Groundwater Discharge Permit Application

REFERENCES IN THIS DOCUMENT TO "RULES" ARE TO ADMINISTRATIVE RULES IMPLEMENTING PART 31 OF THE NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION ACT, 1994 PA 451, AS AMENDED, BEING R 323.2101 TO 2192 AND R 323.2201 TO 2240.

GENERAL INFORMATION

Please type or print clearly

1. DISCHARGE FACILITY NAME: **Wastewater Treatment Facility for the Eagle Project**

2. FACILITY OWNER NAME AND MAILING ADDRESS: **Rio Tinto**
   Name

   Street Address or P.O. Box: **504 Spruce Street**

   City, State and Zip Code: **Ishpeming, MI 49849**

   Telephone No.: **906-486-1257**
   Fax No.: **906-486-1053**
   Draft permits authorized pursuant to Rule 2210(y) and 2218 will be sent electronically to owner. Owner Email: **kristen.mariuzza@riotinto.com**

3. CONTACT PERSON
   Name and Title: **Kristen Mariuzza, Environmental & Permitting Manager**

   Street Address or P.O. Box: **504 Spruce Street**

   City, State and Zip Code: **Ishpeming, MI 49849**

   Telephone No.: **906-486-1257** Fax No.: **906-486-1053**

4. DISCHARGE LOCATION
   Street Address: **6510 Triple A Road**

   City: **Michigamme** State: **MI** Zip Code: **49849**

   County: **Marquette** Township: **Michigamme**

   Township: **50N** Range: **29W** Section Number: **12**

   First Quarter Section: **NW** Second Quarter Section: **NE** Additional Quarter Sections

   Latitude: **46° 44' 55" N** Longitude : **87° 53' 43" W**

5. FACILITY TYPE
   Municipal (Sanitary Only) _____ Municipal (w/ Sanitary and Industrial Wastewater Inputs) _____
   Industrial __X__ Commercial _____
   If Municipal, population served _____

6. CERTIFIED OPERATOR (NOT REQUIRED FOR 2211(c), (d), (e), (g), (h), or 2213 (2), (3), (4))
   A Certified Operator is required by Section 3110 (1) of Part 31 of Act 451.
   Name: **Todd Macco** Certification Number: **W 6698**

   Street Address: **6510 Triple A Road**

   City: **Michigamme** State: **MI** Zip Code: **49861**

   Telephone No.: **906-662-0080 x108**

7. FOR RULE **2215, 2216 AND 2218** AUTHORIZATIONS ONLY:

PLEASE INDICATE WHERE THE COMPLIANCE MONITORING REPORT FORMS SHOULD BE SENT

NAME: **Kristen Mariuzza**

STREET ADDRESS: **504 Spruce Street**

CITY: **Ishpeming** STATE: **MI** ZIP CODE: **49849**

8. AUTHORIZATION REQUESTED:

____Rule 2210(y), Site Specific Exemption	____NEW USE	____REISSUANCE
____Rule 2211, Notification	____NEW USE	____REISSUANCE
____Rule 2213, Notification with Certification	____NEW USE	____REISSUANCE
____Rule 2215, General Permit, Certificate of Coverage	____NEW USE	____REISSUANCE
____Rule 2216, Specific Discharges	____NEW USE	____REISSUANCE
__X__Rule 2218, Discharge Permit	____NEW USE	__X__REISSUANCE

IF REQUESTING A REISSUANCE OR AN AUTHORIZATION DIFFERENT THAN THE CURRENT AUTHORIZATION, PLEASE INCLUDE THE PERMIT/EXEMPTION NUMBER OF THE CURRENT AUTHORIZATION:

If the current authorization is a permit, Rules 2216 or 2218, or was issued prior to August 26, 1999, the number is: M **GW1810162**

If the current authorization is a General Permit, Rule 2215, the number is: MG_____

If the current authorization is a site specific exemption, Rule 2210(y), or was issued prior to August 26, 1999, the number is: GWE-_____

If the current authorization is a notification, Rule 2211, the number is: GWN-_____

If the current authorization is a notification/certification, Rule 2213, the number is: GWC-_____

9. FACILITY STANDARD INDUSTRIAL CLASSIFICATION (SIC) CODE: **1021** .
This information is available through the US Department of Labor, Office of Safety and Heath Administration, at the following web address: **www.osha.gov/oshstats/sicser.html**

10. SITE MAPS

Provide two black and white 8 1/2" X 11" maps drawn to scale that show the following:

SITE MAP 1

a) Discharge location in relation to property boundaries on a topographic map.
b) Township and county name.
c) North arrow orientation.

SITE MAP 2 - All sites must include item a, include items b-e as necessary.

a. Current and proposed treatment units and discharge areas and distance to property lines.
b. Monitoring wells on site and on adjacent properties.
c. Potable wells on site and on adjacent properties.
d. Surface waters, including wetlands, lakes, rivers, streams, and drains on the property.
e. Distance between multiple disposal sites.

ATTACH SITE MAP TO THIS APPLICATION FORM – **See Appendix A**

11. WATER USAGE DIAGRAM

Please attach an 8 ½ x 11 diagram showing water usage at the facility, from supply to discharge. Include all flows such as sanitary, process water, etc. Please also indicate where in the system additives or other substances are added to the waste stream for which this authorization is being sought. The water balance should show daily average flow rates at influent, intake and discharge points and daily flow rates between treatment units. Please use actual measurements whenever possible.

A copy of the water balance is attached – See Appendix B

12. OWNERSHIP OF TREATMENT SYSTEM AND DISPOSAL AREA

Are all parts of the treatment system and discharge areas (e.g. treatment plant, underground piping or irrigation fields) located on property owned by the applicant? Yes _____ No __X__.

See Note 1

IF NO, ATTACH THE NAME AND ADDRESS OF THE PROPERTY OWNER WHERE THE DISCHARGE WILL OCCUR, AND A COPY OF THE WRITTEN PERMISSION TO DISCHARGE ON PROPERTY NOT OWNED BY THE DISCHARGER.

13. PROXIMITY OF TREATMENT SYSTEM TO A KNOWN SOURCE OF GROUNDWATER CONTAMINATION

Are there any known groundwater contamination sites within 1/4 mile of your disposal site?

Yes _____ No__X____ Unknown _____

IF YES, ATTACH TO THE APPLICATION FORM A DESCRIPTION OF THE LOCATION AND CONTAMINANTS BEING REMEDIATED AT THE SITE.

14. ISOLATION DISTANCE

The following are isolation distances required from the discharge to adjacent water supply wells. What is the distance from your discharge to the nearest water supply well?

WELL TYPE	PERMIT AUTHORIZATION: 2218, 2216(3)	ALL OTHER AUTHORIZATIONS
I, IIa	2000	200
IIb, III	800	75
Domestic	300	50

Distance to nearest **Type I, IIa** water supply well: **> 2,000 ft**
Distance to nearest **Type IIb, III** water supply well: **> 800 ft**
Distance to nearest **Domestic** water supply well: **> 300 ft**

15. ADJACENT PROPERTY OWNERS

List the names and addresses of all property owners adjacent to the facility, treatment systems and discharge locations. Include properties across roadways.

ATTACH ANY ADDITIONAL NAMES AND ADDRESSES TO THE APPLICATION FORM.

NAME: **See Note 2** COMPLETE MAILING ADDRESS

16. WELLHEAD PROTECTION

Is your facility located in a designated wellhead protection area? Yes _____ No __X__.
If yes, please identify the community * _____

- Approved wellhead protection areas can be reviewed at the following web address: **http://www.michigan.gov/deq/0,1607,7-135-3313_3675_3695-59280--,00.html**

17. SIGNATORY REQUIREMENT

Pursuant to Rule 2114 of the Part 21 Rules, this application must have an original signature, and be signed by the appropriate representative(s) as follows:

A. For a corporation, the form must be signed by a principal executive officer of at least the level of Vice-president, or his/her designated representative, if the representative is responsible for the overall operation of the facility from which the discharge described in the permit application (appropriate documentation must be provided to demonstrate the position and responsibility of the designated representative).
B. For a partnership, the form must be signed by a general partner.
C. For a sole proprietorship, the form must be signed by the proprietor.
D. For municipal, state or other public facility, the form must be signed by either a principal executive officer, the mayor, village president, city or village manager or other duly authorized employee.

All signatures submitted to the department must be original signatures, or the application will be returned as incomplete. The details of these requirements are found in Rule 2114.

The department reserves the right to request information in addition to that supplied with this application if necessary to verify statements made by the applicant or for the department to make a determination required by Part 31, Water Resources Protection, Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451) and/or the Part 22 Rules associated with Part 31.

I certify, under penalty of law, that I have personally examined and am familiar with the information submitted in this document and all attachments. The information being submitted was collected and analyzed in accordance with the Part 22 Rules of Part 31 of Act 451, as amended. Based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Print Name ADAM BUELEY Title PRESIDENT

Representing KEMC

Signature [signature] Date JULY 2 2012

Notes:

(1) The land in which the water treatment system and discharge area are located are owned by the State of Michigan. KEMC has entered into a surface use lease, No. L-9742, with the State of Michigan Department of Natural Resources.

(2) Adjacent Property Owners:
   a. Longyear Realty Corporation, 210 Front Street, Marquette, MI 49855
   b. Plum Creek Timber Company, Inc., 1 Concourse Parkway NE, Atlanta, GA 30328
   c. State of Michigan, Department of Natural Resources Land and Mineral Services, Division, PO Box 30448, Lansing, MI 48909-7948

RULE 323.2218

DISCHARGE PERMITS

1. TYPE OF TREATED WASTEWATER FOR WHICH THE AUTHORIZATION IS REQUESTED. PLEASE CHECK ALL THAT APPLY

_____ Sanitary sewage
__X__ Process wastewater
_____ Cooling water, greater than 5,000 gallons per day
_____ Non-contact cooling without additives, greater than 10,000 gallons per day, source water not approved by department.
_____ Non-contact cooling water with additives, greater than 10,000 gallons per day.
_____ Other, please describe:

2. DISCHARGE VOLUME

ALL DISCHARGES:

Maximum daily discharge: **504,000** gallons per day

Cumulative annual discharge: **184,000,000** gallons per year

SEASONAL DISCHARGES SHOULD INCLUDE THE FOLLOWING:

Discharge period _____ through _____

IRRIGATION SYSTEMS AND SEEPAGE BEDS UTILIZING SOILS FOR TREATMENT SHOULD INLCUDE THE FOLLOWING:

Effluent application rate: **10 gal/sq ft/day**

Inches per hour _____ Inches per day _____ Inches per week _____ Inches per year _____

3. DISCHARGE METHOD

Please check the discharge method used:

LAND SURFACE DISPOSAL	DISPOSAL CODE	SUBSURFACE DISPOSAL	DISPOSAL CODE
_____Spray Irrigation	A1f1	_____Tile Field	A1g1
_____Ridge and Furrow	A1f2	_____Injection well	A1g2
_____Flood/Sheet Irrigation	A1f3	_____Trench	A1g3
		_____ Drywell	A1g4
Seepage Beds:			
_____Slow/Medium Rate	A1f4		
__X__Rapid Rate	A1f5		
_____Other - Please describe:			

4. TREATMENT CODES

Select and enter the appropriate treatment codes to describe treatment units, i.e., A1b, B2b (see APPENDIX A, Pages 41-44)

Treatment Unit A _____ _____ _____
Treatment Unit B _____ _____ _____ **Treatment units include A-2b, B-1b, B-2a, B-2b**
Treatment Unit C _____ _____ _____
Treatment Unit D _____ _____ _____

Please provide a description of the treatment system indicating how it will produce an effluent that will meet the standards of Rule 2222. **See Appendix C.**

4b. **Reissuance of current permit, no modifications, Rule 2218(3)(c)**. The following information must be included in the application for the reissuance of your current permit. Please check that all items have been included:

__X__ The discharge consists of the same quantity, effluent characterization, and treatment process as previously permitted.

__X__ A narrative description of the history of facility compliance with effluent and groundwater permit limits and sampling frequency is included. This item is found __Appendix D__.

__X__ An updated site map is included. This item is found __Appendix A__.

__X__ The most recent static water levels and groundwater elevations from all wells on site. This item is found __Appendix E__.

__X__ A current groundwater contour map is included, with a narrative evaluation of whether changes to the existing groundwater monitoring system are warranted and the rationale for any proposed change. This item is found __See Note 3, Appendix F__.

__X__ The most recent groundwater quality results are included from all wells on site. This item is found __Appendix G__.

__X__ The most recent effluent quality results are included. This item is found __Appendix H__.

Please check that all of the following that apply are included:

__X__ If permit limits were exceeded, the steps taken to bring the facility into compliance. This item is found __Appendix D__.

_____ An evaluation of whether there are general trends in the effluent or groundwater sampling data indicating that the discharge is approaching permit limits. This item is found _____.

__X__ The discharger has provided the department, within 30 calendar days of completion of construction of the treatment facilities, a certification by an engineer licensed under Act No. 299 of the Public Acts of 1980, as amended, that a quality control and quality assurance program was utilized and that the facilities were built consistent with standard construction practices to comply with the permit and this part. __Appendix I__

Notes:

(3) No changes to the existing groundwater monitoring system are warranted. All groundwater quality monitoring results and groundwater contours have remained consistent with pre-operational levels.

Requested Revisions to
Groundwater Discharge Permit - GW1810162

As discussed during the pre-application meeting on May 24, 2012, the following are the requested modifications to the Eagle Mine Groundwater Discharge Permit (GW1810162).

1. Permit Condition, Part I, 10 (d) "Notification of Changes in Discharge"

KEMC concurs that this requirement provides valuable information to both the Department and mine site operations as a potential indicator of a process issue. Because this is not considered an exceedence of a permit parameter, KEMC requests that the requirement be changed from written notification to verbal notification. The verbal notification would allow all parties to be apprised of the situation without the excess paperwork and time required to both write and review the written notification.

2. Permit Condition, Part I, 4 "Groundwater Monitoring and Limitations"

This permit condition indicates that hydraulically downgradient monitor wells shall not exceed the established limitations (maximum daily limit, MDL). As noted in the Narrative Description of Facility Compliance (Appendix D), monitoring well sampling locations QAL008A, QAL008D and QAL051A have exceeded the MDL for pH and/or vanadium during and prior to operations. A July 2008 letter provided to MDEQ (Appendix D) discussed the elevated parameters identified in the background well data.

Due to several locations having background levels above the existing MDL, KEMC is requesting revised limits to account for baseline levels. Attached are copies of the background pH and vanadium results, as well as monitoring data collected since the start of operations in September 2011. The results include all downgradient well locations as well as upgradient well QAL053A for comparison.

In accordance with the discharge standards outlined in 5(a) of the Michigan Administrative Code R323.2222, Part 22 Groundwater Quality Rules, the concentration of vanadium shall not exceed a concentration half way between the background water quality and the concentration at which the site would be a facility as defined by Part 201. The average background concentration of vanadium for all downgradient wells is 1.4 µg/L and the Part 201 groundwater, surface water interface criteria is 12 µg/L. Half way between the two values is 6.7 µg/L. Therefore, we are requesting that the maximum daily limit for vanadium be changed from 2.2 µg/L to 6.7 µg/L for all downgradient monitoring locations. The historical background levels for vanadium range from <1.0 – 3.4 µg/L.

Due to background pH data indicating that all downgradient monitoring locations had background pH levels at or above the MDL, KEMC is requesting a revised maximum pH limit of 10.0. The maximum background level for pH at all downgradient locations ranged from 9.0 to 9.7.

Background pH Results - Pre-Operations									
	Downgradient Wells								Upgradient Well
	QAL008A	QAL008D	QAL050A	QAL051A	QAL051D	QAL052A	QAL057A	QAL057D	QAL053A
2008 May	9.4	8.8	7.5	i	7.4	8.1	7.8	7.6	8.8
2008 June	9.3	8.7	8.8	i	8.7	8.5	9.1	8.7	8.5
2008 July	9.4	9.3	9.0	i	9.5	8.6	9.0	8.7	9.3
2008 Aug	9.3	8.6	8.8	i	8.5	8.5	8.8	8.8	8.5
2008 Sept	9.3	8.7	8.5	i	8.5	8.5	9.1	8.3	8.7
2008 Oct	9.4	8.8	9.0	i	8.7	8.6	9.2	8.8	9.0
2009 Feb	9.7	8.9	8.9	i	8.8	8.7	8.7	8.6	9.1
2009 May	8.9	8.7	8.9	i	8.6	8.4	8.6	8.6	8.6
2009 Aug	7.2	8.7	9.0	i	8.6	8.0	9.2	8.8	8.6
2009 Nov	9.1	8.7	8.9	i	8.6	8.6	9.1	8.8	8.6
2010 Feb	9.1	8.7	8.7	i	8.6	9.0	9.1	8.9	8.7
2010 May	NM	8.6	8.9	i	NM	NM	9.0	8.6	8.6
2010 Aug	8.7	8.6	8.9	i	8.4	8.4	8.9	8.3	8.6
2010 Nov	8.9	8.6	8.8	i	8.4	i	9.0	8.7	8.4
2011 Feb	9.0	8.2	8.9	i	8.4	i	9.0	8.6	8.6
2011 May	9.0	8.3	8.9	i	8.3	i	8.6	8.6	8.6
2011 Aug	9.3	8.3	8.6	i	7.9	i	8.7	9.0	9.2
Background MIN	7.2	8.2	7.5	i	7.4	8.0	7.8	7.6	8.4
Background MAX	9.7	9.3	9.0	i	9.5	9.0	9.2	9.0	9.3
Background Mean	9.0	8.7	8.8	i	8.6	8.5	8.9	8.6	8.7
Standard Deviation	0.56	0.25	0.35	i	0.44	0.26	0.34	0.32	0.26
MAX Daily Limit	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0
pH Results - Operations									
2011 Nov	9.1	8.7	8.9	i	8.3	NA	8.7	8.3	8.4
2012 Feb	8.8	8.7	8.9	i	8.4	NA	9.0	8.6	8.3
2012 May	8.6	8.6	8.8	8.6	8.5	8.5	8.9	8.6	8.4

Notes:

i = Insufficient water volume for collection of field parameters

NM = Not measured

Background Vanadium Results - Pre-Operations									
	Downgradient Wells (µg/L)								Upgradient Well (µg/L)
	QAL008A	QAL008D	QAL050A	QAL051A	QAL051D	QAL052A	QAL057A	QAL057D	QAL053A
2008 May	<1.0	2.0	1.4	i	2.6	2.2	<1.0	1.1	1.5
2008 June	1.8	1.9	1.2	1.8	1.4	1.9	<1.0	<1.0	1.4
2008 July	<1.0	1.9	1.5	2.2	1.3	1.2	<1.0	1.1	1.5
2008 Aug	<1.0	1.9	1.2	2.7	1.2	1.5	<1.0	1.0	1.2
2008 Sept	<1.0	2.1	1.4	1.4	1.3	<1.0	<1.0	1.2	1.5
2008 Oct	<1.0	2.0	1.3	2.2	<1.0	1.0	<1.0	1.1	1.3
2009 Feb	<1.0	2.3	1.4	2.0	1.1	1.1	<1.0	1.1	1.5
2009 May	<1.0	1.8	1.4	1.7	<1.0	<1.0	<1.0	1.0	1.4
2009 Aug	<1.0	1.4	<1.0	<1.0	<1.0	1.6	<1.0	<1.0	<1.0
2009 Nov	<1.0	1.9	1.3	2.5	1.8	1.6	<1.0	1.1	1.5
2010 Feb	<1.0	2.1	1.3	i	<1.0	1.2	<1.0	1.0	1.5
2010 May	<1.0	2.1	1.3	1.4	1.1	<1.0	<1.0	<1.0	1.6
2010 Aug	<1.0	2.0	1.3	3.4	1.5	<1.0	<1.0	1.0	1.6
2010 Nov	<1.0	2.1	1.0	2.3	2.7	1.6	<1.0	1.2	1.4
2011 Feb	<1.0	2.1	1.4	2.0	1.2	1.7	<1.0	1.1	1.5
2011 May	<1.0	2.2	1.2	2.3	<1.0	1.2	<1.0	1.0	1.6
2011 Aug	<1.0	1.7	1.2	2.2	<1.0	1.1	<1.0	<1.0	1.4
Background MIN	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Background MAX	1.8	2.3	1.5	3.4	2.7	2.2	<1.0	1.2	1.6
Background Mean	<1.0	2.0	1.3	2.2	1.6	1.5	<1.0	1.1	1.5
Standard Deviation[4]	0.19	0.21	0.14	0.58	0.53	0.37	0.00	0.07	0.15
MAX Daily Limit	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Vanadium Results - Operations									
2011 Nov	<1.0	1.9	1.2	2.5	<1.0	1.2	<1.0	<1.0	1.4
2012 Feb	<1.0	2.0	1.4	NA	<1.0	1.4	<1.0	<1.0	1.4
2012 May	<1.0	2.3	1.5	3.3	1.0	1.2	<1.0	1.1	1.6

Notes

1. Average Background calculated from Background Mean. Results reported as <1.0 were assumed to be 1.0 µg/L for this calculation.

2. Source: Part 201 Generic Cleanup Criteria and Screening Levels; Groundwater, Surface water Interface Criteria, March 25, 2011

3. As dictated in Part 22 Groundwater Quality, R323.222 5(a) Discharge Standards. This value is calculated at 1/2 way between the background groundwater quality and Part 201 standard.

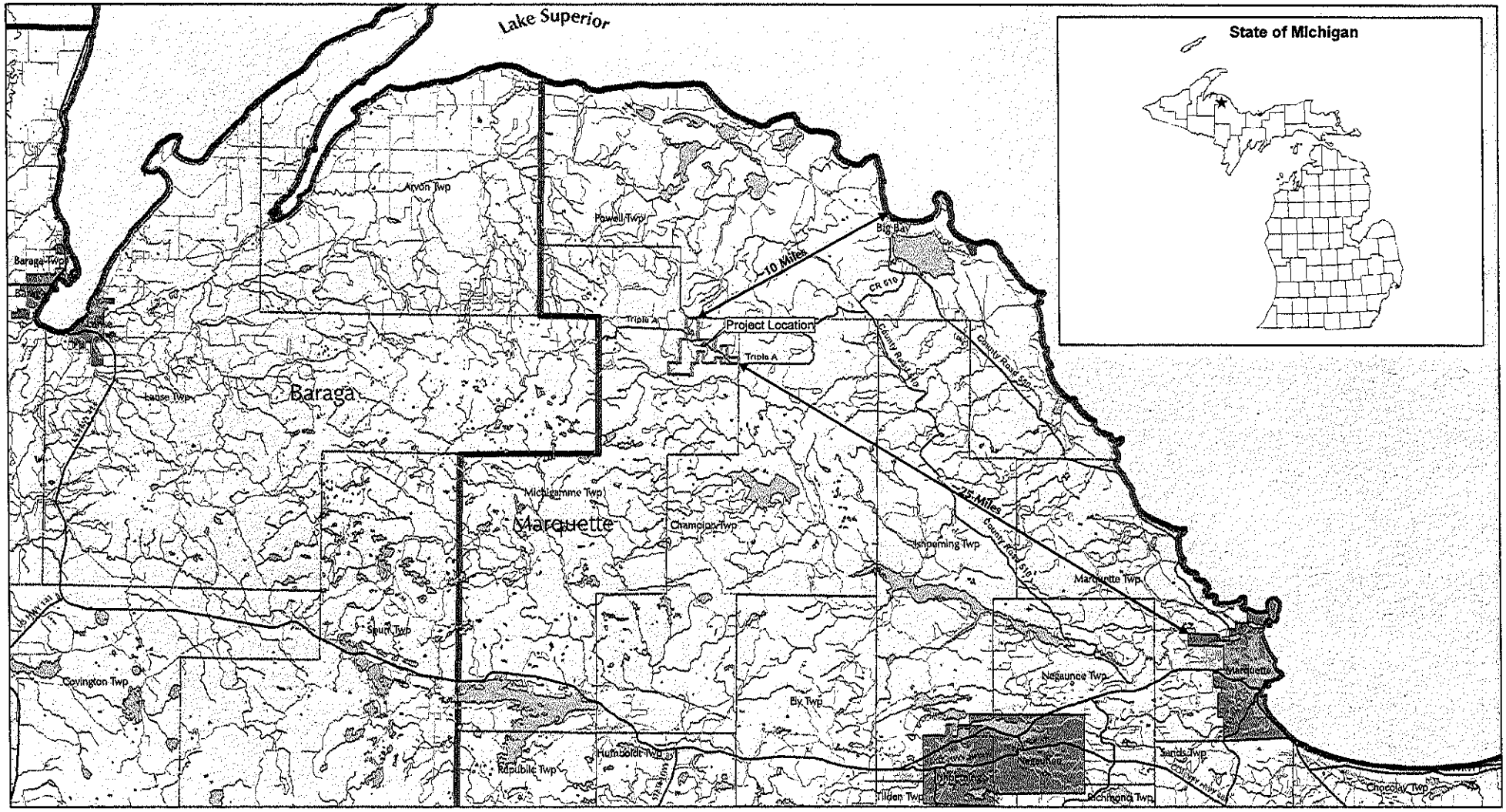
4. Results less than reporting limit were assumed to be 1.0 µg/L for the standard deviation calculation.

i = Insufficient water volume for collection of field parameters

NA = Not Applicable

Appendix A

Site Maps



NOTES

1. Surface property boundary as of November 18, 2004 supplied by Kennecott via Golder & Associates Inc., August, 2005.
2. Horizontal datum based on NAD 83/94, Horizontal coordinates based on UTM Zone 16.
3. All base information downloaded from Michigan Center of Geographic Information (http://www.michigan.gov/cgi).
4. Site Location - Project Site within Sections 11 &12, T50N, R29W, Town of Michigamme, Marquette County, Michigan.

LEGEND

- Counties
- Minor Civil Divisions
- Kennecott Surface Ownership
- Lakes and Rivers
- Highways
- Major Roads
- Minor Roads

N

Foth & Van Dyke

Foth & Van Dyke			
REVISED	DATE	BY	DESCRIPTION
CHECKED BY:	JOS1	DATE: FEB. '06	
APPROVED BY:	SVD1	DATE: FEB. '06	
APPROVED BY:		DATE:	

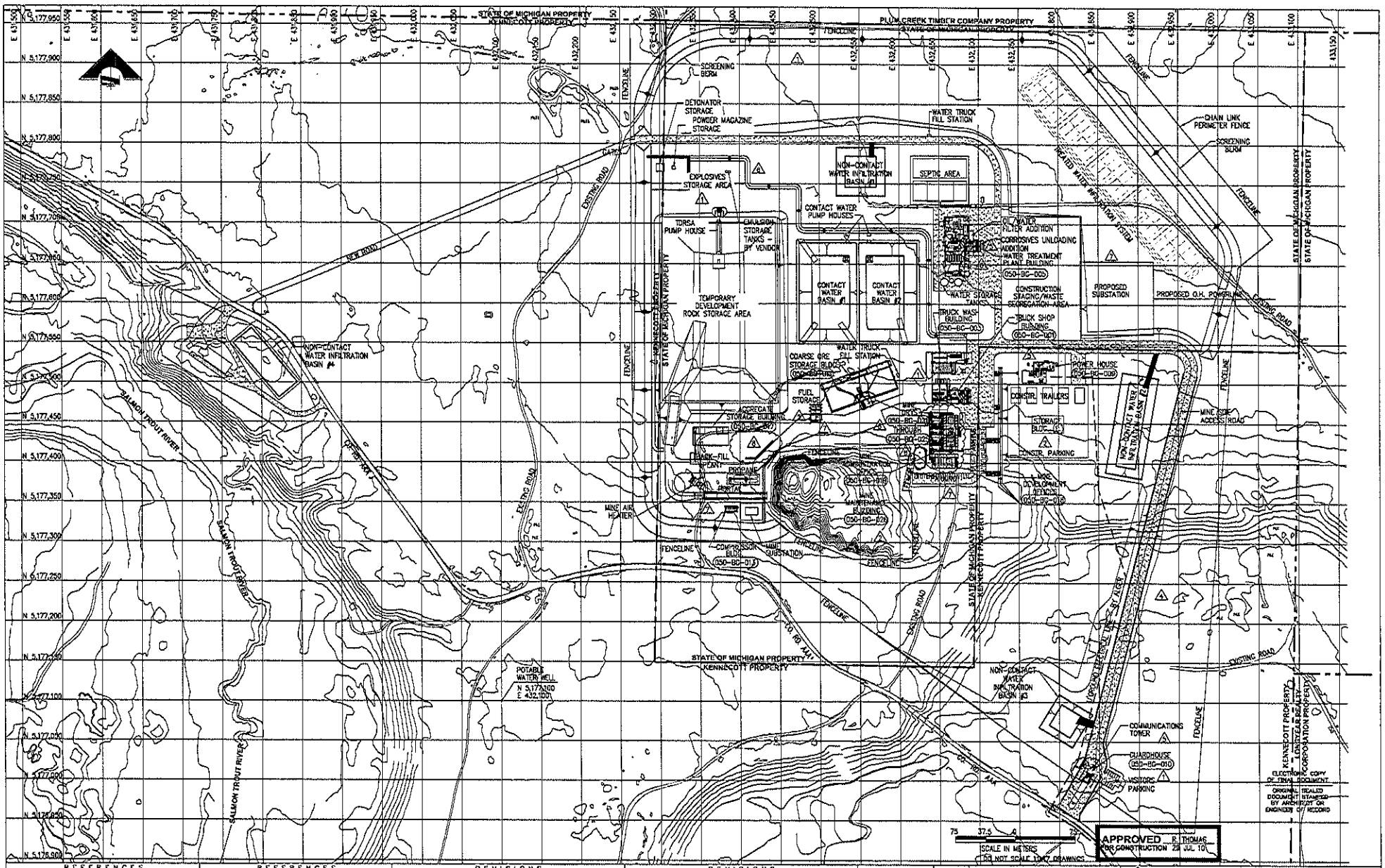
Kennecott
Eagle Minerals

FIGURE 2-1
PROJECT LOCATION

Scale: 1" = 1 Mile | Date: FEBRUARY, 2006

Prepared by: Foth & Van Dyke | By: DAT | 04W018

M:\04w018\mxd\gw\projectlocation_2-1_11x17.mxd January 13, 2006



REFERENCES

DWG. NO.	TITLE
050-GA-002	PORTAL AREA SITE PLAN

REFERENCES

DWG. NO.	TITLE

REVISIONS

NO.	DESCRIPTION	BY	APP'D	DATE
8	REVISED CIVIL & BUILDINGS	KLR	GER	13 SEP 11
7	REVISED CIVIL & BUILDINGS	KLR	GER	29 JUL 11
6	REVISED CIVIL & BUILDINGS	JAL	GER	08 APR 11
5	REVISED PORTAL & GUARDHOUSE AREAS	JAL	GER	17 FEB 11

REVISIONS

NO.	DESCRIPTION	BY	APP'D	DATE
4	RELOCATED U'GROUND ELECTRICAL LINE	GER	JAN	15 NOV 10
3	UPDATED PROJECT NUMBER, ADD NOTE	MSB	JAN	14 OCT 10
2	ADDED FENCE, REVISED SEPTIC	GER	JAN	07 SEP 10
1	REVISED PER NEW SITE LAYOUT	GER	JAN	30 JUL 10
0	APPROVED FOR CONSTRUCTION	RMV	GER	10 MAY 10

		DATE
SCALE:	1:2000	
DESIGNED BY	JAN	JUN 05
DRAWN BY	ETB	JUN 05
CHECKED BY	GCR	MAY 10
PROJECT MGR.	JAN	MAY 10
OWNER APPR.	WJH	MAY 10

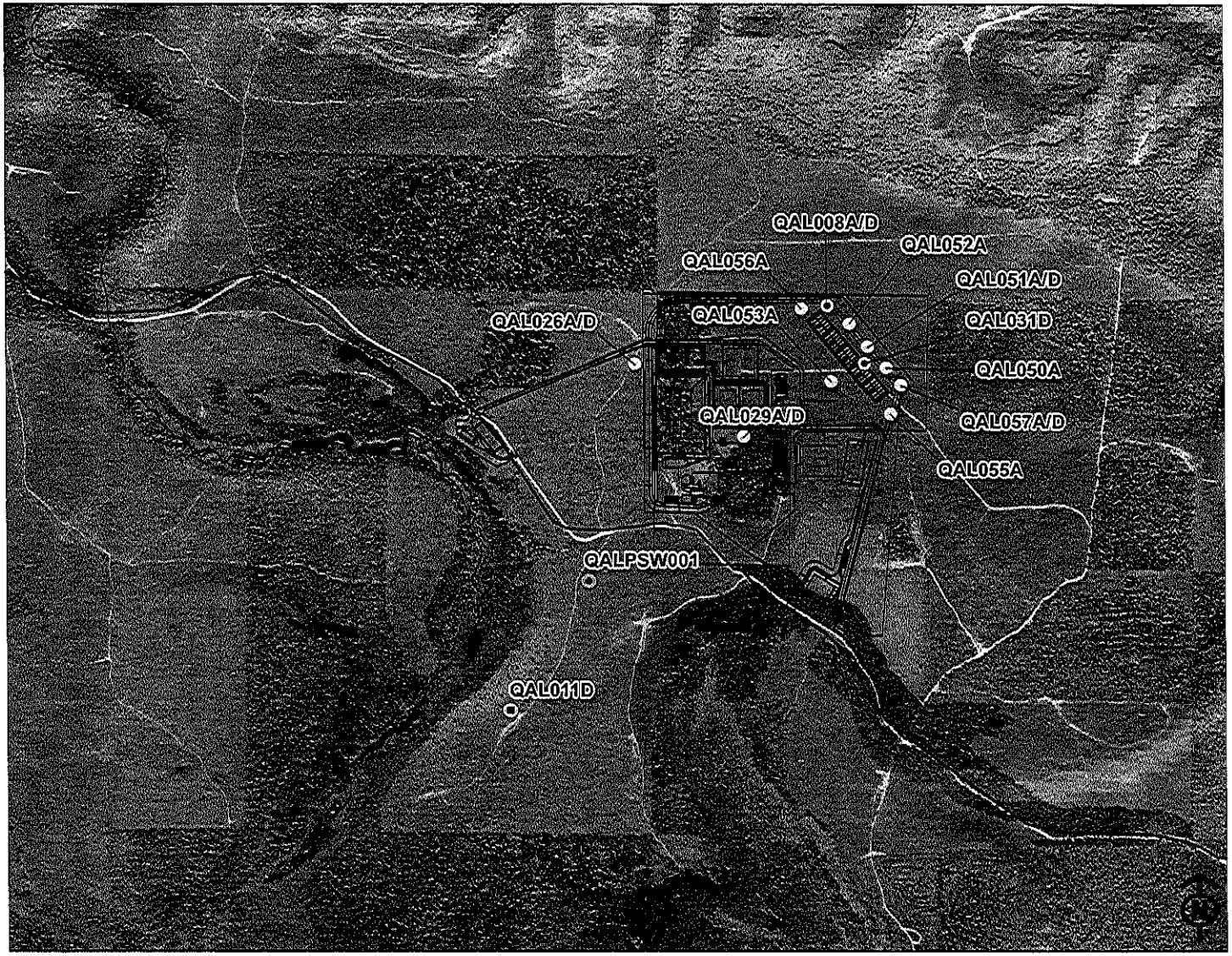
ARCHITECTURE
ENGINEERING
CONSTRUCTION MANAGEMENT

Tucson, Arizona
Charlotte, North Carolina
Minneapolis, Minnesota Omaha

KENNECOTT EAGLE MINERALS

EAGLE DEVELOPMENT PROJECT
MINE SITE
GENERAL ARRANGEMENT
OVERALL PLAN

JOB NO. M3-PN100115
DWG NO. 050-GA-001
REV NO. 8
DATE 13 SEP 11



GROUNDWATER DISCHARGE PERMIT MONITORING LOCATIONS

Project View

- ROAD
- HYDROGRAPHY
- PROPOSED MINE FACILITY
- GROUNDWATER QUALITY MONITORING WELL
  - *Instrumented for continuous monitoring*
- NON - POTABLE WATER SUPPLY WELL
- POTABLE WATER SUPPLY WELL

Reference

Data provided by: Kennecott Eagle Minerals, North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

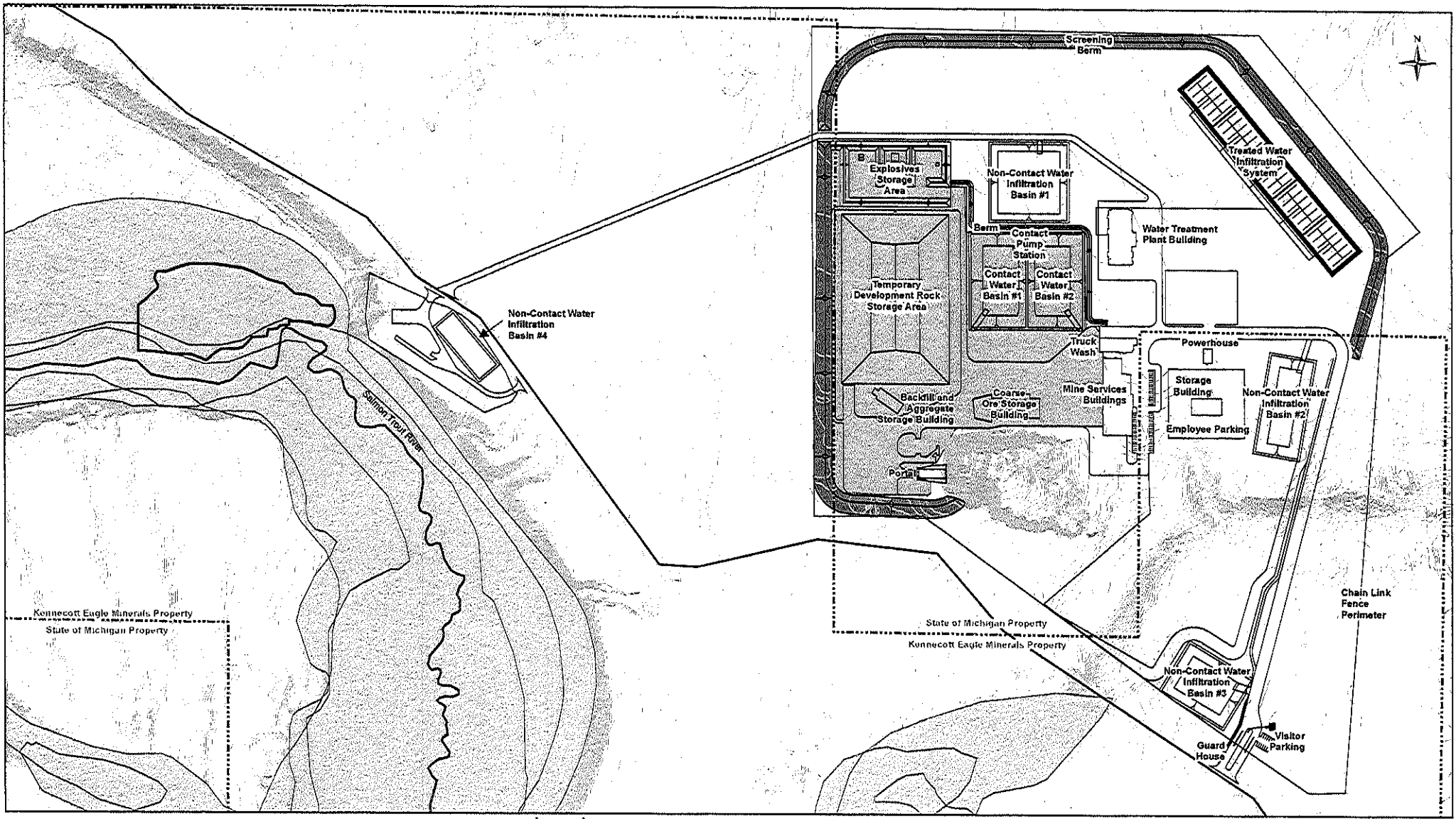
0 2,000 Feet

Scale: 1:12,000

Kennecott Eagle Minerals

North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Figure: XX



Legend

- Mine Facilities
- CR AAA Unpaved
- Rivers
- Kennecott Eagle Minerals Co. Property
- MDEQ Inventory Wetlands
- Pre-Existing Contour
- Contact Area
- Excess Soil Berm
- KEMC_Ore_Body

NOTES-
1) Map based in UTM Zone 16N, with Datum NAD83
2) Property Ownership Provided by Marquette Plat Book 2009 and KEMC Records
3) Project Site Located in T50N R29W in Sections 11 & 12
4) Wetland Inventory Courtesy of MiGDL and based on MDEQ Final Wetlands Inventory
5) Topographic Information Provided by Aero-Metric Engineering, June 2, 2004 at 1 foot interval
6) Mine Plan Data Adapted from M3 Engineering Plans

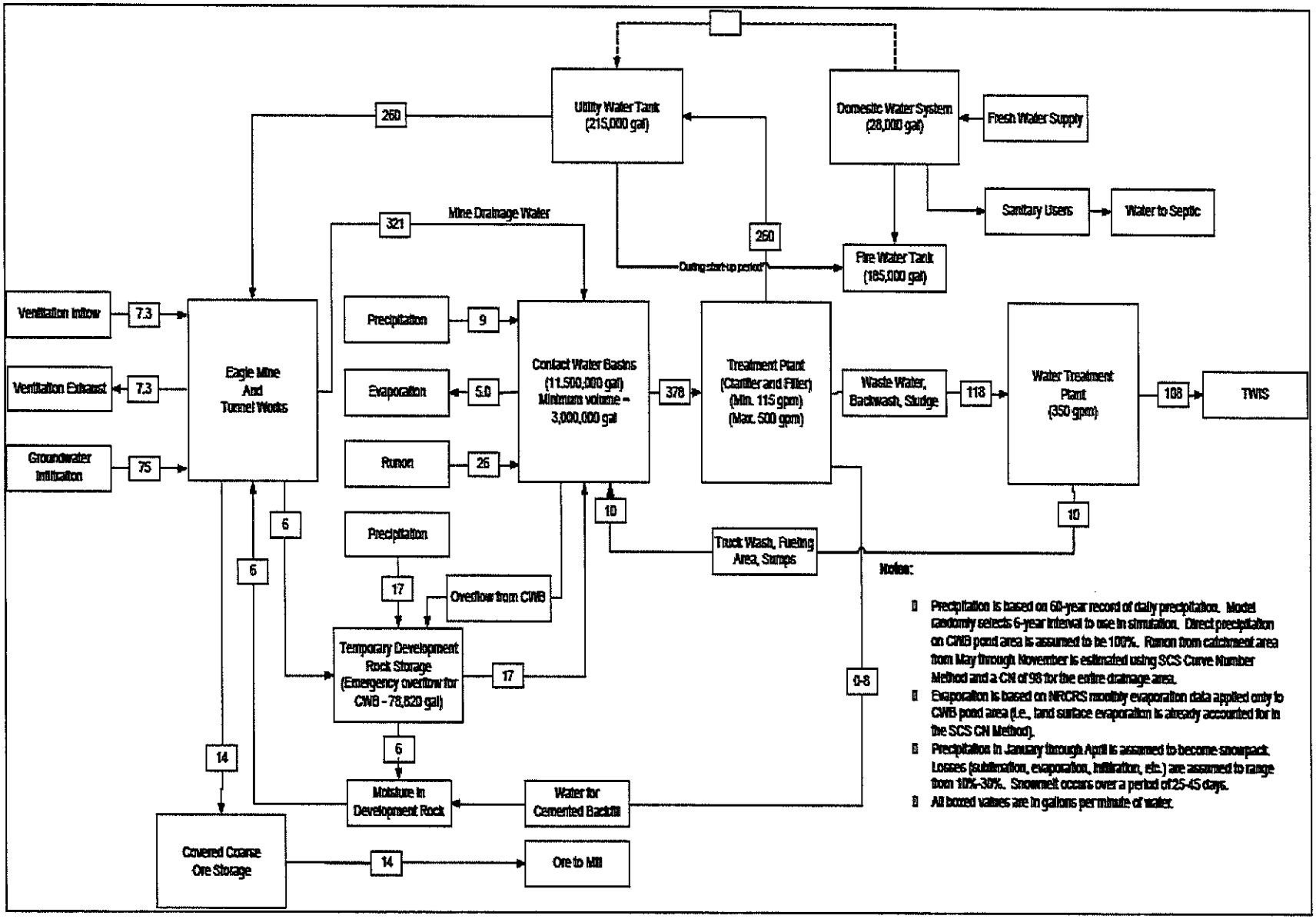
RioTinto

Surface Facility Plan	
Figure XX	
0 75 150 Meters	
Date: May 18, 2012	Author: JRE

Appendix B

Water Usage Diagram

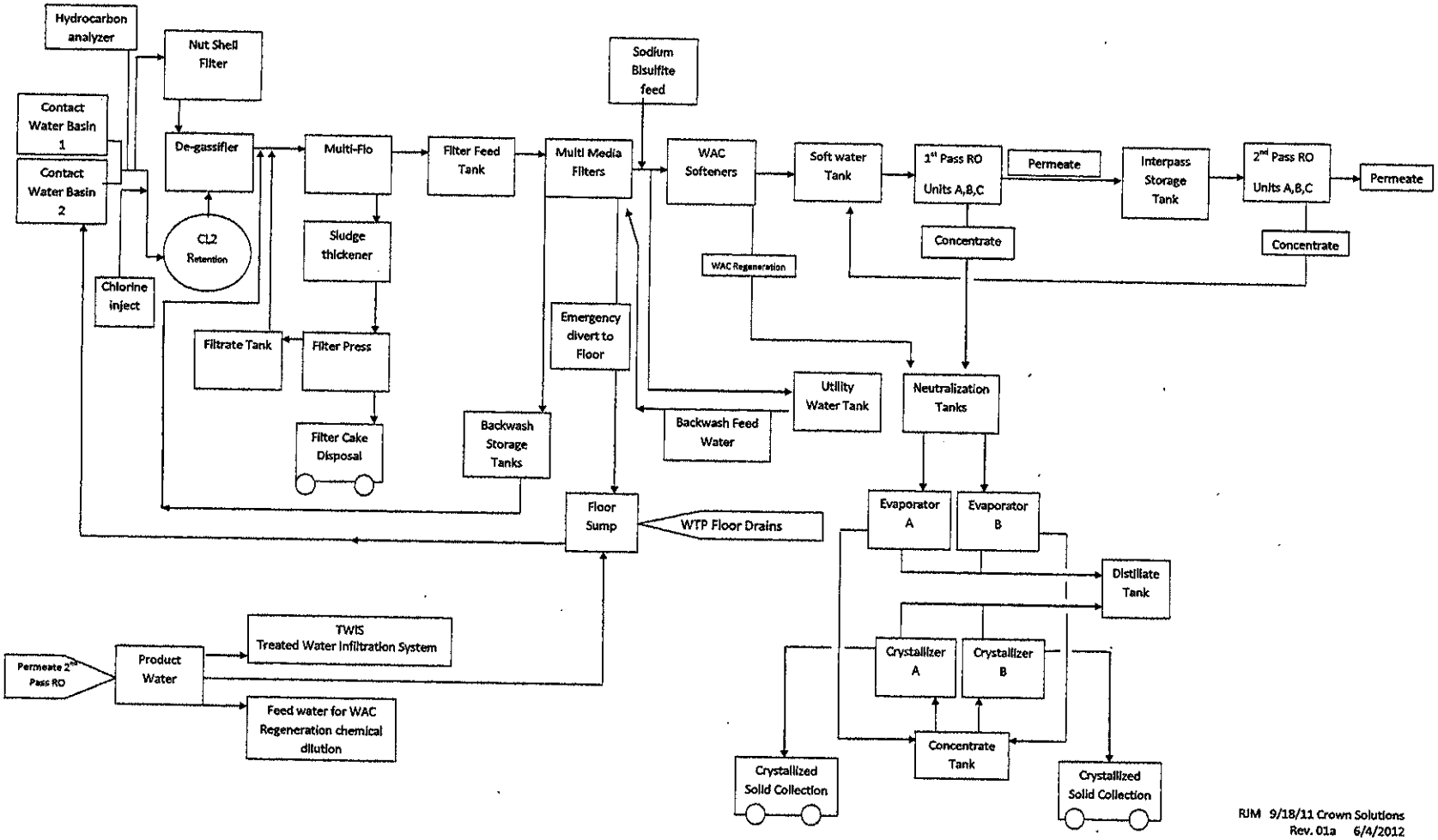
Water Balance Flow Sheet – Expected Case Conditions



Appendix C

Treatment Process

WTP Flow Diagram – Eagle Mine



RJM 9/18/11 Crown Solutions
Rev. 01a 6/4/2012

Kennecott Eagle Minerals Company

Main Wastewater Treatment Process

A process flow diagram for the main water treatment process is provided in Appendix C. This process will include the following:

- Hydrocarbon removal – nutshell filter
- Degassification
- Metals precipitation/sedimentation
- Multimedia filtration
- Ion exchange
- First pass reverse osmosis
- Second pass reverse osmosis
- Final effluent pH adjustment

Nutshell Filter

Hydrocarbon removal is the first treatment process and is only utilized if required. An in-line oil monitor measures the hydrocarbon content as water is pumped from the contact water basin to the WTP. If hydrocarbon content of the influent is measured above 0.8 mg/L, the water is re-directed through the nutshell filter. Influent with hydrocarbon less than 0.8 mg/L is routed to the degassifier tower.

The filtering media is comprised of granular roasted walnut and pecan shells. As the influent moves through the nutshell filter, the hydrocarbons adsorb to the shells, removing it from the water. Once the adsorption capacity of the shells is diminished the nutshell filter is backwashed and the shells are regenerated.

Degassifier Tower

The next step in the treatment process is degassification of the influent to allow for more optimal treatment in the Multiflo ™ Clarifier. Influent is delivered to the top of the degassifier tower and flows down to the clearwell storage tank which has a capacity of 2,500 gallons. As the water flows down, air is forced up through the same tower which results in the removal of carbon dioxide. Water is pumped to the Multiflo ™ Clarifier from the degassifier clear well tank.

Multiflo ™ Clarifier

This step of the process involves metals precipitation, softening, and separation through sedimentation and results in the removal of the majority of the metals and hardness present in the wastewater. This process also serves to remove a portion of the suspended solids present in the wastewater.

Hydroxide precipitation is used to precipitate out metals present in the wastewater. During hydroxide precipitation, metals removal occurs by adjusting the pH of the wastewater to the point where metals exhibit minimum solubility and precipitate as metal hydroxides. These precipitates can then be separated from the wastewater through sedimentation. The effectiveness of hydroxide precipitation is dependent on wastewater characteristics such as pH, the form of the metal ions present, and the presence of complexing agents. The extent of metals removed is limited by the solubility of the metal hydroxides generated. Although minimum solubility for most metal hydroxides occur in the pH range of 9 to 11, this process is operated at a pH of 10.5 to 11 in order to satisfy downstream requirements.

Lime ($Ca(OH)_2$) and sodium hydroxide (NaOH) are used in the precipitation process. In the hydroxide precipitation process, wastewater is mixed with sodium hydroxide, ferric iron, and previously precipitated sludge in a reaction tank. Rapid mixing in the tank promotes the crystallization and sedimentation of the metal hydroxides. The wastewater and precipitated solids flow into the second reactor where soda ash is added. The mixing of the soda ash with the wastewater allows the remaining calcium in the wastewater to precipitate, further softening the water. The wastewater then flows into a slowly mixed vessel where polymer is added. The polymer allows the solids to flocculate to promote settling and aid in dewatering. The water then flows into an inclined plate separator where the suspended solids are separated by gravity from the water. Solids are pumped from the clarifier to the solids handling process for dewatering (i.e. filter press). Water from the clarifier is routed to the downstream multimedia filters.

Multimedia Filtration System (MMF)

Effluent from the Multiflo ™ Clarifier is pumped to the multimedia filters whose primary function is to remove suspended solids that did not settle in the clarifier. The system consists of three identical filter units and the utility water storage tank. Two units are in service and one is on standby. The filters are capable of removing debris down to the range of 5 to 10 micron. Water flows down through the filter bed which consists of three distinct layers of media. The top layer (anthracite #1) will retain particles in the 50 micron and larger range. The second layer (filter sand .45 - .55mm) will retain particles in the 40 micron and larger range; and the third layer (Garnet #30) will retain particles in the 5 to 10 micron range. The two lower layers of garnet and the quartz gravel serve as a support bed to prevent loss of the fine garnet out of the service lines. Once the water has been filtered, it is sent to the utility water storage tank. Water from this tank is used as supply water for underground operations as well as operational uses within the WTP. Once the utility tank is full, the remaining water is sent to the next step in the treatment process.

Weak Acid Cation Exchanger (WAC)

The ion exchange system is provided to further reduce the level of heavy metals and inorganic salt cations remaining in the water. Reduction of these wastewater constituents will allow the operation of the downstream RO system at a higher level of recovery and minimize the RO concentrate flow to the evaporator/crystallizer process which in turn reduces the likelihood of membrane fouling.

The system includes multiple ion exchange columns, an ion exchange regeneration/backwash system, and instrumentation for monitoring and control purposes. Three ion exchange columns are provided with each column being designed to handle 50% of the design peak flow. The columns are operated in parallel. This configuration allows continued operation in the event that either of the columns is off-line for regeneration, maintenance, or repairs.

Double-Pass Reverse Osmosis

This system provides polishing of the effluent with respect to heavy metals and also removes other contaminants not removed by the metals precipitation/sedimentation system such as sodium, chlorides, and sulfate.

Reverse osmosis (RO) is a treatment process which uses semi-permeable membranes to remove inorganic and organic constituents from wastewater. RO separation of high molecular weight molecules, such as organic compounds, is achieved through physical "straining". RO separation of low molecular weight wastewater constituents such as metals and inorganic salts is achieved through electro-chemical interactions between the membrane surface and the ions in solution. The basic principles are as follows; water is passed laterally across the membrane surface and is driven by applied hydrostatic pressure through the membrane. Constituents present in the wastewater are rejected at the membrane surface and become concentrated in the "reject" or "concentrate" stream while purified "permeate" or "product water" passes through the membrane. This process separates the membrane system feed stream into two new aqueous streams, the purified "permeate" or "product water" stream and the concentrated "reject" or "concentrate" stream.

Water treated by the ion exchange system is pumped from the soft water storage tank to the two pass reverse osmosis system. The first pass consists of three RO process trains, each of which has a 5, 2, 1 array. Each train is designed for 50% of the peak design flow rate. This configuration allows for continued operation of the RO system in the event that one of the trains is off-line for maintenance. First pass permeate is sent to the inter-pass storage tank and concentrate is sent to the neutralization storage tank.

The first pass permeate is sent from the inter-pass storage tank to the second pass RO system. The second pass system is provided for additional removal of contaminants. The second pass RO system also consists of three RO process trains set-up in a 3, 2, 1 array. As with the first pass system, two trains will be operating in parallel with the third on stand-by. Second pass permeate is sent to the product water storage tank and concentrate is sent to the soft water tank.

Product Water System

A product water storage tank is provided for short term storage of the final effluent. Effluent stored in the tank will be continuously monitored for pH and conductivity to ensure it is meeting operational limits. If necessary, pH is adjusted using hydrochloric acid.

The product water system distributes water to the crystallizers for use as a heat exchanger fluid and is also used as dilution water for sodium hydroxide and hydrochloric acid for WAC regeneration. The remaining water is discharged to the treated water infiltration system (TWIS).

Treated Water Infiltration System (TWIS)

The treated effluent will be discharged to groundwater through the TWIS. The TWIS is a rapid infiltration system that is located in highly permeable soil. The treated effluent will be applied to the TWIS through five separate infiltration cells. This design allows for at least one cell to be out of service for resting and/or maintenance while the other cells are being loaded. The cells being loaded are rotated by the WTP operators on a routine basis.

Because of the high water quality being discharged from the WTP, the land application system doesn't require any further water treatment from on-site soils or vegetation. Soil attenuation and vegetative uptake of contaminants is not part of the treatment process.

Additional Treatment

Filter Press

The solids slurry generated in the Multiflo ^{TM} Clarifier is routed to the filter press to be dewatered. The concentrated slurry, once pumped through the press, is returned to the process tank. Suspended solids are retained by the woven filter cloth. Solids gradually build up inside the filter chamber under pump pressure. Once the chamber's maximum capacity is reached, the dewatered filter cake is dumped into a dedicated roll-off bin, with solids being disposed of in accordance with applicable regulations.

Evaporator/Crystallizer

The evaporator/crystallizer system is used to remove water from the RO concentrate and neutralized water from the ion exchange system. The initial step in this process is to neutralize the concentrate and neutralization waste water in one of the two 22,000 gallon neutralization tanks.

The evaporator/crystallizer system removes water from the liquid waste solutions. The objective is to generate a solid waste that is easily managed in accordance with applicable regulations.

The water removed from the waste solutions during the evaporation process is initially in vapor form. The vapor forms a liquid distillate through a condensation process within the unit. The resulting distilled water is routed to the product water storage tank where it is combined with the treated effluent and discharged. After pH adjustment, the distillate meets applicable groundwater discharge standards. The remaining concentrate from the evaporators is diverted to the concentrate storage tank which is routed to the crystallizer. The crystallizer is designed to reduce the brine concentrate to a dry solid. Solid crystals

are formed from the liquid concentrate under a specific temperature and vacuum pressure. All recovered solids are managed and disposed in accordance with applicable regulations.

Breakpoint Chlorination

Breakpoint chlorination may be used periodically when elevated ammonia levels are present in the influent. In this process, chlorine (i.e. sodium hypochlorite), is added to the influent prior to degasification (Note: The nutshell filter will not be used during periods in which breakpoint chlorination is required). The chlorine oxidizes the ammonia through a progression of oxidation products including monochloroamine, dichloroamine, nitrogen trichloride, and nitrogen gas. The point at which nearly all ammonia in the influent is oxidized to nitrogen gas, and additional application of chlorine results in free chlorine residual in the influent, is referred to as breakpoint chlorination.

When breakpoint chlorination is required, the influent from the contact water basins will be immediately routed to the bottom of the reaction tank where sodium hypochlorite will be added as the chlorine source. The tank would have mixing and a contact time of approximately 39 minutes. After this time period, the influent overflows to the degassifier clear well through a drain connection. In addition, sodium bisulfite is added before the WACs, as required, to remove any residual chlorine present in the wastewater. Removal of residual chlorine is required to protect the downstream RO membranes and final product water (discharge).

Appendix D

Description of Facility Compliance

Kennecott Eagle Minerals (Rio Tinto Eagle Mine)
Narrative Description of Facility Compliance

Groundwater Monitoring Wells

Beginning in 2008, the groundwater monitoring locations listed in Table 1 below have been monitored on a quarterly basis as required by KEMC's current groundwater discharge permit (GW1810162). Quarterly groundwater sampling is conducted by North Jackson Company during the months of February, May, August, and November and sample analysis completed by TriMatrix Laboratories located in Grand Rapids, MI. All samples have been collected, analyzed, and reviewed in accordance with methods approved by the MDEQ in the Field Monitoring and Sample Collection Standard Operating Procedures Manual, Supplemental Sampling and Analysis Plan for Waste Treatment and Infiltration System Operations, and the Quality Assurance Project Plan.

Table 1. Groundwater Discharge Permit Monitoring Wells

Hydraulically up-gradient & side gradient wells	Hydraulically down gradient wells
QAL026A	QAL008A
QAL026D	QAL008D
QAL029A	QAL050A
QAL029D	QAL051A
QAL053A	QAL051D
QAL055A	QAL052A
QAL056A	QAL057A
	QAL057D

All results are reported to the MDEQ on or before 30 days following the month the sampling occurred using the eDMR reporting system. Hardcopies of self-monitoring data are also submitted to the MDEQ within 30 days of sampling period.

The monitoring wells hydraulically down gradient of the Treated Water Infiltration System (TWIS) have permit assigned maximum daily limits (MDL). Since the start of operations in September 2011, all monitoring well sampling locations have been found in compliance with assigned MDLs or have corresponded with existing background data. Data from QAL008A, QAL008D and QAL051A have indicated some occurrences of elevated vanadium and pH both during and prior to operations. MDEQ was notified in July 2008 of these elevated parameters in the background data (letter attached).

Effluent Discharge

Effluent discharged to the TWIS is sampled by WTP operators and analyzed by TriMatrix Laboratories. On June 19, 2012 KEMC successfully completed the requirements set forth in Part I, 1, Initial Effluent Limitations, as noted in KEMC's Groundwater Discharge Permit (GW1810162). During this period samples were collected on a daily basis when discharging. Upon completion of the initial 90-day sampling period, samples are now collected on a weekly/monthly basis dependent upon the parameter as dictated in Part I, 2, Final Effluent Limitations of the GWDP Permit.

All effluent results are reported to the MDEQ on or before 30 days following each month of the authorized discharge period(s) using the eDMR reporting system. Hardcopies of self-monitoring data are also submitted to the MDEQ within 30 days of sampling period.

The effluent discharge was found to be in compliance with all established limits with the exception of BOD in the effluent discharged from November 30 – December 3, 2011. Upon receipt of the laboratory results, MDEQ was notified and an extensive review of the system was initiated. The direct source of the BOD was determined to be a drum of citric acid, which was utilized for pH adjustment of the product water following the final pass of reverse osmosis and prior to discharge. A letter describing the analyses and source determination was submitted to MDEQ on February 21, 2012. The citric acid has been replaced with hydrochloric acid. Since this change was implemented all results have been well within established limits for BOD.

The primary source of water to the WTP is storm water. Due to lack of storm water during the winter months, the WTP operated in recirculation mode until March 6, 2012 when water was once again discharged.

Rio Tinto
Kennecott Eagle Minerals
Victoria Peacey
Environmental Affairs Manager
504 Spruce Street
Ishpeming, Michigan 49849
(906) 486-1257

October 17, 2008

Ms. Jeanette Bailey
Permit Processor – Groundwater Permits Unit
Michigan Department of Environmental Quality
525 W Allegan St.
Lansing, MI 48909

Subject: Kennecott Eagle Mineral Company (KEMC), Marquette County, Michigan
Groundwater Discharge Permit GW1810162, Part I Section 5
Schedule of Compliance Notification

Dear Ms. Bailey:

In a letter dated July 2, 2008 KEMC submitted a copy of the monitor well installation report specified in Part I, Section 5f of groundwater discharge permit GW1810162. Please find attached a copy of the monitor well sampling results that establish background water quality.

Results of the background sampling indicate that parameters for all wells meet already established permit compliance limits, with the exception of pH and vanadium. Five of 14 wells have statistically significant representative value (average) pH that exceeds the upper compliance limit of 9.0 standard pH units. Three additional wells have pH exceeding the upper compliance limit in their respective 95% upper confidence limit about the average. The slightly alkaline conditions of groundwater in this area were previously documented and reported in the permit application. The representative concentration of vanadium exceeds the permit compliance limit (2.2 ug/l) in one well, and the 95% upper confidence limit about the average exceeds this value in another well.

As per guidesheet I referenced by Part 22 Rules of Part 31 of the Natural Resources and Environmental Protection Act, 1994 PA 451, background shall be established by sampling the approved wells once every other month for one year. Part I, Section 5g of GW1810162 specifies that results shall be submitted 180 days following installation of monitor wells. In an effort to capture as much temporal variability, yet maintain the tighter time frame for submittal of the results, KEMC condensed the recommended 6 sample events into monthly events (rather than bimonthly) over 180 days in order to meet permit requirements.

In a letter dated April 17, 2008 KEMC specified that wells were installed and developed by April 5th, 2008. According to Part I, Section 5f, results should be submitted within 180 days of installation, by October 3rd, 2008. All sampling was complete within this timeframe, however the completion of the laboratory analysis and reporting, quality assurance review, and statistical analyses, required an

additional two weeks to complete the October event. However as per Part II, Section 4 of GW1810162, this letter also serves as a written notification indicating whether the particular requirement was accomplished within 14 days of the schedule of compliance (due by October 17, 2008).

KEMC appreciates the MDEQ's understanding in this matter. Should you wish to discuss these issues further, or if you have any question please contact me at (906) 486-1257.

Sincerely,

Victoria Peacey
Environmental Affairs Manager

cc: Joe Maki, Michigan Department of Environmental Quality
Jim Janiczek, Michigan department of Environmental Quality
Gene Smary, Warner, Norcross & Judd, LLP
Dennis Donohue, Warner, Norcross & Judd, LLP
Dan Wiitala, North Jackson Company
Steve Donohue, Foth
Vicky Peacey, Kennecott Eagle Minerals Company

Appendix E

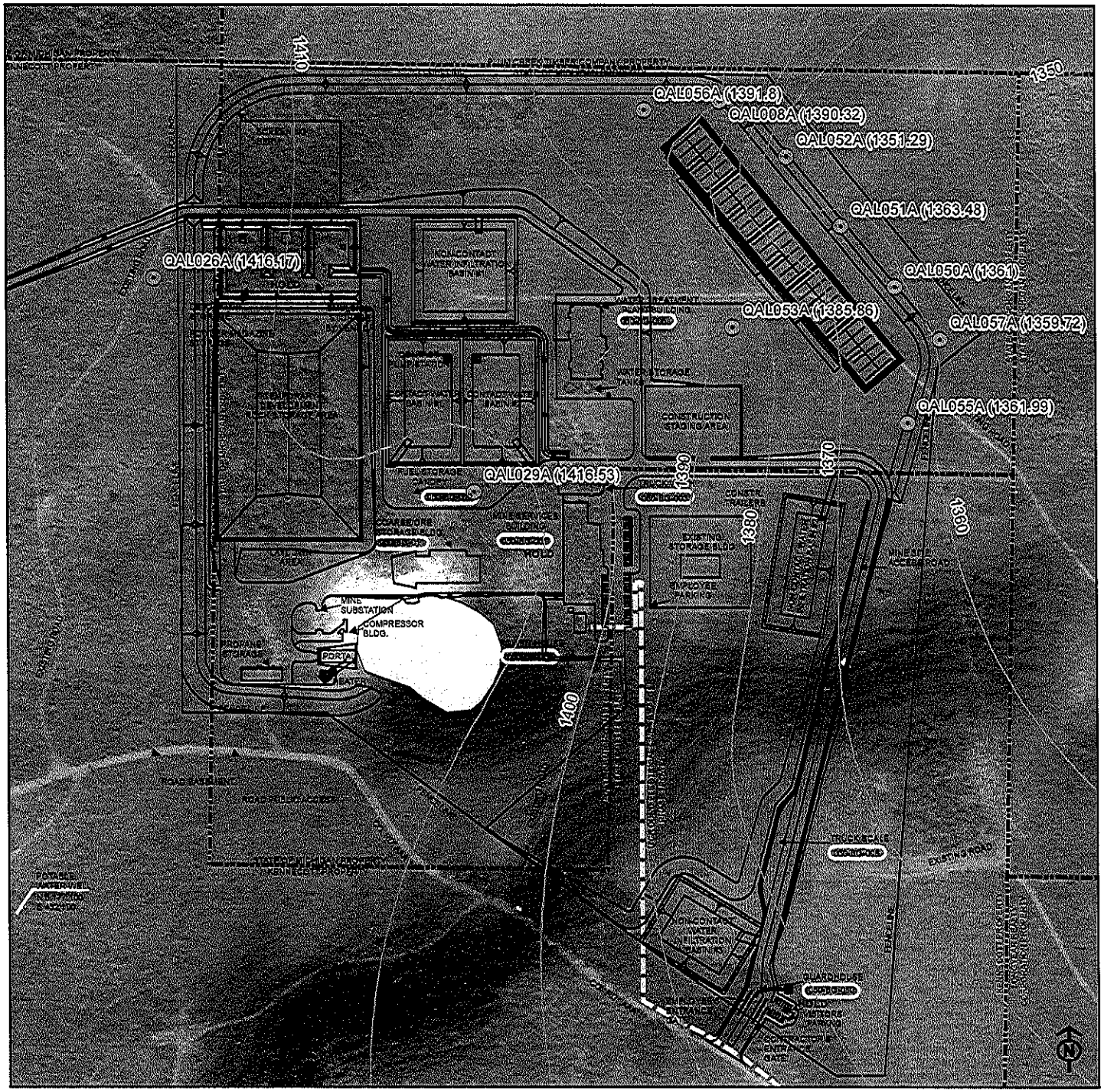
Static Water Levels
and
Groundwater Elevations

Eagle Mine
Static Water Levels and Groundwater Elevations

Location	Event Date	Groundwater Elevation (ft MSL)	Depth to Water (ft)	Total Well Depth (ft)
Hydraulically Upgradient Monitoring Wells				
QAL053A	5/16/12	1385.86	78.62	91
Hydraulically Side Gradient Monitoring Wells				
QAL026A	5/16/12	1416.17	44.84	48
QAL026D	5/16/12	1409.16	52.13	83
QAL029A	5/16/12	1416.53	39.32	47
QAL029D	5/16/12	1406.24	49.51	62
QAL055A	5/16/12	1361.99	106.66	117
QAL056A	5/16/12	1391.80	78.55	92
Hydraulically Downgradient Monitoring Wells				
QAL008A	5/16/12	1390.32	83.98	99
QAL008D	5/16/12	1353.23	121.50	129
QAL050A	5/16/12	1361.00	111.08	123
QAL051A	5/16/12	1363.48	105.96	109
QAL051D	5/16/12	1363.43	106.72	120
QAL052A	5/16/12	1351.29	119.38	126
QAL057A	5/16/12	1359.72	113.57	123
QAL057D	5/16/12	1359.79	114.40	135

Appendix F

Groundwater Contour Maps



A-ZONE GROUNDWATER ELEVATION CONTOURS
SPRING BASEFLOW, MAY 2012

Legend

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

Reference

Data provided by Kennecott Eagle Minerals, North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

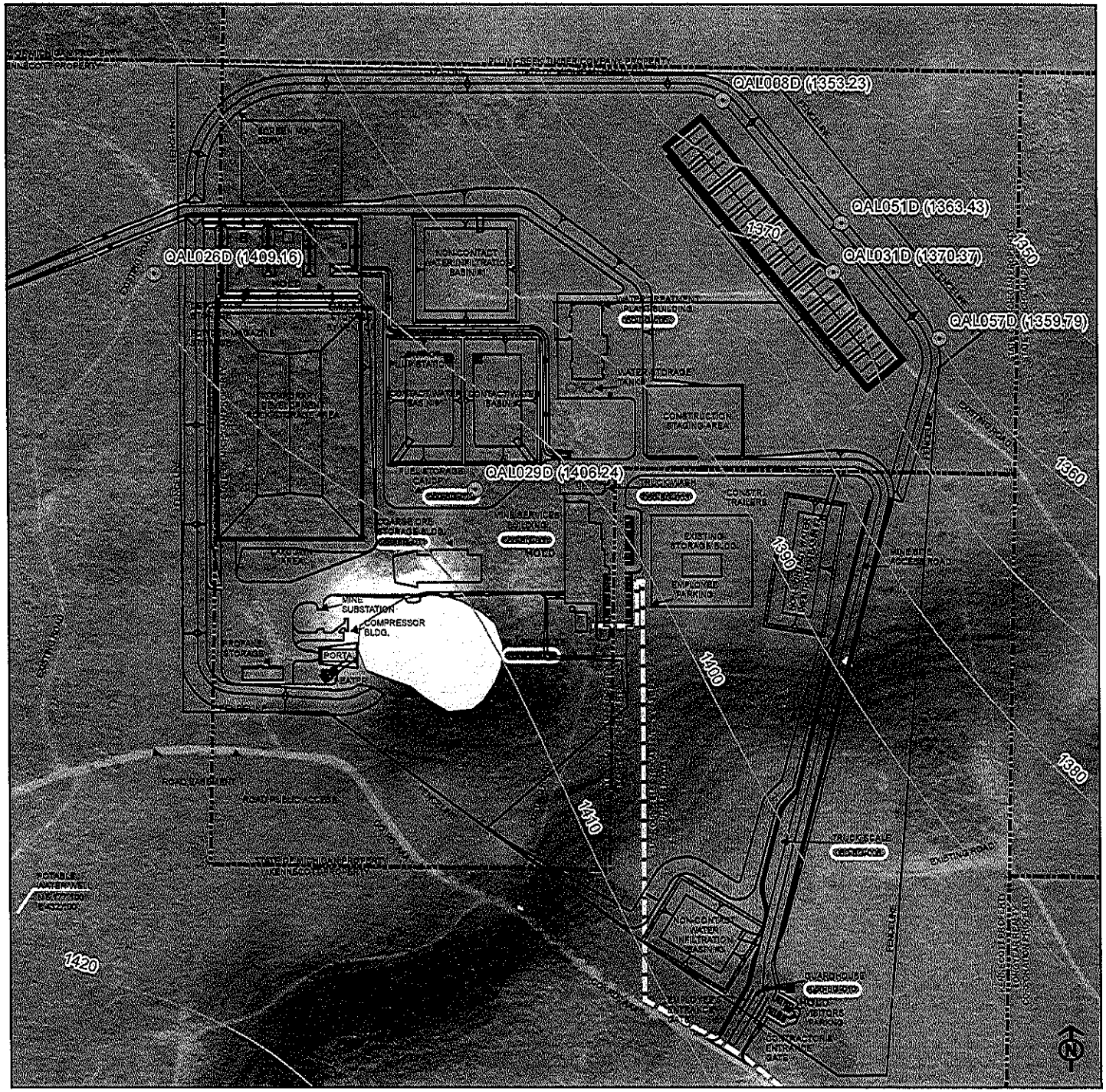
0 250 500 Feet

1:5,500

Kennecott Eagle Minerals — Eagle Project
Hydrologic Monitoring Update
Kennecott Eagle Minerals Company

North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Figure:



D-ZONE GROUNDWATER ELEVATION CONTOURS
SPRING BASEFLOW, MAY 2012

Legend

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

Reference

Data provided by Kennecott Eagle Minerals, North Jackson Company
Projection & Datum: UTM NAD 83 Zone 16N

0 250 500 Feet

1:5,500

Kennecott Eagle Minerals — Eagle Project
Hydrologic Monitoring Update
Kennecott Eagle Minerals Company

North Jackson Company
ENVIRONMENTAL SCIENCE & ENGINEERING

Figure:

Appendix G

Groundwater Quality Results

Eagle Mine Groundwater Quality Data
QAL008A

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012
			5/1/2012
Field			
D.O.1	ppm	na	**12**
ORP	mV	na	**235**
pH	SU	9.0	**8.6**
Specific Conductance	µmhos/cm	na	**75**
Temperature	°C	na	**8.0**
Turbidity	NTU	na	<1
Water Elevation	ft MSL	na	**1390.26**
Metals			
Antimony	µg/L	5.0	<1.0
Arsenic	µg/L	6.0	<1.0
Barium	µg/L	1,000	<5.0
Beryllium	µg/L	3.0	<1.0
Boron	µg/L	285	<20
Cadmium	µg/L	3.0	<0.20 e
Chromium	µg/L	52	<1.0
Cobalt	µg/L	23	<15
Copper	µg/L	10	<1.0
Iron	µg/L	na	<20
Lead	µg/L	3.0	<1.0
Lithium	µg/L	88	<8.0
Manganese	µg/L	50	<5.0
Mercury	µg/L	na	<0.500
Molybdenum	µg/L	22	<10
Nickel	µg/L	57	<2.0
Selenium	µg/L	5.0	<1.0
Silver	µg/L	0.4	<0.20
Strontium	µg/L	2,300	**14 e**
Thallium	µg/L	1.0	<1.0
Vanadium	µg/L	2.2	<1.0
Zinc	µg/L	1,200	<10
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	**34**
Chloride	mg/L	250	**1.3**
Nitrogen, Ammonia	mg/L	10	**0.025 a**
Nitrogen, Nitrate	mg/L	10	**0.14**
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	**0.0215 e**
Sulfate	mg/L	250	**2.1**
Major Cations			
Calcium	mg/L	na	**10**
Magnesium	mg/L	na	**1.6**
Potassium	mg/L	na	**0.50**
Sodium	mg/L	120	**0.53**
General			
Hardness	mg/L	na	**32**

Eagle Mine Groundwater Quality Data
QAL008D

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012 5/1/2012
Field			
D.O.1	ppm	na	**5.9**
ORP	mV	na	**92**
pH	SU	9.0	**8.6**
Specific Conductance	µmhos/cm	na	**100**
Temperature	°C	na	**7.8**
Turbidity	NTU	na	<1
Water Elevation	ft MSL	na	**1353.63**
Metals			
Antimony	µg/L	5.0	<1.0
Arsenic	µg/L	6.0	**4.2**
Barium	µg/L	1,000	**6.8**
Beryllium	µg/L	3.0	<1.0
Boron	µg/L	285	<20
Cadmium	µg/L	3.0	<0.20 e
Chromium	µg/L	52	**1.0**
Cobalt	µg/L	23	<15
Copper	µg/L	10	<1.0
Iron	µg/L	na	<20
Lead	µg/L	3.0	<1.0
Lithium	µg/L	88	<8.0
Manganese	µg/L	50	<5.0
Mercury	µg/L	na	<0.500
Molybdenum	µg/L	22	<10
Nickel	µg/L	57	<2.0
Selenium	µg/L	5.0	<1.0
Silver	µg/L	0.4	<0.20
Strontium	µg/L	2,300	**43 e**
Thallium	µg/L	1.0	<1.0
Vanadium	µg/L	2.2	**2.3**
Zinc	µg/L	1,200	<10
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	**48**
Chloride	mg/L	250	<1.0
Nitrogen, Ammonia	mg/L	10	<0.020 a
Nitrogen, Nitrate	mg/L	10	**0.089**
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	**0.0222 e**
Sulfate	mg/L	250	**4.7**
Major Cations			
Calcium	mg/L	na	**12**
Magnesium	mg/L	na	**2.7**
Potassium	mg/L	na	**0.78**
Sodium	mg/L	120	**1.1**
General			
Hardness	mg/L	na	**41**

Eagle Mine Groundwater Quality Data
QAL026A

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012 5/1/2012
Field			
D.O.1	ppm	na	**12**
ORP	mV	na	**134**
pH	SU	na	**7.3**
Specific Conductance	µmhos/cm	na	**90**
Temperature	°C	na	**9.4**
Turbidity	NTU	na	<1
Water Elevation	ft MSL	na	**1416.17**
Metals			
Antimony	µg/L	na	<1.0
Arsenic	µg/L	na	<1.0
Barium	µg/L	na	**5.4**
Beryllium	µg/L	na	<1.0
Boron	µg/L	na	<20
Cadmium	µg/L	na	<0.20 e
Chromium	µg/L	na	**1.2**
Cobalt	µg/L	na	<15
Copper	µg/L	na	**1.9**
Iron	µg/L	na	**250**
Lead	µg/L	na	<1.0
Lithium	µg/L	na	<8.0
Manganese	µg/L	na	<5.0
Mercury	µg/L	na	**0.530**
Molybdenum	µg/L	na	<10
Nickel	µg/L	na	<2.0
Selenium	µg/L	na	<1.0
Silver	µg/L	na	<0.20
Strontium	µg/L	na	**20 e**
Thallium	µg/L	na	<1.0
Vanadium	µg/L	na	<1.0
Zinc	µg/L	na	**15**
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	**50**
Chloride	mg/L	na	<1.0
Nitrogen, Ammonia	mg/L	na	<0.020 a
Nitrogen, Nitrate	mg/L	na	**0.49**
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	**0.0141 e**
Sulfate	mg/L	na	**3.3**
Major Cations			
Calcium	mg/L	na	**8.5**
Magnesium	mg/L	na	**1.5**
Potassium	mg/L	na	**0.79**
Sodium	mg/L	na	**1.1**
General			
Hardness	mg/L	na	**27**

Eagle Mine Groundwater Quality Data
QAL026D

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012 5/1/2012
Field			
D.O.1	ppm	na	**11**
ORP	mV	na	**96**
pH	SU	na	**8.9**
Specific Conductance	µmhos/cm	na	**62**
Temperature	°C	na	**7.5**
Turbidity	NTU	na	<1
Water Elevation	ft MSL	na	**1409.10**
Metals			
Antimony	µg/L	na	<1.0
Arsenic	µg/L	na	<1.0
Barium	µg/L	na	<5.0
Beryllium	µg/L	na	<1.0
Boron	µg/L	na	<20
Cadmium	µg/L	na	<0.20 e
Chromium	µg/L	na	<1.0
Cobalt	µg/L	na	<15
Copper	µg/L	na	<1.0
Iron	µg/L	na	<20
Lead	µg/L	na	<1.0
Lithium	µg/L	na	<8.0
Manganese	µg/L	na	<5.0
Mercury	µg/L	na	<0.500
Molybdenum	µg/L	na	<10
Nickel	µg/L	na	<2.0
Selenium	µg/L	na	<1.0
Silver	µg/L	na	<0.20
Strontium	µg/L	na	**10 e**
Thallium	µg/L	na	<1.0
Vanadium	µg/L	na	<1.0
Zinc	µg/L	na	<10
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	**27**
Chloride	mg/L	na	<1.0
Nitrogen, Ammonia	mg/L	na	<0.020 a
Nitrogen, Nitrate	mg/L	na	**0.098**
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	**0.0230 e**
Sulfate	mg/L	na	**2.0**
Major Cations			
Calcium	mg/L	na	**8.2**
Magnesium	mg/L	na	**1.2**
Potassium	mg/L	na	<0.50
Sodium	mg/L	na	**0.57**
General			
Hardness	mg/L	na	**25**

Eagle Mine Groundwater Quality Data
QAL029A

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012 5/1/2012
Field			
D.O.1	ppm	na	**11**
ORP	mV	na	**145**
pH2	SU	na	**6.6**
Specific Conductance	µmhos/cm	na	**29**
Temperature	°C	na	**10**
Turbidity	NTU	na	**11**
Water Elevation	ft MSL	na	**1416.57**
Metals			
Antimony	µg/L	na	<1.0
Arsenic	µg/L	na	<1.0
Barium	µg/L	na	**8.2**
Beryllium	µg/L	na	<1.0
Boron	µg/L	na	<20
Cadmium	µg/L	na	<0.20 e
Chromium	µg/L	na	<1.0
Cobalt	µg/L	na	<15
Copper	µg/L	na	<1.0
Iron	µg/L	na	<20
Lead	µg/L	na	<1.0
Lithium	µg/L	na	<8.0
Manganese	µg/L	na	**5.1**
Mercury	µg/L	na	<0.500
Molybdenum	µg/L	na	<10
Nickel	µg/L	na	<2.0
Selenium	µg/L	na	<1.0
Silver	µg/L	na	<0.20
Strontium	µg/L	na	**14 e**
Thallium	µg/L	na	<1.0
Vanadium	µg/L	na	<1.0
Zinc	µg/L	na	<10
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	<20
Chloride	mg/L	na	<1.0
Nitrogen, Ammonia	mg/L	na	<0.020 a
Nitrogen, Nitrate	mg/L	na	**0.13**
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	**0.0348 e**
Sulfate	mg/L	na	**2.4**
Major Cations			
Calcium	mg/L	na	**3.1**
Magnesium	mg/L	na	**0.50**
Potassium	mg/L	na	**0.74**
Sodium	mg/L	na	**0.50**
General			
Hardness	mg/L	na	**10**

Eagle Mine Groundwater Quality Data
QAL029D

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012 5/1/2012
Field			
D.O.1	ppm	na	**11**
ORP	mV	na	**287**
pH2	SU	na	**6.4**
Specific Conductance	µmhos/cm	na	**50**
Temperature	°C	na	**7.6**
Turbidity	NTU	na	**3**
Water Elevation	ft MSL	na	**1406.22**
Metals			
Antimony	µg/L	na	<1.0
Arsenic	µg/L	na	<1.0
Barium	µg/L	na	<5.0
Beryllium	µg/L	na	<1.0
Boron	µg/L	na	<20
Cadmium	µg/L	na	<0.20 e
Chromium	µg/L	na	**1.2**
Cobalt	µg/L	na	<15
Copper	µg/L	na	<1.0
Iron	µg/L	na	**39**
Lead	µg/L	na	<1.0
Lithium	µg/L	na	<8.0
Manganese	µg/L	na	<5.0
Mercury	µg/L	na	**0.632**
Molybdenum	µg/L	na	<10
Nickel	µg/L	na	<2.0
Selenium	µg/L	na	<1.0
Silver	µg/L	na	<0.20
Strontium	µg/L	na	**11 e**
Thallium	µg/L	na	<1.0
Vanadium	µg/L	na	<1.0
Zinc	µg/L	na	<10
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	**22**
Chloride	mg/L	na	<1.0
Nitrogen, Ammonia	mg/L	na	<0.020 a
Nitrogen, Nitrate	mg/L	na	**0.23**
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	**0.0180 e**
Sulfate	mg/L	na	**2.8**
Major Cations			
Calcium	mg/L	na	**4.7**
Magnesium	mg/L	na	**2.0**
Potassium	mg/L	na	**0.58**
Sodium	mg/L	na	**0.68**
General			
Hardness	mg/L	na	**20**

Eagle Mine Groundwater Quality Data
QAL050A

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012 5/1/2012
Field			
D.O.1	ppm	na	**10**
ORP	mV	na	**88**
pH	SU	9.0	**8.8**
Specific Conductance	µmhos/cm	na	**84**
Temperature	°C	na	**7.2**
Turbidity	NTU	na	<1
Water Elevation	ft MSL	na	**1361.33**
Metals			
Antimony	µg/L	5.0	<1.0
Arsenic	µg/L	6.0	<1.0
Barium	µg/L	1,000	<5.0
Beryllium	µg/L	3.0	<1.0
Boron	µg/L	285	<20
Cadmium	µg/L	3.0	<0.20 e
Chromium	µg/L	52	<1.0
Cobalt	µg/L	23	<15
Copper	µg/L	10	<1.0
Iron	µg/L	na	<20
Lead	µg/L	3.0	<1.0
Lithium	µg/L	88	<8.0
Manganese	µg/L	50	<5.0
Mercury	µg/L	na	<0.500
Molybdenum	µg/L	22	<10
Nickel	µg/L	57	<2.0
Selenium	µg/L	5.0	<1.0
Silver	µg/L	0.4	<0.20
Strontium	µg/L	2,300	**21 e**
Thallium	µg/L	1.0	<1.0
Vanadium	µg/L	2.2	**1.5**
Zinc	µg/L	1,200	<10
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	**38**
Chloride	mg/L	250	<1.0
Nitrogen, Ammonia	mg/L	10	<0.020 a
Nitrogen, Nitrate	mg/L	10	**0.10**
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	**0.0206 e**
Sulfate	mg/L	250	**2.9**
Major Cations			
Calcium	mg/L	na	**11**
Magnesium	mg/L	na	**2.1**
Potassium	mg/L	na	**0.54**
Sodium	mg/L	120	**0.80**
General			
Hardness	mg/L	na	**36**

Eagle Mine Groundwater Quality Data
QAL051A

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012 5/1/2012
Field			
D.O.1	ppm	na	**9.6**
ORP	mV	na	**129**
pH	SU	9.0	**8.6**
Specific Conductance	µmhos/cm	na	**87**
Temperature	°C	na	**10**
Turbidity	NTU	na	<1
Water Elevation	ft MSL	na	**1363.76**
Metals			
Antimony	µg/L	5.0	<1.0
Arsenic	µg/L	6.0	**1.3**
Barium	µg/L	1,000	**6.6**
Beryllium	µg/L	3.0	<1.0
Boron	µg/L	285	<20
Cadmium	µg/L	3.0	<0.20 e
Chromium	µg/L	52	**1.1**
Cobalt	µg/L	23	<15
Copper	µg/L	10	**1.2**
Iron	µg/L	na	**100**
Lead	µg/L	3.0	<1.0
Lithium	µg/L	88	<8.0
Manganese	µg/L	50	<5.0
Mercury	µg/L	na	<0.500
Molybdenum	µg/L	22	<10
Nickel	µg/L	57	<2.0
Selenium	µg/L	5.0	<1.0
Silver	µg/L	0.4	<0.20
Strontium	µg/L	2,300	**21 e**
Thallium	µg/L	1.0	<1.0
Vanadium	µg/L	2.2	**3.3**
Zinc	µg/L	1,200	<10
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	**41**
Chloride	mg/L	250	<1.0
Nitrogen, Ammonia	mg/L	10	**0.038**
Nitrogen, Nitrate	mg/L	10	**0.17**
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	**0.0272 e**
Sulfate	mg/L	250	**3.3**
Major Cations			
Calcium	mg/L	na	**11**
Magnesium	mg/L	na	**1.9**
Potassium	mg/L	na	**0.77**
Sodium	mg/L	120	**1.1**
General			
Hardness	mg/L	na	**35**

Eagle Mine Groundwater Quality Data
QAL051D

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012 5/1/2012
Field			
D.O.1	ppm	na	**0.3**
ORP	mV	na	**-85**
pH	SU	9.0	**8.5**
Specific Conductance	µmhos/cm	na	**129**
Temperature	°C	na	**8.2**
Turbidity	NTU	na	<1
Water Elevation	ft MSL	na	**1363.72**
Metals			
Antimony	µg/L	5.0	<1.0
Arsenic	µg/L	6.0	**3.5**
Barium	µg/L	1,000	**17**
Beryllium	µg/L	3.0	<1.0
Boron	µg/L	285	**22**
Cadmium	µg/L	3.0	<0.20 e
Chromium	µg/L	52	<1.0
Cobalt	µg/L	23	<15
Copper	µg/L	10	**1.0**
Iron	µg/L	na	<20
Lead	µg/L	3.0	<1.0
Lithium	µg/L	88	<8.0
Manganese	µg/L	50	**9.8**
Mercury	µg/L	na	<0.500
Molybdenum	µg/L	22	<10
Nickel	µg/L	57	<2.0
Selenium	µg/L	5.0	<1.0
Silver	µg/L	0.4	<0.20
Strontium	µg/L	2,300	**95 e**
Thallium	µg/L	1.0	<1.0
Vanadium	µg/L	2.2	**1.0**
Zinc	µg/L	1,200	<10
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	**62**
Chloride	mg/L	250	<1.0
Nitrogen, Ammonia	mg/L	10	**0.023 a,s**
Nitrogen, Nitrate	mg/L	10	<0.050
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	**0.0169 e**
Sulfate	mg/L	250	**5.5**
Major Cations			
Calcium	mg/L	na	**15**
Magnesium	mg/L	na	**3.3**
Potassium	mg/L	na	**1.0**
Sodium	mg/L	120	**2.9**
General			
Hardness	mg/L	na	**51**

Eagle Mine Groundwater Quality Data
QAL052A

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012 5/1/2012
Field			
D.O.1	ppm	na	**3.0**
ORP	mV	na	**118**
pH	SU	9.0	**8.5**
Specific Conductance	µmhos/cm	na	**130**
Temperature	°C	na	**11**
Turbidity	NTU	na	<1
Water Elevation	ft MSL	na	**1351.63**
Metals			
Antimony	µg/L	5.0	<1.0
Arsenic	µg/L	6.0	**1.0**
Barium	µg/L	1,000	**6.4**
Beryllium	µg/L	3.0	<1.0
Boron	µg/L	285	<20
Cadmium	µg/L	3.0	<0.20 e
Chromium	µg/L	52	<1.0
Cobalt	µg/L	23	<15
Copper	µg/L	10	**4.3**
Iron	µg/L	na	**94**
Lead	µg/L	3.0	<1.0
Lithium	µg/L	88	<8.0
Manganese	µg/L	50	<5.0
Mercury	µg/L	na	<0.500
Molybdenum	µg/L	22	<10
Nickel	µg/L	57	<2.0
Selenium	µg/L	5.0	<1.0
Silver	µg/L	0.4	<0.20
Strontium	µg/L	2,300	**53 e**
Thallium	µg/L	1.0	<1.0
Vanadium	µg/L	2.2	**1.2**
Zinc	µg/L	1,200	<10
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	**58**
Chloride	mg/L	250	**1.1**
Nitrogen, Ammonia	mg/L	10	**0.17 a**
Nitrogen, Nitrate	mg/L	10	<0.050
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	**0.0132 e**
Sulfate	mg/L	250	**7.1**
Major Cations			
Calcium	mg/L	na	**16**
Magnesium	mg/L	na	**3.6**
Potassium	mg/L	na	**0.89**
Sodium	mg/L	120	**1.5**
General			
Hardness	mg/L	na	**55**

Eagle Mine Groundwater Quality Data
QAL053A

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012 5/1/2012
Field			
D.O.1	ppm	na	**3.8**
ORP	mV	na	**196**
pH	SU	na	**8.4**
Specific Conductance	µmhos/cm	na	**115**
Temperature	°C	na	**7.9**
Turbidity	NTU	na	<1
Water Elevation	ft MSL	na	**1386.18**
Metals			
Antimony	µg/L	na	<1.0
Arsenic	µg/L	na	**6.9**
Barium	µg/L	na	**8.1**
Beryllium	µg/L	na	<1.0
Boron	µg/L	na	**29**
Cadmium	µg/L	na	<0.20 e
Chromium	µg/L	na	<1.0
Cobalt	µg/L	na	<15
Copper	µg/L	na	<1.0
Iron	µg/L	na	<20
Lead	µg/L	na	<1.0
Lithium	µg/L	na	<8.0
Manganese	µg/L	na	<5.0
Mercury	µg/L	na	<0.500
Molybdenum	µg/L	na	<10
Nickel	µg/L	na	<2.0
Selenium	µg/L	na	<1.0
Silver	µg/L	na	<0.20
Strontium	µg/L	na	**78 e**
Thallium	µg/L	na	<1.0
Vanadium	µg/L	na	**1.6**
Zinc	µg/L	na	<10
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	**49**
Chloride	mg/L	na	**1.0**
Nitrogen, Ammonia	mg/L	na	<0.020 a
Nitrogen, Nitrate	mg/L	na	**0.050**
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	**0.0247 e**
Sulfate	mg/L	na	**5.2**
Major Cations			
Calcium	mg/L	na	**13**
Magnesium	mg/L	na	**3.3**
Potassium	mg/L	na	**1.0**
Sodium	mg/L	na	**1.6**
General			
Hardness	mg/L	na	**46**

Eagle Mine Groundwater Quality Data
QAL055A

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012 5/1/2012
Field			
D.O.1	ppm	na	**11**
ORP	mV	na	**101**
pH	SU	na	**9.0**
Specific Conductance	µmhos/cm	na	**65**
Temperature	°C	na	**7.9**
Turbidity	NTU	na	<1
Water Elevation	ft MSL	na	**1362.29**
Metals			
Antimony	µg/L	na	<1.0
Arsenic	µg/L	na	**1.7**
Barium	µg/L	na	<5.0
Beryllium	µg/L	na	<1.0
Boron	µg/L	na	<20
Cadmium	µg/L	na	<0.20 e
Chromium	µg/L	na	<1.0
Cobalt	µg/L	na	<15
Copper	µg/L	na	<1.0
Iron	µg/L	na	<20
Lead	µg/L	na	<1.0
Lithium	µg/L	na	<8.0
Manganese	µg/L	na	<5.0
Mercury	µg/L	na	<0.500
Molybdenum	µg/L	na	<10
Nickel	µg/L	na	<2.0
Selenium	µg/L	na	<1.0
Silver	µg/L	na	<0.20
Strontium	µg/L	na	**19 e**
Thallium	µg/L	na	<1.0
Vanadium	µg/L	na	**1.0**
Zinc	µg/L	na	<10
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	**29**
Chloride	mg/L	na	**1.6**
Nitrogen, Ammonia	mg/L	na	<0.020 a
Nitrogen, Nitrate	mg/L	na	**0.093**
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	**0.0228 e**
Sulfate	mg/L	na	**2.3**
Major Cations			
Calcium	mg/L	na	**7.7**
Magnesium	mg/L	na	**1.6**
Potassium	mg/L	na	<0.50
Sodium	mg/L	na	**0.56**
General			
Hardness	mg/L	na	**26**

Eagle Mine Groundwater Quality Data
QAL056A

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012 5/1/2012
Field			
D.O.1	ppm	na	**12**
ORP	mV	na	**233**
pH	SU	na	**8.9**
Specific Conductance	µmhos/cm	na	**68**
Temperature	°C	na	**8.0**
Turbidity	NTU	na	<1
Water Elevation	ft MSL	na	**1391.66**
Metals			
Antimony	µg/L	na	<1.0
Arsenic	µg/L	na	<1.0
Barium	µg/L	na	<5.0
Beryllium	µg/L	na	<1.0
Boron	µg/L	na	<20
Cadmium	µg/L	na	<0.20 e
Chromium	µg/L	na	<1.0
Cobalt	µg/L	na	<15
Copper	µg/L	na	<1.0
Iron	µg/L	na	<20
Lead	µg/L	na	<1.0
Lithium	µg/L	na	<8.0
Manganese	µg/L	na	<5.0
Mercury	µg/L	na	<0.500
Molybdenum	µg/L	na	<10
Nickel	µg/L	na	<2.0
Selenium	µg/L	na	<1.0
Silver	µg/L	na	<0.20
Strontium	µg/L	na	**13 e**
Thallium	µg/L	na	<1.0
Vanadium	µg/L	na	<1.0
Zinc	µg/L	na	<10
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	**29**
Chloride	mg/L	na	**1.2**
Nitrogen, Ammonia	mg/L	na	<0.020 a
Nitrogen, Nitrate	mg/L	na	**0.11**
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	**0.0183 e**
Sulfate	mg/L	na	**2.2**
Major Cations			
Calcium	mg/L	na	**8.5**
Magnesium	mg/L	na	**1.4**
Potassium	mg/L	na	<0.50
Sodium	mg/L	na	**0.53**
General			
Hardness	mg/L	na	**27**

Eagle Mine Groundwater Quality Data
QAL057A

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012 5/1/2012
Field			
D.O.1	ppm	na	11
ORP	mV	na	92
pH	SU	9.0	8.9
Specific Conductance	µmhos/cm	na	68
Temperature	°C	na	7.7
Turbidity	NTU	na	<1
Water Elevation	ft MSL	na	1359.98
Metals			
Antimony	µg/L	5.0	<1.0
Arsenic	µg/L	6.0	<1.0
Barium	µg/L	1,000	<5.0
Beryllium	µg/L	3.0	<1.0
Boron	µg/L	285	<20
Cadmium	µg/L	3.0	<0.20 e
Chromium	µg/L	52	<1.0
Cobalt	µg/L	23	<15
Copper	µg/L	10	<1.0
Iron	µg/L	na	<20
Lead	µg/L	3.0	<1.0
Lithium	µg/L	88	<8.0
Manganese	µg/L	50	<5.0
Mercury	µg/L	na	<0.500
Molybdenum	µg/L	22	<10
Nickel	µg/L	57	<2.0
Selenium	µg/L	5.0	<1.0
Silver	µg/L	0.4	<0.20
Strontium	µg/L	2,300	12 e
Thallium	µg/L	1.0	<1.0
Vanadium	µg/L	2.2	<1.0
Zinc	µg/L	1,200	<10
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	29
Chloride	mg/L	250	1.1
Nitrogen, Ammonia	mg/L	10	<0.020 a
Nitrogen, Nitrate	mg/L	10	0.11
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	0.0272 e
Sulfate	mg/L	250	2.3
Major Cations			
Calcium	mg/L	na	8.7
Magnesium	mg/L	na	1.5
Potassium	mg/L	na	<0.50
Sodium	mg/L	120	0.63
General			
Hardness	mg/L	na	28

Eagle Mine Groundwater Quality Data
QAL057D

Parameter	Unit	Maximum Daily Limit	2nd Qtr 2012 5/1/2012
Field			
D.O.1	ppm	na	**5.7**
ORP	mV	na	**107**
pH	SU	9.0	**8.6**
Specific Conductance	µmhos/cm	na	**108**
Temperature	°C	na	**7.7**
Turbidity	NTU	na	<1
Water Elevation	ft MSL	na	**1360.06**
Metals			
Antimony	µg/L	5.0	<1.0
Arsenic	µg/L	6.0	**4.3**
Barium	µg/L	1,000	<5.0
Beryllium	µg/L	3.0	<1.0
Boron	µg/L	285	**22**
Cadmium	µg/L	3.0	<0.20 e
Chromium	µg/L	52	<1.0
Cobalt	µg/L	23	<15
Copper	µg/L	10	<1.0
Iron	µg/L	na	<20
Lead	µg/L	3.0	<1.0
Lithium	µg/L	88	<8.0
Manganese	µg/L	50	<5.0
Mercury	µg/L	na	<0.500
Molybdenum	µg/L	22	<10
Nickel	µg/L	57	<2.0
Selenium	µg/L	5.0	<1.0
Silver	µg/L	0.4	<0.20
Strontium	µg/L	2,300	**56 e**
Thallium	µg/L	1.0	<1.0
Vanadium	µg/L	2.2	**1.1**
Zinc	µg/L	1,200	<10
Major Anions			
Alkalinity, Bicarbonate	mg/L	na	**49**
Chloride	mg/L	250	**1.3**
Nitrogen, Ammonia	mg/L	10	<0.020 a
Nitrogen, Nitrate	mg/L	10	**0.072**
Nitrogen, Nitrite	mg/L	na	<0.050
Phosphorus, Total	mg/L	na	**0.0274 e**
Sulfate	mg/L	250	**4.9**
Major Cations			
Calcium	mg/L	na	**13**
Magnesium	mg/L	na	**2.6**
Potassium	mg/L	na	**0.80**
Sodium	mg/L	120	**1.2**
General			
Hardness	mg/L	na	**43**

Footnote	Explanation
a	Estimated value. Duplicate precision for this parameter exceeded quality control limit.
e	Estimated value. The laboratory statement of data qualifications indicates that a quality control limit for this parameter was exceeded.
s	Potential false positive value. Compound present in blank sample.
na	Not applicable.

Appendix H

Effluent Quality Results

May 2012
Eagle Mine Site - WTP Effluent Monitoring

PARAMETER	BOD5 (mg/l)	Total Aluminum (mg/l)	Total Antimony (ug/l)	Total Arsenic (ug/l)	Total Arsenic (ug/l)	Total Barium (ug/l)	Total Beryllium (ug/l)	Total Boron (ug/l)	Total Cadmium (ug/l)	Total Cadmium (ug/l)	Total Chromium (ug/l)	Total Cobalt (ug/l)	Total Copper (ug/l)	Total Copper (ug/l)	Total Fluoride (ug/l)	Total Lead (ug/l)
CODE	310	1105	1097	1002	1002	1007	1012	1022	1027	1027	1034	1037	1042	1042	951	1051
MONITORING POINT	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1
STAGE	1	1	1	1	U	1	1	1	1	U	1	1	1	U	1	1
1																
2																
3																
4																
5																
6	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
7	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
8	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
9	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
10																
11	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
12	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
13	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	1.2
14	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
15	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
16	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
17	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
18																
19																
20																
21	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
22	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
23	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
24																
25																
26																
27																
28	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
29	<2.0	<0.050	<2.0	<1.0		<10	<5.0	<10	<0.50		<5.0	<5.0	<5.0		<100	<1.0
30																
31					<1.0					<0.50				<5.0		

May 2012
Eagle Mine Site - WTP Effluent Monitoring

PARAMETER	Total Lithium (ug/l)	Total Manganese (ug/l)	Total Mercury (ug/l)	Total Molybdenum (ug/l)	Total Nickel (ug/l)	Total Potassium (ug/l)	Total Selenium (ug/l)	Total Selenium (ug/l)	Total Silver (ug/l)	Total Silver (ug/l)	Total Strontium (ug/l)	Total Thallium (ug/l)	Total Vanadium (ug/l)	Total Zinc (ug/l)	Total Sulfate (ug/l)	Total Iron (ug/l)
CODE	1132	1055	71900	1062	1067	937	1147	1147	1077	1077	1082	1059	1087	1092	81020	1045
MONITORING POINT	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1
STAGE	1	1	1	1	1	1	1	U	U	1	1	1	1	1	1	1
1																
2																
3																
4																
5																
6	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
7	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
8	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
9	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
10																
11	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
12	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
13	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
14	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
15	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
16	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
17	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
18																
19																
20																
21	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
22	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
23	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
24																
25																
26																
27																
28	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
29	<10	<5.0	<0.000500	<5.0	<5.0	<200	<2.0		<0.20		<5.0	<2.0	<4.0	<20	<5.0	<50
30																
31								<2.0		<0.20						

May 2012
Eagle Mine Site - WTP Effluent Monitoring

PARAMETER	pH (minimum)	pH (maximum)	Dissolved Oxygen (mg/l)	Ammonia Nitrogen (mg/l)	Nitrate Nitrogen (mg/l)	Nitrite Nitrogen (mg/l)	Total Sodium (mg/l)	Total Chloride (mg/l)	Total Phosphorous (mg/l)	Specific Conductance (umhos/cm)	Effluent Flow (US GPD)	Effluent Flow (US GPY)	Influent Flow (US GPD)	Land Application Rate (Gal/sq ft)
CODE	99991	99992	300	90002	620	90004	90005	90006	90007	90019	90027	90028	50050	90010
MONITORING POINT	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	EQ-1	IF-1	LA-1
STAGE	1	1	1	1	1	1	1	1	1	1	1	1	G	G3
1											0	4076511	254887	0.00
2											0	4076511	183939	0.00
3											0	4076511	195343	0.00
4											0	4076511	36550	0.00
5											0	4076511	154236	0.00
6	7.6	8.1	7.1	0.23	<0.050	<0.050	1.9	1.8	0.012	24	19751	4096262	267753	0.16
7	7.3	8.3	7.8	0.41	<0.050	<0.050	1.3	1.7	<0.0100	14	87485	4183748	270927	0.71
8	7.4	8.4	8.1	0.35	<0.050	<0.050	1.0	1.3	<0.0100	11	185596	4369343	263583	1.52
9	8.1	8.6	8.1	0.20	<0.050	<0.050	0.98	1.3	<0.0100	11	178586	4547930	286188	1.46
10											0	4547930	284285	0.00
11	7.4	8.8	7.8	0.41	<0.050	<0.050	2.1	1.1	0.0111	27	155976	4703906	277257	1.27
12	6.9	8.6	8.0	<0.25	<0.050	<0.050	1.0	1.0	<0.0100	15	218199	4922105	279935	1.78
13	6.8	8.2	7.9	<0.25	<0.050	<0.050	1.0	1.0	<0.0100	11	210068	5132174	278856	1.72
14	6.8	8.8	8.1	0.14	<0.050	<0.050	2.0	1.2	<0.0100	32	148853	5281026	276606	1.22
15	7.6	9.0	8.8	<0.25	<0.050	<0.050	1.5	1.3	0.0163	17	67571	5348597	223050	0.55
16	6.6	8.7	6.1	0.58	<0.050	<0.050	3.6	1.7	0.0113	33	31647	5380244	273906	0.26
17	7.1	8.7	7.2	0.076	<0.050	<0.050	1.8	1.3	0.0283	20	40556	5420800	134200	0.33
18											0	5420800	193926	0.00
19											0	5420800	38	0.00
20											0	5420800	76610	0.00
21	7.1	8.7	9.0	0.063	<0.050	<0.050	1.6	1.1	0.0163	18	157416	5578216	272000	1.29
22	6.8	8.6	7.8	<0.25	<0.050	<0.050	2.4	<1.0	<0.0100	33	211566	5789782	277045	1.73
23	8.0	8.1	8.2	<0.25	<0.050	<0.050	1.3	<1.0	<0.0100	14	93077	5882859	145198	0.76
24											0	5882859	18567	0.00
25											0	5882859	820	0.00
26											0	5882859	719666	0.00
27											0	5882859	384071	0.00
28	8.1	8.7	7.4	0.17	<0.050	<0.050	2.6	<1.0	<0.0100	20	220915	6103774	285754	1.80
29	7.8	8.8	6.7	0.12	<0.050	<0.050	2.1	<1.0	<0.0100	22	122014	6225788	264474	1.00
30											0	6225788	33599	0.00
31											0	6225788	151903	0.00

Appendix I

Construction Certification

Rio Tinto

Kennecott Eagle Minerals
Kristen Mariuzza
Environmental Manager
504 Spruce Street
Ishpeming, Michigan 49849
(906) 486-1257

October 24, 2011

Mr. Randy Conroy
Michigan Department of Environmental Quality
420 5th Street
Gwinn, MI 49841

Subject: **Compliance Notification, Groundwater Discharge Permit GW1810162 Kennecott Eagle Minerals Company**

Dear Mr. Conroy:

In accordance with Part I Section 5b of the aforementioned groundwater discharge permit, Kennecott Eagle Minerals Company is providing this notification of schedule compliance. The water treatment facility construction was completed on October 7, 2011. This certification is being provided in the attached letter by John Woodson, M3Engineering, Professional Engineer License No. 57625.

Should you have any questions please contact me at (906) 486-1257.

Sincerely,

Kristen Mariuzza, P.E.
Environmental and Permitting Manager

enclosure

ARCHITECTURE
ENGINEERING
CONSTRUCTION MANAGEMENT

October 14, 2011

Correspondence M3-KEMC-1068L
Project No. M3-PN100115

Ms. Kristen Mariuzza, P.E.
General Manager of Engineering and Construction
Kennecott Eagle Minerals Company
504 Spruce Street
Ishpeming, MI 49849

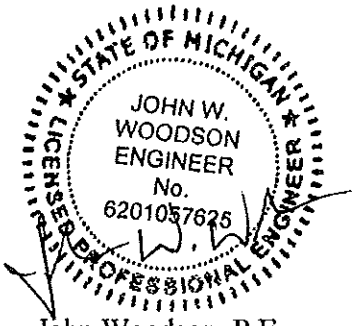
Re: Water Treatment Facility

Dear Ms. Mariuzza:

The Water Treatment Plant building and equipment were installed per M3 design drawings and specifications utilizing a quality control and quality assurance program consistent with standard construction practices. This explicitly includes the construction and installation of the building shell, concrete, piping, electrical, HVAC, and equipment.

Sincerely,

M3 ENGINEERING & TECHNOLOGY CORPORATION



John Woodson, P.E.

Copy: Daniel Neff, M3
Denton Henkelman, KEMC
File: M3 –PN100115-152.1

2051 W. Sunset Rd.
Suite 101
Tucson, Arizona
85704
t 520.293.1488
f 520.293.8349
www.m3eng.com