

2013 WORK PLAN
For
Rio Tinto Eagle Mine
Independent Community Environmental Monitoring Program

Submitted by
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Commonly Used Acronyms and Abbreviations

CEMP	Community Environmental Monitoring Program
CWB	Contact Water Basin
DEQ	Michigan Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
GW	Ground Water
GWDP	Ground Water Discharge Permit
HTDF	Humboldt Tailings Disposal Facility
MCCF	Marquette County Community Foundation
PM	Particulate Matter (dust) measured in microns
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
SOP	Standard Operating Procedures
SWP	Superior Watershed Partnership
TBD	To Be Determined
TDRSA	Temporary Development Rock Storage Area
TWIS	Treated Water Infiltration System
WWTP	Waste Water Treatment Plant

Diagram of Eagle Mine Facilities



Site legend

- | | | |
|---|---|---|
| <p>01 Treated Water Infiltration System -
Infiltration system that slowly releases treated water back into the environment through a series of insulated, perforated pipes laying on the grounds surface.</p> <p>02 Power House -
Industrial facility for the distribution of power and backup generation of electric energy.</p> <p>03 Storage Facility - Storage for supplies used in the mining operation.</p> <p>04 Water Treatment Plant -
A state of the art, reverse osmosis water treatment plant to purify water from operations.</p> <p>05 Truck Wash -
All vehicles leaving the main operations area are required to go through the truck wash to clean the vehicles before they leave the area. Water is captured and sent to the water treatment plant for processing. Water that is not recyclable will be routed to the water treatment plant for processing.</p> | <p>06 Mine Services Buildings -
The buildings and structures utilized for supporting Eagle. These include offices, maintenance facilities, a mine dry and other mine support services.</p> <p>07 Contact Water Basins -
All water that comes into contact with mining activities will be stored in two basins and pumped into the water treatment plant for purification. The basins are designed to hold water in excess of a 100 year rain event.</p> <p>08 Non-Contact Water Basin -
Water not directly related to mining activities, such as snow and rain, will be collected in these basins. Water will flow to these basins and be naturally reabsorbed into the ground.</p> <p>09 Coarse Ore Storage -
Closed storage facility for coarse, uncrushed ore that is brought to the surface. Underground mine trucks will off load the ore which in turn will be loaded into highway trucks and taken to the Humboldt Mill.</p> | <p>10 Temporary Development Rock Storage Area -
Environmentally secure storage facility for development rock, all rock removed from the underground that is not considered ore. The facility features a multilayered liner, leak detection system and sump pump to collect water which will be treated by the water treatment plant. All development rock will be returned underground as fill.</p> <p>11 Portal -
Entrance to decline leading to the underground development and ore body.</p> <p>12 County Road Triple A</p> |
|---|---|---|

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Introduction

The independent Community Environmental Monitoring Program (CEMP) of the Rio Tinto Eagle Mine is implemented by two community-based organizations; the Superior Watershed Partnership (SWP) and the Marquette County Community Foundation (MCCF). The CEMP is defined and governed by formal agreements between these organizations and Rio Tinto. The CEMP is designed to build a comprehensive and accurate picture of any environmental impacts that may be a result of Eagle Mine's operations at the mine site, the Humboldt Mill, and along the designated transportation route. The CEMP is independent, transparent, and based on the highest scientific standards.

The CEMP consists of three parts: 1) *Verification monitoring*: SWP conducts verification monitoring of the environmental monitoring done by Eagle Mine as required by its permits. At this time, environmental monitoring is required by two State of Michigan permits: a Part 632 Nonferrous Metallic Mineral Mining Permit and a Groundwater Discharge Permit; 2) *Additional monitoring*: This is environmental monitoring done by SWP over and above the monitoring that Eagle Mine is required to do under its permits; and 3) *Community outreach*: Community outreach aims to make sure that the results of the monitoring program are available and understood by the community and that the community has opportunities to provide input regarding CEMP activities.

The following work plan is organized into five sections that describe CEMP activities including overall community monitoring objectives, risks assessment, annual monitoring objectives, data publication, and community outreach. Table 1 provides a summary of work plan tasks.

1. Community Monitoring Objectives

1.1. Verification Monitoring and Data Review

1.1.1. Baseline Data Review

Rio Tinto will continue to provide SWP with baseline environmental data in the form of reports, a data base or summary format. SWP recognizes the baseline data collection period as beginning in 2004 and continuing through the beginning of mining (ore extraction) in early 2014. Baseline monitoring data continues to be collected where mining activities have not been initiated, primarily at monitoring stations upgradient of

the Eagle Mine surface facilities and at the Humboldt Mill. The focus of the baseline data review will be to develop an understanding of pre-mining environmental conditions for use in the evaluation of data generated during monitoring of mining operations.

1.1.2. Operations Data Review

Rio Tinto will continue to provide SWP with Eagle Mine operational data in the form of reports, a data base or summary format. SWP will review operations data from three perspectives. The first is to verify the validity (precision, accuracy representativeness) of the environmental monitoring data. The second is to analyze data collected from compliance monitoring points for indications of impact from the mining operations. The last is to analyze data from background (including upgradient, baseline and reference watershed monitoring points) for indications of local (e.g., logging), regional (e.g., atmospheric deposition) or global (e.g., climate change) impact related to other non-mine activity.

1.1.3. Procedures Review

SWP will continue to audit field data collection procedures and review the Rio Tinto Eagle Project Quality Assurance Project Plan (QAPP) and Standard Operating Procedures (SOP) and other applicable procedures during 2013. The objective of this review is to verify that the procedures used are appropriate and will result in the generation of data sets that are representative of environmental conditions.

1.1.4. Interpretation Review

SWP will continue to review Rio Tinto's interpretation of baseline, operational, reference and background environmental monitoring data. The interpretations review will focus primarily on the basis of interpretations, assigning likely root cause (mine impacts, data quality issues or unrelated impacts) to monitoring point values that exceed permit specified benchmarks or thresholds.

1.1.5. Split Sampling

SWP will carry out split sampling at permit required monitoring sites in conjunction with Rio Tinto's scheduled monitoring. Split sampling is when a sample taken from a single source (e.g., a groundwater well) is divided in two, with each sample analyzed by a different certified laboratory. Split samples will be collected from a subset of the mine site locations shown in Figures 1-4 and will be submitted to an independent laboratory for

analyses. The samples may be analyzed for the full parameter list or a subset of the parameters specified for that monitoring point. The objective of the split sampling is to verify that the procedures/laboratories used are appropriate and the results are representative of environmental conditions.

1.1.6. Standards, Methodologies, and Baseline Data for Verification Monitoring

SWP intends to follow the procedures, methodologies and use the standards outlined in this work plan, the CEMP agreement, and the applicable permits while carrying out Verification Monitoring.

1.2. Additional Monitoring

1.2.1. Powell Township Air Quality

During November of 2012, an air quality and meteorological station was installed in Powell Township per the CEMP Agreement. The station is located in the community of Big Bay behind Crams General Store. The air monitoring equipment measures particulate matter (dust) in the 10 micron size range (PM10) on a continuous and weekly basis following a schedule and standards established by the U.S. EPA's Ambient Air Monitoring Program. The equipment also has the capability to monitor particulate matter as small as 2.5 microns (PM2.5). In addition, particulate matter filters are retained for quarterly laboratory analysis of metal concentrations. The meteorological station measures wind speed and direction, temperature, barometric pressure, precipitation, solar radiation, and relative humidity. The objective of the Powell Township air quality monitoring station is to generate data that can be used to identify potential air quality impacts in the community that may be a result of mining operations. Data collected from the station during 2013 will be considered baseline.

1.2.2. Mine Site

Additional monitoring at the mine site during 2013 will include collection of baseline air quality monitoring data using a portable particulate monitoring device that will measure particulate matter in the 10 micron size range (PM10). The equipment also has the capability to monitor particulate matter as small as 1 micron in size (PM1). Additional secondary data that will be evaluated includes air quality (PM10) and meteorological data from the Eagle Mine air/meteorological station. During 2013, data collected using the portable air monitoring device will be considered baseline. The objective of the portable

air quality monitoring at the mine site is to provide baseline data for evaluation of potential air quality impacts from mining operations.

1.2.3. Transportation Route

Environmental monitoring along the transportation route will begin during 2013 as soon as the final route is identified. This includes collection of baseline water quality data at stream crossings and baseline air quality data using a portable particulate monitoring device. Additional secondary data that may be evaluated and/or collected along the transportation route includes weather and traffic data. The objective of the surface water quality and portable air quality monitoring along the transportation route is to provide baseline data for evaluation of potential impacts from transportation of ore during mining operations.

1.2.3 Humboldt Mill

SWP will review/evaluate Rio Tinto baseline environmental data for the Humboldt Mill including groundwater and surface water quality data as described in Section 1.1.1. In addition, SWP will verify Rio Tinto baseline data collection at the Humboldt Mill during 2013 through observations and/or split sampling as described in Section 1.1.5. SWP will also collect baseline air quality monitoring data near the mill site using a portable particulate monitoring device. Additional supplemental data that will be evaluated includes data from the Rio Tinto floating meteorological station located on the water surface at the north end of the Humboldt Tailings Disposal Facility (HTDF). The objective of the baseline data review and collection is to develop an understanding of pre-mining environmental conditions at the mill for use in the evaluation of data generated during monitoring of mining operations.

1.2.4 Other Based on Results or New Activities

Other additional monitoring during 2013 may include a Kirtland's Warbler population study on the Yellow Dog Plains (near the mine site) that will be conducted in cooperation with Michigan State University.

1.2.5 Standards, Methodologies, and Baseline Data for Additional Monitoring

SWP intends to follow the procedures, methodologies and use the standards outlined in this work plan, the CEMP agreement, and the applicable permits while carrying out Additional Monitoring. Standards and methodology for water quality monitoring along

the transportation route and the Kirtland's Warbler population study will be developed prior to commencing with any monitoring activities.

2. Risks Assessment

2.1 Potential Impacts from Rio Tinto Eagle Mine

At this time, mining activities, and consequentially the greatest potential for environmental impacts from the Rio Tinto Eagle Mine are limited to the immediate vicinity of the mine surface facilities. Within the surface facilities, mining activities that create potential risk are the removal of development rock from the decline and storage of that material in the Temporary Development Rock Storage Area (TDRSA). Storage of water used in mining operations in the Contact Water Basins (CWBs) and treatment of that water in the Wastewater Treatment Plant (WWTP) for reuse (in mining operations) or discharge through infiltration to the ground surface and ultimately to groundwater at the location of the Treated Water Infiltration System (TWIS) also provide potential risks. There is also a potential for air quality impacts from surface facilities and the mine shaft vent raise. Table 2 provides a summary of the potential mine impacts to groundwater quality, surface water quality, air quality and flora/fauna.

2.2 Potential Impacts from Rio Tinto Humboldt Mill and Transportation Route

At this time, the greatest potential for impacts from the Humboldt Mill includes construction activities associated with refurbishing the mill and re-commissioning the Humboldt Tailings Disposal Facility (HTDF). This includes, but is not limited to, construction a cutoff wall between the HTDF and wetlands on the north side and potential impacts to air quality from particulate emissions. The greatest potential for environmental impacts from the Transportation Route include potential impacts to surface waters at road stream crossings (spills and/or increased sedimentation) and potential impacts to air quality from vehicle emissions. Table 3 provides a summary of potential impacts of the Humboldt Mill and Transportation Route to groundwater quality, surface water quality, air quality and flora/fauna.

2.3 Relationship between Risks and Annual Monitoring Objectives

Annual monitoring objectives are specifically focused on risks identified based on various phases of operation of the Eagle Mine. Within the Eagle Mine area of focus, 2013 monitoring objectives are divided between verifying Rio Tinto generated data at permit-

required monitoring locations and initiation of baseline air quality monitoring. Because ore will not be extracted or transported from the mine or processed at the Humboldt Mill until early 2014, any data collected at the Humboldt Mill or along the designated transportation route will be considered baseline.

3. Annual Monitoring Objectives

3.1. Sampling Objectives

3.1.1 Facilities Monitoring

Environmental monitoring of Eagle Mine facilities will be conducted monthly and/or quarterly and includes monitoring of water quality at the TDRSA and CWB sumps and WWTP effluent. Water samples will be collected in conjunction with Rio Tinto's scheduled monitoring using split-sampling methods described in Section 1.1.5. Three to six samples will be submitted to a laboratory for analysis each quarter. Analytical parameters, methods and reporting limits are presented in Tables 4 and 5.

3.1.2 Groundwater Elevation

No independent groundwater elevation monitoring is proposed for 2013; however, groundwater elevation data will be provided by Rio Tinto for review and trends analysis.

3.1.3 Groundwater Quality

Groundwater quality monitoring will be conducted quarterly at a subset of the mine permit and groundwater discharge permit-required monitoring locations shown in Figures 2 and 3. Groundwater samples will be collected in conjunction with Rio Tinto's scheduled monitoring using split-sampling methods described in Section 1.1.5. Five to eight samples will be submitted to a laboratory for analysis each quarter. Analytical parameters, methods and reporting limits are presented in Tables 6 and 7. In addition, SWP will verify baseline groundwater data collection at the Humboldt Mill during 2013 in conjunction with Rio Tinto's scheduled monitoring. This will be accomplished through observations and/or split sampling as described in Section 1.1.5.

3.1.4 Surface Water Quality

SWP will observe surface water quality monitoring at permit required monitoring sites near the mine (Figures 1 and 5) in conjunction with Rio Tinto's scheduled monitoring. In addition, SWP will collect baseline water quality data at stream crossings along the transportation route once the route is identified (sites and parameters TBD). Standards

and procedures for water quality monitoring along the transportation route will be developed prior to commencing with any monitoring activities. SWP will also verify Rio Tinto baseline surface water quality monitoring at the Humboldt Mill during 2013 through observations and/or split sampling as described in Section 1.1.5. This monitoring will be conducted in conjunction with Rio Tinto's scheduled monitoring.

3.1.5 Flora/Fauna Monitoring

SWP will observe monitoring of wetlands and flora/fauna as required by the mine permit (Figure 6) in conjunction with Rio Tinto's scheduled monitoring. Additional flora/fauna monitoring proposed for 2013 includes a Kirtland's Warbler population study on the Yellow Dog Plains (near the mine) that will be conducted in cooperation with Michigan State University. Standards and procedures for the Kirtland's Warbler population study will be developed prior to commencing with any monitoring activities.

3.1.6 Air Quality

During 2013, an air quality monitoring program will be implemented using the Powell Township air quality and meteorological station (see Section 1.2.1) and a portable air quality monitoring device. Air quality monitoring will be conducted in Powell Township, and in the vicinity of the Eagle Mine and Humboldt Mill, and along the designated transportation route. All air quality monitoring will follow the *CEMP Air Quality Monitoring Plan* that is currently under development with oversight from Air Quality Program staff from the Michigan DEQ and U.S. EPA. The plan will include standards and procedures for air quality monitoring and supplemental data collection as well as use of secondary data, including data from Eagle Mine's air quality/meteorological station, the Humboldt floating meteorological station, and other regional stations as appropriate. The objective of the air quality monitoring program is to generate data that can be used to identify potential impacts from mining operations. During 2013, all air quality monitoring data collected will be considered baseline.

3.2 Sampling Procedures

3.2.1 Data Collection Methods

Data collection methods and procedures described in the Eagle Project QAPP and SOP will be followed for verification monitoring. SWP will develop its own QAPP and SOP for additional monitoring of surface waters (e.g. transportation route monitoring) prior to

commencing with monitoring activities. A study plan, including quality assurance and sampling procedures for the Kirtland's Warbler population study, will be developed prior to commencing with study activities. Data collection methods for air quality monitoring will follow the *CEMP Air Quality Monitoring Plan* (under development).

3.2.2 Parameters, Analytical Methods, Reporting Limits

Tables 4 through 7 present the parameters, analytical methods and reporting limits for samples collected from Eagle Mine facilities, and groundwater and surface water monitoring locations associated with the mine and groundwater discharge permits. Parameters, analytical methods, and reporting limits for baseline data collected from groundwater monitoring locations at the Humboldt Mill are included in the Mining Permit Application for the Humboldt Mill.

3.2.3 Quality Control

Quality assurance and quality control described in the Eagle Project QAPP and SOP will be followed for verification monitoring. SWP will develop its own QAPP and SOP for additional monitoring of surface waters (e.g. transportation route baseline monitoring) prior to commencing with monitoring activities. A study plan, including quality assurance and sampling procedures for the Kirtland's Warbler population study, will be developed prior to commencing with study activities. Quality assurance and quality control for air quality monitoring will follow the *CEMP Air Quality Monitoring Plan* (under development).

3.3 Sampling Schedule

Verification monitoring will be conducted in conjunction with Rio Tinto's scheduled monitoring. Sampling schedules for additional monitoring will be detailed in QAPPs and SOPs that will be developed prior to commencing with monitoring activities. The sampling schedule for the Powell Township air quality monitoring and meteorological station is included in the *CEMP Air Quality Monitoring Plan*. Table 1 includes a proposed schedule and frequency for most 2013 monitoring activities.

3.4 Analytical Procedures

3.4.1 Data Representativeness, Precision and Accuracy

Data will be assessed for representativeness, precision and accuracy according to the procedures described in the Eagle project and SWP QAPPs and SOPs. Acceptable

measures of representativeness, precision and accuracy will translate to acceptable levels of trust in Rio Tinto produced data.

3.4.2 Comparison of Results to Benchmarks Related to Baseline Data and Permit Criteria

Data generated will be compared to appropriate baseline data, criteria/benchmarks specified in the mining and groundwater permits, and other agreed upon state and federal criteria. If any locations outside of Eagle's baseline or permit required monitoring locations are utilized for data collection, at least one year of data will be collected before any interpretation of results will be made.

3.5 Quality Assurance

Quality assurance will be completed in accordance with the procedures described in the Eagle Project and SWP QAPPs and SOPs.

4. Data Publication

4.1 Communication Plan for Data Publication

4.1.1 Data Processing

SWP laboratory(s) will deliver data in electronic format to SWP no later than 30 days of receipt of samples and the data will be processed by SWP within 5 working days of receipt from the laboratory. Primary processing will consist of verification that samples, parameters, analytical methods, and detection limits were completed as requested. Secondary processing will consist of the evaluation of laboratory quality control data and duplicate data for evidence of quality control issues. Tertiary processing will consist of comparison of data to appropriate baseline data, permit specified criteria/benchmarks, or other agreed upon state or federal criteria. The final data processing step will follow receipt of Rio Tinto data and consist of the assessment of data precision by comparison Rio Tinto's laboratory derived values with values produced by SWP's laboratory(s). Data processing procedures will be conducted in a manner consistent with the CEMP Agreement and Rio Tinto Eagle project and SWP QAPPs and SOPs.

4.1.2 Notification Process

Once data has been received from the laboratory and processed according to the procedures described below, SWP will post data to the CEMP website (<http://www.cempmonitoring.com>). Notification processes are defined by the CEMP

agreement and will be further defined by the *CEMP Communications Plan* (under development). This includes, but is not limited to the following: 1) CEMP data that does not conform to permit conditions or that indicate quality assurance issues will be shared with Rio Tinto within 24-hours of discovery and prior to posting on the CEMP website; 2) SWP and Rio Tinto may repeat sampling in the event of non-conforming data in order to rule out problems associated with laboratory analysis or interference from outside sources and 3) Non-conforming data will be shared with Rio Tinto prior to posting on the CEMP website in any event and in cases where Rio Tinto has a dissenting interpretation of the issue, both viewpoints will be presented on the website; and 4) Rio Tinto and SWP will inform each other by phone or email of any data that suggests a danger to community health or the environmental as soon as they become aware of the risk. If this communication is by phone, it will be followed up with a confirming email. SWP and Rio Tinto will release this information to the community and DEQ as soon as possible.

4.1.3 Data Publication Schedule

Per the CEMP Agreement, data that exceeds permit conditions will be published on the website no later than 10 days after Rio Tinto has been notified and all other data will be published on the website within 14 days of becoming available.

4.2 Web Access to CEMP and Eagle Mine Data

CEMP and Eagle Mine monitoring data will be available to the public on the CEMP website in an interactive GIS-based format (under development). The data will be available for downloading and for display either spatially, graphically or in tabular formats. Spatial displays will show environmental monitoring locations relative to topography, structures, hydrology and aerial imagery. Spatial displays will also highlight environmental monitoring locations where parameters have been detected at concentrations that exceed permit specified criteria/benchmarks. Graphical displays will consist of charts that illustrate which parameters were sampled at a monitoring location or which environmental monitoring stations have data for a parameter. For a specified monitoring period, users will be able to plot reported concentrations of one or two parameters at one environmental monitoring location or for one parameter at multiple environmental monitoring locations. Tables will be produced for each graphical display conveying the information in the chart along with additional information such as data

source, sampling time, or laboratory reporting limits. The website may also include related monitoring data from other agencies and organizations.

4.3 CEMP Report Card

The CEMP website and GIS-based data portal will include a Monitoring Report Card that rates Eagle Mine on its environmental performance. At a glance, this report card will show areas where values have exceeded permit specified criteria/benchmarks or other agreed upon state or federal criteria. Those who want to dig deeper can access specific test results, locations and trends via the website.

4.4 Eagle Mine Scorecard

SWP will provide input to Rio Tinto on Eagle Mine's environmental performance for inclusion in its Scorecard.

5. Community Outreach

5.1 Description of CEMP Outreach

SWP will implement a comprehensive community outreach program to provide information to the public about the CEMP and environmental monitoring conducted by Eagle Mine. The CEMP outreach program will include the CEMP website and GIS-based data portal, the CEMP Report Card, input to Eagle Mine's Scorecard, press releases and media outreach, printed materials and publications, and opportunities for the community to provide input regarding CEMP activities.

5.2 Schedule of Community Forums

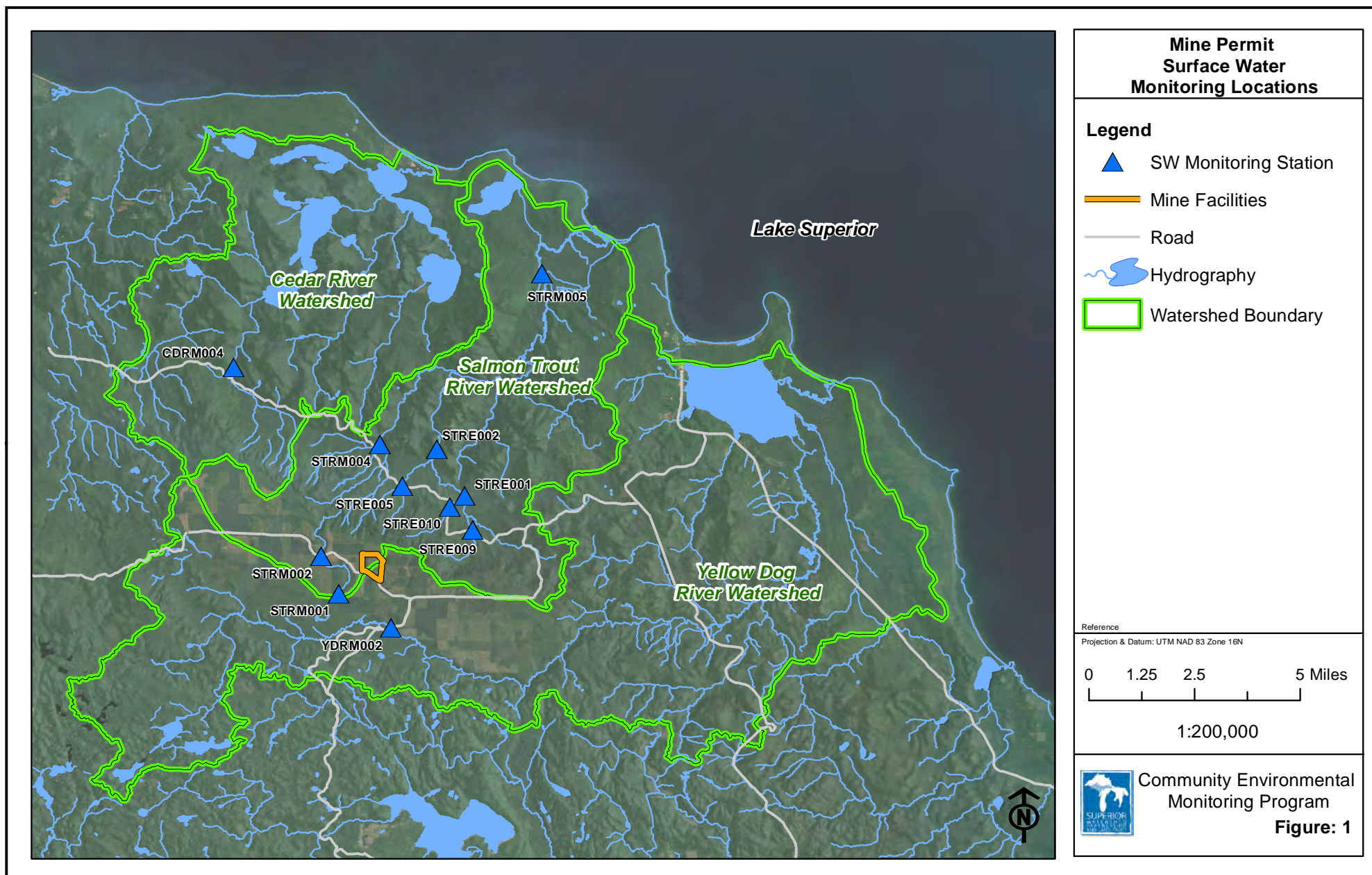
The SWP will coordinate a series of community meetings to inform the public about the CEMP and gather input regarding future monitoring. Meetings will be held in the following communities on a quarterly basis; Marquette, Baraga, Powell Township, Michigamme Township, and Humboldt Township. Tentative dates for 2013 public meetings are include in Table 8.

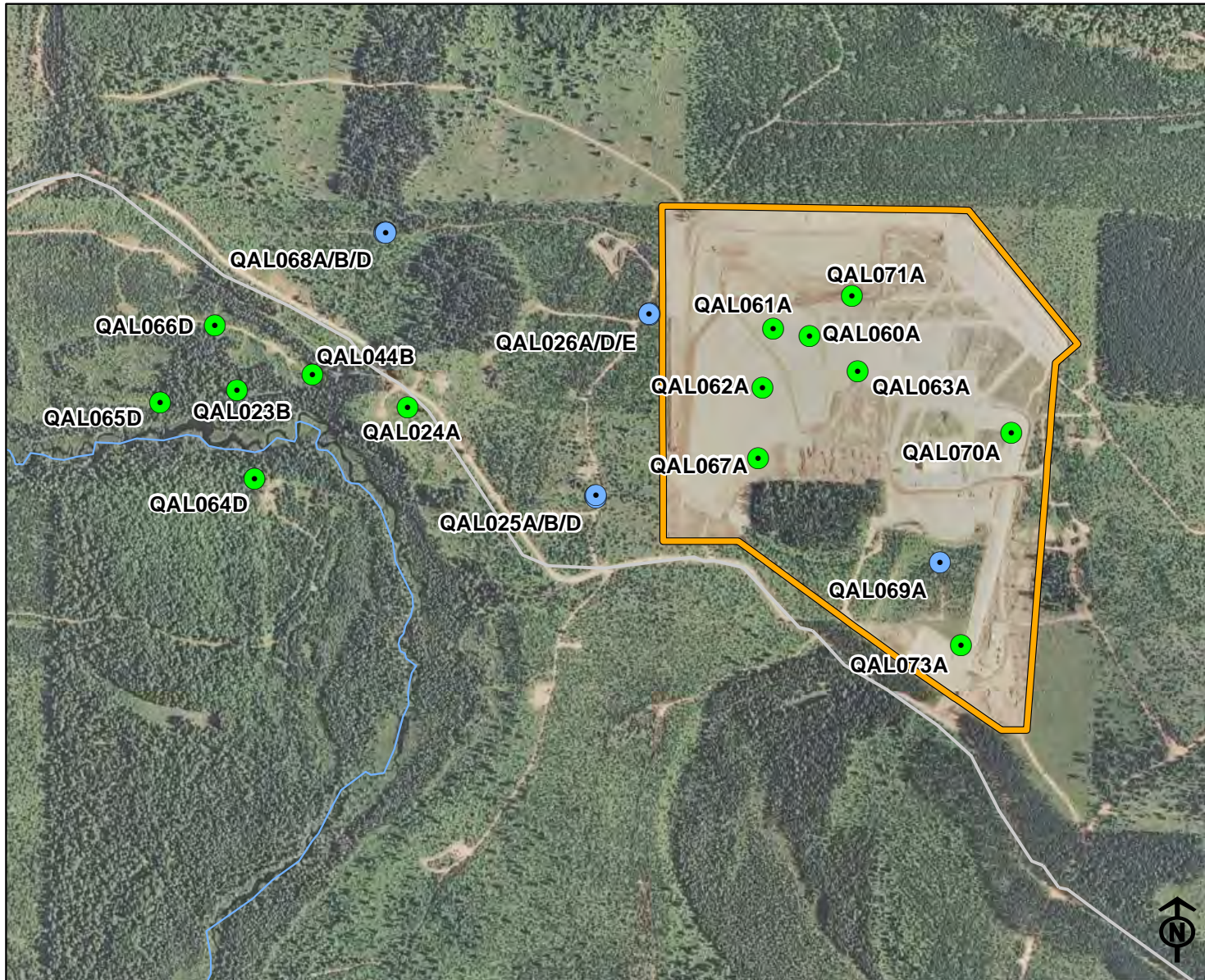
5.3 Additional presentations and publications

The CEMP outreach program will also include presentations to community organizations and other interested stakeholders as requested.

Community Environmental Monitoring Program 2013 Budget

ITEM	TITLE	HOURS	RATE	DESCRIPTION	TOTAL
MCCF Management Fee				MCCF Management Fee	15,000.00
PROJECT MANAGEMENT and STAFFING				PROJECT MANAGEMENT and STAFFING	
				Monitoring	119,600.00
				Public Outreach / Meetings	67,600.00
				Clerical Assistance	16,900.00
					204,100.00
CONTRACTUAL					
North Jackson	Work Orders			Technical Assistance	29,000.00
WI State Laboratory	Air Station	208		33 Laboratory Analysis (PM10)	6,864.00
Eastern Research Group	Air Station	8		279 Laboratory Analysis (Metals)	2,232.00
Met 1 Instruments	Air Station	6		75 Laboratory Analysis (BAM Continuous)	450.00
Various	Air Station	1		4750 Maintenance/Calibration	4,750.00
URL	Surface Water/Ground water	1		12500 Laboratory Technical =Assistance	12,500.00
MSU	Additional Monitoring	1		7500 Kirtland's Warbler Study (MSU)	7,500.00
Elegant Seagulls	Website	1		1500 Website Maintenance	1,500.00
				TOTAL CONTRACTUAL	64,796.00
OUTREACH AND SUPPLIES					
Printing Company	Printing			Educational Materials, Reports, etc.	1,250.00
Meeting Space	Meetings			Public Meetings/Announcements	650.00
Field and office supplies	Supplies			Field and Office supplies/materials	1,500.00
Equipment	Purchase	1		4500 YSI Handheld water quality	4,500.00
Equipment	Rentals			Snowmobile, trailer, etc	2,250.00
				TOTAL OUTREACH & SUPPLIES	10,150.00
TRAVEL					
		MILES			
Mileage	Federal Rate	10,538		0.0565 Travel to meetings, field sites, etc.	5,954.00
				TOTAL TRAVEL	5,954.00
				2013 Funding	300,000.00





Mine Permit Groundwater Monitoring Locations

Legend

- Background Well
- Compliance Well
- Mine Facilities
- Road
- ~ Hydrography

Reference

Projection & Datum: UTM NAD 83 Zone 18N

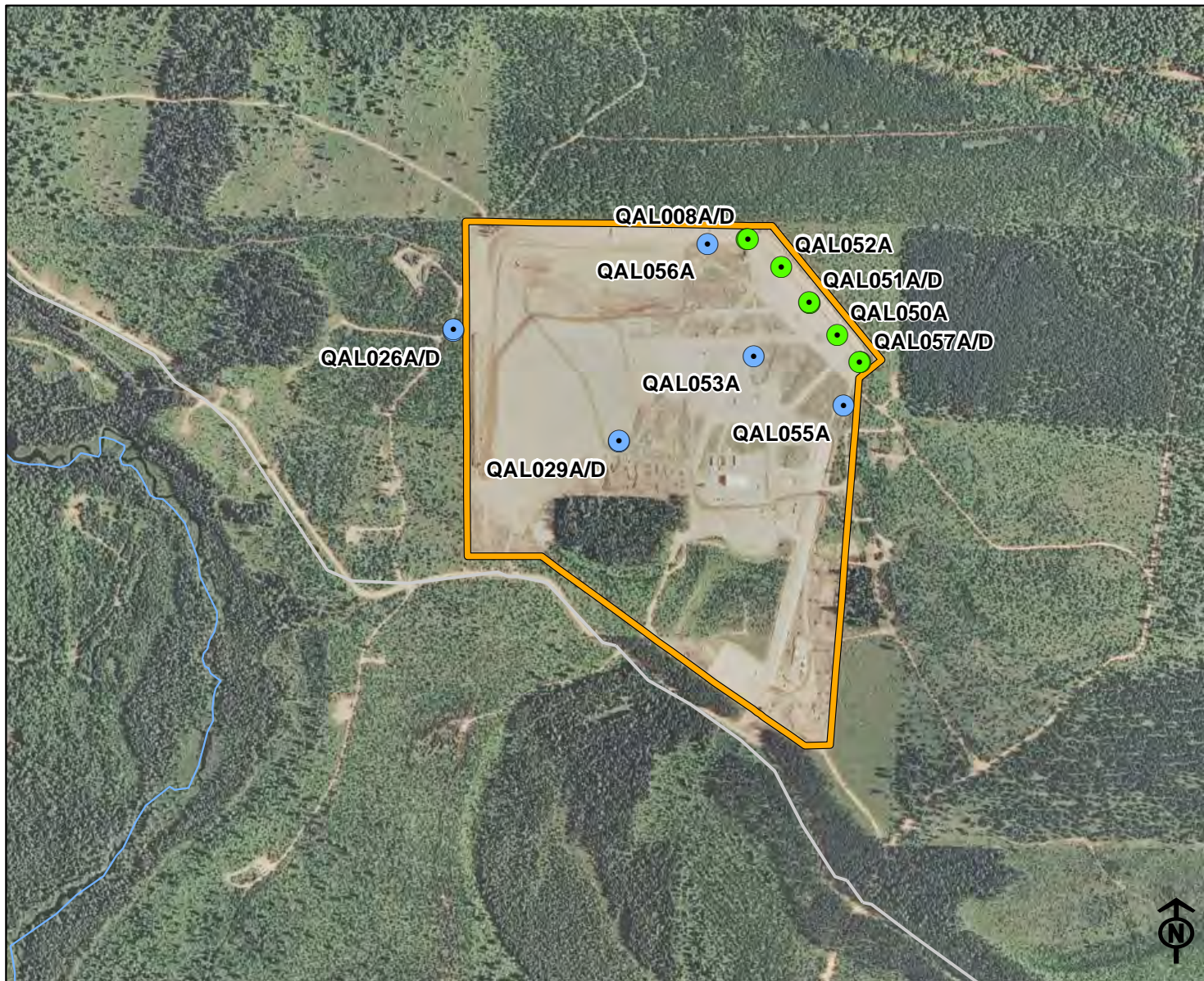
0 0.05 0.1 0.2 Miles

1:12,000



Community Environmental
Monitoring Program

Figure: 2



Groundwater Discharge Permit Monitoring Locations

Legend

- Compliance Well
- Background Well
- Mine Facilities
- Road
- ~ Hydrography

Reference

Projection & Datum: UTM NAD 83 Zone 16N

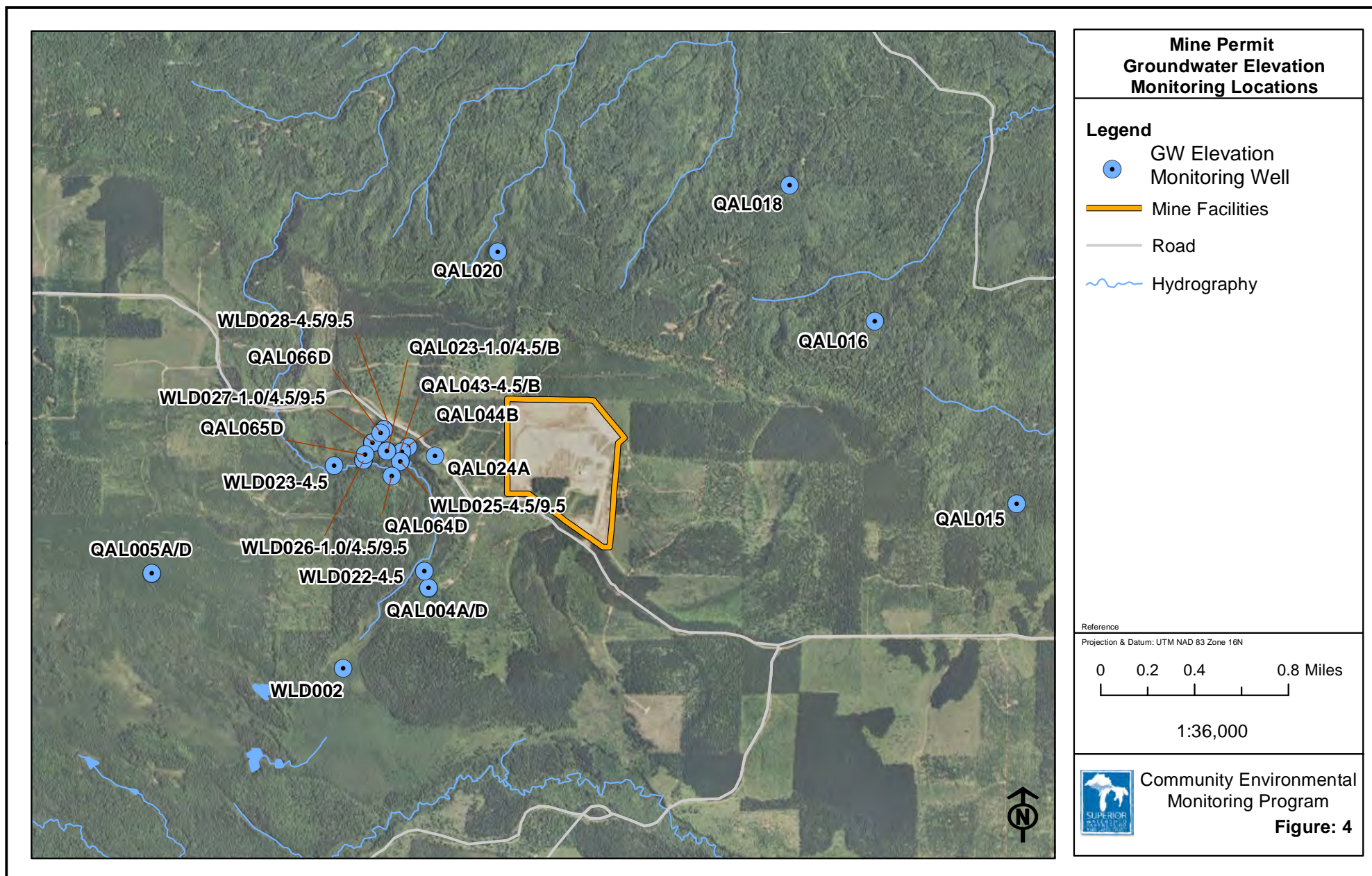
0 0.05 0.1 0.2 Miles

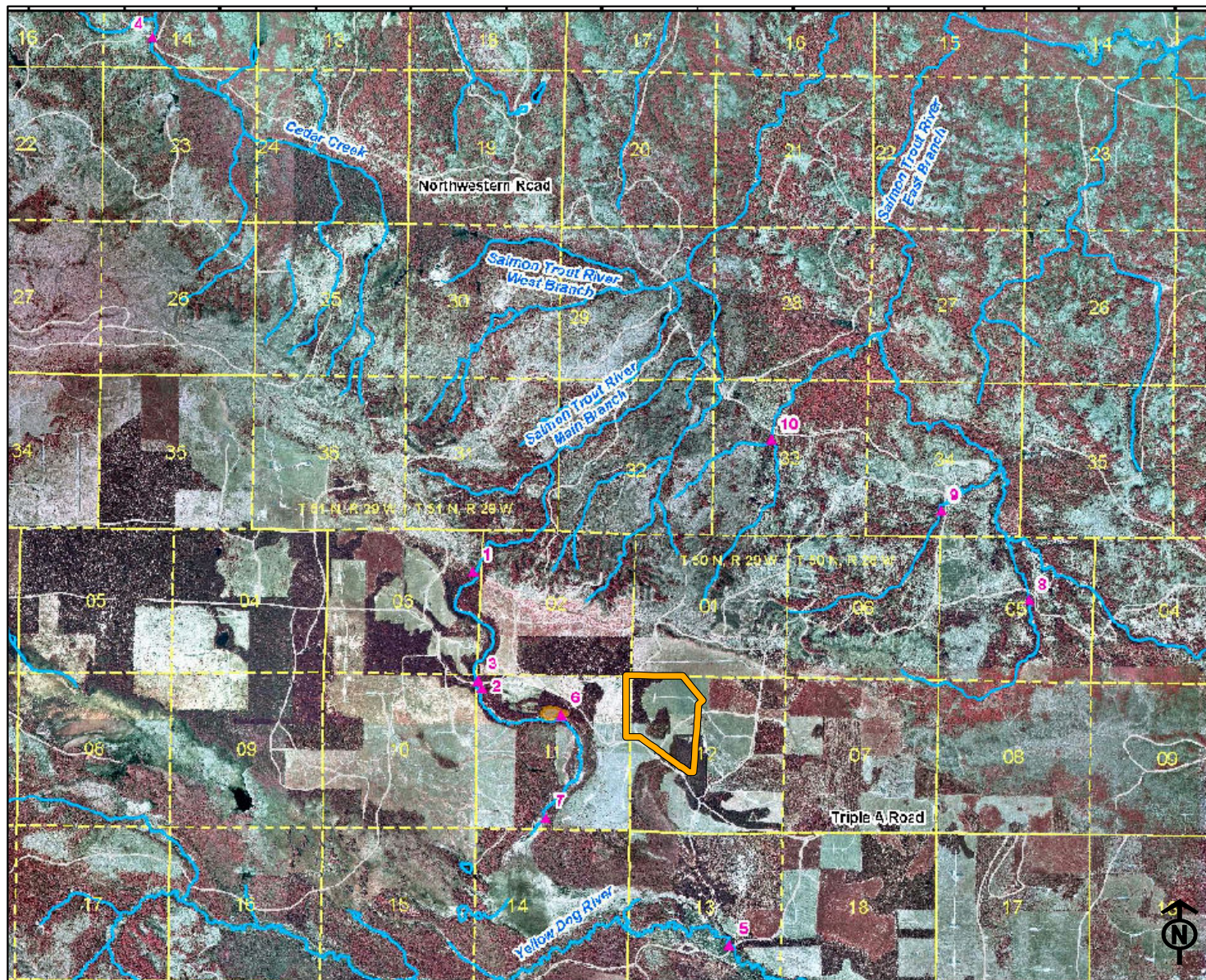
1:12,000



Community Environmental
Monitoring Program

Figure: 3





Aquatic Sampling Monitoring Locations

Legend

- ▲ Aquatic Sampling Monitoring Station
- Mine Facilities
- Road
- ~ Hydrography

Reference

Projection & Datum: UTM NAD 83 Zone 18N

0 0.375 0.75 1.5 Miles

1:65,000



Community Environmental
Monitoring Program

Figure: 5

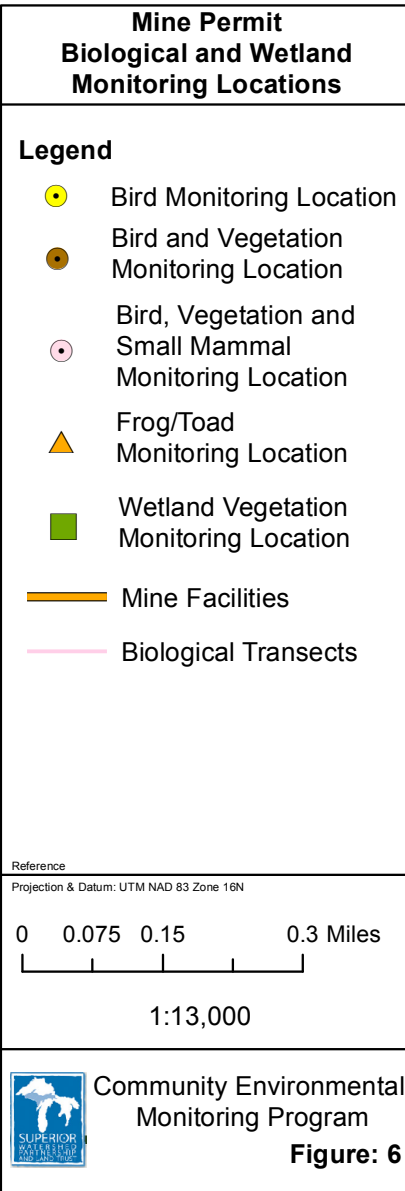
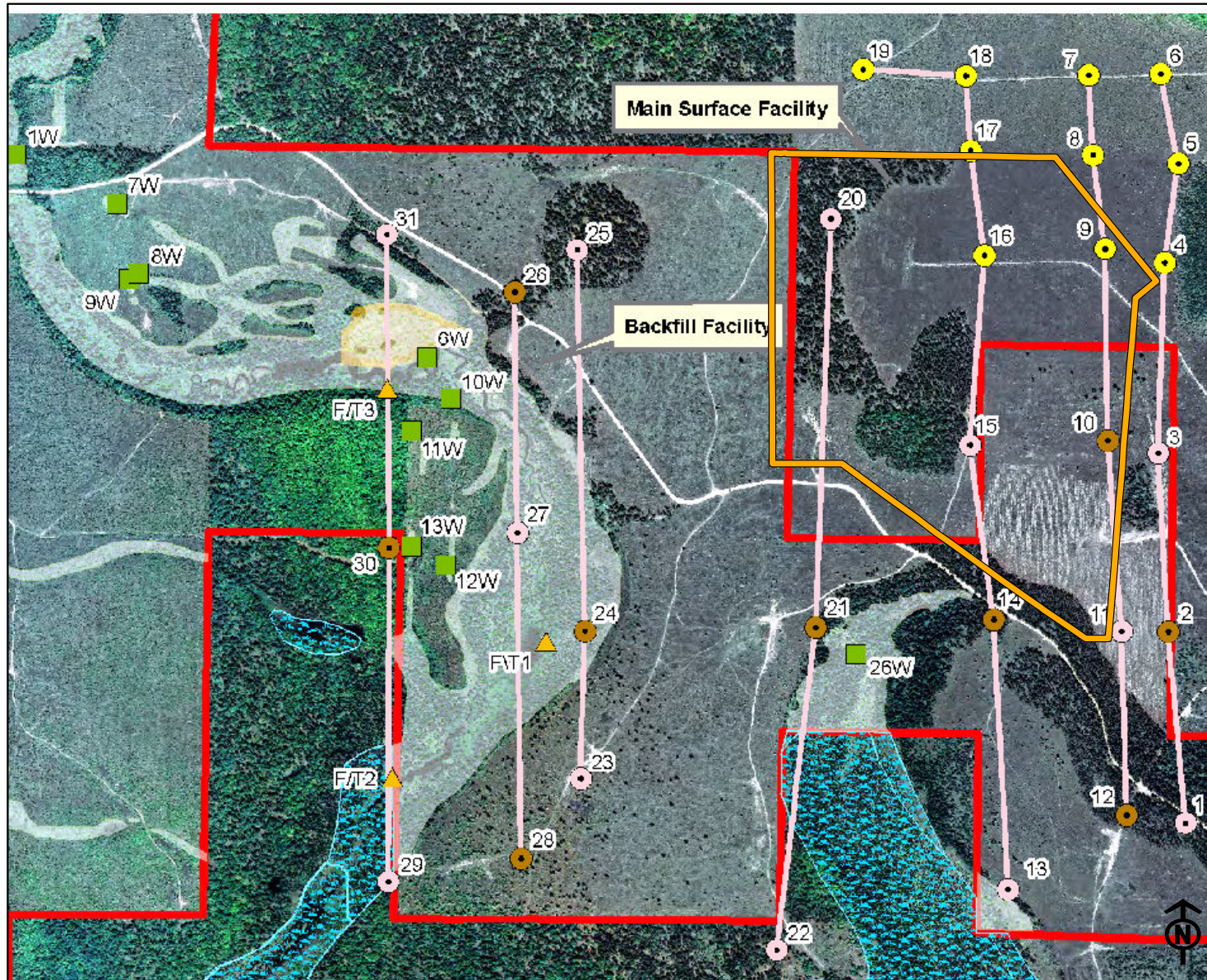


Table 1
Independent Environmental Community Monitoring Program
Summary of Work, Standards, Schedule
and
Relationship of Tasks to Potential Environmental Impacts
Prepared by Superior Watershed Partnership

WORK PLAN TASK	SITE(S)	PARAMETERS	STANDARDS	PERIOD	FREQUENCY	2013 SCHEDULE	POTENTIAL IMPACTS*
1.1 Verification Monitoring and Data Review							
1.1.1 Baseline Data Review	All	Groundwater, surface water, and wastewater quantity/elevation/flow and quality; flora and fauna diversity and numbers	Data review and trends analysis	Pre-mining data through start of ore production	Not Applicable	January-December	SM1- SM6, GM2-GM5
1.1.2 Operations Data Review	All	Groundwater, surface water, and wastewater quantity/elevation/flow and quality; flora and fauna diversity and numbers	Validity of data, mining impacts (Part 632 Rule and Mining and Groundwater Discharge Permits), non-mining impacts	2013	Not Applicable	January-December	SM1- SM6, GM2-GM5
1.1.3 Procedures Review	Permit Required Monitoring Sites	Field Practices and QAPP and SOP	Part 632 Mining and Groundwater Discharge Permits	2013	Various, Based on Rio Tinto Scheduled Monitoring	January-December	Not Applicable
1.1.4 Interpretation Review	All	Groundwater, surface water, and wastewater quantity/elevation/flow and quality; flora and fauna diversity and numbers	Part 632 Rule and Mining and Groundwater Discharge Permit specified criteria	2013	Not Applicable	January-December	SM1- SM6, GM2-GM5
1.1.5 Split Sampling Eagle Permitted Facilities	TDRSA and CWB Sumps, WWTP effluent and Mining Permit and GWDP surface water and groundwater	Tables 4 through 7	Part 632 Rule and Mining and Groundwater Discharge Permits	2013	Various, Based on Rio Tinto Scheduled Monitoring	January-December	GM3, GM5, SM3, SM5

*Risk Assessment Codes for Eagle Mine, Humboldt Mill, and Transportation Route are explained in Tables 2 and 3.

Table 1
Independent Environmental Community Monitoring Program
Summary of Work, Standards, Schedule
and
Relationship of Tasks to Potential Environmental Impacts
Prepared by Superior Watershed Partnership

WORK PLAN TASK	SITE(S)	PARAMETERS	STANDARDS	PERIOD	FREQUENCY	2013 SCHEDULE	POTENTIAL IMPACTS*
1.2 Additional Monitoring							
1.2.1 Powel Township Air Quality	Stationary Air/Met Station just west of Big Bay	PM10, metals, wind speed and direction, etc.	National Ambient Air Quality Standards and Michigan Air Toxic Screening Levels	November 2012 through start of ore production (this will define Baseline)	PM10 weekly, metals quarterly	January-December	AM1-AM5
1.2.2 Mine Site	Near Eagle Mine Site and mine shaft vent raise	PM10, wind speed and direction, etc.	National Ambient Air Quality Standards and Michigan Air Toxic Screening Levels	First Quarter 2013 through start of ore production (this will define Baseline)	PM10 monthly	January-December	AM1-AM5
1.2.3 Transportation Route	Various along designated transportation route	PM10, wind speed and direction, etc., surface water quality	National Ambient Air Quality Standards and Michigan Air Toxic Screening Levels, surface water (TBD)	When route identified through start of ore production (this will define Baseline)	Periodic (TBD)	When route is identified-December	AHT1-AHT3, SHT4, SHT7
1.2.4 Humboldt Mill	Various near Humboldt Mill facilities	PM10, wind speed and direction, etc., groundwater/surface water quality	National Ambient Air Quality Standards and Michigan Air Toxic Screening Levels, surface water (TBD)	First Quarter 2013 through start of ore production (this will define Baseline)	Various, Based on Rio Tinto Scheduled Monitoring	January-December	AHT1-AHT3, SHT1-SHT3
1.2.5 Other Based on Results or New Activities	Various along Eagle Mine perimeter fence	Kirtland's Warbler Study	TBD	2013	Periodic (TBD)	May-September	AM1-AM5, FM1-FM4

*Risk Assessment Codes for Eagle Mine, Humboldt Mill, and Transportation Route are explained in Tables 2 and 3.

Table 2
Potential Impacts from Rio Tinto Eagle Mine

Risk Code	Potential Impact	Phase
<i>Groundwater Quality</i>		
GM1	A reduction in groundwater levels in the Quaternary aquifer due to dewatering of the mine	Operations
GM2	A leak of contact water through the liner system of the Contact Water Basins (CWBs)	Operations
GM3	A leak of contact water through liner system of the Temporary Development Rock Storage Area (TDRSA)	Operations
GM4	A spill of diesel-fuel or unleaded gasoline associated with the fuel storage and distribution system	Operations
GM5	A failure of the Waste Water Treatment Plant (WWTP)	Operations
GM6	An increase in groundwater elevations due to the infiltration of treated water at the Treated Water Infiltration System (TWIS)	Operations
GM7	The migration of inorganic ions from the backfilled mine up into the Quaternary aquifer	Reclamation
<i>Surface Water Quality</i>		
SM1	A reduction in stream flows due to a reduction in groundwater levels in the Quaternary aquifer due to dewatering of the mine during operations	Operations
SM2	Contamination of surface waters (via ground water) from a leak of contact water through the liner system of the CWBs	Operations
SM3	Contamination of surface waters (via ground water) from a leak of contact water through liner system of the TDRSA	Operations
SM4	Contamination of surface waters (via ground water) from a spill of diesel-fuel or unleaded gasoline associated with the fuel storage and distribution system	Operations
SM5	Contamination of surface waters (via ground water) from a failure of the WWTP	Operations
SM6	An increase in stream flows due to an increase in groundwater elevations due to the infiltration of treated water at the TWIS	Operations
SM7	Surface water quality impacts caused by runoff from the surface facilities and roads	Operations, Reclamation

Table 2
Potential Impacts from Rio Tinto Eagle Mine

Risk Code	Potential Impact	Phase
SM8	Contamination of surface waters (via ground water) from the migration of inorganic ions from the backfilled mine up into the Quaternary aquifer	Reclamation
<i>Air Quality</i>		
AM1	Fugitive dust associated with material storage and ore processing areas	Construction, Operations
AM2	Exhaust emissions from operation of diesel generators and exhaust of emissions from underground operations through the ventilation raise	Operations
AM3	Exhaust and fugitive dust from vehicle traffic	Operations
AM4	Elevated ambient air concentrations of criteria pollutants such as particulate matter, nitrogen dioxide, sulfur dioxide and carbon monoxide; and airborne metals, such as copper and nickel	Operations
AM5	Deposition of particulate matter and metals	Operations
<i>Flora/Fauna</i>		
FM1	Impacts to vegetative communities and hydrology in groundwater/stream supported wetlands due to changes in hydrology caused by mine dewatering and construction and operations of surface facilities	Construction, Operations
FM2	Impacts to habitat, flora and fauna due to contamination of groundwater or surface waters	Operations, Reclamation
FM3	Impacts to native habitat from introduction of invasive species as a result of physical disturbance of the landscape and increased vehicular traffic	Operations
FM4	Impacts from noise and light at the mine facility	Operations

Information compiled from Eagle Project Mining Permit Application, Volumes I II, Environmental Impact Assessment, Project I.D.: 04W018, Kennecott Eagle Minerals Company, Marquette, Michigan. February 2006.

Table 3
Potential Impacts from Rio Tinto Humboldt Mill and Transportation Route

Risk Code	Potential Impact	Phase
<i>Groundwater Quality</i>		
GHT1	Reduction in seepage of water from the Humboldt Tailings Disposal Facility (HTDF) to the aquifer on the north side	Construction, Operations
GHT2	Contamination of groundwater from the HTDF (removal of the cut-off wall and Wastewater Treatment Plant (WWTP))	Reclamation
<i>Surface Water Quality</i>		
SHT1	An increase in surface water discharge from the HTDF	Operations
SHT2	Contamination of surface waters from the HTDF (failure of the WWTP)	Operations
SHT3	Contamination of surface waters from a break in the tailings slurry pipeline to the HTDF	Operations
SHT4	Contamination of surface waters from a spill during transportation of ore from Eagle Mine facility (transportation route)	Operations
SHT5	Contamination of surface waters from a spill during concentration load out from Humboldt Mill to rail cars	Operations
SHT6	Impacts to surface waters from increased stormwater runoff	Construction, Operations, Reclamation
SHT7	Impacts to surface waters from increased traffic along transportation routes (sedimentation, spills from trucks)	Operations
SHT8	Contamination of surface waters (via groundwater) from the HTDF (removal of the cut-off wall and WWTP)	Reclamation
<i>Air Quality</i>		
AHT1	Fugitive dust associated with construction/reclamation activities, and operations	Construction, Operations, Reclamation
AHT2	Exhaust emissions from operation of diesel generators and milling operations	Construction, Operations, Reclamation
AHT3	Elevated ambient air concentrations of criteria pollutants such as particulate matter, nitrogen dioxide, sulfur dioxide and carbon monoxide; and airborne metals, such as copper and nickel	Construction, Operations, Reclamation

Table 3
Potential Impacts from Rio Tinto Humboldt Mill and Transportation Route

Risk Code	Potential Impact	Phase
<i>Flora/Fauna</i>		
FHT1	Impacts from refurbishing and operation of the mill, re-commissioning and operating the HTDF, and particulate emissions	Construction, Operations
FHT2	Impacts to habitat, flora and fauna due to contamination of groundwater or surface waters	Operations, Reclamation
FHT3	Reduction in seepage of water from the HTDF to the aquifer on the north side	Operations
FHT4	An increase in surface water discharge from the HTDF to wetlands on the north side	Operations
FHT5	An increase in non-contact stormwater discharge to wetlands to the south	Construction, Operations, Reclamation
FHT6	Impacts to native habitat from introduction of invasive species as a result of physical disturbance of the landscape and increased vehicular traffic	Construction, Operations, Reclamation
FHT7	Impacts from noise and light at the mill facility	Construction, Operations, Reclamation

Information compiled from Humboldt Mill Mining Permit Application, Volumes I II, Environmental Impact Assessment, Project I.D.: 06W003, Kennecott Eagle Minerals Company, Marquette, Michigan. December 2008.

Table 4
Parameters, Analytical Methods and Reporting Limits for
TDRSA and CWB Monitoring

L13 Parameters	Units	Frequency of Analysis	Analytical Method ¹	Reporting Limit
Static Water Elevation	ft	Quarterly	Field	0.01
Alkalinity, Bicarbonate	mg/L	Quarterly	310.1/SM 2320 B	2
Alkalinity Carbonate	mg/L	Quarterly	310.1/SM 2320 B	2
Nitrate Nitrogen	mg/L	Annual	EPA-353.2/4500 NO3F	0.05
pH	su	Quarterly	Field	--
Specific Conductance	umhos/cm	Quarterly	Field	--
Sulfate	mg/L	Quarterly	EPA-375.4/9038	1
Chloride	mg/L	Quarterly	EPA-325.2/4599-CL E	1
Sodium	mg/L	Annual	EPA-200.7/6010B	0.5
Antimony	ug/L	Annual	200.8/6020	2
Arsenic	ug/L	Quarterly	200.8/6020	1
Barium	ug/L	Annual	200.8/6020	10
Beryllium	ug/L	Annual	200.8/6020	1
Boron	ug/L	Quarterly	200.8/6020	50
Cadium	ug/L	Annual	200.8/6020	0.2
Calcium	mg/L	Annual	200.7/6010B	0.5
Chromium	ug/L	Annual	200.8/6020	1
Cobalt	ug/L	Annual	200.8/6020	10
Copper	ug/L	Quarterly	200.8/6020	1
Flouride	mg/L	Annual	SM 4500 F-C	0.1
Iron	ug/L	Quarterly	200.7/6010B	20
Lead	ug/L	Annual	200.8/6020	1
Lithium	ug/L	Annual	200.7/6010B	10
Magnesium	mg/L	Annual	200.7/6010B	0.5
Manganese	ug/L	Quarterly	200.8/6020	10
Mercury	ug/L	Quarterly	1631/----	0.00025
Molybdenum	ug/L	Annual	200.8/6020	10
Nickel	ug/L	Quarterly	200.8/6020	1
Potassium	mg/L	Annual	200.7/6010B	0.5
Selenium	ug/L	Quarterly	200.8/6020	2
Silver	ug/L	Annual	200.8/6020	0.2
Strontium	ug/L	Annual	200.8/6020	50
Thallium	ug/L	Annual	200.8/6020	2
Vanadium	ug/L	Annual	200.8/6020	10
Zinc	ug/L	Quarterly	200.8/6020	10

¹ Acceptable to use equivalent or improved analytical methods.

-- Indicates the permit does not specify this information.

Table 5
Parameters, Analytical Methods and Reporting Limits for
WWTP Effluent Monitoring

GWDP Effluent Parameters Part 1, 2	Units	Frequency of Analysis	Analytical Method ¹	Reporting Limit	Maximum Daily Limit	Monthly Avg Limit
Influent Flow	GPD	Daily	--	--	Report	
Effluent Flow	GPD	Daily	--	--	504,000	
Biochemical Oxygen	mg/l	Weekly	--	--	10	
Dissolved Oxygen	mg/l	Monthly	--	--	Report	
Ammonia Nitrogen	mg/l	Monthly	--	--	Report	
Nitrate Nitrogen	mg/l	Monthly	--	--	Report	
Nitrite Nitrogen	mg/l	Monthly	--	--	Report	
pH (Minimum)	S.U.	Continuous Measurement	--	--	6.5	
pH (Maximum)	S.U.	Continuous Measurement	--	--	9	
Total Phosphorus	mg/l	Monthly	--	--	Report	
Specific Conductance	umhos/cm	Continuous Measurement	--	--	Report	
Total Aluminum	mg/l	Monthly	--	--	Report	
Total Antimony	ug/l	Monthly	200.8/6020	1	Report	
Total Arsenic	ug/l	Weekly	200.8/6020	1	10	
Total Barium	ug/l	Monthly	200.8/6020	5	Report	
Total Beryllium	ug/l	Monthly	200.8/6020	1	Report	
Total Boron	ug/l	Weekly	200.8/6020	20	285	
Total Cadmium	ug/l	Weekly	200.8/6020	0.2	5	
Total Chloride	mg/l	Monthly	--	--	Report	
Total Chromium	ug/l	Monthly	200.8/6020	1		
Total Cobalt	ug/l	Monthly	200.8/6020	15	Report	
Total Copper	ug/l	Weekly	200.8/6020	1	21	
Total Fluoride	ug/l	Monthly	--	--	Report	
Total Iron	ug/l	Monthly	--	--	Report	
Total Lead	ug/l	Monthly	200.8/6020	1	Report	
Total Lithium	ug/l	Monthly	200.8/6020	8	Report	
Total Manganese	ug/l	Monthly	200.8/6020	5	Report	
Total Mercury	ug/l	Weekly	1631/---	0.0005	Report	
Total Molybdenum	ug/l	Monthly	200.8/6020	25	Report	
Total Nickel	ug/l	Monthly	200.8/6020	2	Report	
Total Potassium	ug/l	Monthly	--	--	Report	
Total Selenium	ug/l	Weekly	200.8/6020	1	25	5
Total Silver	ug/l	Weekly	200.8/6020	0.2	17	0.4
Total Sodium	mg/l	Monthly	--	--	Report	
Total Strontium	ug/l	Monthly	200.8/6020	5	Report	
Total Sulfate	ug/l	Monthly	--	--	Report	
Total Thallium	ug/l	Monthly	200.8/6020	2	Report	
Total Vanadium	ug/l	Monthly	200.8/6020	2	Report	
Total Zinc	ug/l	Monthly	200.8/6020	10	Report	

¹ Acceptable to use equivalent or improved analytical methods.

-- Indicates the permit does not specify this information.

Table 6
Parameters, Analytical Methods and Reporting Limits for
Mine Permit Groundwater Monitoring

L23 Parameters	Units	Frequency of Analysis	Analytical Method ²	Reporting Limit
Field				
Static Water Elevation	ft/msl	Quarterly	Field	--
Redox	meV	Quarterly	Field	--
Temperature	°C	Quarterly	Field	--
Dissolved Oxygen	mg/L	Quarterly	Field	--
pH	su	Quarterly	Field	--
Specific Conductance	umhos/cm	Quarterly	Field	--
Anions				
Alkalinity, Bicarbonate	mg/L	Quarterly	310.1	2.0
Alkalinity Carbonate	mg/L	Quarterly	310.1	2.0
Nitrate Nitrogen	mg/L	Quarterly	EPA-353.2	0.050
Sulfate	mg/L	Quarterly	EPA-375.4	2.0-5.0
Flouride	mg/L	Annual	SM 4500 F-C	0.10
Chloride	mg/L	Quarterly	EPA-325.2	1.0
Cations				
Calcium	mg/L	Annual	EPA-6010B	0.50
Sodium	mg/L	Quarterly	EPA-6010B	0.50
Magnesium	mg/L	Annual	EPA-6010B	0.50
Potassium	mg/L	Annual	EPA-6010B	0.50
Metals				
Aluminum	ug/L	Annual	EPA-6010B	50
Antimony	ug/L	Annual	EPA-6020	5.0
Arsenic	ug/L	Quarterly	EPA-6020	2.0
Barium	ug/L	Annual	EPA-6020	20
Beryllium	ug/L	Annual	EPA-6020	1.0
Boron	ug/L	Quarterly	EPA-6010B	100
Cadmium	ug/L	Annual	EPA-6020	0.50
Chromium	ug/L	Annual	EPA-6020	5.0
Cobalt	ug/L	Annual	EPA-6010B	10
Copper	ug/L	Quarterly	EPA-6020	5.0
Iron	ug/L	Quarterly	EPA-6010B	20
Lead	ug/L	Annual	EPA-6020	1.0
Lithium	ug/L	Annual	EPA-6010B	8.0
Manganese	ug/L	Quarterly	EPA-6010B	20
Mercury ¹	ug/L	Quarterly	EPA-1631E	0.00025
Molybdenum	ug/L	Annual	EPA-6020	10
Nickel	ug/L	Quarterly	EPA-6020	25
Selenium	ug/L	Quarterly	EPA-6020	1.0
Silver	ug/L	Annual	EPA-6020	0.20
Strontium	ug/L	Annual	EPA-6010B	50
Thallium	ug/L	Annual	EPA-200.8/6020	2.0
Vanadium	ug/L	Annual	EPA-200.8/6020	10
Zinc	ug/L	Quarterly	EPA-6020	10

¹ Acceptable by MDEQ to use 0.005 ug/L as reporting limit for mercury.

² Acceptable to use equivalent or improved analytical methods.

-- Indicates the permit does not specify this information.

Table 7
Parameters, Analytical Methods and Reporting Limits for
Groundwater Discharge Permit Monitoring

GWD Parameters	Units	Frequency of Analysis	Analytical Method ¹	Reporting Limit
Field				
Static Water Elevation	USGS-Ft	Quarterly	Field	--
Dissolved Oxygen	mg/l	Quarterly	Field	--
pH (Minimum)	S.U.	Quarterly	Field	--
pH (Maximum)	S.U.	Quarterly	Field	--
Specific Conductance	mmhos/cm	Quarterly	Field	--
Anions				
Bicarbonate	mg/l	Quarterly	--	--
Chloride	mg/l	Quarterly	--	--
Ammonia Nitrogen	mg/l	Quarterly	--	--
Nitrate Nitrogen	ug/l	Quarterly	--	--
Nitrite Nitrogen	ug/l	Quarterly	--	--
Total Phosphorus	mg/l	Quarterly	--	--
Sulfate	mg/l	Quarterly	--	--
Cations				
Calcium	mg/l	Quarterly	--	--
Sodium	mg/l	Quarterly	--	--
Magnesium	mg/l	Quarterly	--	--
Potassium	mg/l	Quarterly	--	--
Metals				
Antimony	ug/l	Quarterly	200.8/6020	1
Arsenic	ug/l	Quarterly	200.8/6020	1
Barium	ug/l	Quarterly	200.8/6020	5
Beryllium	ug/l	Quarterly	200.8/6020	1
Boron	ug/l	Quarterly	200.8/6020	20
Cadium	ug/l	Quarterly	200.8/6020	0.2
Chromium	ug/l	Quarterly	200.8/6020	1
Cobalt	ug/l	Quarterly	200.8/6020	15
Copper	ug/l	Quarterly	200.8/6020	1
Iron	mg/l	Quarterly	--	--
Lead	ug/l	Quarterly	200.8/6020	1
Lithium	ug/l	Quarterly	200.8/6020	8
Manganese	mg/l	Quarterly	200.8/6020	5
Mercury	ug/l	Quarterly	1631/----	0.0005
Molybdenum	ug/l	Quarterly	200.8/6020	25
Nickel	ug/l	Quarterly	200.8/6020	2
Selenium	ug/l	Quarterly	200.8/6020	1
Silver	ug/l	Quarterly	200.8/6020	0.2
Strontium	ug/l	Quarterly	200.8/6020	5
Thallium	ug/l	Quarterly	200.8/6020	2
Vanadium	ug/l	Quarterly	200.8/6020	2
Zinc	ug/l	Quarterly	200.8/6020	10

¹ Acceptable to use equivalent or improved analytical methods.

-- Indicates the permit does not specify this information.

Table 8: 2013 CEMP Public Forums**First Quarter - All dates/times/locations tentative**

Tuesday March 19	7pm – 8pm	Humboldt Twp
Thursday March 21	7pm – 8pm	Powell Twp
Tuesday March 26	7pm – 8pm	Baraga/L'Anse
Thursday March 28	7pm – 8pm	Marquette

Second Quarter - All dates/times/locations tentative

Tuesday June 4	7pm – 8pm	Michigamme Twp
Thursday June 6	7pm – 8pm	Powell Twp
Tuesday June 11	7pm – 8pm	Baraga/L'Anse
Thursday June 13	7pm – 8pm	Marquette

Third Quarter - All dates/times/locations tentative

Tuesday September 17	7pm – 8pm	Michigamme Twp
Thursday September 19	7pm – 8pm	Powell Twp
Tuesday September 24	7pm – 8pm	Baraga/L'Anse
Thursday September 26	7pm – 8pm	Marquette

Fourth Quarter - All dates/times/locations tentative

Tuesday December 3	7pm – 8pm	Humboldt Twp
Thursday December 5	7pm – 8pm	Powell Twp
Tuesday December 10	7pm – 8pm	Baraga/L'Anse
Thursday December 12	7pm – 8pm	Marquette