MINTO EXPLORATIONS Ltd.

A Subsidiary of Sherwood Copper Corp.

PROJECT PROPOSAL
AND
QUARTZ MINING LICENSE AMENDMENT APPLICATION

MINING AND MILLING RATE INCREASE

MINTO PROJECT
YUKON TERRITORY

Version 2.0

Prepared by:

ACCESS CONSULTING GROUP

May 2008

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Minto Explorations Ltd.

Project Proposal & Quartz Mining Licence Amendment Application

Minto Project, Yukon Territory

VERSION 2.0

May 2008

Submitted by:

Access Consulting Group
#3 Calcite Business Centre, 151 Industrial Road
Whitehorse, Yukon
Y1A 2V3

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PROJECT CONTACT LIST

MINTO EXPLORATIONS LTD. c/o The Northair Group Suite 860, 625 Howe Street Vancouver B.C. Telephone: (604) 687-7545 Fax: (604) 689-5041 Website: www.sherwoodcopper.com	**Kevin Weston** COO, Sherwood Copper Corp. Email: kweston@sherwoodcopper.com
ACCESS CONSULTING GROUP #3 Calcite Business Centre 151 Industrial Road Whitehorse, Yukon Y1A 2V3 Telephone: (867) 668-6463 Fax: (867) 667-6680 Website: www.accessconsulting.ca	**Scott Keesey, Environmental Manager** Email: scott@accessconsulting.ca **Dan Cornett, Environmental Assessment Manager** Email: dan@accessconsulting.ca

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1.0 INTRODUCTION

Minto Explorations Ltd. ("MintoEx", or "the Company"), a wholly owned subsidiary of Sherwood Copper Corporation (Sherwood), operates the Minto Project located 240 km (150 miles) northwest of Whitehorse, Yukon Territory. For the purposes of this report, the "Minto Project" means an open-pit mine, a concentrator and ancillary facilities. This project was subject to multiple developments over the years in which the principal milestones were as follows:

- first drilling program initiated in 1971 by Silver Standard Mines Ltd. and Asarco Inc.;
- a detailed feasibility study completed in 1995 with reserves of 6,509,700 short tons at an average of 2.13% Cu, 0.018 oz/t Au and 0.27 oz/t Ag;
- completion of environmental assessment process and issuing of key licences (Type A Water Use Licence in 1998 and Quartz Mining Licence in 1999);
- detailed engineering and start of construction in 1997-1998. Some infrastructure was built (access road, domestic water supply, camp, mill concrete foundations,);
- temporary suspension of the project in 1999 due to low copper prices and poor industry-wide macroeconomic conditions;
- acquisition of MintoEx by Sherwood in June 2005;
- environmental assessment and renewal of water and quartz mining licenses to June 30, 2016;
- mine construction from March 2006 to December 2007; and
- commencement of commercial production in October 2007.

The Minto Project is located in the eastern margin of the Yukon-Tanana Composite Terrain, which is comprised of several metamorphic assemblages and batholiths. Since 1971, previous owners have conducted significant mineral exploration on the property, with approximately 25,800 m of drilling. The exploration efforts by MintoEx since Sherwood's acquisition were largely confirmatory on the main resource area. The drilling program totalled 10,100 m in 2005 and 2006.

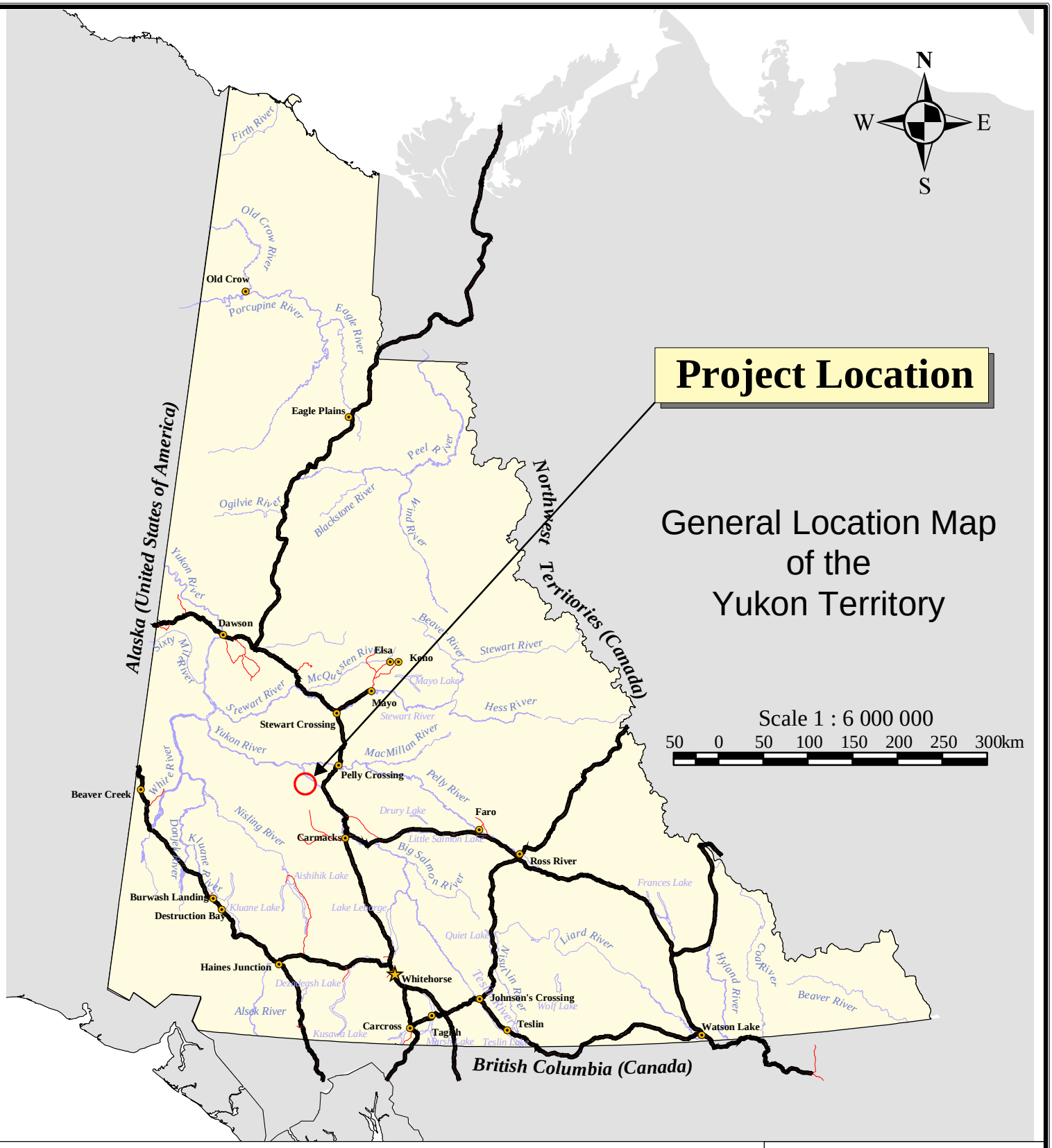
Bornite and chalcopyrite are the main copper sulphide minerals. The deposit exhibits absence of non-copper bearing sulphide minerals, particularly pyrite. The two main copper sulphide minerals occur in zones of varied ratios and gradational boundaries across the deposit. The bornite rich zone is dominant in the west; a thicker, lower grade chalcopyrite zone is dominant on the east side of the deposit. The higher-grade portion of the Minto deposit roughly corresponds to the bornite zone. The precious metal grades are elevated in the bornite zone (very fine gold and electrum occur as inclusions in the bornite).

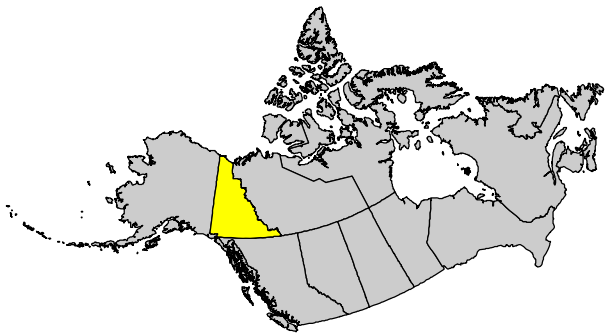
Significant oxidation has been noticed with visual evidence persisting to approximately 50 m to 60 m below surface. In addition to the obvious copper oxide minerals (malachite and azurite), oxidation is also evident by pervasive iron staining, earthy hematite, clay alteration of feldspars and a significant loss in bulk density. While the copper oxide mineralization found closer to the surface will only be stockpiled with no processing intended, some zones of partial oxidation are found close to the sulphide zones and those will be processed by the mill with reduced recovery rates. The vast majority of the mineralization within the proposed open pit has no oxidation and has excellent recoveries (in the 90% to 95% range).

The Minto deposit is being mined as an open pit to produce a total of 6.1 million tonnes (Mt) of ore and 30.5 Mt of waste over a 5-year mine operating life, with an additional 2 years of processing low grade stockpiles. The Minto life-of-mine metal production is estimated to be 281.9 million pounds of copper, 144,000 ounces of gold and 1.7 million ounces of silver contained in concentrates. The mine plan has been optimized to access the high-grade ore first; the lower grade material and partially oxidized material will be stockpiled for later years, while the completely oxidized material will be sent to the waste dump. When the Area II reserves are included (not part of this project review), the life-of-mill is at 8.5 years and is longer than the period of active mining, since the lower grade material that is stockpiled over the first 6 years is processed in the last 2.5 years (SRK, 2007).

1.1. PROJECT LOCATION

The Minto Project is located 240 km (150 miles) northwest of Whitehorse, Yukon Territory (Figure 1-1). The project is centred at approximately 62°37'N latitude and 137°15'W longitude (NAD 83, UTM Zone 8 coordinates 6945000N, 384000E). The Project is located on the west side of the Yukon River on Selkirk First Nation (SFN) settlement land (Figure 1-2). Highway 2 is located on the east side of the Yukon River. The Minto Project consists of 284 claims. There are 120 quartz claims, 99 quartz claims and 65 quartz claims under lease. The 100% registered owner of the claims and leases is MintoEx. An independent title opinion has confirmed the good standing order for the ownership, the claims and the leases.





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Minto Mine Project

Milling Rate Increase Project Description

Drawn By: HD	**Figure 1-1**
Checked By: SK	Date: April 2008

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Minto Mine Project

Milling Rate Increase Project Description

MINTO EXPLORATIONS Ltd.
A Subsidiary of Sherwood Copper Corp.

Legend

- Minto Mine Site
- Contour (100' interval)
- Limited used road
- Road
- Access Road
- Trail
- Watercourse
- Minto Claim - DEF
- Minto Claim - MINTO
- Waterbody
- Habitat Protection Area
- First Nation Settlement Land

Projection: UTM Zone 8 NAD83
Units: Meters
NTS Sheet 115 I/10 and 115 I/11

Figure 1-2

Project Area Overview

Scale: 1:100,000

0 0.5 1 2 3 4 km

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Drawn by: HD	Checked by: SK	Date: April 2008

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1.2. PAST ENVIRONMENTAL ASSESSMENTS

Past environmental assessment activities have been undertaken for the site and are included in Table 1-1 below.

These are relevant to the current project, and were consulted during the preparation of the current documentation, in particular past Valued Components and mitigative measures to reduce potential project effects. These past environmental assessment materials provide additional background information of particular importance for defining and addressing environmental effects, including cumulative environmental effects.

Table 1-1 Previous Environmental Assessments

Activity	Period	Sources
Minto Explorations Ltd. Minto Mine Development, Operation and Closure	1996 to 1998	Government and company reports, 1996. DIAND EARP screening and Decision Report, Water Licence QZ96-006.
Minto Explorations Ltd. Minto Mine Development, Operation and Closure Cumulative Effects Assessment	1999	Company report on Cumulative Effects, 1999. Quartz Mining License QLM-9902.
Minto Explorations Ltd. Minto Mine Development, Operation and Closure License Amendments – Expiry Extensions and Temporary Closure Modifications	2004-2005	Government and company reports, 2004. YG AO Development Assessment Branch YEAA Screening Water License Amendment and Quartz Mining License QML-0001

1.3. REGULATORY APPROVALS

Government Environmental Assessment and Permitting Regime

A Type A Water License (QZ96-006) was issued in April 1998; a Quartz Mining Production Licence (QML-9902) was issued in October 1999. These licences were screened under the Environmental Assessment and Review Process Guidelines Order (EARPGO) in April, 1997. The Company continues to ensure that all licence obligations are fulfilled as the project progresses and the mine begins the operational phase.

Several agencies are involved in reviewing, assessing, authorizing and monitoring mining projects in the Yukon Territory. Through the licences previously mentioned, these agencies have permitted this undertaking after review of various environmental assessments and screenings completed for the project. A summary of the project assessment and licensing is provided below.

Initial Project Assessment and Licensing

MintoEx has completed extensive environmental and permitting work for the Minto Project. In December 1994, a four volume Initial Environmental Evaluation (IEE) was submitted under EARPGO to the Department of Indian Affairs & Northern Development (DIAND) for review. The IEE prepared by Hallam Knight Piesold (HKP, 1994), encompassed:

- *Volume I – Development Plan* providing a general overview of the Minto Project;
- *Volume II – Environmental Setting* which described the local environmental conditions and studies undertaken at the site since the 1970's;
- *Volume III – Socio-Economic Description and Impact Assessment* describing socio-economic conditions and archaeological evaluation and impact assessment for the Minto Project; and
- *Volume IV – Environmental Mitigation and Impact Assessment* was submitted in May 1995 and summarized the results of overburden and waste characterization studies.

The assessment indicated no acid generation potential as tailings solids and effluent test work indicated very low levels of metals present and showed solids that were strongly acid

consuming. Subsequent correspondence and information was exchanged with DIAND regulators to address issues raised during the review. Public consultation was carried out with interested members of the public, stakeholder groups and First Nations. DIAND issued an EARPGO screening report decision on April 7, 1997, indicating that potentially adverse environmental effects that may be caused by the project are mitigable using known technology and that the project could proceed.

Type A Water Use License

In February 1997, MintoEx submitted a Type A Water Use Licence application (QZ96-006). The Yukon Water Board (YWB) convened a public hearing into the application in May 1997, and after deliberations by the YWB, the Type A Water Use Licence was subsequently issued in April 1998 pursuant to the Yukon Waters Act (YWA) and Regulations for the mine and milling operations. The Type A Licence was supported by the Selkirk First Nation (SFN) and contained typical licence terms and conditions to ensure that mitigation measures identified during the environmental assessment were implemented. The licence expiry date for the Type A Water Use Licence was June 30, 2006.

Type B Water Use Licence

A Type B Water Use Licence application was filed with the YWB in August 1995 for construction of the Yukon River barge landing sites, the Big Creek Bridge, and Minto Creek road culvert installations. In October 1995 a land use and quarry permit application for the access road construction were filed with DIAND Land Resources. An integrated Canadian Environmental Assessment Act (CEAA) screening of the Type B and land use applications was completed and a positive determination was made in August 1996. Type B Water Use Licence MS95-013 and Land and Quarry Permit YA5F045 were issued in August 1996 and the initial 16 km of the Minto project access road, barge landings and Big Creek Bridge were installed in September and October 1996.

Yukon Quartz Mining Production Licence

In 1999, the Yukon Quartz Mining Act (YQMA) was amended and Section 139 of the Act required that all development and production activities related to quartz mining in the Yukon be

carried out in accordance with a licence issued by the Minister. In June 1999, MintoEx filed an application with DIAND Minerals for a Yukon Quartz Mining Production Licence, which included a cumulative effects assessment (ACG, 1999) for the project to ensure that the provisions of CEAA were met. DIAND issued Yukon Quartz Mining Production Licence QLM-9902 in October 1999 with a licence expiry date of June 30, 2006.

Amendments and Current Licensing

Water Use Licence QZ96-006 was amended (Amendment #1) to revise the decommissioning requirements for the project, and to request the submission of an interim plan as the project was not yet constructed. The project is still subject to Water Use Licence QZ96-006.

As the Type A Water Use Licence (QZ96-006), Type B Water Use Licence (MS95-013), and Yukon Quartz Mining Licence (QLM-9902) were set to expire in June 2006, and in recognition of the project development delays, licence amendment applications to extend the licenses to June 30, 2016 were filed with the YWB and Government of Yukon (GOY), Department of Energy, Mines & Resources (EMR) in October 2004.

In response to the amendment applications, GOY Development Assessment Branch completed a Yukon Environmental Assessment Act (YEAA) screening of the Type A Water Use Licence using the previous EARPGO screening and issued their screening report in March 2005.

The YWB completed a YEAA screening of the Type B application and subsequently issued the amended Type B Water Use Licence (MS04-227) in February 2005. GOY Development Assessment Branch completed a YEAA screening of the Type A Water Use Licence and Yukon Quartz Mining Licence using the previous EARPGO screening and issued their screening report in March 2005. The YWB issued the amended Type A Water Use License (QZ04-064) in September 2005 and GOY EMR issued amendments to the Yukon Quartz Mining License QLM-0001, Amendment No. 05-001 in December 2005 and Amendment No. 05-002 to change the mill rate to 2,500 today in October 2006.

Generally the amended licences contain similar terms and conditions as the original licences and are typical of other Yukon mining licences. All of the above noted licences have an expiry date of June 30, 2016.

In addition, the Federal *Metal Mining Effluent Regulations* (MMER) under the Fisheries Act currently apply to the Minto mine. These Regulations are a law of general application and the requirements of this legislation are the responsibility of the Company. Generally, the Type A Water Use Licence is considered more restrictive that the MMER; however, separate reporting for effluent discharge and receiving water monitoring is required by the Federal Department of Environment Canada.

1.4. PROJECT STATUS

Prior to the sale to Sherwood in 2005, the site had seen only minor development, was in a state of interim closure, and was under the care of the Company and a part-time caretaker. The caretaker provided security for the site, conducted periodic checks of the mill and the general area, mine camp, as well as documenting site maintenance requirements. Annual maintenance was conducted on the access road and camp to facilitate the planned start-up.

Water quality monitoring, as required by Water Licence QZ96-006, was conducted on an annual basis until 2004, and on the Company's initiative was conducted on a monthly basis during the open season of 2005, and on a daily basis by Access Consulting Group during spring freshet of 2006 (April-June) and the primary construction period (March 2006 – September 2007). All combined, this sampling ensured that adequate baseline data was compiled prior to formal operational start-up, which was declared on October 11, 2007.

Figure 1-3 presents an overview of current site conditions.

Minto Mine Project

Milling Rate Increase Project Description

MINTO EXPLORATIONS Ltd.
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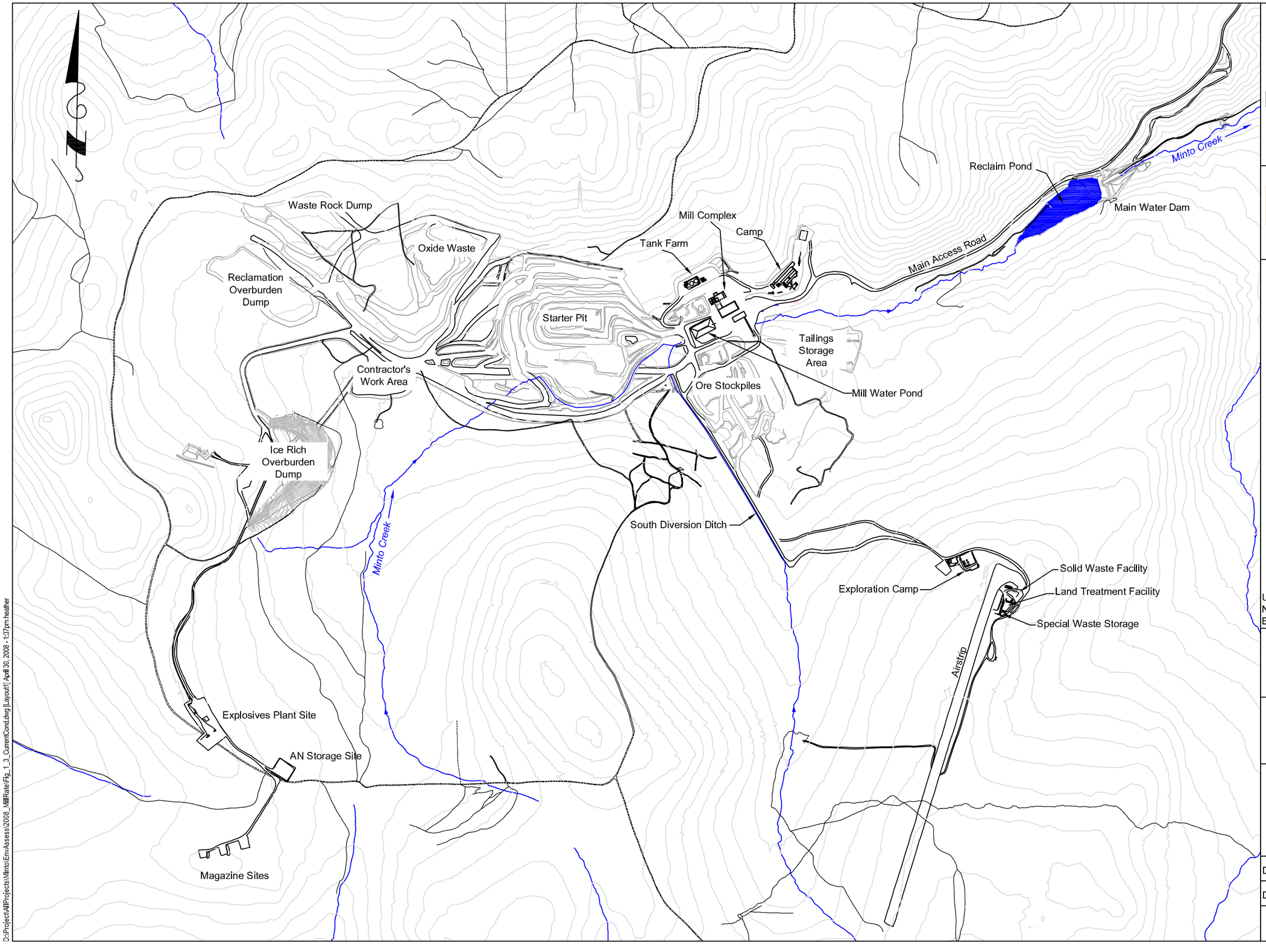

Legend:

- Access Road
- Exploration Road
- Contour
- Water Course
- Water Body

UTM Zone 8 NAD83
NTS Sheet 115I11
Basedata obtained from Minto Mine March 2008

March 2008 Current Conditions

Scale:

0 50 100 200 300 400 500 m

ACCESS CONSULTING GROUP

Drawn by: HD	Checked by: SK
Date: April 2008	**Figure 1-3**

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1.5. PROJECT PURPOSE

MintoEx proposes to increase the mill throughput rate in order to take advantage of current economic conditions which favour copper production. This proposed increase in mining and milling rates is strictly related to mining of its currently delineated and permitted deposit.

A positive prefeasibility study has been completed on the Area II extension of the ore body which indicates a mineral reserve capable of supporting a minimum eight year mill life. An amendment application and project description for the development of the Area II reserves is currently being prepared, but does not factor into the scope of this project.

1.6. SCOPE OF THE PROJECT

The Minto Mine project is currently fully permitted to conduct mining and milling operations at a rate of 2,500 tonnes of ore per day (tpd). As previously mentioned, these operations have been screened for environmental effects and these screenings have founded the permit conditions that govern the current operations. Included in the items that have already been assessed in the previous Environmental Assessments are:

- Site access and transportation of materials;
- Acid Rock Drainage (ARD) and metal leaching;
- Thickened tailings disposal;
- Tailings effluent treatment;
- Tailings/Mill water storage dam;
- Stream diversions;
- Waste rock dumps;
- Ore stockpiles;
- Other solid and liquid waste;
- Water;
- Fuel handling/spill contingency;
- Heritage resources;
- Wildlife;
- Decommissioning planning; and
- Cumulative effects.

The scope of the project proposed herein is limited to an increase in the rate at which the identified deposit is mined, and an attendant increase in the milling rate to accommodate this increase in ore throughput. There will also be an associated increase in the rate at which mining and milling wastes (waste rock, overburden and tailings) are placed in the already permitted locations. There will be no change in the overall footprint of the mill facilities or any of the waste deposition areas as a result of this project.

There will be no change in fuel handling/storage requirements for this project, as the Yukon Electric spur line will supply the site with power as of September 2008, well before the scheduled increase in milling rate is slated for commissioning (early 2009). In fact, although there is an anticipated increase in concentrate haul traffic (1-2 additional haul trucks) this will be offset markedly by the reduction in fuel handling traffic to site.

1.7. COOPERATION AGREEMENT WITH SELKIRK FIRST NATION

The Cooperation Agreement (CA) between MintoEx and the SFN (dated September 16, 1997) states that "*Minto is the sole legal and beneficial owner of the Minto and DEF mining claims and mining leases forming part of the Minto Project and wishes to develop the mining project known as the Minto Project*".

In addition to establishing cooperation with respect to permitting and environmental monitoring, this confidential document deals with other economic and social measures and communication between SFN and MintoEx. Both parties are content with the CA progress to date. The agreement is functioning well, and with minor modifications the agreement will be suitable for the future.

2.0 PROJECT DESCRIPTION

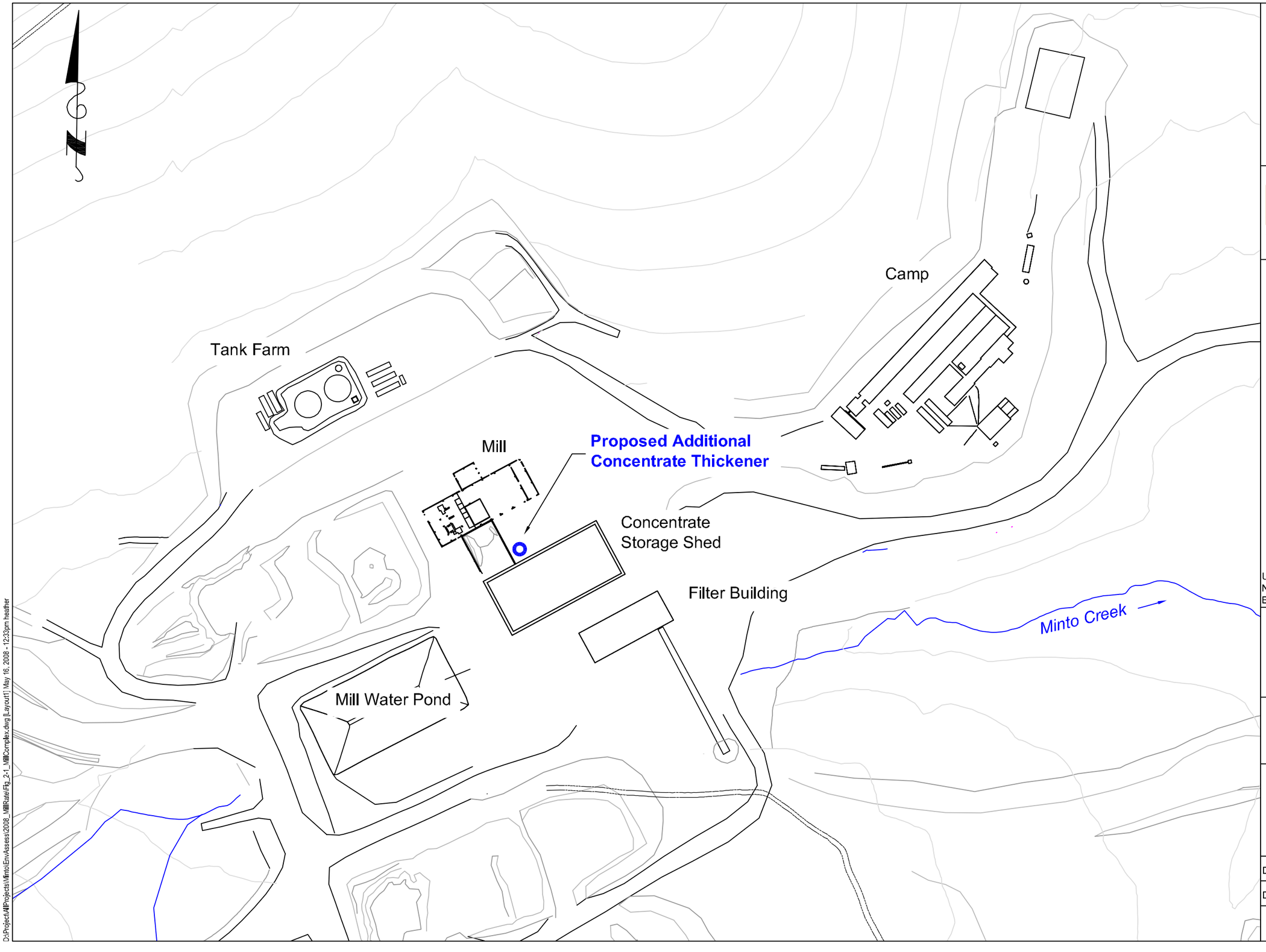
2.1. INTRODUCTION

The Minto Mine is a fully operational copper/gold mine in the central Yukon Territory. The elements of the project as operated presently have been designed, assessed and permitted previously, and the operation is proceeding in accordance with those permits (see Section 1.3 for applicable authorizations).

Although there will be little change to the physical structure of the existing facilities at the Minto project resultant from the proposed increase in the mining and milling rate, a brief description of these facilities is provided in the following section for the benefit of the reader; this is preceded by a description of the operational changes that are proposed under the mining and milling rate increase.

2.2. MINING AND MILLING RATE INCREASE

This project description and proposal is specific to the increase of the authorized mining and milling rate at the Minto Mine. Currently authorized at 2,500 tpd on an annual (12 month) average, the Company is proposing to increase this milling rate to 3,200 tpd through some minor modifications to the grinding circuit, primarily involving changing grate sizes inside the SAG mill and altering the trommel screen size. The footprints of all waste facilities will not be impacted by this rate increase, and the mill facilities will require only a minor modification with the addition of a concentrate thickener between the existing mills and concentrate storage shed. (see Figures 2-1 and 2-2). There will be a modest increase in the manpower required to achieve this increase; approximately 4 persons for the mining activity and possibly 2 persons in the mill and tailings facilities. Concurrently, the Company in proposing to achieve this increase in milling by increasing the currently authorized mining rate of 912,500 tonnes of ore per year to 1,168,000 tonnes of ore per year. This rate will be sufficient to meet the Company's proposed increased mill throughput of 3,200 tpd. This mining rate excludes 626,000 tonnes of low grade material that should be stockpiled over the planned pit life for possible processing at a future date, should economics warrant. The quantity of low grade ore stockpiled is as per the Company's original quartz mining and water use licence applications.



Minto Mine Project

Milling Rate Increase Project Description

MINTO EXPLORATIONS Ltd.
A Subsidiary of Sherwood Copper Corp.

Legend:

- Access Road
- Exploration Road
- Contour
- Water Course
- Water Body

UTM Zone 8 NAD83
NTS Sheet 115I11
Basedata obtained from Minto Mine March 2008

Porposed Change to Mill Complex (Plan View)

Scale:

0 10 20 40 60 80 100m

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Drawn by: HD	Checked by: SK
Date: May 2008	**Figure 2-1**

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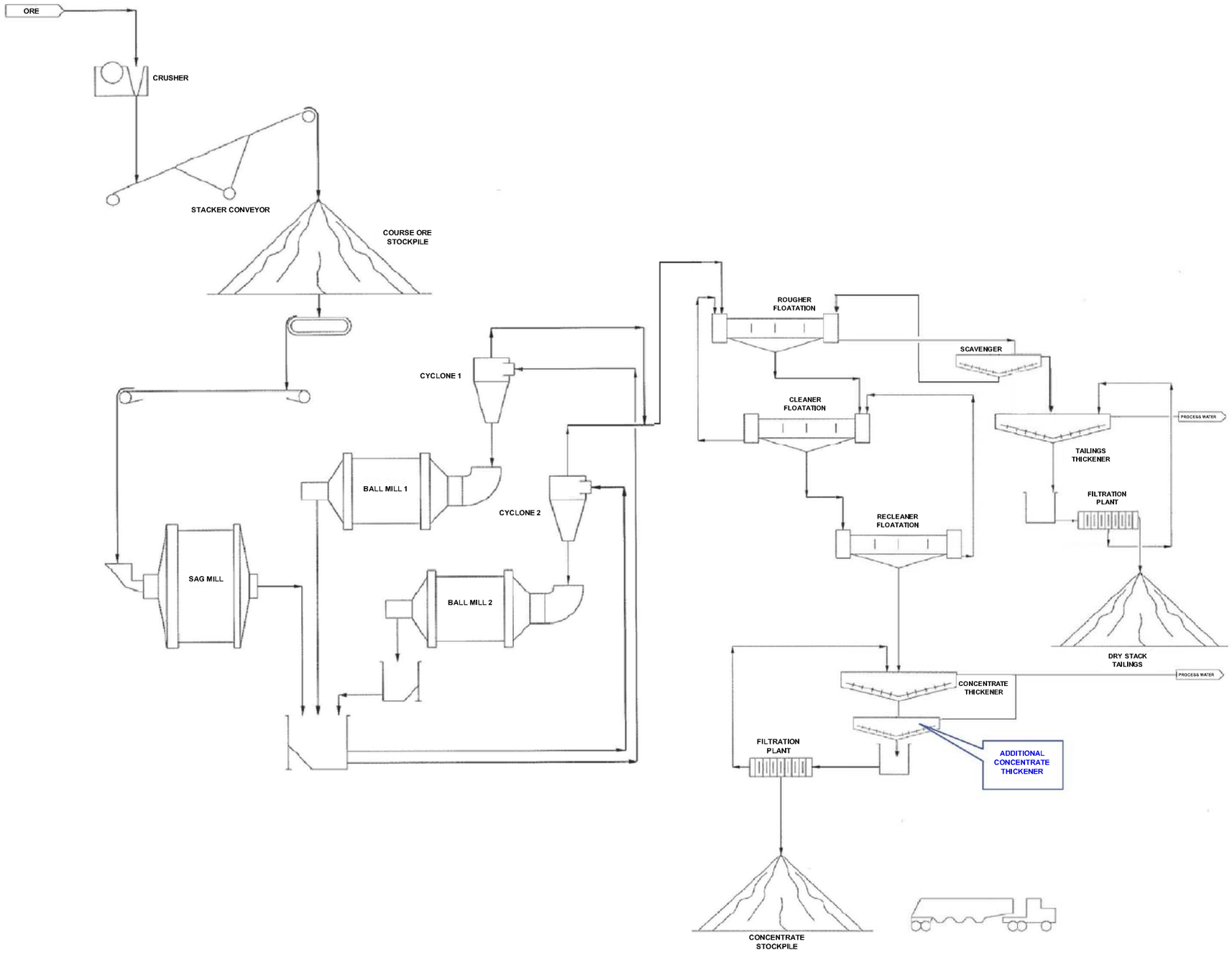

Original Drawing by HATCH

Minto Mine Project

Milling Rate Increase Project Description

MINTO EXPLORATIONS Ltd.
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Revised Milling Process Flowsheet

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Drawn by: HD	Checked by: SK
Date: May 2008	**Figure 2-2**

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2.3. EXISTING FACILITIES AND DEVELOPMENT

The Minto Project is accessible from Whitehorse, Yukon Territory, by means of the Klondike Highway (YG Highway No. 2) to Minto Crossing (240 km). Passage across the Yukon River can be made by barge in the summer or by ice bridge in the winter. A 28.8 km long, 10 m wide gravel access road provides access from the west side of the Yukon River to the project site (see Figure 1-2). The highway, river crossing and gravel access road are suitable for heavy transport traffic. Storage capacity for consumables at the mine site is sufficient for 2.5 months which, historically, is sufficient for the impassable freeze-up period or thaw period of the Yukon River. Normally, operations personnel are transported to the site in busses based out of Whitehorse. During the river freeze and thaw periods, personnel are transported from Whitehorse and Pelly Crossing to the site airstrip (recently refurbished) by air transport. The barge has a 75,000 kg (165,000 lb) net capacity. B-train transport trailers are transported across the river one at a time.

The road from the Yukon River to the project site is a well maintained class “A” all-weather gravel road, complete with drainage ditches, road signage and runaway lanes on steeper downhill sections. Roadbed material is fluvial sand or gravel along its lower reaches along the Yukon River and coarse sand along its upper reaches. For the most part the road is constructed on stable south facing slopes, which do not have permafrost, except for one short section where geotechnical cloth was laid down prior to the road fill being placed. The road crosses one major tributary of the Yukon River, Big Creek, by way of a single lane bridge made with reinforced concrete abutments and deck. The approaches to the bridge have been stabilized with berms and a spillway constructed to divert floodwaters exceeding the bridge capacity.

There is a 150-person prefabricated trailer camp/kitchen facility at the mine site. There is a trailer pump house with a water pump and filtration tanks that are supplied by a potable water well located adjacent to the pump house. Camp sewage disposal is by in-ground septic system, with a back up disposal lagoon located above the ice-rich overburden dump (IROD) at the west end of the project area.

The Minto operation currently includes an open pit mine with associated waste dumps and ore storage areas, a mill plant and mill water pond, a concentrate storage shed, a filter building, a dry-stack tailings storage area, a water retention dam with reclaim water reservoir, administrative offices, an airstrip, and a camp.

The ore deposit is being mined using conventional open pit truck and loader operations and processed in a mill plant on site. The plant initially processed 1,563 tpd (metric tons per day) of ore in year 1 defined as Phase 1. In year 2 (beginning January 2008), the plant throughput has increased to 2,400 tpd of ore, defined as Phase 2. Tailings are thickened and vacuum filtered into a 'cake' and deposited on a bench to the south (upslope) of Minto Creek. Precipitation and surface water collect in the main water storage (reclaim) pond. Operation of the tailings facility is in accordance with Quartz Mining License and the *Minto Mine Tailings Management Plan*, prepared by Access Consulting Group (ACG, 2007) and the *Operation, Maintenance and Surveillance Manual, Dry Stack Tailings Storage Facility, Minto Mine YT (Rev. 2007-01),* prepared by EBA Engineering Consultants Ltd. and submitted by the Company in December of 2007. More information on these permitted facilities is provided in the following sections.

2.4. ORE PROCESSING

In general, the Minto Phase 1 plant was designed to process 1,563 tpd of ore containing copper, gold and silver to produce a copper concentrate. In Phase 2, provisions were made to the plant layout and design to accommodate the increased throughput to 2,400 tpd. The main changes included a new building extension to contain the second ball mill circuit, three additional rougher flotation cells, and also the utilization of the new re-cleaner cells in the main mill building. Equipment has been sized to handle both Phase 1 and 2 tonnages, and only minor modifications to the grinding circuit will be required to increase the milling rate to 3200 tpd, involving grate sizes inside the SAG mill and trommel screen size.

The processing plant consists of the following main unit operations (see Figure 2-2):

- Primary crushing;
- Coarse ore conveying;
- Two stage grinding circuits for Phase 1;

- Additional Ball Mill circuit for Phase 2;
- Copper flotation;
- Concentrate thickening and pumping;
- Concentrate filtration;
- Concentrate storage (on-site);
- Tailings handling; and
- Water reclaim.

The primary crusher is designed to operate six hours per day, 365 days per year at an availability of 75%. The mill circuit operates 24 hours per day, 365 days per year at an availability of 90%. Availability is defined as the operating hours in a 24-hour day.

2.5. WASTE MANAGEMENT

All waste management facilities and methods have been designed, assessed and permitted under the Quartz Mining License and Water Use License. The project is operating in accordance with these authorizations. A brief description of these facilities is provided below, although only the rate at which the wastes will be deposited will change – the footprints and approved engineered designs of the facilities still remain valid for the proposed rate increase.

2.5.1. OVERBURDEN

As part of the mining operations at the Minto Mine, ice-rich overburden material is being excavated from the open pit during pre-stripping and pit expansion operations. This material will is stockpiled in a designated IROD storage facility so that it can be used for reclamation at closure.

2.5.2. WASTE ROCK

As part of the mining operations at the Minto Mine, waste rock materials are generated from the open pit and placed in the waste rock storage facility (dump), situated on a south-facing slope located west of the mine (see Figure 1-3). This facility is being constructed throughout the mine's life to an approximate final elevation of 960 m above mean sea level, and includes waste

rock as well as thaw-stable overburden. In addition to overburden/waste rock, the dump area contains an oxide ore stockpile and a low-grade ore stockpile that will be processed in the last years of operation of the mill. The overall waste rock dump design will not be altered as a result of the rate increase.

2.5.3. TAILINGS

Tailings management at the site will not be altered as a result of the requested change to the milling rate. The volume of tailings produced under the updated Tailings Management Plan will remain the same; however, the rate at which the tailings will be deposited will be somewhat faster based on the increased milling rate, but this will present no operational problems.

In 2006, the planning and development of the Minto project included a review of the proposed tailings de-watering technology. Subsequent to this review the Company installed, as part of the mine construction, a filter press system for dewatering tailings, and produces a dry tailings (~18% moisture by weight) suitable for compaction and stacking.

2.6. WATER STORAGE

The main water storage (reclaim) pond is formed behind the water retention dam. Runoff and water pumped from the open pit currently flow via the mill water pond, culverts and temporary upstream diversion ditches and are collected and stored in the reclaim pond during spring, summer and fall. Water storage capacity in the reclaim pond is approximately 378,000 m^3. The maximum depth of water at the face of the water retention dam is 15.2 m. The area covered by water at maximum depth is approximately 5 ha and the length of the pond is approximately 500 m. The water retention dam will not be altered as a result of the mill rate increase.

Water is also stored in the smaller mill water pond (with a 9.1 m depth and approximately 20,000 m^3 capacity) southwest of the mill. The water pumped from the open pit and any flow collected from the upper sub-basins is collected in this pond. The mill water pond is self-regulating for approximately seven months of the year and overflows continuously via a culvert into a diversion ditch leading to the main water storage pond during these months. The

reclaim water system is only used when there is insufficient water available from the mill water pond.

2.7. WATER BALANCE AND USAGE

The water demand for the project, and consequently the licensed water use rate for the project, were developed and proposed in the original Water Use License application based on the production of thickened 'paste' tailings. The process water requirement was identified as 0.036 m^3/s, as shown below in Table 2-1.

Table 2-1 Proposed Water Use Specifications from 1996 Water License Application

Mill Water Pond	Mean Annual (m^3/s)	10-Year Dry (m^3/s)	10-Year Wet (m^3/s)
Inflows			
Basin A	0.013	0.007	0.019
Basin C1	0.005	0.003	0.007
Pit Dewatering	0.005	0.005	0.005
Thickner Overflow	0.029	0.029	0.029
Total Inflows	0.052	0.044	0.060
Extractions or Losses			
Process Requirements	0.036	0.036	0.036
Seepage to Main Storage Pond	0.001	0.001	0.001
Total Extractions or Losses	0.037	0.037	0.037
Mill Water Pond Overflow	0.015	0.007	0.023
Main Water Storage Pond	**Mean Annual (m^3/s)**	**10-Year Dry (m^3/s)**	**10-Year Wet (m^3/s)**
Inflows			
Basin B	0.015	0.008	0.021
Basin C2	0.006	0.003	0.009
Tailings Runoff and Seepage	0.005	0.004	0.007
Mill Water Pond Overflow	0.015	0.007	0.023
Thickner Underflow	0.008	0.008	0.008
Seepage from Mill Pond	0.001	0.001	0.001
Total Inflows	0.050	0.031	0.069
Extractions or Losses			
Tailings Lock-up	0.006	0.006	0.006
Evaporation	0.002	0.002	0.002
Seepage to Minto Creek	0.001	0.001	0.001
Total Extractions or Losses	0.009	0.009	0.009
Main Water Pond Overflow to Minto Creek	0.041	0.022	0.060

The filter press technology for dewatering the tailings is much less water intensive than the originally proposed system of paste tailings deposition, allowing the project to realize significant water use savings. Process water use is tracked using totalizers on the input piping from both the reclaim and mill water ponds. Table 2-2 below shows that actual water use recorded for the months from October 2007 to March 2008 inclusive.

Table 2-2 Actual and Projected Process Water Requirements relative to Mill Throughput Rate

Month	Mill Throughput (tpd)	Actual Water Use (m^3)	Mean Monthly Water Use (m^3/s)	Projected Use at 2500 tpd (m^3/s)	Projected Use at 3200 tpd (m^3/s)
Oct-07	1084	15907	0.0059	0.0137	0.0175
Nov-07	1056	13580	0.0052	0.0124	0.0159
Dec-07	1146	14946	0.0056	0.0122	0.0156
Jan-08	1610	19269	0.0072	0.0112	0.0143
Feb-08	1600	19070	0.0076	0.0119	0.0152
Mar-08	1808	20650	0.0077	0.0107	0.0136

This table shows that at the projected milling rate of 3,200 tpd, the process water demand will still remain well below the originally proposed rate of 0.036 m^3/s. As such, the permitted rate of water use in the Type A Water Use License will not be impacted (see Appendix A for Water Use License Application Section on Water Use) and therefore no changes to the permitted water use under Water Use License QZ96-006 are required as a result of request.

2.8. CLOSURE PLANNING & STUDIES

A Decommissioning and Reclamation Plan (DRP) was developed by the previous owners and filed with the Yukon Water Board in April 2001 as per Water Use License requirements. This plan included cost estimates for closure activities.

A review of the 2001 plan by YG Water Resources identified areas of deficiency in the document, primarily associated with the level of detail provided and planning assumptions made. This review guided the preparation, as required in *Part G – Decommissioning and Reclamation* of the Company's Water Use Licence, of an Interim Care and Maintenance &

Interim Closure Plan ("Interim Plan") which was filed with the Yukon Water Board in November 2003 (Access Mining Consultants Ltd, 2003.). The Interim Plan addressed two scenarios:

1. continued care and maintenance of the present project infrastructure; and
2. closure issues related to the decommissioning of existing site developments at the Minto mine and reclamation of the site, including reclamation and security costs associated with the then dormant property.

The 2003 plan presented closure scenarios based on existing conditions at the time, stating:

> "*The mine and related infrastructure to support mining and milling activities has not yet been fully constructed. Once the Company has made a production decision, the remaining components of the project will be constructed, including the mill, tailings facilities, open pit and waste rock storage areas. Development of those mine components and their operations will expand existing areas of disturbance and a new decommissioning and reclamation plan will be developed and submitted to the Yukon Water Board (YWB).*"

The submission of a detailed closure plan was also required under the Quartz Mining Production Licence QML-0001, Section 14.1, which states:

> *"At least six (6) months prior to the Start-up Date, the Licensee must submit to the Chief a closure plan for the Undertaking for the Chief's review and approval."*

Both the 2001 and 2003 plans were drawn upon in the preparation of the Detailed Decommissioning and Reclamation Plan (DDRP), which was submitted in November 2006 and approved in June 2007 after government review and the Company's submission of some supplemental planning information. The plan addresses the long-term physical and chemical stability of the site, including reclamation of surface disturbances. A program was presented for site management and monitoring both during implementation of closure and after decommissioning and reclamation measures are completed. Decommissioning and reclamation cost estimates were provided and financial security requirements were reviewed.

The development of the closure plan was based on the best information available at the time of preparation. As required in Section 14.3 of Quartz Mining Licence #QML-0001, this plan will be updated every two years, and submitted to the Chief of Mining Lands for review and approval no later than every second anniversary of the startup date.

There will be no changes to the DDRP as a result of the increased mining/milling rate increase.

3.0 EXISTING ENVIRONMENTAL AND SOCIO-ECONOMIC CONDITIONS

3.1. INTRODUCTION

Similar to the plans for the existing site facilities and infrastructure, the environmental and socio-economic conditions pre-existing the Minto Mine development have been compiled and presented, reviewed and assessed and referenced in the previous environmental assessments (see Section 1.2 for past EA's.)

It is expected that there will be minimal change to these conditions resultant from the proposed increase in the mining and milling rate, as outlined in Section 2.2. These conditions are summarized in Appendix A, regardless if effects are expected as a result of this project.

3.2. OVERVIEW

Table 3-1 summarizes existing environmental and community conditions in the Minto project area. The information was compiled from various published and unpublished reports. This table is not intended to provide a thorough reflection of the environmental setting of the project area, but rather a succinct overview of the key environmental and community parameters. A more detailed description of the environmental conditions in the Minto project area was compiled and presented as part of the environmental assessment and licensing process associated with the 1996 Water Licence application including the *Initial Environmental Evaluation (IEE),* prepared by Hallam Knight Piesold in 1994.

Appendix A contains a summary of the information presented in the *IEE* as well as updates based on more recent information collected at the site during the Interim Closure Monitoring and from monitoring associated with license conditions and operational management during mine construction and initial operations.

Table 3-1 Minto Mine Setting Summary

Project Area Attribute	Description
Region:	Yukon
Topographic Map Sheet:	NTS 115 I/10, 115 I/11
Geographic Location Name Code:	Minto Project
Latitude:	62° 36' N
Longitude:	137° 15' W
Drainage Region:	Yukon River
Watersheds:	Yukon River, Big Creek, Wolverine Creek, Dark Creek, and Minto Creek.
Nearest Community:	Pelly Crossing, Yukon, approx. 33 km north on Klondike Highway.
Access:	Klondike Highway, Barge crossing on Yukon River at Minto Landing, Minto mine access road. Airstrip on site.
Traditional Territory:	Northern Tutchone, Selkirk First Nation peoples. Traditional use for hunting, trapping and fishing.
Surrounding Land Status:	Selkirk First Nation Settlement Lands and Federal Crown Land.
Special Designations:	Lhutsaw Wetland Habitat Protection Area located approx. 17 km NE of Minto Landing (outside the project area).
Ecoregion:	Yukon Plateau (Central) - Pelly River Ecoregion.
Study Area Elevation:	Rolling hills above mine site at 1131 metres to 600 metres at the Yukon River Valley bottom.
Site Climate:	Temp. ranges from –43.2°C (Nov. 2006) to 25.9°C (Jun. 2006). Mean annual temp. of -3.0°C. Mean annual rainfall is 131mm.
Vegetation Communities:	Riparian, black spruce, white spruce, paper birch, lodgepole pine, buck brush/willow and ericaceous shrubs, feather moss, sedge, sagewort grassland, mixed, aspen, balsam, and sub-alpine. Discontinuous permafrost is present on site. Site has been subject to recent forest fires.
Wildlife Species:	Moose, caribou, Dall sheep, mule deer, grizzly and black bear, varying hare, beaver, lynx, marten, ermine, deer mouse, fox, mink, wolverine, least weasel, wolf, squirrel, porcupine coyote, muskrat, otter and wood frog. Bird species include: spruce, blue, ruffed, and sharp-tail grouse, waterfowl, raptors, and a variety of smaller birds.
Fish Species:	In the Yukon River, chinook, coho, and chum salmon, rainbow trout, lake trout, least cisco, bering cisco, round whitefish, lake whitefish, inconnu, arctic grayling, northern pike, burbot, longnose sucker and slimy sculpin; In Big Creek, Chinook and

Project Area Attribute	Description
	chum salmon, arctic grayling and whitefish species; In Wolverine Creek, chinook salmon, arctic grayling, and slimy sculpins; In Minto Creek and project area watershed (lower reaches only), chinook salmon, slimy sculpin, round whitefish, arctic grayling.
Known Heritage Resources:	East side of Yukon River in the vicinity of Minto Landing four historic sites designated KdVc-2 (Minto landing), KdVc-3 (Minto Resort), KdVc-4 (Old Tom's Cabin), and KdVD-1 (Minto Creek).

4.0 POTENTIAL ENVIRONMENTAL AND SOCIO-ECONOMIC EFFECTS AND PROPOSED MITIGATION

4.1. INTRODUCTION

The following section comprises the assessment of potential effects resulting from the increase to the mining and milling rate at the Minto Mine property. The environmental assessment (EA) aspects in this section rely on information collected and presented in previous environmental assessment submissions (see Section 1.2), and also on existing data that has been collected at the site since those submissions, during baseline, construction and most recently operational conditions. The previous environmental assessments fully addressed any potential adverse effects from the project and are directly applicable to our amendment request. It is important for the purposes of this assessment to make the clear distinction between the existing project and the project proposed herein (as discussed in Section 1.6, *Scope of the Project*). The existing project will be substantially the same, with the only significant change being that mining the Minto deposit and mill processing will occur over a shorter time frame.

This section discusses the effects of an increase in the milling and mining rates on valued environmental and socio-economic components (VC's), including aquatic and terrestrial resources and other resource users. The previous chapters have summarized the site and project history and provided a project description for the milling and mining rate increases. The EA presented below builds on the information discussed and presented in these previous assessments and recognizes already authorized activities and mandated monitoring and mitigation measures.

As the Minto Project is a fully permitted and operational mine with milling facilities, the approach taken for the effects assessment reflects this and is specific to the mining and milling rate increase. The emphasis in this EA has been placed on understanding and assessing effects in two main areas: Aquatic Resources and Socio-economics. Experience at other mine sites has indicated that while terrestrial and other resources users' effects may be significant, the effects are limited to a local area. The potential effects associated with surface water quality contamination and aquatic resources are more widespread. Water and contaminant loading balances have been previously prepared and used as the basis for evaluating aquatic effects.

Socio-economic conditions also have the potential to be impacted by an increase in the rate of mining and milling at the Minto site, *both positively and negatively*. These effects are discussed in the context of a mining operation with established practices and agreements with the local first nation and community.

This EA for increasing the milling rate at the Minto Mine considers VC's and presents mitigation measures for potential effects. Guidance documents provided by YESAB, the *Proponents Guide to Project Proposal Submission to a Designated Office,* (2005) and the *Assessor's Guide to the Assessment of Environmental Effects* (2006) were relied upon. A cumulative effects assessment is also presented.

4.2. ENVIRONMENTAL ASSESSMENT APPROACH

The environmental and socio-economic assessment has relied upon previous EA's and documentation and includes the identification of VC's and an assessment to determine whether or not the project is predicted to cause significant adverse environmental effects on identified VC's after the implementation of appropriate mitigation measures. A risk assessment process rates potential consequences to human health and safety as well as the natural environment and serves as the basis to develop mitigation measures that have the highest probability of success.

To determine whether or not the potential adverse environmental effects were considered significant, six criteria were taken into consideration. These descriptors follow the YESAB *Assessor's Guide to the Assessment of Environmental Effects* and are similar to those presented in *The Responsible Authority's Guide to the Canadian Environmental Assessment Act* prepared by the Federal Environmental Assessment Review Office (FEARO) in 1994.

- **Magnitude** of the adverse environmental effect, where magnitude refers to severity. Minor or inconsequential effects may not be significant, but effects that are major or catastrophic will be significant;
- **Geographic** extent of the potential environmental effect. Localized effects may not be significant while widespread effects are more likely to be significant;

- **Duration and Frequency** of the potential environmental effect. Long-term and/or frequent adverse effects may be significant; however, those of a short term and/or temporary nature should not be significant. The occurrence may be once, rarely, or even continuously;
- **Reversibility:** Degree to which the adverse effect is reversible or irreversible. Reversible adverse environmental effects may be less significant than effects that are irreversible;
- **Economic and Social Context**: The adverse effects of projects may be significant if they occur in areas or regions that have already been adversely affected by human activities and/or are economically or socially fragile and have little resilience to imposed stresses or changes; and
- **Direction**: The adverse effect may be negative or beneficial.
- **Likelihood Determination:** To identify effects that are reasonably likely to occur within the spatial and temporal scopes of the assessment, two concepts for likelihood determination were used:
    - Probability: The chance or possibility that a specific event will occur.
    - Uncertainty: The possible error or range of error that may exist within assumptions.

The ratings system used to determine the significance of potential environmental effects is shown in Table 4-1. Table 4-2 provides a summary of the assessment of potential environmental and socio-economic effects, a summary listing of mitigation measures, and a determination of the significance of the potential effects using quantifiable measures. The VC's that were evaluated for potential environmental effects include: Aquatic Resources (water quality, fisheries, benthic invertebrates), Terrestrial Resources (wildlife, vegetation), Traditional Land and Historic Use Components (trapping, traditional harvest, heritage resources), and Socio-Economic Components (community wellness, education, unemployment, business opportunity, infrastructure and community services, human health and safety.)

Subsequent sections present the determination of VC's, the details of the effects assessment and mitigation measures for these environmental and socio-economic conditions, as well as a cumulative effects assessment.

Table 4-1 Significance of Effects Descriptors

Descriptor	*Direction*	Duration	Geographic Extent	Magnitude	Reversibility*	Economic & Social Context	*Frequency*	*Significance*
Very low	+ = *Beneficial Effect*	<1 to 5 years	<1 ha	negligible effects to surrounding environment	90-100%	Community with very good economic and social fitness and a very high degree of resilience	*Occurs once*	*Not significant adverse environmental effect (NS)*
Low	*n = neutral effect*	5 to 10 years	1-75 ha	low effects to surrounding environment	70-90%	Community with good economic and social fitness and a high degree of resilience	*Occurs Rarely and at Sporadic Intervals*	*Positive environmental effect (P)*
Moderate	- = *negative effect*	10 to 25 years	75-200 ha	moderate effects to surrounding environment	40-70%	Community with moderate economic and social fitness and a moderate degree of resilience	*Occurs on a regular basis and a regular interval*	*Significant adverse environmental effect (S)*
High	+/- = *beneficial and negative effect*	25 to 100 years	200-300 h	extreme effects to surrounding environment	<40%	Community with a poor economic and social fitness and low degree of resilience	*Continuous*	*Significant adverse environmental effect (S)*

Note: * Descriptors for reversibility still reflect the *significance* and are opposite to the actual reversibility.

Likelihood:

Probability of Occurrence of Residual Effect:

Based on professional judgment

1 = None
2 = Low probability of occurrence
3 = Medium probability of occurrence
4 = High probability of occurrence

Uncertainty:

Based on scientific information, social research or professional judgment

1 = Low level of confidence
2 = Medium level of confidence
3 = High level of confidence

Table 4-2. Summary of the Assessment of Potential Environmental and Socioeconomic Effects Resulting from Increased Milling Rate at Minto Mine.

Parameters	Consequence and Effect	Mitigation Measure (already in place)	Significance of Residual Effects								Overall Significance	Likelihood	
			Direction	Duration	Geographic Extent	Magnitude	Reversibility	Economic & Social Context	Frequency	Overall Rating		Probability	Uncertainty
Aquatic Resources													
Water Quality	Increased metals and sediments loading, change in pH	Effluent and water quality monitoring and reporting.* Maintain and use existing water treatment system operations.* Comply with operational requirements of Tailings Management Plans.* Ensure site stability, monitor and track potential effects.* Water management conditions in WUL.* Physical Monitoring Program and regular stability inspections.* Acid Base Accounting Test Program under WUL.* Spill Contingency Plan in place.* Permitted waste management facilities.*	n	9 yrs-low	low	low	low	low	low	**LOW**	**NS**	2	3
Fisheries Benthic Invertebrates	Reduced population health and robustness due to increased metals and sediments loading, change in pH	Effluent and water quality monitoring and reporting.* Maintain and use existing water treatment system operations.* Comply with operational requirements of Tailings Management Plans.* Ensure site stability, monitor and track potential effects.* Water management conditions in WUL .* Physical Monitoring Program and regular stability inspections.* Acid Base Accounting Test Program under WUL.* Spill Contingency Plan in place.* Permitted waste management facilities.*	n	9 yrs-low	low	low	low	low	low	**LOW**	**NS**	2	3
	Loss of habitat (decrease in surface flows) due to increased rate of water use.	Flow Monitoring Plan in place to ensure no impact to downstream fisheries habitat.* Projected water use still well below permitted rate, lower Minto Creek base flows from other tributaries maintain sufficient habitat for seasonal fisheries use.	n	9 yrs-low	low	very low	low	low	low	**LOW**	**NS**	2	3
Terrestrial Resources													
Wildlife	Indirect habitat loss, avoidance, habitat fragmentation	Small project footprint, reclamation at closure. Approved Closure Plan in QML.*	n	9 yrs-low	low	very low	low	low	low	**LOW**	**NS**	2	3
	Harassment	No hunting policy, employee education.	n	9 yrs-low	low	very low	low	low	low	**LOW**	**NS**	2	3
	Road kills, hunting & poaching pressure	No hunting/firearms policy on site, access control during operations,. Road reclamation in approved Closure Plan in QML.*	n	9 yrs-low	low	low	low	low	low	**LOW**	**NS**	2	3
Vegetation	Distrubance/loss of native vegetation	Closure Plan approved in QML with reclamation research and revegetation planning.* Revegetation initiatives will utilize native species.	n	9 yrs-low	low	low	low	low	very low	**LOW**	**NS**	2	3
Traditional Land & Historic Use													
Trapping	Decrease in wildlife populations, decrease trapping success	Trapping use maintained - Trapper Compsensation Agreement in place with Trapper.* Compensation included improving access to areas that are presently inaccessible.	n	9 yrs-low	low	very low	low	low	low	**LOW**	**NS**	2	3
Traditional Harvest	Decrease in access to wildlife and cultural pursuits	Trapper Compsensation Agreement in place.* Project provides continued and improved access to harvest areas for building timber and firewood on west side of Yukon River.	n	9 yrs-low	low	low	low	low	low	**LOW**	**NS**	2	3
Heritage Resources	Impact to heritage sites	Previous heritage assessment completed - consultation with community and SFN regarding sites. Heritage finds (i.e. bones/tusks) reported and/or delivered to SFN and YG.	n	9 yrs-low	mod	low	moderate	low	low	**LOW/MOD**	**NS**	2	3

Parameters	Consequence and Effect	Mitigation Measure (already in place)	Significance of Residual Effects							Overall Significance	Likelihood	
			Direction	Duration	Geographic Extent	Magnitude	Reversibility	Economic & Social Context	Frequency	Overall Rating	Probability	Uncertainty
Socioeconomic Effects												
Community Wellness	Change in substance abuse pattern and therefore family violence	Consumption of alcohol and 'recreational' drugs not allowed on site. 'Fit for Duty' testing required for all employees, and company works with SFN Drug & Alcohol department as appropriate to assist employees.	+/-	9 yrs-low	low	low	low	low	low	**LOW**	**NS**	2	3
	Effects on workers and family mental, physical and cultural health	Well-paying, full time employment can improve self-esteem and reduces financial stress on family. Flexible approach to employee leave to accommodate cultural activities. Skills upgrading - life long and transferable. Direct financial support for community athletics and recreation. Company works collaboratively with community to identify issues and provide support.	+/-	9 yrs-low	low	low	low	low	low	**LOW**	**NS**	3	3
	Change to visual aesthetics by milling operations.	Project area not visible from public roads. Waste managed under permits. Closure plan approved in QML for the project. Revegetation using indigenous flora where native vegetation has been removed or destroyed. Natural revegetation of the roads and airstrip will be promoted.*	n	9 yrs-low	low	low	low	low	low	**LOW**	**NS**	2	3
Education	Change in individuals' skill and education levels	Training and skills upgrading provided by company and contractors. Scholarships established under Cooperation Agreement. Enhanced employment opportunity through local training program.	+	9 yrs-low	low	low	low	low	low	**LOW**	**NS**	4	3
Employment	Project activities generate economic benefits and growth for individual, families and community.	Cooperation Agreement already negotiated with local First Nations.* Preferential hire of local residents to the benefit of company. Contributing to development of stable qualified workforce. Provides attractive wage and benefits package to employees. Company actively consults with the community, individuals, groups, and stakeholders for increased project awareness.	+	9 yrs-low	low	low	low	low	low	**LOW**	**NS**	4	3
	Economic benefits reducing community unemployment, and/or creating financial inequality in community.	Ongoing community dialogue/consultation. Measures to include local hire and business opportunities through project life (see below). Cooperation Agreement already negotiated with SFN. *	+/-	9 yrs-low	low	low	low	low	low	**LOW**	**NS**	3	3
Business Opportunity	Increased business opportunities and business growth potential locally and regionally.	In accordance with Cooperation Agreement, company utilizes local/SFN companies and individuals to provide services.*	+	9 yrs-low	low	low	low	low	low	**LOW**	**NS**	4	3
Infrastructure and Community Services	increased demand for services and infrastructure - local community and regionally.	Providing information on requirements to enable local community to effectively plan. * Working with agencies and institutions currently providing services to provide support and to better serve community needs.	+	9 yrs-low	low	low	low	low	low	**LOW**	**NS**	4	3
Human Health and Safety	On Site - accidents or malfunctions cause inability to work.	Health & safety plans, training, culture of safety - guidelines to meetings and incident review, inspections and monitoring. Safety meetings held for all staff at the beginning of each work assignment period. Medical equipment and trained personnel on site 24 hours a day. Occupational health and safety standards enforced for all personnel/contractors. Consumption of alcohol and 'recreational' drugs not allowed on site. Employees required to undergo 'fit for duty' testing. Emergency Response Plan will be implemented if required as necessary.* Employees eligible for Workers Compensation. Monitoring and maintenance programs in place to ensure facility and worker safety and equipment integrity. Project engineering designs utilized with appropriate factors of safety, containment systems, and redundant systems to minimize accidents and malfunctions.*	n	9 yrs-low	low	low	low	low	low	**LOW**	**NS**	2	3
	Off Site - increased risk of traffic accidents due to increased truck traffic.	Transportation crews instructed on traffic safety. Traffic will be controlled on mine access road - radio control to reduce accidents. Communication and notification of hazardous materials transport to the site. Vehicles equipped for winter travel and carry emergency first aid kits. Concentrate haul from site to Skagway during daylight hours only, and drivers have to meet specific experience and training criteria.	n	9 yrs-low	low	low	low	low	low	**LOW**	**NS**	2	3

*** Mitigation measures in place in either Quartz Mining Licence (QML), Water Use Licence (WUL) or SFN/MEL Cooperation Agreement.**

4.3. VALUED ENVIRONMENTAL AND SOCIO-ECONOMIC COMPONENTS

Valued environmental and socio-economic components (VC's) are defined as elements of the environment, which are valued for environmental, scientific, social, aesthetic or cultural reasons. Selecting project specific VC's or indicators are essential for focusing the effects assessment and determination of significance of effects.

VC's for the area and associated activities have been previously identified and used indirectly through the assessments of the project (see Section 1.2 for past EAs). These VC's included primarily aquatic and terrestrial resources and lacked the specific focus on socio-economic components that is now included in assessments under the Yukon Environmental and Socio-Economic Assessment Act (YESAA).

The process for identifying VC's for this EA included a review of previous EA screenings and site EA's, baseline research, literature review, species vulnerability, and community consultations.

Examples of attributes that influenced the selection of VC's are noted below and in Table 4-3 (coded):

- Ecological Importance (EI);
- Focal Species and/or Habitat (FS);
- Socio-economic Importance (existing and potential) (SI);
- Cultural Importance (CI);
- First Nation/ Resident/Community Values or Concerns (V);
- Aesthetic Value (AV);
- Rare or Endangered (R);
- Special Elements (SE); and
- Responsiveness to Impacts or Stress (RS).

The types of VC's selected for this project have included First Nation/ Resident/ Community and commercially important wildlife and fish species such as moose or Chinook salmon; surface water quality; important cultural or heritage sites; traditional uses; trapping; and recreational use.

The approximate spatial boundaries for VC's are somewhat more regional in context as these VC's have been identified for not only the mine site but also the access road, drainage areas and Minto Landing. Wildlife species, such as moose, will move into and out of the area. The identification of socio-economic/cultural VC's is presented in a regional context, including Pelly Crossing, Carmacks and the entire Yukon. Input from the public including traditional knowledge has contributed to the identification of VC's.

Table 4-3 provides a complete list of the VC's within the EA study area and within a regional context that will be affected by the project and rationale for their selection, including who identified them and their attributes. Consultation with SFN, the public and regulatory agencies, knowledge of local environmental conditions and best professional judgment lead to the selection of the project VC's.

Table 4-3 Identification of VC's

Component Type	Identified Group/Rationale for Selection/Attribute
Environmental	
Surface Water Quality	Identified by FN, G, OP. Minto Creek and Yukon River are local receiving waters and support aquatic resources. Water quality is representative of ecological processes and of concern to community members. Attributes include EI, V, SE, RS.
Fisheries and Benthic Resources	Identified by FN, G, OP. Chinook salmon - sensitive fish species; important commercial and native food fisheries; downstream indicator, focal species. Attributes include EI, FS, SI, CI, V, SE, RS. Arctic grayling - Species of importance for First Nations and sport fisheries. Attributes include EI, FS, CI, V, SE, RS.
Wildlife	Identified by FN, G, OP. Moose specifically - This species is a focal species and important socially, culturally, economically, and highly valued by the community. Attributes include EI, FS, SI, CI, V, SE, RS.
Vegetation	Identified by FN, G, OP. Native vegetation and suppression of invasive floral species are key to local ecosystem and traditional harvesting. Attributes include EI, FS, SI, CI, V, SE, RS.
Socio-economic	
Traditional Use – Trapping	Identified by FN, G. Trapping concession provides employment benefits and sustenance lifestyle. Attributes include SI, CI, V.
Traditional Use – Harvesting	Identified by FN, G, OP. Wildlife, fish, berries, plant harvesting support sustenance lifestyle and cultural pursuits. Attributes include SI, CI, V.
Heritage Resources	Identified by FN, G. Known historic sites in area; Attributes include CI, V,SE.
Community Wellness	Identified by FN, G, OP. General indicator of community health and resilience. Attributes include SI, CI, V.
Education	Identified by FN, G, OP. Foundation for furthering life skills and opportunities. Attributes include SI, V.
Employment	Identified by FN, G, OP. Economic, health and other social and individual benefits associated with stable employment. Attributes include SI, V.
Business Opportunity	Identified by FN, G, OP. Economic development and growth potential important locally and regionally. Attributes include SI, V.
Infrastructure and Community Services	Identified by FN, G, OP. Elements contribute to robust and liveable community. Attributes include SI, V.
Human Health and Safety	Identified by FN, G, OP. Worker health and safety on the mine site, and public health and safety are key. Attributes include SI, V, RS

Notes: FN = First Nation; G = Government; OP = Other Public

Potential effects on each VC were examined within specified spatial and temporal extents, which are defined below in Table 4-4.

Table 4-4 VC Spatial and Temporal Boundaries

Valued Component	Spatial		Temporal	
	Boundaries	**Rationale**	**Boundaries**	**Rationale**
Environmental				
Surface Water Quality	Minto Creek watershed, Yukon River	Project receiving waters.	Mine life and active closure – 9 years	Water quality data collected during all project phases to ensure continued environmental protection.
Fisheries and Benthic Resources	Minto Creek watershed, Yukon River	Fish-bearing receiving waters.	Mine life and active closure – 9 years	Potential effects during mine life to downstream resources. Known fisheries utilization in Yukon River.
Wildlife	Regional Context	Range of wildlife resources is not confined to a specific area.	Mine life and active closure – 9 years	Direct effects to wildlife would occur during this period.
Socio-economic				
Traditional Use – Trapping	Actively Trapped Area	Trapping activities only affected in the actively trapped area.	Mine life and active closure – 9 years	Potential effects to trapper harvesting and wildlife would occur during this period.
Traditional Use – Harvesting	Regional Context	Traditional use of the land not confined to a specific area.	Mine life and active closure – 9 years	Traditional activities potentially affected during this period.
Heritage Resources	Mine Site, Access Road, Minto Landing	Only these areas would see potential for disturbance of heritage resources	Mine life and active closure – 9 years	Limited potential for disturbances of heritage sites during this period.
Community Wellness	Regional Context	Wellness of different communities may be affected – at site (camp), Pelly Crossing/Carmacks, Whitehorse, Yukon in general.	Indefinite	Potential for economic legacy to affect local community well beyond life of proposed project and mine life.
Education	Regional Context	Skills and education gained are transferable to other locations/projects.	Indefinite	Potential for advanced education and skills gained to support individual and community development well beyond life of proposed project and mine life.

Valued Component	Spatial		Temporal	
	Boundaries	Rationale	Boundaries	Rationale
Employment	Regional Context	Employment figures and quality affected not only at mine site, but in other locations with support services.	Mine life and active closure – 9 years	Increased employment will be seen during these time periods.
Business Opportunity	Regional Context	Similar to employment, opportunity for business development will arise on a regional scale to support site activities.	Indefinite	Opportunities for business development and operation may continue for spin-off activities well beyond life of project and mine.
Infrastructure and Community Services	Regional Context	Infrastructure and services may develop in response to mining/milling activities at site and in local communities, on greater regional scale to some extent.	Indefinite	Services and infrastructure implemented may outlive mine life and active closure activities.
Human Health and Safety	Site, Access Road and Regional Context	Company accountable for worker and public health and safety at site and along access roads.	Mine life and active closure – 9 years	Potential effects to human health and safety would occur during this period.

4.4. SUMMARY OF POTENTIAL ENVIRONMENTAL AND SOCIO-ECONOMIC EFFECTS AND PROPOSED MITIGATION

This section summarizes key potential environmental and socio-economic effects for the project and proposed mitigation measures. Table 4-2 presented in the preceding section provides a tabular summary of the significance assessment and proposed mitigation presented in the following sections. Table 4-2 characterizes the effects to VC's and provides a description of planned mitigation measures for potential adverse effects. The direction of effects and an assessment of the residual environmental and socio-economic effects using criteria presented in Section 4.3 are also provided. A significance determination is made along with a determination of the likelihood of occurrence based on probability and uncertainty of effects.

VC's identified in previous EA's for the project have been utilized in this assessment. Most of these previously identified VC's will not be impacted by the scope of this project but have been included here for continuity. For the most part, mitigation measures for identified potential effects are already in place in the form of license-mandated conditions including design submissions, monitoring programs, and reporting requirements. The proposed increase to the mining and milling rates will not impact VC's significantly, so the existing mitigation measures remain valid. Monitoring program elements are summarized further following this section.

4.4.1. ENVIRONMENTAL EFFECTS

4.4.1.1 Water Quality and Aquatic Resources

A primary objective of the management of the Minto mine is the protection of surface water quality that supports aquatic resources, which is achieved by alleviating contaminant loadings to the receiving environment, in particular Minto Creek which makes its way to the Yukon River. As such the EA discussion and mitigation measures presented below are for the VC's surface water quality and aquatic resources.

Potential Effects:

- Altered water chemistry and aquatic resources (including fisheries and benthic communities) productivity and diversity. An increase of the mining and milling rate has the potential to increase the contaminant loading *rate* in the project area, but not the total contaminant load.
- Loss of aquatic habitat due to reduced surface flows from increased project water use.

Mitigation:

The following presents a summary of existing mitigation measures in place at the Minto mine:

- Water Quality Surveillance Program (Water Use License QZ96-006) and Effluent Monitoring (MMER) underway, with regular reporting requirements;
- Water management conditions in WUL implemented – ditch design and other construction QA/QC planning;
- Water treatment contingency planning undertaken and implemented as proposed and referenced in WUL for metals and sediment control;
- Physical Monitoring Program and regular stability inspections by registered engineer and subsequent reporting in place for dam, diversions, and waste dumps;
- Approved monitoring program and O&M Manual for Tailings Storage Area in place for stack stability and compaction;
- Acid Base Accounting Test Program under water use licence in place with regular reporting requirements – guides placement of waste materials in dumps and for construction purposes;
- Spill Contingency Plan in place, as submitted for and referenced in WUL – currently under review;
- Proper handling and storage of waste materials ensured through permitted waste management facilities including commercial dump, Land Treatment Facility for hydro-carbon contaminated soils, special waste storage area and waste incinerator; and
- Fisheries and habitat assessments of Lower Minto Creek are ongoing, and a Flow Monitoring Plan is in place to ensure no effects to fisheries habitat occur as a result of project water use upstream.

Based on the potential effects and mitigation measures listed above, an assessment of the residual environmental effects of the increased milling rate, significance assessment and determination of the likelihood of the effect was completed. Potentially adverse effects to VC's surface water quality and aquatic resources are considered to be low as the duration is low (9 years: 6 year mine life and 3 years of active closure), geographic extent is low, magnitude is low, effects due to project reversibility are low (high degree of reversibility), economic and social context is low (good community fitness and resilience), and frequency is low (effect occurs rarely/sporadically). The potential residual adverse effects are **not considered significant** based on a low probability of occurrence and a high degree of confidence. A summary of the potential environmental effects for the mill rate increase is provided in Table 4-2.

4.4.1.2 Wildlife

There are no additional impacts to wildlife resources expected as a result of the proposed mill rate increase. Some displacement of wildlife by the entire project is expected and has been identified in previous assessments, although the limited project footprint of the project and the existing mitigation planning serve reduce the significance of these effects. The following implemented wildlife impact mitigation measures remain valid:

Potential Effects

None expected from this project, but overall mine development project may see the following effects which have been included with existing mitigation measures:

- Indirect habitat loss, avoidance and habitat fragmentation;
- Camp facilities and waste storage and disposal odors as an attractant for bears;
- Harassment of animals;
- Direct mortality due to injury due to mining debris, road kill, hunting pressure and poaching.

Mitigation Measures

The following mitigation measures have already been implemented:

- No hunting policy on project site or access roads;
- Adhere to provisions wildlife protection measures of Commercial Dump Permit No: 81-005:

- Camp is kept clean and combustible waste is incinerated completely on a daily basis to eliminate odors that may attract wildlife. See waste management location on Figure 1-3:
- If wildlife becomes and nuisance or problem a portable electric fence will be installed around the perimeter of the camp. All nuisances / problems with wildlife will be reported to the local conservation officer immediately for assistance in further effective means of reducing wildlife mortality;
- No hunting policy for project employees is adhered to;
- Firearms banned from the mine site;
- Vehicle-animal encounters are prevented by employees following posted speed limits;
- Employees are required to fill out the Company's posted wildlife log;
- In two years of site development and operation, there have been no reported wildlife fatalities in the project area.

Based on the potential effects and mitigation measures listed above, an assessment of the residual environmental effects of the milling rate increase, significance assessment and determination of the likelihood of the effect was completed. Potentially adverse effects to VC wildlife were considered to be low as the duration is low (9 years: 6 year mine life and 3 years of active closure), geographic extent is low, magnitude is low, effects due to project reversibility are low (high degree of reversibility), economic and social context is low (good community fitness and resilience), and frequency is low (effect occurs rarely/sporadically). The potential residual adverse effects are **not considered significant** based on a low probability of occurrence and a high degree of confidence. A summary of the potential environmental effects for the mill rate increase is provided in Table 4-2.

4.4.1.3 Vegetation

There are no additional impacts to vegetation resources expected as a result of the proposed mill rate increase. Impacts to vegetative cover (stripping, road construction) by the entire project is expected and has been identified in previous assessments, although the limited project footprint of the project and the existing mitigation planning serve to reduce the significance of these effects. The following implemented vegetation impact mitigation measures remain valid:

Potential Effects

None expected from this project, but overall mine development project may see the following effects which have been included with existing mitigation measures:

- Disturbance/loss of native vegetation due to mine development activities.

Mitigation Measures

The following mitigation measures have already been implemented and remain valid:

- There is an approved closure plan for the project that identifies the re-establishment of a self-sustaining native vegetative cover as a reclamation objective. These objectives are being reviewed and refined with SFN.
- Closure plan outlines a reclamation research program targeted at gaining knowledge regarding optimal native seed mixes, reclamation media (cover) characteristics and reclamation measures;
- Recently approved Reclamation Overburden Dump will ensure adequate supply of reclamation medium for closure revegetation activities, part of Adaptive Management Plan for reclamation medium supply;
- Integration of SFN objectives for closure planning and site reclamation.

Based on the potential effects and mitigation measures listed above, an assessment of the residual environmental effects of the increase in milling rate, significance assessment and determination of the likelihood of the effect was completed. Potentially adverse effects to VC vegetation were considered to be low as the duration is low (9 years: 6 year mine life and 3 years of active closure), geographic extent is low, magnitude is low, effects due to project reversibility are low (high degree of reversibility), economic and social context is low (good community fitness and resilience), and frequency is very low (effect occurs once). The potential residual adverse effects are **not considered significant** based on a low probability of occurrence and a high degree of confidence. A summary of the potential environmental effects for the mill rate increase is provided in Table 4-2.

4.4.2. TRADITIONAL LAND AND HISTORIC USES

The mill rate increase will not affect traditional and historic land uses on the Minto property or in the vicinity. The development, operation and closure of the Minto mine, however, will continue to alter traditional use patterns and harvest activities in the area. Local First Nations continue to utilize the area for traditional harvesting activities. Trapping is ongoing, with only minor conflicts with existing trap line uses. Continued implementation of mitigation measures and closure planning for the project is expected to further improve traditional use and harvesting pursuits, reducing the significance of the effects.

The main property and mine access road are not subject to recreational or tourism use, although Minto Landing is accessed via a public road. Lands surrounding Minto Landing have been identified as a SFN heritage site. The Company is aware of SFN's interest in historic resources in the project vicinity, and the mill rate increase is not expected to impact heritage resources in the area. Previously identified potential impacts to heritage resource as a result of the mine development, operation and closure activities have been addressed in previous assessments and mitigation measures have been established and are being implemented. As part of operational and closure planning, the company will continue to work with SFN and YG Heritage to ensure protection of importance heritage resources.

Potential Effects

None expected from this project, but overall mine development project may see the following effects which have been included with existing mitigation measures:

- Decrease in wildlife resources/trapping success or access to harvesting areas;
- Decrease in access to wildlife and cultural pursuits; and
- Impacts to heritage sites.

Mitigation Measures

The following mitigation measures have already been implemented:

- Adhere to provisions of the *Cooperation Agreement*;
- No disturbance of trap line trails, use is maintained;

- Trapper Compensation Agreement in place – provides continued access to traditional harvest areas;
- Ongoing communication with SFN to refine closure planning objectives to ensure that traditional and local land use capacity is preserved and/or restored at closure;
- Ongoing community consultations and communication to ensure awareness of project extent and operations, with opportunity for public discussion or raising of concerns;
- A previous Heritage Assessment was completed, with consultation with SFN regarding these sites resulting in a further recent investigation of one site. In the summer of 2007 an archaeological project was completed at the Northern Tutchone Cultural landmark known as Trouble Hill. This site was a salmon fishing camp and the location of a historic feud between the Tutchone and the Chilkat Tlingit. The project field crew included SFN Members, Parks Canada Cultural Resource staff and a YG staff archaeologist. Funding for the project was provided by MintoEx, SFN, and YG. This site is located outside the main project footprint.
- Alternatives to the use of the current Yukon River crossing site are being investigated; and
- All discoveries of heritage and paleontological resources will be reported to SFN government's heritage department and YG Heritage Branch.

Based on the potential effects and mitigation measures listed above, an assessment of the residual environmental effects of the increased milling rate, significance assessment and determination of the likelihood of the effect was completed.

Potentially adverse effects to the VC's trapping and traditional harvest were considered to be low as the duration is low (9 years: 6 year mine life and 3 years of active closure), geographic extent is low, magnitude is very low to low, effects due to project reversibility are low (high degree of reversibility), economic and social context is low (good community fitness and resilience), and frequency is very low (effect occurs once). The potential residual adverse effects are **not considered significant** based on a low probability of occurrence and a high degree of confidence.

Potentially adverse effects to the VC heritage resources was considered to be low to moderate as the duration is low (9 years: 6 year mine life and 3 years of active closure), geographic extent is moderate, magnitude is low, effects due to project reversibility are moderate (moderate

degree of reversibility), economic and social context is low (good community fitness and resilience), and frequency is very low (effect occurs once). The potential residual adverse effects are **not considered significant** based on a low probability of occurrence and a high degree of confidence.

A summary of the potential environmental effects for the mill rate increase is provided in Table 4-2.

4.4.3. SOCIO-ECONOMIC EFFECTS

Valued socio-economic components, unlike environmental components, often see a beneficial effect from development projects. Although the potential effects (beneficial or negative) from the increased mill rate are minimal compared with the effects potential of the entire mine development project, they have been identified in this section along with the existing mitigation measures.

4.4.3.1 Community Wellness

Community wellness has the potential to be affected (both negatively and beneficially) by the proposed project.

Potential Effects

- Changes in substance abuse patterns and therefore family violence patterns (beneficial or negative);
- Effects on workers and family mental, physical and cultural health (beneficial or negative); and
- Change to visual aesthetics by milling operations.

Mitigation Measures

The following implemented socio-economic effects mitigation measures aimed at addressing effects to community wellness remain valid:

- Consumption of alcohol and 'recreational' drugs not allowed on site – individuals have been removed from site for infractions;

- 'Fit for Duty' drug testing required for all employees;
- Company works with SFN Drug & Alcohol department as appropriate to assist employees with substance abuse issues and reintegration into mine workforce;
- Well-paying, full time employment can improve self-esteem and reduces financial stress on family;
- The company offers a flexible approach to employee leave to accommodate cultural activities such as harvest and government gatherings;
- Skills developed in the course of mine employment are life long and transferable;
- The company provides direct financial support for community athletics and recreation;
- The company works collaboratively with the community to identify issues and provide support through regular community update sessions;
- The project area is not visible from public roads, and therefore will not impact visual aesthetics from public areas;
- Waste streams are managed under permit conditions to reduce likelihood of community effects due to waste management, i.e. special waste storage and removal to permitted facilities, sewage management on site in in-ground systems.
- Closure plan (DDRP) is approved by YG with SFN review for the project. Revegetation is planned and implemented progressively using indigenous flora where native vegetation has been removed or destroyed. Natural revegetation of the roads and airstrip will be promoted to remediate visual effects of mine development disturbance.

Based on the potential effects and mitigation measures listed above, an assessment of the residual environmental effects of the increased milling rate, significance assessment and determination of the likelihood of the effect was completed. Potentially adverse effects to VC of community wellness were considered to be low as the duration is low (9 years: 6 year mine life and 3 years of active closure), geographic extent is low, magnitude is low, effects due to project reversibility are low (high degree of reversibility), economic and social context is low (good community fitness and resilience), and frequency is low (effect occurs rarely or sporadically). The potential residual adverse effects are **not considered significant** based on the potential for beneficial effects, a low to medium probability of occurrence and a high degree of confidence. A summary of the potential environmental effects for the mill rate increase is provided in Table 4-2.

4.4.3.2 Education

Education has the potential to be affected (beneficially) by the proposed project.

Potential Effects

- Changes in individuals' skill sets and education levels

Mitigation Measures

The following implemented socio-economic impact mitigation measures aimed at ensuring beneficial effects to education levels occur:

- Training and skills upgrading is provided directly by the company and contractors in the form of on-the-job training and apprenticeship programs;
- Scholarships for advanced education have been established for SFN beneficiaries under the Cooperation Agreement; and
- There is enhanced employment opportunity at the Minto site and other mining and industrial development projects through local training programs established partially through funding by MintoEx (Yukon Mine Training Association.)

Based on the potential effects and mitigation measures listed above, an assessment of the residual environmental effects of the increased milling rate, significance assessment and determination of the likelihood of the effect was completed. Potentially adverse effects to VC of education were considered to be low as the duration is low (9 years: 6 year mine life and 3 years of active closure), geographic extent is low, magnitude is low, effects due to project reversibility are low (high degree of reversibility), economic and social context is low (good community fitness and resilience), and frequency is low (effect occurs rarely or sporadically). The potential residual adverse effects are **not considered significant** based on the potential for beneficial effects, a high probability of occurrence and a high degree of confidence. A summary of the potential environmental effects for the mill rate increase is provided in Table 4-2.

4.4.3.3 Employment

Employment characteristics of the local and regional workforce have the potential to be affected (negatively and/or beneficially) by the proposed project.

Potential Effects

- The increased development of a stable, qualified workforce;
- Economic benefits and growth for individuals, families and communities will be generated as a result of the project; and
- Economic disparity in the community resulting from employment of some could have secondary social effects.

Mitigation Measures

The following implemented socio-economic impact mitigation measures aimed at ensuring beneficial effects to employment characteristics occur:

- Cooperation Agreement already negotiated with local First Nations, has provisions for community/First Nation employment, all targets met to date;
- Preferential hire of local residents is to the benefit of the company and individuals, with local knowledge and decreased transportation costs
- The Company provides an attractive wage and benefits package to employees to encourage long-term employment and reduce turnover; and
- Company actively consults with the community, individuals, groups, and stakeholders for increased project awareness.

Based on the potential effects and mitigation measures listed above, an assessment of the residual environmental effects of the increased milling rate, significance assessment and determination of the likelihood of the effect was completed. Potentially adverse effects to VC of employment were considered to be low as the duration is low (9 years: 6 year mine life and 3 years of active closure), geographic extent is low, magnitude is low, effects due to project reversibility are low (high degree of reversibility), economic and social context is low (good community fitness and resilience), and frequency is low (effect occurs rarely or sporadically). The potential residual adverse effects are **not considered significant** based on the potential

for mostly beneficial effects, a medium to high probability of occurrence and a high degree of confidence.

A summary of the potential environmental effects for the mill rate increase is provided in Table 4-2.

4.4.3.4 Business Opportunity

Business opportunity in the local communities and regional area has the potential to be affected (beneficially) by the proposed project.

Potential Effects

- Increased business opportunities and business growth potential, both locally and regionally.

Mitigation Measures

The following implemented mitigation measures are aimed at ensuring beneficial effects to local and regional business opportunity occur:

- In accordance with the established Cooperation Agreement, company utilizes local/SFN companies and individuals to provide services. Many contracts have been established with more being planned;
- Local companies and contractors used to provide support services to MEL.

Based on the potential effects and mitigation measures listed above, an assessment of the residual environmental effects of the increased milling rate, significance assessment and determination of the likelihood of the effect was completed. Potentially adverse effects to VC of business opportunity were considered to be low as the duration is low (9 years: 6 year mine life and 3 years of active closure), geographic extent is low, magnitude is low, effects due to project reversibility are low (high degree of reversibility), economic and social context is low (good community fitness and resilience), and frequency is low (effect occurs rarely or sporadically). The potential residual adverse effects are **not considered significant** based on the potential for beneficial effects, a high probability of occurrence and a high degree of confidence. A

summary of the potential environmental effects for the mill rate increase is provided in Table 4-2.

4.4.3.5 Infrastructure and Community Services

Infrastructure and local community services have the potential to be affected (beneficially) by the proposed project.

Potential Effects

- Increased demand/funding for services and infrastructure in the local community(s) can lead to municipal/community improvements.

Mitigation Measures

The following implemented mitigation measures are aimed at ensuring beneficial effects to local community infrastructure and services occur:

- Company consistently provides information on service/infrastructure requirements to enable local community to effectively plan.
- Company works with agencies and institutions currently providing services to provide support and to better serve community needs.

Based on the potential effects and mitigation measures listed above, an assessment of the residual environmental effects of the increased milling rate, significance assessment and determination of the likelihood of the effect was completed. Potentially adverse effects to VC of infrastructure and community services were considered to be low as the duration is low (9 years: 6 year mine life and 3 years of active closure), geographic extent is low, magnitude is low, effects due to project reversibility are low (high degree of reversibility), economic and social context is low (good community fitness and resilience), and frequency is low (effect occurs rarely or sporadically). The potential residual adverse effects are **not considered significant** based on the potential for beneficial effects, a high probability of occurrence and a high degree

of confidence. A summary of the potential environmental effects for the mill rate increase is provided in Table 4-2.

4.4.3.6 Human Health & Safety

An increase to the milling and mining rate at the Minto site has the potential to effect human health and safety, both on the site – in the mining, milling and support facilities – and off the site on the highways as a result of a slight increase in concentrate haul traffic. This increase in haul traffic (from an average of 10 trucks to 12 trucks) represents a relatively small maximum increase in total traffic numbers on the North and South Klondike highways, with the average monthly daily traffic (AMDT) increasing depending on month and location from:

- 0.079% in July between Whitehorse and the Takhini Hot Springs Road (based on 2003 numbers adjusted for existing concentrate haul traffic, YTG 2006); to
- 4.76% in December at the Canada Customs Border Crossing at Fraser (based on 2006 numbers adjusted for existing concentrate haul traffic, YTG 2006).

In addition, net traffic on the North Klondike Highway will increase less or even be reduced with the reduction in fuel hauling traffic once the site power comes online.

<u>Potential Effects</u>

- Accidents and malfunctions related to use of heavy machinery, drilling and blasting activities, milling equipment and waste handling can cause personal harm and the inability to work;
- Increased risk of traffic accidents due to increased concentrate haul traffic; and
- Illness can result from poor sanitation at site and camp.

<u>Mitigation</u>

- Health & safety plans are in place at the site, on the job training is aimed at safe operation of equipment;

- A general culture of safety is fostered at the site - guidelines exist for regular meetings and incident review, inspections and monitoring;
- Safety meetings are held and documented for all staff at the beginning of each work assignment period;
- All site visitors/contractors must undergo mandatory safety orientation immediately upon site arrival;
- Medical equipment and trained personnel are on site 24 hours a day;
- Site and mobile communications are provided and maintained;
- Occupational health and safety standards are enforced for all personnel/contractors;
- Consumption of alcohol and 'recreational' drugs are not allowed on site. Employees are required to undergo 'fit for duty' drug testing prior to employment or after incidents if abuse is suspected;
- Traffic is controlled on mine access and site roads - radio control to reduce accidents. Communication and notification of hazardous materials transport to the site is in place through shipping/receiving department;
- There is no unauthorized access to the site permitted;
- Emergency and Spill Response Plan is in place and will be implemented if required, as necessary;
- Transportation crews are instructed on traffic safety;
- Vehicles equipped for winter travel and carry emergency first aid kits.
- Concentrate haul from site to Skagway occurs only during daylight hours and drivers must meet specific experience and training criteria;
- All employees are eligible for Workers Compensation Health & Safety Board benefits;
- Monitoring and maintenance programs are in place to ensure facility and worker safety and equipment integrity;
- Project engineering designs have been utilized with appropriate factors of safety, containment systems, and redundant systems to minimize accidents and malfunctions, in keeping with permit conditions and applicable regulations and codes;
- Site well potable water is filtered and treated by UV, with testing conducted semi-annually for potability;
- Grey and black water treated and disposed of in permitted, engineered in-ground septic systems; and
- Public Health Act *Camp Sanitation Regulations* are adhered to.

Based on the potential effects and mitigation measures listed above, an assessment of the residual environmental effects of the increased milling rate, significance assessment and determination of the likelihood of the effect was completed. Potentially adverse effects to VC of human health and safety were considered to be low as the duration is low (9 years: 6 year mine life and 3 years of active closure), geographic extent is low, magnitude is low, effects due to project reversibility are low (high degree of reversibility), economic and social context is low (good community fitness and resilience), and frequency is low (effect occurs rarely or sporadically). The potential residual adverse effects are **not considered significant** based on a low probability of occurrence and a high degree of confidence. A summary of the potential environmental effects for the mill rate increase is provided in Table 4-2.

4.5. ENVIRONMENTAL MONITORING PROGRAMS

This section describes the environmental monitoring programs that are currently in place and will continue through the mill expansion and life of mine to ensure mining and milling activities are carried out in a manner that ensures human and environmental protection. An Environmental Monitoring Plan was submitted with the Water Use License application in 1996. This plan is in the process of being updated to reflect new technologies and mining methods that are being employed at the site.

4.5.1. PERMIT CONDITIONS

Most of the originally proposed Monitoring program components for the Minto project have been incorporated into permit or approval conditions. These include:

4.5.1.1 Water Use Licenses

Water Quality Surveillance Program

- Daily, weekly, monthly and quarterly monitoring of surface water quality at various background sites, sites in the area of operations, points of compliance and receiving water sites;

Physical Monitoring Program

- Regular geotechnical stability monitoring of key site structures (dam, mill water pond, waste dumps and diversion ditches) and annual physical inspection of facilities by registered professional engineer;

Stream Sediment and Benthic Invertebrate Monitoring Programs

- Annual or bi-annual monitoring of stream sediment geochemistry and benthic invertebrate population at site, receiving water and reference locations;

Acid Base Accounting Test Program

- Regular monitoring and testing of waste rock and tailings mining waste for acid generation/buffering and metal leaching potential;

Groundwater Monitoring Plan

- Monitoring potential groundwater contamination related to the waste rock and overburden dumps;

Big Creek Bridge and Erosion Control Inspections

- Annual structural inspection of Big Creek Bridge and rip rap armouring and overflow protection measures implemented to protect the mine access road and bridge from flood-related impacts of Big Creek.

Table 4-5 below outlines the water quality monitoring program stations and their respective monitoring requirements and frequencies.

4.5.1.2 Metal Mining Effluent Regulations

- Weekly monitoring of effluent quality and effluent discharge rates;
- Quarterly monitoring of water quality in reference and receiving water locations;
- Bi–annual effluent sublethal toxicity testing;
- Environmental Effects Monitoring of biological communities (fish and benthic invertebrates) exposed to mine effluent compared with reference communities.

Table 4-5 Minto Water Quality Monitoring Stations and Parameters under WUL and MMER Programs

Site	Description	Program	Frequency	Parameters	Flow Measurements
W-1	Mainstem Minto Creek 200 m u/s Access Road Crossing	Water License	Daily	Flows only	Daily (continuous record)
W-2	Mainstem Minto Creek directly u/s Access Road Crossing	Water License	Weekly during construction	Field in situ, Suite A, DM	Weekly
			Monthly during operation	Field in situ, Suite A, DissCu, DOC	Monthly
		MMER	Quarterly	Field in situ, MMER Suite	Quarterly
W-3	Mainstem Minto Creek 50 m d/s toe of Dam (Final Point of Discharge)	Water License	Weekly during construction	Field in situ, Suite A, DM, LT50	Weekly
			Monthly during operation	Field in situ, Suite A, DissCu, LT50	Monthly
		MMER	Weekly	Field in situ, MMER Suite	Daily (continuous record)
			Monthly	LT_{50} - Rainbow Trout / Daphnia magna	
W-4	Yukon River u/s Minto Cr.	*No information / requirements in W.License - was done as part of baseline data 2005*			
W-5	Yukon River d/s Minto Cr.	*No information / requirements in W.License - was done as part of baseline data 2005*			
W-6	Tributary to Minto Creek	Water License	Quarterly (when flowing)	Field in situ, Suite A	Quarterly
W-7	Tributary to Minto Creek	Water License	Quarterly	Field in situ, Suite A	Quarterly
	Note: W-7 tributary has been designated "control" for upper Minto Creek	MMER	Quarterly	Field in situ, MMER Suite	Quarterly
W-8	Tributary to Minto Creek	Water License	no surveillance requirements		
W-9	Mainstem of Minto Creek, u/s Pit area	Water License	no surveillance requirements		
W-10	Mainstem Minto Creek (south fork at headwaters)	Water License	Monthly	Field in situ, Suite A	Monthly
W-11	Waste Rock Dump Seepage	Water License	Monthly	Field in situ, Suite A	Monthly

Site	Description	Program	Frequency	Parameters	Flow Measurements
W-12	Discharge from Open Pit	Water License	Biweekly	Suite B, Suite D	Biweekly
W-13	Mill Water Pond Discharge *Note: W-13 is Mill Water Pond Surface if not discharging*	Water License	Monthly	Field in situ, Suite B	Monthly
W-14	Tailings Thickener Overflow	Water License	Monthly	Field in situ, Suite A	Monthly
W-15	Minto Creek, downstream of the overburden dump, just upstream of Open Pit	Water License	Weekly if there is discharge	Field in situ, Suite A	Weekly
W-16	Main Tailings/Water Storage Pond Discharge (or Main/Tailings Storage Pond if not discharging)	Water License	Monthly if no discharge	Field in situ, Suite A	Monthly
			Monthly	Field in situ, Suite A	Monthly
W-17	Main Tailings/Water Storage Pond Dam Seepage	Water License	Monthly	Field in situ, Suite A	Monthly
W-18	Oxide Stockpile Seepage	Water License	Monthly	Field in situ, Suite A	Monthly
W-19	Low Grade Sulphide Stockpile Seepage	Water License	Weekly	Field in situ, Suite A	Weekly
W-20	Spill Pond Discharge	Water License	Monthly	Field in situ, Suite B	n/a
Sediments	Stations W2, W3, W6 and W7	Water License	Bi-annually in July or August	*Do routine water chemistry samples at start and finish of benthics program*	During Sampling
Benthics	Stations W2, W3, W6 and W7	Water License			

4.5.1.3 Quartz Mining License

Tailings Management Plan

- Regular monitoring of tailings compaction success and settling of the tailings stack and of groundwater levels and permafrost migration in the tailings foundation area;

Closure Plan

- Interim and permanent closure monitoring of surface and ground water quality, structural stability of key structures, and biological parameters;
- Permanent closure monitoring scaled back based on achieving closure success;
- Reliance on Adaptive Management Planning to compare monitoring program results to identified performance thresholds to determine management success. Failure to achieve success will result in changes to management and planning techniques and potentially to monitoring program parameters/frequencies as well.

Many of the monitoring requirements of the Water Use License have been incorporated in the Quartz Mining License in an effort to harmonize monitoring and reporting elements under these different departments.

4.5.1.4 Waste Management Permits

- Regular monitoring and documentation of activities at site waste management facilities, including Land Treatment Facility for contaminated soils, Special Waste Storage Area, conventional dump and waste incinerator.

4.5.1.5 Reporting

All monitoring program results and observations are documented, and as a condition of various permits and authorizations, results reported monthly or annually to regulatory agencies and SFN.

4.5.2. MANAGEMENT INITIATIVES

Certain monitoring and inspection programs may not be mandated under permits or authorizations, but have been instituted in the interest of good corporate governance and workplace responsibility. These include:

4.5.2.1 Health and Safety

Considerable emphasis is placed on ensuring worker health and safety. The Company has procedures in place to provide worker health and safety and follows all occupational requirements. Routine health and safety meetings and briefings are undertaken for all employees. Scheduled environmental tours of the workplace occur to look for environmental and safety hazards and potential accidents, and to assess waste management activities. This information is used for feedback in safety briefings and implementation of corrective action.

Employee training is one of the tools used to manage project environmental performance and minimize potential hazards to people. Personnel training in the appropriate safety measures are on site at all times to manage and follow emergency response plans as required, including mine rescue and spill response.

4.5.2.2 Meteorological Monitoring

Monitoring of meteorological parameters is conducted via an Onset HOBO Weather Station at the airstrip. Data from the station is collected regularly and is used for future development and operational planning purposes.

4.6. EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Potential effects of the environment on the project include:

- Extreme climatic conditions can cause process upsets;
- Unusually cold weather; and

- Reduced visibility due to winter storms and blowing snow can restrict access to or from the site.

Mitigation

- Physical Monitoring Program continues to monitor for structural issues with mine components, even in winter;
- Water quality surveillance program in place;
- Redundant systems in place to ensure pumping, power and treatment systems operational during extreme events;
- Spare parts and equipment to ensure equipment failures are replaced and repaired and ensure continued treatment system operations;
- Trained personnel onsite to maintain redundant systems during emergency situations;
- Monitoring of climatic conditions to forecast storage requirements;
- Facilities and equipment design has been previously proven and personnel are trained to work under extreme conditions;
- Main mine access road and site roads are maintained year-round for all conditions;
- Communication links with site are established with backup and alternates (phone, internet, radio); and
- Trained first aid staff and emergency response staff on site at all times.

Potentially adverse effects of the environment on the project are considered to be low and not significant based on implementation of these mitigation measures.

4.7. CUMULATIVE EFFECTS

Cumulative effects refer to those effects on the environment that result from effects of a project when combined with those of other past, existing, and imminent projects and activities. To address cumulative effects, a project's activities must be considered in context to actual or potential effects on the environment from other sources.

There are no cumulative effects identified for this project (mill rate increase) as there are no pre-existing or imminent activities other than the identified mining and milling of mineral deposits in the upper Minto Creek watershed which is already occurring and forms the underlying basis for the project.

With respect to cumulative effects of the mine development and operation, the Company submitted a Quartz Mining License application in 1999, for which DIAND determined that:

> *"…the 1997 EARPGO screening adequately scoped quartz mining activities with the exception of cumulative effects. Minto Explorations Ltd. then submitted a Cumulative Effects Assessment [ACG, 1999]. DIAND determined that the cumulative effects submission adequately addressed the matter and Yukon Quartz Mining Licence QLM-9902 was subsequently issued in October of 1999." (YTG, 2005)*

5.0 LICENSE AMENDMENT REQUESTS

5.1 MILLING RATE

The Minto Project is subject to Quartz Mining License QML-0001. This licence was originally issued as QLM-9902 but was amended December 21, 2005 under Amendment No. 05-001 at which time the license number was changed. Among other conditions, QML-0001 authorizes specific milling and mining rates, which were increased through a further amendment on October 5, 2006 to the currently permitted rates. These are referenced below in the context of the specific amendments requested in this document to QML-0001.

Specific Amendments to QLM-0001 requested:

1. **Clause 7.2 Milling Rate:**
    a. Change "…*milling rate must not exceed 2,500 tonnes per day; based on a twelve month average*." to "…*milling rate must not exceed 3,200 tonnes per day, based on a twelve month average*."

2. **Clause 8.1 Mining Rate:**
    a. Change "…*mining rate not to exceed 912,500 tonnes of ore per year*." to "…*mining rate not to exceed 1,168,000 tonnes of ore per year*."

No other amendments to the Quartz Mining Licence or Water Use Licence are envisioned as a result of our request to increase the mill throughput. The present monitoring requirements under all authorizations still apply and will be followed.

6.0 ACKNOWLEDGEMENT AND CERTIFICATION

Access Consulting Group[1] of Whitehorse, Yukon, has prepared this Quartz Mining License Amendment Application in conjunction with Minto Explorations Ltd. Senior scientific review and technical advice was provided by Dan Cornett, President of Access Consulting Group.

The information within this document is submitted to Government of Yukon, Energy, Mines & Resources, Mineral Resources Division and Yukon Environmental and Socioeconomic Assessment Board for the purpose of conducting a screening under Yukon Environmental and Socio-Economic Assessment Act (YESAA). It is acknowledged that pursuant to Section 119 of YESAA, a copy of this document will be placed on a public registry and will be available to any member of the public to review.

It is understood that misrepresenting or omitting information required for the evaluation may cause delays in the screening or render the recommendation invalid.

We trust this document fulfills your present requirements. If you have any questions or require further details, please contact the undersigned at Tel: (867) 668-6463.

I certify that the information provided is true and correct to the best of my knowledge and belief.

Dan D. Cornett, B.Sc., R.P. Bio, CCEP President, Access Consulting Group Senior Technical Review	**Scott Keesey, B.Sc., CEPIT** Environmental Manager Access Consulting Group	**Kevin Weston** Chief Operating Officer Sherwood Copper Corporation

[1] Access Consulting Group is a registered trade name for Access Mining Consultants Ltd.

7.0 REFERENCES

Access Consulting Group, 2007a. *Minto Mine Tailings Management Plan*, submitted under Quartz Mining License QML-0001

Access Consulting Group, 2007b. *Detailed Decommissioning and Reclamation Plan, Minto Project, Yukon Territory, Revision 1.* June 2007.

Access Mining Consultants, 2003. *Interim Care and Maintenance & Interim Closure Plan, Minto Mine,* filed with the Yukon Water Board in November 2003.

DIAND, Regional Environmental Review Committee, 1997. *Screening Report: Minto Explorations Ltd., Minto Property.*

EBA Engineering Consultants, 2007. *Operation, Maintenance and Surveillance Manual, Dry Stack Tailings Storage Facility, Minto Mine YT (Rev. 2007-01)*

Government of Canada. 2002. Metal Mining Effluent Regulations. Canada Gazette, Part II. Vol. 136, No. 13. Wednesday, June 19, 2002.

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SRK Consulting Inc., 2007. *Area 2 Pre-feasibility Study, Minto Mine, Yukon*. SRK Project Number 2CM022.000.

Yukon Environmental and Socio-economic Assessment Act. May 13, 2003.

Yukon Environmental and Socio-economic Assessment Board, *Assessor's Guide to the Assessment of Environmental Effects*, 2006

REFERENCES (cont'd)

Yukon Environmental and Socio-economic Assessment Board, *Proponent's Guide to Project Proposal Submission to a Designated Office*, 2005

Yukon Government, Development Assessment Branch, Executive Council Office, 2005. *Screening Report, Minto Explorations Ltd., Quartz and Water License Extension, Minto Mine.*

Yukon Government, Highways and Public Works, 2006. *Yukon Traffic Count Summary*, 2006. Prepared by Transportation Planning and Programming, Transportation Engineering Branch.

APPENDIX A

Summary of Existing Environmental and Socio-Economic Conditions

1.0 ENVIRONMENTAL CONDITIONS

1.1. Physiography

The property lies in the Dawson Range, which is part of the Klondike Plateau, an uplifted surface that has been dissected by erosion. Topography in the area consists of rounded rolling hills and ridges with relief of up to 600 m (2000 ft). The highest elevation on the property is 975 m (3200 ft) above sea level, compared to elevations of 460 m (1500 ft) along the Yukon River. The property is at a height of land where slopes are relatively gentle, thereby providing accessible areas for waste storage and tailings containment for the anticipated development. The hills and ridges often have spines of bedrock outcrops at their crests; elsewhere bedrock exposures are limited in the area.

Overburden is colluvium primarily made up of sand derived from decomposition of the largely granitic bedrock in the area and is generally thin but pervasive. In south-facing locations, this material provides a well-drained, sound foundation for buildings and roads. The north-facing slopes in the area are permanently frozen solid with permafrost. Vegetation in the area is sub-Arctic boreal forest made up of largely spruce evergreen trees and poplar deciduous trees. The trees prefer well-drained south-facing slopes and may be sparse on the north-facing slopes where moss and alder ‘buck brush’ prevails. The area was burned over by several wild fires, the latest of which was in 1997, and is now devoid of mature living trees. Many of the burnt trees have blown down.

1.2. Climate

The climate in the Yukon is sub-Arctic continental with short cool summers and long cold winters. The average temperature in the summer is 10°C and the average temperature in the winter is –20°C. Average precipitation is limited to about 25 cm of rain equivalent per annum in the form of rain and snow. The weather does not impede year round commercial operations in the Yukon, including outdoor activities in the winter, except in the harshest cold snaps when temperatures may plummet to –50°C. The Cyprus Anvil open pit lead/zinc mine at Faro, not far from the project, operated successfully for many years in this climate.

A few (partial) months of meteorological data were collected in 1993 and 1994, and a complete meteorological station was established at the site in September of 2005 near the camp. In early spring 2006 due to camp expansion activities, the station was relocated to near the airstrip. The data collected includes temperatures (air and soil), incoming solar radiation, wind speed and direction, relative humidity, barometric pressure, and rainfall. No winter snowfall data have been collected with this station, but snow surveys have been carried out by J. Gibson & Associates in 1994, 1995, 1998 and 2006 at three locations in the Minto Creek catchment. These data are summarized in the Site Hydrology Update (Clearwater 2006).

Using orographic factors and regional climate data, the Minto Site is estimated to have a total average annual rainfall of 195 mm and an average annual snowfall of 136 mm. From data collected from the site climate station between September 2005 and January 2008, the prevailing wind direction is approximately 189^0 (S to SSW) with average windspeeds ranging from 0.77 m/s in January to 3.20 m/s in April. The mean site air temperature ranged from -18.43^{o}C in January to 15.40^{o}C in July. The air temperature readings ranged from a minimum of -43.20^{o}C to 25.95^{o}C.

Table 1-1 Summary of Meteorological Data Collected at Minto Mine from September 2005 to January 2008.

	Range		Monthly Mean											
	Min (mm)	Max (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Total Monthly Rainfall (mm)	0.00	47.80	0.00	0.00	1.80	3.20	2.74	18.68	34.07	25.10	23.93	16.33	3.87	0.00
Air Temp (^{o}C)	-43.20	25.95	-18.43	-16.06	-13.95	0.02	7.73	14.05	15.40	12.69	6.64	-1.99	-15.15	-13.49
Windspeed (m/s)	0.00	10.20	0.77	1.36	2.04	3.20	3.14	2.87	2.54	2.37	2.25	1.84	1.33	1.21

1.3. Geology and Topography

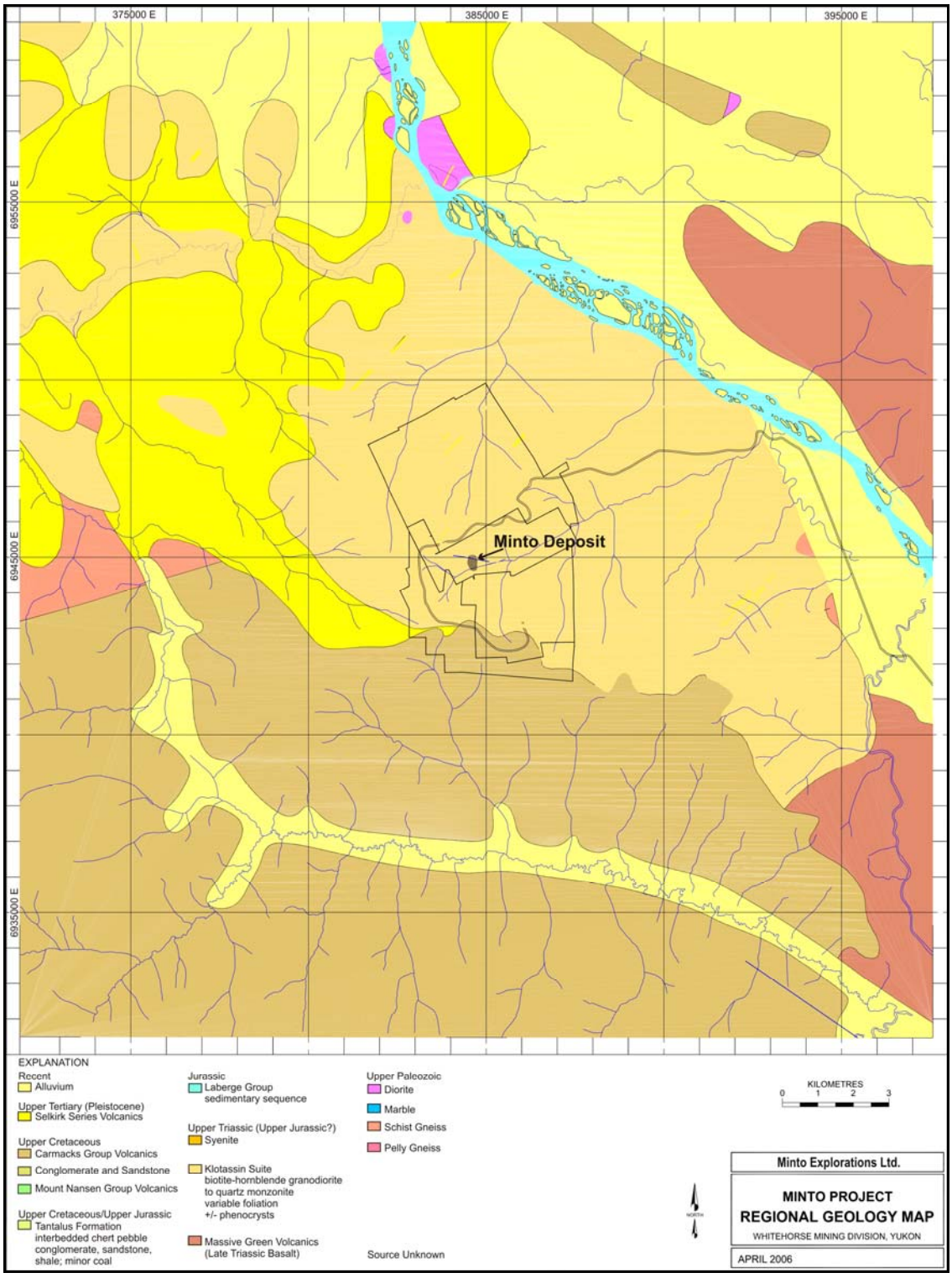
The Minto Project is found in the eastern margin of the Yukon-Tanana Composite Terrain, which is comprised of several metamorphic assemblages and batholiths. It is broadly contemporaneous with the Omineca Belt in nearby British Columbia.

The Minto Property and surrounding area are underlain by plutonic rocks of the Granite Mountain Batholith (Early Mesozoic Age) (Figure 1-1). They vary in composition from quartz diorite and granodiorite to quartz monzonite. The batholith is unconformably overlain by clastic sedimentary rocks of the Tantalus Formation and andesitic to basaltic volcanic rocks of the Carmacks Group, both are assigned a Late Cretaceous age. Immediately flanking the Granite Mountain Batholith, to the east, is a package of undated mafic volcanic rocks, outcropping on the shores of the Yukon River. The structural relationship between the batholith and the undated mafic volcanics is poorly understood because the contact zone is not exposed.

Lithologically the Property is underlain by predominantly igneous rocks of granodiorite composition. In the few available outcrops and in drill core two basic units are distinguished, an equigranular phase and a potassic feldspar megacrystic phase. The equigranular phase is relatively leucocratic, grey to whitish in color and uniform in texture. The potassic-feldspar megacrystic phase can be slightly darker, may contain more biotite and hornblende and may be light pink in color. In surface exposures, the latter exhibits a very weak alignment of the feldspar megacrysts, defining an interpreted magmatic foliation.

Other rock types, albeit volumetrically insignificant include dykes of simple quartz-feldspar pegmatite, aplite; and an aphanitic textured intermediate composition rock. Bodies of all of these units are relatively thin and rarely exceed one metre core intersections. These dykes are relatively late, generally postdating the peak ductile deformation event, however some pegmatite and aplite bodies observed in a rock cut located north of the mill complex are openly folded. Conglomerate and volcanic flows have been logged in drill core by past operators but have not been confirmed by the authors as the drill core from previous campaigns was largely destroyed in forest fires and no new drilling has intersected such rocks.

Figure 1-1: Regional Geology

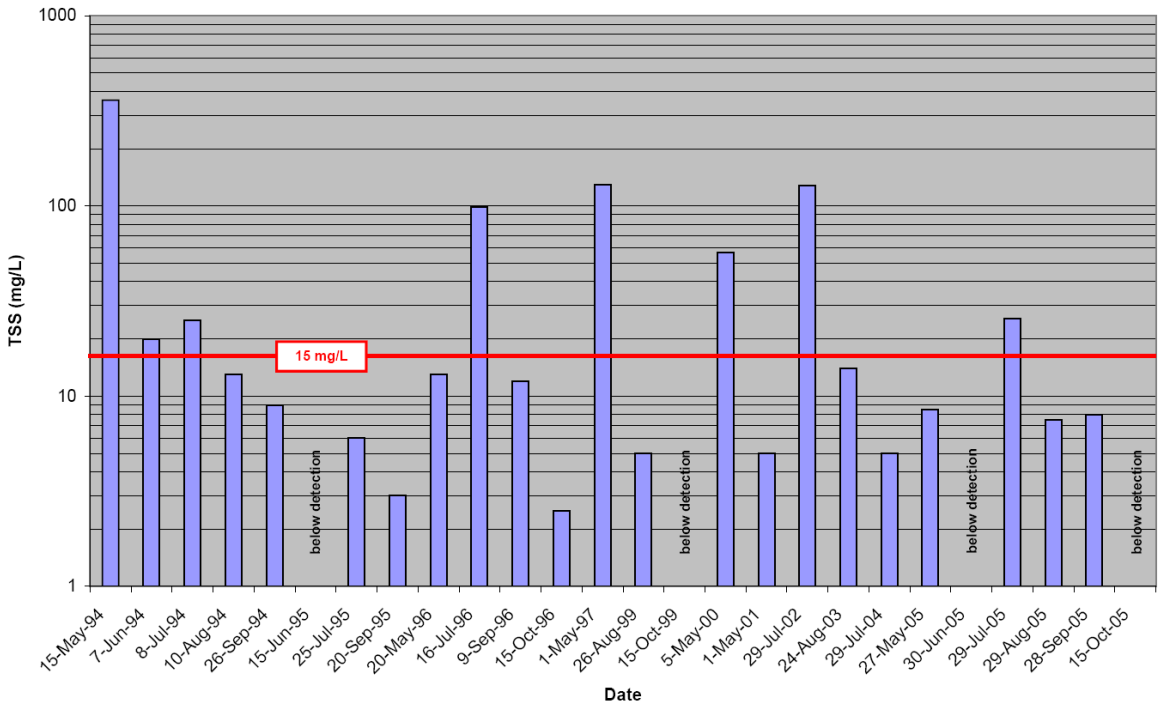


1.4. Surface Water Quality

1.4.1. Minto Creek Watershed

Metals that have naturally elevated concentrations in Minto Creek include aluminum, copper, iron, lead, zinc, and manganese. Historic sampling (since 1993) has frequently returned background concentrations of these metals in upper Minto Creek that are higher than the water licence effluent discharge standards (see Figure 1-2 and Figure 1-3). Historic background total suspended solids (TSS) concentrations have frequently been reported above the discharge standard (15 mg/L). The Minto property and much of the surrounding area, including the headwaters of the Minto Creek drainage upstream of the mine site and sample station W3 (project compliance point below dam) have historically been impacted by forest fires, the most recent of which was in 1995. This may contribute to the increased levels of suspended solids seen in historic water quality results.

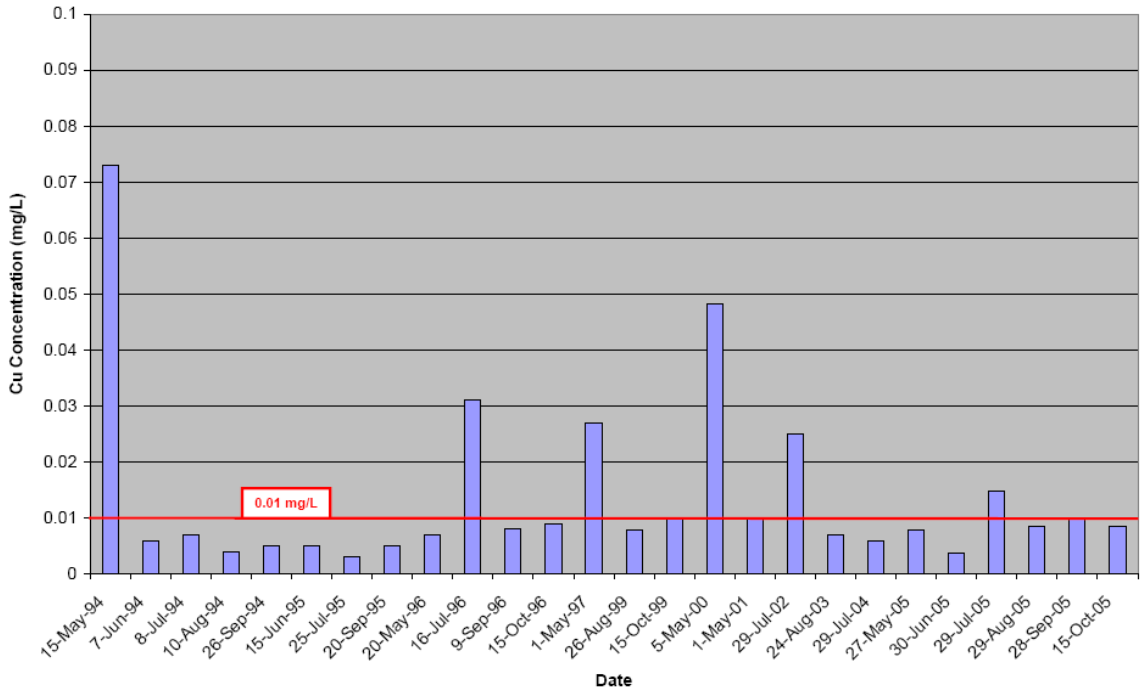
Figure 1-2 Total Suspended Solids Concentrations [TSS] in Upper Minto Creek at Station W3 from 1994-2005.



Copper and lead levels are typically found to be naturally elevated in all stream reaches located within the Minto Creek watershed. Station W10, located at the headwaters of Minto

Creek, is shown at times to have higher concentrations of copper and lead than at station W3. This confirms that levels of copper and lead are significantly affected by the native mineralization of the area. In fact, geochemical signatures of elevated copper in stream sediments draining the deposit played a key role in the discovery of the Minto deposit (Sinclair et al, 1976).

Figure 1-3 Total Copper Concentrations [Cu] in Upper Minto Creek at Station W3 from 1994-2005.



Water quality in the Minto Creek watershed is closely related to discharge volumes. Generally speaking, during periods of high discharge (typically experienced at spring freshet and during summer high precipitation events) suspended solids and metal concentrations tend to increase. As a result of extensive runoff management and erosion and sediment control activities on the property during the mine construction and initial operational period, most effluent quality parameters have been controlled to well below historically observed levels in the natural system, as indicated in Section 1.4.3.

1.4.2. Receiving Waters

Lower Minto Creek

Water quality in the Minto Creek drainage is characterized as neutral to slightly basic pH, moderately hard, moderately high in total suspended and dissolved solids and moderately to highly conductive. Concentrations of anions, nutrients, and cyanide/cyanogen-like compounds have been found to be moderate to high. In the lower reaches of Minto Creek (see Table 1-2) metal concentrations are generally moderately high with arsenic, chromium, iron, lead, cadmium, selenium, silver, zinc, copper, and aluminum present in high concentrations and in exceedance of the CCME Guidelines for the Protection of Freshwater Aquatic Life.

Table 1-2. Water Quality Summary of W2 Receiving Water, September 1993 to May 2007

Parameter[1]	Summary Statistics					Detection Limit	CCME Guidelines Water: Freshwater Aquatic Life
	Count	Count > CCME Guidelines	Mean	Min	Max		
Physical Tests							
Conductivity	105		263.32	61.00	602.00	2.0	
Total Dissolved Solids	103		182.40	67.00	394.00	10	
Hardness	69		118.93	10.00	216.00	0.54	
pH (Lab)	110		7.93	6.95	8.39	0.010	6.5 - 9.0
pH (Field)	68		8.12	7.10	8.60		6.5 - 9.0
Total Suspended Solids (Lab)	110		81.48	1.00	657.00	3.0	
Total Suspended Solids (On Site Hach)	74		25.66	0.00	265.00		
Tempurature (field)	3		1.20	-1.00	3.90		
Conductivity (field)	3		365.33	266.00	446.00		
Turbidity	109		20.27	0.30	100.00		
Dissolved Anions							
Alkalinity-Total CaCO3	109		121.43	25.0	286.0	2.0	
Bromide Br	61		<DL	0.0	0.0		
Chloride Cl	85		1.18	0.5	3.4	0.50	
Fluoride F	61		0.36	0.1	0.8		
Sulphate SO4	104		18.88	2.6	63.1	0.50	
Nutrients							
Ammonia Nitrogen N	95		0.017	0.003	0.060	0.020	1.04 - 2.33
Nitrate Nitrogen N	107		0.080	0.003	0.800	0.0050	
Nitrite Nitrogen N	93		0.003	0.001	0.025	0.0010	0.06
ortho-Phosphate	14		0.032	0.003	0.100		
Total Dissolved Phosphate	9		0.011	0.009	0.013		
Total Phosphorous	14		0.081	0.017	0.200		
Cyanides							
Total Cyanide CN	72		0.0101	0.0010	0.0270	0.0050	
Total Metals (Trace)							
Aluminum T-Al	110	88	1.1800	0.0070	22.8000	0.0010	0.005 - 0.1
Antimony T-Sb	110		0.0025	0.0001	0.0100	0.00010	
Arsenic T-As	110	7	0.0014	0.0003	0.0100	0.00010	0.005
Barium T-Ba	110		0.0715	0.0360	0.4310	0.000050	
Beryllium T-Be	110		0.0003	0.0000	0.0015	0.00050	
Bismuth T-Bi	107		0.0100	0.0100	0.0100	0.00050	
Boron T-B	104		0.0276	0.0040	0.3900	0.010	
Cadmium T-Cd	110	16	0.0002	0.0000	0.0006	0.000050	0.000017
Calcium T-Ca	110		33.0902	10.7000	70.0000	0.050	
Chromium T-Cr	110	30	0.0048	0.0005	0.0380	0.00050	0.001[a]
Cobalt T-Co	110		0.0015	0.0001	0.0164	0.00010	
Copper T-Cu (Lab)	110	43	0.0078	0.0012	0.0700	0.00010	0.002 - 0.004
Copper (On Site Hach)	64		0.0037	0.0001	0.0180		
Iron T-Fe	110	49	2.1346	0.0520	26.2000	0.030	0.3
Lead T-Pb	110	2	0.0013	0.0001	0.0086	0.000050	0.001 - 0.007
Lithium T-Li	91		0.0030	0.0010	0.0090	0.0050	
Magnesium T-Mg	110		12.3150	3.6300	32.5000	0.10	
Manganese T-Mn	110		0.0826	0.0060	0.6680	0.000050	
Mercury T-Hg	41		0.0000	0.0000	0.0001	0.000020	0.0001
Molybdenum T-Mo	110		0.0012	0.0004	0.0050	0.000050	0.073
Nickel T-Ni	110		0.0039	0.0005	0.0410	0.00050	0.025 - 0.15
Phosphorous T-P	67		0.1675	0.0600	0.3300	0.30	
Potassium T-K	87		2.5846	1.0000	5.5000	2.0	
Selenium T-Se	110	4	0.0033	0.0002	0.0100	0.0010	0.001
Silicon T-Si	86		7.1885	3.6800	25.6000	0.050	
Silver T-Ag	110	7	0.0001	0.0000	0.0006	0.000010	0.0001
Sodium T-Na	87		8.9858	2.3000	22.9000	2.0	
Strontium T-Sr	107		0.2846	0.0647	0.6620	0.00010	
Thallium T-Tl	87		<DL	<DL	<DL	0.00010	0.0008
Tin T-Sn	89		0.0003	0.0001	0.0005	0.00010	
Titanium T-Ti	89		0.0450	0.0008	0.3790	0.010	
Uranium T-U	105		0.0026	0.0002	0.0300	0.000010	
Vanadium T-V	110		0.0062	0.0005	0.0620	0.0010	
Zinc T-Zn	110	3	0.0105	0.0010	0.1250	0.0010	0.03
Dissolved Metals (Trace)							
Aluminum D-Al	86		0.0382	0.0050	0.3900	0.0010	
Antimony D-Sb	86		0.0067	0.0001	0.0100	0.00010	
Arsenic D-As	86		0.0013	0.0003	0.0100	0.00010	
Barium D-Ba	86		0.0574	0.0213	0.3280	0.000050	
Beryllium D-Be	86		0.0001	0.0000	0.0004	0.00050	
Bismuth D-Bi	83		0.0050	0.0007	0.0100	0.00050	
Boron D-B	80		0.0059	0.0020	0.0190	0.010	
Cadmium D-Cd	86		0.0001	0.0000	0.0003	0.000050	
Calcium D-Ca	86		30.9143	3.8000	70.1000	0.050	
Chromium D-Cr	86		0.0010	0.0004	0.0069	0.00050	
Cobalt D-Co	86		0.0003	0.0001	0.0010	0.00010	
Copper D-Cu	86		0.0031	0.0001	0.0060	0.00010	
Iron D-Fe	86		0.7289	0.0200	26.2000	0.030	
Lead D-Pb	86		0.0012	0.0001	0.0025	0.000050	
Lithium D-Li	65		0.0020	0.0010	0.0030	0.0050	
Magnesium D-Mg	86		10.5843	0.9000	31.4000	0.10	
Manganese D-Mn	86		0.0371	0.0027	0.6680	0.000050	
Mercury D-Hg	39		<DL	0.0000	0.0000	0.000020	
Molybdenum D-Mo	86		0.0012	0.0003	0.0025	0.000050	
Nickel D-Ni	86		0.0017	0.0005	0.0173	0.00050	
Phosphorus D-P	47		0.3620	0.0700	1.3000	0.30	
Potassium D-K	85		1.5818	0.0500	6.7000	2.0	
Selenium D-Se	86		0.0058	0.0002	0.0100	0.0010	
Silicon D-Si	81		5.8645	2.6900	12.5000	0.050	
Silver D-Ag	86		0.0004	0.0001	0.0005	0.000010	
Sodium D-Na	86		7.1544	1.9000	20.2000	2.0	
Strontium D-Sr	81		0.2680	0.0491	0.6520	0.00010	
Thallium D-Tl	65		<DL	0.0000	0.0000	0.00010	
Tin D-Sn	65		<DL	0.0000	0.0000	0.00010	
Titanium D-Ti	65		0.0009	0.0005	0.0028	0.010	
Uranium D-U	82		0.0036	0.0001	0.0300	0.000010	
Vanadium D-V	85		0.0018	0.0007	0.0050	0.0010	
Zinc D-Zn	81		0.0031	0.0005	0.0100	0.0010	
Organic Parameters							
Dissolved Organic Carbon C	58		13.5	7.5	30.3	0.5	
Total Inorganic Carbon C	52		33.3	4.03	67.3	0.5	
Total Organic Carbon C	58		14.7	7.8	34.2	0.5	
Radiological Parameters							
Radium-226	59		0.0080	0.0070	0.0100	0.0050	

Notes:

[1] All units are in mg/L unless otherwise indicated

[a] Based on guideline for Hexavalent chromium (Cr(VI))

Value exceeds the CCME Guidelines

Minto Mine Project

Water Quality Surveillance Program

MINTO EXPLORATIONS Ltd.
A Subsidiary of Sherwood Copper Corp.

Legend

- Water Quality Surveillance Program Sites
- Access Road
- Exploration Road
- Contour
- Water Course
- Intermittent Water Course
- Physical Monitoring Program Sites

Projection: UTM Zone 8 NAD83
Units: Meters
NTS: 105I/11
Basedata obtained from Yukon Engineering Services Nov3_06_status_plan.dwg
Tailings data obtained from EBA 1200173 Figure 2 Site Plan.dwg

Figure 1-4

WUL Surveillance Monitoring Sites

Scale:

0 50 100 200 300 400 500 m

ACCESS CONSULTING GROUP

Drawn by: HD	Checked by: SVB/SK

Date: November 2007

Our File: D:\Project\AllProjects\Minto\gis\mxd\WQ_SurvProgDec06\Water QualitySites_Oct07.mxd

N

Main Water Dam
W-3
Minto Creek
W-17
W-16
Low-Grade Ore Oxide Pad
Fuel Storage Pad
Waste Rock Dump
Oxide Waste
W-19
W-18
Mill Site
Camp
Main Access Road
Starter Pit
W-13
W-8
W-12
W-11
Mill Water Pond
Laydown Pads
Contractor's Work Area & Office Pad
Proposed Dry StackTailings Storage Facility
High-Grade Ore Stockpile Pad
W-15
Ice-Rich Overburden Dump
South Diversion Ditch
Minto Creek
Solid Waste Facility
Exploration Camp
Land Treatment Facility
Special Waste Storage
Airstrip
Explosives Plant Site
AN Storage Site
W-10
Magazine Sites

Yukon River
W-2
W-1
Access Road
Minto Creek
W-6
W-7
W-3
W-10
0 500 1,000 2,000 3,000 m

Yukon River

Compared with Minto Creek, measured water quality parameters in the Yukon River were generally lower, though select metals also exceeded CCME guidelines. This is not uncommon for large, turbid rivers. Data collected under HKP's Initial Environmental Evaluation (IEE; HKP 1994) indicated that Minto Creek did not significantly impact the Yukon River water quality at the time of that investigation.

1.4.3. Effluent Quality

With respect to regulations that apply to the discharge of effluent from the Minto Mine Site – and in addition to the Federal Metal Mining Effluent Regulations (MMER) under the Fisheries Act – the Type A Water Use license contains effluent discharge standards that apply at the project's final compliance point(s) (see Table 1-3). The Type A Water Use Licence is generally more restrictive than the MMER, and separate monitoring and reporting for effluent discharge and receiving water quality is required under the Water Use License's Water Quality Surveillance Program.

Effluent quality monitoring is conducted under these two programs. Specific to the federal MMER, monthly mean concentrations of parameters of deleterious substances have not exceeded discharge limits since the application of the regulations in July 2006.

Expanded effluent quality monitoring efforts under MEL's Type A Water Use License – Water Quality Surveillance Program for a full suite of analytical parameters is summarized below (Table 1-4) with red values denoting parameters where concentrations in the effluent since July 2006 have exceeded either of the sets of discharge criteria. As the Water Use License discharge standards are more restrictive than the MMER criteria, these exceedances are primarily related to the former.

Table 1-3 Compliance Monitoring Frequency and Limits Applicable to the Minto Mine Effluent.

Parameter	Units	Water Use License QZ96-006 Effluent Quality Standards		MMER Effluent Quality Standards		
		Frequency	Daily Limit	Frequency	Maximum Monthly Mean	Maximum Authorized Concentration in Grab
pH	pH units	weekly	6.5 - 9.0	-	-	-
Suspended Solids	mg/L	weekly	15	weekly	15.00	30.00
Aluminun	mg/L	weekly	0.5	-	-	-
Arsenic	mg/L	-	-	weekly	0.50	1.00
Iron	mg/L	weekly	1.0	-	-	-
Copper	mg/L	weekly	0.01	weekly	0.30	0.60
Lead	mg/L	weekly	0.002	weekly	0.20	0.40
Manganese	mg/L	weekly	0.2	-	-	-
Nickel	mg/L	weekly	0.065	weekly	0.50	1.00
Radium 226	Bq/L	-	-	weekly	0.37	1.11
Zinc	mg/L	weekly	0.03	weekly	0.50	1.00
total Ammonia	mg/L	weekly	1.0	-	-	-
Oil and Grease	visibility	weekly	no visible oil or grease	-	-	-
Rainbow Trout Acute Lethality Test	<50% mortality in 100% effluent	monthly	Pass	monthly	Pass	
Daphnia magna Acute Lethality Test	<50% mortality in 100% effluent	-	-	monthly	Pass	

Table 1-4 Summary of W3 Effluent Chemistry, July 2006 to May 2007

Parameter[1]	Summary Statistics					Detection Limit	Regulatory Limits	
	Count	Count > Regulatory Limit	Mean	Min	Max		Water Use License Standards	MMER Maximum Authorized Concentration in a Grab Sample
Physical Tests								
Conductivity	46		433.2	264.0	521.0	2.0		
Total Dissolved Solids	36		282	130	332	10		
Hardness	45		214.64	142.00	267.00	0.54		
pH (Lab)	46		7.780	7.050	8.360	0.010	6.5 to 9.0 pH units	
Total Suspended Solids (Lab)	45	8	12.3	2.0	34.0	3.0	15 mg/L	30.00 mg/L
Total Suspended Solids (On Site Hach)	43		8.51	0.00	65.00			
pH (Field)	49		7.63	6.38	8.80			
Temperature (field)	27		1.14	-0.10	6.10			
Conductivity (field)	27		470.56	309.00	585.00			
Turbidity	39		7.33	0.20	65.00			
Dissolved Anions								
Alkalinity-Total CaCO3	46		187.78	106.00	248.00	2.0		
Bromide Br	0							
Chloride Cl	29		2.24	0.90	4.10	0.50		
Fluoride F	0							
Sulphate SO4	43		40.77	22.10	48.00	0.50		
Nutrients								
Ammonia Nitrogen N	46		0.023	0.002	0.100	0.020	1.0 mg/l	
Nitrate Nitrogen N	46		0.9244	0.0080	4.8000	0.0050		
Nitrite Nitrogen N	32		0.1450	0.0600	0.1900	0.0010		
ortho-Phosphate	26		0.05	0.01	0.09			
Total Dissolved Phosphate	1		0.09	0.09	0.09			
Total Phosphorous	25		0.12	0.02	0.75			
Cyanides								
Total Cyanide CN	22		0.02	0.00	0.14	0.0050		2.00 mg/L
Total Metals (Trace)								
Aluminum T-Al	46	11	0.3028	0.0060	1.4600	0.0010	0.5 mg/L	
Antimony T-Sb	46		0.00187	0.00020	0.00500	0.00010		
Arsenic T-As	46		0.00070	0.00020	0.00900	0.00010		1.00 mg/L
Barium T-Ba	46		0.111370	0.051000	1.900000	0.000050		
Beryllium T-Be	46		< DL	< DL	< DL	0.00050		
Bismuth T-Bi	46		0.00055	0.00050	0.00060	0.00050		
Boron T-B	46		0.027	0.005	0.480	0.010		
Cadmium T-Cd	46		0.000019	0.000010	0.000030	0.000050		
Calcium T-Ca	46		49.791	38.900	64.400	0.050		
Chromium T-Cr	46		0.00122	0.00050	0.00670	0.00050		
Cobalt T-Co	46		0.00050	0.00010	0.00400	0.00010		
Copper T-Cu (Lab)	46	9	0.00676	0.00100	0.05000	0.00010	0.01 mg/L	0.60 mg/L
Copper (On Site Hach)	34		0.00149	0.00020	0.00500			
Iron T-Fe	46	4	0.466	0.100	1.800	0.030	1.0 mg/L	
Lead T-Pb	46	2	0.000468	0.000100	0.003100	0.000050	0.002 mg/L	0.40 mg/L
Lithium T-Li	46		0.0052	0.0020	0.0900	0.0050		
Magnesium T-Mg	46		22.90	11.00	52.70	0.10		
Manganese T-Mn	46	5	0.122891	0.008000	2.260000	0.000050	0.2 mg/L	
Mercury T-Hg	29		0.000100	0.000100	0.000100	0.000020		
Molybdenum T-Mo	46		0.003442	0.001000	0.060000	0.000050		
Nickel T-Ni	46		0.00224	0.00050	0.03000	0.00050	0.065 mg/L	1.00 mg/L
Phosphorous T-P	21		0.06	0.02	0.14	0.30		
Potassium T-K	46		1.9	1.4	3.0	2.0		
Selenium T-Se	46		0.0008	0.0002	0.0080	0.0010		
Silicon T-Si	46		6.691	5.170	10.100	0.050		
Silver T-Ag	46		0.000200	0.000200	0.000200	0.000010		
Sodium T-Na	46		13.1	7.7	15.8	2.0		
Strontium T-Sr	46		0.86585	0.23600	15.90000	0.00010		
Thallium T-Tl	46		< DL	< DL	< DL	0.00010		
Tin T-Sn	46		< DL	< DL	< DL	0.00010		
Titanium T-Ti	46		0.015	0.001	0.057	0.010		
Uranium T-U	46		0.003200	0.001000	0.058000	0.000010		
Vanadium T-V	46		0.0019	0.0004	0.0200	0.0010		
Zinc T-Zn	46	2	0.0071	0.0010	0.0500	0.0010	0.03 mg/L	1.00 mg/L
Dissolved Metals (Trace)								
Aluminum D-Al	44		0.0144	0.0050	0.0450	0.0010		
Antimony D-Sb	44		0.00020	0.00020	0.00020	0.00010		
Arsenic D-As	44		0.00041	0.00020	0.00110	0.00010		
Barium D-Ba	44		0.067773	0.049000	0.095000	0.000050		
Beryllium D-Be	44		0.00010	0.00010	0.00010	0.00050		
Bismuth D-Bi	44		0.00060	0.00050	0.00070	0.00050		
Boron D-B	44		0.013	0.004	0.022	0.010		
Cadmium D-Cd	44		0.000019	0.000010	0.000050	0.000050		
Calcium D-Ca	44		49.727	38.600	63.100	0.050		
Chromium D-Cr	44		0.00141	0.00050	0.00980	0.00050		
Cobalt D-Co	44		0.00028	0.00010	0.00080	0.00010		
Copper D-Cu	44		0.00445	0.00100	0.01800	0.00010		
Iron D-Fe	44		0.065	0.010	0.290	0.030		
Lead D-Pb	44		0.000240	0.000100	0.000500	0.000050		
Lithium D-Li	44		0.0027	0.0010	0.0050	0.0050		
Magnesium D-Mg	44		21.97	11.10	28.10	0.10		
Manganese D-Mn	44		0.119682	0.005000	2.160000	0.000050		
Mercury D-Hg	22		< DL	< DL	< DL	0.000020		
Molybdenum D-Mo	44		0.002047	0.001000	0.006000	0.000050		
Nickel D-Ni	44		0.00115	0.00050	0.00530	0.00050		
Phosphorus D-P	19		0.38	0.06	1.60	0.30		
Potassium D-K	43		1.9	1.4	2.8	2.0		
Selenium D-Se	44		0.0004	0.0003	0.0006	0.0010		
Silicon D-Si	44		6.283	4.570	7.440	0.050		
Silver D-Ag	44		0.000100	0.000100	0.000100	0.000010		
Sodium D-Na	43		13.5	7.2	16.6	2.0		
Strontium D-Sr	44		0.51070	0.23800	0.78000	0.00010		
Thallium D-Tl	44		0.00005	0.00005	0.00005	0.00010		
Tin D-Sn	44		0.00100	0.00100	0.00100	0.00010		
Titanium D-Ti	44		0.001	0.001	0.003	0.010		
Uranium D-U	44		0.001832	0.000800	0.002600	0.000010		
Vanadium D-V	44		0.0020	0.0006	0.0053	0.0010		
Zinc D-Zn	44		0.0030	0.0010	0.0120	0.0010		
Organic Parameters								
Dissolved Organic Carbon C	38		6.4	1.9	25.6	0.5		
Total Inorganic Carbon C	34		47.2294118	3	65.2	0.5		
Total Organic Carbon C	33		6.42424242	2	20	0.5		
Radiological Parameters								
Radium-226	42		0.0093	0.0050	0.0200	0.0050		1.11 Bq/L
Toxicity Testing'								
96 HourTrout LTSO Bioassay (hrs)	23						100%	
Percent Survival	22		99.09	90.00	100.00		(pH non-adjusted)	
Designation	22							
48 Hour Daphnia magna LTSO (hrs)	23							
Percent Survival								
Designation								

Notes:

[1] All units are in mg/L unless otherwise indicated

Value exceeds the Water Use Licnese standards or the MMER limit

Effluent quality monitoring for toxicity has been conducted at a minimum under the MMER schedule (monthly) since April 2006, and during early 2006 these tests were conducted weekly for site water quality characterization purposes. These bioassay tests are conducted for acute toxicity to rainbow trout (*Oncorhynchus mykiss,* 96 h pass/fail) and *Daphnia magna* (48 h pass/fail). All results have returned non-toxic to both species.

1.5. Stream Sediment Quality

Stream sediment monitoring is conducted on a bi-annual basis, during July/August. Table 1-5 below presents the average values from a sampling event in by Hallam Knight Piesold (HKP) in the fall of 1994 and the most recent (August 23, 2006) sampling event by MEL for key metal parameters. Specifically, aluminum, arsenic, cadmium, copper, lead and zinc were chosen for closer examination as these can be toxic to the aquatic system.

Table 1-5. Mean Values from 1994 and 2006 Stream Sediment Sampling Results

		1994 Sites (HKP)		2006 Sites (MEL)			
Parameter	**Unit**	**W2**	**W3**	**W2**	**W3**	**W6**	**W7**
Arsenic	**µg/g**	4.44	4.37	5.1	5.6	6.4	4.0
Aluminum	**µg/g**	-	-	11820	12400	12820	10334
Cadmium	**µg/g**	0.00	0.13	0.2	0.1	0.1	0.1
Copper	**µg/g**	13.80	48.27	81.5	96.8	28.2	20.1
Iron	**µg/g**	-	-	22640	24700	23020	19480
Lead	**µg/g**	1.60	3.93	8.6	6.9	6.9	5.7
Manganese	**µg/g**	-	-	746	785	435	363
Mercury	**µg/g**	0.01	0.01	0.038	0.034	0.068	0.140
Silver	**µg/g**	0.00	0.00	<0.2	<0.2	<0.2	<0.2
Zinc	**µg/g**	29.43	47.80	116.6	60.8	50.0	47.3

Data collected under HKP's Initial Environmental Evaluation (IEE) showed that 1994 levels of arsenic were extremely high. The maximum level was found at Site W2 with a mean value of 4.44 µg/g. 2006 mean levels have increased to a mean of 5.1 µg/g. However, the mean arsenic found at W6 in 2006 was highest at 6.4 µg/g.

When comparing 2006 results against 1994 results, there has been an increase in W2 metal levels in cadmium, copper, lead, mercury and zinc. Silver has remained relatively constant. W3 metals levels have increased in arsenic, copper, lead, mercury and zinc. Cadmium and

silver levels have remained relatively constant at W3. Given the 2006 results, manganese and copper are highest at W2 and W3. Lead and zinc is highest at W2.

It is likely that the site-wide forest fire of 1995 is the primary contributor of sediment-bound metals through sediment mobilization by runoff throughout the watershed.

1.6. Biological Environment

1.6.1. Aquatic Resources

1.6.1.1. Fisheries

Fisheries resource data for Minto Creek and surrounding drainages is limited to information collected under the following programs:

- Hallam Knight Piesod's IEE (1994) for Minto Creek, Dark Creek and 2 unnamed creeks; and
- Fisheries investigations on lower Minto Creek by ACG for Minto Explorations Ltd. (2006/07)

HKP's fisheries investigation in 1994 was comprised of fish sampling and habitat assessments and surveys to identify spawning, rearing and overwintering areas, as well as barriers to fish migration. Minto Creek was classified at that time as a Type II habitat - salmonid rearing stream - by the Yukon Fisheries Protection Authorization, and all fisheries investigations have confirmed that this habitat is found in the lower sections of Minto Creek, and that a steep canyon 1.5 km upstream of the confluence with the Yukon River represents a barrier to fish migration. The effects of forest fire (reduced cover and substrate siltation) in the upper reaches also reduced the quality of the habitat upstream of the canyon in Minto Creek. The ephemeral nature of the creek also prohibits overwintering of fish populations in the lower reaches of the creek (HKP, 1994).

The August 1994 investigation returned adult and juvenile arctic grayling captures just downstream of the canyon, with slimy sculpins observed further downstream where creek flows were significantly reduced (HKP, 1994). At the time of this investigation, the Minto

Creek valley below the canyon had not been burned by forest fire, so the creek cover (and consequent water temperatures/food source) and clean substrate in the area below the canyon provided good habitat for arctic grayling. In 1995 this area was part of a larger burn that impacted the majority of the watershed, resulting in a degredation of creek habitat in the lower section primarily, including reduced vegetative cover, a significant increase in LOD loading and increased siltation of downstream reaches.

This change in morphology and the expected changes in fish usage have been confirmed by fisheries investigations in 2006 and 2007. The only fish species captured have been young of year chinook salmon (*Onchorynchus tshawatscha*) at the mouth of Minto Creek, in the upper reach of the flood zone (backwater) of the Yukon River, and slimy sculpin (*Cottus cognatus)* in the same location and further upstream in the vicinity of the road crossing and culvert. Young of year chinook are thought to have originated in the Yukon River. Sculpin were only captured in the June 2007 sampling event.

Fish Population Data

Catches and catch per unit effort (CPUE) have been low in all fish studies conducted on Minto Creek between 1994 and 2007 (Table 1-6). Significant effort in both trapping and electrofishing has returned very few individuals, most notably in the recent surveys of 2006 and 2007. In addition, there is little consistency in presence of species in the lower reaches of Minto Creek, suggesting the lack of a significant resident fish population. The morphological changes related to forest fire activity in the Minto Creek basin have likely contributed to fish population changes since the initial surveys of 1994. The unique low flow conditions that are periodically observed in the Minto Creek lower reaches with little or no flow existing also works against the establishment of resident fish populations in lower Minto Creek.

Table 1-6 Fish Community in Minto Creek.

Year, Study	Month	Stream/Site	Method	Effort (s or h)	Species	Round Whitefish	Slimy Sculpin	Arctic Grayling	Chinook Salmon
1994 (Hallam Knight Piesold)	June	Minto Creek, Site 1	Electrofishing	210 s	number	1	-	-	-
					#/min	0.29	-	-	-
			Minnow Trap	NR	number	-	2		
		Minto Creek, Site 2	Electrofishing	270 s	number	-	-	-	-
					#/min	-	-	-	-
			Minnow Trap	NR	number	-	-	-	-
	August	Minto Creek, Site 1	Angling	3600	number	-	-	-	-
					#/min	-	-	-	-
			Minnow Trap	NR	number	-	2		
		Minto Creek, Site 2	Electrofishing	390 s	number	-	2	-	-
					#/min	-	0.31	-	-
			Minnow Trap	NR	number		2		
		Minto Creek, Site 3	Electrofishing	564 s	number	-	-	2	-
					#/min	-	-	0.21	-
	September	Minto Creek, Site 2	Electrofishing	270 s	number	-	-	-	-
					#/min	-	-	-	-
			Minnow Trap	NR	number	-	-	-	-
		Minto Creek, Site 3	Electrofishing	150 s	number	-	-	2	-
					#/min	-	-	0.8	-
2006 (R&D Environmental)	September	Minto Creek	Gee Trap	24h	number	-	-	-	-
					#/min	-	-	-	-
2007 (R&D Environmental)					#/min	-	-	-	-
					#/min	-	-	-	2.51
			Gee Trap (x6)	5.5h	number	-	-	-	4
					#/trap/h	-	-	-	0.12
		Minto Creek, d/s Haul Road	Electrofishing	460 s	number	-	-	-	-
					#/trap/h	-	-	-	-
			Gee Trap (x8)	15 h	number	-	-	-	-
					#/trap/h	-	-	-	-
		Minto Creek, ~100m u/s Haul Road	Gee Trap (x3)	15h	number	-	-	-	-
					#/trap/h	-	-	-	-
		Minto Creek, @ base of canyon	Gee Trap (x5)	15h	number	-	-	-	-
					#/trap/h	-	-	-	-
	June	Minto Creek, ~100m u/s Yukon River	Gee Trap (x5)	18h	number	-	1	-	24
					#/trap/h	-	0.01	-	0.27
		Minto Creek, d/s Haul Road	electrofishing	212 s	number	-	-	-	-
					#/min	-	-	-	-
			Gee Trap (x8)	22h	number	-	4	-	-
					#/trap/h	-	0.02	-	-

Year, Study	Month	Stream/Site	Method	Effort (s or h)	Species	Round Whitefish	Slimy Sculpin	Arctic Grayling	Chinook Salmon
		Minto Creek, ~100m u/s Haul Road	Gee Trap (x2)	22h	number	-	1	-	-
					#/trap/h	-	0.02	-	-
		Minto Creek, @ base of canyon	Gee Trap (x5)	20h	number	-	-	-	-
					#/trap/h	-	-	-	-
	August	Minto Creek, ~100m u/s Yukon River	Gee Trap (x5)	22 h	number	-		1	3
					#/trap/h	-	-	0.01	0.01
		Minto Creek, d/s Haul Road	Gee Trap (x5)	27 h	number	-	-	-	3
					#/trap/h	-	-	-	0.02
		Minto Creek, ~100m u/s Haul Road	Gee Trap (x5)	27 h	number	-	2	-	32
					#/trap/h	-	0.01	-	0.24
		Minto Creek, @ base of canyon	Gee Trap (x0)	0	number	-	-	-	-
					#/trap/h	-	-	-	-
	September	Minto Creek, ~100m u/s Yukon River	Gee Trap (x1)	23 h	number	-	-	-	5
					#/trap/h	-	-	-	0.22
		Minto Creek, d/s Haul Road	Gee Trap (x4)	23 h	number	-	-	-	-
					#/trap/h	-	-	-	-
		Minto Creek, ~100m u/s Haul Road	Gee Trap (x5)	23 h	number	-	-	-	24
					#/trap/h	-	-	-	0.21
		Minto Creek, @ base of canyon	Gee Trap (x0)	0	number	-	-	-	-
					#/trap/h	-	-	-	-

There is no known documentation or instance of any human utilization of fish from Minto Creek as a food source. Accordingly, there is only one documented instance of fish tissue analysis from populations in Minto Creek (HKP 1994). Results from this event are difficult to compare between sites, due to low population numbers and the small size of individuals, with most metal results returning below detection limits. The highest copper, mercury and zinc concentrations were detected in arctic grayling muscle tissue from the mouth of a reference creek north of the project area (Unnamed Creek B), with the highest arsenic concentrations seen in slimy sculpins from the mouth of Minto Creek. Arsenic and zinc concentrations in Minto Creek grayling muscle tissue may not be representative of baseline values due to the transient nature of the grayling in the lower reaches of Minto Creek (HKP 1994).

1.6.1.2. Benthic invertebrates

Limited benthic invertebrate data exists for the Minto Creek watershed. Benthic invertebrate population data has been previously collected in the watershed under two initiatives:

- Hallam Knight Piesod's IEE (1994); and
- Minto Explorations Ltd.'s Water License – Benthic Monitoring Program (2006 data only)

Under the IEE baseline data collection in August 1994, triplicate Hess samples (250 micron mesh) were collected from six sites in the Minto drainage, three of which overlap with the Water License Monitoring Program, which used a 300 micron mesh Surber Sampler. The data for W2, W3 and W7 have been compared for both studies in Table 1-7 below.

Table 1-7 Benthic Summary Data for 2006 and 1994.

Benthic Data Summary for 2006 and 1994						
	W2		W3		W7	
	2006	1994	2006	1994	2006	1994
Density (m2)	10,018	9,327	2,070	2,637	2,379	20,140
Diversity	32	43	33	38	19	34
EPT Index	4	7	6	6	5	6
Richness Index	3.9	5.3	5.0	5.6	3.3	3.8
% sensitive	3.7	37.4	44.4	49.4	44.8	71.8
% facultative	88.7	62.2	53.6	44.5	22.6	23.2
% tolerant	7.5	0.4	2.1	6.1	32.6	5.0

Density was very similar for both years at W2 and W3. However, density was significantly higher at W7 in 1994 compared with 2006, although the 1994 figure is based on triplicate samples whereas the 2006 data is based on a single sample only, due to space constraints. All communities were more diverse in 1994, and although the EPT and Richness indices were very similar for both years at W3 and W7, both were higher in 1994 at W2.

1.7. Terrestrial Resources

1.7.1. Wildlife

Baseline wildlife conditions were documented thoroughly in the IEE (HKP, 1994) but have not been re-assessed substantially since then. It is expected that some usage and population dynamics in the direct project area (including access road) may have been altered slightly.

Table 1-8 Wildlife Species in the Vicinity of the Minto Project Area

Ungulates	
Moose	*Alces alces*
Woodland caribou	*Rangifer tarandus*
Dall sheep	*Ovis dalli dalli*
Mule deer	*Odocoileus hemionus*
Carnivores and Furbearers	
Grizzly bear	*Ursus horribilis*
Black bear	*Ursus americanus*
Coyote	*Canis latrans*
Wolf	*Canis lupus*
Lynx	*Lynx canadensis*
Red fox	*Vulpes vulpes*
Wolverine	*Gulo luscus*
Marten	*Martes americana*
Least weasel	*Mustela rixosa*
Mink	*Mustela vison*
Muskrat	*Ondantra zibethicus*
River otter	*Lutra canadensis*
Beaver	*Castor canadensis*
Squirrel	*Tamiascurus hudsonieus*
Snowshoe hare	*Lepus americanus*
Game Birds	
Spruce grouse	*Dendragapus canadensis*
Ruffed grouse	*Bonada umbellus*
Sharp-tailed grouse	*Tympanuchus phasianellus*
Willow ptarmigan	*Lagopus lagopus*
White-tailed ptarmigan	*Lagopus leucurus*
Rock ptarmigan	*Lagopus mutus*
Canada goose	*Branta canadensis*
Mallard duck	*Anas platyrhynchos*

Northern pintail	*Anas acuta*
Green-winged teal	*Anas crecca*
American widgeon	*Anas americana*

Adapted from Table 10.1 (Minto Explorations Ltd. IEE, *Volume II Environmental Setting)*

Species at Risk

A review of the species at risk in Yukon was considered in accordance with the Species at Risk Act (2002) and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (2004). Species at risk in the Yukon and all of Canada, as listed on the YG, Department of Environment web site:

http://environmentyukon.gov.yk.ca/wildlifebiodiversity/speciesrisk.php

and whose ranges could conceivably overlap within the study area include:

- peregrine falcon Anatum subspecies (Threatened);
- grizzly bear, wolverine, short-eared owl (Special Concern); and
- mule deer, elk, cougar (At risk in Yukon but not elsewhere).

No wildlife species at risk have been observed within the immediate project area nor were any key habitats for these species at risk encountered, however there have been occasional sightings of grizzly bear near Big Creek on the access road, which would be expected due to Big Creek being a salmon spawning stream.

1.7.2. Vegetation

Baseline vegetative communities and distributions were also documented thoroughly in the IEE (HKP, 1994) but have not been re-assessed substantially since then. It is NOT expected that these community conditions will have changed significantly since the studies that supported the IEE, although the mine development disturbances will have changed the vegetative distribution in certain areas, removing the cover in areas where the pit, roads, dumps and ancillary facilities are being developed.

2.0 SOCIO-ECONOMIC CONDITIONS

2.1. Introduction

A detailed description of the socio-economic conditions in Whitehorse, Carmacks, Pelly Crossing and Faro was provided in HKP, Volume III, 1994, prepared in December 1994. This report provided a detailed description of community profiles, demographics, infrastructure, government, municipal and First Nations services, business, utilities, health and education, housing and recreation. Although some of these components are expected to have changed since the original assessment was completed, the majority of components remain valid. These conditions are summarized and updated in the following sections.

2.2. Pelly Crossing

The following socio-economic information for Pelly Crossing has been taken directly from the "Yukon Community Profiles" website, which was produced by Human Resources Development Canada in partnership with the Yukon Chamber of Commerce:

Website address: http://www.yukoncommunities.yk.ca.

Much of this data is based on 2001 census information, but still remains mostly valid. More recent influences on employment and community services as a result of the Minto Mine construction and operation are reflected in the main report Section 1.7 regarding the Cooperation Agreement with the SFN, and in the sections following in this Appendix.

The community of Pelly Crossing is located on the Klondike Highway and on the bank of the Pelly River, 282 kilometres northwest of Whitehorse and 254 km southeast of Dawson City.

Pelly Crossing's 2003 population of 277 is at the lowest point it has been for the past several years.

Pelly is predominantly a First Nations community. The 2001 Census indicated that First Nation members made up over 85 percent of the community population. In addition, a few non-First Nations people live and work in Pelly Crossing.

There has been little movement into Pelly Crossing during the past decade. The 2001 Census reported that just about 20 percent of residents had moved into the community during the previous five years. Some of these movers will be people who have moved from other provinces to take up positions in the community; others will have moved within the Yukon. It is also likely that some of those moving into Pelly Crossing will be returning residents who had previously moved away to work elsewhere.

The percentage of the population that is female is 51, just over the Yukon average of 50 percent.

Pelly Crossing has proportionately more children than the Yukon's overall average. Nearly 24 percent of the Pelly population is aged 14 or under, compared to 20 percent Yukon-wide. The proportion of youth, aged 15 to 24, is about the same as for the Yukon as a whole. The 25-to-44 age group is also well represented. The share in the 45-to-64 year age group, reflecting the older working-age adults, is 22 percent, somewhat lower than the Yukon average of 29 percent. This suggests that some people have left the community to look for work elsewhere.

Pelly Crossing's economy is based on a narrow range of activities. The government services, education and health sectors provide most of the market work. The main employer in the community is the Selkirk First Nation government, which provides work for about 20 people. Some people who normally live in Pelly Crossing move elsewhere for at least part of the year to find work.

The historic site of Fort Selkirk provides seasonal work for Selkirk First Nation members through a management agreement with the Yukon Heritage Branch. Employees work on restoration and maintenance of the historic townsite and maintenance of the campground.

Traditional activities also play a role in the Pelly Crossing economy. Many people get a significant portion of their food supply from hunting and fishing, and some earn cash through trapping.

At the time of the 2001 Census, about 83 percent of Pelly Crossing's adult population reported that they were involved in the formal labour market. This is only a little lower than the overall Yukon proportion. With a limited economy and few job opportunities available in the community, unemployment is very high: 30 percent of those in the labour force reported being unemployed in 2001, compared to the Yukon unemployment rate of 12 percent at the time of the Census. Unemployment is especially high for men, with nearly 40 percent reporting that they were unemployed. Unemployment for women stood at about 20 percent.

Close to 70 percent of the young people in Pelly Crossing reported being involved in the formal labour force. Of these, about half were unemployed. This compares with a 22-percent youth unemployment rate across the Yukon in 2001.

This pattern of high unemployment for community residents is borne out by employment insurance numbers. In 2003, an average of 36 individuals claimed employment insurance payments. The number of people claiming income from employment insurance has averaged more than 30 throughout the early 2000s.

The 2001 Census indicates that only a third of the workers in Pelly Crossing work full-time for the full year, compared to almost one half Yukon-wide. This confirms local information indicating that full-time, full year work is rare. Some adults are likely to move, for at least part of the year, to find work.

Most who are employed in the community work in service occupations, such as home care, sales and food services, or in social science, education, and government service occupations such as teaching and social work. Other important occupations in Pelly Crossing are in construction trades and transport fields. Some people find employment in management and administration; others work in primary industry occupations, such as mining, trapping, or forestry. The numbers of people working in fields like health or arts are very small.

The 2001 Census indicates that about 70 percent of Pelly Crossing's population aged 20 years or older have taken some non-university education or training after leaving school. Less than 10 percent of that age group said that their highest level of education was some secondary school. About 12 percent reported that they had completed Grade 9 or less; 12 percent said they had taken some university-level education, most of them reporting having completed a degree.

Students can attend school from kindergarten to Grade 12 in Pelly Crossing at the Eliza Van Bibber School. The Pelly Crossing Campus of Yukon College is located in the Selkirk First Nation's previous administration office. The Northern Tutchone name of the campus, Hets'edan ku', means "learning house." Staff at Hets'edan ku', in partnership with the Selkirk First Nation, offer programming that is locally relevant. Programs and courses include academic upgrading, computer, accounting, office administration, pre-trades, oil and gas entry-level preparation, art and culture, and youth employment preparation, Additional courses are made available via videoconferencing and include such credentialed courses as early childhood education, accounting and academic upgrading.

Pelly Crossing is served by a local community health centre, which has regular hours from Monday to Friday. This centre also provides 24-hour emergency service. A social worker is located in the Selkirk First Nation office.

The RCMP operates a detachment in Pelly Crossing, staffed by a corporal and two constables. Probation officer and native courtworker services are provided from Mayo.

The Selkirk First Nation administers community infrastructure, such as water, sewer, local road maintenance, community recreation, and fire protection. A chief and six volunteers provide fire department services.

Diesel generators operated by the Yukon Electrical Co. Ltd. provide electricity.

Road access is by an all-weather paved highway from Whitehorse. There is also road access to Carmacks, Dawson City, Faro, and Ross River.

Mail is trucked in three times a week.

Banking services are provided in Pelly Crossing.

Community facilities include the Heritage Centre, a community hall, a youth centre, and a newly renovated recreation centre that includes an arena and curling rink.

A convenience store/gas station and motel is located beside the highway and Heritage Centre. There is a 24-hour card lock system for obtaining gas. There is a sewage disposal area for mobile homes, as well as a place to refill water supplies. There are laundry and shower facilities as well. Across from the store and off the highway close to the river is a newly-renovated campground, which is free of charge.

Minto Resorts, on the Yukon River, is owned by the Selkirk Development Corporation and provides an RV campground and tour bus lunch stop during the summer tourist season. It is located about 30 km from Pelly Crossing.

There is no hotel in Pelly Crossing but the store has six hotel rooms that are available year-round.

2.3. Selkirk First Nation

History of Selkirk First Nations Land Claims

On May 29, 1993, the Government of Canada, the YTG, and Yukon First Nations as represented by the Council of Yukon Indians (now the Council of Yukon First Nations) signed the Umbrella Final Agreement (UFA) after approxiamately 20 years of negotiation. The UFA provided a comprehensive land claim agreement for all Yukon First Nations and an outline for community based social well-being, political autonomy, and economic independence.

On July 21, 1997, Selkirk First Nation (SFN), became the fifth First Nation to sign a comprehensive land claim agreement. The Selkirk First Nation Final Agreement and the

Selkirk First Nation Self Government Agreement (LCA) was negotiated by SFN, YTG and the Government of Canada. Through the LCA, the SFN was allocated 1,830 sq. miles of land over which the SFN has ownership and control. Of this land total, 930 sq. miles are Category A Settlement Lands, of which the SFN has the ownership of the surface and subsurface, including minerals and oil and gas, and exclusive fish and wildlife harvesting rights. The balance of the land allocation is 900 sq. miles of Category B, on which SFN has ownership of surface only, and a small amount of land, (2.62 sq. miles) in the form of site-specific parcels.

SFN and the Minto Mine Site

Three years before the start of land claims negotiations, the Minto and DEF mineral claims were staked by 2 competing exploration syndicates. These claims were extensively explored between 1971 and 1974 and feasibility studies were completed in 1975-76, but thereafter, activities ceased. Ownership was somewhat restructured in 1984 and 1989, which resulted in limited exploration in 1989, after which the property became dormant again. In 1993, MintoEx purchased the claims for the purposes of initiating mining in the area, and was active until 1999. During this time, SFN signed the LCA, which placed the MintoEx and DEF claims within Category A Settlement Lands. Recognizing that, pursuant to land claims agreement, the SFN were afforded the rights to exercise certain powers over land use and environmental protection.

The MintoEx and DEF property continue to lie within SFN Category A Settlement Lands (SNF R-6A), where both surface and mineral rights are reserved for SFN. In addition, the mine access road lies within parcels SNF R-6A and SFN R-44A, and the east boat landing access point lies on SFN R-43B. However, under the LCA, certain rights are reserved, including:

1. *All rights to mines (opened and unopened) and minerals (including precious and base metals) within settlement land are ceded to the Crown except on Category A lands, where mines and minerals are owned fee simple by SFN excepting pre-existing rights such as those that form the Minto property (SFN Final Agreement, Chapter 5.4.2);*

2. *Where pre-existing rights lie within Category A land, such as the Minto mineral claims, the government will continue to administer those rights as though they were still Crown Land (SFN Final Agreement, Chapter 5.6.2) except that any royalties collected from those mineral rights will be paid to SFN (SFN Final Agreement, Chapter 5.6.3);*

3. *A 30m right of way within land parcels SFN R-6A, SFN R-40B and SFN R-44A covering the existing access road from Minto Landing to the project, with the right to construct, maintain, upgrade and use the right of way and road for as long as MintoEx holds its mineral rights (SFN Final Agreement Chapter 5, descriptions in Appendix A);*

4. *The right of YTG to grant a surface lease over the mineral rights, subject to the consent of SFN, not to be unreasonably withheld (SFN Final Agreement, Appendix A).*

If any of the claims are allowed to lapse, they could not be re-staked, and the surface and mineral rights would revert to the SFN. In September 16, 1997, MintoEx and the SFN entered a Cooperation Agreement concerning the Minto Project with respect to the development of the Minto deposit. The Agreement is reviewed often and is in good standing.

2.4. Traditional Land and Historic Use

Interviews of SFN members were conducted as part of the compilation of environmental information for the project area in 1994 (Access Mining Consultants Ltd., 2003). The project area lies within the traditional territory of the SFN and comprises part of land claim settlement parcels R-6A (Category A Settlement Lands), R-44A and R-40B, specifically the upper reaches of Minto Creek.

The SFN continues to use the project area for various activities, including fishing, hunting, berry picking, and spiritual fulfillment. As a result, their current and historical knowledge of the area represents a valuable source of baseline information.

Interviews were conducted with elders and knowledgeable band members in the community of Pelly Crossing to gather local and traditional knowledge about the project area. Generally, there were no significantly negative responses to the questions posed, however a general sense of concern regarding the Minto Project was expressed. The respondents use the area for subsistence and other cultural activities and are keen on seeing it remain a site of continued cultural land use. Respondents indicated on a map of the project area various cultural land use activity sites they know about. The results of this questionnaire are reported in Access Mining Consultants Ltd., 2003.

Ongoing dialogue continues between MintoEx and SFN and the community. Regular community information sessions are held in Pelly Crossing to present updates on mine planning and development and environmental monitoring initiatives, and company representatives hold regular meetings with the SFN Chief and Council to discuss similar issues and agreements.

2.5. Trapping and Outfitting

Trapping remains an important economic and subsistence activity for many SFN members and Yukoners in the project area. Several Registered Trapping Concessions are held in the project area. These include: RTC #136: Heinz Sauer, RTC#139: Danny Joe, RTC #142: OPEN, RTC #143: Johnny Sam, RTC #145: Glen and Jim Bullied, RTC #146: Geo and Ken M^{c}Ginty, RTC #147: Kathleen Sam. Only RTC #145 and #146 are located within the immediate mine area.

Trapper access to the project area has been identified and will be maintained in accordance with the Cooperation Agreement. Compensation agreements have been negotiated with the RTC #146 & #147 trap line holders of the trapping areas impacted by the mine and access road.

Only two outfitting concessions fall within the project area, Registered Outfitting Concessions #13 – Held by Tim Mervyn (Mervyn Outfitting) and #14 – Held by Curt Thompson (Trophystone Safaris).

2.6. Cultural Land Use Activities

Annual salmon fishing occurs at Minto Landing and other sites along the Yukon River. The Minto Landing area is used for various cultural activities throughout the year, including berry picking, trapping, hunting, and spiritual activities.

The Yukon River, in the vicinity of Minto Landing and the Minto Project access route, currently hosts recreational activities, such as fishing, hunting, hiking and canoeing/rafting. The nearby Minto Resorts, owned and operated by an SFN member, provides camping and other outdoor adventure excursions for visitors to the area. Minto Landing is a starting point for tourist excursions down-river to historic Fort Selkirk. The Yukon River is also used as a transportation corridor for freight and other cargo. Land use on the western shores of the Yukon River is limited, as vehicle access to the western shore is available only in winter over river ice, or during open water by barge.

2.7. Heritage Resources

Areas of archaeological interest near Minto are represented by 4 sites identified during an archaeological survey conducted by Sheila Greer in 1994 (HKP, Volume II, 1994). Three of the sites exist on the east side of the Yukon River, outside of the mine development area, while the other (Trouble Hill) is located near the mouth of Minto Creek. No sites were identified or suspected of existing along the project access road or within the mine site area. This work is reported in HKP, Volume II, 1994.

In early 2007, YG archaeologists conducted an investigation of the Trouble Hill area with field assistance from SFN and funding support from Minto Explorations Ltd. Although the final report of this investigation is yet to be released, preliminary results confirm that the Trouble Hill location is outside the direct project footprint and is not at risk of impact from the mine operations.

APPENDIX B

Project Water Requirements

(From Type A Water Use License Application – 1996)

MINTO EXPLORATIONS Ltd.

6.3 PROJECT COMPONENTS

6.3.1 Project Water Requirements

An analysis of the water required for the Project is shown in **Table 6.1**. The minimum, annual, average supply of water required to permit the mill to operate is 23.24 tons/h, 92.84 U.S.gpm or 0.207 ft^3/s (5.86 L/s) for 7560 hours per year.

The estimated average water required for domestic purposes is 2.0 U.S.gpm or 0.004 ft^3/s (0.113 L/s). Allowance has been made in the design of the camp services for water storage, water purification and distribution. A number of the diamond drill holes had artesian flows when they were first drilled in the 1970's. An evaluation will be done to determine the feasibility of supplying the domestic water requirements from a diamond drill hole drilled specifically for this purpose.

Water will be required for intermittent uses such as watering roads during the summer months or for approximately four months of the year. Water will be drawn either from the mill water pond or from the main water storage pond. The quantities of water required will be small and will not have an impact on the water storage required. See also subsection **9.2.6 Fugitive Dust From The Mining Operation.**

The total water use is estimated as 182.6 m^3/day as shown in the Type A Water Use Licence application. This was calculated as follows. The projected annual average reduction in mean flow in Minto Creek at station H3 is 0.002 m^3/s or 172.8 m^3/day as shown in Table 9.4. The estimated domestic water use is 0.113 L/s or 9.8 m^3/day.

It will be necessary to confirm the water balance after construction has been completed and once the mine is in production.

6.3.2 Water Storage

The tailings/water dam has been described in sub-section **5.2.5 Design And Construction Of The Tailings Water Dam.** The main water storage pond will be formed behind the tailings/water dam.
Runoff and water pumped from the open pit will flow via the mill water pond and the diversion ditch and will be collected and stored in the main water storage pond during spring, summer and fall.

Water storage required is approximately 153,000 yds^3 (118,000 m^3) as set out in **Table 6.1**. The main water storage pond will initially be able to store approximately 495,000 yds^3 or 13.3 million ft^3 (378,000 m^3) or 417,000 tons of water and this capacity to store water will be reduced as tailings are deposited. The maximum depth of water at the face of the tailings/water dam will initially be 50 feet (15.2 m). The area covered by water at maximum depth will be 5 ha and the length of the pond will be approximately 500 m. It will take approximately 45 days to fill the

water storage pond assuming it is filled during freshet flows of 3.88 ft^3/s (0.11 m^3/s) in April and 2.47 ft^3/s (0.07 m^3/s) in May.

The level of water in the main water storage pond is set by the level of the overflow weir and this will therefore be self-regulating for approximately 7 months of the year. The weir will be protected with one or two floating booms to keep debris away from the weir. A seepage analysis for the dam and dam foundation gave an estimated seepage rate of 500 ft^3 (14.3 m^3) per day.[2] A seepage rate of 0.006 ft^3/s (0.001 m^3/s) has been used to assess the impact on water quality downstream of the dam.

The reclaim water pump will be set in the main water storage pond, close to the upstream face of the dam. The system will be modelled on an innovative system in use at the Cluff Lake operations of Amok Ltd. in northern Saskatchewan. The reclaim water line will be 3 inches (7.5 cm) in diameter and will be insulated with heat tracing. The line will be laid on a berm on the side of the access road from the mill to the dam. The road will be constructed with a continuous grade between the mill and the dam to ensure that the reclaim line is self-draining. Power will be supplied to the reclaim pump and for heating the pump station via a Teck cable at 5000 V.

Water will also be stored in the smaller mill water pond just below mill and this pond will have a depth of 30 ft (9.1 m) and a capacity of approximately 26,000 yds^3 (20,000 m^3). The tailings thickener or paste production unit overflow, water pumped from the open pit and any flow collected from the upper sub-basins will be collected in this pond. The runoff from the area surrounding the mill, workshop/warehouse and concentrate storage will be directed either to the mill water pond or to the spill pond. The mill water pond will be self-regulating for approximately seven months of the year and is expected to overflow continuously via a culvert into a diversion ditch leading to the main water storage pond during these months. Process water will be pumped from the mill water pond at the rate of 145.42 tons/h, 580.79 U.S.gpm or 1.295 ft^3/s (36.64 L/s) as set out in **Table 6.1**. The reclaim water system will therefore only be used for approximately 5 months of the year or from late fall to early spring.

6.3.3 Site Drainage And Diversion Ditches

6.3.3.1 Site Drainage

Refer to sub-section **5.2.3 Thickened Tailings Disposal System** for comments on the importance of controlling runoff. A site drainage layout at the end of construction and at the start of production is shown in **Figure 6.2**. Two main ditches are shown. A drainage ditch follows the access road from the mill to the airstrip. This ditch will collect runoff from sub-basins B and C_1 and divert the flows to the mill water pond. The overflow from the mill water pond will flow through a culvert into the main diversion ditch and from there to the main water storage pond. Note that this diversion ditch will also collect runoff from sub-basin C_2.

6.3.3.2 Diversion Ditches

A detailed layout for the road to the airstrip and the drainage ditch that follows the road is shown

in **Figure 6.2.** This ditch has been designed with an average gradient of 1.67 %.
A layout for the access road from the top of the tailings/water dam to the mine and the diversion ditch is shown in **Figure 5.2.** The average slope of the Minto Creek bed is 4.8 % between the mill and the centre line of the dam. The creek drops from an elevation of 2,540 ft (774 m) to 2,275 ft (693 m) over a distance of 5,530 ft (1,686 m). The average slope of the road from the mill to the top of the dam will be 3.7 % and this will be the average slope of the ditch. The ditch will discharge into the main water storage pond approximately 500 ft (152 m) upstream of the centreline of the dam.

An initial design for the diversion ditch has been done by EBA.[48] This design includes a seepage analysis for the unlined portion of the ditch using appropriate material properties. This analysis yielded a seepage loss estimate of only 5 % of the average monthly flow in upper Minto Creek. The ditch has been designed for a maximum flow of 176.5 ft^3/s (5 m^3/s) and will be 10 ft (3 m) wide with 2:1 side slopes and 2.8 ft (0.85 m) deep including freeboard. The ditch will be lined with rip-rap. Water will flow in the ditch at approximately 4.9 ft/s (1.49 m/s) and this will be slower than the current average flow rate in Minto Creek.

It is expected that the main access road from the Yukon River to the mine will be constructed in the spring of 1997. This road will cross the top of the tailings/water dam at an elevation of 2360 ft (720 m) and then follow the edge of the tailings disposal basin to the mill. The road will be used for access to the mill and for construction of the dam for a period of approximately six months before the diversion ditch is constructed along the inside edge of the access road. The road excavation will be carefully inspected and tests to determine permeabilities of the in-situ materials will be done by EBA if necessary. The ditch will be constructed to a specification prepared by EBA and this specification will include a ditch liner if required.

It is essential that the access road be usable at all times. The diversion ditch will therefore be checked a number of times per day as shown in **Table 10.2 Operational Monitoring Program** and any indicated or actual failures will be corrected immediately. It is expected that some raveling of the slope above the ditch will occur during the spring breakup, especially in the early years of the life of the mine. This material will be removed with a backhoe or small loader.

It is expected that a number of other drainage ditches will be constructed and maintained by the surface crew during the life of the mine. Ditches will be checked by the surface crew once per day to ensure that no failures have occurred or will occur. Support equipment such as a grader, backhoe and small loader will be available on site and rip-rap can be produced in large quantities by screening waste rock from the open pit through a grizzly.

It is proposed that the long term serviceability of the diversion ditch be monitored and evaluated during the expected life of mine of thirteen years. Experience during the first two to three years will quickly provide information on the diversion ditch cleanup and maintenance required on an ongoing basis. An initial design for abandonment has been prepared and abandonment is further discussed in sub-sections **11.5.3 Phase II (Year 2 To Year 12)** and **11.6.6 Tailing/Water Dam And Diversion Ditch.**[2]

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Table 6.1

Project Water Requirements

	SOLIDS					WATER			SLURRY			
	tons/day	tons/hr	S.G.	U.S. gpm		tons/hr	U.S. gpm	ft³/sec	tons/hr	S.G.	% solids	U.S. gpm
Ore to the mill	1500	69.44	2.70		A	2.15	8.58	0.019				
Concentrate shipped	128	5.94	4.00		B	0.66	2.64	0.006				
Tailings to the tailings thickener	1372	63.51	2.58	98.37	C	146.90	586.73	1.308	210.41	1.23	30.18	685.10
Thickener underflow to tailings pond	1372	63.51	2.58	98.37	D	30.71	122.64	0.273	94.21	1.70	67.41	221.01
Thickener overflow to mill water storage pond					E	116.20	464.09	1.035				
Tailings lockup	1372	63.51	2.58	98.37	F	24.73	98.67	0.220	88.24		71.97	352.08
Water available for recycle accumulates in tailings pond					G = D−F	5.98	23.86	0.053				
Process water required					H	145.42	580.79	1.295				
Makeup water required for the process					I = H−E	29.22	116.70	0.260				
Average annual runoff required to permit mill operations					J = I−G	23.24	92.84	0.207				

		Tons	Cubic Yards	Cubic Metres
Minimum water storage for 7 months of operation	23.24 X 7560 X 7/12	102,500	121,700	93,700
With a 25% contingency				
Water storage based on total water required for 7 months of operation	29.22 X 7560 X 7/12	128,900	153,000	118,000

Note:

1 ton/hr = 3.99 U.S.gpm
1 U.S. gpm = 0.00223 ft³/sec
1 L = 0.2642 U.S. gal
1 U.S. gal = 0.1338 ft³
1 yd³ = 0.77 m³

$$\% \text{ Solids} = \frac{\text{Weight of Solids}}{\text{Weight of Water + Weight of Solids}} \times \frac{100\,\%}{1}$$

1 ton of water occupies a volume of 1.187 cubic yards

6.3.3.3 Storm Water Runoff

Runoff from major storm events will be impeded by various features such as the overburden and waste rock dumps, the open pit, the access road to the airstrip, various explorations roads and trenches, the mill and camp areas with secondary drainage ditches and the mill water pond. The peak instantaneous flow expected in the diversion ditch is therefore considerably lower than the peak instantaneous flow of 226 ft^3/s (6.4 m^3/s) estimated for the upper Minto Creek basin, see sub-section **2.3.7 Peak Instantaneous Flows**. The ditch has been designed for a peak instantaneous flow of 175 ft^3/s (5 m^3/s) and this is therefore a conservative design.

Precipitation information will be collected on an ongoing basis as per **Table 10.2 Operational Monitoring Program.** This information will be used to estimate a value for the possible maximum flood that might be expected. Both the tailings/water dam and the diversion ditch will be designed for a possible maximum flood at closure.

6.4 WATER BALANCE

Careful management of the various components of runoff from the upper Minto Creek basin will be required to ensure an adequate water supply for the operation. Estimated annual water balances for the upper Minto Creek basin are shown in **Table 6.2** for years of mean annual, 10-year return dry and 10-year return wet runoff conditions and schematically shown in **Figures 6.3, 6.** and **6.5** for each runoff scenario, respectively. This analysis indicates that, on an annual basis, there will be sufficient runoff within the upper Minto Creek watershed to supply the operation year round.

Although water will be recycled from the main water storage pond to the mill water pond in order to supplement water deficits during the winter months (October to March of the following year), the annual water balances shown in **Table 6.2** indicate that the quantity of water recycled on an annualized basis is zero.

6.5 DISCHARGE OF WATER TO LOWER MINTO CREEK

The main water storage pond will ultimately receive all runoff from the various sub-basins and it is expected that water will continuously overflow the weir from late spring onwards and through the summer and fall months. This will therefore permit water quality monitoring at a single point before discharge to the downstream environment. The main water storage pond will have adequate retention time to settle out sediment and it is not expected that water treatment will be required as more fully described in sub-section **9.4.2.3 Impact On Water Quality Of Minto Creek At The Point Of Discharge.** Note the commitment made in sub-section **9.4.4 CONTINGENCIES.**

Water will finally be discharged to the existing Minto Creek channel below the dam and will follow the original course to the Yukon River. The distance from the point of discharge to the Yukon River is approximately 4.2 miles (6.7 km).

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Table 6.2

Annual Mass Balance Calculations

Mill Water Pond	Mean Annual (m^3/s)	10-Year Dry (m^3/s)	10-Year Wet (m^3/s)
Inflows			
Basin A	0.013	0.007	0.019
Basin C1	0.005	0.003	0.007
Pit Dewatering	0.005	0.005	0.005
Thickner Overflow	0.029	0.029	0.029
Total Inflows	0.052	0.044	0.060
Extractions or Losses			
Process Requirements	0.036	0.036	0.036
Seepage to Main Storage Pond	0.001	0.001	0.001
Total Extractions or Losses	0.037	0.037	0.037
Mill Water Pond Overflow	**0.015**	**0.007**	**0.023**

Main Water Storage Pond	Mean Annual (m^3/s)	10-Year Dry (m^3/s)	10-Year Wet (m^3/s)
Inflows			
Basin B	0.015	0.008	0.021
Basin C2	0.006	0.003	0.009
Tailings Runoff and Seepage	0.005	0.004	0.007
Mill Water Pond Overflow	0.015	0.007	0.023
Thickner Underflow	0.008	0.008	0.008
Seepage from Mill Pond	0.001	0.001	0.001
Total Inflows	0.050	0.031	0.069
Extractions or Losses			
Tailings Lock-up	0.006	0.006	0.006
Evaporation	0.002	0.002	0.002
Seepage to Minto Creek	0.001	0.001	0.001
Total Extractions or Losses	0.009	0.009	0.009
Main Water Pond Overflow to Minto Creek	**0.041**	**0.022**	**0.060**