Rio Tinto

2012 Annual Mining and Reclamation Report

Rio Tinto Eagle Mine LLC

March 15, 2013

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Appendices

1 Introduction

Rio Tinto Eagle Mine, LLC (RTEM) began construction of the Eagle Mine, an underground nickel and copper mine in Michigamme Township, in May 2010 and began underground operations in September 2011. Per Michigan's Nonferrous Metallic Mining Regulations and the Eagle Mine Part 632 Mining Permit, RTEM 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 MMR will provide a 2012 construction update to summarize the activities that have occurred since the 2011 MMR submittal and a look forward to 2013. 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 October 4, 2012, the company's legal name was changed from Kennecott Eagle Minerals Company (KEMC) to Rio Tinto Eagle Mine, LLC (RTEM). This was a change in the company name only and not a change in ownership or operational control.

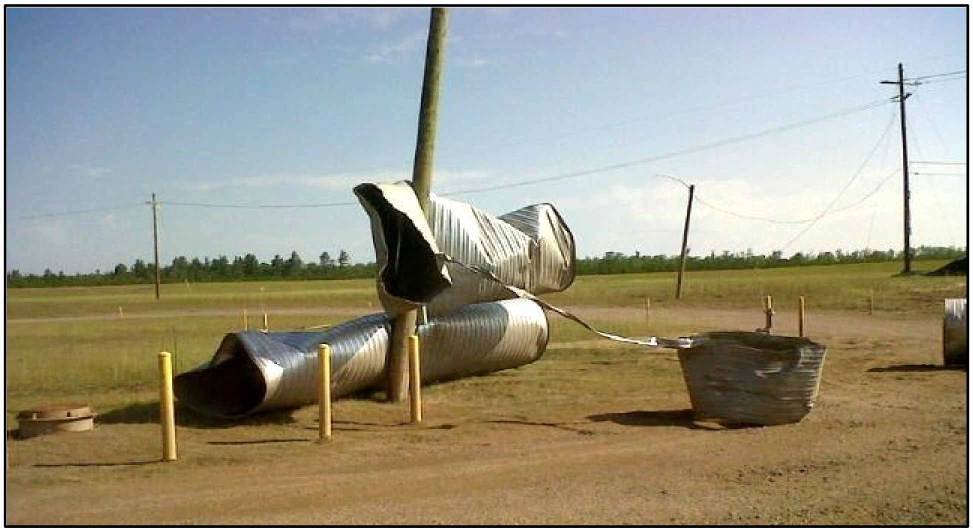
2 Site Development and Construction Status

Construction of surface facilities which support mine development and future operations continued throughout 2012. Construction activities included the paving of the mine access road from the guard house to the truck wash, completion of several surface structures and commencement of activities at the mine ventilation area. Additional facilities are planned for construction in 2013 to support both the actual mining of the ore body and stope backfilling process.

Eagle Mine Site Aerial View, October 2012

2.1 Severe Weather Event

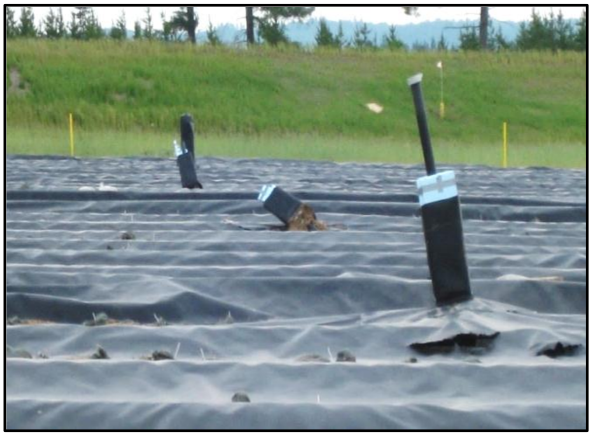
On June 8, 2012, severe weather resulted in minor damage at the Eagle Mine Site. An F1 tornado touched down at the northwest corner of the site and traveled east along the northern edge of the facility. During the event, all critical structures and equipment remained intact and operational. Minor damage occurred to the perimeter fence, an overhead door and roof corner at the WTP, siding of the pump houses, and the geo-membrane cover of the TWIS. In addition, ventilation tubes were carried from their staging location at the northwest corner of the facility and distributed throughout the site and outside the eastern fence line. All repairs to the TWIS, perimeter fence, and WTP were completed in 2012 and new siding was installed on the pump houses of the TDRSA and CWBs in Q1 2013.



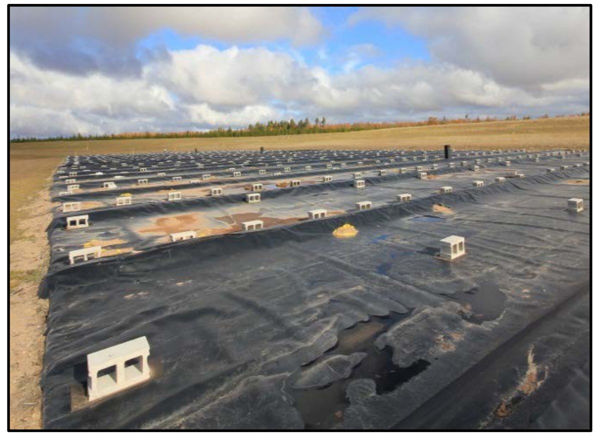
Vent Tube Wrapped Around Light Pole

Damage to Perimeter Fence, June 2012

Repaired Perimeter Fence, November 2012



Damage to TWIS Geo-Membrane, June 2012



Repaired TWIS Geo-Membrane, October 2012

2.2 Soil Erosion Control Measures

Soil Erosion and Sediment Control (SESC) measures continue to be located around the perimeter of the mine site facility and mine ventilation area in accordance with Part 91 (NREPA, 1994 PA 451, as amended). Although SESC measures related to the construction of mining facilities now fall under the purview of Part 632, Rio Tinto will continue to uphold the requirements of Part 91 for the SESC permits that are currently in place. 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. Rio Tinto staff conducts the inspections and maintain the proper SESC and storm water certifications. Inspections are recorded in a logbook maintained at the mine site guardhouse.

In 2012, sediment control measures (i.e. silt fence) were removed from the utility corridor as the permanent vegetation had grown into place. The SESC permit associated with the utility corridor was closed out upon final review by the Marquette County Conservation District erosion control inspector.

2.3 Storm Water Control

In addition to the three non-contact water infiltration basins (NCWIBs) constructed on the main site facility in 2011, a fourth NCWIB was constructed at the mine ventilation area in 2012. The mine ventilation area was graded to ensure that all storm water runoff from the area will collect in this NCWIB.

2.3.1 Non-Contact Water Infiltration Basins (NCWIB)

Inspections of the NCWIBs, following wet weather events, continue to indicate no storage of site runoff water due to rapid infiltration. The basins are monitored for excess silting that would prevent infiltration from occurring and not allow the basins to operate as designed. The wells located down gradient of the NCWIBs are monitored on an annual basis. In 2012, samples were collected in Q4 and compared to benchmarks established for the location. All results were found to be below the established benchmarks and are summarized in Appendix H of this report.

2.3.2 Contact Water Basins and Storm Water Catchment

Currently, two areas within the contact area remain to be constructed; the coarse ore storage area (COSA) and backfill plant. The COSA building footprint remains unpaved until construction of the facility begins in 2013. In order to ensure contact area snow is not plowed into the footprint and that storm water runoff cannot discharge to the open area, reflective posts and curbing have been installed surrounding the footprint of the building. The future location of the backfill plant is currently paved with all runoff discharging to the contact water basins.

2.4 Surface Facility Construction

During final design of the Eagle Mine site, modifications were implemented to improve overall environmental control, safety and project efficiency. These modifications have been communicated in the form of Part 632 mine permit amendment requests or construction notifications and have been approved by MDEQ. The structures that were constructed in 2012 are necessary to support mine development and provide additional environmental protection. Facilities to be constructed in 2013 will support both the mining of the ore body and the stope backfilling process.

2.4.1 Site Modifications and Amendments

On May 17, 2012, RTEM received approval from the MDEQ for a Part 632 amendment request to relocate the backfill facility to the main mine facility rather than near the mine ventilation area as originally permitted. This modification provided two significant environmental improvements for the overall site. A site wide reduction in air emissions is realized due to all activity occurring in an enclosed building that is fitted with control units to filter the air prior to venting from the building. In addition, the building will now be constructed within the contact area providing better environmental control. This amendment approval also contained the inclusion of the core shed as a permanent structure of the mine site.

In August 2012 notifications were sent to the MDEQ requesting approval to pave the mine access road and construct an ambulance garage just east of the mine development office. The paving project resulted in an additional environmental improvement at the site due to the significant reduction in the fugitive dust emissions associated with vehicle traffic. The ambulance garage was constructed to protect the surface and underground ambulances, mine rescue trailer, equipment and supplies from harsh weather conditions. MDEQ approved both requests on August 29, 2012.

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

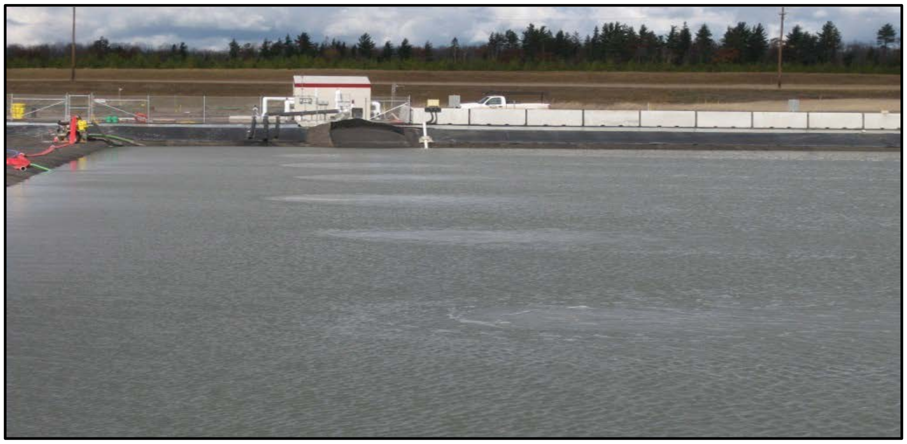
Table 2.4.1 Amendments, Submittals, and Approvals

Date	Description	Approval
1/31/2012	Slight modification of decline alignment	2/6/2012
9/13/2011	P-51 aquatic monitoring clarifications	1/17/2012
11/11/2011	Reporting limit adjustment for Hg	1/10/2012
11/11/2011	Revised reporting requirements for dewatering data and fisheries/aquatics reporting	3/22/2012
11/21/2011	Ready-line canopy, amendment requirements	1/17/2012
3/15/2012	2011 Annual Mining and Reclamation Report	
4/6/2012	Amendment for backfill plant relocation and inclusion of core storage as permanent mine facility structure*	5/17/2012
4/3/2012	Relocation of surface water monitoring location STRE001	4/17/2012
8/2/2012	Construction notification - ambulance garage	8/29/2012
8/9/2012	Construction notification - mine access road paving	8/29/2012
10/3/2012	Request to revise frequency of TDRSA and CWB collection pipe cleanout	10/8/2012
10/5/2012	Request frequency modification CWB sediment thickness inspection	10/16/2012
11/8/2012	Request for clarification on Condition D-13, generator silencer	11/13/2012

* Amendments

2.4.2 Contact Water Basins

During the 2012 construction season, aerators were installed to minimize ice formation, provide mixing for improved WTP operations, prevent excessive sediment deposition, and assist in optimizing water quality before treatment from the underground operations. Two rows of six aerators were installed along the east and west sides of each basin, for a total of 12 per CWB.



Installed Diffusers, October 2012

2.4.3 On-Site Utilities

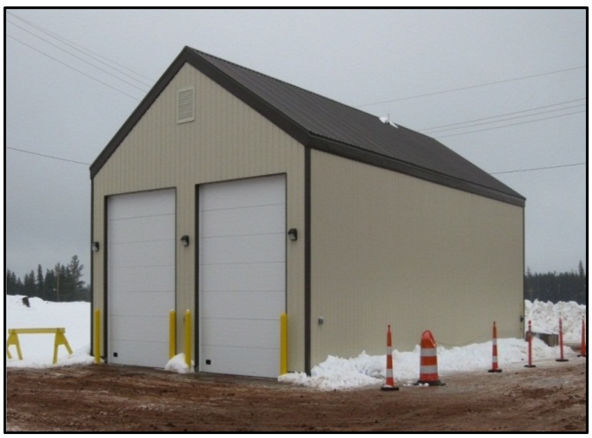
The potable well, providing water to the Eagle Mine Site, is routinely monitored and samples analyzed as required by the Marquette County Health Department (MCHD) pursuant to the State of Michigan Safe Drinking Water Act. During the initial sanitary survey in late 2011, the MCHD initiated an enhanced sampling program for arsenic as it had been detected in the well during development at levels above the maximum contaminant level (MCL). Although not initially required by the MCHD, bottled water was provided to all employees and all faucets labeled as non-potable. Arsenic samples were collected and analyzed on a quarterly basis for one year, and at the end of 2012, the average was still found to be above the MCL for arsenic. Therefore, a treatment proposal was submitted to the MDEQ and MCHD for review and was approved in December 2012. A formal application will be submitted in Q2 2013 with installation of the treatment system expected by mid-year. An application was also retroactively submitted in December 2012 for the chlorine injection system that was installed during construction of the potable water system. Although the chlorine system is not currently in daily operation, it will be required in the initial stage of the arsenic treatment process.

In addition, the pump in the potable well was also replaced in August 2012. The pump failed and when replaced was upgraded from 60 gpm to 70 gpm to ensure it was large enough to adequately supply the mine with the water it needed. Since the change in pumping capacity was minor, Rio Tinto was not required to re-register through the MDEQ water assessment tool, nor was a permit required by the MCHD.

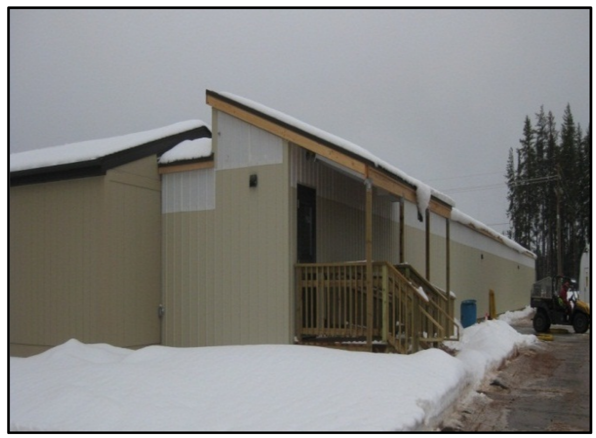
2.4.4 Miscellaneous

In 2012, Rio Tinto completed construction on several ancillary facilities including the permanent guardhouse, concrete floor in the warehouse, ambulance garage, covered walkways from mine drys to the development office, compressor building, mine substation and the access road paving.

Paved Access Road, October 2012

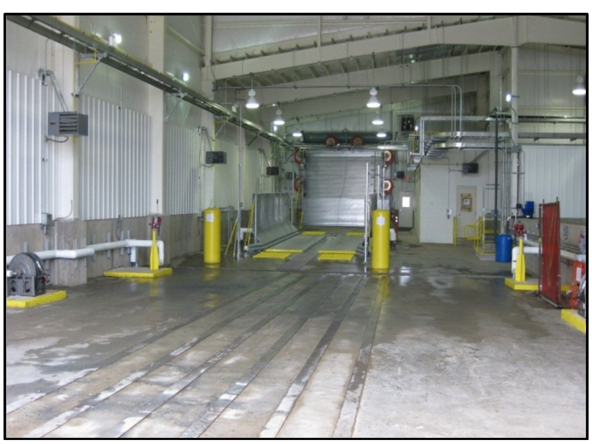


Ambulance Garage, December 2012



Covered Walkways, December 2012

The truck wash was partially commissioned in 2012, with the manual bay of the truck wash currently being used to wash vehicles prior to leaving the contact area. Full operation of the automated system is expected in early 2013.



Truck Wash – Interior View, April 2012

Truck Wash – Exterior View, April 2012

Construction of the truck maintenance shop commenced in August 2012.

Truck Maintenance Shop, December 2012

Construction of the mine ventilation area, located southwest of the main mine facility, commenced in August 2012 and included earthwork, grading, and perimeter fence installation. In addition, concrete pads were poured to aid in the drilling and reaming of the main air ventilation intake/emergency egress and exhaust shafts.

Mine Ventilation Area, October 2012

2.5 Upcoming 2013 Work

In 2013, Rio Tinto intends to complete the main ventilation air raise, including ground support and Alimak installation in the fresh air raise, and associated surface infrastructure (exhaust stack, electrical house, and heater house) to complete the permanent mine ventilation plan. The remaining 2013 construction schedule is still being finalized and may include completion of the truck maintenance shop, a concrete backfill batch plant and aggregate storage building, and coarse ore storage building (with truck scale).

3 Mining Activities and Data Report

Underground activities began on September 15, 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

3.1.1 Underground Development Progress

In January 2012, MDEQ approved minor adjustments to the configuration of the mine decline. One additional turn back and adjustments to the turn angles in the decline route were made while maintaining the path within the original corridor identified in the permit application. These changes will result in operational enhancements, such as the safety of the decline during construction and operation, and a decrease in the volume of rock that will need to be stored on the TDRSA. Appendix B includes an as built drawing of the new decline configuration.

As of December 31, 2012, construction of the primary decline, also referred to as the centerline, had progressed an additional 1,560 meters for a project total of approximately 1,790 meters (excluding the 78 meter portal entrance). In addition to the centerline advance an additional 798 meters were developed off-centerline. The off-centerline advance included five muckbays, five power substations, three pump stations, four passing bays, the up-ramp access, the raisebore access drift (including 2 substation cutouts, and 3 ventilation cutouts), three level accesses (240, 250, and 265), and 3 stope accesses on the 265 level. Table 3.1.1 below summarizes the monthly progress of both centerline and off-centerline underground advance and Appendix B contains a map which outlines the development positions for 2012.

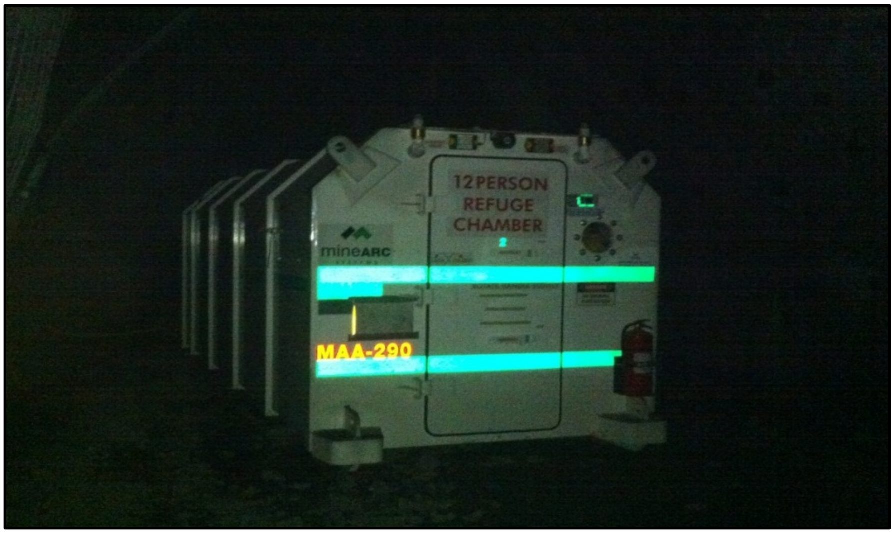
Also, in accordance with special condition E-8 of the mining permit, a review of the rock stability was completed to ensure that the modeling provided in the permit application is still valid. A letter signed by the Mine Manager certifying the rock stability can be found in Appendix C.

Table 3.1.1 Underground Advance

Month	Distance of Advance Centerline (m)	Distance of Advance Off-Centerline (m)
January	68.8	36.5
February	96.4	33.2
March	110.5	22.7
April	120.5	57.8
May	157.2	21.7
June	151.3	43.9
July	197.9	48.2
August	212.9	57.9
September	136.0	77.6
October	137.7	153.2
November	112.3	157.4
December	58.3	88.1
Total	**1,559.8**	**798.2**

Source: Mine Engineering Department 2012 Development Summary

Three 12 person, 36-hour self-contained, Mine Arc refuge chambers were placed underground in 2012. They are currently located in muckbay No. 2, muckbay No. 5, and 265 level stope access 1665. Each unit is inspected on a weekly basis with a more robust inspection completed three times per year.

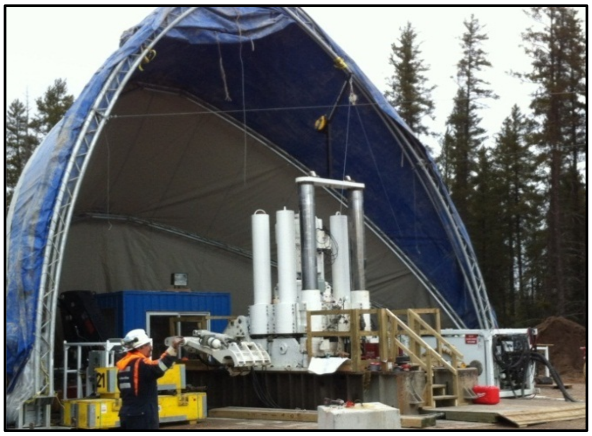


Mine Refuge Chamber, June 2012

In addition to the underground development work completed in 2012, underground diamond drilling commenced in November 2012 to further define the orebody. The definition drilling is being completed by Boart Longyear and is scheduled to continue in 2013.

Raise bore drilling contractor, Cementation, also mobilized in November 2012 to complete the pilot hole and reaming of the mine air ventilation exhaust and emergency egress/ventilation intake. Drilling of the initial pilot hole for the emergency egress/ventilation intake began in late December 2012 and is 15" in diameter. Once the pilot hole is completed in early 2013, the drill bit will be replaced with a reamer bit that is 4.5 m (14.9 ft) in diameter which bores the hole from the bottom up. The process will then be repeated for the ventilation exhaust raise bore.

Underground Definition Drilling, Dec. 2012



Raise Bore Drill, Dec. 2012

3.1.2 Dewatering Volume and Quality

Water is required underground in order to complete drilling, bolting, and dust suppression activities. The WTP supplies treated water to the utility water tank which is then utilized underground. If the WTP does not have an adequate supply of utility water, the mine services well is utilized.

The lines both supplying and removing water to and from the underground are equipped with totalizer meters. These meters are monitored daily by the Rio Tinto shift supervisor and the flows are 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.

The amount of water supplied for underground operations in 2012 ranged from an average of approximately 2,000 gallons per day (gpd) (1.4gpm) in January to 123,000 gpd (85 gpm) in December. The water pumped from the mine corresponded with the amount of water provided for operations and ranged from an average of 5,500 gpd (3.8 gpm) in January to 129,000 gpd (90 gpm) in December.

Table 3.1.2 below summarizes the monthly average flow provided to the underground and the calculated dewatering volume during the months of operation in 2012. 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 710 gpd (0.49 gpm) in April to 6,334 gpd (4.4 gpm) in December.

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)
January	2000	5500	3500
February	5890	9771	3881
March	5443	6833	1390
April	12613	13323	710
May	12605	15548	2943
June	8326	11693	3367
July	12430	13774	1344
August	43317	46502	3185
September	43174	44858	1684
October	66145	69622	3477
November	78204	81052	2848
December	123040	129374	6334

* 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 WTP. This data will also be utilized in the ongoing geochemistry assessment.

The Q1-Q4 underground dewatering samples were analyzed for the permit required parameters and results can be found in Appendix D. Review of the data, available to date, does not indicate any apparent trending, but will continue to be monitored throughout the life of the mine.

3.2 Temporary Development Rock Storage Area

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 provide acid-neutralizing capacity to the TDRSA minimizing the generation of low pH water. In addition, it will increase the pH of the water collected in the TDRSA. Maintaining a slightly elevated pH will, in turn, help to maintain lower concentrations of pH-sensitive metals such as copper and stabilize the ferric hydroxide in the contact water.

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. Therefore, the volume of limestone may fluctuate above or below the required 2 percent. In 2012, the calculated volume of limestone required was 2,242 m^3 (3,993 t) and the actual volume delivered was 2,333 m^3 (4,153 t) which is approximately four percent greater than the required volume. Table 3.2.1 below summarizes the calculated and actual limestone volumes and tonnage for 2012.

Table 3.2.1 Volume of Limestone Added in 2012

Month	Limestone Required - 2% (tonnes)	Limestone Delivered (tonnes)
January	176	0
February	268	907
March	249	0
April	271	0
May	298	545
June	320	427
July	424	292
August	426	264
September	356	275
October	440	780
November	506	664
December	259	0
Total	**3,993**	**4,154**

Source: Mine Engineering Department 2012 Development Summary

In 2012, approximately 72,996 m^3 (199,637 t) of development rock was placed in the TDRSA. In addition to the development rock, 2,333 m^3 (4,153 t) of limestone was delivered and placed in the TDRSA. Assuming a 30 percent swell of the development rock, approximately 97,228 m^3 of development rock and limestone were placed in the TDRSA in 2012. Table 3.2.1a below summarizes the monthly volume and tonnage of development rock mined in 2012 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 2012

Month	Volume of Rock Mined (m^3)	Tonnage Mined (tonnes)
January	2,838	8,798
February	4,437	13,389
March	4,613	12,454
April	5,026	13,571
May	5,515	14,891
June	5,917	15,976
July	7,852	21,201
August	7,887	21,295
September	6,601	17,824
October	8,143	21,986
November	9,373	25,308
December	4,794	12,944
Total	**72,996**	**199,637**

Source: Mine Engineering Department 2012 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)
2011 Total	**7,933**	**0**	**9,759**	**9,759**
January 2012	2,838	0	3,690	13,449
February 2012	4,437	510	6,278	19,727
March 2012	4,613	0	5,996	25,723
April 2012	5,026	0	6,534	32,257
May 2012	5,515	306	7,476	39,733
June 2012	5,917	240	7,932	47,665
July 2012	7,852	164	10,371	58,036
August 2012	7,887	148	10,401	68,437
September 2012	6,601	154	8,736	77,173
October 2012	8,143	438	11,024	88,197
November 2012	9,373	373	12,558	100,755
December 2012	4,794	0	6,232	106,987
2012 Total	**72,996**	**2,333**	**97,228**	

Source: Mine Engineering Department 2012 Development Summary

The initial phase of rock placement on the TDRSA required that the first two feet of material placed in the TDRSA was a 3 to 4 inch particle size. Therefore, a portable crusher was utilized and a two foot base layer of crushed development rock was graded across the entire floor area. The base layer was not completed in 2011, therefore crushing operations continued through March 2012. Approximately 11,888 m^3 (34,641 t) of development rock was crushed in 2012 in order to complete the two foot base layer.


TDRSA and CWBs, October 2012

3.2.2 2013 Mining Forecast

The 2013 mining forecast calls for the continuation of the decline as well as ramp, level, and stope accesses for a total of 2,138 meters of advance which would result in an additional 57,093 m^3 (160,322 t) of development rock being removed and stored on the TDRSA. Assuming an estimate of 30 percent swell, approximately 74,221 m^3 (160,322 t) of development rock will be placed on the TDRSA in 2013. An additional 1,801 m^3 (3,206 t) of limestone will be required for this amount of development rock.

3.2.3 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 in contact with waste rock. The leak detection sump collects water from beneath the primary liner within the secondary liner system. 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.

3.2.3.1 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).

As discussed in Comment No. 28 of the October 2006 Response to Comments document, Michigan's solid waste program allows more than one foot of head on liner systems for a short period of time in response to a significant storm event. Rule 432 of Part 115, Solid Waste Management, allows for the leachate depth on the liner to exceed more than one foot above the sump for not more than seven days following a significant storm event. A significant storm event has been defined as a storm that generates 0.1 inches or more of rainfall in 24 hours. Because snow melt may occur rapidly, the snow melt/rainfall water equivalent has been determined. Utilizing a conservative estimate of 0.1 inches water per 1 inch snow (0.28 inches of water per inch snow was approved in the Mine Permit Application, Appendix E), a total of 1 inch of snow melting in a 24 hour period is equivalent to 0.1 inches of water, or a significant wet weather event.

During these periods of rapid snowmelt, the TDRSA may experience short term exceedences of the one foot level due to the reduced absorptive capacity of the rock as compared to traditional solid waste in a landfill. The system will be continuously pumped to maintain the one foot level or return to that level as quickly as possible following the wet weather event. In addition, the leak detection sump is continuously monitored for water level and is purged and sampled routinely.

In 2012, approximately 3,642,000 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 also commenced during Q1 2012 with samples being collected in February, May, July, and October.

Additional samples were collected intermittently for limited parameters in order to compare results with the leak detection sump. These additional monthly samples were collected in March, August, September, and December. A summary of the results can be found in Appendix E.

3.2.3.2 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 2012, seven separate samples were collected and the accumulation rates calculated. The average daily rate of accumulation ranged from a minimum of 0.10 gal/acre/day in December to a maximum of 0.43 gal/acre/day in August. All results were well below the 25 gal/acre/day threshold indicated in the permit. Table 3.2.3.2 below summarizes the calculated flow rate from the TDRSA leak detection sump for 2012. A total of 534 gallons of water was purged from the leak detection sump in 2012 which 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 March, May, July, August, September, October, and December 2012. 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 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 2012. The pH results were fairly consistent and ranged from a low of 7.58 to a high of 7.87. Sulfate results ranged from a minimum of 360 mg/L in March to 630 mg/L in August. The sulfate concentrations from July, August, and September were above the 500 mg/L threshold identified in the permit. Although the sulfate concentrations increased for a period of time, the amount of water in the leak sump and actual loading of sulfate steadily decreased. Subsequent results have shown a decline in the sulfate concentrations to a level below the 500 mg/L screening level.

As required, the MDEQ was notified of the upward trending of sulfate. An investigation was initiated and results summarized in a letter to the MDEQ in January 2013. The investigation consisted of a review and analysis of construction materials, an increase in parameters to be analyzed in order to "fingerprint" the water quality, and a comparison in analytical results between the TDRSA leak detection and contact water sumps.

Review of the data identified clear differences in the concentrations of sulfate, magnesium, chloride, and nitrate between the two sumps. In addition, the sulfate concentrations in the leak sump have decreased during the last three sampling periods while the sulfate results in the TDRSA contact sump have trended upward. This indicates that the water in the leak detection sump was not from the primary contact sump and the integrity of the liner is intact. The source of sulfate was likely introduced during construction of the lining system.

Due to the results of the investigation, Rio Tinto also determined that sulfate will not be used internally as the single indicator parameter for monitoring the leak detection sump. Due to the absence of solubility controls on nitrate in the sump, it is a more reliable indicator of leakage through the liner and will be added to the routine sampling suite. Ammonia and nitrite will also be added and trends will be documented and reviewed.

Table 3.2.3.2 TDRSA Leak Detection Sump Results for 2012

Parameter	**3/29/12**	**5/16/12**	**7/18/12**	**8/20/12**	**9/27/12**	**10/29/12**	**12/4/12**
Magnesium (mg/L)	NM	9.1	13	12	12	10	7.4
Sodium (mg/L)	NM	280	390	400	390	420	330
Chloride (mg/L)	NM	5	5.2	7.3	8.2	7.4	6.5
Sulfate (mg/L)	360	480	610	630	580	490	470
Nitrate (mg/L)	NM	NM	NM	7	7.8	5	4.4
Nitrite (mg/L)	NM	NM	NM	NM	NM	NM	0.94
Ammonia (mg/L)	NM	NM	NM	NM	NM	NM	0.37
Average Daily Flow Rate (gal/acre/day)	0.21	0.15	0.42	0.43	0.32	0.32	0.10
pH	7.65	7.87	7.87	7.74	7.67	7.58	7.78
Specific Conductivity (uS/cm)	1369	1611	2019	2108	2007	1846	1697

Notes: NM = Not Measured

3.3 Site Water Usage, Treatment, and Discharge

The site wide water usage and treatment include three separate sources to supply the mining activities and three primary sources that supply water to the CWBs and WTP for treatment. 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 and may also be utilized to replenish the fire water tank and truck wash. During 2012 approximate water use was 10,656 gpd (7.4 gpm). This number was down slightly from the average of 15,500 gpd utilized the previous year.

The mine services well (QAL011D) is primarily used to supply water for exploration drilling and the drilling/reaming activities associated with the construction of the mine ventilation system. It also provides water to the network of fire hydrants on site and may be used to supplement the water demands of underground mine operations if necessary. From mid-April to December 2012, water supplied underground was provided by the mine services well. Approximately 24,395 gpd (16.9 gpm) of water was utilized in 2012 which is significantly higher than quantities supplied in 2011.

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. Utility water is supplied to the underground as required for drilling, bolting, and dust suppression. In addition, the utility water is required in various stages of the water treatment process. In 2012, the total volume of utility water treated and recycled either to the underground or in the water treatment process was approximately 127,675 gpd (89 gpm). Again, this was significantly higher than last year which may be attributed to the fact that the WTP operated significantly more in 2012 than 2011.

3.3.2 CWB Water Management and Water Quality

Three primary sources of site water are discharged to the CWB 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 2012 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.

As required by the mining permit, 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, July, and October 2012 with the annual parameter list collected in Q3. A summary of the results can be found in Appendix F.

3.3.3 Water Treatment Plant Operations and Discharge

Due to minimal water on-site, no water was discharged from the WTP the first two months of 2012. During this time, all water treated in the plant was either recycled back into the CWBs or supplied for underground operations. Early and rapid spring snowmelt and rain events occurred in March resulting in a significant increase in water volume to be treated at the Water Treatment Plant (WTP). Utilizing process control parameters and continuous evaluation of expected volumes and capacity and potential weather conditions, the WTP successfully operated through the snow melt period with all effluent parameters within permitted limits.

Although all effluent parameters were within permitted discharge limits, ammonia concentrations steadily increased during March 2012. This was due to the utilization of shotcrete underground as well as residuals from blasting operations. Therefore, breakpoint chlorination was successfully installed in April 2012 to eliminate ammonia in the influent.

Due to excessive salt use on the contact area during the winter of 2011, the conductivity of the influent also increased rapidly during the spring thaw. Therefore, the salt application during the 2012-2013 winter season was significantly reduced.

Effluent discharges to the TWIS are regulated under the GWDP with analytical results and discharge volume reported to the MDEQ on a monthly basis through the e2 electronic reporting system. Table 3.3.3 below outlines the volume of water, per month, that was discharged to the TWIS.

Table 3.3.3 Volume of Water Discharged in 2012

Month	**Volume of Water Discharged (gal)**
January	0
February	0
March	3,559,877
April	516,634
May	2,149,277
June	1,578,549
July	4,834,420
August	2,976,219
September	4,489,581
October	3,388,779
November	2,196,802
December	758,533
Total	**26,448,672**

Source: WTP Operators log

The water treatment process generates two waste streams; filter press solids and crystallizer solids. 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. A waste characterization program was initiated in 2012 as required by the Marquette County Landfill in order to dispose of the solids at their facility. All characterization results indicated the waste was non-hazardous. Therefore, the Marquette County Landfill accepted approximately 128 tons of filter press waste and 336 tons of crystallizer waste for disposal in 2012.

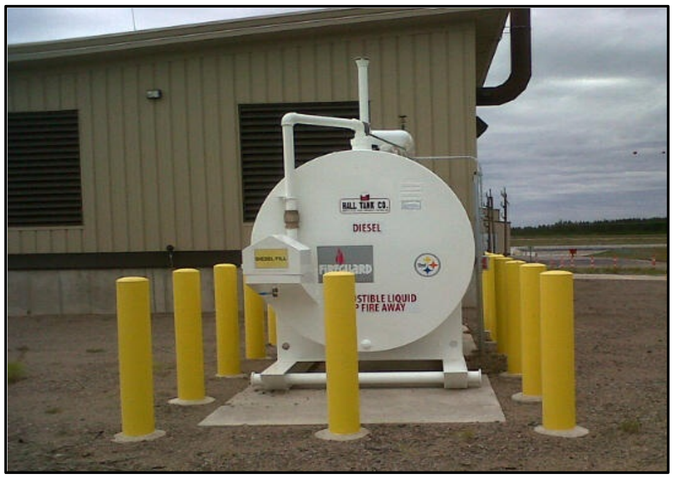
Filter Press Waste, March 2012

Crystallizer Waste, March 2012

3.4 Materials Handling

3.4.1 Fuel Handling

Rio Tinto has an equipment fueling area for underground equipment that consists of two identical 20,000-gallon Class II diesel aboveground storage tanks (ASTs) and one 560-gallon gasoline AST. Although the tanks are in place, they are not currently operational. One of the 20,000 gallon tanks was temporarily certified, pending final installation of electrical systems, for use on March 1, 2012 by the MDEQ's Hazardous Materials Storage Inspector and filled with fuel, but is not currently in use. In addition, on July 5, 2012, final certification was granted by the MDEQ's Hazardous Materials Storage Inspector for the 1,700-gallon day tank used to fuel the standby generator located in the powerhouse.



Certified 1,700 gallon day tank, July 2012

3.4.2 Bulk Chemical Handling and Storage

Rio Tinto and its subcontractors follow a strict approach to respond to and report spills. In 2012, Rio Tinto had no spills at the Eagle Mine that were reportable per the Part 5 Rules of Part 31, Water Resources Protection of NREPA, 1994 PA 451 as amended (Spillage of Oil and Polluting Materials). Although not a reportable spill under the Part 5 Rules, there was a spill of approximately 100 gallons of hydrochloric acid in the bulk storage room of the water treatment plant on July 7, 2012. The spill was fully contained in the secondary containment of the plant and recovered back into the process. .

As required by the MDEQ's SARA Title III Program, section 302 and 311 reports were submitted for sulfuric acid that is stored at the WTP above threshold planning quantities (TPQs). In addition, although not required since the Eagle Mine Site is regulated under MSHA and not OSHA, a Tier II Report was also submitted in July 2012. All three reports were submitted via the online Tier II Reporting System to the State Emergency Response Commission (SERC) and copies e-mailed to the Marquette County Local Emergency Planning Committee (LEPC). An updated Pollution Incident Prevention Plan (PIPP) was also submitted to the Marquette County LEPC in July 2012.

<u>4 Additional Monitoring Activities</u>

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 G.

Four rounds of quarterly sampling were completed in January, April, July, and October 2012. The Eagle Mine Permit prescribes both a long parameter list (MP 01 2007 L23) for annual monitoring events (conducted in Q2 2012) and a short list to be used quarterly (Q1, Q3, Q4 2012). 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 Q4 2012. 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 H.

Benchmark Calculations

Two sets of benchmarks were calculated for all mine permit groundwater monitoring locations based on the guidance provided by MP 01 2007 and Part 632. The first is an upper prediction limit (UPL), which follows Part 632 R 426.406 (6) and is also consistent with MP 01 2007 N2 and the second is a maximum contaminant level (MCL) derived benchmark, which follows R 426.406 (7a). UPLs are calculated using two standard deviations above the baseline mean and an MCL-derived benchmark was calculated for parameters that have a drinking water quality MCL established by the USEPA.

The MCL benchmark is calculated taking into account the MCL and baseline mean. The benchmark that is used for screening monitoring data is the lower of the two values. The benchmarks are considered provisional and may change as data collected during future monitoring events will be incorporated into the benchmarks if deemed to be representative of baseline conditions. In addition, benchmarks listed as "pending" (p) or "trending" (t) cannot be statistically derived with accuracy utilizing the baseline data collected to date, either because there are insufficient values (p) or the sequence of values suggest a trend may be present (t). A complete report outlining the establishment of the benchmarks is available upon request.

Monitoring Results

Twenty-two monitoring well samples were collected during each of the four quarterly sampling events and one sample was collected from NCWIB locations QAL070A and QAL073A in Q4. 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 H.

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 source or cause resulting in the deviation from the benchmark.

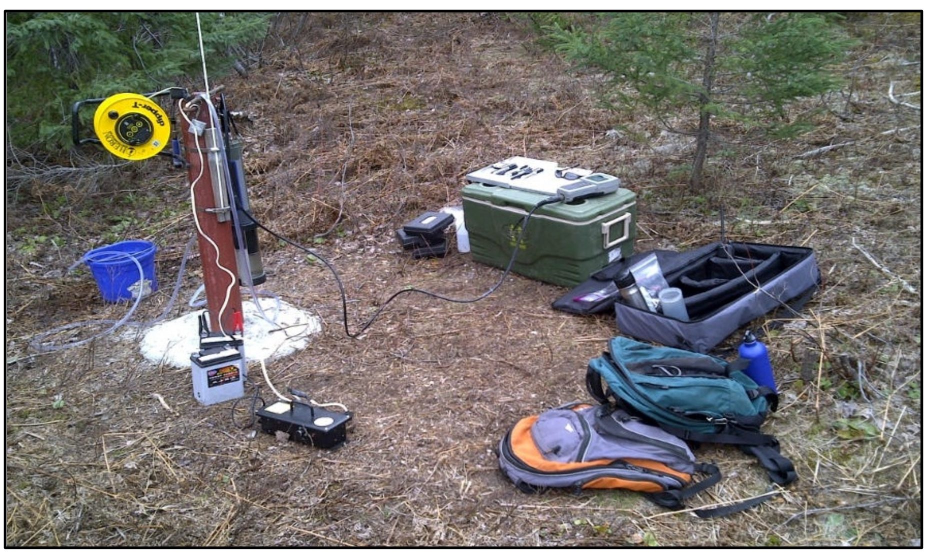
Since pH, arsenic and mercury results at location QAL066D were outside of representative background conditions for more than two consecutive periods, the MDEQ was contacted and an investigation was initiated to determine the cause of these results. No mining or exploration or other surface activities had occurred near the location of the monitoring well, so the investigation was focused on well configuration or sampling techniques.

Upon review of the data, Rio Tinto outlined their plan of action in a letter dated October 17, 2012, to the MDEQ which included aggressively redeveloping the well by surging and sampling field index parameters to determine if water quality parameters could be returned to baseline levels. North Jackson Company technicians removed the bladder pump from QAL066D and purged the well with three successive pumping cycles. The water that was recovered from each pumping cycle reported field parameters that were consistent with aggregate local baseline data. During this purging event, fine grained sediment was also observed in the lower 0.25 feet of the well screen and was removed using a sediment bailer. It was suspected that the sediment may have been the source of the deviations from baseline for the field and metals parameters in QAL066D. Q4 samples were collected on October 23, 2012, with all results returning to baseline levels and below established benchmarks. Results will continue to be monitored to ensure that baseline water quality sustains in future monitoring events. If future deviations occur, the well will be re-evaluated and potentially abandoned and re-drilled if the issue persists. A complete list of all results for QAL066D can be found in Appendix H.

Deviations from the benchmark also occurred for two consecutive sampling events at monitoring location QAL067A which reported results for pH that were below the benchmark range in Q3 and Q4 2012. Written notification was submitted to the MDEQ on January 8, 2013.

As with location QAL066D, the well column at QAL067A was fully purged to determine if field index parameters could be returned to baseline levels. Upon purging, the pH did increase slightly, but was still below the established benchmarks. Further investigation of fourth quarter 2011 and 2012 pH values identify a spatial trend supporting the conclusion that the pH value decrease measured at location QAL067A is actually apparent at many well locations and is not attributable to any mining or other activity and, therefore, indicative of natural background conditions. Maps showing the changing geospatial distribution of pH in fourth quarter 2011 and 2012 are found in Appendix O. Additional details regarding the pH trending at location QAL067A can be found in the letter submitted to the MDEQ on January 8, 2013.

For additional information on the sample results see Appendix H. A comprehensive full data report will be made available upon request.



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 2012 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, March, August, and October in 2012. The spring runoff sample is generally collected in April, but due to the early snowmelt was collected in March 2012 instead. 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.

On April 17, 2012, approval was received from the MDEQ to relocate surface water sampling location STRE001 on the east branch of the Salmon Trout River. A series of beaver dams resulted in the formation of a large pool and affected the upstream channel morphology. This resulted in the inability to measure stream stage, collect discharge measurements and provide an accurate representation of the overall stream conditions. Therefore, the sampling location was moved 1,200 feet downstream of the original location and beaver activity.

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 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.

Monitoring Results
Grab samples were collected from each location during the quarterly sampling events completed in February, March, August, and October 2012. The Eagle Mine Permit prescribes a long parameter list (MP 01 2007 L23) for annual monitoring events (conducted in Q2 2012) and a short list to be used quarterly (Q1, Q3, and Q4 2012). 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.

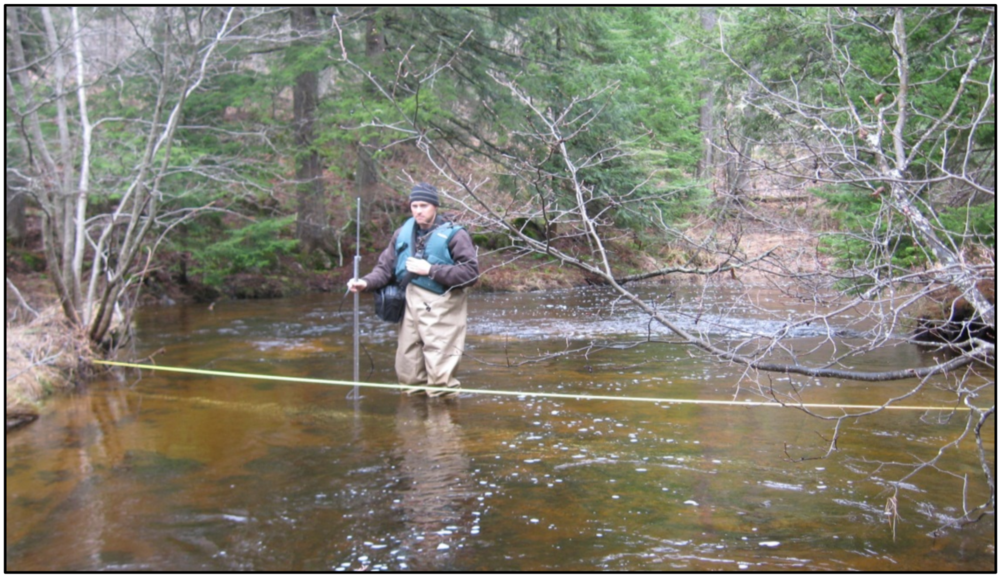
The majority of parameters analyzed at the surface water monitoring locations were reported at values below the analytical reporting limit and calculated benchmark and listed as non-detect. A summary of locations that have had one or more parameters exceed a benchmark value can be found in Appendix J.

As stipulated by MP 01 2007 N2, if there is an exceedence in a water quality parameter at a compliance monitoring location, additional evaluation of the data is required. This evaluation will determine if the reported values represent a potential trend and if it is attributable to non-mine related factors. Comparison with other datasets, including both background and additional compliance monitoring locations, will also be included in the evaluation.

At background location STRM001, pH readings were below benchmark ranges for two consecutive sampling events (Q1 and Q2) and returned to baseline levels in Q3 and Q4. All other locations only experienced a single or non-consecutive result outside of benchmark ranges.

The Q2 sampling results found pH to be below the calculated benchmark range at eight of the eleven monitoring stations. Mercury concentrations, although not above benchmark values, were also higher in Q2 at all monitoring stations. Since no other parameters were reported outside of benchmark levels and no mining activities were occurring in the area, the readings were likely attributable to the snowmelt/runoff period as is typical during spring break up.

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



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 monthly by North Jackson Company field technicians. A map of these locations can be found in Appendix K.

Calculated background water levels and monthly water level results are based on mean daily values and summarized in Appendix L. Monitoring well water level results for 2012 were found to be consistent with baseline data, with the exception of the December 2012 average water level reading at QAL024A, located in the mine ventilation area, which was found to be 0.4 inches below baseline elevations. Review of additional water elevations indicates this is likely due to seasonal variations and weather conditions and not related to mining operations.

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.

In addition to continuous monitoring, Rio Tinto 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 K. All discrete water elevations from Q4 were found to be consistent with preoperation 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 may be associated with effluent discharge to the treated water infiltration system (TWIS). A summary of the discrete water elevation results from Q1 – Q4 2012 are summarized in Appendix M.

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 monthly by North Jackson Company field technicians.

Continuous readings were averaged over each month of operation in 2012 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 N.

All stream temperature, flow, and conductivity measurements were found to be consistent with background results and fall within historical minimum and maximum value readings.

4.3 Biological Monitoring

Biological monitoring events conducted in 2012 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 2012 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 2012.

Table 4.3.1 Type and Duration of 2012 Flora, Fauna, and Wetland Surveying Events

Survey Type	Survey Date
Bird	June 12-14, September 27-28
Small Mammals	September 19-21
Large Mammals	June 12-14, September 19-21
Toads/Frogs	April 24, May 2 & 23, June 28
Threatened and Endangered Species	August 6
Wetland Vegetative Monitoring	June 19-21 & 28
Vegetative Monitoring	June 19-21 & 28, September 5-6

The wildlife and plant species identified during the 2012 surveys within the Study Area were similar to those identified during KME baseline surveys. Forty-three species of birds, none of which are threatened or endangered, were observed during the bird surveys, and six additional bird species were identified during other KME surveys; e.g., nocturnal surveys for frog and toad species.

- The bird counts were down slightly in 2012, likely due to differing weather conditions. Seven small mammal species, none of which are threatened or endangered, were identified.

- Small mammal species richness was up slightly in 2012, but the species assemblages were different from previous years. It is too early to see any trends related to the assemblages within the study area but they will continue to be monitored in future surveys.

- Two species of large mammals were directly observed by KME biologists and indirect evidence of four other large mammal species was also documented. None of the large mammal species recorded in 2012 were threatened or endangered. However, gray wolves remain a protected, nongame species in Michigan.

- Five frog species and one species of toad were identified; none of them are threatened or endangered. Frog/toad species richness was up slightly from previous surveys, which is likely due to the weather and the fact that more nights were included in the 2012 survey.

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 2012 was found to be very similar to previous years. No threatened or endangered plant species were encountered within the vegetative survey plots; narrow-leaved gentian plants (a state-threatened plant species) were found by KME botanists in abundance (hundreds) along the Salmon Trout River in approximately the same areas where they were recorded by Wetland and Coastal Resources in 2004. 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 Vegetative Survey, Plot 6W, June 2012

Upland Vegetative Survey, Plot 2, June 2012

4.3.2 Narrow-Leaved Gentian (NLG)

The 2012 annual survey was conducted on July 25th and August 10th and 23rd during peak flowering period by King & MacGregor Environmental, Inc. Summer 2012 rainfall was just above normal in July and slightly below normal in August. The flows in most area streams were generally normal.

Results from the 2012 survey were generally similar to those of the previous annual surveys. Flowering NLG plants are found to proliferate in northern Marquette County and northeastern Baraga County. NLG were consistently found along and near streams in both wet organic soil and in dryer sand and gravel near wetlands again in the 2012 survey. Areas of disturbance, especially beaver flooding, provide NLG habitat. NLG continues to occur in the Eagle Project area as well as in other areas of the region away from the Eagle Project area.

4.3.3 Fisheries and Macro Invertebrate Report

The 2012 Fisheries and Macro-Invertebrate annual surveys were conducted by Advanced Ecological Management (AEM). A total of ten stations were surveyed during summer 2012, 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 359 fish representing nine species were collected from all stations; up slightly from 2011. Northern redbelly dace (*Phoxinus eos*), brook trout (*Salvelinus fontinalis*), and blacknose dace (*Rhinichthys obtusus*) continue to be the most frequently collected species.

Using the P-51 protocol, a total of 1,669 macro-invertebrates representing 55 taxa, identified to the family level, were observed and/or collected from all ten stations that were investigated 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.

4.3.4 Fish Tissue Survey

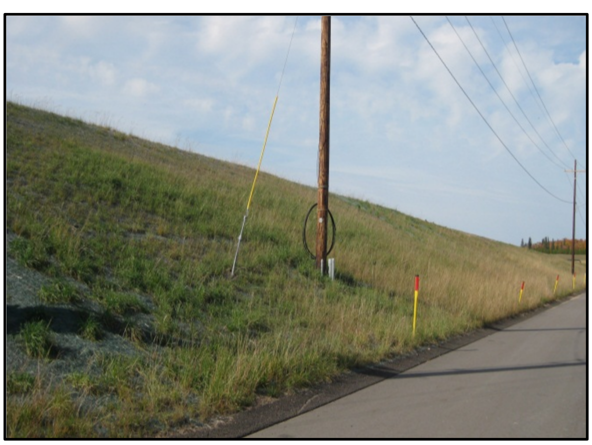
No fish tissue survey was conducted in 2012. Surveys are only required once every three years, with the next survey scheduled for 2014.

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 2012 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.

Inspections conducted in 2012 did not uncover any issues with the integrity of the berms. Seeding and mulching that occurred late in the 2011 construction season did result in vegetative growth on the berms near the CWBs, but was unsuccessful on the exterior berms of the TDRSA. In spring 2012, top soil, seed, and mulch were reapplied to the TDRSA berms and added to the berms south of the portal to further reduce soil erosion and sedimentation in the CWBs. The efforts were successful and vegetative growth is now present at both locations.



TDRSA Berm, October 2012

Berm South of Portal, October 2012

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 2012 include the WTP and truck wash floors, sumps, and trench drains and contact area and travel ways comprised of bituminous concrete or asphalt.

The WTP floors, sumps, and drains were inspected monthly from January through December 2012 and inspections of the truck wash began in April 2012 and continued through the end of the year. Inspections of the contact area and travel ways were completed during the months of April through November. Per the monitoring plan, inspections of the contact area and travel ways are suspended during the months of November to April 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.

Two items were identified as requiring repairs during 2012. The floor near the neutralization tanks in the WTP exhibited an area of erosion and scoring that had resulted from the heavy constant flow from the tanks. The floor was repaired with an epoxy based product and the tanks re-piped so the water is transferred directly to the trench drain rather than across the floor to the drain. In addition, signs of initial cracking on sections of concrete near the entrance to the portal were identified, and due to the winter season, all required repairs will be made in 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 have been collected by project geologists and logged at a rate of one sample per one hundred meters of decline development. Samples are visually characterized and percentage of sulfides noted in a comprehensive spreadsheet.

The static testing program commenced in 2012 with forty-four samples, including field blanks and standards, being sent to SGS Mineral Services in Canada. All samples collected in the static testing program are analyzed for acid-base accounting, single addition net acid generation, and whole rock geochemical analysis. Every fourth sample is analyzed for mineralogy by x-ray diffraction and ICP-MS/AES analysis of the effluent from the NAG test in addition to the standard analytical list. All results are sent to Geochimica, Inc. for review and comparison to baseline data to determine if any deviations from predictions occurred.

A report detailing the results of the statistical analysis of the geochemical test results is expected by mid-2013. However, an initial review of the results indicate that all of the samples have mineralogical, chemical and acid-base characteristics that are typical of the Country Rock and Intrusive Rocks that were characterized as part of the development-rock sequences expected during mining. Therefore, based on the analysis to date, ongoing geochemical testing of development rock indicates that the geochemical behavior of the rock being mined at Eagle is consistent with the expectations for waste-rock geochemistry based on a full set of long-term kinetic tests. Because the new materials fall within the range of rocks that were tested previously by kinetic methods, there is no scientific basis for believing that the new rock would generate effluents in any way different from those that already have been tested through the 5 to 7 year-long kinetic testing program. The analytical results will be summarized in the 2013 geochemistry report, but are currently available upon request.

The geochemistry model is also expected to be updated in 2013. This model update will utilize the recent static testing and the long-term kinetic testing results to reevaluate the geochemical nature of TDRSA effluent. The observed TDRSA data will be utilized to calibrate the revised model. The calibration is expected to include updated waste-rock proportion values, using actual mining data and updated mine-planning estimates, as well as the full site of long-term test data from the 288 to 320 weeks of kinetic testing. As was the case for the permitting analysis, the purpose of the modeling is to confirm the expected nature and ranges of water quality inputs that will report to the WTP.

A copy of the geochemistry monitoring program plan is available upon request.

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 2012, each of the four NCWIBs was inspected with no reportable accumulation observed at any of the locations. Minimal vegetation was observed at NCWIBs 1, 2 and 3 and will continue to be monitored in 2013. If the vegetation persists it may require removal if it begins to impact infiltration rates.

Also in October 2012, as noted in section 2.4.1 above, approval was granted by the MDEQ to change the frequency at which the sediment thickness is measured in the CWBs from monthly to semi-annually. The change was requested due to the low projected rate of sedimentation and safety risks associated with measurement collection methods. The new schedule requires that measurements are collected after the spring snow melt period and again before the winter freeze. A standard operating procedure (SOP) was also submitted and approved by the MDEQ which outlines the three methods that may be utilized to complete the required inspections.

One sediment thickness measurement was completed in September 2012 in CWB 2 and October 2012 in CWB 1 when the basins were lowered for the installation of the aerators. CWB 1 was found to have a maximum of 24 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 less than 2 inches of accumulation. The sediment from the south end was redistributed using fire hoses, resulting in a more uniform distribution within the basin. CWB 2 was found to have minimal sediment accumulation with the majority of the basin having 0.2 inches or less of sediment accumulation.

5 Reclamation Activities

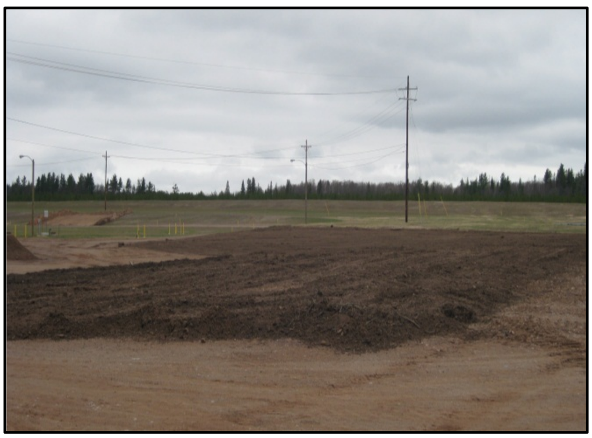
In May 2012, reclamation activities were initiated and included seeding and mulching of more than 25 acres on the main mine facility. An additional 3 acres were also seeded in the mine ventilation area in late October 2012. A map outlining the areas in which reclamation took place in 2012 is found in Appendix P.

Seeding and mulching were completed in the area south of the mine development office, around the powerhouse, sections of the construction laydown area, the area directly south of the WTP, and a section north of the explosives storage area. The areas were rough graded and a five inch layer of top soil spread over each area to aid in vegetative growth. A layer of straw was placed over the seed to help hold in the moisture, reduce erosion, and prevent birds and other animals from eating the seeds.

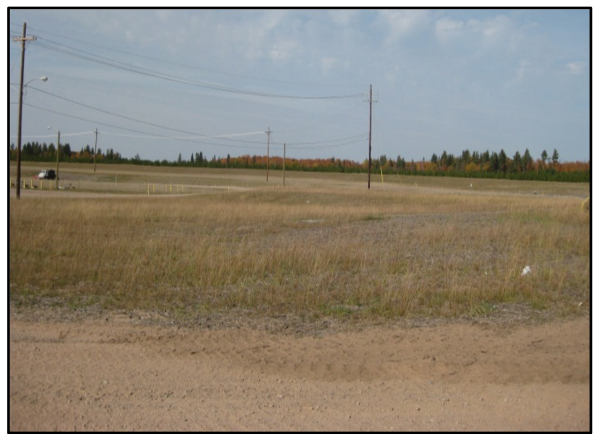
Reclamation efforts were successful at the majority of locations around the main mine facility with the exception of the area south of the mine development office which only saw limited vegetative growth. A soil sample was collected and analyzed from this area to determine the soil chemistry and whether additional measures are required to aid in vegetative growth. Test results indicate that the soil is slightly acidic likely due to the pine stands that were at the location prior to construction. The area will be monitored in 2013 to determine if additional planting is required.

Upon completion of the fence and concrete pads in the mine ventilation area, topsoil, seed, and mulch were placed in October 2012 in all areas that had been disturbed during construction. As construction activities are still in progress in this area, it is likely that additional seeding and mulching will be required in 2013.

No major reclamation activities are scheduled for 2013, however as construction is completed in an area, additional seed and mulch will be applied to encourage vegetative growth around the site.



Construction Laydown Area, May 2012



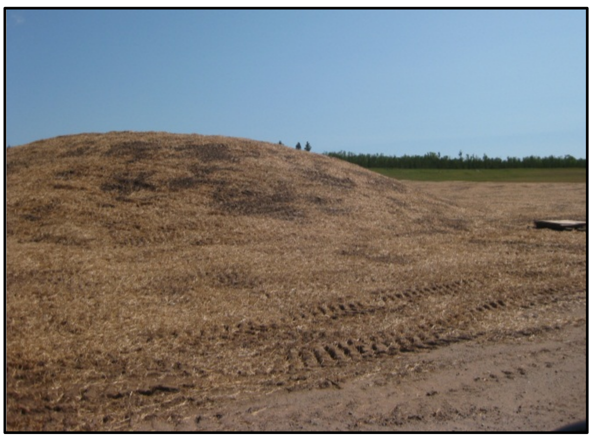
Construction Laydown Area, October 2012

South of Development Office, May 2012

South of Development Office, June 2012


South of WTP, June 2012


South of WTP, October 2012


Northwest Corner, June 2012


Northwest Corner, October 2012

6 Contingency Plan Update

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

7 Financial Assurance Update

Updated reclamation costs can be found in Appendix R. It is understood that MDEQ will notify Rio Tinto if these updated costs require re-negotiation of the current bond for financial assurance.

8 Organizational Information

An updated organization report can be found in Appendix S.