 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 were consistent with previous evaluations. A copy of the full report is available upon request.

Aquatics monitoring location Station 9, June 2013

4.3.5 Fish Tissue Survey

No fish tissue survey was conducted in 2013. Surveys are only required once every three years, with the next survey scheduled for 2014.

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 2013 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.

One area was identified in 2013 as requiring attention; the north bank of NCWIB No. 1 eroded slightly due to the flow of water during the spring melt. The area was routinely inspected to ensure conditions were not deteriorating and that the integrity of the berm remained. The condition of the bank will be reassessed in the spring of 2014 in order to determine the type and extent of repair that is required. No other issues with the integrity of the berms were found during the inspections conducted in 2013.

Eroded bank on NCWIB No.1, May 2013

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 2013 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 and truck wash floors, sumps, and drains were inspected monthly from January through December 2013 and inspections of the truck shop began in October 2013 and continued through the end of the year. 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 2012, signs of cracking were identified near the entrance of the portal. However, due to the winter season, repairs were unable to be made until 2013. In early 2013 an investigation was initiated to understand the full extent of the concrete damage. It was determined that several sections of concrete should be removed and replaced and that some grading would be required to ensure that pooling of water was not occurring near the portal entrance. The sections of concrete were removed in late summer, while the temporary waiver of permit condition G1 (vehicle washing) was in place, and replaced with reinforced concrete in early November. No other issues were identified in 2013 that required repair.

Areas of concrete removed near the portal that required repair, October 2013

4.4.3 Geochemistry Program

In accordance with the mining permit a geochemistry program has been developed which includes geochemical characterization (i.e. static testing program) and water quality monitoring (i.e. geochemical model update). Since the start of operations in September 2011, samples were collected by project geologists and logged at a rate of one sample per fifty meters of decline development. Samples were visually characterized and percentage of sulfides noted in a comprehensive spreadsheet. All results were sent to Geochimica, Inc. for review and comparison to baseline data to determine if any deviations from predictions occurred.

A summary report detailing the results of the geochemical model update and statistical analysis of the recent geochemical testing has been completed and is available upon request. The final report will be completed and available for review in 2014.

The purpose of the water quality model update is to confirm the expected nature and ranges of water quality inputs to the WTP. The updated geochemical model includes the observed composition of the development rock mined, most current facility design information, and full suite of long-term kinetic testing data that ran for approximately six years (306-330 weeks). Analytical results from quarterly facilities monitoring events (i.e. underground and TDRSA sumps) were also

considered in the review to determine if observed results followed modeled expectations. The following conclusions were derived from the water quality monitoring model update:

- Incorporating new data and facilities information into the kinetic tests leads to lower-pH and higher-sulfate and metals estimates. However, the fundamental nature of the waters as requiring active management (TDRSA) and water treatment (using alkaline addition and high-density sludge controls) remains as predicted in 2006.

- Observed water quality in the Eagle monitoring system (using data for November 2013) shows water quality at both the TDRSA and the underground sump that is closer to that predicted in 2006 than to that predicted in 2014 using the long-term leaching results. This comparison leads to two relevant conclusions:

    - The modeling approach can produce useful results in support of project decision-making. Because of the short life-of-mine, following which all development rock and exposed mine surfaces will be inundated and oxidation eliminated, evolution to the observed long-term leaching limits is not expected, and future water quality should remain closer to the 2006 predictions than to the much more evolved 2014 predictions. The extent of weathering observed in the long-term tests seems very unlikely to be observed in these rocks, provided they are backfilled and flooded.

    - The nature of the materials actually exposed as development rock and exposed underground surfaces is similar in geochemical behavior, at full scale, to the samples that were tested in the project development stages. In addition, the ensemble Development Rock has geochemical characteristics that fall well within the limits of the geochemistry observed in the exploration and development program. Therefore, the existing geochemical characterization program can be considered adequate for understanding current and future water quality.

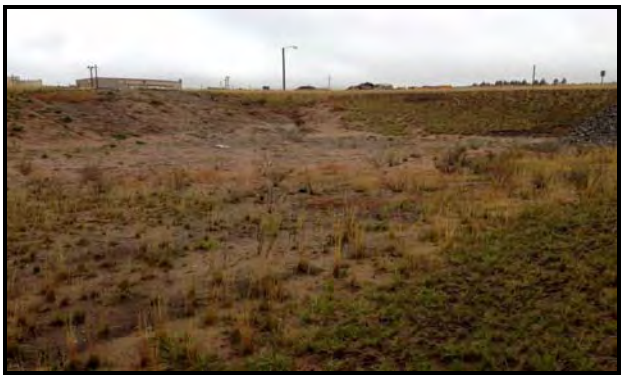
Since development is almost complete, an evaluation was conducted to determine if sampling of the development rock should continue into 2014 and how to remain in compliance with permit condition L18. Based on the results from the geochemical model update, Geochimica determined that enough data has been analyzed to confirm the modeled predictions and that continued sampling and testing of rock materials will not add to the understanding presently available from the extensive program already competed. The determination was made that the future geochemistry program will focus on the water quality of the underground as it will be representative of ore. If deviations from the modeled predictions are identified, additional static testing will be considered.

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.

As required by the mining permit, sediment accumulation measurements are conducted on an annual basis for the NCWIBs. In October 2013, each of the four NCWIBs were inspected. With the exception of NCWIB No.2, located near the construction trailers, no reportable accumulation was observed at any of the locations. Approximately 8-10 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 2014. If the vegetation persists it may require removal if it begins to impact infiltration rates.



NCWIB 2 sediment accumulation in northwest corner, October 2013

Two sediment thickness measurements were completed in CWB 1 and 2 in July and October 2013 using a boat and sludge judge. A sludge judge is a sampling device which allows an individual to take readings of settled solids. Although not as accurate as readings taken when the basins are fully lowered, the Sludge Judge provides an understanding of the volume of solids within the basins.

In July and October 2013, CWB 1 was found to have a maximum of 26 inches of sediment accumulating in a very small area at the south end of the basin directly under the inlet from the underground. The north end of the basin measured an average of 8 inches of accumulation. In July, CWB 2 was found to have a maximum reading of 21 inches along the west edge of the middle of the basin where the WTP sump discharges. These are very fine solids that actively redistribute as the water moves. In October, the highest reading was 10 inches at the south end near the underground and truck wash discharge outlet. Aside from the highest readings, the remainder of the CWB 2 averaged 1.5 – 2.0 inches of sediment accumulation in both July and October. Results were found to be fairly consistent from 2012 to 2013 in CWB#1 and slightly higher in 2013 in CWB #2, this is likely due to solids returned to the basin from the WTP sump.

5. Reclamation Activities

Reclamation activities were minimal in 2013 as construction continued. The only area that was reclaimed in 2013 was the sump area that the exploration department used for storage and treatment of drill cuttings. The sump area has been relocated and the old location graded and seeded in late 2013. The area was cleaned up and sampled prior to seeding to ensure no cuttings or residuals remained.

No major reclamation activities are scheduled for 2014, however as construction is completed additional seed and mulch will be applied to encourage vegetative growth around the site.

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

Based on the reclamation cost update provided in the 2012 Annual Report, MDEQ indicated an increase in financial assurance was required and will be in place by April 2014.

The 2013 update to the reclamation estimate can be found in Appendix S. Based on additional paving that occurred at the mine site, there was minor increase in the current reclamation costs. A final estimate will be conducted during Q4 2014 following the completion of construction.

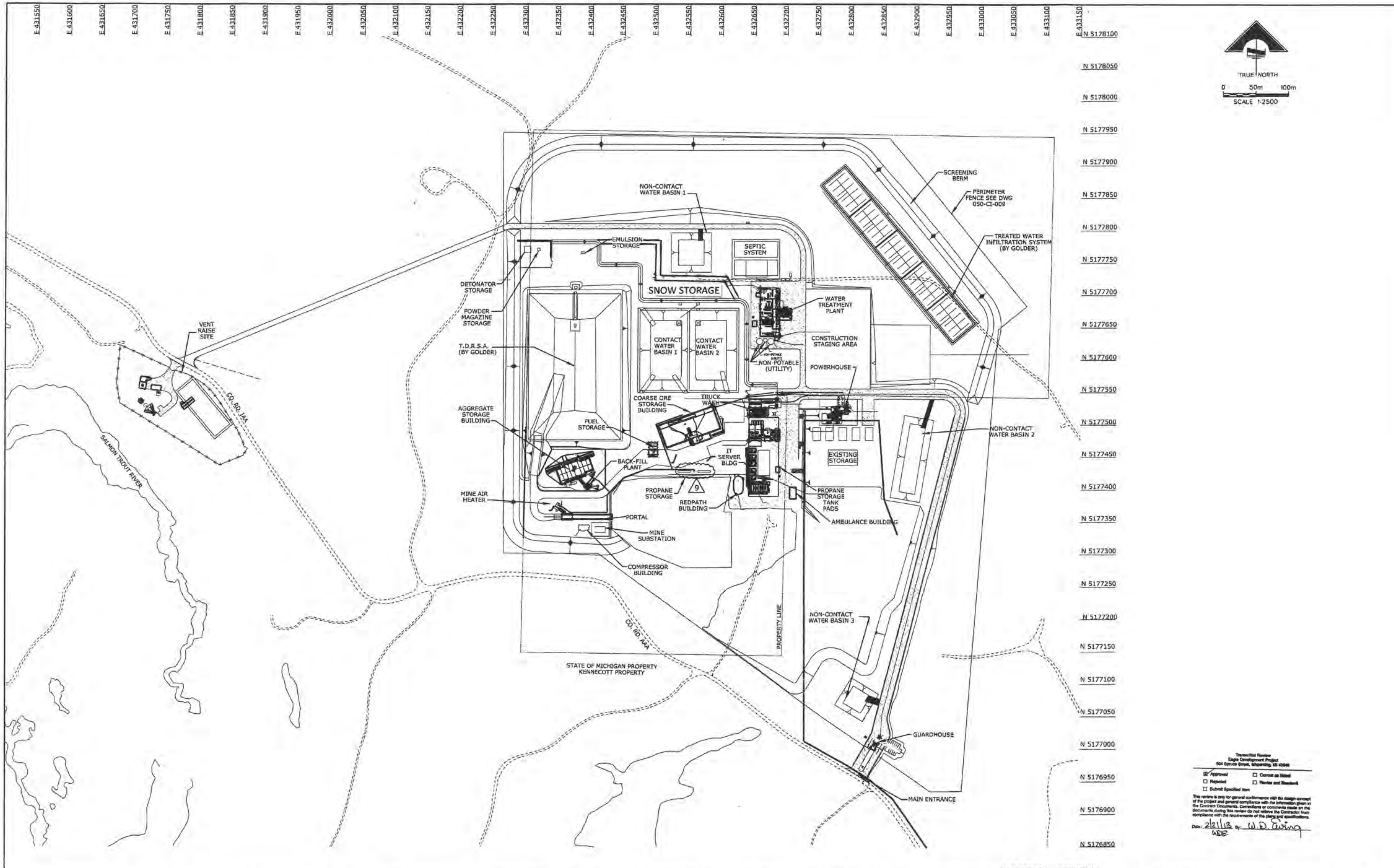
8. Organizational Information

An updated organization report can be found in Appendix T.

Appendix A

Eagle Development Project Mine Site

General Arrangement



Transmittal Review
Eagle Development Project

☑ Approved ☐ Correct as Noted
☐ Rejected ☐ Revise and Resubmit
☐ Submit Specified Item

This review is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections or comments made on the documents during this review do not relieve the Contractor from compliance with the requirements of the plans and specifications.

Date: 2/21/13 WDE By: W.D. Ewing

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE
050-CI-121	CIVIL STANDARDS		

REVISIONS					
NO	DESCRIPTION	BY	APP'D	DATE	OWNER
9	AFC-REVISED AS NOTED	MJ	[signature]	20FEB13	WDE
8	REVISED CIVIL & BUILDINGS	KLR	GER	13SEP11	JH
7	REVISED CIVIL & BUILDINGS	KLR	GER	22JUL11	JH
6	REVISED CIVIL & BUILDINGS	JAL	GER	08APR11	FvH
5	REVISED PORTAL & GAURDHOUSE AREAS	JAL	GER	17FEB11	FvH
4	RELOCATED U'GRD ELECT LINE	GER	JAN	11NOV10	FVH
3	UPDATED PROJECT NUM ADD NOTE	MSB	JAN	14OCT10	RMT
2	ADDED FENCE, REVISED SEPTIC	GER	JAN	07SEP10	RMT
1	REVISED PER NEW SITE LAYOUT	GER	JAN	30JUL10	RMT
0	APPROVED FOR CONSTRUCTION	RMV	GER	10MAY10	WJH

SCALE: 1:2500		DATE
DESIGNED BY	JAN	JUN 06
DRAWN BY	ETB	JUN 06
CHECKED BY	M.M.	20FEB13
PROJECT MGR	K. Teet	21Feb13
OWNER APPR	WDE	21Feb13

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KENNECOTT EAGLE MINERALS

EAGLE DEVELOPMENT PROJECT
MINE SITE
GENERAL ARRANGEMENT
OVERALL PLAN

JOB NO. A6ED	
DWG NO. 050-GA-001	
REV NO. 9	DATE 21FEB13

Appendix B

Eagle Mine

Cemented Rock Backfill Summary

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

Subject: **Use of Development Rock as Cemented Rock Fill (CRF) in Primary Stopes**

References: September 23, 2011 report on the Evaluation of Impacts from use of Potentially Acid Generating Rock in Cemented Rock Fill

September 23, 2011 Technical Memorandum "Interpretation of Laboratory Assessment on Kennecott Eagle Mine Cemented Rock Fill Strength Dated August 30, 2011"

Cemented Rock Backfill

In accordance with permit condition E6 the mined stopes will be backfilled sequentially as mining progresses. The primary stopes will be backfilled using cemented aggregate and secondary stopes will initially be backfilled using limestone amended development rock followed by quarried aggregate. The stipulation is that the quarry aggregate must be characterized to demonstrate that it has a net neutralization capacity of zero or higher.

In 2011, the Eagle Mine requested that Golder Associates conduct a cemented rock fill (CRF) testing program. The testing program was targeted at determining if development waste rock from the Eagle Mine could be used as a suitable source of aggregate for CRF as an alternative to the use of locally quarried and crushed rock. The results of the study were summarized in the September 23, 2011 Technical Memorandum "Interpretation of Laboratory Assessment on Kennecott Eagle Mine Cemented Rock Fill Strength Dated August 30, 2011." As part of the overall rock fill assessment, a screening-level evaluation was conducted to evaluate the effect of using potentially acid generating (PAG) waste rock on the stability (i.e. longevity and integrity) of CRF proposed for placement at the Eagle Mine. The potential effect of mine water quality on CRF setting and strength development was assessed using information obtained from the kinetic testing program initiated in 2004 and summarized by Mark Logsdon in a technical memorandum in 2010. The report concluded that "CRF is expected to be non-acid generating and maintain neutral conditions during operation." The rationale to support this conclusion is presented in the report and summarized below.

- The sulfide minerals in the various waste rock types are present in disseminated form. This indicates that the amount of exposed sulfide actively oxidizing the CRF at and given time, is likely only a small proportion of the total sulfide mineral content.
- The CRF represents a cemented material, with cement coating the grains and filling the pore space, individual sulfide grains will be occluded and rimmed by cement. Oxygen diffusion into the CRF will be limited to the outer surfaces of the CRF mass, with the vast majority of the CRF bulk largely inaccessible to ingress of oxygen.

- The CRF provides neutralization potential that was not accounted for in the kinetic testing program. The proposed cement content is between 2-8% which equates to additional neutralizing potential. Taking this into account, the majority of CRF mixtures will be non-acid generating with the addition of 2% cement. The addition of 4% cement results in all mixtures being non-acid generating.
- Lag times to acidic conditions relative to those determined from the kinetic testing program will be increased due to the factors listed above.

Mine water quality from the kinetic testing was also reviewed to determine if it would have a negative impact in CRF strength. The following conclusions were derived from the review:

- The comparisons between the limits for concrete preparation and the maximum concentrations observed in the kinetic testing program demonstrate that no leachates exceeded the mixing water criteria.
- Given that the kinetic tests represent accelerated conditions, the setting time and strength development of the cement in the CRF should not be adversely affected if the mine water has a composition similar to the kinetic testing leachates and interacts with the CRF during and after placement.

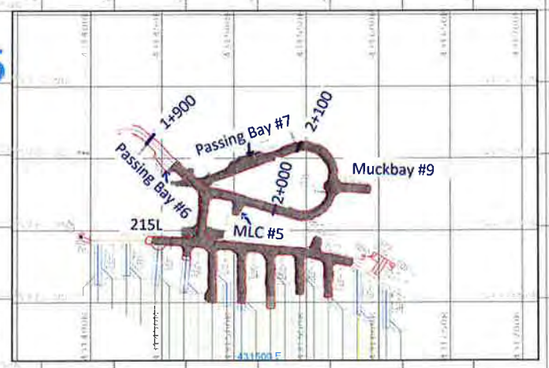
Additional strength testing, using development rock and quarried aggregate, is planned for early 2014. Results from this testing will be used, in conjunction with previous studies, to determine the appropriate type(s) and percentage of binders necessary to meet strength and stability requirements.

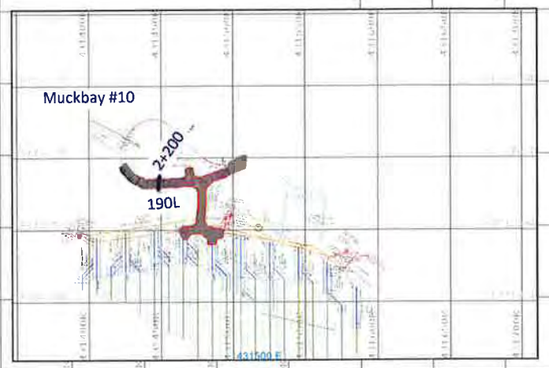
Appendix C

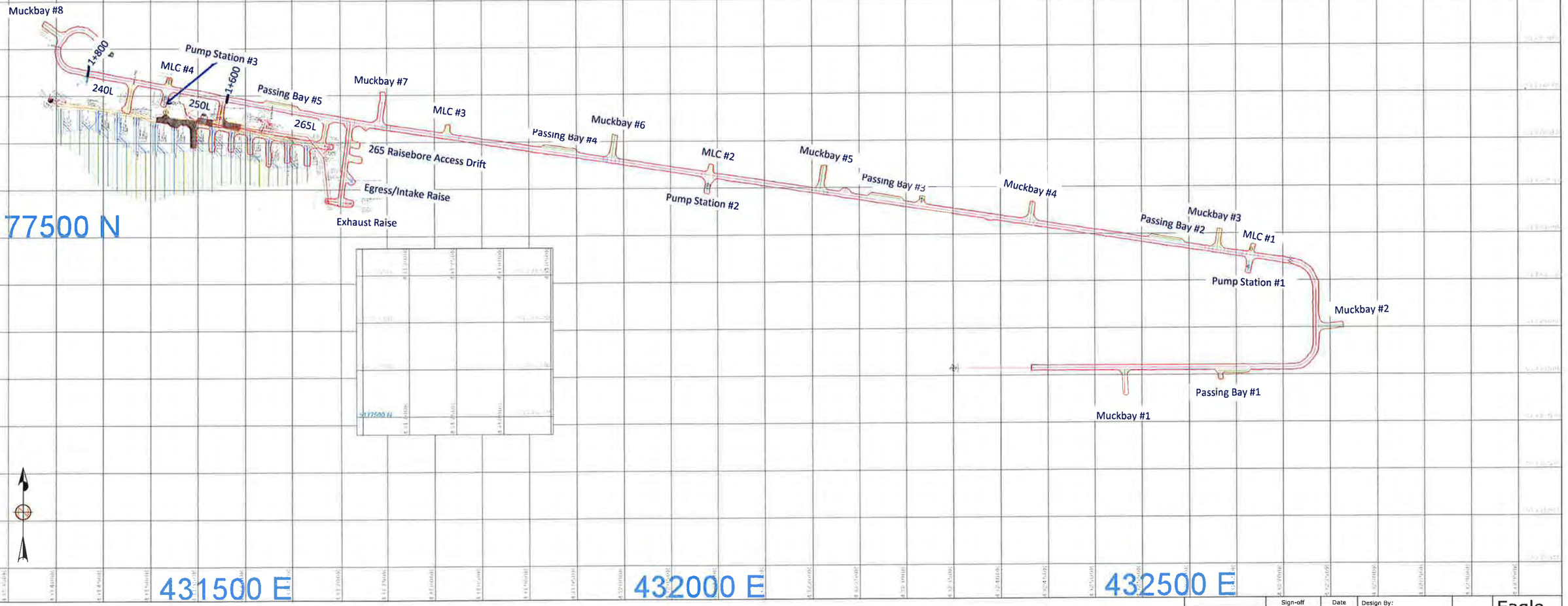
Eagle Mine

Map of Development Positions

5







5177500 N

431500 E

432000 E

432500 E

Red outline is total development through 2013

Areas shaded in gray were developed in 2013

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

Design By:
Drawn By: RLB
Check By:
Comp. File:
Scale:
Draw Date: 21-Feb-2014
Sheet:
Dwg. No.:

Eagle Mine

Eagle Mine
Escape and
Ventilation Map

Appendix D

Eagle Mine

Rock Stability Certification

Eagle Mine
lundin mining

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

Tuesday, March 04, 2014

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 an update of the geotechnical block model which did not indicate any significant changes in rock conditions. An updated stability model is in progress and we will have results in 2014. In addition, daily visual inspections are also conducted by Eagle Mine representatives and/or contractor mining personnel to verify ground stability.

Sincerely,

Steve Kirsch
Mine Manager
Eagle Mine, LLC.

Appendix E

Eagle Mine

Facilities Water Quality Monitoring Results

Eagle Mine
2013 Mine Permit Water Quality Monitoring Data
Contact Water Basins

Parameter	Unit	Q1 2013 2/11/2013	Q2 2013 5/29/2013	Q3 2013 8/6/2013	Q4 2013 11/14/2013
Alkalinity, Bicarbonate	mg/L	<2.0	**94**	**47**	**77**
Alkalinity, Carbonate	mg/L	**110**	**57**	**54**	**52**
Aluminum, Total	mg/L	—	**1.5**	—	—
Antimony, Total	µg/L	—	**14**	—	—
Arsenic, Total	µg/L	**2.4**	**4.9**	**3.8**	**1.4**
Barium, Total	µg/L	—	**45**	—	—
Beryllium, Total	µg/L	—	<1.0	—	—
Boron, Total	µg/L	**470**	**1000**	1200	**1300**
Cadmium, Total	µg/L	—	<0.20	—	—
Calcium, Total	mg/L	—	**65**	—	—
Chloride	mg/L	**1100**	**1700**	**1500**	**1200**
Chromium, Total	µg/L	—	**5.8**	—	—
Cobalt, Total	µg/L	—	<10	—	—
Copper, Total	µg/L	**21**	**7.5**	**7.2**	**16**
Fluoride	µg/L	—	**200**	—	—
Iron, Total	µg/L	**6700**	**2300**	—	—
Lead, Total	µg/L	—	**3.4**	—	—
Lithium, Total	µg/L	—	**15**	—	—
Magnesium, Total	mg/L	—	**39**	—	—
Manganese, Total	µg/L	**69**	**24**	**19**	**25**
Mercury, Total	µg/L	**0.0144**	**0.00387**	**0.00203**	**0.00355**
Molybdenum, Total	µg/L	—	**25**	—	—
Nickel, Total	µg/L	**74**	**13**	**11**	**23**
Nitrogen, Nitrate	mg/L	**110**	**260**	**300**	**250**
pH	SU	**9.54**	**9.26**	**9.43**	**9.3**
Potassium, Total	µg/L	—	**61000**		
Selenium, Total	µg/L	**3.3**	**6.7**	**5.5**	**5.9**
Silver, Total	µg/L	—	<0.20	—	—
Sodium, Total	mg/L	**1000**	**2100**	**1700**	**1300**
Specific Conductivity	µS/cm	**5200**	**9252**	**9015**	**7165**
Strontium, Total	µg/L	—	**960**	—	—
Sulfate	mg/L	**210**	**820**	**930**	**810**
Thallium, Total	µg/L	—	<2.0	—	—
Vanadium, Total	µg/L	—	<10	—	—
Zinc, Total	µg/L	**19**	**14**	<10	<10

— Analyte not included in the quarterly parameter list.

Eagle Mine
2013 Mine Permit Water Quality Monitoring Data
TDRSA Contact Water Sump

Parameter	Unit	Q1 2013 2/11/2013	Q2 2013 5/29/2013	Q3 2013 8/6/2013	Q4 2013 11/14/2013	Additional Event 3/13/2013
Alkalinity, Bicarbonate	mg/L	**48**	**22**	**25**	**22**	—
Alkalinity, Carbonate	mg/L	<2.0	<2.0	<2.0	<2.0	—
Aluminum, Total	mg/L	—	**0.24**	—	—	—
Antimony, Total	µg/L	—	<2.0	—	—	—
Arsenic, Total	µg/L	**3.7**	**2.0**	<1.0	<1.0	<1.0
Barium, Total	µg/L	—	**87**	—	—	—
Beryllium, Total	µg/L	—	<1.0	—	—	—
Boron, Total	µg/L	**1200**	**1000**	<1200	**920**	**1100**
Cadmium, Total	µg/L	—	**0.64**	—	—	—
Calcium, Total	mg/L	—	**370**	—	—	—
Chloride	mg/L	**180**	**480**	**220**	**130**	**250**
Chromium, Total	µg/L	—	<1.0	—	—	—
Cobalt, Total	µg/L	—	<10	—	—	—
Copper, Total	µg/L	**2.7**	**3.2**	**3.0**	<1.0	**6.7**
Fluoride	µg/L	—	<100	—	—	—
Iron, Total	µg/L	**89**	**60**	**66**	**130**	**190**
Lead, Total	µg/L	—	<1.0	—	—	—
Lithium, Total	µg/L	—	<10	—	—	—
Magnesium, Total	mg/L	**440**	**160**	**140**	**98**	—
Manganese, Total	µg/L	**1900**	**480**	**390**	**390**	**1700**
Mercury, Total	µg/L	**0.00799**	**0.00418**	**0.00249**	**0.00149**	—
Molybdenum, Total	µg/L	—	<10	—	—	—
Nickel, Total	µg/L	**9.3**	**6.7**	**18**	**4.7**	**22**
Nitrogen, Ammonia	mg/L	**23**	**25**	**13**	**0.85**	**55**
Nitrogen, Nitrate	mg/L	**980**	**610**	**480**	**280**	**1000**
Nitrogen, Nitrite	mg/L	**4.0**	**2.3**	**0.11**	<0.050	**0.57**
pH	SU	**6.45**	**6.10**	**6.10**	**6.10**	**6.6**
Potassium, Total	µg/L	—	**76000**	—	—	—
Selenium, Total	µg/L	**27**	**8.9**	**8.7**	**6.9**	**23**
Silver, Total	µg/L	—	<0.20	—	—	—
Sodium, Total	mg/L	**750**	**660**	**530**	**270**	—
Specific Conductivity	µS/cm	**9864**	**6455**	**5680**	**3474**	**10080**
Strontium, Total	µg/L	—	**3700**	—	—	—
Sulfate	mg/L	**1300**	**750**	**930**	**840**	**1200**
Thallium, Total	µg/L	—	<2.0	—	—	—
Vanadium, Total	µg/L	—	<10	—	—	—
Zinc, Total	µg/L	**24**	**25**	**68**	<10	**23**

— Analyte not included in the quarterly parameter list.

Eagle Mine
2013 Mine Permit Water Quality Monitoring Data
Underground Mine Water

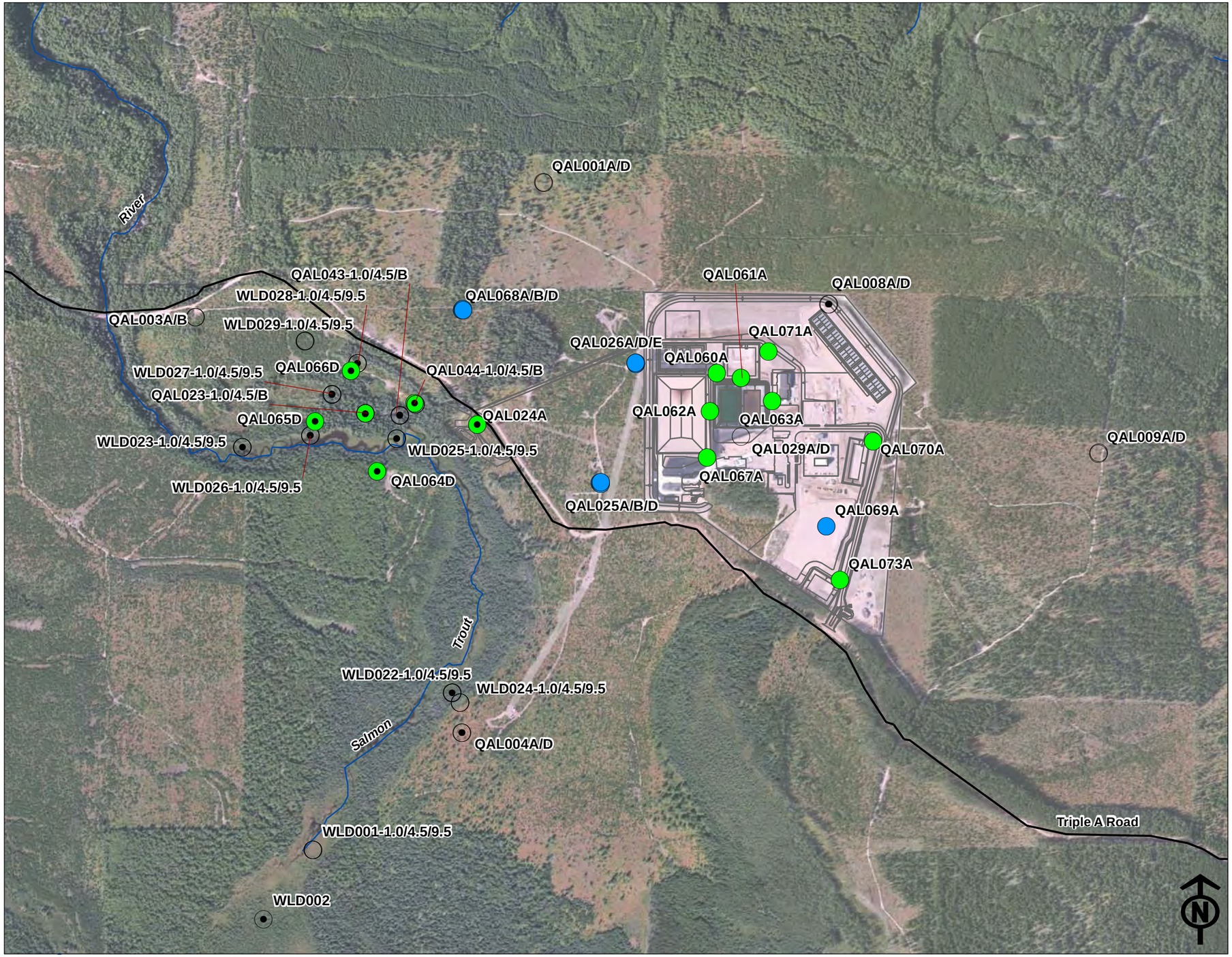
Parameter	Unit	Q1 2013 2/11/2013	Q2 2013 5/29/2013	Q3 2013 8/14/2013	Q4 2013 11/14/2013
Alkalinity, Bicarbonate	mg/L	**130**	**110**	**78**	**89**
Alkalinity, Carbonate	mg/L	<2.0	<2.0	<2.0	<2.0
Aluminum, Total	mg/L	—	**42**	—	—
Antimony, Total	µg/L	—	<2.0	—	—
Arsenic, Total	µg/L	**4.6**	**21**	**8.7**	**7.1**
Barium, Total	µg/L	—	**100**	—	—
Beryllium, Total	µg/L	—	<1.0	—	—
Boron, Total	µg/L	**1200**	**300**	**1400**	**1200**
Cadmium, Total	µg/L	—	**0.53**	—	—
Calcium, Total	mg/L	—	**44**	—	—
Chloride	mg/L	**1100**	**19**	**110**	**110**
Chromium, Total	µg/L	—	**120**	—	—
Cobalt, Total	µg/L	—	**31**	—	—
Copper, Total	µg/L	**34**	**180**	**3.5**	**120**
Fluoride	µg/L	—	**140**	—	—
Iron, Total	µg/L	—	**85000**	**520**	**15000**
Lead, Total	µg/L	—	**55**	—	—
Lithium, Total	µg/L	—	**74**	—	—
Magnesium, Total	mg/L	—	**43**	—	—
Manganese, Total	µg/L	**220**	**840**	**11**	**140**
Mercury, Total	µg/L	**0.0309**	**0.0773**	**0.000834**	**0.0491**
Molybdenum, Total	µg/L	—	<10	—	—
Nickel, Total	µg/L	**110**	**320**	**7.4**	**120**
Nitrogen, Nitrate	mg/L	**160**	**13**	**5.2**	**4.6**
pH	SU	**8.26**	**7.92**	**7.91**	**7.88**
Potassium, Total	µg/L	—	**6500**	—	—
Selenium, Total	µg/L	**4.9**	<2.0	**2.6**	**2.0**
Silver, Total	µg/L	—	<0.20	—	—
Sodium, Total	mg/L	—	**30**	—	—
Specific Conductivity	µS/cm	**5613**	**555**	**642**	**724**
Strontium, Total	µg/L	—	**180**	—	—
Sulfate	mg/L	**220**	**6.0**	**35**	**46**
Thallium, Total	µg/L	—	<2.0	—	—
Vanadium, Total	µg/L	—	**45**	—	—
Zinc, Total	µg/L	**63**	**230**	**13**	**72**

— Analyte not included in the quarterly parameter list.

Appendix F

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

Figure: 2

Appendix G

Eagle Mine

Groundwater Monitoring Well Results

and

Benchmark Summary Table

Eagle Mine
2013 Mine Permit Groundwater Monitoring
Benchmark Comparison Summary

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

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

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 02/04/13[T]	Q2 2013 05/23/13[T]	Q3 2013 07/24/13[T]	Q4 2013 10/09/13[T]
Field						
D.O.[1]	ppm	--	<0.1	<0.1	<0.1	**0.2**
ORP	mV	--	**-245**	**-197**	**-234**	**-195**
pH	SU	8.1-9.1 t	**8.5**	**8.7**	**8.5**	**8.3**
Specific Conductance	µS/cm @ 25°C	--	**135**	**130**	**239**	**112**
Temperature	°C	--	**6.7**	**6.2**	**7.6**	**7.3**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1415.73**	**1416.08**	**1416.55**	**1416.33**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	192 p	**130**	**91** a,e	**72** e	**71**
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	67 p	**60**	**60**	**62**	**58**
Alkalinity, Carbonate	mg/L	8.0	**3.9**	<2.0 e	<2.0	**2.4**
Chloride	mg/L	4.0	<1.0	**1.6**	**1.2**	**1.0**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	<0.050	<0.050	<0.050 e	<0.050
Sulfate	mg/L	6.0 p	**5.1**	**4.8**	**5.0**	**5.4**
Major Cations						
Calcium	mg/L	p	--	**15**	--	--
Magnesium	mg/L	p	--	**3.5**	--	--
Potassium	mg/L	2.0	--	<0.50 e	--	--
Sodium	mg/L	12	**9.2**	**8.4**	**7.0**	**7.1**
General						
Hardness	mg/L	p	--	**52**	--	--

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 01/30/13[T]	Q2 2013 05/21/13[T]	Q3 2013 07/22/13[T]	Q4 2013 10/08/13[T]
Field						
D.O.[1]	ppm	--	**11** f	**8.3**	**14** R	**11**
ORP	mV	--	**215** f	**83**	**230**	**155**
pH	SU	6.2-7.2 t	**6.2** f	**7.1**	**6.5**	**6.5**
Specific Conductance	µS/cm @ 25°C	--	**49** f	**1127**	**503**	**497**
Temperature	°C	--	**8.4** f	**7.9**	**8.1**	**8.0**
Turbidity	NTU	--	**1** f	<1	<1	<1
Water Elevation	ft MSL	--	**1416.69**	**1417.75**	**1418.62**	**1418.07**
Metals						
Aluminum	µg/L	200	--	<50	<50	--
Antimony	µg/L	5.5	--	<5.0	<5.0	--
Arsenic	µg/L	6.0	<2.0 f	<2.0	<2.0	<2.0
Barium	µg/L	80	--	**74**	**26**	**--**
Beryllium	µg/L	2.5	--	<1.0	<1.0	--
Boron	µg/L	400	<100 f	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	<0.50	--
Chromium	µg/L	20	--	<5.0	<5.0	--
Cobalt	µg/L	40	--	<10	<10	--
Copper	µg/L	5.0	<5.0 f	<5.0	<5.0	<5.0
Iron	µg/L	97	**30** f	<20 e	<20 e	<20
Lead	µg/L	4.0	--	<1.0 e	<1.0	--
Lithium	µg/L	32	--	<8.0	<8.0	--
Manganese	µg/L	80	<20 f	<20	<20	<20
Mercury	ng/L	2.00	<0.500 f	**0.849**	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	<10	--
Nickel	µg/L	100	<25 f	<25	<25	<25
Selenium	µg/L	4.0	<1.0 f	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	<0.20	--
Strontium	µg/L	200	--	**140** e	**73**	**--**
Thallium	µg/L	2.0	--	<2.0	<2.0	--
Vanadium	µg/L	40	--	<10	<10	--
Zinc	µg/L	40	<10 e,f	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	24	**22** f	**21**	**21**	**31**
Alkalinity, Carbonate	mg/L	8.0	<2.0 f	<2.0 e	<2.0	<2.0
Chloride	mg/L	4.0	<1.0 f	**340**	**120**	**180**
Fluoride	mg/L	0.40	--	<0.10	<0.10	--
Nitrogen, Nitrate	mg/L	0.20	**0.32** f	**0.15**	**0.19** e	**0.32**
Sulfate	mg/L	8.0	**2.8** f	**8.4**	**2.7**	**7.1**
Major Cations						
Calcium	mg/L	p	--	**42**	**20**	**--**
Magnesium	mg/L	2.0	--	**6.7**	**3.6**	**--**
Potassium	mg/L	2.0	--	**3.1** e	**1.7**	**--**
Sodium	mg/L	1.2 t	**0.78** f	**180**	**55**	**29**
General						
Hardness	mg/L	p	--	**132**	**65**	--
TDS	mg/L	p	--	**--**	**318**	

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 01/28/13[T]	Q2 2013 05/15/13[T]	Q3 2013 07/23/13[T]	Q4 2013 10/07/13[T]
Field						
D.O.[1]	ppm	--	**11**	**12**	**12**	**12**
ORP	mV	--	**241**	**151**	**181**	**202**
pH	SU	6.4-7.4	**7.5**	**6.7**	**7.0**	**6.9**
Specific Conductance	µS/cm @ 25°C	--	**72**	**48**	**117**	**61**
Temperature	°C	--	**8.9**	**8.3**	**7.7**	**7.4**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1415.29**	**1414.78**	**1417.58**	**1417.07**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	73	<20	<20 e	<20 e	<20
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	25	**28**	**16**	**31**	**28**
Alkalinity, Carbonate	mg/L	8.0	<2.0	<2.0 e	<2.0	<2.0
Chloride	mg/L	1.8	**1.8**	**2.1**	**1.1**	**1.8**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	1.1	**0.89**	**1.1**	**0.59** e	**0.70**
Sulfate	mg/L	8.0	<2.0	<2.0	<2.0	**2.0**
Major Cations						
Calcium	mg/L	7.6 p	--	**5.8**	--	--
Magnesium	mg/L	1.6 p	--	**1.1**	--	--
Potassium	mg/L	2.0	--	**0.74** e	--	--
Sodium	mg/L	0.78	**0.71**	**1.0**	**0.92**	**1.0**
General						
Hardness	mg/L	26 p	--	**19**	--	--

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 01/28/13[T]	Q2 2013 05/16/13[T]	Q3 2013 07/23/13[T]	Q4 2013 10/07/13[T]
Field						
D.O.[1]	ppm	--	**10**	**11**	**11**	**11**
ORP	mV	--	**178**	**169**	**135**	**106**
pH	SU	8.5-9.5	**9.3**	**9.2**	**9.1**	**9.0**
Specific Conductance	µS/cm @ 25°C	--	**79**	**78**	**136**	**66**
Temperature	°C	--	**8.0**	**7.7**	**7.6**	**7.4**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1415.17**	**1415.33**	**1417.37**	**1416.95**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	61	<20	**20** a,e	<20 e	<20
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	38 t	**29**	**30**	**30**	**29**
Alkalinity, Carbonate	mg/L	12	**8.2**	**5.8** e	**4.0**	**5.9**
Chloride	mg/L	1.7	**1.2**	<1.0	1.2	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	**0.34**	**0.19**	**0.15** e	**0.12**
Sulfate	mg/L	3.5	**2.7**	**2.7**	**2.2**	**2.7**
Major Cations						
Calcium	mg/L	11 p	--	**9.9**	**--**	**--**
Magnesium	mg/L	1.7 p	--	**1.7**	**--**	**--**
Potassium	mg/L	2.0	--	<0.50 e	--	--
Sodium	mg/L	5.6 p	**2.7**	**3.2**	**1.8**	**2.7**
General						
Hardness	mg/L	34 p	--	**32**	**--**	**--**

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 01/28/13[T]	Q2 2013 05/16/13[T]	Q3 2013 07/23/13[T]	Q4 2013 10/07/13[T]
Field						
D.O.[1]	ppm	--	**4.9**	**5.5**	**5.0**	**5.1**
ORP	mV	--	**166**	**113**	**139**	**156**
pH	SU	8.4-9.4	**9.0**	**8.7**	**8.8**	**8.6**
Specific Conductance	µS/cm @ 25°C	--	**103**	**98**	**186**	**88**
Temperature	°C	--	**8.1**	**7.4**	**7.5**	**7.5**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1411.36**	**1410.86**	**1412.91**	**1412.88**
Metals						
Aluminum	µg/L	p	--	**76**	**--**	**--**
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	4.7 t	**2.7**	**2.7**	**2.4**	**2.7**
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	137 t	**59**	**62** a,e	**51** e	**55**
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	1.32	<0.500	<0.500	**0.54**	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	54	**42**	**42**	**44**	**46**
Alkalinity, Carbonate	mg/L	19 t	**4.8**	**3.8** e	**3.5**	<2.0
Chloride	mg/L	2.2	**1.2**	<1.0	<1.0	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.17	**0.12**	**0.14**	**0.11** e	**0.13**
Sulfate	mg/L	10 t	**4.9**	**4.7**	**4.3**	**4.8**
Major Cations						
Calcium	mg/L	12 p	--	**12**	--	--
Magnesium	mg/L	2.6 p	--	**2.6**	--	--
Potassium	mg/L	2.0	--	**0.61** e	--	--
Sodium	mg/L	17 t	**5.1**	**5.6**	**4.7**	**5.0**
General						
Hardness	mg/L	40 p	--	**41**	--	--

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 No Sample	Q2 2013 No Sample	Q3 2013 08/06/13[T]	Q4 2013 11/05/13[T]
Field						
D.O.[1]	ppm	--	i	i	**11**	**12**
ORP	mV	--	i	i	**106**	**135**
pH	SU	6.4-7.4 p	i	i	**6.3**	**6.7**
Specific Conductance	µS/cm @ 25°C	--	i	i	**121**	**180**
Temperature	°C	--	i	i	NM	**9.2**
Turbidity	NTU	--	i	i	<1	**2**
Water Elevation	ft MSL	--	<1415.5 BP	<1415.6 BP	**1416.79**	**1416.51**
Metals						
Aluminum	µg/L	200	--	i	--	--
Antimony	µg/L	5.5	--	i	--	--
Arsenic	µg/L	6.0	i	i	<2.0	<2.0
Barium	µg/L	80	--	i	--	--
Beryllium	µg/L	2.5	--	i	--	--
Boron	µg/L	400	i	i	<100	<100
Cadmium	µg/L	2.0	--	i	--	--
Chromium	µg/L	20	--	i	--	--
Cobalt	µg/L	40	--	i	--	--
Copper	µg/L	5.0	i	i	<5.0	<5.0
Iron	µg/L	350	i	i	**59** e	**290**
Lead	µg/L	4.0	--	i	--	--
Lithium	µg/L	32	--	i	--	--
Manganese	µg/L	80	i	i	<20	<20
Mercury	ng/L	2.0	i	i	<0.500	0.783
Molybdenum	µg/L	40	--	i	--	--
Nickel	µg/L	100	i	i	<25	<25
Selenium	µg/L	4.0	i	i	<1.0	<1.0
Silver	µg/L	0.80	--	i	--	--
Strontium	µg/L	200	--	i	--	--
Thallium	µg/L	2.0	--	i	--	--
Vanadium	µg/L	40	--	i	--	--
Zinc	µg/L	40	i	i	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	117	i	i	**57**	**82**
Alkalinity, Carbonate	mg/L	8.0	i	i	<2.0	<2.0
Chloride	mg/L	4.0	i	i	**2.4**	**3.5**
Fluoride	mg/L	0.40	--	i	--	--
Nitrogen, Nitrate	mg/L	0.73 t	i	i	**1.1** e	**3.2**
Sulfate	mg/L	4.7 t	i	i	**3.9**	**2.7**
Major Cations						
Calcium	mg/L	p	--	i	--	--
Magnesium	mg/L	p	--	i	--	--
Potassium	mg/L	2.0	--	i	--	--
Sodium	mg/L	1.3	i	i	**1.7**	**1.6**
General						
Hardness	mg/L	p	--	i	--	--

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 02/06/13[T]	Q2 2013 05/15/13[T]	Q3 2013 08/06/13[T]	Q4 2013 11/05/13[T]
Field						
D.O.[1]	ppm	--	**11**	**11**	**13** R	**11**
ORP	mV	--	**124**	**78**	**60**	**154**
pH	SU	8.3-9.3 t	**9.2**	**9.0**	**8.6**	**8.8**
Specific Conductance	µS/cm @ 25°C	--	**64**	**61**	**50**	**62**
Temperature	°C	--	**8.6**	**7.7**	**8.1**	**7.8**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1408.09**	**1407.74**	**1409.64**	**1409.49**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	80	<20	**140** a,e	<20 e	<20
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	**56**	**12**	**13**
Major Anions						
Alkalinity, Bicarbonate	mg/L	33	**22**	**25**	**24**	**25**
Alkalinity, Carbonate	mg/L	6.4	**6.9**	**4.3** e	**5.4**	**4.8**
Chloride	mg/L	4.0	<1.0	**1.0** s	<1.0	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.10 t	**0.086**	**0.093**	**0.11** e	**0.086**
Sulfate	mg/L	8.0	**2.0**	<2.0	<2.0	<2.0
Major Cations						
Calcium	mg/L	p	--	**12**	**--**	**--**
Magnesium	mg/L	p	--	**2.2**	**--**	**--**
Potassium	mg/L	2.0	--	**0.77** e	**--**	**--**
Sodium	mg/L	0.73	**0.61**	**1.2**	**0.58**	**0.64**
General						
Hardness	mg/L	p	--	**39**	**--**	**--**

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 01/28/13[T]	Q2 2013 05/15/13[T]	Q3 2013 07/22/13[T]	Q4 2013 10/07/13[T]
Field						
D.O.[1]	ppm	--	<0.1	<0.1	<0.1	<0.1
ORP	mV	--	**-109**	**-173**	**-117**	**-134**
pH	SU	7.9-8.9 p	**8.7**	**8.6**	**9.3**	**8.5**
Specific Conductance	µS/cm @ 25°C	--	**129**	**126**	**124**	**112**
Temperature	°C	--	**8.2**	**7.2**	**7.6**	**7.3**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1408.05**	**1407.56**	**1408.99**	**1409.35**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	7.8	**6.9**	**7.5**	**7.1**	**7.0**
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	80	<20	<20 e	<20 e	<20
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	**57** e	**--**	**--**
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	**21**
Major Anions						
Alkalinity, Bicarbonate	mg/L	136 p	**57**	**56**	**54**	**57**
Alkalinity, Carbonate	mg/L	8.0	<2.0	**2.4** e	**3.5**	<2.0
Chloride	mg/L	4.0	**1.3**	**1.1** s	**1.1**	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	<0.050	<0.050	<0.050 e	<0.050
Sulfate	mg/L	8.6	**7.9**	**7.7**	**7.0**	**7.5**
Major Cations						
Calcium	mg/L	p	--	**16**	**--**	**--**
Magnesium	mg/L	p	--	**4.1**	**--**	**--**
Potassium	mg/L	p	--	**1.8** e	**--**	**--**
Sodium	mg/L	2.0 p	**1.6**	**1.6**	**1.6**	**1.8**
General						
Hardness	mg/L	p	--	**57**	**--**	**--**

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 02/04/13[T]	Q2 2013 05/23/13[T]	Q3 2013 07/24/13[T]	Q4 2013 10/09/13[T]
Field						
D.O.[1]	ppm	--	<0.1	**1.2**	<0.1	<0.1
ORP	mV	--	**-298**	**-99**	**-228**	**-187**
pH	SU	8.0-9.0 p	**9.2**	**9.0**	**9.0**	**8.7**
Specific Conductance	µS/cm @ 25°C	--	**125**	**85**	**240**	**147**
Temperature	°C	--	**8.5**	**7.5**	**8.6**	**9.1**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1414.68**	**1414.85**	**1415.69**	**1415.66**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	**5.1**	<5.0	<5.0	<5.0
Iron	µg/L	114 p	**49**	**34** a,e	**23** e	<20
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	**0.546**	**0.572**	**1.46**	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	**1.1**	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	58	**39**	**29**	**34**	**42**
Alkalinity, Carbonate	mg/L	8.0	**8.8**	**8.0** e	**6.4**	<2.0
Chloride	mg/L	4.0	**2.0**	**2.1**	**2.9**	**2.6**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	<0.050	<0.050	<0.050 e	<0.050
Sulfate	mg/L	8.0	**12**	**9.9**	**20**	**34**
Major Cations						
Calcium	mg/L	p	--	**9.9**	**--**	**--**
Magnesium	mg/L	p	--	**2.1**	**--**	**--**
Potassium	mg/L	2.0	--	**0.58** e	**--**	**--**
Sodium	mg/L	2.6	**5.9**	**4.0**	**4.8**	**4.2**
General						
Hardness	mg/L	p	--	**33**	**--**	**--**

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 01/30/13[T]	Q2 2013 05/21/13[T]	Q3 2013 07/22/13[T]	Q4 2013 10/08/13[T]
Field						
D.O.[1]	ppm	--	**6.7**	**7.6**	**8.9**	**11**
ORP	mV	--	**157**	**173**	**165**	**99**
pH	SU	7.9-8.9	**8.8**	**8.7**	**8.5**	**8.1**
Specific Conductance	µS/cm @ 25°C	--	**112**	**104**	**176**	**78**
Temperature	°C	--	**8.9**	**7.7**	**8.3**	**8.1**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1404.16**	**1403.78**	**1404.98**	**1404.66**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	4.7	**4.6**	**4.5**	**4.4**	**4.6**
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	80	<20	<20 e	20 e	<20
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	0.788	<0.500	<0.500	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	56	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	58	**49**	**49**	**38**	**40**
Alkalinity, Carbonate	mg/L	8.0	**3.9**	<2.0 e	**7.0**	**3.0**
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	**0.091**	**0.13**	**0.15** e	**0.18**
Sulfate	mg/L	4.2	**3.3**	**3.3**	**2.5**	**2.6**
Major Cations						
Calcium	mg/L	16	--	**14**	**--**	**--**
Magnesium	mg/L	3.9	--	**3.4**	**--**	**--**
Potassium	mg/L	1.2	--	**1.1** e	**--**	**--**
Sodium	mg/L	2.1	**2.2**	**1.9**	**1.5**	**1.6**
General						
Hardness	mg/L	55	--	49	--	--

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 01/30/13[T]	Q2 2013 05/21/13[T]	Q3 2013 07/22/13[T]	Q4 2013 10/08/13[T]
Field						
D.O.[1]	ppm	--	**11**	**11**	**14** R	**13**
ORP	mV	--	**201**	**204**	**218**	**131**
pH	SU	8.1-9.1	**9.0**	**8.9**	**8.8**	**8.3**
Specific Conductance	µS/cm @ 25°C	--	**79**	**76**	**71**	**64**
Temperature	°C	--	**8.4**	**9.0**	**8.4**	**8.5**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1405.40**	**1405.06**	**1406.36**	**1406.36**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	80	<20	<20 e	<20 e	<20
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	**10** e,s	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	41 t	**33**	**34**	**33**	**31**
Alkalinity, Carbonate	mg/L	4.6	**4.9**	**2.8** e	**2.0**	**4.4**
Chloride	mg/L	1.6	<1.0	<1.0	<1.0	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.27	**0.13**	**0.13**	**0.13** e	**0.14**
Sulfate	mg/L	2.8	**2.2**	**2.1**	<2.0	**2.1**
Major Cations						
Calcium	mg/L	p	--	**11**	**--**	**--**
Magnesium	mg/L	2.2 p	--	**2.1**	**--**	**--**
Potassium	mg/L	2.0	--	**0.57** e	**--**	**--**
Sodium	mg/L	0.72	**0.66**	**0.65**	**0.61**	**0.63**
General						
Hardness	mg/L	37 p	--	**36**	**--**	**--**

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 02/04/13[T]	Q2 2013 05/21/13[T]	Q3 2013 07/22/13[T]	Q4 2013 10/08/13[T]
Field						
D.O.[1]	ppm	--	**11**	**10**	**14** R	**11**
ORP	mV	--	**100**	**78**	**235**	**137**
pH	SU	8.3-9.3	**8.1**	**8.4**	**8.8**	**8.7**
Specific Conductance	µS/cm @ 25°C	--	**85**	**75**	**84**	**64**
Temperature	°C	--	**8.2**	**7.9**	**8.1**	**8.4**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1406.45**	**1406.36**	**1407.69**	**1407.81**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	34	<20	<20 e	<20 e	23
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	**0.513**	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	48 t	**36**	**36**	**37**	**29**
Alkalinity, Carbonate	mg/L	4.5 t	**4.9**	<2.0 e	**4.0**	<2.0
Chloride	mg/L	1.6	<1.0	**1.3**	**1.2**	**1.1**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.43	**0.27**	**0.25**	**0.27** e	**0.33**
Sulfate	mg/L	2.8	**2.2**	**6.4**	<2.0	**2.2**
Major Cations						
Calcium	mg/L	12 p	--	**13**	**--**	**--**
Magnesium	mg/L	2.2 p	--	**2.4**	**--**	**--**
Potassium	mg/L	2.0	--	**0.83** e	**--**	**--**
Sodium	mg/L	0.76 t	**0.65**	**0.80**	**0.64**	**0.73**
General						
Hardness	mg/L	40 p	--	**42**	**--**	**--**

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 02/04/13[T]	Q2 2013 05/21/13[T]	Q3 2013 07/22/13[T]	Q4 2013 10/08/13[T]
Field						
D.O.[1]	ppm	--	**11**	**12**	**11**	**11**
ORP	mV	--	**71**	**117**	**193**	**156**
pH	SU	8.1-9.1 p	**8.7**	**8.6**	**8.6**	**8.7**
Specific Conductance	µS/cm @ 25°C	--	**79**	**76**	**151**	**72**
Temperature	°C	--	**8.4**	**8.1**	**8.6**	**8.4**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1400.59**	**1400.47**	**1401.53**	**1401.50**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	52	<20	**31** a,e	<20 e	<20
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	42 t	**33**	**34**	**33**	**35**
Alkalinity, Carbonate	mg/L	3.2 t	**4.9**	**3.8** e	**5.5**	**3.0**
Chloride	mg/L	1.7	<1.0	<1.0	<1.0	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.26	**0.14**	**0.22**	**0.21** e	**0.29**
Sulfate	mg/L	2.8	**2.4**	**2.4**	<2.0	2.6
Major Cations						
Calcium	mg/L	12 p	--	**12**	--	--
Magnesium	mg/L	2.0 p	--	**2.1**	--	--
Potassium	mg/L	2.0	--	**0.74** e	--	--
Sodium	mg/L	0.78	**0.66**	**0.82**	**0.68**	**0.63**
General						
Hardness	mg/L	40 p	--	**39**	**--**	**--**

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 02/04/13[T]	Q2 2013 05/22/13[T]	Q3 2013 07/23/13[T]	Q4 2013 10/08/13[T]
Field						
D.O.[1]	ppm	--	<0.1	<0.1	<0.1	**1.0**
ORP	mV	--	**-85**	**-214**	**-109**	**-135**
pH	SU	8.0-9.0	**8.2**	**8.5**	**8.5**	**8.3**
Specific Conductance	µS/cm @ 25°C	--	**142**	**138**	**139**	**122**
Temperature	°C	--	**7.5**	**7.1**	**7.6**	**7.5**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1417.74**	**1417.67**	**1418.33**	**1418.15**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	30 t	<20	**27** a,e	<20 e	20
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	**97** e	**--**	**--**
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	69	**65**	**71**	**66**	**71**
Alkalinity, Carbonate	mg/L	8.0	**4.9**	**2.4** e	**2.0**	<2.0
Chloride	mg/L	4.7	**2.4**	**2.6**	**2.9**	**3.3**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	<0.050	<0.050	0.05 e	<0.050
Sulfate	mg/L	8.0	<2.0	<2.0	<2.0	<2.0
Major Cations						
Calcium	mg/L	p	--	**20**	--	--
Magnesium	mg/L	3.3 p	--	**4.2**	--	--
Potassium	mg/L	2.0	--	**1.2** e	--	--
Sodium	mg/L	7.1 t	**5.2**	**5.6**	**4.7**	**5.1**
General						
Hardness	mg/L	51 p	--	**67**	**--**	**--**

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

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 02/04/13[T]	Q2 2013 05/22/13[T]	Q3 2013 07/24/13[T]	Q4 2013 10/09/13[T]
Field						
D.O.[1]	ppm	--	<0.1	<0.1	<0.1	<0.1
ORP	mV	--	**-118**	**-193**	**-151**	**-201**
pH	SU	8.0-9.0	**8.5**	**8.8**	**8.2**	**8.5**
Specific Conductance	µS/cm @ 25°C	--	**152**	**156**	**282**	**132**
Temperature	°C	--	**6.3**	**6.8**	**8.6**	**7.7**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1416.61**	**1417.17**	**1417.17**	**1417.21**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	5.2	**2.1**	**3.1**	**2.5**	**3.4**
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	60 t	**56**	**36** a,e	**36** e	**44**
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	188 p	--	**210** e	**--**	**--**
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	86	**78**	**73**	**76**	**77**
Alkalinity, Carbonate	mg/L	8.0	<2.0	**8.0** e	**3.4**	<2.0
Chloride	mg/L	1.6	<1.0	**1.4**	<1.0	<1.0
Fluoride	mg/L	0.40	--	**0.11**	**--**	**--**
Nitrogen, Nitrate	mg/L	0.20	<0.050	<0.050	<0.050 e	<0.050
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	--	**2.9** e	--	--
Sodium	mg/L	12	**8.0**	**12**	**10**	**10**
General						
Hardness	mg/L	54 p	--	**51**	**--**	**--**

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

Parameter	Unit	Benchmark 2012-2013[2]	Q1 2013 01/30/13[T]	Q2 2013 05/22/13[T]	Q3 2013 07/24/13[T]	Q4 2013 10/09/13[T]
Field						
D.O.[1]	ppm	--	**6.7**	**6.5**	**7.0**	**6.8**
ORP	mV	--	**53**	**-55**	**50**	**-55**
pH	SU	10.4-11.4 p	**11.5**	**9.9**	**9.2**	**8.8**
Specific Conductance	µS/cm @ 25°C	--	**330**	**127**	**128**	**105**
Temperature	°C	--	**4.4**	**7.0**	**11**	**11**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1415.89**	**1416.24**	**1416.87**	**1416.93**
Metals						
Aluminum	µg/L	675 p	--	100	--	--
Antimony	µg/L	5.5 p	--	<5.0	--	--
Arsenic	µg/L	9.7 p	**8.6**	**8.4**	**8.5**	**7.6**
Barium	µg/L	80 p	--	<20	--	--
Beryllium	µg/L	2.5 p	--	<1.0	--	--
Boron	µg/L	400 p	<100	<100	<100	<100
Cadmium	µg/L	2.0 p	--	<0.50	--	--
Chromium	µg/L	20 p	--	<5.0	--	--
Cobalt	µg/L	40 p	--	<10	--	--
Copper	µg/L	5.0 p	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	49 p	<20	**47** a,e	**74** e	**20**
Lead	µg/L	4.0 p	--	<1.0 e	--	--
Lithium	µg/L	32 p	--	<8.0	--	--
Manganese	µg/L	80 p	<20	<20	<20	<20
Mercury	ng/L	1.37 p*	**0.687**	**1.20**	**0.664**	<0.500
Molybdenum	µg/L	40 p	--	<10	--	--
Nickel	µg/L	100 p	<25	<25	<25	<25
Selenium	µg/L	4.0 p	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80 p	--	<0.20	--	--
Strontium	µg/L	570 p	--	**59** e	**--**	**--**
Thallium	µg/L	2.0 p	--	<2.0	--	--
Vanadium	µg/L	40 p	--	<10	--	--
Zinc	µg/L	40 p	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	45 p	<2.0	**21**	**38**	**38**
Alkalinity, Carbonate	mg/L	65 p	**31**	**18** e	**22**	**14**
Chloride	mg/L	2.0 p	**1.2**	**1.2**	**1.3**	<1.0
Fluoride	mg/L	0.14 p	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20 p	<0.050	<0.050	<0.050 e	<0.050
Sulfate	mg/L	11 p	**11**	**12**	**9.8**	**8.5**
Major Cations						
Calcium	mg/L	87 p	--	**23**	**--**	**--**
Magnesium	mg/L	2.0 p	--	**1.1**	**--**	**--**
Potassium	mg/L	3.6 p	--	**1.4** e	**--**	**--**
Sodium	mg/L	7.6 p	**6.0**	**5.9**	**7.4**	**5.8**
General						
Hardness	mg/L	213 p	--	**62**	**--**	**--**

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 01/30/13[T]	Q2 2013 05/21/13[T]	Q3 2013 07/22/13[T]	Q4 2013 10/08/13[T]
Field						
D.O.[1]	ppm	--	**11**	**9.6**	**13** R	**10**
ORP	mV	--	**179**	**111**	**273**	**193**
pH	SU	5.9-6.9	**6.3**	**6.7**	**6.1**	**5.7**
Specific Conductance	µS/cm @ 25°C	--	**39**	**38**	**252**	**1577**
Temperature	°C	--	**8.7**	**8.4**	**8.8**	**8.2**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1413.84**	**1413.78**	**1415.01**	**1415.74**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	80	<20	<20 e	<20 e	<20
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	**1.08**
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	**30**
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	27	**17**	**17**	**14**	**9.1**
Alkalinity, Carbonate	mg/L	8.0	<2.0	<2.0 e	<2.0	<2.0
Chloride	mg/L	1.9	<1.0	**1.5**	**61**	**660**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.25 t	**0.27**	**0.29**	**0.50** e	**0.86**
Sulfate	mg/L	8.4 t	**2.1**	**2.1**	<2.0	**2.0**
Major Cations						
Calcium	mg/L	8.2 p	--	**5.7**	**--**	**--**
Magnesium	mg/L	1.3 p	--	**0.93**	**--**	**--**
Potassium	mg/L	1.3 p	--	**1.1** e	**--**	**--**
Sodium	mg/L	1.6 t	**0.74**	**0.81**	**1.2**	**130**
General						
Hardness	mg/L	26 p	--	**18**	**--**	**--**

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 01/28/13[T]	Q2 2013 05/20/13[T]	Q3 2013 07/22/13[T]	Q4 2013 10/07/13[T]
Field						
D.O.[1]	ppm	--	**12**	**12**	**12**	**13**
ORP	mV	--	**177**	**179**	**136**	**148**
pH	SU	6.6-7.6 t	**6.5**	**6.7**	**6.9**	**6.0**
Specific Conductance	µS/cm @ 25°C	--	**39**	**46**	**38**	**34**
Temperature	°C	--	**8.4**	**8.0**	**8.8**	**7.6**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1420.21**	**1419.26**	**1422.08**	**1422.74**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	80	<20	<20 e	<20 e	<20
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	45 p	**21**	**24**	**21**	**21**
Alkalinity, Carbonate	mg/L	8.0	<2.0	<2.0 e	<2.0	<2.0
Chloride	mg/L	2.3	<1.0	**1.1** s	<1.0	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	**0.41**	<0.050	<0.050 e	<0.050
Sulfate	mg/L	2.5	<2.0	<2.0	<2.0	<2.0
Major Cations						
Calcium	mg/L	p	--	**6.5**	**--**	**--**
Magnesium	mg/L	2.0	--	**1.2**	**--**	**--**
Potassium	mg/L	2.0	--	**0.77** e	**--**	**--**
Sodium	mg/L	1.0	**0.57**	**0.61**	**0.81**	**0.74**
General						
Hardness	mg/L	p	--	**21**	**--**	**--**

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 01/28/13[T]	Q2 2013 05/20/13[T]	Q3 2013 07/22/13[T]	Q4 2013 10/07/13[T]
Field						
D.O.[1]	ppm	--	**12**	**12**	**11**	**12**
ORP	mV	--	**159**	**138**	**123**	**15**
pH	SU	8.4-9.4 t	**8.8**	**8.8**	**9.6**	**8.8**
Specific Conductance	µS/cm @ 25°C	--	**57**	**62**	**64**	**57**
Temperature	°C	--	**8.3**	**7.9**	**8.2**	**7.6**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1412.55**	**1412.14**	**1413.77**	**1414.12**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	237 p	<20	<20 e	<20 e	<20
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2	<0.500	<0.500	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	31	**24**	**27**	**23**	**20**
Alkalinity, Carbonate	mg/L	8.3	**7.2**	**3.8** e	**9.0**	**9.8**
Chloride	mg/L	1.5	**1.1**	<1.0	<1.0	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.12	**0.26**	**0.11**	**0.11** e	**0.11**
Sulfate	mg/L	5.6 p	**2.3**	**2.2**	<2.0	2
Major Cations						
Calcium	mg/L	10 p	--	**8.5**	**--**	**--**
Magnesium	mg/L	2.0 p	--	**1.7**	**--**	**--**
Potassium	mg/L	2.0	--	**0.61** e	**--**	**--**
Sodium	mg/L	1.8 t	**1.0**	**1.1**	**1.1**	**1.1**
General						
Hardness	mg/L	33 p	--	**28**	**--**	**--**

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 01/28/13[T]	Q2 2013 05/20/13[T]	Q3 2013 07/23/13[T]	Q4 2013 10/07/13[T]
Field						
D.O.[1]	ppm	--	**1.7**	**2.5**	**1.0**	**4.2**
ORP	mV	--	**-97**	**-85**	**-19**	**-88**
pH	SU	7.9-8.9 t	**8.5**	**8.6**	**8.7**	**8.2**
Specific Conductance	µS/cm @ 25°C	--	**110**	**114**	**123**	**106**
Temperature	°C	--	**6.7**	**8.4**	NM	**8.5**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1412.52**	**1412.12**	**1413.96**	**1414.4**
Metals						
Aluminum	µg/L	200	--	**78**	**--**	**--**
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	5.7	**4.1**	**4.2**	**3.5**	**4.1**
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	167	**20**	**60** a,e	**23** e	**33**
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.17 t	<0.500	<0.500	<0.500	<0.500
Molybdenum	µg/L	40 p	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	26
Major Anions						
Alkalinity, Bicarbonate	mg/L	61 p	**56**	**55**	**55**	**50**
Alkalinity, Carbonate	mg/L	8.4	**4.8**	<2.0 e	3.5	**5.9**
Chloride	mg/L	1.6	**1.6**	**1.3**	**1.1**	<1.0
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.20	**0.088**	<0.050	<0.050 e	<0.050
Sulfate	mg/L	12	**5.7**	**5.9**	**5.0**	**5.5**
Major Cations						
Calcium	mg/L	15 p	--	**13**	**--**	**--**
Magnesium	mg/L	3.9 p	--	**3.5**	**--**	**--**
Potassium	mg/L	2.2 p	--	**1.3** e	**--**	**--**
Sodium	mg/L	6.7	**5.8**	**4.7**	**3.8**	**4.4**
General						
Hardness	mg/L	53 p	--	**47**	**--**	**--**

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 01/30/13[T]	Q2 2013 05/21/13[T]	Q3 2013 07/22/13[T]	Q4 2013 10/08/13[T]
Field						
D.O.[1]	ppm	--	**9.0**	**9.1**	**6.9**	**6.7**
ORP	mV	--	**206**	**138**	**87**	**145**
pH	SU	7.8-8.8 t	**7.5**	**7.0**	**7.3**	**6.9**
Specific Conductance	µS/cm @ 25°C	--	**342**	**401**	**481**	**367**
Temperature	°C	--	**8.9**	**8.2**	**8.7**	**8.6**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1380.18**	**1381.45**	**1382.37**	**1382.46**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	80	<20	<20 e	<20 e	<20
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	**0.611**
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	**64** e	**--**	**--**
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	<10 e	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	138 t	**180**	**230**	**250**	**230**
Alkalinity, Carbonate	mg/L	8.0	<2.0	<2.0 e	<2.0	<2.0
Chloride	mg/L	2.6	**2.1**	**2.6**	**11**	**18**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.57	**0.43**	**0.78**	**2.1** e	**2.0**
Sulfate	mg/L	4.3	**3.4**	**4.3**	**3.5**	**4.1**
Major Cations						
Calcium	mg/L	35 p	--	**52**	**--**	**--**
Magnesium	mg/L	18 p	--	**24**	**--**	**--**
Potassium	mg/L	2.0	--	**1.3** e	**--**	**--**
Sodium	mg/L	1.2 t	**1.5**	**1.8**	**2.0**	**4.3**
General						
Hardness	mg/L	162 p	--	**228**	--	--

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

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

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

Parameter	Unit	Benchmark 2012-2013	Q1 2013 01/30/13[T]	Q2 2013 05/21/13[T]	Q3 2013 07/22/13[T]	Q4 2013 10/08/13[T]
Field						
D.O.[1]	ppm	--	**11**	**11**	**11**	**11**
ORP	mV	--	**195**	**196**	**165**	**113**
pH	SU	8.1-9.1	**8.8**	**8.8**	**8.2**	**8.1**
Specific Conductance	µS/cm @ 25°C	--	**110**	**114**	**273**	**136**
Temperature	°C	--	**8.2**	**8.1**	**8.6**	**8.3**
Turbidity	NTU	--	<1	<1	<1	<1
Water Elevation	ft MSL	--	**1403.80**	**1407.16**	**1407.43**	**1405.87**
Metals						
Aluminum	µg/L	200	--	<50	--	--
Antimony	µg/L	5.5	--	<5.0	--	--
Arsenic	µg/L	6.0	<2.0	<2.0	<2.0	<2.0
Barium	µg/L	80	--	<20	--	--
Beryllium	µg/L	2.5	--	<1.0	--	--
Boron	µg/L	400	<100	<100	<100	<100
Cadmium	µg/L	2.0	--	<0.50	--	--
Chromium	µg/L	20	--	<5.0	--	--
Cobalt	µg/L	40	--	<10	--	--
Copper	µg/L	5.0	<5.0	<5.0	<5.0	<5.0
Iron	µg/L	44	<20	<20 e	<20 e	<20
Lead	µg/L	4.0	--	<1.0 e	--	--
Lithium	µg/L	32	--	<8.0	--	--
Manganese	µg/L	80	<20	<20	<20	<20
Mercury	ng/L	2.00	<0.500	<0.500	<0.500	<0.500
Molybdenum	µg/L	40	--	<10	--	--
Nickel	µg/L	100	<25	<25	<25	<25
Selenium	µg/L	4.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	0.80	--	<0.20	--	--
Strontium	µg/L	200	--	<50 e	--	--
Thallium	µg/L	2.0	--	<2.0	--	--
Vanadium	µg/L	40	--	<10	--	--
Zinc	µg/L	40	**10** e,s	<10	<10	<10
Major Anions						
Alkalinity, Bicarbonate	mg/L	44 t	**49**	**54**	**62**	**70**
Alkalinity, Carbonate	mg/L	6.0	<2.0	<2.0 e	**4.0**	<2.0
Chloride	mg/L	1.5	**1.5**	**1.8**	**3.3**	**3.2**
Fluoride	mg/L	0.40	--	<0.10	--	--
Nitrogen, Nitrate	mg/L	0.31	**0.15**	**0.18**	**0.24** e	**0.41**
Sulfate	mg/L	3.3	**2.0**	**2.3**	**2.3**	**3.4**
Major Cations						
Calcium	mg/L	12 p	--	**19**	--	--
Magnesium	mg/L	1.7 p	--	**2.6**	--	--
Potassium	mg/L	2.0	--	**0.70** e	--	--
Sodium	mg/L	1.8	**0.99**	**0.91**	**1.1**	**1.1**
General						
Hardness	mg/L	38 p	--	**58**	**--**	**--**

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

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

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

Parameter	Unit	Q2 2013 05/21/13[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 2013 05/21/13[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 2013 05/21/13[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
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 at a compliance monitoring location. An exceedance occurs if there are 2 consecutive sampling events with a value equal to or greater than the benchmark. Color also indicates compliance monitoring location when applied to column headers.
	Value is equal to or above site-specific benchmark at a background monitoring location. Color also indicates background monitoring location when applied to column headers.

Appendix H

Eagle Mine

Groundwater Monitoring

Trend Analysis Summary & Trending Charts

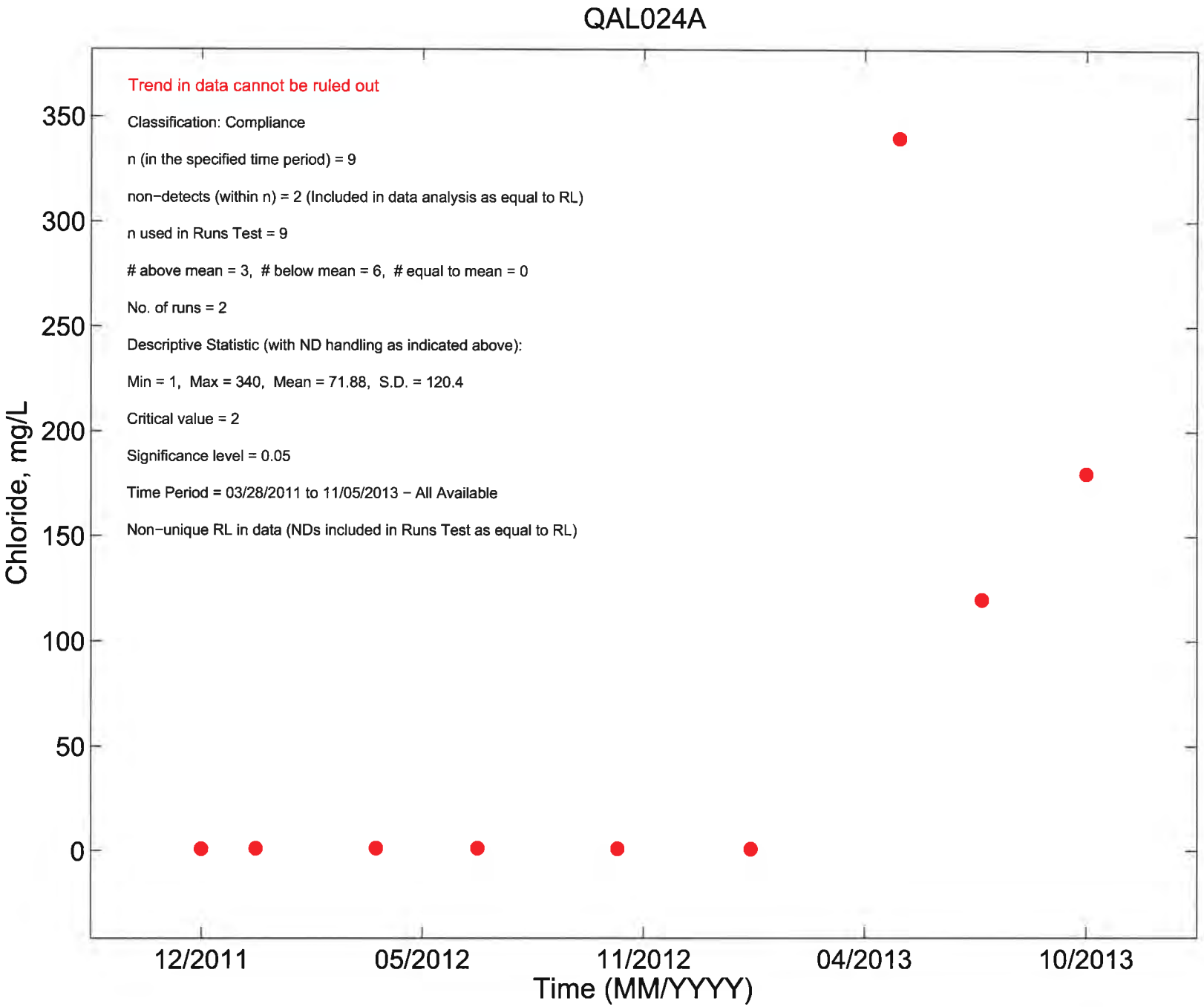
Eagle Mine
2013 Mine Permit Groundwater Monitoring
Trend Analysis Summary

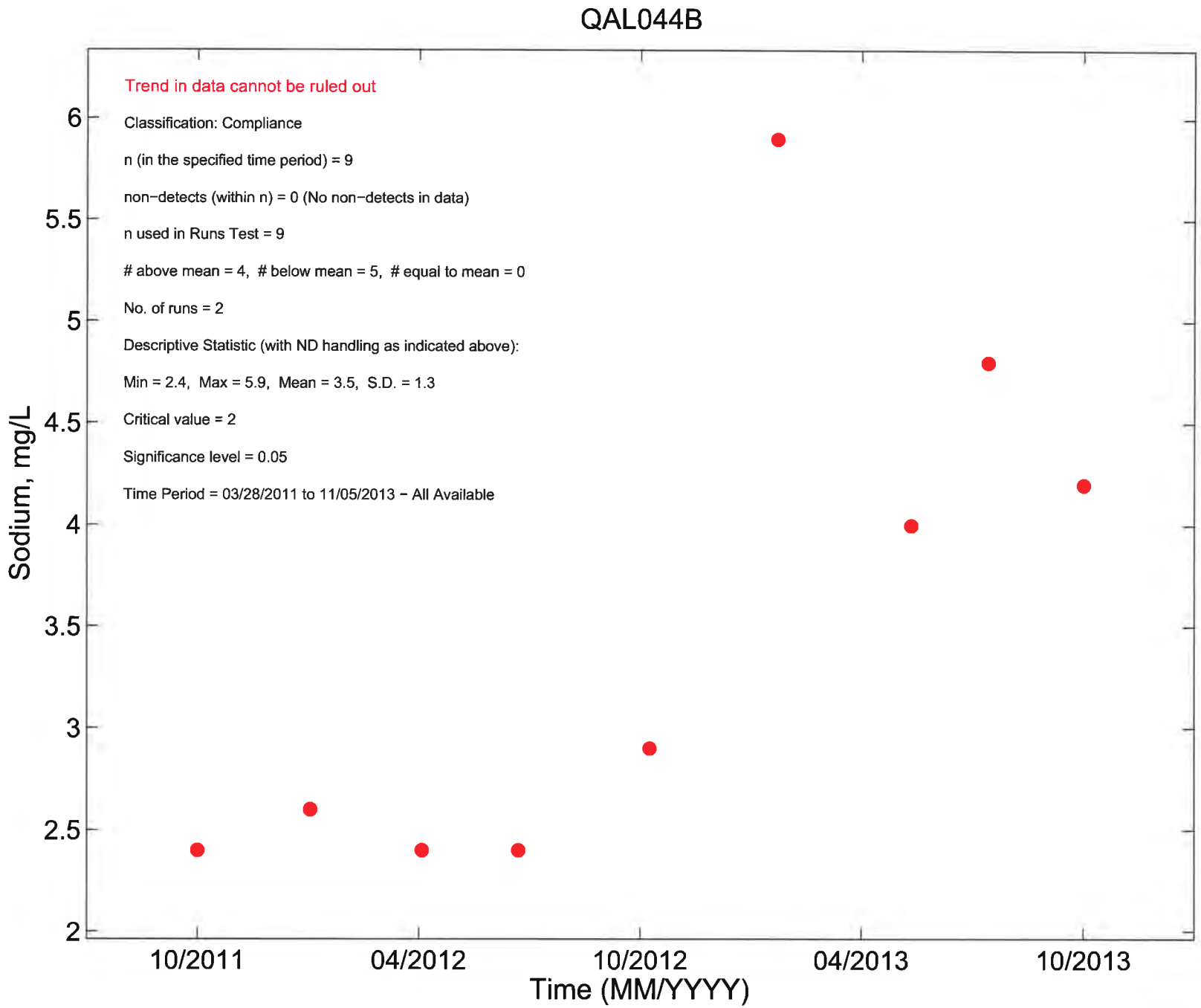
Location	Classification	Parameter	Unit	# Samples	# NDs	Non-detects Handling	# used in Runs Test	Min	Max	Mean	St. Dev	# Above Mean	# Below Mean	# Equal Mean	# Runs	Critical Value	Statistical Significance Level	Trend Present	Remarks
QAL023B	Compliance	Sodium	mg/L	9	0	No NDs	9	7.0	11	9.2	1.49	5	4	0	2	2	0.05	Y	
QAL024A	Compliance	Chloride	mg/L	9	2	Included as RL	9	1.0	340	71.88	120.4	3	6	0	2	2	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
QAL024A	Compliance	Nitrogen, Nitrate	mg/L	9	3	Included as RL	9	0.050	0.32	0.14	0.11	4	5	0	2	2	0.05	Y	
QAL024A	Compliance	Specific Conductance	µS/cm @ 25°C	9	0	No NDs	9	33.000	1127	277	371.8	3	6	0	2	2	0.05	Y	
QAL025A	Background	Sodium	mg/L	11	0	No NDs	11	0.62	1.0	0.77	0.14	3	8	0	2	2	0.05	Y	
QAL025A	Background	Sulfate	mg/L	11	7	Included as RL	11	1.2	2.4	1.9	0.31	9	2	0	2	2	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
QAL025A	Background	Alkalinity, Bicarbonate	mg/L	11	0	No NDs	11	27.00	37.0	31	2.8	4	7	0	2	3	0.05	Y	
QAL025B	Background	Mercury	ng/L	11	9	Included as RL	11	0.50	0.807	0.543	0.10	2	9	0	2	2	0.05	Y	
QAL025D	Background	Alkalinity, Bicarbonate	mg/L	11	0	No NDs	11	42.00	53.0	46	3.3	6	5	0	3	3	0.05	Y	
QAL025D	Background	Alkalinity, Carbonate	mg/L	11	0	Included as RL	11	2.00	16.0	6.5	4.4	2	9	0	2	2	0.05	Y	
QAL025D	Background	Arsenic	mg/L	11	0	No NDs	11	2.40	4.3	3	0.61	3	8	0	2	2	0.05	Y	
QAL025D	Background	Iron	mg/L	11	4	Included as RL	11	20.00	100.0	47	25.3	7	4	0	2	3	0.05	Y	
QAL025D	Background	Sodium	mg/L	11	0	No NDs	11	4.70	15.0	7.3	3.46	3	8	0	2	2	0.05	Y	
QAL026A	Background	Chloride	mg/L	7	1	Included as RL	7	1.00	3.5	1.9	0.94	3	4	0	2	2	0.1	Y	
QAL026A	Background	Nitrogen, Nitrate	mg/L	7	0	No NDs	7	0.49	3.2	1.09	0.97	3	4	0	2	2	0.1	Y	Non-unique RL in data
QAL026A	Background	Sodium	mg/L	7	0	No NDs	7	0.92	1.8	1.3	0.37	3	4	0	2	2	0.1	Y	Non-unique RL in data
QAL044B	Compliance	Alkalinity, Bicarbonate	mg/L	9	0	No NDs	9	29.0	62	48	12	5	4	0	2	2	0.05	Y	
QAL044B	Compliance	Chloride	mg/L	9	1	Included as RL	9	1.0	3.2	2	0.81	5	4	0	2	2	0.05	Y	
QAL044B	Compliance	Sodium	mg/L	9	0	No NDs	9	2.4	5.9	3.5	1.3	4	5	0	2	2	0.05	Y	
QAL044B	Compliance	Sulfate	mg/L	9	0	No NDs	9	7.1	34	13	8.96	2	7	0	2	2	0.1	Y	
QAL060A	Compliance	Alkalinity, Bicarbonate	mg/L	11	0	No NDs	11	38.0	56	51	6.4	7	4	0	2	3	0.05	Y	
QAL060A	Compliance	Nitrogen, Nitrate	mg/L	11	0	No NDs	11	0.063	0.18	0.11	0.03	4	7	0	3	3	0.05	Y	
QAL060A	Compliance	Sulfate	mg/L	11	0	No NDs	11	2.5	4.1	3.5	0.55	6	5	0	2	3	0.05	Y	Non-unique RL in data
QAL061A	Compliance	Alkalinity, Bicarbonate	mg/L	11	0	No NDs	11	31.0	39	35	2.6	4	7	0	2	3	0.05	Y	
QAL063A	Compliance	Alkalinity, Bicarbonate	mg/L	11	0	No NDs	11	33.00	40.0	36	2.6	4	7	0	2	3	0.05	Y	
QAL063A	Compliance	Alkalinity, Carbonate	mg/L	11	4	Included as RL	11	2.00	5.5	3.2	1.3	4	7	0	3	3	0.05	Y	
QAL064D	Compliance	Sodium	mg/L	11	0	No NDs	11	4.70	6.9	5.7	0.65	5	6	0	2	3	0.05	Y	
QAL066D	Compliance	Arsenic	mg/L	11	0	No NDs	11	6.20	12.0	9	1.62	5	6	0	3	3	0.05	Y	
QAL067A	Compliance	Specific Conductance	µS/cm @ 25°C	11	0	No NDs	11	27.0	1577	198	461.9	2	9	0	2	2	0.05	Y	
QAL067A	Compliance	Sulfate	mg/L	11	3	Included as RL	11	2.0	7.8	2.8	1.7	2	9	0	2	2	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
QAL068B	Background	Sodium	mg/L	11	0	No NDs	11	1.0	1.6	1.3	0.22	4	7	0	2	3	0.05	Y	
QAL068D	Background	Mercury	ng/L	11	7	Included as RL	11	0.5	1.72	0.745	0.45	3	8	0	2	2	0.05	Y	
QAL068D	Background	pH	SU	11	0	No NDs	11	8.1	8.7	8.4	0.2	6	5	0	3	3	0.05	Y	
QAL069A	Background	Alkalinity, Bicarbonate	mg/L	11	0	No NDs	11	49.0	250	137	78.3	5	6	0	2	3	0.05	Y	
QAL069A	Background	Chloride	mg/L	11	2	Included as RL	11	1.0	18	4.2	5.35	2	9	0	2	2	0.05	Y	
QAL069A	Background	Nitrogen, Nitrate	mg/L	11	0	No NDs	11	0.083	2.1	0.67	0.71	3	8	0	2	2	0.05	Y	Non-unique RL in data
QAL069A	Background	pH	SU	11	0	No NDs	11	6.9	8.7	7.8	0.67	5	6	0	2	3	0.05	Y	
QAL069A	Background	Sodium	mg/L	11	0	No NDs	11	0.710	4.3	1.5	1.02	3	8	0	2	2	0.05	Y	
QAL069A	Background	Specific Conductance	µS/cm @ 25°C	11	0	No NDs	11	99.0	481	264.0	127	5	6	0	2	3	0.05	Y	
QAL071A	Compliance	Alkalinity, Bicarbonate	mg/L	11	0	No NDs	11	30.0	70	45	13	4	7	0	2	3	0.05	Y	
QAL071A	Compliance	chloride	mg/L	11	1	Included as RL	11	1.0	3.3	1.6	0.82	3	8	0	2	2	0.05	Y	
QAL071A	Compliance	Specific Conductance	µS/cm @ 25°C	11	0	No NDs	11	53.0	273	108.0	60.6	4	7	0	2	3	0.05	Y	

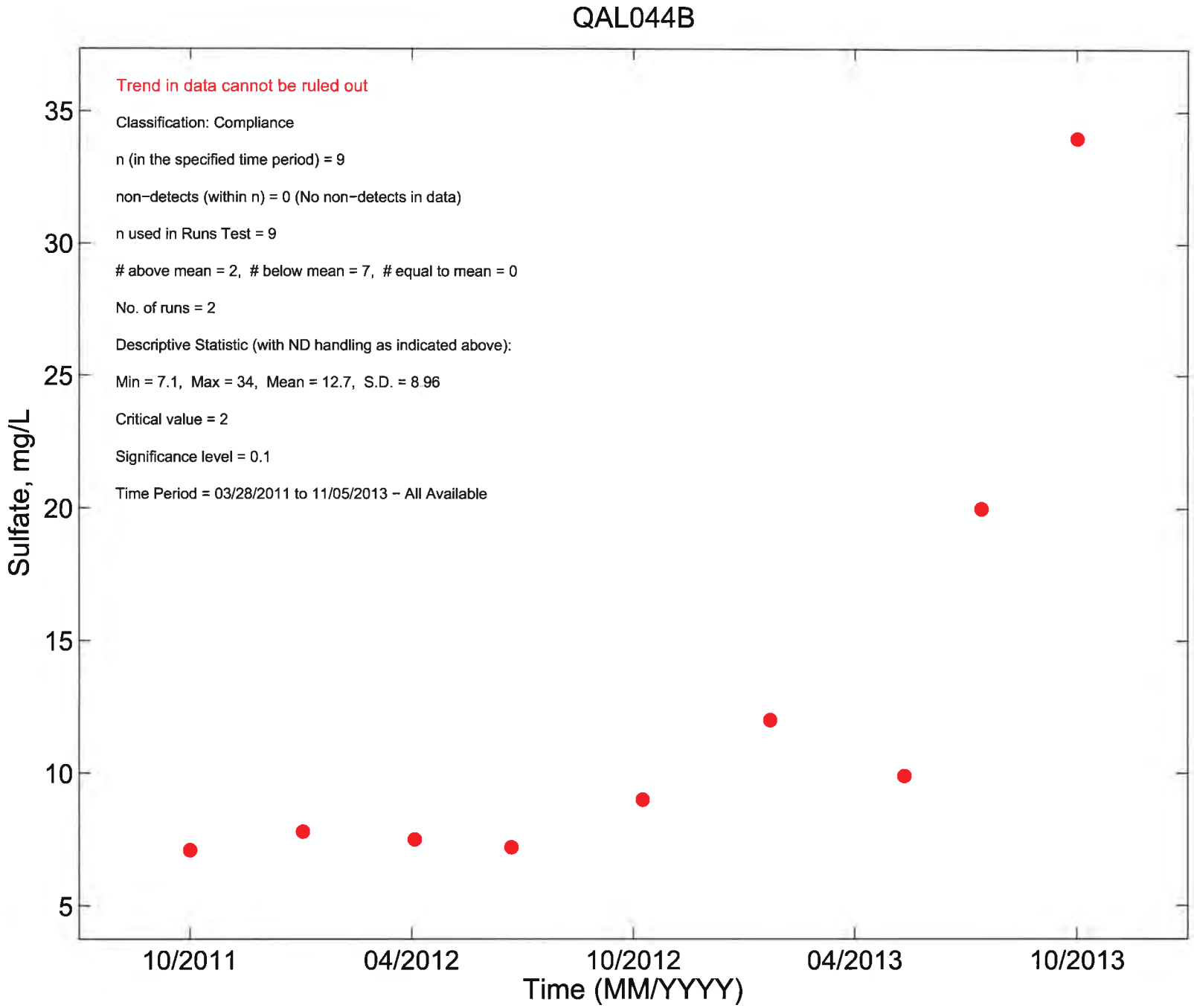
Mine Permit Groundwater Trend Analysis
Notes and Abbreviations Used in Statistical Summary Tables
Eagle Mine

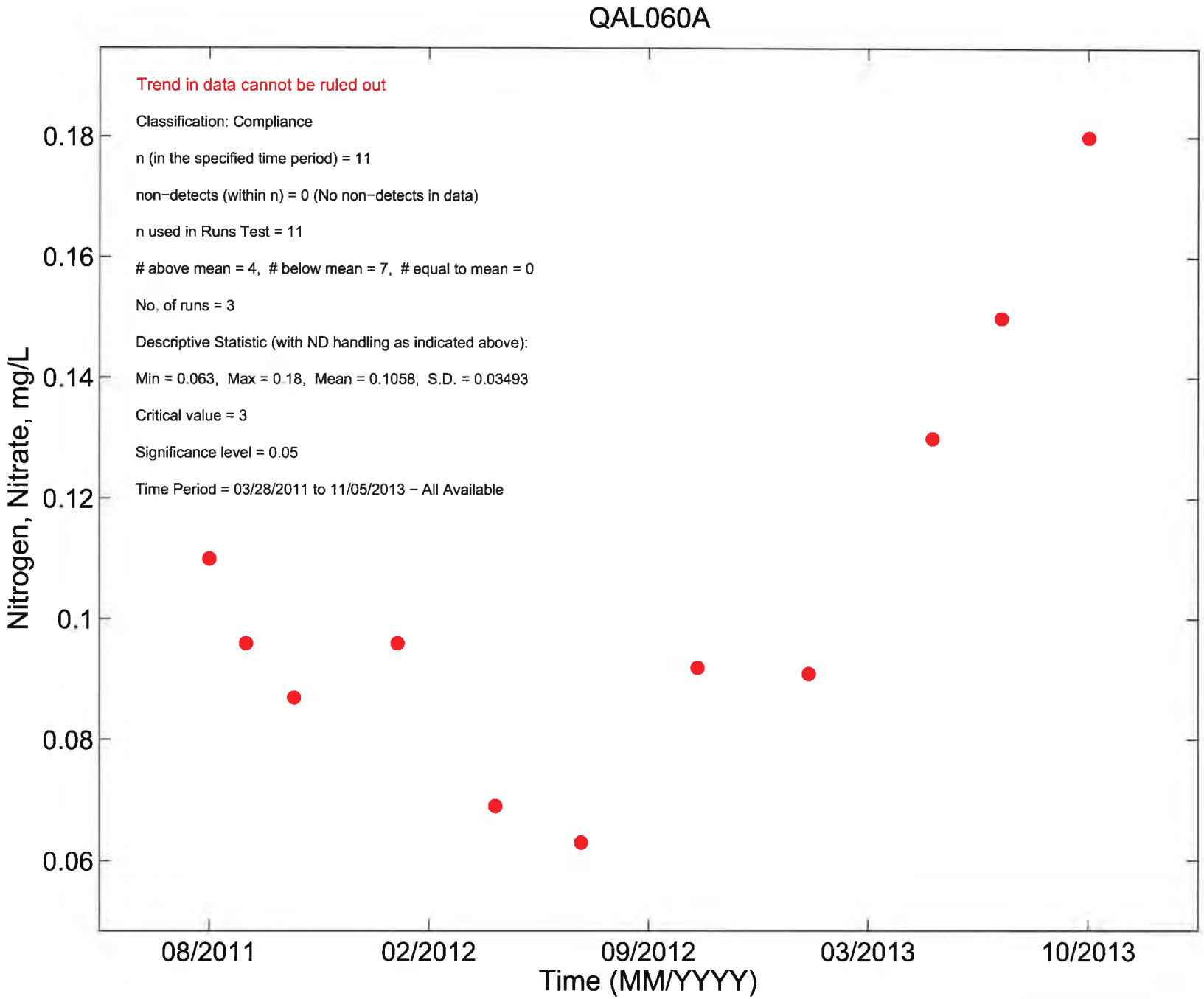
Abbreviation	Explanation
Y	Null Hypothesis that the sequence was produced in a random manner cannot be accepted at the indicated significance level (i.e. a trend in data cannot be ruled out)
N	Null Hypothesis that the sequence was produced in a random manner cannot be rejected at the indicated significance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

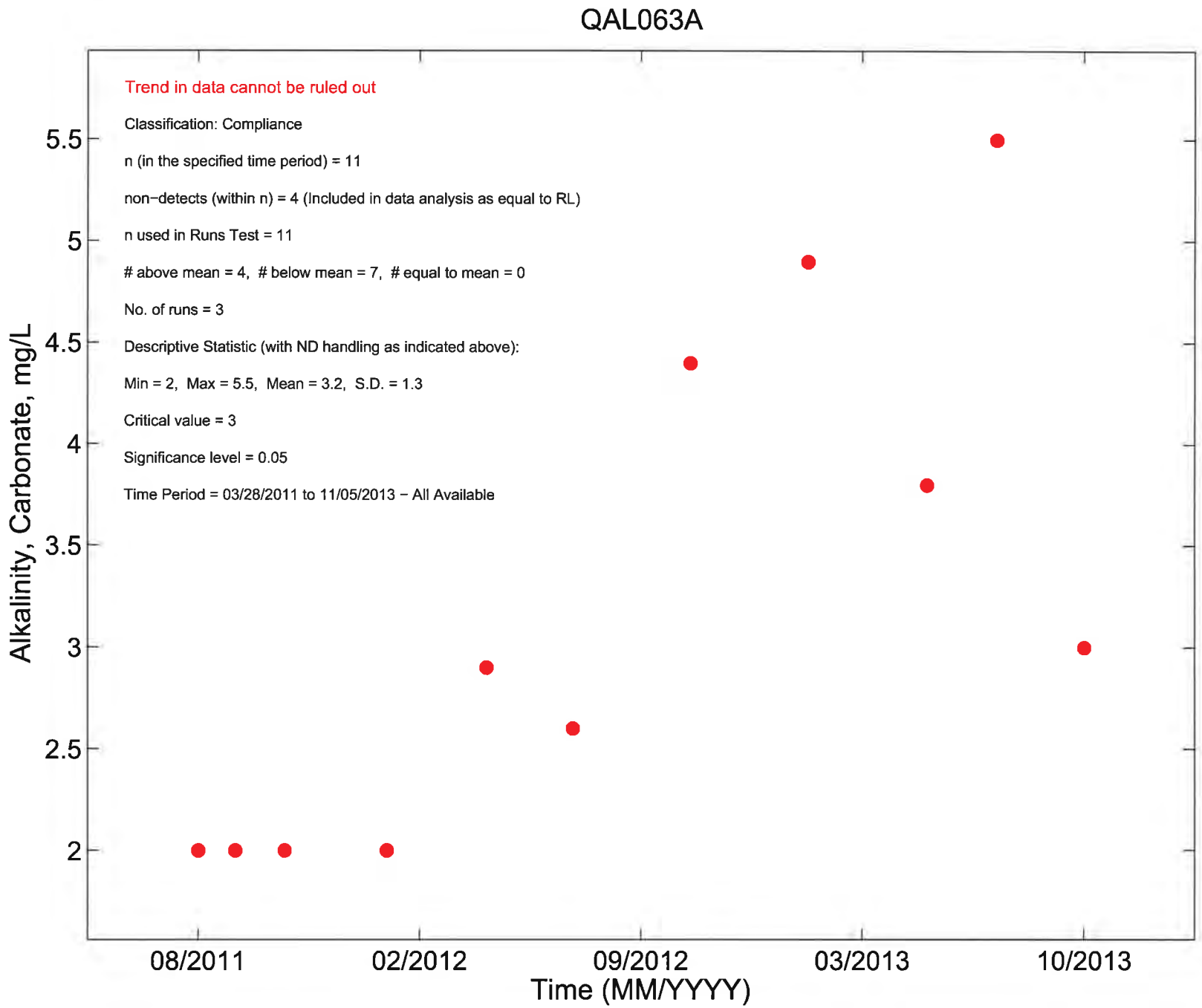
Notes: Trends that have inconsistent RLs or >50% NDs are typically rejected.
Trend analysis period is baseline through Q4 2013.

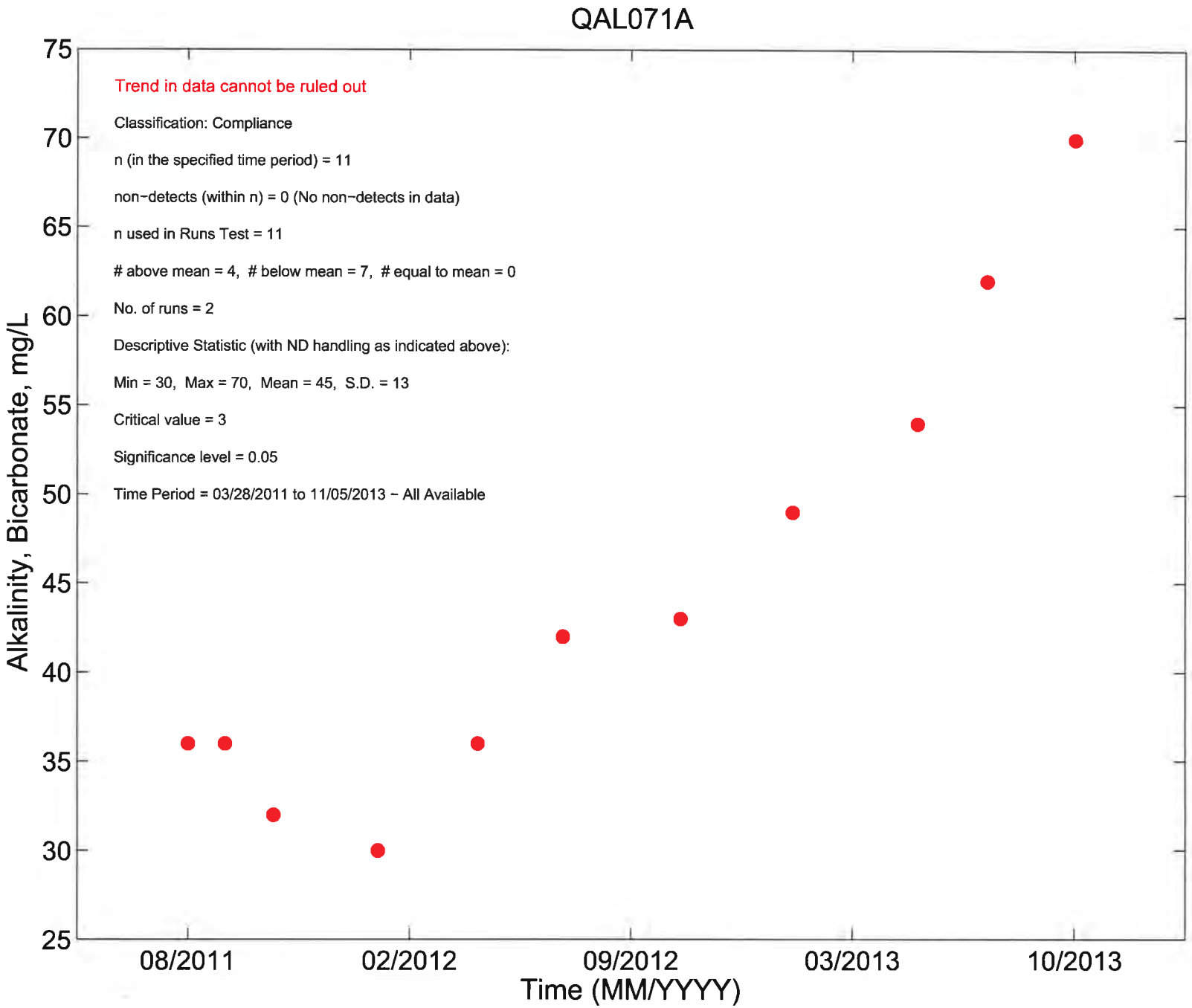

QAL024A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non-detects (within n) = 2 (Included in data analysis as equal to RL)
n used in Runs Test = 9
above mean = 3, # below mean = 6, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 340, Mean = 71.88, S.D. = 120.4
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/05/2013 - 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
05/2012
11/2012
04/2013
10/2013
Time (MM/YYYY)

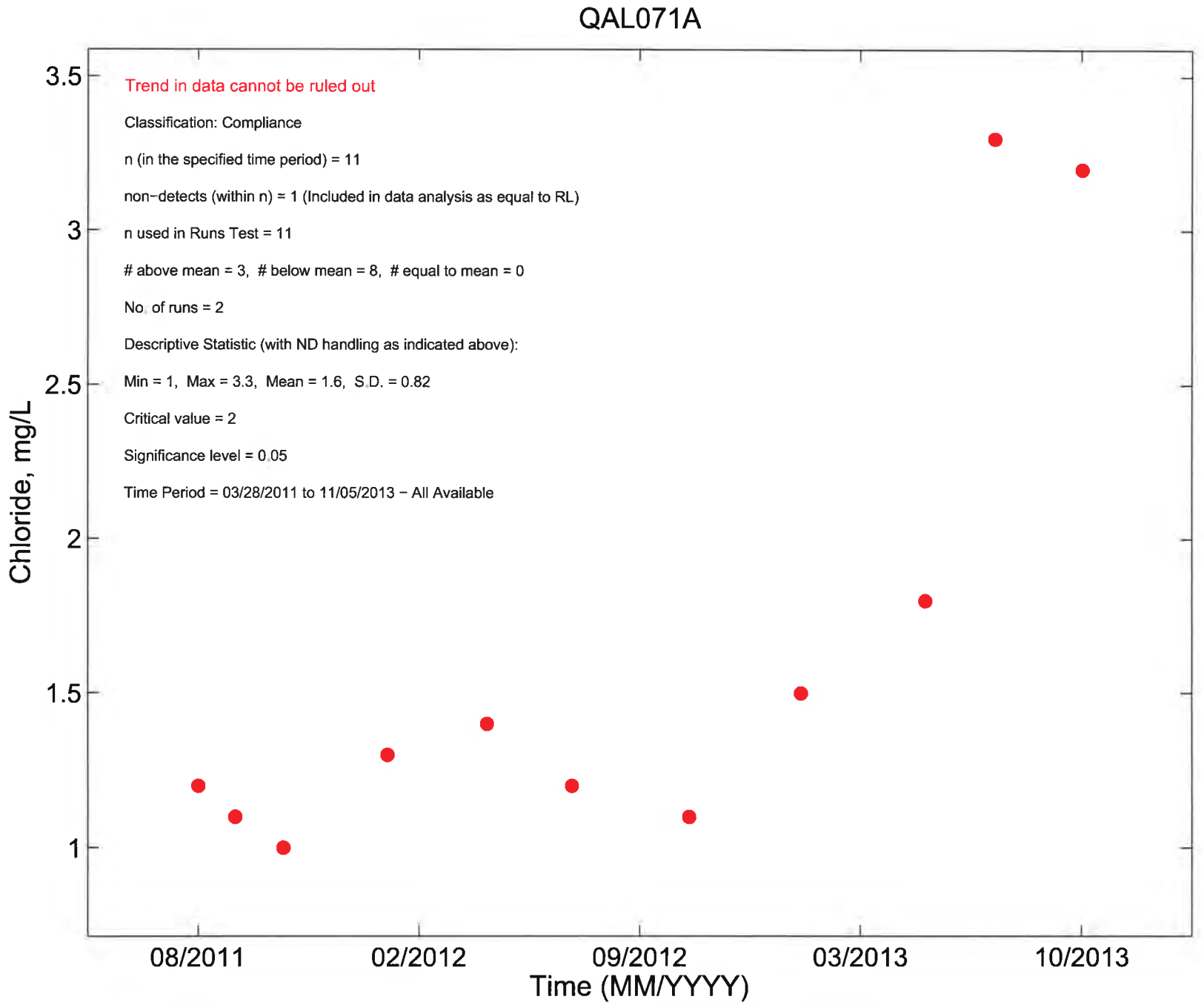

QAL044B
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non-detects (within n) = 0 (No non-detects in data)
n used in Runs Test = 9
above mean = 4, # below mean = 5, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 2.4, Max = 5.9, Mean = 3.5, S.D. = 1.3
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/05/2013 - All Available
Sodium, mg/L
6
5.5
5
4.5
4
3.5
3
2.5
2
10/2011
04/2012
10/2012
04/2013
10/2013
Time (MM/YYYY)


QAL044B
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 9
non-detects (within n) = 0 (No non-detects in data)
n used in Runs Test = 9
above mean = 2, # below mean = 7, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 7.1, Max = 34, Mean = 12.7, S.D. = 8 96
Critical value = 2
Significance level = 0.1
Time Period = 03/28/2011 to 11/05/2013 - All Available
Sulfate, mg/L
35
30
25
20
15
10
5
10/2011
04/2012
10/2012
04/2013
10/2013
Time (MM/YYYY)


QAL060A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 11
non-detects (within n) = 0 (No non-detects in data)
n used in Runs Test = 11
above mean = 4, # below mean = 7, # equal to mean = 0
No. of runs = 3
Descriptive Statistic (with ND handling as indicated above):
Min = 0.063, Max = 0.18, Mean = 0.1058, S.D. = 0.03493
Critical value = 3
Significance level = 0.05
Time Period = 03/28/2011 to 11/05/2013 - All Available
Nitrogen, Nitrate, mg/L
0.18
0.16
0.14
0.12
0.1
0.08
0.06
08/2011
02/2012
09/2012
03/2013
10/2013
Time (MM/YYYY)


QAL063A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 11
non-detects (within n) = 4 (Included in data analysis as equal to RL)
n used in Runs Test = 11
above mean = 4, # below mean = 7, # equal to mean = 0
No. of runs = 3
Descriptive Statistic (with ND handling as indicated above):
Min = 2, Max = 5.5, Mean = 3.2, S.D. = 1.3
Critical value = 3
Significance level = 0.05
Time Period = 03/28/2011 to 11/05/2013 - All Available
Alkalinity, Carbonate, mg/L
5.5
5
4.5
4
3.5
3
2.5
2
08/2011
02/2012
09/2012
03/2013
10/2013
Time (MM/YYYY)

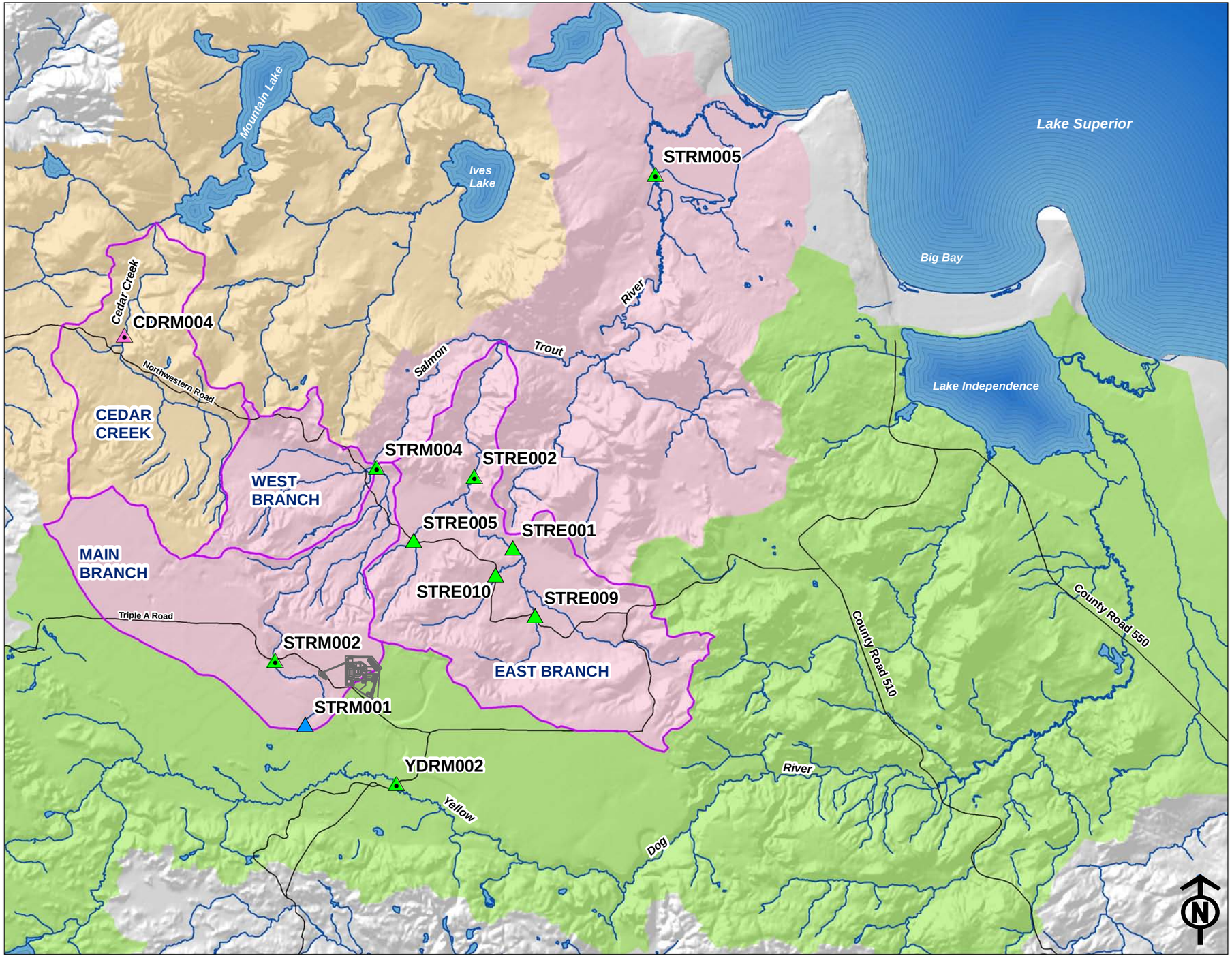

QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 11
non-detects (within n) = 0 (No non-detects in data)
n used in Runs Test = 11
above mean = 4, # below mean = 7, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 30, Max = 70, Mean = 45, S.D. = 13
Critical value = 3
Significance level = 0.05
Time Period = 03/28/2011 to 11/05/2013 - All Available
Alkalinity, Bicarbonate, mg/L
75
70
65
60
55
50
45
40
35
30
25
08/2011
02/2012
09/2012
03/2013
10/2013
Time (MM/YYYY)


QAL071A
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 11
non-detects (within n) = 1 (Included in data analysis as equal to RL)
n used in Runs Test = 11
above mean = 3, # below mean = 8, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 1, Max = 3.3, Mean = 1.6, S.D. = 0.82
Critical value = 2
Significance level = 0.05
Time Period = 03/28/2011 to 11/05/2013 - All Available
Chloride, mg/L
3.5
3
2.5
2
1.5
1
08/2011
02/2012
09/2012
03/2013
10/2013
Time (MM/YYYY)

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

Figure: 3

Appendix J

Eagle Mine

Surface Water Results

and

Benchmark Summary Table

Eagle Mine
2013 Mine Permit Surface Water Monitoring
Benchmark Comparison Summary

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

Parameters listed in this table had values reported that were equal to or greater than a site-specific benchmark. Parameters in **BOLD** are instances in which the Department was notified because benchmarks deviations were identified at compliance monitoring locations for two consecutive seasonal (e.g. Q1 2012 and Q1 2013) sampling events. If the location is classified as background, Department notification is not required for an exceedance.

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

Parameter	Unit	Permit RL	STRM001 Seasonal Benchmarks				STRM001 Data (Q1 2013-Q4 2013)							
			Q1	Q2	Q3	Q4	Q1 2013		Q2 2013		Q3 2013		Q4 2013	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/27/13		5/7/13		8/12/13		10/24/13	
Field														
D.O.	ppm	--	--	--	--	--	**5.3**		**7.5**		**4.1**		**8.7**	
Flow	cfs	--	--	--	--	--	NM		**0.4**		**0.3**		**0.2**	
pH	SU	--	6.5-7.5 p	6.4-7.4	6.1-7.1 p	6.0-7.0	**6.5**		**6.2**		**6.5**		**6.8**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**41**		**27**		**55**		**34**	
Temperature	°C	--	--	--	--	--	**0.1**		**9.8**		**13**		**5.2**	
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	e	<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		<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	1861	8077 p	760	**450**		**320**		**1500**	e	**260**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	149 p	187	508 p	33	**31**		<10		**48**		**14**	
Mercury	ng/L	0.500	2.80 p	3.41	3.89 p	1.07	**0.537**		**3.35**		**0.777**		<0.500	
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	p	40	40	<10		<10		**12**		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	42	--	--	--		**10**		**--**		--	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	8.6 p	--	--	--		**1.4**		**--**		--	
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	p	10 p	4.0	4.0	<1.0		<1.0		<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	12	--	--	--		**3.1**		**--**		--	
Magnesium	mg/L	0.50	--	2.6	--	--	--		**0.72**		**--**		--	
Potassium	mg/L	0.50	--	0.77	--	--	--		<0.50		--		--	
Sodium	mg/L	0.50	--	1.1	--	--	--		<0.50		--		--	
General														
Hardness	mg/L	3	--	40	--	--	--		**11**		**--**		--	
TDS	mg/L	50	125 p	127	200	66	<50.0		<50.0		**56**	e	<50	e

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

Parameter	Unit	Permit RL	STRM002 Seasonal Benchmarks				STRM002 Data (Q1 2013-Q4 2013)							
			Q1	Q2	Q3	Q4	Q1 2013		Q2 2013		Q3 2013		Q4 2013	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/28/13		5/1/13		8/12/13		10/22/13	
Field														
D.O.	ppm	--	--	--	--	--	**12**		**12**		**9.2**		**12**	
Flow	cfs	--	--	--	--	--	**1.2**		**11**		**1.5**		**2.3**	
pH	SU	--	6.8-7.8	6.7-7.7	6.3-7.3 p	6.6-7.6	**7.2**		**6.3**		**6.5**		**6.4**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**70**		**23**		**51**		**48**	
Temperature	°C	--	--	--	--	--	**0.3**		**3.8**		**15**		**4.2**	
Metals														
Aluminum	ug/L	50	--	200	--	--	--		**89**		--		**--**	
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**	e	<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		<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	**210**		**250**		**240**	e	**250**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	15	62	31 p	20	<10		**10**		<10		<10	
Mercury	ng/L	0.500	1.76	4.77 t	2.79 p	3.19	<0.500		**5.54**		**1.48**		**1.20**	
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	--	35	--	--	--		**8.2**		**--**		**--**	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	1.7	--	--	--		**1.7**		**--**		**--**	
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		<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	10	--	--	--		**3.0**		**--**		**--**	
Magnesium	mg/L	0.50	--	2.1	--	--	--		**0.70**		**--**		**--**	
Potassium	mg/L	0.50	--	0.87	--	--	--		**0.53**		--		**--**	
Sodium	mg/L	0.50	--	0.91	--	--	--		<0.50		--		--	
General														
Hardness	mg/L	3	--	34	--	--	--		**10**		**--**		**--**	
TDS	mg/L	50	79	123	200	73	**54**		<50		<50	e	**54**	e

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

Parameter	Unit	Permit RL	STRM004 Seasonal Benchmarks				STRM004 Data (Q1 2013-Q4 2013)							
			Q1	Q2	Q3	Q4	Q1 2013		Q2 2013		Q3 2013		Q4 2013	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/25/13		4/30/13		8/12/13		10/22/13	
Field														
D.O.	ppm	--	--	--	--	--	**14**		**13**		**9.9**		**12**	
Flow	cfs	--	--	--	--	--	**4.1**		**49**		**4.7**		**5.8**	
pH	SU	--	6.9-7.9 p	7.3-8.3 p	7.2-8.2 p	7.2-8.2 p	**7.6**		**7.1**		**7.7**		**7.6**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**105**		**41**		**98**		**80**	
Temperature	°C	--	--	--	--	--	**1.0**		**3.1**		**13**		**4.8**	
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	**1.1**		<1.0		**2.1**	e	<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		<50	
Cadmium	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0	--	--	--		**2.0**		--		**--**	
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		**1.5**		<1.0		<1.0	
Iron	ug/L	20	362 p	555 p	336 p	472	**200**		**840**		**180**	e	**190**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	37 p	30 p	50 p	**12**		**45**		**12**		**12**	
Mercury	ng/L	0.500	2.80 p	8.34 p	1.62 p	3.67	**1.71**		**9.52**		<0.500		**1.45**	
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	p	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	53 p	--	--	--		**18**		**--**		**--**	
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	--	0.12 p	--	--	--		**0.11**	e	--		**--**	
Sulfate	mg/L	1.0	4.0	4.0	4.0	4.0	**3.3**		<1.0		<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	18 p	--	--	--		**6.3**		**--**		**--**	
Magnesium	mg/L	0.50	--	3.2 p	--	--	--		**1.5**		**--**		**--**	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.63**		--		**--**	
Sodium	mg/L	0.50	--	1.0 p	--	--	--		**0.54**		--		**--**	
General														
Hardness	mg/L	3	--	58 p	--	--	--		**22**		**--**		**--**	
TDS	mg/L	50	200	200	200	87	**62**		<50.0		<50	e	**62**	e

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

Parameter	Unit	Permit RL	STRM005 Seasonal Benchmarks				STRM005 Data (Q1 2013-Q4 2013)							
			Q1	Q2	Q3	Q4	Q1 2013		Q2 2013		Q3 2013		Q4 2013	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/28/13		5/1/13		8/12/13		10/23/13	
Field														
D.O.	ppm	--	--	--	--	--	**14**		**14**		**11**		**13**	
Flow	cfs	--	--	--	--	--	**36**		**745**		**27**		**35**	
pH	SU	--	7.1-8.1 p	7.0-8.0 p	6.6-7.6 p	7.4-8.4 p	**7.8**		**5.5**		**7.4**		**7.7**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**135**		**25**		**112**		**108**	
Temperature	°C	--	--	--	--	--	**0.0**		**3.1**		**14**		**4.6**	
Metals														
Aluminum	ug/L	50	--	395 p	--	--	--		**510**		--		**--**	
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		**1.7**	e	<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		<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		**1.8**		<1.0		<1.0	
Iron	ug/L	20	187 p	423 p	207 p	265 p	**120**		**420**		**180**	e	**190**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	40	40	40	<10		**23**		**11**		**11**	
Mercury	ng/L	0.500	1.31 p	9.64 p	1.91 p	3.28 p	**0.633**		**9.03**		**0.967**		**0.942**	
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	**4.9**	e	<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	--	--	--		**9.7**		**--**		**--**	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		**1.6**		**--**		**--**	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.050	--	0.20	--	--	--		**0.15**	e	--		**--**	
Sulfate	mg/L	1.0	6.6 p	4.0	p	4.0	**5.8**		<1.0		**1.6**		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	23 p	--	--	--		**4.1**		**--**		**--**	
Magnesium	mg/L	0.50	--	4.6 p	--	--	--		**0.87**		**--**		**--**	
Potassium	mg/L	0.50	--	1.5 p	--	--	--		**0.56**		--		**--**	
Sodium	mg/L	0.50	--	1.4 p	--	--	--		<0.50		--		--	
General														
Hardness	mg/L	3	--	76 p	--	--	--		**14**		**--**		**--**	
TDS	mg/L	50	200	200	200	200	**82**		<50.0		**56**	e	**56**	e

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

Parameter	Unit	Permit RL	STRE001 Seasonal Benchmarks				STRE001 Data (Q1 2013-Q4 2013)							
			Q1	Q2	Q3	Q4	Q1 2013		Q2 2013		Q3 2013		Q4 2013	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/27/13		4/30/13		8/12/13		10/22/13	
Field														
D.O.	ppm	--	--	--	--	--	**12**		**12**		**11**		**12**	
Flow	cfs	--	--	--	--	--	**11**		NM		**13**		**13**	
pH	SU	--	7.3-8.3 p	7.2-8.2	7.1-8.1 p	7.4-8.4 p	**7.7**		**6.8**		**7.6**		**7.7**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**136**		**38**		**136**		**111**	
Temperature	°C	--	--	--	--	--	**2.3**		**2.8**		**9.1**		**5.6**	
Metals														
Aluminum	ug/L	50	--	149 p	--	--	--		**310**		--		--	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	4.0	**1.2**		<1.0		<1.0	e	<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		<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	**63**		**320**		**77**	e	**79**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	40	40	151 p	<10		**24**		13		**10**	
Mercury	ng/L	0.500	2.00	6.05	p	1.83 p	<0.500		**7.35**		**0.647**		**0.648**	
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	**4.4**	e	<2.0		<2.0		<2.0	
Silver	ug/L	0.20	--	0.80	--	--	--		<0.20		--		--	
Zinc	ug/L	10	40	40	40	p	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	82	--	--	--		**17**		**--**		--	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	3.9 p	--	--	--		**1.5**		**--**		--	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.050	--	0.091	--	--	--		**0.088**	e	--		--	
Sulfate	mg/L	1.0	4.9 p	4.0	p	4.0	**5.3**		<1.0		**3.4**		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	25	--	--	--		**5.8**		**--**		--	
Magnesium	mg/L	0.50	--	4.7	--	--	--		**1.3**		**--**		--	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.52**		--		--	
Sodium	mg/L	0.50	--	1.1	--	--	--		**0.58**		--		--	
General														
Hardness	mg/L	3	--	82	--	--	--		**20**		**--**		--	
TDS	mg/L	50	200	133	200	200	**74**		<50.0		**60**	e	**70**	e

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

Parameter	Unit	Permit RL	STRE002 Seasonal Benchmarks				STRE002 Data (Q1 2013-Q4 2013)							
			Q1	Q2	Q3	Q4	Q1 2013		Q2 2013		Q3 2013		Q4 2013	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/26/13		5/6/13		8/12/13		10/24/13	
Field														
D.O.	ppm	--	--	--	--	--	**13**		**13**		**10**		**12**	
Flow	cfs	--	--	--	--	--	**13**		**75**		**14**		**11**	
pH	SU	--	7.3-8.3 p	7.6-8.6 p	7.5-8.5 p	7.3-8.3 t	**7.9**		**7.1**		**7.9**		**7.6**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**138**		**64**		**139**		**112**	
Temperature	°C	--	--	--	--	--	**2.6**		**2.5**		**12**		**4.1**	
Metals														
Aluminum	ug/L	50	--	200	--	--	--		**210**		--		--	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0	4.0	4.0	3.0 p	**1.5**		<1.0		**2.0**	e	1.2	
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		<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	**79**		**180**		**99**	e	**110**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40	40	40	40	<10		**10**		<10		**12**	
Mercury	ng/L	0.500	2.31 p	4.84 p	2.00	2.22	**0.542**		**6.66**		<0.500		**0.782**	
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	34 p	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	82 p	--	--	--		**26**		**--**		--	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0	--	--	--		**1.3**		**--**		--	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.050	--	0.20	--	--	--		**0.063**	e	--		--	
Sulfate	mg/L	1.0	5.1 p	4.0	p	4.0	**5.1**		<1.0		**3.5**		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	25 p	--	--	--		**8.1**		**--**		--	
Magnesium	mg/L	0.50	--	4.8 p	--	--	--		**1.7**		**--**		--	
Potassium	mg/L	0.50	--	2.0	--	--	--		**0.58**		--		--	
Sodium	mg/L	0.50	--	1.4 p	--	--	--		**0.84**		--		--	
General														
Hardness	mg/L	3	--	82 p	--	--	--		**27**		**--**		--	
TDS	mg/L	50	200	200	200	87	**78**		<50.0		**54**	e	**74**	e

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

Parameter	Unit	Permit RL	STRE005, STRE009 & STRE010 Seasonal Benchmarks				STRE005 Data (Q1 2013-Q4 2013)							
			Q1	Q2	Q3	Q4	Q1 2013		Q2 2013		Q3 2013		Q4 2013	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/25/13		4/30/13		8/12/13		10/22/13	
Field														
D.O.	ppm	--	--	--	--	--	**14**		**13**		**10**		**12**	
Flow	cfs	--	--	--	--	--	**0.8**		**17**		**0.6**		**0.7**	
pH	SU	--	7.1-8.1 p	6.6-7.6 p	6.8-7.8 p	6.8-7.8 p	**7.6**		**7.0**		**7.7**		**7.5**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**123**		**37**		**133**		**100**	
Temperature	°C	--	--	--	--	--	**0.5**		**1.8**		**12**		**5.3**	
Metals														
Aluminum	ug/L	50	--	540 p	--	--	--		**1200**		--		**--**	
Antimony	ug/L	2.0	--	8.0 p	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0 p	4.0 p	4.0 p	4.0 p	<1.0		<1.0		<1.0	e	<1.0	
Barium	ug/L	10	--	40 p	--	--	--		**13**		--		**--**	
Beryllium	ug/L	1.0	--	4.0 p	--	--	--		<1.0		--		--	
Boron	ug/L	50	200 p	200 p	200 p	200 p	<50		<50		<50		<50	
Cadmium	ug/L	0.20	--	0.80 p	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0 p	--	--	--		**1.9**		--		**--**	
Cobalt	ug/L	10	40 p	40 p	40 p	40 p	<10		<10		<10		<10	
Copper	ug/L	1.0	4.0	4.0 p	4.0 p	4.0	<1.0		**1.8**		<1.0		<1.0	
Iron	ug/L	20	581 p	508 p	587 p	272 p	**170**		**1,000**		**350**	e	**170**	
Lead	ug/L	1.0	--	4.0 p	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40 p	--	--	--		<10		--		--	
Manganese	ug/L	10	94 p	40 p	35 p	40	**23**		**77**		**29**		**13**	
Mercury	ng/L	0.500	1.87 p	7.67 p	2.59 p	1.94 p	**1.33**		**13.8**		**1.09**		**0.952**	
Molybdenum	ug/L	10	--	40 p	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0 p	4.0 p	4.0 p	4.0 p	<1.0		**1.8**		<1.0		<1.0	
Selenium	ug/L	2.0	8.0 p	8.0 p	8.0 p	8.0 p	<2.0	e	<2.0		<2.0		<2.0	
Silver	ug/L	0.20	--	0.80 p	--	--	--		<0.20		--		--	
Zinc	ug/L	10	40 p	40 p	40 p	40 p	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	35 p	--	--	--		**17**		**--**		**--**	
Alkalinity, Carbonate	mg/L	2.0	--	8.0 p	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0 p	--	--	--		**1.2**		**--**		**--**	
Fluoride	mg/L	0.10	--	0.40 p	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.050	--	p	--	--	--		**0.074**	e	--		**--**	
Sulfate	mg/L	1.0	4.5 p	4.0 p	4.0 p	9.5 p	**4.3**		<1.0		<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	12 p	--	--	--		**5.7**		**--**		**--**	
Magnesium	mg/L	0.50	--	2.1 p	--	--	--		**1.3**		**--**		**--**	
Potassium	mg/L	0.50	--	2.0 p	--	--	--		**0.58**		--		**--**	
Sodium	mg/L	0.50	--	2.0 p	--	--	--		<0.50		--		--	
General														
Hardness	mg/L	3	--	39 p	--	--	--		**20**		**--**		**--**	
TDS	mg/L	50	200 p	200 p	200 p	85 p	**72**		<50.0		**60**	e	**80**	e

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

Parameter	Unit	Permit RL	STRE005, STRE009 & STRE010 Seasonal Benchmarks				STRE009 Data (Q1 2013-Q4 2013)							
			Q1	Q2	Q3	Q4	Q1 2013		Q2 2013		Q3 2013		Q4 2013	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/26/13		4/29/13		8/12/13		10/22/13	
Field														
D.O.	ppm	--	--	--	--	--	**13**		**13**		**11**		**12**	
Flow	cfs	--	--	--	--	--	**3.5**		**10**		**22**		**3.6**	
pH	SU	--	7.1-8.1 p	6.6-7.6 p	6.8-7.8 p	6.8-7.8 p	**7.7**		**7.3**		**7.8**		**7.0**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**119**		**61**		**118**		**99**	
Temperature	°C	--	--	--	--	--	**2.7**		**1.8**		**11**		**4.7**	
Metals														
Aluminum	ug/L	50	--	540 p	--	--	--		**240**		--		**--**	
Antimony	ug/L	2.0	--	8.0 p	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0 p	4.0 p	4.0 p	4.0 p	**1.5**		<1.0		<1.0	e	<1.0	
Barium	ug/L	10	--	40 p	--	--	--		<10		--		--	
Beryllium	ug/L	1.0	--	4.0 p	--	--	--		<1.0		--		--	
Boron	ug/L	50	200 p	200 p	200 p	200 p	<50		<50		<50		<50	
Cadmium	ug/L	0.20	--	0.80 p	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0 p	--	--	--		<1.0		--		--	
Cobalt	ug/L	10	40 p	40 p	40 p	40 p	<10		<10		<10		<10	
Copper	ug/L	1.0	4.0	4.0 p	4.0 p	4.0	<1.0		**1.1**		<1.0		<1.0	
Iron	ug/L	20	581 p	508 p	587 p	272 p	**78**		**240**		**100**	e	**63**	
Lead	ug/L	1.0	--	4.0 p	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40 p	--	--	--		<10		--		--	
Manganese	ug/L	10	94 p	40 p	35 p	40	<10		**14**		**13**		<10	
Mercury	ng/L	0.500	1.87 p	7.67 p	2.59 p	1.94 p	<0.500		**4.43**		**0.885**		<0.500	
Molybdenum	ug/L	10	--	40 p	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0 p	4.0 p	4.0 p	4.0 p	<1.0		<1.0		<1.0		<1.0	
Selenium	ug/L	2.0	8.0 p	8.0 p	8.0 p	8.0 p	<2.0	e	<2.0		<2.0		<2.0	
Silver	ug/L	0.20	--	0.80 p	--	--	--		<0.20		--		--	
Zinc	ug/L	10	40 p	40 p	40 p	40 p	<10		**17**		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	35 p	--	--	--		**31**		**--**		**--**	
Alkalinity, Carbonate	mg/L	2.0	--	8.0 p	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0 p	--	--	--		**1.0**		**--**		**--**	
Fluoride	mg/L	0.10	--	0.40 p	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.050	--	p	--	--	--		**0.051**	e	--		**--**	
Sulfate	mg/L	1.0	4.5 p	4.0 p	4.0 p	9.5 p	**4.4**		<1.0		**2.3**		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	12 p	--	--	--		**9.4**		**--**		**--**	
Magnesium	mg/L	0.50	--	2.1 p	--	--	--		**1.9**		**--**		**--**	
Potassium	mg/L	0.50	--	2.0 p	--	--	--		**0.53**		--		**--**	
Sodium	mg/L	0.50	--	2.0 p	--	--	--		**0.76**		--		**--**	
General														
Hardness	mg/L	3	--	39 p	--	--	--		**31**		**--**		**--**	
TDS	mg/L	50	200 p	200 p	200 p	85 p	**78**		**68**		**52**	e	**72**	e

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

Parameter	Unit	Permit RL	STRE005, STRE009 & STRE010 Seasonal Benchmarks				STRE010 Data (Q1 2013-Q4 2013)							
			Q1	Q2	Q3	Q4	Q1 2013		Q2 2013		Q3 2013		Q4 2013	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/25/13		4/29/13		8/12/13		10/22/13	
Field														
D.O.	ppm	--	--	--	--	--	**13**		**13**		**11**		**12**	
Flow	cfs	--	--	--	--	--	**2.7**		**7.4**		**2.7**		**2.7**	
pH	SU	--	7.1-8.1 p	6.6-7.6 p	6.8-7.8 p	6.8-7.8 p	**7.8**		**7.3**		**7.8**		**7.5**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**123**		**61**		**123**		**102**	
Temperature	°C	--	--	--	--	--	**2.9**		**1.8**		**9.4**		**5.6**	
Metals														
Aluminum	ug/L	50	--	540 p	--	--	--		**230**		--		**--**	
Antimony	ug/L	2.0	--	8.0 p	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	4.0 p	4.0 p	4.0 p	4.0 p	<1.0		<1.0		<1.0	e	<1.0	
Barium	ug/L	10	--	40 p	--	--	--		<10		--		--	
Beryllium	ug/L	1.0	--	4.0 p	--	--	--		<1.0		--		--	
Boron	ug/L	50	200 p	200 p	200 p	200 p	<50		<50		<50		<50	
Cadmium	ug/L	0.20	--	0.80 p	--	--	--		<0.20		--		--	
Chromium	ug/L	1.0	--	4.0 p	--	--	--		<1.0		--		--	
Cobalt	ug/L	10	40 p	40 p	40 p	40 p	<10		<10		<10		<10	
Copper	ug/L	1.0	4.0	4.0 p	4.0 p	4.0	<1.0		<1.0		<1.0		<1.0	
Iron	ug/L	20	581 p	508 p	587 p	272 p	**130**		**230**		**71**	e	**60**	
Lead	ug/L	1.0	--	4.0 p	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40 p	--	--	--		<10		--		--	
Manganese	ug/L	10	94 p	40 p	35 p	40	**16**		**15**		**12**		<10	
Mercury	ng/L	0.500	1.87 p	7.67 p	2.59 p	1.94 p	**2.11**		**4.82**		**0.858**		**0.542**	
Molybdenum	ug/L	10	--	40 p	--	--	--		<10		--		--	
Nickel	ug/L	1.0	4.0 p	4.0 p	4.0 p	4.0 p	<1.0		<1.0		<1.0		<1.0	
Selenium	ug/L	2.0	8.0 p	8.0 p	8.0 p	8.0 p	<2.0	e	<2.0		<2.0		<2.0	
Silver	ug/L	0.20	--	0.80 p	--	--	--		<0.20		--		--	
Zinc	ug/L	10	40 p	40 p	40 p	40 p	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	35 p	--	--	--		**29**		**--**		**--**	
Alkalinity, Carbonate	mg/L	2.0	--	8.0 p	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	4.0 p	--	--	--		**1.3**		**--**		**--**	
Fluoride	mg/L	0.10	--	0.40 p	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.050	--	p	--	--	--		**0.083**	e	--		**--**	
Sulfate	mg/L	1.0	4.5 p	4.0 p	4.0 p	9.5 p	**3.8**		<1.0		<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	12 p	--	--	--		**8.6**		**--**		**--**	
Magnesium	mg/L	0.50	--	2.1 p	--	--	--		**1.6**		**--**		**--**	
Potassium	mg/L	0.50	--	2.0 p	--	--	--		**0.65**		--		**--**	
Sodium	mg/L	0.50	--	2.0 p	--	--	--		**0.79**		--		**--**	
General														
Hardness	mg/L	3	--	39 p	--	--	--		**28**		**--**		**--**	
TDS	mg/L	50	200 p	200 p	200 p	85 p	**70**		**64**		**60**	e	**72**	e

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

Parameter	Unit	Permit RL	YDRM002 Seasonal Benchmarks				YDRM002 Data (Q1 2013-Q4 2013)							
			Q1	Q2	Q3	Q4	Q1 2013		Q2 2013		Q3 2013		Q4 2013	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/28/13		5/1/13		8/12/13		10/22/13	
Field														
D.O.	ppm	--	--	--	--	--	**11**		**12**		**8.6**		**11**	
Flow	cfs	--	--	--	--	--	**12**		**449**		**11**		**21**	
pH	SU	--	6.5-7.5 p	6.3-7.3	6.7-7.7 p	6.7-7.7	**7.0**		**5.8**		**6.5**		**5.2**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**72**		**19**		**56**		**51**	
Temperature	°C	--	--	--	--	--	**0.0**		**0.7**		**16**		**4.3**	
Metals														
Aluminum	ug/L	50	--	155 p	--	--	--		**120**		**--**		**--**	
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		**1.6**	e	<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		<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		**1.1**		<1.0	
Iron	ug/L	20	711	1352	1172 p	1200	**540**		**260**		**1200**	e	**930**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	40 t	57	38 p	41	**27**		**28**		**34**		**35**	
Mercury	ng/L	0.500	2.86 p	7.86	3.40 p	5.67	**1.27**		**5.76**		**2.49**		**2.69**	
Molybdenum	ug/L	10	--	40	--	--	--		<10		--		--	
Nickel	ug/L	1.0	p	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	114 p	40	40	40	**22**		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	35	--	--	--		**4.8**		**--**		**--**	
Alkalinity, Carbonate	mg/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Chloride	mg/L	1.0	--	1.4	--	--	--		**1.3**		**--**		**--**	
Fluoride	mg/L	0.10	--	0.40	--	--	--		<0.10		--		--	
Nitrogen, Nitrate	mg/L	0.050	--	0.16	--	--	--		**0.13**		**--**		**--**	
Sulfate	mg/L	1.0	p	10 p	4.0	p	**3.3**		<1.0		<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	11	--	--	--		**2.0**		**--**		**--**	
Magnesium	mg/L	0.50	--	2.3	--	--	--		**0.53**		**--**		**--**	
Potassium	mg/L	0.50	--	0.67	--	--	--		<0.50		--		--	
Sodium	mg/L	0.50	--	1.2	--	--	--		<0.50		--		--	
General														
Hardness	mg/L	3	--	36	--	--	--		**7**		**--**		**--**	
TDS	mg/L	50	200	86	200	97	**64**		<50		<50.0	e	**64**	e

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

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

Parameter	Unit	Permit RL	CDRM004 Seasonal Benchmarks				CDRM004 Data (Q1 2013-Q4 2013)							
			Q1	Q2	Q3	Q4	Q1 2013		Q2 2013		Q3 2013		Q4 2013	
			Winter Baseflow	Spring Snowmelt & Runoff	Summer Baseflow	Fall Rain	Winter Baseflow		Spring Snowmelt & Runoff		Summer Baseflow		Fall Rain	
							2/6/13		4/29/13		8/12/13		10/23/13	
Field														
D.O.	ppm	--	--	--	--	--	**13**		**13**		**10**		**13**	
Flow	cfs	--	--	--	--	--	**13**		**109**		**11**		**15**	
pH	SU	--	7.3-8.3 p	7.3-8.3	7.1-8.1 p	7.2-8.2 p	**7.7**		**7.7**		**7.8**		**7.5**	
Specific Conductance	µS/cm @ 25°C	--	--	--	--	--	**138**		**55**		**145**		**114**	
Temperature	°C	--	--	--	--	--	**1.5**		**1.9**		**12**		**4.1**	
Metals														
Aluminum	ug/L	50	--	200	--	--	--		**240**		**--**		--	
Antimony	ug/L	2.0	--	8.0	--	--	--		<2.0		--		--	
Arsenic	ug/L	1.0	1.5	2.4	3.7 p	2.5	**1.5**		<1.0		**3.3**	e	**1.6**	
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		<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		**1.1**		<1.0		<1.0	
Iron	ug/L	20	102 p	177	264 p	168	**120**		**330**		**130**	e	**130**	
Lead	ug/L	1.0	--	4.0	--	--	--		<1.0		--		--	
Lithium	ug/L	10	--	40	--	--	--		<10		--		--	
Manganese	ug/L	10	13	19	46 p	129 p	**14**		**48**		**19**		**19**	
Mercury	ng/L	0.500	2.00	4.62	2.00	1.90 t	**0.753**		**5.91**		**0.877**		**0.802**	
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	p	40	40	<10		<10		<10		<10	
Major Anions														
Alkalinity, Bicarbonate	mg/L	2.0	--	88	--	--	--		**28**		**--**		--	
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	--	--	--		**0.096**	e	**--**		--	
Sulfate	mg/L	1.0	p	4.0	4.0 p	4.0	**4.3**		<1.0		<1.0		<1.0	
Major Cations														
Calcium	mg/L	0.50	--	26	--	--	--		**8.1**		**--**		--	
Magnesium	mg/L	0.50	--	4.0	--	--	--		**1.5**		**--**		--	
Potassium	mg/L	0.50	--	0.63	--	--	--		**0.51**		--		--	
Sodium	mg/L	0.50	--	1.2	--	--	--		**0.61**		--		--	
General														
Hardness	mg/L	3	--	81	--	--	--		**26**		**--**		--	
TDS	mg/L	50	118 p	128	200	102	**80**		**68**		**64**	e	**70**	e

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.
	Value is equal to or above site-specific benchmark.

Appendix K

Surface Water Monitoring

Trend Analysis Summary & Trending Charts

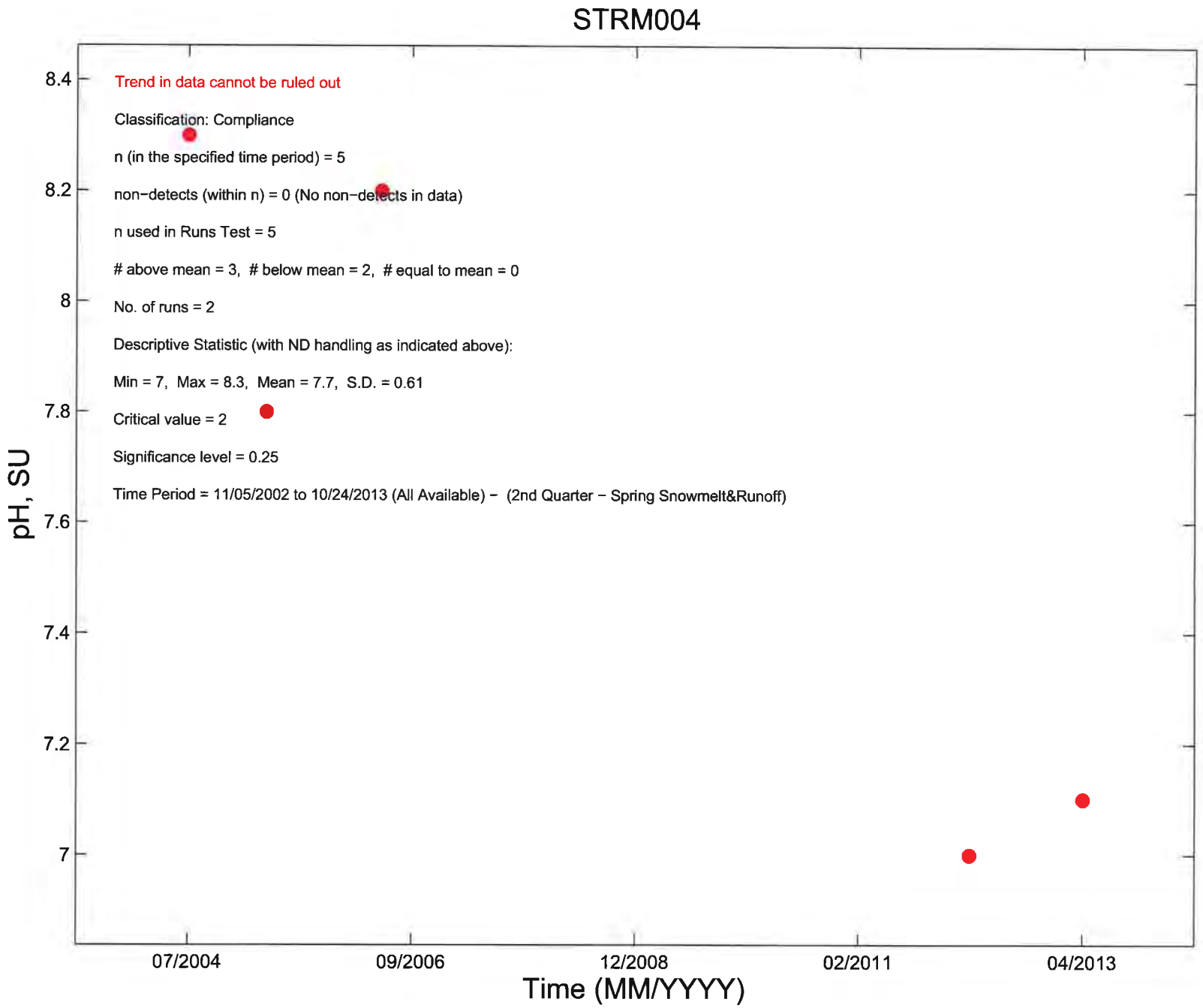
Eagle Mine
2013 Mine Permit Surface Water Monitoring
Trend Analysis Summary

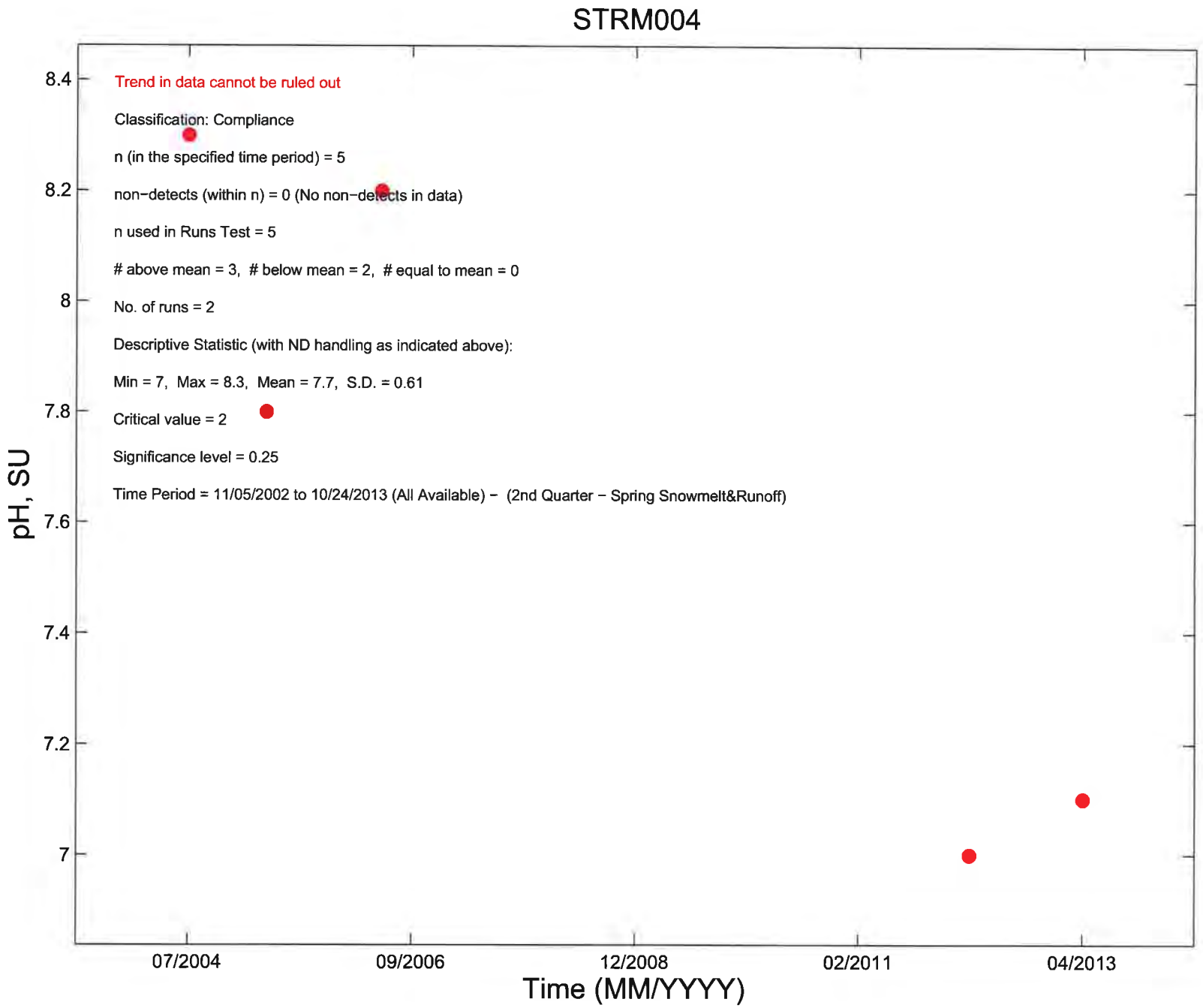
Location	Quarter	Classification	Parameter	Unit	# Samples	# NDs	Non-detects Handling	# used in Runs Test	Min	Max	Mean	St. Dev	# Above Mean	# Below Mean	# Equal Mean	# Runs	Critical Value	Statistical Significance Level	Trend Present	Remarks
CDRM004	Q1	Reference	TDS	mg/L	5	0	No NDs	5	42	102	71	22.2	2	3	0	2	2	0.25	Y	Non-unique RL in data
STRM001	Q1	Background	Sulfate	mg/L	5	4	Included as RL	5	1.0	7.1	3.8	2.7	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	pH	SU	7	0	No NDs	7	6.6	7.5	7.0	0.29	2	5	0	2	2	0.10	Y	
YDRM002	Q1	Compliance	Sulfate	mg/L	7	5	Included as RL	7	1	5.1	3.6	1.9	4	3	0	2	2	0.10	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
CDRM004	Q2	Reference	Chloride	mg/L	6	3	Included as RL	6	1	1.4	1.2	0.2	2	4	0	2	2	0.25	Y	
STRE001	Q2	Compliance	Sulfate	mg/L	6	5	Included as RL	6	1	5	2	2	2	4	0	2	2	0.25	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE001	Q2	Compliance	TDS	mg/L	6	1	Included as RL	6	49	124	68	28.7	2	4	0	3	2	0.25	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE002	Q2	Compliance	Alkalinity, Bicarbonate	mg/L	5	0	No NDs	5	26	67	50	17	3	2	0	2	2	0.25	Y	
STRE002	Q2	Compliance	Barium	mg/L	5	2	Included as RL	5	10	11	11	0.55	3	2	0	2	2	0.25	Y	
STRE002	Q2	Compliance	Calcium	mg/L	5	0	No NDs	5	8.1	21	16	5.28	3	2	0	2	2	0.25	Y	
STRE002	Q2	Compliance	Chloride	mg/L	5	2	Included as RL	5	1	1.3	1.1	0.13	2	3	0	2	2	0.25	Y	
STRE002	Q2	Compliance	Magnesium	mg/L	5	0	No NDs	5	1.7	4.1	3.1	0.98	3	2	0	2	2	0.25	Y	
STRE002	Q2	Compliance	Mercury	ng/L	5	0	No NDs	5	0.885	6.66	2.98	2.39	2	3	0	2	2	0.25	Y	Non-unique RL in data
STRE002	Q2	Compliance	pH	SU	5	0	No NDs	5	7.1	8.9	7.9	0.79	3	2	0	2	2	0.25	Y	
STRM001	Q2	Background	Sulfate	mg/L	8	6	Included as RL	8	1	8.3	3.6	3	4	4	0	2	2	0.25	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRM002	Q2	Compliance	Mercury	ng/L	8	0	No NDs	8	2.03	5.54	3.52	1.08	4	4	0	2	2	0.25	Y	Non-unique RL in data
STRM002	Q2	Compliance	Sulfate	mg/L	8	6	Included as RL	8	1	5.7	3.1	2.3	4	4	0	2	2	0.25	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRM004	Q2	Compliance	Alkalinity, Bicarbonate	mg/L	5	0	No NDs	5	18	44	33	11	3	2	0	2	2	0.25	Y	
STRM004	Q2	Compliance	Copper	ug/L	5	3	Included as RL	5	1	1.5	1.1	0.22	2	3	0	2	2	0.25	Y	
STRM004	Q2	Compliance	Iron	ug/L	5	0	No NDs	5	260	840	442	241	2	3	0	2	2	0.25	Y	Non-unique RL in data
STRM004	Q2	Compliance	Mercury	ng/L	5	0	No NDs	5	2.1	9.52	4.92	3.25	2	3	0	2	2	0.25	Y	Non-unique RL in data
STRM004	Q2	Compliance	pH	SU	5	0	No NDs	5	7	8.3	7.7	0.61	3	2	0	2	2	0.25	Y	
STRM004	Q2	Compliance	Potassium	mg/L	5	0	No NDs	5	0.5	0.63	0.57	0.05	3	2	0	2	2	0.25	Y	Non-unique RL in data
YDRM002	Q2	Compliance	Sulfate	mg/L	8	6	Included as RL	8	1	8.3	3.5	2.9	4	4	0	2	2	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)
STRE002	Q4	Compliance	pH	SU	6	0	No NDs	6	7.3	8.2	7.8	0.34	3	3	0	2	2	0.1	Y	
YDRM002	Q4	Compliance	Sulfate	mg/L	9	8	Included as RL	9	1	15	4.4	4.4	5	4	0	2	2	0.05	Y	Non-unique RL in data (NDs included in Runs Test as equal to RL)

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

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

Notes: Trends that have inconsistent RLs or >50% NDs are typically rejected.
Trend analysis period is baseline through Q4 2013.


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 = 3, # below mean = 2, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 7, Max = 8.3, Mean = 7.7, S.D. = 0.61
Critical value = 2
Significance level = 0.25
Time Period = 11/05/2002 to 10/24/2013 (All Available) - (2nd Quarter - Spring Snowmelt&Runoff)
pH, SU
8.4
8.2
8
7.8
7.6
7.4
7.2
7
07/2004
09/2006
12/2008
02/2011
04/2013
Time (MM/YYYY)

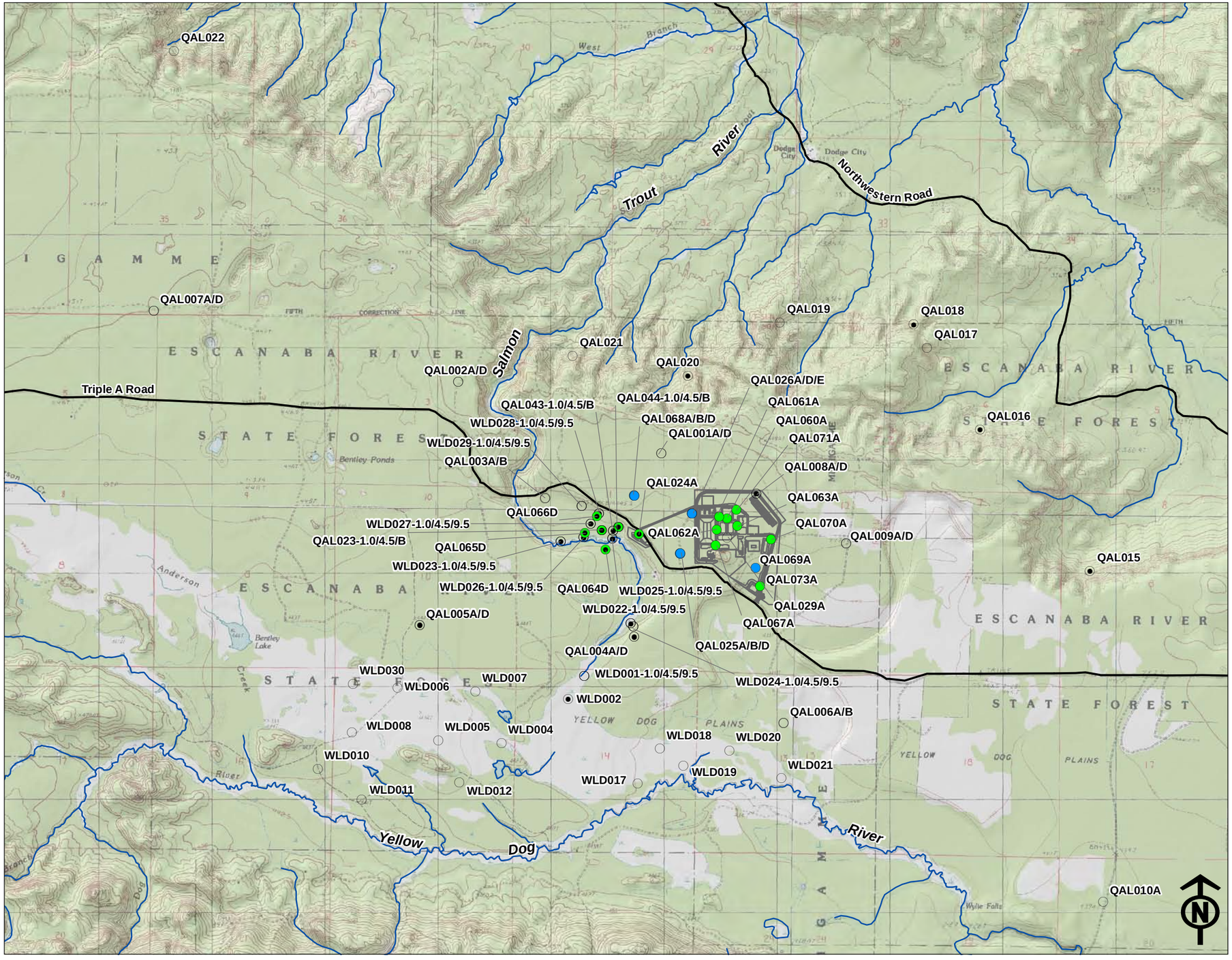

STRM004
Trend in data cannot be ruled out
Classification: Compliance
n (in the specified time period) = 5
non-detects (within n) = 0 (No non-detects in data)
n used in Runs Test = 5
above mean = 3, # below mean = 2, # equal to mean = 0
No. of runs = 2
Descriptive Statistic (with ND handling as indicated above):
Min = 7, Max = 8.3, Mean = 7.7, S.D. = 0.61
Critical value = 2
Significance level = 0.25
Time Period = 11/05/2002 to 10/24/2013 (All Available) - (2nd Quarter - Spring Snowmelt&Runoff)
pH, SU
8.4
8.2
8
7.8
7.6
7.4
7.2
7
07/2004
09/2006
12/2008
02/2011
04/2013
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 lundin mining

North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Figure: 1

Appendix M

Eagle Mine

Continuous Groundwater Level Results

Eagle Mine
2013 Water Year
Continuous Monitoring Results
Monitoring Well Locations

	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-12						
Mean	1416.7	1417.0	1415.9	1417.8	1417.0	1416.9
Minimum	1416.4	1417.0	1415.9	1417.8	1417.1	1416.9
Maximum	1417.3	1417.2	1416.0	1417.9	1417.1	1417.1
Nov-12						
Mean	1416.7	1416.9	1415.6	1417.8	1417.0	1416.4
Minimum	1416.4	1416.9	1415.4	1417.4	1416.9	1416.3
Maximum	1417.5	1417.0	1416.2	1418.3	1417.3	1416.8
Dec-12						
Mean	1416.4	1416.8	1415.5	1418.0	1417.0	1416.2
Minimum	1416.2	1416.7	1415.2	1417.4	1416.9	1416.1
Maximum	1416.7	1416.9	1415.7	1418.2	1417.2	1416.5
Jan-13						
Mean	1416.1	1416.6	1414.9	1417.8	1416.8	1415.9
Minimum	1415.95	1416.51	1414.74	1417.27	1416.63	1415.8
Maximum	1416.42	1416.74	1415.54	1418.16	1416.97	1416.19
Feb-13						
Mean	1415.8	1416.4	1414.5	1417.3	1416.5	1415.6
Minimum	1415.48	1416.37	1414.35	1416.4	1416.17	1415.39
Maximum	1416.04	1416.52	1414.77	1417.85	1416.77	1415.84
Mar-13						
Mean	1415.5	1416.2	1414.3	1416.7	1416.2	1415.3
Minimum	1415.39	1416.22	1414.27	1416.23	1416.06	1415.31
Maximum	1415.68	1416.37	1414.43	1417.26	1416.45	1415.47
Apr-13						
Mean	1415.6	1416.1	1414.3	1417.0	1416.4	1415.4
Minimum	1415.47	1416.16	1414.21	1416.7	1416.26	1415.3
Maximum	1415.89	1416.23	1414.48	1417.39	1416.85	1415.71
May-13						
Mean	1416.2	1417.2	1414.8	1417.6	1417.2	1416.1
Minimum	1415.94	1416.28	1414.5	1417.48	1416.95	1415.75
Maximum	1416.37	1418.33	1415.12	1418.02	1417.33	1416.42
Jun-13						
Mean	1416.4	1418.5	1415.3	1418.1	1417.2	1416.4
Minimum	1416.29	1418.37	1415.02	1417.59	1417.06	1416.42
Maximum	1416.64	1418.64	1415.57	1418.51	1417.31	1416.46

Eagle Mine
2013 Water Year
Continuous Monitoring Results
Monitoring Well Locations

	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
Jul-13						
Mean	1416.6	1418.4	1415.6	1418.3	1417.2	NM
Minimum	1416.47	1418.36	1415.5	1418.17	1417.09	NM
Maximum	1416.89	1418.55	1415.91	1418.66	1417.39	NM
Aug-13						
Mean	1416.6	1418.2	1415.7	1418.3	1417.1	1417.0
Minimum	1416.5	1418.2	1415.61	1417.97	1416.97	1416.9
Maximum	1416.8	1418.37	1415.91	1418.51	1417.26	1417.12
Sep-13						
Mean	1416.6	1418.0	1415.8	1418.3	1417.1	1417.0
Minimum	1416.55	1417.98	1415.7	1418.01	1416.96	1416.93
Maximum	1416.83	1418.2	1415.94	1418.56	1417.25	1417.14

Source: North Jackson Company, REACH system

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

NM = Not measured due to failed instrument

Results in red indicate values outside of the background range.

Eagle Mine
2013 Water Year
Continuous Monitoring Results
Wetland Monitoring Locations

	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-12										
Mean	1422.6	1414.5	1416.3	1416.4	1416.6	1416.6	1422.2	1422.1	1426.0	1425.7
Minimum	1422.6	1414.4	1416.3	1416.4	1416.5	1416.7	1421.6	1421.5	1425.5	1425.4
Maximum	1422.7	1414.6	1416.4	1416.4	1416.8	1416.7	1422.8	1422.7	1427.3	1426.5
Nov-12										
Mean	1422.5	1414.3	1416.2	1416.3	1416.7	1417.0	1422.5	1422.5	1426.8	1426.3
Minimum	1422.5	1414.3	1416.3	1416.4	1416.7	1416.9	1422.5	1422.5	1426.5	1426.1
Maximum	1422.7	1414.5	1416.3	1416.4	1416.9	1417.3	1422.8	1422.8	1427.4	1426.7
Dec-12										
Mean	1422.5	NM	NM	1416.3	1416.7	1417.0	1422.5	1422.5	1426.6	1426.2
Minimum	1422.5	NM	NM	1416.3	1416.7	1416.9	1422.4	1422.4	1426.2	1425.9
Maximum	1422.6	NM	NM	1416.4	1416.9	1417.1	1422.8	1422.8	1427.4	1426.7
Jan-13										
Mean	NM	NM	NM	1416.2	NM	NM	1422.3	1422.3	1426.0	1425.7
Minimum	NM	NM	NM	1416.3	NM	NM	1422.3	1422.3	1425.9	1425.6
Maximum	NM	NM	NM	1416.3	NM	NM	1422.6	1422.6	1426.6	1425.9
Feb-13										
Mean	NM	NM	NM	NM	NM	NM	1422.2	1422.2	1425.7	1425.4
Minimum	NM	NM	NM	NM	NM	NM	1422.2	1422.2	1425.6	1425.4
Maximum	NM	NM	NM	NM	NM	NM	1422.4	1422.4	1425.8	1425.6
Mar-13										
Mean	NM	NM	NM	NM	1416.5	1416.6	1422.2	1422.3	1425.6	1425.3
Minimum	NM	NM	NM	NM	1416.5	1416.6	1422.2	1422.2	1425.5	1425.3
Maximum	NM	NM	NM	NM	1416.6	1416.8	1422.6	1422.6	1426.6	1425.7
Apr-13										
Mean	1422.6	1414.0	1416.0	1416.0	1416.7	1416.9	1422.7	1422.7	1427.2	1426.3
Minimum	1422.4	1413.8	1416.0	1416.0	1416.6	1416.7	1422.5	1422.5	1426.3	1425.7
Maximum	1422.8	1414.4	1416.2	1416.1	1417.2	1417.5	1423.2	1423.2	1428.4	1428.0
May-13										
Mean	1422.7	1414.2	1416.1	1416.1	1416.9	1417.2	1422.8	1422.8	1428.0	1427.6
Minimum	1422.7	1414.0	1416.1	1416.1	1416.8	1417.0	1422.6	1422.6	1427.8	1427.5
Maximum	1422.8	1414.4	1416.3	1416.3	1417.2	1417.6	1423.2	1423.2	1428.3	1428.0
Jun-13										
Mean	1422.6	1414.1	1416.0	1416.1	1416.6	1416.9	1422.5	1422.5	1427.6	1427.4
Minimum	1422.6	1414.0	1416.0	1416.1	1416.6	1416.8	1422.3	1422.4	1427.5	1427.2
Maximum	1422.8	1414.4	1416.2	1416.2	1416.9	1417.2	1422.9	1422.9	1428.0	1427.7

Eagle Mine
2013 Water Year
Continuous Monitoring Results
Wetland Monitoring Locations

	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
Jul-13										
Mean	1422.5	1414.1	1416.1	1416.2	1416.5	1416.7	1422.8	1422.9	1427.7	1427.6
Minimum	1422.4	1414.1	1416.0	1416.2	1416.4	1416.6	1421.7	1421.7	1426.7	1426.8
Maximum	1422.7	1414.3	1416.3	1416.4	1416.8	1417.0	1422.8	1422.9	1427.7	1427.6
Aug-13										
Mean	1422.4	1414.1	1416.0	1416.1	1416.4	1416.6	1422.0	1422.1	1427.0	1426.9
Minimum	1422.4	1414.1	1416.0	1416.0	1416.3	1416.5	1421.2	1421.3	1426.1	1426.4
Maximum	1422.6	1414.1	1416.2	1416.2	1416.7	1416.9	1422.6	1422.7	1427.6	1427.4
Sep-13										
Mean	1422.3	NA	1416.1	1416.1	1416.4	1416.6	1421.9	1421.9	1426.4	1426.5
Minimum	1422.3	NA	1416.1	1416.1	1416.3	1416.5	1421.4	1421.4	1425.9	1426.2
Maximum	1422.5	NA	1416.2	1416.3	1416.6	1416.8	1422.4	1422.5	1427.2	1427.0

Source: North Jackson Company, REACH System

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

NA = Either no data was available or insufficient data was available to perform calculations

NM = Data was unable to be retrieved due to frozen conditions.

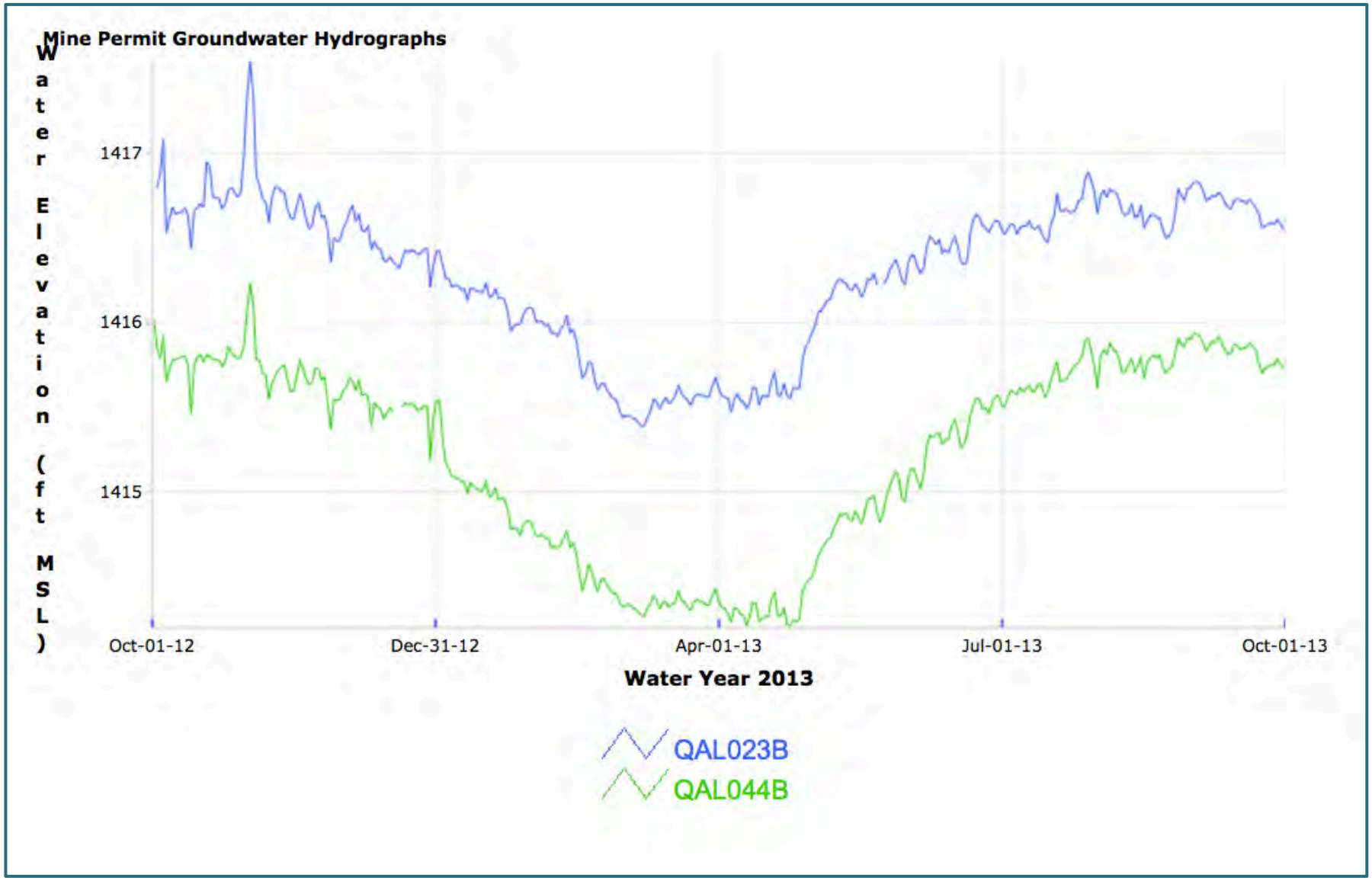
Results in red indicate values within the 6" limit, but greater than the baseline range

Appendix N

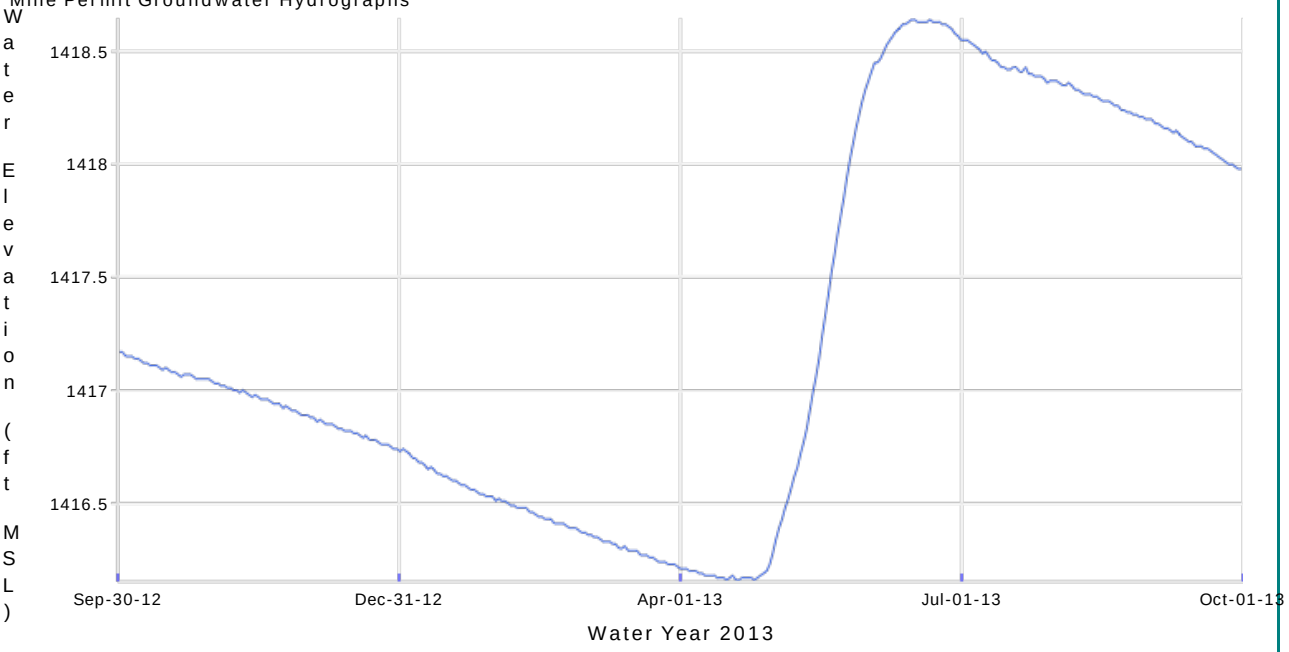
Eagle Mine

Groundwater and Wetland

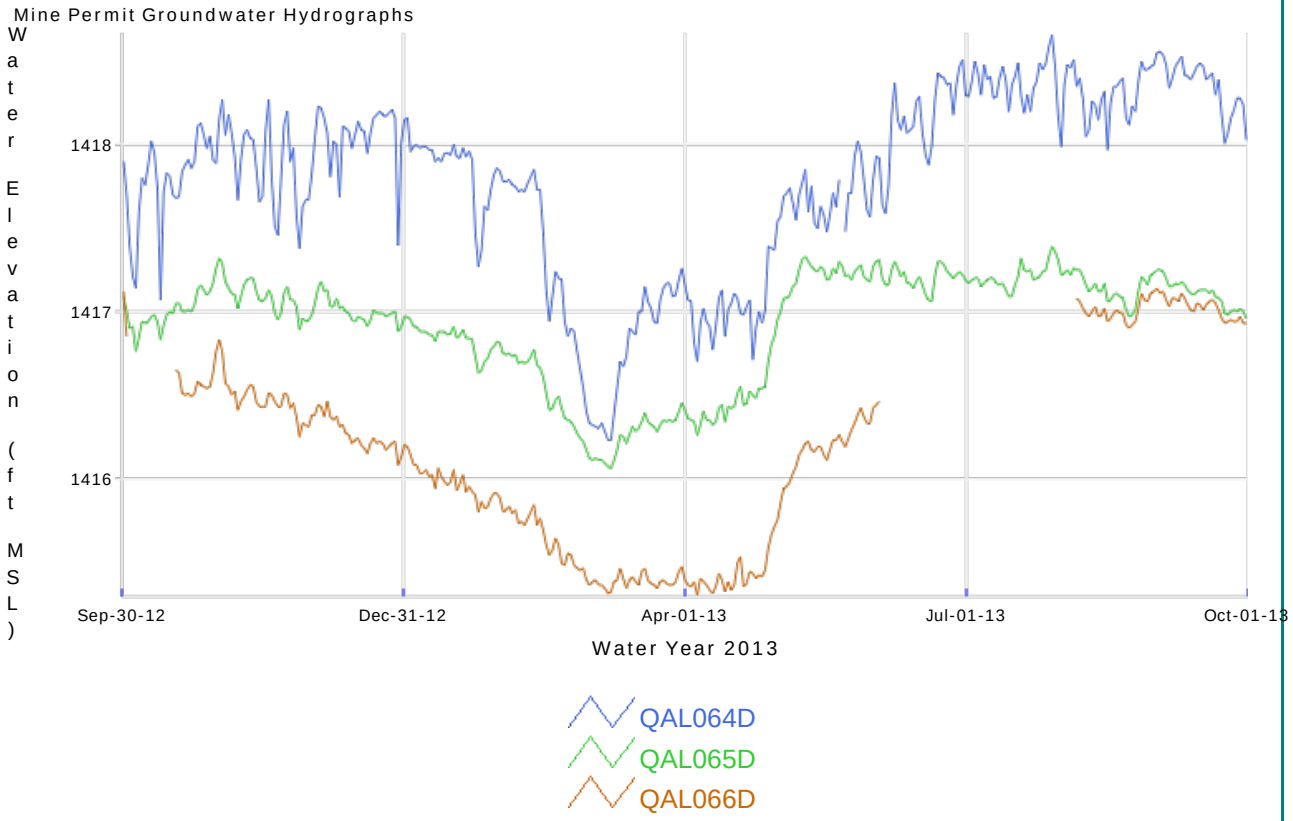
Hydrographs


Mine Permit Groundwater Hydrographs
Water Elevation (ft MSL)
1417
1416
1415
Oct-01-12
Dec-31-12
Apr-01-13
Jul-01-13
Oct-01-13
Water Year 2013
QAL023B
QAL044B

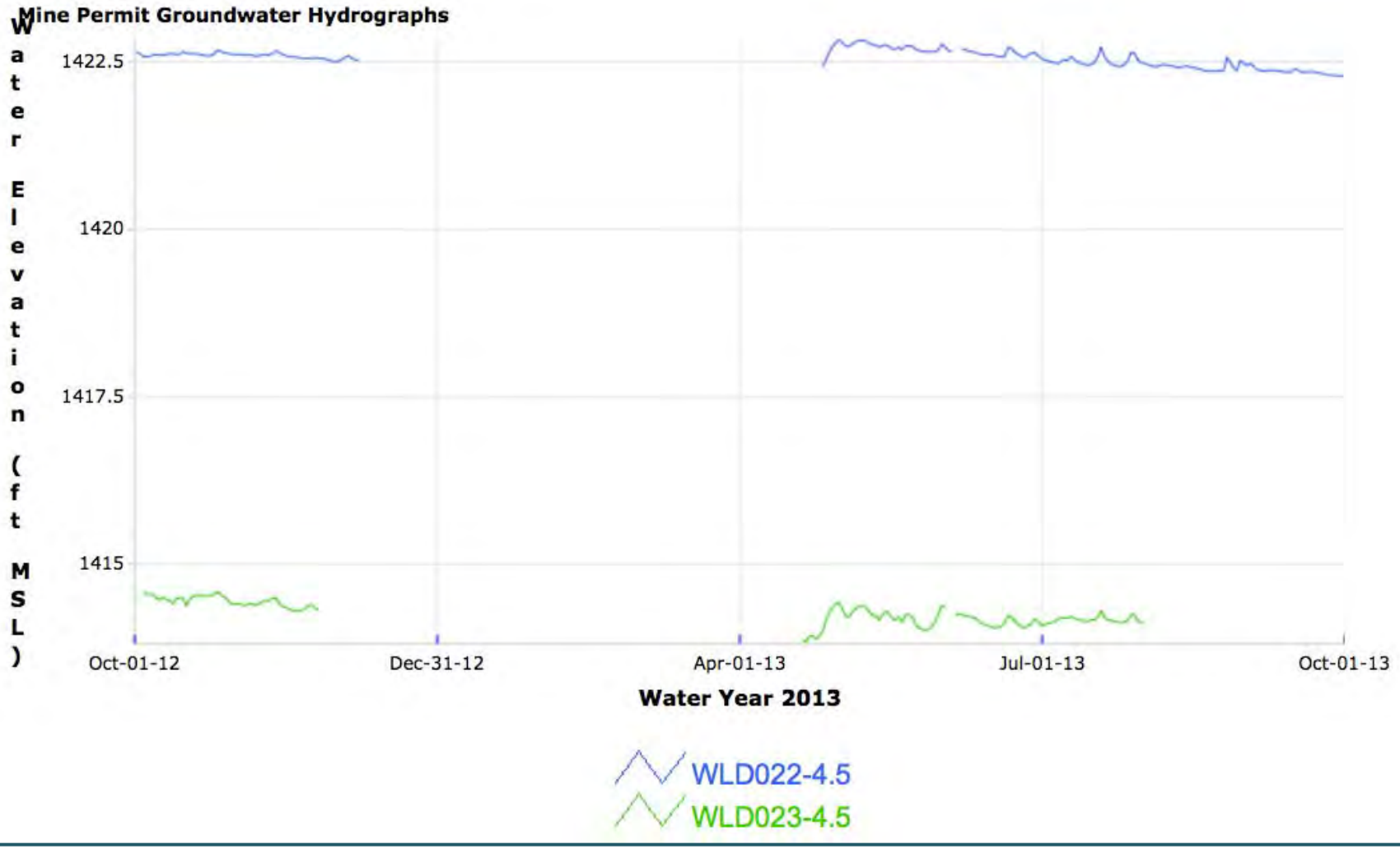
Mine Permit Groundwater Hydrographs



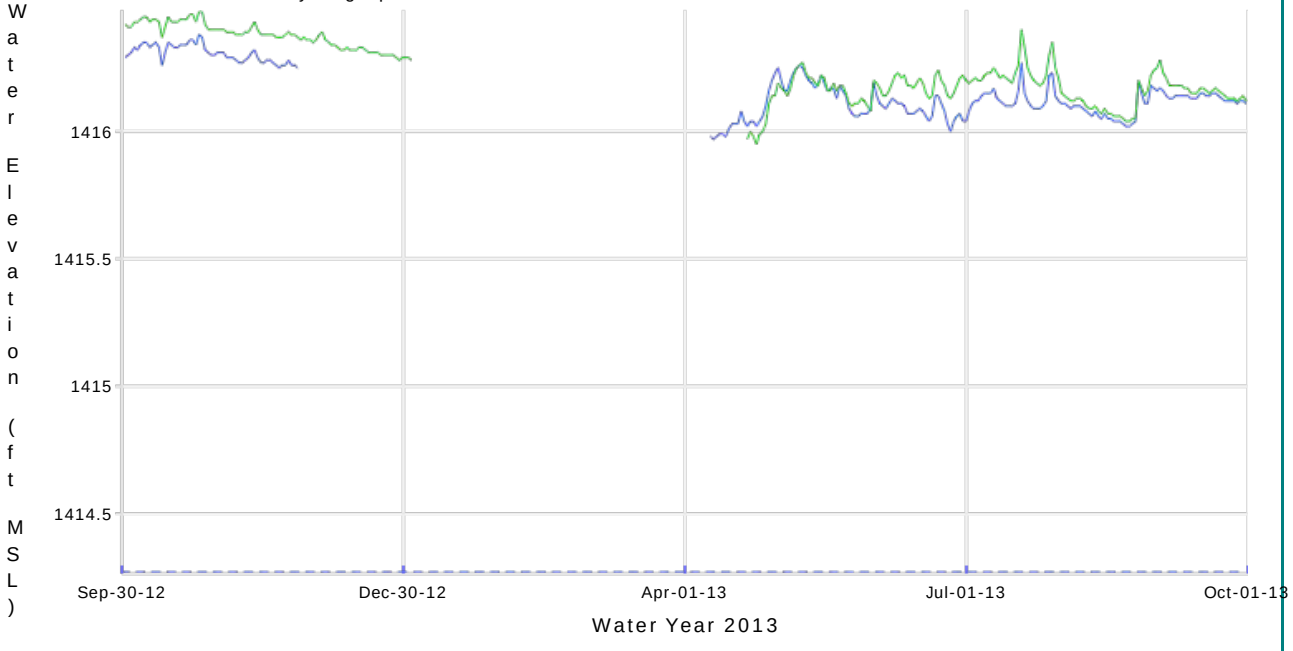
0


Mine Permit Groundwater Hydrographs
Water Elevation (ft MSL)
1418
1417
1416
Sep-30-12
Dec-31-12
Apr-01-13
Jul-01-13
Oct-01-13
Water Year 2013
QAL064D
QAL065D
QAL066D

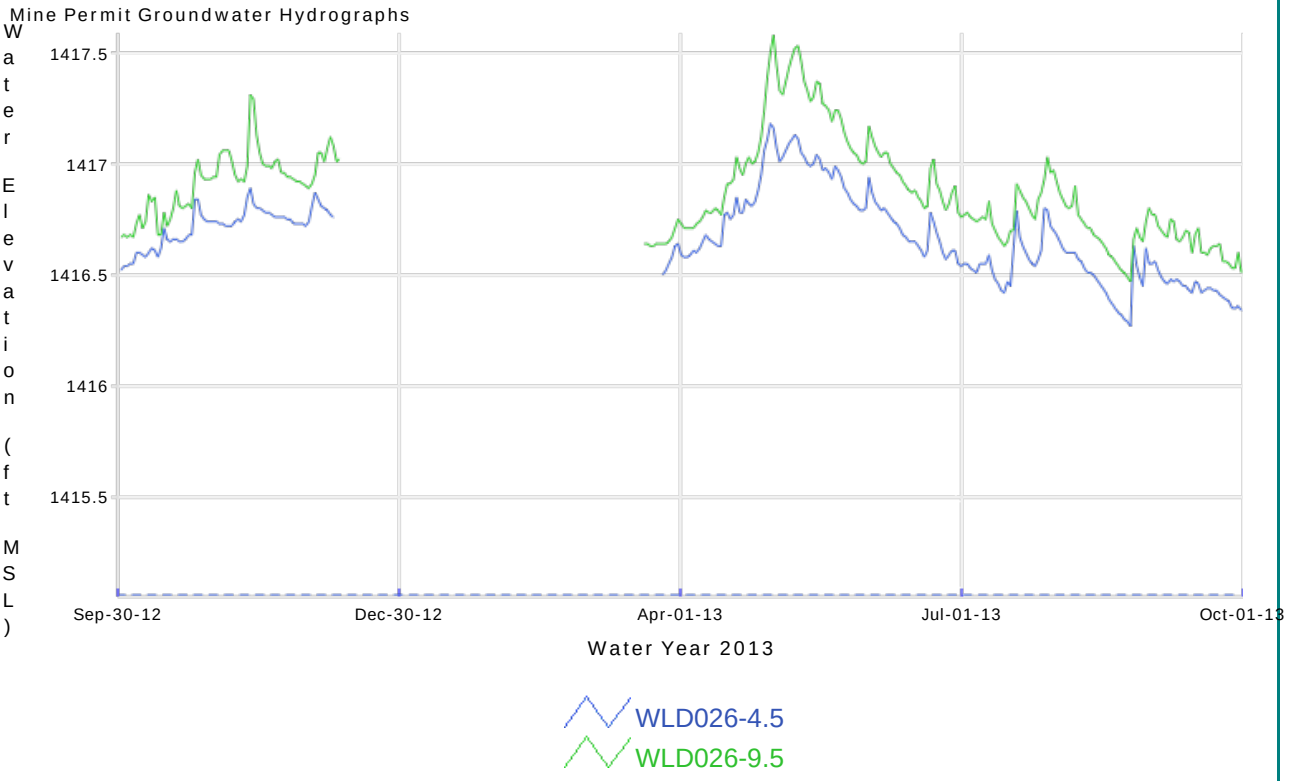
EAGLE Project - Mine Permit
Groundwater Hydro Data

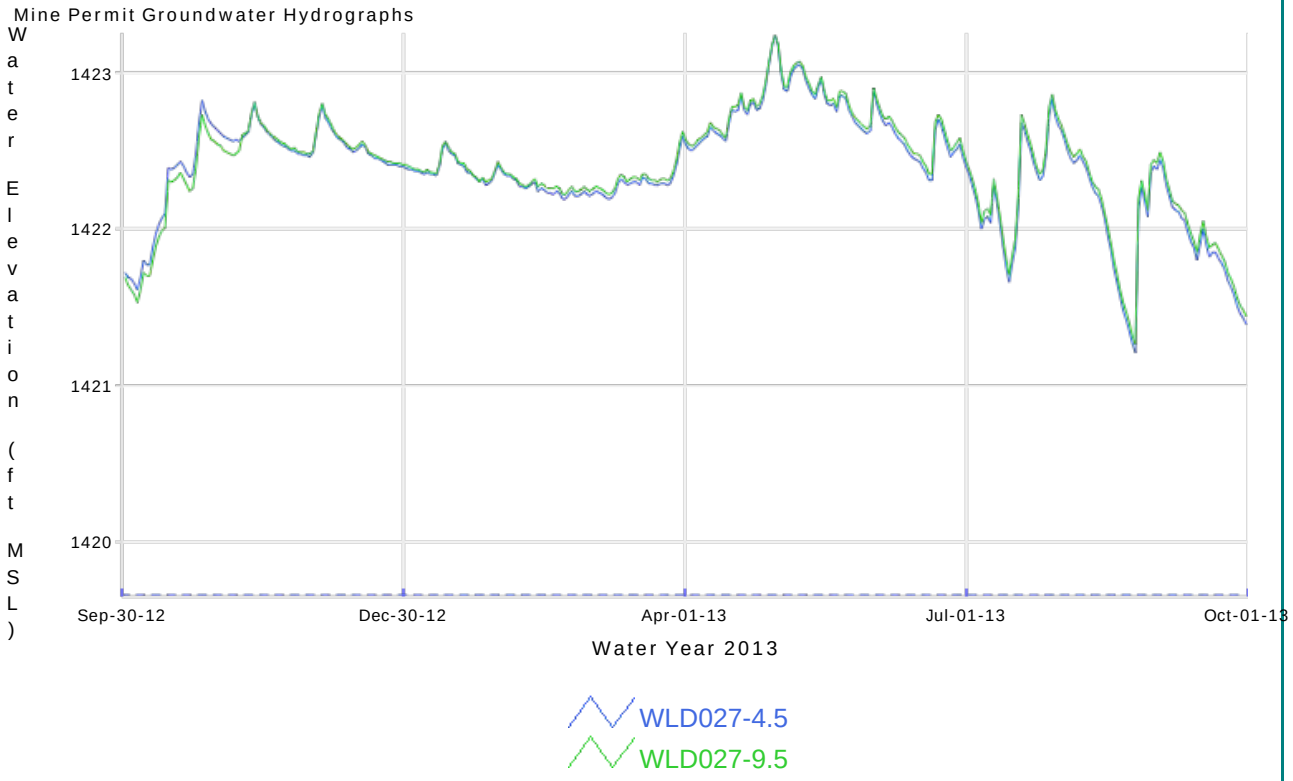


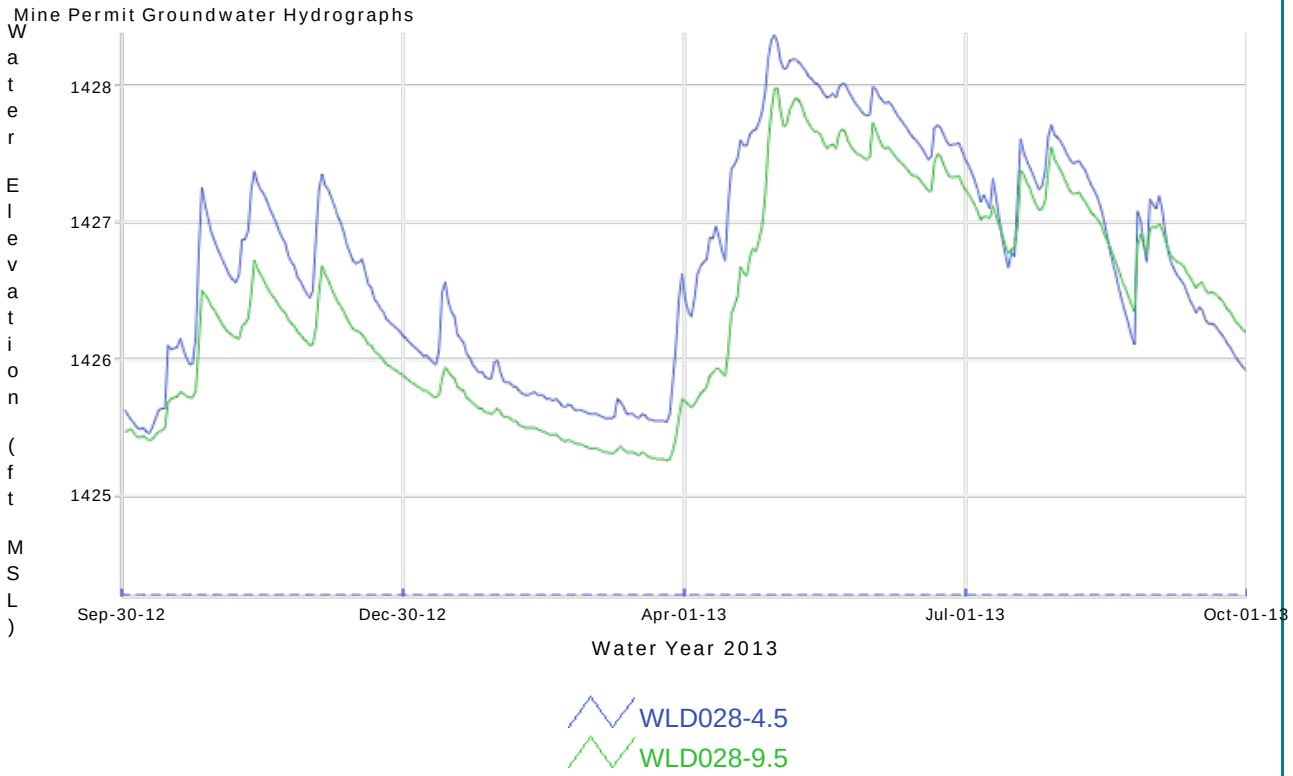
Mine Permit Groundwater Hydrographs



0


Mine Permit Groundwater Hydrographs
Water Elevation (ft MSL)
1417.5
1417
1416.5
1416
1415.5
Sep-30-12
Dec-30-12
Apr-01-13
Jul-01-13
Oct-01-13
Water Year 2013
WLD026-4.5
WLD026-9.5


Mine Permit Groundwater Hydrographs
Water Elevation (ft MSL)
1423
1422
1421
1420
Sep-30-12
Dec-30-12
Apr-01-13
Jul-01-13
Oct-01-13
Water Year 2013
WLD027-4.5
WLD027-9.5


Mine Permit Groundwater Hydrographs
Water Elevation (ft MSL)
1428
1427
1426
1425
Sep-30-12
Dec-30-12
Apr-01-13
Jul-01-13
Oct-01-13
Water Year 2013
WLD028-4.5
WLD028-9.5

Appendix O

Eagle Mine

Discrete Water Level Results

Mine Permit Water Elevation Data
2013 Full Network Quarterly Discrete Measurements
Eagle Project

Location	1st Qtr 2013		2nd Qtr 2013		3rd Qtr 2013		4th Qtr 2013	
	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date
QAL001A	1408.47	02/12/13	1408.02	06/04/13	1409.37	08/01/13	1410.39	10/21/13
QAL001D	1403.70	02/12/13	1403.64	06/04/13	1404.89	08/01/13	1405.38	10/21/13
QAL002A	1431.04	02/12/13	1431.82	06/04/13	1433.82	08/01/13	1433.56	10/21/13
QAL002D	1393.24	02/12/13	1393.19	06/04/13	1393.96	08/01/13	1394.48	10/21/13
QAL003A	1423.07	02/11/13	1427.91	06/04/13	1426.63	08/01/13	1425.05	10/21/13
QAL003B	1411.06	02/11/13	1414.38	06/04/13	1412.77	08/01/13	1411.93	10/21/13
QAL004A	1424.07	02/07/13	1426.33	06/04/13	1425.66	08/01/13	1424.88	10/22/13
QAL004D	1432.69	02/07/13	1429.94	06/04/13	1426.34	08/01/13	1425.89	10/22/13
QAL005A	1451.09	02/07/13	1455.75	06/04/13	1454.51	08/01/13	1452.75	10/21/13
QAL005D	1450.09	02/07/13	1453.53	06/04/13	1452.89	08/01/13	1451.87	10/21/13
QAL006A	1412.20	02/21/13	1415.91	06/04/13	1414.48	08/01/13	1413.43	10/21/13
QAL006B	1395.60	02/21/13	1397.87	06/04/13	1398.33	08/01/13	1397.77	10/21/13
QAL007A	1425.05	02/12/13	1426.22	06/04/13	1428.06	08/01/13	1427.85	10/21/13
QAL007D	1433.80	02/12/13	1436.29	06/04/13	1437.12	08/01/13	1436.51	10/21/13
QAL008A	1390.60	02/08/13	1394.88	06/04/13	1394.65	08/01/13	1393.01	10/22/13
QAL008D	1353.77	02/08/13	1353.59	06/04/13	1354.62	08/01/13	1355.01	10/22/13
QAL009A	1350.62	02/21/13	1350.10	06/04/13	1350.97	08/01/13	1351.79	10/21/13
QAL009D	1350.50	02/21/13	1349.97	06/04/13	1350.81	08/01/13	1351.64	10/21/13
QAL010A	1420.04	02/22/13	1423.34	06/04/13	1423.23	08/01/13	1422.45	10/21/13
QAL015	1291.71	02/22/13	1291.86	06/04/13	1291.64	08/01/13	1291.63	10/21/13
QAL016	1274.17	02/08/13	1273.88	06/04/13	NM	08/01/13	1274.06	10/24/13
QAL017	1250.08	02/08/13	1251.04	06/04/13	1250.37	08/01/13	1250.27	10/21/13
QAL018	F	02/08/13	1249.44	06/04/13	1249.20	08/01/13	1249.13	10/21/13
QAL019	1284.78	02/22/13	1284.83	06/04/13	1285.00	08/01/13	1284.76	10/21/13
QAL020	1335.07	02/08/13	1335.39	06/04/13	1335.08	08/01/13	1335.21	10/21/13
QAL021	1389.08	02/22/13	1388.94	06/04/13	1388.77	08/01/13	1388.91	10/21/13
QAL022	1298.00	02/12/13	1297.93	06/04/13	1297.89	08/01/13	1297.95	10/21/13
QAL023-1.0	F	02/11/13	1418.45	06/04/13	1418.58	08/01/13	1418.59	10/21/13
QAL023-4.5	F	02/11/13	1418.39	06/04/13	1418.37	08/01/13	1418.40	10/21/13
QAL023B	1415.93	02/04/13	1416.26	06/04/13	1416.65	08/01/13	1416.67	10/21/13
QAL024A	1416.69	01/30/13	1418.64	06/04/13	1418.53	08/01/13	1417.96	10/22/13
QAL025A	1415.29	01/28/13	1416.78	06/04/13	1417.52	08/01/13	1416.95	10/21/13
QAL025B	1415.17	01/28/13	1416.62	06/04/13	1417.38	08/01/13	1416.83	10/21/13
QAL025D	1411.36	01/28/13	1411.75	06/04/13	1412.78	08/01/13	1412.90	10/21/13
QAL026A	<1415.4 BP	02/06/13	1416.45	06/04/13	1416.78	08/01/13	1416.60	10/21/13
QAL026D	1408.09	02/06/13	1408.22	06/04/13	1409.45	08/01/13	1409.66	10/21/13
QAL026E	1408.05	01/28/13	1407.90	06/04/13	1409.08	08/01/13	1409.50	10/21/13
QAL029A	1414.95	02/12/13	1416.17	06/04/13	1416.25	08/01/13	1416.17	10/21/13
QAL029D	1405.51	02/05/13	1405.36	06/04/13	1406.58	08/01/13	1406.96	10/21/13
QAL031D	1371.51	02/12/13	1371.08	06/04/13	1372.28	08/01/13	1372.70	10/21/13
QAL043-1.0	1419.23	02/11/13	1419.85	06/04/13	1419.67	08/01/13	1419.91	10/21/13
QAL043-4.5	1419.22	02/11/13	1419.86	06/04/13	1419.68	08/01/13	1419.93	10/21/13
QAL043B	1415.33	02/11/13	1415.58	06/04/13	1415.99	08/01/13	1416.16	10/21/13
QAL044-1.0	F	02/12/13	1424.84	06/04/13	1424.70	08/01/13	1424.40	10/21/13
QAL044-4.5	1422.98	02/12/13	1424.82	06/04/13	1424.62	08/01/13	1424.21	10/21/13
QAL044B	1414.68	02/04/13	1415.05	06/04/13	1415.59	08/01/13	1415.77	10/21/13
QAL050A	1363.09	02/05/13	1362.58	06/04/13	1363.79	08/01/13	1364.50	10/21/13
QAL051A	1364.62	02/11/13	1364.35	06/04/13	1365.51	08/01/13	1366.52	10/21/13
QAL051D	1365.60	02/05/13	1364.32	06/04/13	1365.48	08/01/13	1366.47	10/21/13
QAL052A	1352.41	02/04/13	1351.86	06/04/13	1353.13	08/01/13	1353.69	10/21/13
QAL053A	1386.33	02/05/13	1385.36	06/04/13	1386.36	08/01/13	1386.76	10/21/13
QAL055A	1363.96	02/05/13	1363.60	06/04/13	1365.08	08/01/13	1365.68	10/21/13
QAL056A	1391.93	02/06/13	1395.43	06/04/13	1395.79	08/01/13	1394.32	10/21/13
QAL057A	1361.78	02/05/13	1361.36	06/04/13	1362.61	08/01/13	1363.33	10/21/13
QAL057D	1361.90	02/05/13	1361.43	06/04/13	1362.70	08/01/13	1363.42	10/21/13
QAL060A	1404.16	01/30/13	1403.74	06/04/13	1404.96	08/01/13	1405.18	10/21/13
QAL061A	1405.40	01/30/13	1405.08	06/04/13	1406.29	08/01/13	1406.55	10/21/13
QAL062A	1406.45	02/04/13	1406.40	06/04/13	1407.64	08/01/13	1407.88	10/21/13
QAL063A	1400.59	02/04/13	1400.25	06/04/13	1401.42	08/01/13	1401.76	10/21/13

Mine Permit Water Elevation Data
2013 Full Network Quarterly Discrete Measurements
Eagle Project

Location	1st Qtr 2013		2nd Qtr 2013		3rd Qtr 2013		4th Qtr 2013	
	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date	Elev. (ft MSL)	Meas. Date
QAL064D	1417.66	02/12/13	1417.59	06/04/13	1417.96	08/01/13	1418.22	10/21/13
QAL065D	1416.64	02/12/13	1417.15	06/04/13	1417.22	08/01/13	1417.12	10/21/13
QAL066D	1415.73	02/12/13	1416.44	06/04/13	1416.99	08/01/13	1417.02	10/21/13
QAL067A	1413.84	01/30/13	1414.00	06/04/13	1415.12	08/01/13	1415.78	10/21/13
QAL068A	1420.21	01/28/13	1419.98	06/04/13	1422.28	08/01/13	1422.62	10/21/13
QAL068B	1412.55	01/28/13	1412.48	06/04/13	1413.94	08/01/13	1414.37	10/21/13
QAL068D	1412.52	01/28/13	1412.53	06/04/13	1413.99	08/01/13	1414.42	10/21/13
QAL069A	1380.18	01/30/13	1381.78	06/04/13	1382.36	08/01/13	1382.38	10/21/13
QAL070A	1369.30	01/30/13	1370.05	06/04/13	1371.36	08/01/13	1371.32	10/21/13
QAL071A	1403.80	01/30/13	1407.69	06/04/13	1407.14	08/01/13	1405.66	10/21/13
QAL073A	1380.32	01/30/13	1381.80	06/04/13	1382.52	08/01/13	1382.58	10/21/13
QAL074A	1402.13	01/30/13	1405.41	06/04/13	1405.18	08/01/13	1403.60	10/21/13
STRM002	1400.42	02/28/13	1400.55	06/04/13	1400.55	08/01/13	1400.59	10/21/13
STRM011	1416.73	02/12/13	1416.78	06/04/13	1416.77	08/01/13	1416.68	10/21/13
WLD001-1.0	F	02/07/13	1428.98	06/04/13	1428.98	08/01/13	1428.98	10/22/13
WLD001-4.5	F	02/07/13	1428.01	06/04/13	1428.05	08/01/13	1428.01	10/22/13
WLD001-9.5	F	02/07/13	1429.56	06/04/13	1429.40	08/01/13	1429.24	10/22/13
WLD002	1430.58	02/07/13	1430.82	06/04/13	1430.74	08/01/13	1430.72	10/22/13
WLD004	1445.24	02/21/13	1446.39	06/04/13	1446.21	08/01/13	1445.86	10/21/13
WLD005	1449.03	02/21/13	1451.03	06/04/13	1450.73	08/01/13	1450.44	10/21/13
WLD006	1452.66	02/13/13	1455.47	06/04/13	1455.26	08/01/13	1454.66	10/21/13
WLD007	1448.35	02/13/13	1450.73	06/04/13	1450.47	08/01/13	1449.89	10/21/13
WLD008	1451.43	02/13/13	1453.67	06/04/13	1453.35	08/01/13	1452.87	10/21/13
WLD010	1446.03	02/13/13	1447.59	06/04/13	1447.41	08/01/13	1446.94	10/21/13
WLD011	1444.95	02/13/13	1446.93	06/04/13	1446.26	08/01/13	1445.60	10/21/13
WLD012	1444.89	02/21/13	1446.22	06/04/13	1445.90	08/01/13	1445.66	10/21/13
WLD017	1423.09	02/22/13	1423.54	06/04/13	1423.04	08/01/13	1423.30	10/21/13
WLD018	1423.12	02/22/13	1422.96	06/04/13	1422.88	08/01/13	1422.80	10/21/13
WLD019	1419.23	02/22/13	1420.83	06/04/13	1420.17	08/01/13	1420.00	10/21/13
WLD020	1417.21	02/22/13	1419.48	06/04/13	1419.12	08/01/13	1417.91	10/21/13
WLD021	1414.79	02/22/13	1416.12	06/04/13	1415.07	08/01/13	1415.50	10/21/13
WLD022-1.0	NM	02/07/13	1422.37	06/04/13	1422.26	08/01/13	1422.24	10/22/13
WLD022-4.5	F	02/07/13	1422.64	06/04/13	1422.47	08/01/13	1422.40	10/22/13
WLD022-9.5	NM	02/07/13	1423.32	06/04/13	1422.98	08/01/13	1422.73	10/22/13
WLD023-1.0	F	02/12/13	1414.39	06/04/13	1414.38	08/01/13	1414.31	10/21/13
WLD023-4.5	F	02/12/13	1414.23	06/04/13	1414.12	08/01/13	1414.05	10/21/13
WLD023-9.5	F	02/12/13	1416.16	06/04/13	1416.04	08/01/13	1415.76	10/21/13
WLD024-1.0	F	02/07/13	1423.21	06/04/13	1423.21	08/01/13	1423.12	10/22/13
WLD024-4.5	1422.94	02/07/13	1423.64	06/04/13	1423.49	08/01/13	1423.29	10/22/13
WLD024-9.5	F	02/07/13	1424.48	06/04/13	1424.04	08/01/13	1423.53	10/22/13
WLD025-1.0	F	02/11/13	1415.97	06/04/13	1415.88	08/01/13	1415.84	10/21/13
WLD025-4.5	F	02/11/13	1415.92	06/04/13	1415.91	08/01/13	1415.88	10/21/13
WLD025-9.5	F	02/11/13	1415.91	06/04/13	1415.94	08/01/13	1415.85	10/21/13
WLD026-1.0	F	02/12/13	1415.93	06/04/13	1415.92	08/01/13	1415.92	10/21/13
WLD026-4.5	F	02/12/13	1416.44	06/04/13	1416.33	08/01/13	1416.26	10/21/13
WLD026-9.5	F	02/12/13	1416.73	06/04/13	1416.63	08/01/13	1416.45	10/21/13
WLD027-1.0	1422.73	02/11/13	1423.07	06/04/13	1423.12	08/01/13	1423.32	10/21/13
WLD027-4.5	1422.33	02/11/13	1422.76	06/04/13	1422.70	08/01/13	1422.65	10/21/13
WLD027-9.5	1422.30	02/11/13	1422.74	06/04/13	1422.74	08/01/13	1422.65	10/21/13
WLD028-1.0	NM	02/11/13	1427.90	06/04/13	1427.55	08/01/13	1427.29	10/21/13
WLD028-4.5	1425.69	02/11/13	1427.84	06/04/13	1427.53	08/01/13	1427.18	10/21/13
WLD028-9.5	1425.32	02/11/13	1427.42	06/04/13	1427.19	08/01/13	1426.77	10/21/13
WLD029-1.0	F	02/12/13	1429.66	06/04/13	D	08/01/13	D	10/21/13
WLD029-4.5	1427.32	02/12/13	1429.64	06/04/13	1429.06	08/01/13	1427.63	10/21/13
WLD029-9.5	1426.16	02/12/13	1429.81	06/04/13	1429.08	08/01/13	1427.85	10/21/13
WLD030	1452.38	02/13/13	1455.07	06/04/13	1454.73	08/01/13	1454.30	10/21/13
YDRM002	1412.51	02/27/13	1413.59	06/04/13	1412.81	08/01/13	1412.64	10/21/13

Notes:
BP = Below pump. Maximum water elevation is shown
D = Dry
F = Frozen
NM = Not measured

Appendix P

Eagle Mine

Continuous Surface Water Monitoring Results

Eagle Mine
2013 Water Year
Continuous Monitoring Results
Surface Water Locations

STRE002								
Parameter	Month	Background MEAN	Background MIN	Background MAX	Background SD	Water Year MEAN	Water Year MIN	Water Year MAX
Temperature	Oct-12	7.5	3.2	14.6	1.5	6.8	3.3	10.4
	Nov-12	3.4	-0.1	9.3	0.5	3.4	1.0	7.1
	Dec-12	0.8	-0.2	3.2	0.4	1.9	0.2	3.9
	Jan-13	0.6	-0.2	0.8	0.5	0.5	-0.1	2.8
	Feb-13	0.5	-0.2	2.4	0.2	0.5	-0.1	2.3
	Mar-13	1.5	-0.2	4.7	0.3	1.2	-0.1	2.6
	Apr-13	4.2	-0.1	10.8	1.6	1.7	0.1	3.0
	May-13	9.7	1.3	17.8	1.0	7.0	0.5	15.6
	Jun-13	13.0	8.1	17.0	0.7	12.4	9.2	15.6
	Jul-13	14.1	10.6	18.2	1.0	14.1	10.7	17.7
	Aug-13	13.5	10.0	17.6	0.7	13.1	10.3	16.8
	Sep-13	11.4	7.0	16.6	0.8	11	8.5	14.3
Flow	Oct-12	22.9	12.0	119.0	7.1	31.1	13.2	70.2
	Nov-12	18.5	12.4	37.8	3.1	NA	NA	NA
	Dec-12	17.8	12.1	58.8	4.1	NA	NA	NA
	Jan-13	18.1	12.0	45.0	3.5	NA	NA	NA
	Feb-13	17.3	12.0	50.0	5.6	NA	NA	NA
	Mar-13	23.3	12.0	110.9	5.7	NA	NA	NA
	Apr-13	37.0	12.0	131.5	10.3	NA	NA	NA
	May-13	22.2	11.8	160.6	6.3	46.8	17.9	103
	Jun-13	18.0	12.0	90.1	3.5	18.2	12.1	53.1
	Jul-13	14.0	11.8	33.0	1.5	17.1	11.6	52.2
	Aug-13	14.5	11.8	74.4	2.3	13.0	11.6	30.1
	Sep-13	16.9	11.7	69.8	3.2	12.7	12.1	14.3
Specific Conductivity	Oct-12	127.8	70.0	146.0	14.4	129.1	104.0	137.0
	Nov-12	130.2	80.0	148.0	9.2	128.6	111.0	133.0
	Dec-12	132.9	89.0	153.0	6.7	126.4	110.0	135.0
	Jan-13	133.3	115.0	145.0	3.9	134.4	131.0	138.0
	Feb-13	133.2	111.0	144.0	3.1	136.3	133.0	140.0
	Mar-13	122.0	54.0	148.0	13.6	135.0	126.0	137.0
	Apr-13	95.6	50.0	146.0	18.2	107.6	40.0	132.0
	May-13	122.0	37.0	149.0	9.3	78.0	38.0	116.0
	Jun-13	129.1	94.0	169.0	6.4	124.1	87.0	135.0
	Jul-13	146.4	119.0	165.0	7.4	135.5	107.0	145.0
	Aug-13	146.1	107.0	163.0	6.5	136.3	117.0	142.0
	Sep-13	138.2	80.0	149.0	6.0	135.5	135.0	137.0

Eagle Mine
2013 Water Year
Continuous Monitoring Results
Surface Water Locations

STRM004								
Parameter	Month	Background MEAN	Background MIN	Background MAX	Background SD	Water Year MEAN	Water Year MIN	Water Year MAX
Temperature	Oct-12	7.5	2.3	15.2	1.6	6.6	2.6	10.7
	Nov-12	3.0	0.0	9.6	0.5	2.7	-0.1	7.0
	Dec-12	0.3	-0.1	2.5	0.2	0.9	-0.1	3.4
	Jan-13	0.2	-0.1	1.9	0.3	0.0	-0.1	1.4
	Feb-13	0.1	0.0	1.3	0.1	0.1	-0.1	1.0
	Mar-13	0.9	-0.1	5.0	0.4	0.3	-0.1	1.2
	Apr-13	4.2	-0.1	11.3	1.9	1.0	0.0	2.0
	May-13	10.1	1.9	18.2	1.0	7.7	0.8	16.5
	Jun-13	13.8	7.9	18.6	1.2	13.0	9.7	16.8
	Jul-13	14.8	11.0	19.0	1.3	15.0	11.4	19.0
	Aug-13	14.2	10.4	18.1	0.7	14.0	10.8	17.8
	Sep-13	11.8	7.3	17.3	4.5	11.7	8.7	15.9
Flow	Oct-12	7.7	3.9	41.1	2.2	5.4	3.1	12.7
	Nov-12	6.8	4.2	23.1	2.5	5.4	4.7	8.6
	Dec-12	6.7	4.6	18.9	1.6	5.7	4.9	7.4
	Jan-13	5.6	3.5	13.2	1.8	3.7	3.1	4.5
	Feb-13	5.7	2.8	15.5	1.8	3.0	2.9	3.2
	Mar-13	8.2	3.1	56.7	3.0	3.5	2.8	6.4
	Apr-13	14.9	5.2	44.5	2.5	12.8	3.3	66.4
	May-13	8.3	4.4	59.9	2.5	16.5	6.4	51.8
	Jun-13	5.7	3.0	27.4	1.1	6.1	4.2	25.0
	Jul-13	4.6	2.8	9.9	0.4	5.8	3.9	18.9
	Aug-13	4.8	2.8	28.0	1.1	4.9	4.1	11.9
	Sep-13	5.2	2.8	24.0	2.2	4.7	4.4	5.7
Specific Conductivity	Oct-12	87.3	56.0	140.0	9.2	97.8	94.0	101.0
	Nov-12	87.1	59.0	96.0	4.2	92.3	87.0	97.0
	Dec-12	84.7	61.0	95.0	11.6	83.9	81.0	87.0
	Jan-13	91.3	67.0	97.0	1.6	108.0	106.0	111.0
	Feb-13	94.5	58.0	103.0	3.5	105.7	103.0	109.0
	Mar-13	88.6	44.0	105.0	8.1	109.2	106.0	113.0
	Apr-13	69.5	33.0	105.0	12.6	97.8	40.0	115.0
	May-13	85.6	37.0	114.0	9.2	56.3	40.0	73.0
	Jun-13	88.5	57.0	116.0	14.3	66.8	64.0	70.0
	Jul-13	97.1	82.0	114.0	6.2	73.1	69.0	77.0
	Aug-13	100.6	70.0	119.0	9.2	76.8	72.0	81.0
	Sep-13	81.3	57.0	130.0	48.8	78.7	75.0	82.0

Eagle Mine
2013 Water Year
Continuous Monitoring Results
Surface Water Locations

STRM005								
Parameter	Month	Background MEAN	Background MIN	Background MAX	Background SD	Water Year MEAN	Water Year MIN	Water Year MAX
Temperature	Oct-12	7.9	2.6	15.5	2.4	7.1	3.2	11.0
	Nov-12	3.1	0.0	7.6	0.2	2.9	-0.1	6.6
	Dec-12	0.3	-0.1	2.2	0.2	1.1	-0.1	3.6
	Jan-13	0.3	-0.1	2.6	0.2	-0.1	-0.1	-0.1
	Feb-13	0.0	-0.1	1.4	0.1	-0.1	-0.1	-0.1
	Mar-13	0.5	-0.1	3.7	0.3	0.0	-0.1	0.5
	Apr-13	4.2	0.1	11.1	1.4	1.4	0.0	3.0
	May-13	10.4	2.1	17.5	1.0	7.8	0.9	17.1
	Jun-13	15.4	9.2	20.5	1.0	13.9	9.9	18.3
	Jul-13	17.2	11.9	21.3	1.1	16.6	11.7	20.8
	Aug-13	16.6	12.7	21.1	0.4	15.7	12.9	19.1
	Sep-13	13.1	9.2	18.7	1.1	12.6	9.5	16.7
Flow	Oct-12	64.2	29.2	346.6	29.2	38.3	28.8	105.9
	Nov-12	52.8	29.2	188.7	24.1	38.7	34.7	67.4
	Dec-12	55.7	33.6	131.3	17.6	45.4	36.3	69.8
	Jan-13	44.9	38.0	83.3	2.7	NA	NA	NA
	Feb-13	59.6	40.7	119.3	0.0	NA	NA	NA
	Mar-13	126.0	36.0	456.2	115.0	NA	NA	NA
	Apr-13	126.8	41.7	459.4	21.5	115.6	37.1	571.3
	May-13	67.2	32.5	781.5	28.7	130.4	43.0	580.5
	Jun-13	40.5	26.3	164.1	9.9	41.7	29.8	117.4
	Jul-13	29.8	24.0	52.0	2.2	36.7	24.9	116.3
	Aug-13	28.8	23.2	82.0	4.0	28.2	23.9	57.8
	Sep-13	38.6	21.8	155.5	14.2	26.2	24.5	30.3
Specific Conductivity	Oct-12	112.0	29.0	147.0	26.8	128.5	90.0	140.0
	Nov-12	123.5	65.0	143.0	15.9	124.2	102.0	136.0
	Dec-12	126.6	79.0	145.0	8.4	115.8	94.0	127.0
	Jan-13	129.3	99.0	145.0	4.7	134.4	119.0	143.0
	Feb-13	128.1	91.0	143.0	5.3	134.3	129.0	140.0
	Mar-13	119.1	55.0	141.0	9.4	129.2	109.0	136.0
	Apr-13	77.5	36.0	121.0	11.3	86.3	34.0	120.0
	May-13	112.5	30.0	141.0	8.1	71.1	33.0	96.0
	Jun-13	130.9	78.0	149.0	4.2	112.1	84.0	119.0
	Jul-13	142.9	111.0	161.0	8.4	98.7	57.0	111.0
	Aug-13	145.0	101.0	163.0	11.4	97.4	75.0	109.0
	Sep-13	133.3	90.0	150.0	15.7	90.1	87.0	93.0

Eagle Mine
2013 Water Year
Continuous Monitoring Results
Surface Water Locations

YDRM002								
Parameter	**Month**	**Background MEAN**	**Background MIN**	**Background MAX**	**Background SD**	**Water Year MEAN**	**Water Year MIN**	**Water Year MAX**
Temperature	Oct-12	8.5	2.7	17.2	1.9	7.0	2.0	11.4
	Nov-12	2.4	0.0	9.3	0.5	0.3	0.0	1.8
	Dec-12	0.1	0.0	1.4	0.0	0.3	-0.1	1.8
	Jan-13	0.0	-0.1	1.0	0.1	0.0	-0.1	0.0
	Feb-13	0.0	0.0	0.2	0.0	-0.1	-0.1	-0.1
	Mar-13	0.4	-0.1	4.9	0.3	-0.1	-0.1	-0.1
	Apr-13	4.3	0.0	11.4	2.1	0.5	-0.1	2.2
	May-13	11.5	0.8	21.6	1.4	8.6	-0.1	18.9
	Jun-13	16.5	9.8	22.2	1.2	15.9	11.5	20.7
	Jul-13	18.6	12.4	23.6	1.4	18.3	12.9	23.3
	Aug-13	17.9	11.7	23.2	0.9	17.0	13.4	21.0
	Sep-13	14.3	8.5	21.0	0.7	13.9	11.0	18.5
Flow	Oct-12	34.6	7.1	214.9	25.4	NA	NA	NA
	Nov-12	26.8	10.0	94.0	9.9	NA	NA	NA
	Dec-12	21.1	10.6	74.0	6.9	NA	NA	NA
	Jan-13	18.4	10.0	41.1	4.1	11.0	9.7	14.2
	Feb-13	16.8	12.2	29.7	2.9	14.3	11.7	21.7
	Mar-13	25.7	11.4	173.1	11.1	15.5	10.2	24.9
	Apr-13	91.8	14.9	306.2	29.0	37.3	9.0	226.8
	May-13	47.2	8.1	204.3	22.2	128.4	37.0	234.0
	Jun-13	21.2	8.0	61.2	8.6	31.3	15.5	83.0
	Jul-13	11.6	6.2	32.6	1.9	19.1	9.4	51.5
	Aug-13	9.0	4.3	45.6	2.7	12.9	7.0	25.0
	Sep-13	13.1	5.5	68.5	5.9	11.0	7.5	20.4
Specific Conductivity	Oct-12	61.3	30.0	102.0	18.8	76.2	54.0	100.0
	Nov-12	53.1	32.0	74.0	7.6	66.6	60.0	70.0
	Dec-12	62.0	32.0	91.0	9.0	67.2	60.0	73.0
	Jan-13	64.6	52.0	76.0	5.8	61.5	58.0	66.0
	Feb-13	69.6	55.0	79.0	5.6	80.0	80.0	80.0
	Mar-13	57.0	28.0	75.0	12.4	70.4	58.0	82.0
	Apr-13	35.2	19.0	72.0	7.1	46.2	21.0	60.0
	May-13	45.9	20.0	92.0	11.7	21.6	15.0	30.0
	Jun-13	67.1	44.0	94.0	4.6	39.2	27.0	51.0
	Jul-13	81.6	53.0	105.0	7.7	48.8	34.0	59.0
	Aug-13	87.4	47.0	107.0	10.2	56.7	38.0	69.0
	Sep-13	80.3	42.0	103.0	11.0	56.2	52.0	64.0

Source: North Jackson Company, REACH system

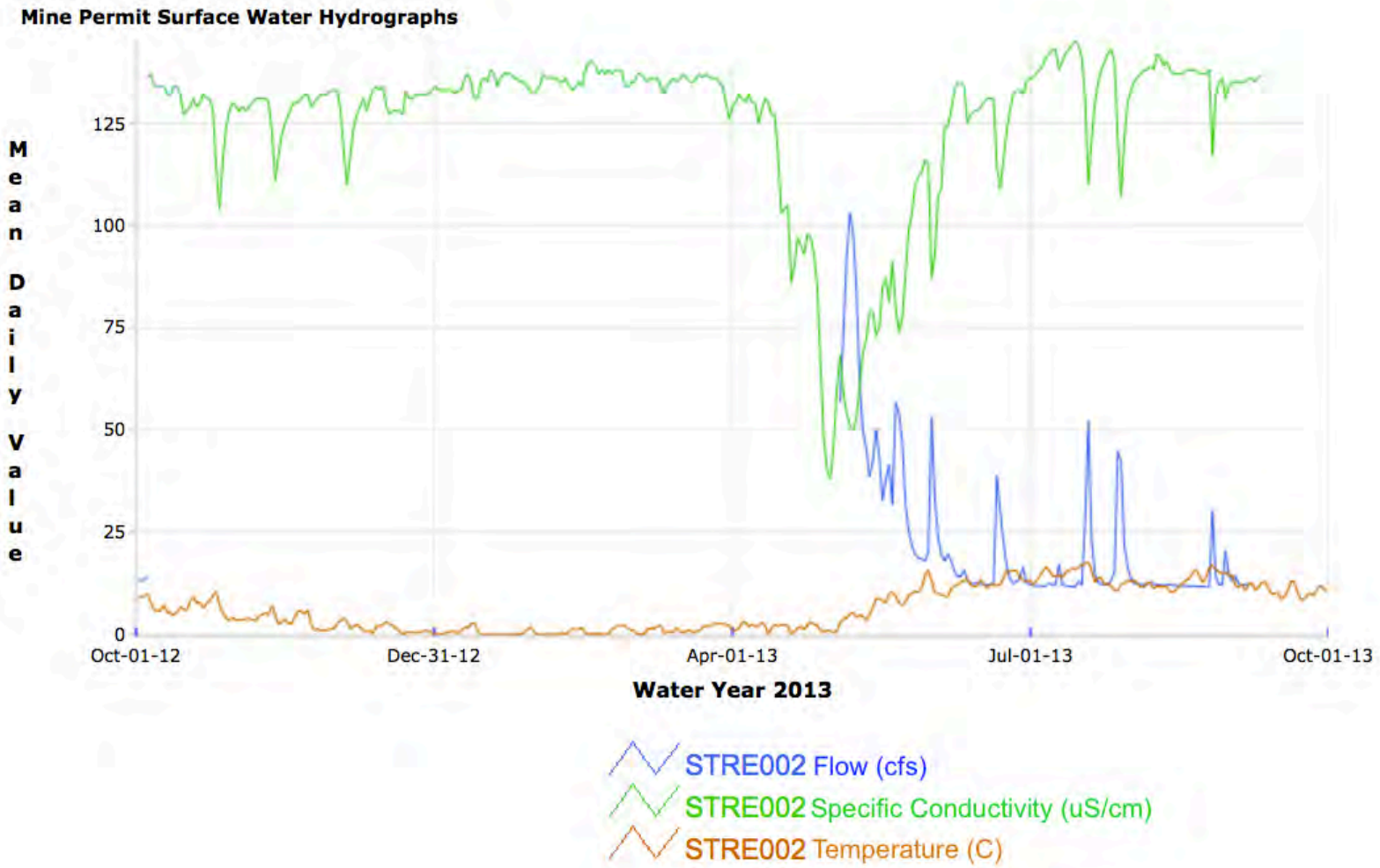
NA = Either no data was available or insufficient data was available to perform calculations.

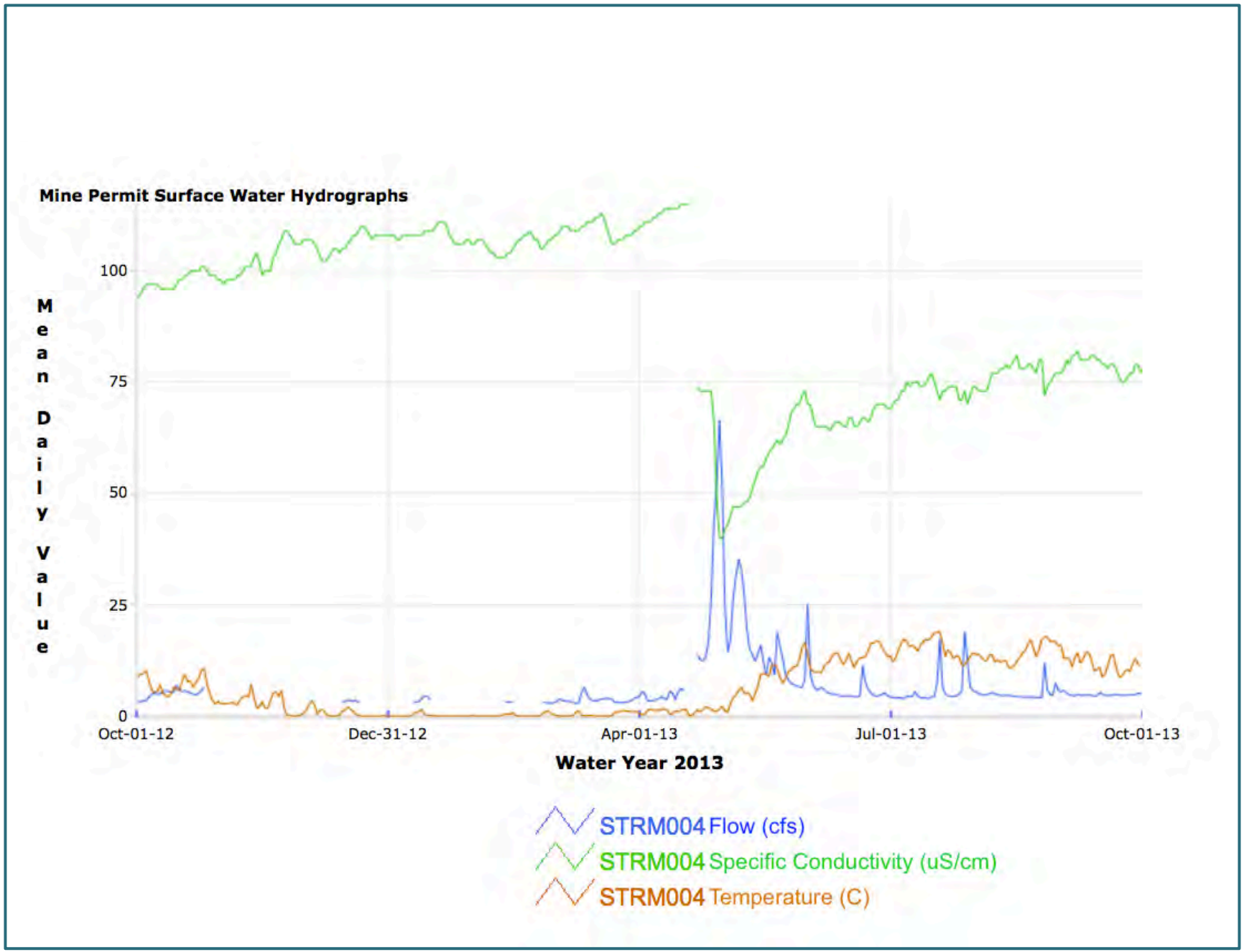
NM = Data was not collected due to an instrument malfunction.

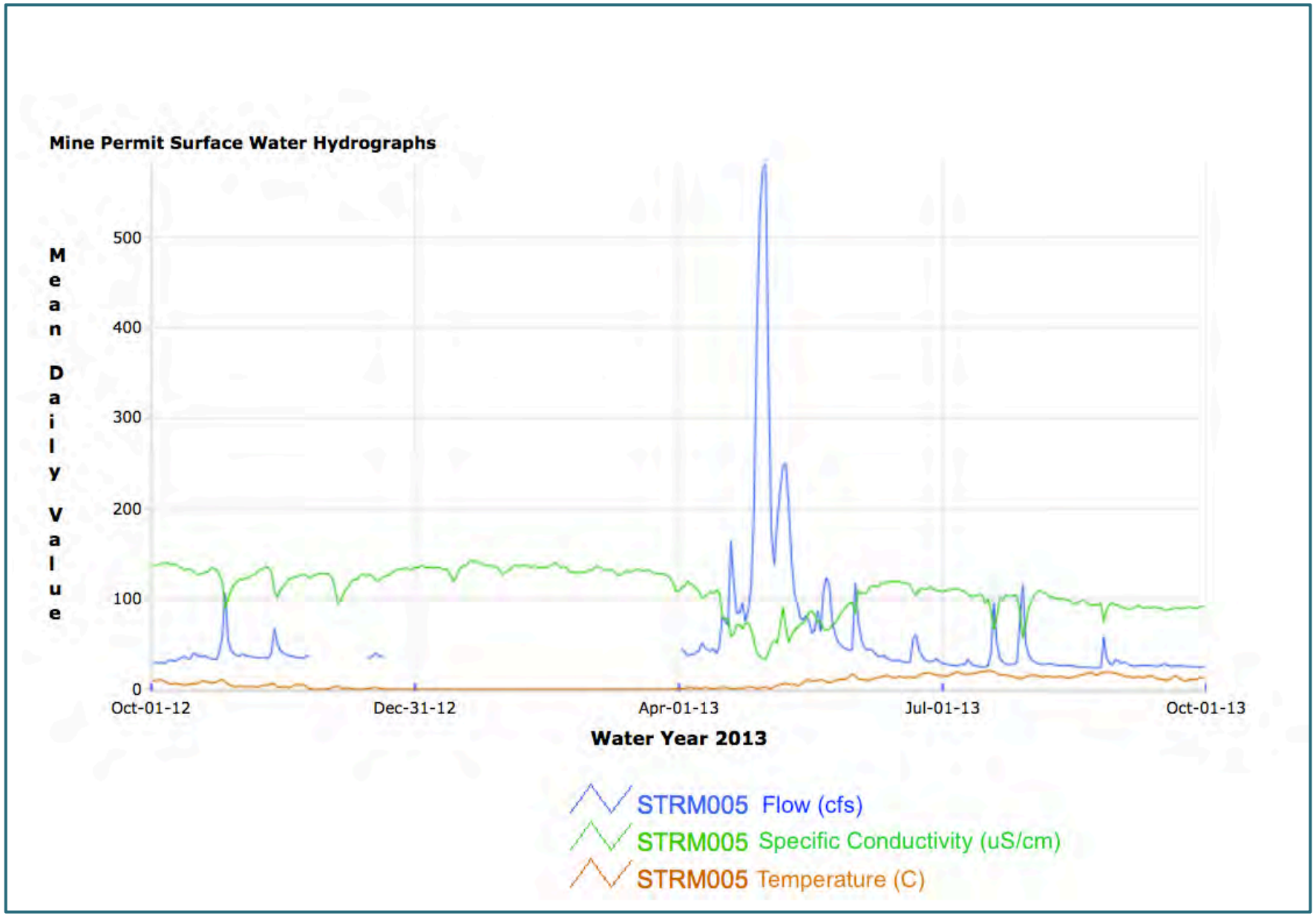
Appendix Q

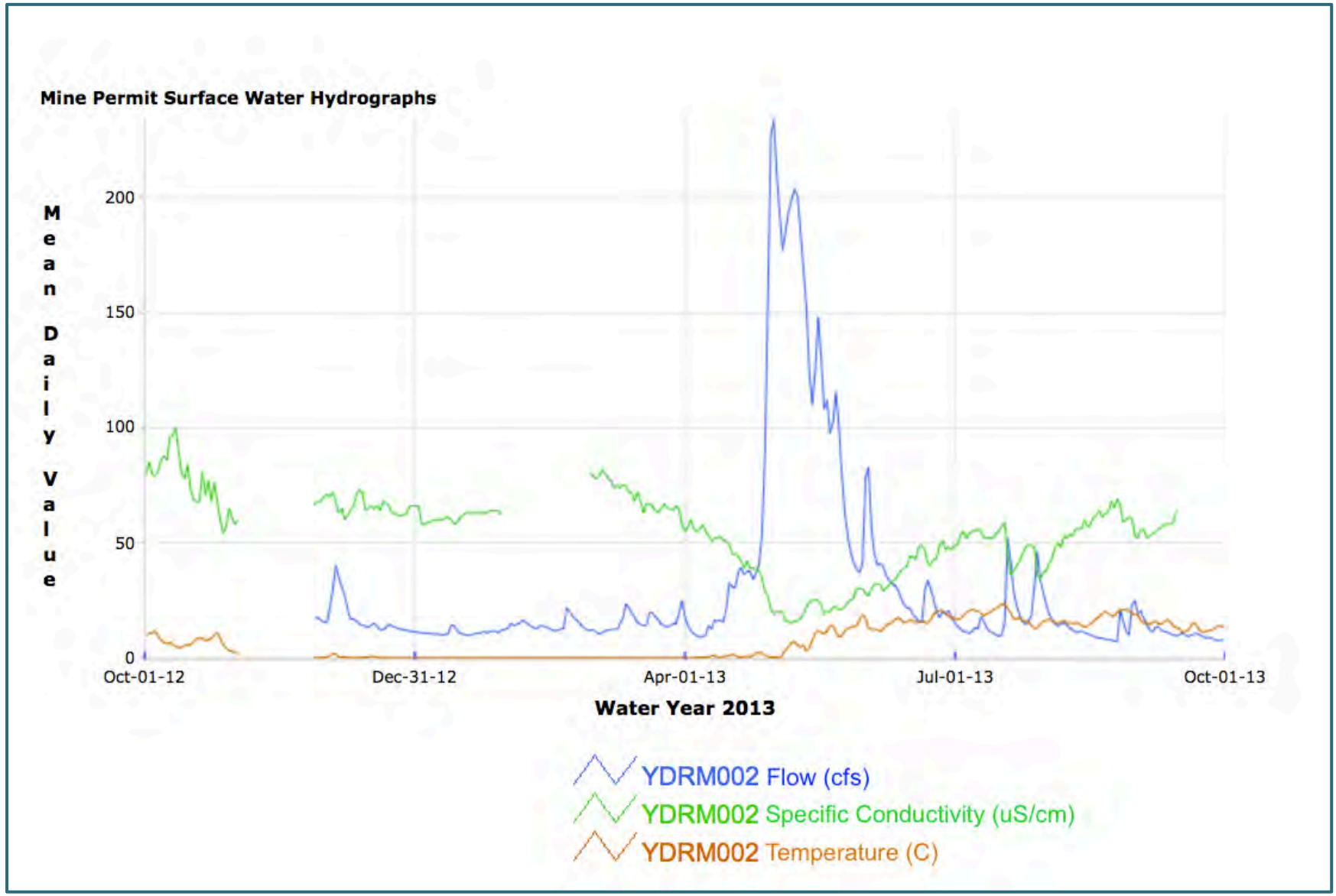
Eagle Mine

Surface Water Hydrographs


Mine Permit Surface Water Hydrographs
Mean Daily Value
125
100
75
50
25
0
Oct-01-12
Dec-31-12
Apr-01-13
Jul-01-13
Oct-01-13
Water Year 2013
STRE002 Flow (cfs)
STRE002 Specific Conductivity (uS/cm)
STRE002 Temperature (C)


Mine Permit Surface Water Hydrographs
Mean Daily Value
100
75
50
25
0
Oct-01-12
Dec-31-12
Apr-01-13
Jul-01-13
Oct-01-13
Water Year 2013
STRM004 Flow (cfs)
STRM004 Specific Conductivity (uS/cm)
STRM004 Temperature (C)


Mine Permit Surface Water Hydrographs
Mean Daily Value
500
400
300
200
100
0
Oct-01-12
Dec-31-12
Apr-01-13
Jul-01-13
Oct-01-13
Water Year 2013
STRM005 Flow (cfs)
STRM005 Specific Conductivity (uS/cm)
STRM005 Temperature (C)


Mine Permit Surface Water Hydrographs
Mean Daily Value
200
150
100
50
0
Oct-01-12
Dec-31-12
Apr-01-13
Jul-01-13
Oct-01-13
Water Year 2013
YDRM002 Flow (cfs)
YDRM002 Specific Conductivity (uS/cm)
YDRM002 Temperature (C)

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 with the Eagle Project. 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.

The Eagle Project involves 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 Project 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 will be 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 will collect any contact water associated with the ore. This contact water will be drained or pumped into the composite lined contact water basin (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.

1.1.1.2 Temporary Development Rock Storage Area

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." At the beginning of mining, 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 will handle 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. After approximately seven years, the development rock will be returned underground as mine backfill. 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 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 have the tires, sides, and undercarriages washed at the on-site truck wash prior to leaving the Contact Area at the Mine site.

During initial mining operation, the following 65 mile route is proposed 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 will upgrade the portions of the 65 mile route that are not currently "all season" status and utilize the longer route as the permanent route.

The trucks will be covered side-dump units with a length limit of approximately 80 ft. They will consist of a tractor, a trailer, and second trailer (pup). The truck will handle approximately 40 metric tons per load on average. Loads will be appropriately reduced during spring time load restrictions if the hauling occurs prior to upgrading the route to "all season" status.

Safety will be stressed with the ore truck drivers. Tracking devices will be mounted on the tractors to monitor and record speed, location and braking effort. Excessive speeds or erratic driving will not be tolerated. Any movements on the gravel portion, prior to upgrades, will utilize escort vehicles. In addition, Eagle Mine will work with the Marquette County Road Commission (MCRC) to maintain a safe road surface for employees, vendors and ore shipment.

Potential truck accidents are possible while transporting ore from the Mine to the Mill. In the event of a truck roll over, ore could be spilled onto the road and adjacent areas. Since the coarse ore is a crushed rock sized material, 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.

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.

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 the Eagle Project is controlled by a gate house and fence system.

The storage, transportation, and use of explosives comply with applicable MSHA and/or ATF standards. Explosives stored on the surface are stored 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 Project 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 diesel fuel storage tanks with a capacity of 20,000 gallons each and one smaller 560 gallon tank for regular unleaded gasoline. 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 54,500 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, gasoline, and propane (fuels) are transported to the Eagle Project 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, which is yet to be fully determined. 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 Project.

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 PIPP. In addition, 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. 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 plan and SPCC plan addresses fueling operations, fuel spill prevention measures, inspections, training, security, spill reporting, and equipment needs. All responses to a fuel spill, both large and small, will follow the guidelines dictated by the spill response plan. The tanks will be inspected regularly, and records of spills will be kept and reported to MDEQ and other agencies as required.

All permanent fuel storage tanks located on the Eagle Mine Site are designed with double-walled construction to protect against leaks. In addition, any temporary fuel storage tanks are required to have secondary containment with significant capacity to contain the contents of the tank and covered to minimize accumulation of precipitation inside the secondary containment.

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 adsorbed 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 Project 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 the installation of fire suppression systems, 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 Project 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 2 ft 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 Fugitive Emissions During Construction

During surface construction, areas subject to cut and fill operations and development of soil stockpiles will be temporarily re-vegetated and/or covered after final grading for soil stabilization and dust control. Temporary re-vegetation will start during the first year and continue through the completion of construction. After final grading of embankment slopes, temporary or permanent vegetation will be planted for soil stabilization and to reduce windblown dust. While these soil stabilization efforts are expected to be effective, there is a potential that excessive dust could be created by extreme weather conditions. These conditions could include strong wind storms or gusts in the area or excessive rain events. Such events could erode soil and vegetation, creating newly exposed soil that could also be subject to wind dispersion.

To address this risk, Eagle Mine will closely monitor re-vegetated and covered areas during the construction phase. If vegetated or covered areas are disturbed by wind activity or excessive rainfall, protective mats and/or vegetation will be re-established as soon as possible. Temporary covers may also need to be re-anchored to ensure temporary stockpiles are protected.

In addition to the above situation, there may be periods when hot and/or dry conditions could occur during the construction phase. To the extent necessary during these periods, roadways will be kept moist by instituting a watering program over identified traffic areas. It is anticipated this program will minimize excessive dust associated with mobile equipment. In the event fugitive dust is still identified as an issue, the cause of the problem will be determined such that appropriate action can occur.

1.1.7.2 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*. 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 will include ore production trucks, front end loaders, product haul trucks and miscellaneous delivery trucks. Although the movement of most vehicles across the site will mostly be on asphalt surfaces, a comprehensive on-site watering program has been developed to control potential

fugitive sources of dust. While the watering program will be closely monitored, if excessive dust emissions should occur, the facility will take appropriate corrective action, which could 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 secondary stope areas 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 may be used to control dust within the building and best housekeeping practices will 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 will be further reduced as all trucks will be equipped with a hard covers. Trucks will undergo an undercarriage and side wash prior to exiting the facility to reduce the potential for ore dust migration from the property.

Portland cement will be incorporated as a binder for aggregate material used in backfilling primary stope areas underground. The cement will be unloaded at the surface and stored in silos at the surface backfill facilities. Controls will be incorporated to minimize fugitive dust emissions during this process. Controls will include 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.

1.1.7.3 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 activities described above, 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 8-1 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	6,000 gal	Liquid
3	sodium carbonate anhydrous	soda ash; Hydrex 1564	497-19-8	4,000 lbs	Solid
4	sodium bisulfite	Hydrex 1321	7631-90-5	165 gal	Liquid
5	sodium metabisulfite	Sodium bisulfite, dry	7681-57-4	5,000 lbs	Solid
6	iron (III) chloride solution	Ferric Chloride; Hydrex 3250	7705-08-0	825 gal	Liquid
7	Antiscalant	Hydrex 4114	20592-85-2	110 gal	Liquid
8	Antiscalant	Hydrex 4104	-	110 gal	Liquid
9	hydrochloric acid	Hydrex 4507	7647-01-0	5,000 gal	Liquid
10	Antifoam	Hydrex 9240	9038953	110 gal	Liquid
11	Antifoam	Hydrex CS-808		110 gal	Liquid
12	nitric acid	Nitric acid, 34%	7697-37-2	300 gal	Liquid
12	sulfuric acid	Hydrex 1925	7664-93-9	600 gal	Liquid
13	polymer	Hydrex 6511	-	110 gal	Liquid
14	Citric Acid	Hydrex 4702	-	Up to 1600 lbs	Solid
15	RO Membrane Cleaner - Basic (Hydrex 4501)	Hydrex 4501	-	Up to 1600 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. Response to a major spill will be in compliance with the PIPP.

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. Section 4 and Section 7 also discuss the proposed handling of surface water runoff to control erosion during each phase of mine construction, operation and reclamation. 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 1825 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 unlikely

event that more than one unit will be down at any given time, Eagle Mine would have to reduce operations so as to keep critical equipment in operation with the reduced power. The details of this will be part of the operating procedures for the facility.

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 proposed for the Eagle Project 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. Mining will start with a small number of stopes near the middle elevation of the ore body. Mining will 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 aggregate fill. A Portland cement binder is planned to be used to prepare the backfill. The quantity of binder required is estimated at approximately 4.0% by weight. The secondary stopes will be backfilled with limestone amended development rock from the TDRSA or local uncemented fill material obtained from on-site or local 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.

The contingency measures to be taken in the event unanticipated surface subsidence occurs will be initiated based on subsidence monitoring. 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.

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 will be completed to identify potential leaks that would go undetected during construction QA/QC.

1.2 Emergency Procedures

This section includes the emergency notification procedures and contacts for the Eagle Project Site. 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
- 30 minute air packs
- BG 4 breathers, RZ testers
- Cap lamps
- Self rescuers
- Portable Refuge Stations
- Mine elevator
- Spill Kits (hydrocarbon and chemical)
- HAZMAT response equipment

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) 339-7000
- Local Ambulance Services: 911
- Hospitals: Marquette General Hospital – (906) 225-3560
  Bell Hospital – (906) 485-2200
- Local Fire Departments: Powell Township - 911
  Marquette Township – 911
  - Due to the location of the Eagle Project, Powell Township will be the first contact as they are the closest responder.
- Local Police: Marquette County Central Dispatch – 911
  Marquette County Sheriff Department – (906) 225-8435
  Michigan State Police – (906) 475-9922 (direct line)
- MDEQ Gwinn Office – (906) 346-8300
- 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

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 - Lundin
Reclamation Project (Mine Site)
Marquette, Michigan

Item	Units	UM	Cost/Unit	Annual Cost	Years	Total Cost
Years 1 thru 4 (Site Construction) - 2010 thru 2014						
1 Regrading	16.0	ac	$ 1,000.00	$ 16,000	1	$ 16,000
2 Install Erosion Control Devices (Silt Fence) + Maintanance	10,500.0	lf	$ 6.00	$ 63,000	1	$ 63,000
3 Seed / Mulch	16.0	ac	$ 2,500.00	$ 40,000	1	$ 40,000
4 Plantings (Trees / Shrubs)	200.0	ea	$ 100.00	$ 20,000	1	$ 20,000
Totals				**$ 139,000**		**$ 139,000**
Year 13 (TDRSA) - 2022						
1 TDRSA Removal						
a) Remove Salvageable Materials	1.0	al	$ 125,000.00	$ 125,000	1	$ 125,000
b) Remove 12" Drainage Layer	27,600.0	cy	$ 4.00	$ 110,400	1	$ 110,400
c) Remove Geosynthetic Components (HDPE/GCL/Geotextile)	262,000.0	sf	$ 0.15	$ 39,300	1	$ 39,300
2 Remove Underground Equipment (1 pump)	1.0	ea	$ 500.00	$ 500	1	$ 500
3 Remove U/G & Surface Uitilities & Generators not needed (Note A)	1.0	lot	$ 350,000.00	$ 350,000	1	$ 350,000
4 Backfill Non Contact Basins 1-4 & Vent Raise NCB	145,800.0	cy	$ 12.00	$ 1,749,600	1	$ 1,749,600
5 Remove Asphalt Paving (Phase 1) **(added 24,256 sy paving demo)**	52,517.0	sy	$ 6.00	$ 315,102	1	$ 315,102
6 Disposal of Asphalt Paving (Phase 1) (Assumed 3770 **+ 3300** cy)	400.0	lds	$ 750.00	$ 300,000	1	$ 300,000
7 Demo Concrete	3,000.0	cy	$ 150.00	$ 450,000	1	$ 450,000
8 Disposal of Concrete (3000 cy) - Dispose underground	300.0	lds	$ 150.00	$ 45,000	1	$ 45,000
9 Regrade Area (Phase I)	50.0	ac	$ 1,500.00	$ 75,000	1	$ 75,000
10 Topsoil (Phase 1)	50.0	ac	$ 2,000.00	$ 100,000	1	$ 100,000
11 Install Silt Fence + Maintenance	2,500.0	lf	$ 6.00	$ 15,000	1	$ 15,000
12 Seed / Fertilize / Mulch	50.0	ac	$ 4,000.00	$ 200,000	1	$ 200,000
Totals				**$ 3,874,902**		**$ 3,874,902**
Year 14 (Closure) - 2023						
1 Remove Salvageable Material from Buildings	1.0	ls	$ 100,000.00	$ 100,000	1	$ 100,000
2 Remove Site Utilities	1.0	ls	$ 125,000.00	$ 125,000	1	$ 125,000
3 Demolish Buildings	13.0	ea	$ 20,000.00	$ 260,000	1	$ 260,000
4 Demolish Building Foundations	13,000.0	cy	$ 150.00	$ 1,950,000	1	$ 1,950,000
5 Remove Asphalt Paving (Phase II)	10,000.0	sy	$ 6.00	$ 60,000	1	$ 60,000
6 Disposal of Asphalt Paving (Phase II) (Assumed 1333 cy)	78.0	lds	$ 750.00	$ 58,500	1	$ 58,500
7 Remove Gravel Roads	24,719.0	cy	$ 6.00	$ 148,314	1	$ 148,314
8 Disposal of Gravel	24,719.0	cy	$ 4.00	$ 98,876	1	$ 98,876
9 Demo Balance Concrete Paving & Foundations - Dispose underground	3,000.0	cy	$ 165.00	$ 495,000	1	$ 495,000
10 Dispose of Regulated Materials	2,000.0	tons	$ 40.00	$ 80,000	1	$ 80,000
11 Parking Lot Removal	7,000.0	sy	$ 6.00	$ 42,000	1	$ 42,000
12 Disposal of Parking Lot material (933 cy)	62.0	lds	$ 750.00	$ 46,500	1	$ 46,500
13 Fence Removal	63,000.0	lf	$ 4.00	$ 252,000	1	$ 252,000
14 Backfill of Contact Basins 1 & 2	138,400.0	cy	$ 12.00	$ 1,660,800	1	$ 1,660,800
15 Regrade Building Sites	3.0	ac	$ 5,000.00	$ 15,000	1	$ 15,000
16 Topsoil (Phase II)	50.0	ac	$ 2,000.00	$ 100,000	1	$ 100,000
17 Regrade Site (Phase II)	50.0	ac	$ 1,500.00	$ 75,000	1	$ 75,000
18 Seed / Mulch Disturbed Areas	50.0	ac	$ 4,000.00	$ 200,000	1	$ 200,000
19 Install Silt Fence + Maintenance	2,000.0	lf	$ 6.00	$ 12,000	1	$ 12,000
Totals				**$ 5,778,990**		**$ 5,778,990**
Year 15 (Closure) - 2024						
1 Remove Surface Salvageable Materials	1.0	ls	$ 100,000.00	$ 100,000	1	$ 100,000
2 Backfill Surface Raises and Cap (Vent Raise)	6,200.0	cy	$ 24.00	$ 148,800	1	$ 148,800
3 Install Mine Plugs	1,000.0	cy	$ 100.00	$ 100,000	1	$ 100,000
4 Remove Site Utilities (Balance of Site)	1.0	ls	$ 150,000.00	$ 150,000	1	$ 150,000
5 Demolish Buildings (Completed)	1.0	ls	$ 100,000.00	$ 100,000	1	$ 100,000
6 Disposal of Regulated Materials	500.0	tons	$ 40.00	$ 20,000	1	$ 20,000
7 Regrade Building Sites	10.0	ac	$ 1,500.00	$ 15,000	1	$ 15,000
8 Seed / Mulch Distributed Areas	20.0	ac	$ 4,000.00	$ 80,000	1	$ 80,000
9 Install Erosion Control Devices (Silt Fence)	2,000.0	lf	$ 6.00	$ 12,000	1	$ 12,000
10 Backfill Mine Portal	15,300.0	cy	$ 12.00	$ 183,600	1	$ 183,600
11 Remove Salvageable Material from Underground	1.0	ls	$ 200,000.00	$ 200,000	1	$ 200,000
12 TDRSA Backfilling	250,000.0	cy	$ 12.00	$ 3,000,000	1	$ 3,000,000
13 Backfilling Stopes (Note 1 & 2)	50,000.0	cy	$ 20.00	$ 1,000,000	1	$ 1,000,000
14 Install Reflooding Wells	1.0	ls	$ 50,000.00	$ 50,000	1	$ 50,000
Totals				**$ 5,159,400**		**$ 5,159,400**

Eagle Mine - Lundin
Reclamation Project (Mine Site)
Marquette, Michigan

	Item	Units	UM	Cost/Unit	Annual Cost	Years	Total Cost
Year 16 (Closure) - 2025							
1	Regrading of remaining Disturbed areas (Vent Raise Area)	10.0	ac	$ 1,500.00	$ 15,000	1	$ 15,000
2	Seed / Mulch Distributed Areas	10.0	ac	$ 4,000.00	$ 40,000	1	$ 40,000
3	Excavate TWIS	19,620.0	cy	$ 4.00	$ 78,480	1	$ 78,480
4	Backfill TWIS (New Topsoil)	19,620.0	cy	$ 12.00	$ 235,440	1	$ 235,440
5	WWT Building (Includes Equipment)	1.0	ea	$ 30,000.00	$ 30,000	1	
6	Install drainage flow lines between U/G and WWT	1.0	al	$ 50,000.00	$ 50,000	1	$ 50,000
7	Powerhouse (Includes Electrical Equipment)	1.0	ea	$ 30,000.00	$ 30,000	1	$ 30,000
8	Remove Underground Electrical (Wire & Conduit)	1.0	al	$ 200,000.00	$ 200,000	1	$ 200,000
9	Asphalt parking @ Mine Office	2,550.00	sy	$ 6.00	$ 15,300	1	$ 15,300
10	Asphalt parking @ Guard House (visitors parking)	625.00	sy	$ 6.00	$ 3,750	1	$ 3,750
11	Disposal of Asphalt Paving (Parking) (Assumed 423 cy)	29.0	lds	$ 750.00	$ 21,750	1	$ 21,750
12	Install Erosion Control Devices (Silt Fence) + Maintenance	2,000.0	lf	$ 6.00	$ 12,000	1	$ 12,000
	Totals				**$ 731,720**		**$ 701,720**
Year 23 (Waste Water Treatment & Guard House) - 2032							
1	Closure of WWTP /Generator / CWB's	1.0	ls	$ 50,000.00	$ 50,000	1	$ 50,000
2	Removal Buildings (WWTP / Guardhouse)	1.0	ls	$ 300,000.00	$ 300,000	1	$ 300,000
3	Removal of Salvageable Materials (WWTP / Guardhouse)	1.0	ls	$ 100,000.00	$ 100,000	1	$ 100,000
4	Disposal of Non-Salvageable Materials (50 tons)	5.0	lds	$ 750.00	$ 3,750	1	$ 3,750
5	Remove Balance of Site Fencing and Silt Fence	1.0	al	$ 4,000.00	$ 4,000	1	$ 4,000
6	Regrading Disturbed Areas	25,000.0	cy	$ 6.00	$ 150,000	1	$ 150,000
7	Seed / Mulch / Disturbed Areas	6.0	ac	$ 4,000.00	$ 24,000	1	$ 24,000
	Totals				**$ 631,750**		**$ 631,750**
Year 26 - 2035							
1	Installation of Wells	1.0	ls	$ 200,000.00	$ 200,000	1	$ 200,000
	Totals				**$ 200,000**		**$ 200,000**
Years 12 - 37 (Post Closure)							
1	Grading	5.0	ac	$ 1,500.00	$ 7,500	1	$ 7,500
2	Install Silt Fence + Maintenance	1,000.0	lf	$ 6.00	$ 6,000	1	$ 6,000
3	Seed / Mulch	5.0	ac	$ 4,000.00	$ 20,000	1	$ 20,000
	Totals				**$ 33,500**		**$ 33,500**
Post Closure Monitoring							
1	Groundwater					1	
	a) Years 12-27 / quarterly (15 Well Locations) (15 YRS)	15.0	yr	$ 60,000.00	$ 900,000	1	$ 900,000
	b) Years 27-37 / annually (9 Well Locations)	10.0	yr	$ 9,000.00	$ 90,000	1	$ 90,000
2	Surface Water (5 Sampling Locations)		yr		$ -	1	$ -
	a) Years 12-27 / quarterly	15.0	yr	$ 20,000.00	$ 300,000	1	$ 300,000
	b) Years 27-37 / annually	5.0	yr	$ 15,000.00	$ 75,000	1	$ 75,000
3	Biological Monitoring Transects (Note 3)	5.0	ea	$ 15,000.00	$ 75,000	1	$ 75,000
	Totals				**$ 1,440,000**		**$ 1,440,000**
	SUB TOTALS						**$ 17,959,262**
	CONTINGENCY						**$ 1,795,926**
	MANAGEMENT OF RECLAMATION 12% OF TOTAL						**$ 2,370,623**
	GRAND TOTAL						**$ 22,125,811**

Note 1: Based upon the Mine design no more than 4 stopes will be open at any point in time. Measuring 30 m by 30 m by 10 m.
Note 2: Cost per unit includes cost for material procurement, transportation and backfilling
Note 3: Threatened and endangered species monitoring will be performed in conjunction with wetlant monitoring.
Note 4: This Estimate does not include hauling or disposal of contaminate materials.
Note 5: No cost is included to connect water treatment plant to re-flooding wells in the event that underground water needs to be treated post-closure

Scope Notes

A) Buried surface utility value = $850K, Assumed $250K to remove
Disposed demolition concrete in Underground mine as approved backfill.
B) Cost are priced to assume Asphalt is recycle quality. Demolitioned Concrete and gravel can be disposed underground.

Appendix T

Eagle Mine

Organizational Report

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

Organizational Information

Eagle Mine, LLC

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
Lee Harrs, Julie A.	22 York Valley Crescent Toronto, ON M2P 1A7 Canada
McRae, Paul M.	11 Pulborough Road Wandsworth London SW18 5UN United Kingdom
Welch, Michael	4547 County Road 601 Champion, MI 49814

Officers

Inkster, Marie	President	70 Rose Way Markham, ON L3P 3S6 Canada
Rose, Benjamin D.	Chief Financial Officer	4547 County Road 601 Champion, MI 49814
Magie, Jinhee	Treasurer	1487 Briarwood Crescent Oakville, ON L6J 2S8 Canada
Ingram, James A.	Secretary	1636 Chesbro Court Mississauga, ON L5H 4H4 Canada
Welch, Michael	General Manager	4547 County Road 601 Champion, MI 49814