



MINTO MINE
Groundwater Monitoring PLAN
VERSION 2013-01

Prepared for:
Minto Mine

Prepared by:
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with contributions from SRK Consulting

Vancouver, British Columbia
March 2013

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1 Introduction

Minto Explorations Ltd. (Minto) was issued Water Use Licence QZ96-006 (Amendment 8) on October 18, 2012. Amendment 8 included a number of conditions including Condition 96, which requires Minto to file an updated Groundwater Monitoring Plan within 6 months of the effective date of the licence amendment. This document constitutes the required updated plan.

For reference, the text of Condition 96 is as follows:

Condition 96. *Within 6 months of the effective date of Amendment 8, the Licensee shall submit to the Board an updated detailed Groundwater Monitoring Program Plan for the purpose of monitoring potential impacts on groundwater from the mine project components including, but not necessarily limited to, the DSTSF, mill area, Main Pit, Area 2 Pit, waste rock dumps and Water Storage Pond.*

- a) *The monitoring network shall include stations down gradient of the Water Storage Pond, as well as stations down gradient of the pits to provide for the adequate assessment of the potential impacts of the long term storage of tailings in the pits on the downstream environment.*
- b) *The plan must be developed by a qualified professional specializing in hydrogeology and shall include specific groundwater monitoring locations, monitoring schedule and parameters.*

This updated Groundwater Monitoring Plan (GMP) provides details of the current monitoring system and monitoring schedule designed to meet the requirements of Water Use Licence QZ96-006.

2 Groundwater-related Monitoring

2.1.1 Groundwater Wells

A variety of groundwater wells have been installed at the Minto Mine site over the life of the project. These wells have been installed for a range of purposes and the information available for these wells varies case-by-case. Table 1 provides summary information of the installed wells. Individual reports describing the drilling results, installation, and preliminary testing results are provided in the Reference section of this GMP.

2.1.2 Vibrating Wire Piezometers

Several vibrating wire piezometers have been installed during geotechnical investigations at the Minto Mine. These instruments provide measurements of both piezometric pressure and temperature, the latter used to increase the accuracy of the calculated pressure measurements, when temperatures are above 0°C. The instruments will also continue to provide temperature data when temperatures are below 0°C and the transducer is frozen. Table 2 provides summary information about the existing vibrating wire piezometers.

Table 1 Summary of Groundwater Wells, Minto Mine

Groundwater Well Name	Location	Status
P94-20	Main Water Dam area	<i>Destroyed</i>
P93-E	Main Pit area	<i>Destroyed during mining</i>
MW09-01	Main Waste Dump area	Operational
MW09-02	DSTSF Area	<i>Destroyed</i>
MW09-03	Minto North Pit area	Operational
MW09-04	Main Pit area	<i>Destroyed</i>
MW11-01A	Downgradient of Main Pit	Operational (sometimes frozen)
MW11-02	NE of Ridgetop North Pit	Operational (sometimes frozen)
MW11-03	SE of Ridgetop North Pit	Operational (sometimes frozen)
MW11-04A	S of Ridgetop South Pit	Operational
MW12-DP1	West of Southwest Waste Dump	Operational
MW12-DP2	West of Southwest Waste Dump	Operational
MW12-DP3	West of Southwest Waste Dump	Operational
MW12-DP4	Downgradient of MVF/DSTSF	Operational
MW12-05	Downgradient of WSP	Operational
MW12-06	Downgradient of MVF/DSTSF	Operational
MW12-07	Downgradient of Main Pit	Operational
Unnamed auxiliary well near mill	Mill area	Operational
Unnamed camp water well	Camp area	Operational
08SWC270	Southwest Waste Dump area	<i>Destroyed</i>
08SWC271	Southwest Waste Dump area	<i>Destroyed</i>
08SWC272	Southwest Waste Dump area	<i>Destroyed (Buried by waste rock)</i>
08SWC273	Southwest Waste Dump area	<i>Destroyed</i>
08SWC274	Southwest Waste Dump area	<i>Destroyed</i>
08SWC275	Southwest Waste Dump area	<i>Destroyed</i>
08SWC277	Southwest Waste Dump area	<i>Destroyed</i>
08SWC278	Southwest Waste Dump area	<i>Destroyed</i>
08SWC280	Southwest Waste Dump area	<i>Destroyed (Buried by waste rock)</i>

Table 2 Summary of Existing Vibrating Wire Piezometers, Minto Mine

Vibrating Wire Piezometer Name	Location	Status
DSP-1	DSTSF area	Operational
DSP-2	DSTSF area	Operational
DSP-3	DSTSF area	Operational
DSP-4	DSTSF area	Operational
SDP-1	Southwest Dump area	Destroyed
SDP-2	Southwest Dump area	Operational
SDP-3	Southwest Dump area	Operational
SDP-4	Southwest Dump area	Operational

Note: installations at the Main Water Dam are excluded from this table

2.1.3 Ground Temperature Monitoring

Several thermistors (ground temperature cables) have been installed during geotechnical investigations at Minto Mine. These instruments provide measurements of temperature at various depths below ground at each location, but do not provide any piezometric data. Table 3 provides summary information about the existing thermistor cables.

Table 3 Summary of Existing Ground Temperature Cables, Minto Mine

Ground Temperature Cable Name	Location	Status
DST-1	DSTSF area	Destroyed
DST-2	DSTSF area	Destroyed
DST-3	DSTSF area	Operational
DST-4	DSTSF area	Operational
DST-5	DSTSF area	Destroyed
DST-6	DSTSF area	Operational
DST-7	DSTSF area	Destroyed
DST-8	DSTSF area	Destroyed
DST-9	DSTSF area	Destroyed
DST-12	DSTSF area	Operational
96-G08	DSTSF area	Destroyed
MWPT-1	Mill Water Pond area	Operational
MWPT-2	Mill Water Pond area	Operational
SDT-1	Southwest Dump area	Operational
SDT-2	Southwest Dump area	Operational
SDT-3	Southwest Dump area	Operational
SDT-4	Southwest Dump area	Operational
08SWC271	Southwest Dump area	Destroyed
08SWC274	Southwest Dump area	Destroyed
08SWC275	Southwest Dump area	Destroyed
08SWC277	Southwest Dump area	Destroyed
08SWC278	Southwest Dump area	Destroyed
08SWC280	Southwest Dump area	Buried under Southwest Dump

Note: installations at the Main Water Dam are excluded from this table

3 Groundwater Monitoring Plan

3.1 Monitoring Objectives

As stipulated in WUL QZ96-006, this groundwater monitoring plan is to provide for monitoring of potential impacts on groundwater from the mine components including, *but not necessarily limited to*:

- Dry Stack Tailings Storage Facility;
- Mill area;
- Main Pit;
- Area 2 Pit
- Main Waste Dump;
- Southwest Waste Dump; and the
- Water Storage Pond.

An additional objective of this groundwater monitoring plan is to provide for the development of baseline hydrogeological conditions in areas where future mine components are being planned. This groundwater monitoring plan contains provision for baseline monitoring of the following planned future mine components:

- Minto North Pit;
- Ridgetop North Pit;
- Ridgetop South Pit.

Monitoring well locations are shown in Figure 1.

3.2 Monitoring Requirements

Monitoring will be comprised of “operational” and “baseline” monitoring. Table 4 summarizes the operational monitoring requirements, and Table 5 summarizes the baseline monitoring requirements.

All monitoring systems have been installed down gradient of the expected final design footprint of the respective mine components.

3.3 Sampling Protocol

Groundwater samples will be collected according to the procedures summarized in ASTM D4448-01- Standard Guide for Sampling Ground-Water Monitoring Wells (ASTM 2007).

Table 4 Operational Groundwater Monitoring Requirements

Mine Project Component	Monitoring Installation	Monitoring Required	Monitoring Frequency
Main Waste Dump	MW09-01	Water Level, Water Quality	Spring/Fall
Southwest Waste Dump	MW12-DP1 MW12-DP2 MW12-DP3	Water Level, Water Quality	Spring/Fall
Dry Stack Tailings Storage Facility and Mill Valley Fill Expansion	MW12-DP4 MW12-06	Water Level, Water Quality	Spring/Fall
Main Pit	MW12-07	Water Level, Water Quality	Spring/Fall
Water Storage Pond	MW12-05	Water Level, Water Quality	Spring/ Fall

Table 5 Baseline Groundwater Monitoring Requirements

Baseline Monitoring Location	Monitoring Installation	Monitoring Required	Monitoring Frequency
North of Proposed Minto North Pit	MW09-03	Water Level, Water Quality	Spring/Fall
East of Proposed Ridgetop North Pit	MW11-02 MW11-03	Water Level, Water Quality	Spring/Fall
South of Proposed Ridgetop South Pit	MW11-04	Water Level, Water Quality	Spring/Fall

3.4 Analytical Suite for Groundwater Samples

Groundwater samples will be collected and analyzed for the parameters identified as suites B, N, and FP in Appendix 3 of Water Use Licence QZ96-006 (Amendment 8).

These analytical suites are defined as follows:

- Suite B: Physical Parameters, Conductivity, Total Dissolved Solids, Alkalinity, Sulphate, ICP Scan - Dissolved Metals.
- Suite N: Nutrients: Ammonia-N, Nitrate-N, Nitrite-N and Phosphorous.
- Suite FP: Field Parameters: In-situ parameters - pH, Conductivity and Temperature.

Groundwater samples will be submitted to an accredited laboratory for analysis.

3.5 Quality Assurance

Field duplicate samples will be collected at a frequency of one field duplicate sample per ten groundwater monitoring samples.

One field blank sample will be collected during each Spring/Fall groundwater monitoring event. Field blank samples will be collected from deionized water supplied by the analytical laboratory, using the exact methods employed to collect groundwater monitoring samples (including field filtration and preservation of the dissolved metals field blank).

3.6 Reporting

Results of the groundwater monitoring program will be included as part of the annual report for WUL QZ96-006.

The groundwater monitoring program summary will also reference results of thermal and piezometric monitoring carried out under other site monitoring plans.

4 References

ASTM 2007: Standard Guide for Sampling Ground-Water Monitoring Wells. Designation: D4448 – 01 (Reapproved 2007).

Minto Explorations Ltd. 2011: Groundwater Monitoring Plan, VERSION 2011-01 Dated Sept 2011

SRK 2008: Waste Dump Overburden Drilling - Minto Mine, Yukon. Prepared for Minto Explorations Ltd., May 2008.

SRK 2012: Monitoring Well Installation Program 2011. Prepared for Minto Explorations Ltd., February 2012.

SRK 2013: 2012 Minto Mine Groundwater Monitoring Well Installation Report. Prepared for Minto Explorations Ltd., February 2013.

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

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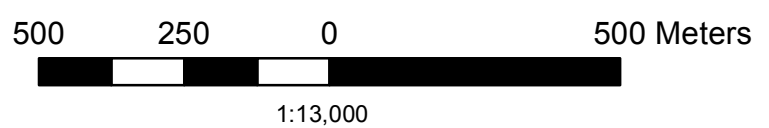
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Legend

-  MP Well, Functional
-  MP Well, Non-functional
-  Piezometer with thermistor, Functional
-  Drivepoint, Functional



Notes:
 1. Data presented in NAD 1983 UTM Zone 8N.
 2. Base airphoto flown August 2012.
 3. Future pit designs from October 2012.



MINTO MINE

**Site Map
Showing Well Locations**

Date: March 2013 Figure: 1