



Musselwhite Mine Sustainability Report

07

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# Mine General Manager's Introduction

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Musselwhite Mine is located on traditional First Nations land, and Musselwhite's relationships and agreements with the First Nations have been recognized as best practice, throughout the mining industry. In March of 2007, the First Nation Leadership of the Signatory Communities endorsed the 2006 Musselwhite Agreement which uses a new funding formula for calculating revenue sharing.

A significant change in 2007 was the purchase by Goldcorp Canada Inc. of the 32% shares owned by Kinross Gold Corporation giving Goldcorp full ownership of Musselwhite Mine. On site management of Musselwhite has not changed, however the corporate support structure and philosophy has seen more responsibilities being transferred to the General Mine Manager.

During 2007, exploration continued to successfully increase resources and we were able to continue to convert these resources in to reserves. Musselwhite has been successful at this over the years and today we still have 2 million ounces of gold in reserves, a mine life of 9 years and excellent potential to keep extending these reserves and the mine life in the future.

During 2007 there were a number of operational challenges including rising costs, attraction and retention of manpower in a very buoyant mining industry, lower equipment reliability due to an ageing fleet, numerous electrical outages, decreased stope flexibility and poor ground conditions as we mine lower levels. Despite the number of challenges, I have been very happy with the way that everyone has responded to meet these challenges and feel very comfortable with the strategies that we have put in place to mitigate their effect in 2008.

A new 100 person, two storey bunk house was built and commissioned late in 2007. On each floor there are two common areas and a laundry facility for 50 workers. The

individual accommodations are similar to the other bunk houses on site.

The Sustainability department is actively working with representatives of the First Nations to continue the consultation process with regards to projects of interest to the First Nation. Several projects of interest to the local First Nation communities include the installation for a fresh air raise out on the esker, the installation of additional generator power and the proposed construction of a power line which will have significant implications in the region. Consultations on these projects are ongoing with the appropriate First Nation communities and government regulators.

In 2008 we look forward to continuing with our focus on 6 main areas of growth. We will continue to Grow People, Grow Safety, Grow Partnerships, Grow Margins, Grow Reserves and Grow Production. I am sure that with the level of commitment and dedication from all those that work at Musselwhite we will achieve our objectives.



Chris Start

Mine General  
Manager



# Musselwhite First Nations Partnerships

The Sustainability of the mining industry is based on the industries ability to develop and maintain good working relationships with the First Nations in the area. Musselwhite Mine personnel have worked extensively during the planning stages of the mine and since the operation went into production to develop and cultivate the relationship with the First Nations in the area.

The Signatories under the 2001 Musselwhite Agreement are the four First Nations of North Caribou Lake, Cat Lake, Kingfisher Lake and Wunnumin Lake. Shibogama First Nations Council and Windigo First Nations Council are also Signatories to the Musselwhite Agreement. There are Affiliates to the Agreement which include three other First Nations that are affiliates to Shibogama First Nations Council and five other First Nations that are affiliates to Windigo First Nations Council.

Three committees are structured to manage the communication process between Musselwhite Mine and the First Nations. The Musselwhite Coordinators from the two First Nation Councils, Implementation Officers from each community, elders from the communities and Pipestone Environmental Lands and Resources Monitoring Secretariat are involved in all the committees.

The Environmental Working Committee First Nation representatives and other resource personnel learn and discuss the complex environmental issues the site deals with and participate with recommendations in the decision process regarding topics potentially affecting their interests. The First Nations utilize a biological consultant to attend meetings and review technical documentation on their behalf. The ongoing consultation process stipulated in the Musselwhite Agreement benefits the site when applying for government permits as the mandatory consultation process required for Government approvals is automatically initiated in the planning stages of any project.

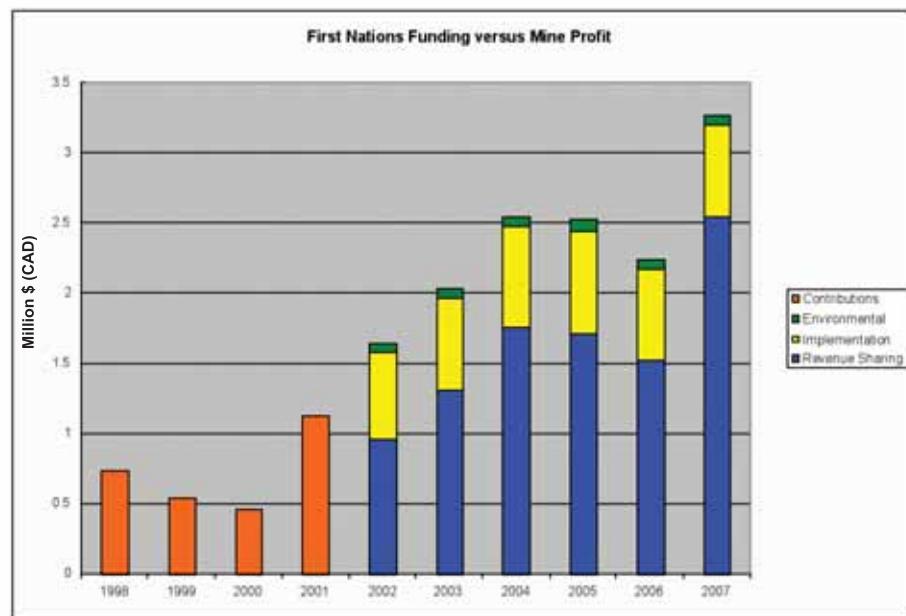
The Musselwhite Working Committee concentrates on increasing First Nation employment

numbers, economic development opportunities and resolving issues that may arise during the Environmental Working Committee meetings.

The Implementation Committee is a dispute resolution committee for the Working Committee as well as monitors the overall implementation and review of the Musselwhite Agreement.

Under the Musselwhite Agreement, the mine provides funding to the First Nations in the nature of Revenue Sharing, Implementation and Environmental Funding. The funds are allocated at the discretion of the First Nations with the implementation dollars having a specific purpose under the agreement and environmental dollars for supporting independent assessments of the mine's influence on the surrounding environment. Prior to the 2001 Musselwhite Agreement contributions were given to the First Nations based on requests from the individual communities. Other dollars going back into the First Nations are through business development and salaries of employees living in the various communities. The graph below depicts the funds going back to the First Nations since 1998.

In attempts to develop honest and transparent business relations and a productive working environment, misunderstandings have occurred due to cultural differences. A working group was organized to provide



examples of misunderstandings, and with the assistance of a facilitator, a Cultural Diversity Awareness Program was developed. All employees will be given the opportunity to attend the training, along with tools to recognize cultural differences, to allow for the development of a better working environment, "Where People Make It Happen".

In respecting the First Nation's traditional belief of water to be kept clean, consumable and not to harm the aquatic species in the river system, Ceremonies are held based on

the mine's planned release of treated water, referred to as effluent. This water was used during the mining process either underground or in the mill. The Opening Ceremony is held in the late spring to bless the water and offer prayers for a successful discharge season. At the end of the season, the Closing Ceremony is held in late October, to give thanks for a successful discharge season in which the mine met its permit requirements. First Nation Clergy, representatives, Council members, including Elders and Youth, are brought to the mine to take part in the ceremonies.

## 2007 Opening Ceremony Photos

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Opening the decant valve



Prayers to bless the water

## Our Business

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### Mill Department

Broken rock containing gold is called ore and is moved to the mill by conveyors or trucks. There are four main processes in the mill which include; (1) crushing and grinding; (2) gold leaching, recovery and refining; (3) cyanide recovery and destruction, (4) and waste solids management.

#### 1. Crushing and Grinding

When the ore arrives at the mill it is first crushed to about 16 mm, (size of a dime) using 2 crushers. The crushed ore is then ground to very fine powder using steel rods and balls in the presence of water.

#### 2. Gold Leaching, Recovery and Refining

Sodium cyanide is the standard chemical used to extract gold from the finely ground ore. This chemical is used by gold mines all over the world. Sodium cyanide and lime is added and mixed with the finely ground ore in the muddy water (slurry) in 4 big tanks. In the presence of the reagents the gold in the ore dissolves into the solution in these tanks. Charcoal (activated carbon) is added to the slurry to collect the gold. The activated carbon is made from the shells of coconuts. The activated carbon that has collected the gold is separated from the slurry, using screens. The carbon containing the gold is put into a strong steel tank and hot caustic water is used to remove the gold.

The liquid mixture (solution) containing gold is put into 3 steel tanks located in the refinery and electricity is passed through the gold solution. Electricity passing through the solution makes the gold drop to the bottom of the tanks. The gold particles are removed once a week and mixed with some reagents (silica sand, borax, and sodium nitrite) before it is heated until melting at about 1000 degree Celsius. At this temperature, everything becomes a liquid and when poured into a bar shaped mold the gold settles to the bottom. The gold bars are shipped to a refinery in Toronto.

### 3. Cyanide Recovery and Destruction

Tailings slurry is the material at the end of the mill when most of the gold (95%) has been removed. The tailings are washed with reclaimed water from the tailings basin to recover liquid cyanide for re-use. The mill is designed to recover and re-use approximately 25% of the original sodium cyanide added earlier in the process. Any remaining cyanide in the tailings slurry is passed through a large tank containing reagents (copper sulphate, sulphur dioxide and air) to destroy most of the remaining cyanide. The mill target is to have the cyanide in the tailings going to the tailings storage area at less than 2 mg/L concentration. Musselwhite Mine has a much lower limit for total cyanide (0.4 mg/L) in the effluent as the mine addressed concerns raised by First Nation communities living adjacent to waterways downstream of the mine.



#### 4. Waste Solid Management

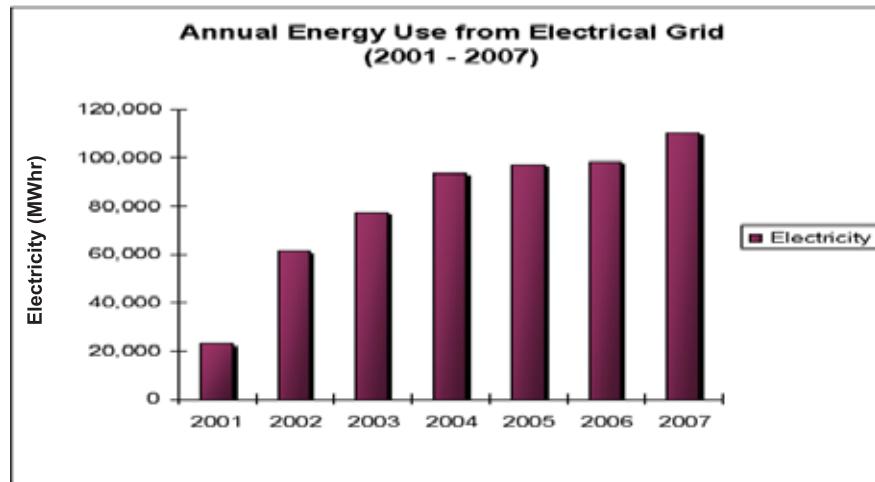
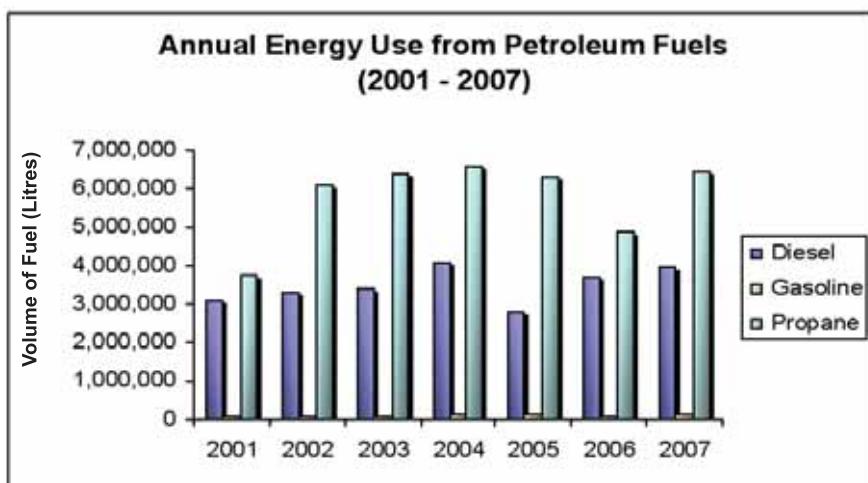
Once the tailings are pumped to the tailings storage area the solids settle out of the muddy water. Clear water is pumped back to the mill for re-use in the grinding circuit. The mill operates on 80 – 85% recycled water. In the beginning of each summer, access water is pumped to the Polishing Pond.

#### Energy Use

Conservative energy use is very important to the Sustainability of Musselwhite Mine. Energy requirements for essential services of the mine like ventilation and ore movement have increased as underground mining has

advanced deeper and further distance from the mill. The prices of electricity and petroleum fuels have also been increasing resulting in higher costs to operate the mine. The mine has taken conservation steps to minimize energy costs including installing automatic fan controls, switching to more efficient lights, and turning off equipment when it does not need to run.

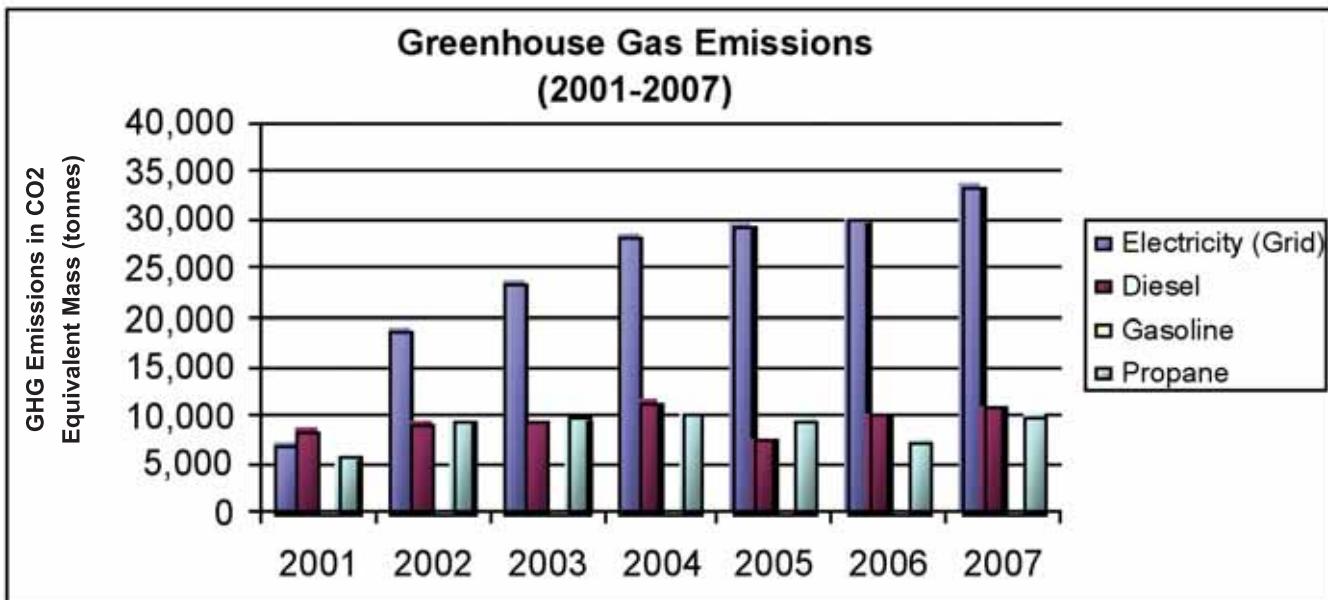
Musselwhite is also looking for future opportunities to re-use heat from air compressors to help cut down on propane use for heating. Propane use was lower in 2006 than it was from 2002 to 2005. Diesel and gasoline usages in 2006 were similar to previous years. The following graphs show annual energy use from 2001 to 2006.



## Greenhouse Gas Emissions

Efforts towards conservative energy use will help to limit the amount of greenhouse gas (GHG) emissions from the operation of Musselwhite Mine. Industry has been under pressure to limit GHG emissions in an effort to lower the potential for global climate change, which has been linked to GHG emissions. GHG emissions are released from the

combustion of petroleum fuels at the mine and coal or natural gas at power plants that feed electricity to the mine through the regional power grid. The following graph shows GHG emissions (in CO<sub>2</sub> equivalent mass) produced annually in the operation of Musselwhite Mine from 2001 to 2007.





# Environmental Stewardship

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Environmental performance at Musselwhite Mine is paramount to the management team and employees alike. Musselwhite Mine was very busy in 2007 with numerous projects in various stages of planning, construction, implementation or monitoring.

Results of the monitoring depicting surface water quality collected from water bodies near the First Nations of Wunnumin Lake and Kingfisher Lake are shown graphically on pages 14 to 15. The graphs contain data from pre-mining conditions until the last sample set of 2007. The data indicates there is no measurable change in the water quality from pre-mining conditions. The parameters indicated in the graphs are compared to their Provincial Water Quality Objective (PWQO) as set by the provincial regulators for the protection of aquatic life. Each parameter is well below the PWQO, therefore will not cause any adverse effects.

As part of Musselwhite Mine's Environment Management System the following programs were implemented: Wildlife Management, Waste Management, and Spill Response. Current planning is ongoing to integrate environmental protection into all aspects of mining and to promote a high level of environmental stewardship.

All employees, contractors and visitors undergo an Environmental Induction when arriving to the site. These inductions promote awareness and responsibility/ownership for environmental protection.

## Wildlife Management

The biological significance of the area requires that resources found in the vicinity of the mine are adequately managed and protected. Therefore a Fish & Wildlife Management Plan was implemented to ensure protection of these resources. During the summer months a recreational activity enjoyed by many is fishing. Employees have the option of recreational fishing in the area in accordance with MNR Regulations which does include catch and release fishing in specific areas. Respite from the industrial landscape are wildlife sightings of bears, wolves, foxes and the occasional moose frequenting areas of the mine. Respect for the wildlife is fundamental in ensuring the safety of personnel onsite by managing domestic food waste to prevent habituation of the animals, which is why waste management is an integral component of our environmental stewardship.

## Waste Management

The Waste Management Plan follows a colour coded Waste Segregation System to manage our various wastes. Proper segregation and disposal of wastes generated onsite minimize the contact situations between people and wildlife. Musselwhite is "Where People Make It Happen", so it is up to the individual to adhere to the waste management strategy being utilized. Hazardous Waste Management ensures the handling of hazardous wastes generated by the operation of Musselwhite complies with the requirements of applicable federal, provincial, and local regulations. The mine operates a storage building for the storage of hazardous waste materials, prior to being sent off site for disposal. Domestic waste and non hazardous industrial waste is deposited and buried in a government approved landfill. Materials collected and set for re-cycling include; paper, batteries, pop cans, scrap metals and vent tubing.



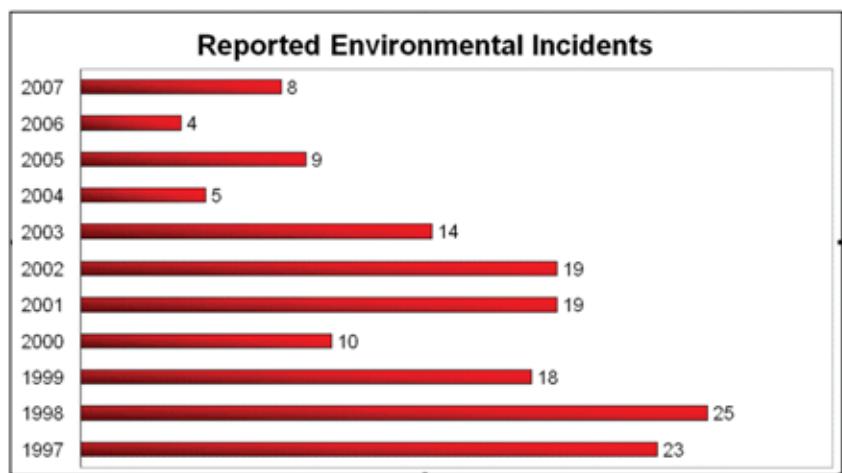
## Spill Management

The Spill Management Plan outlines two classifications of release at Musselwhite which are a spill (as defined in the Environmental Protection Act) and an incident. Both types of releases require response procedures, which include notification of key personnel (internal and external), control, clean up and documentation of the details of the incident. Always, human health and safety is a top priority.

The purpose is to establish a procedure for the transition from normal operations to emergency operations. The organization of the spill response is based on an assumed worst-case scenario and the response is stepped down as applicable to the specific emergency. Depending on the type of spill, environmental sampling (i.e., the collection of water, air or soil) will be carried out immediately and a follow up sampling program established. All regulatory requirements will be followed should the release enter natural water courses.

As part of the Spill Response Plan, information on the hazardous products, First Aid, spill response and disposal methods are provided. Environmental Emergency plans ensure that the proper installation, the performance of

regular maintenance checks, visual inspection of hoses and fittings, and the correct labeling of piping, plus adherence to procedures for off-loading, all lessen the potential of a spill occurring. In 2007 a new provincial regulation came into force called the Environmental Penalty Regulations. This regulation gives the Ministry of Environment the authority to impose financial penalties in response to unlawful industrial spills, discharges, and other related environmental contraventions. The Sustainability Department will be upgrading the Spill Management Plan to meet the new requirements within this new regulation.



## Groundwater Monitoring

As part of the permitting work, in 2005, to raise the tailings dams an additional one meter above the existing height in the permit, the mine was required to complete a ground water assessment. Musselwhite contracted Water Management Consultants to develop a computerized model of the ground water activity adjacent to the tailings impoundment area and predict the direction of flow and concentration of elements in the ground water, over time. All available ground water data from pre-mining conditions to data collected early in 2005 was used to develop the model.

The area depicted in the model is located at the base of Dam B between the tailings facility and the Fish Habitat. The model indicated a release of ground water from the location of Dam B mainly towards the Fish Habitat and to a lesser degree towards Zeemel Lake over an eight to ten year period. The Fish Habitat was constructed by the mine in 1997 as compensation required by the Federal Government for using Crazy Wind Pond for depositing and storing tailings. In 1995, 1996, and 2004 ground water monitoring wells had been installed along the perimeter of the tailings

dams to monitor for water seepage from the dams.

In early 2006, an extensive field program was carried out to determine if the theoretical model was accurate in predicting ground water conditions in the field. Mini probes were inserted into the ground to collect shallow ground water samples from many locations between Zeemel Lake, the Fish Habitat and Dam B. The varying measurements of conductivity and sulphate in the water indicated the path the diluted tailings water was taking. The results of this work indicate that most of the ground water seeping from the dam is moving towards Zeemel Lake and not the

Fish Habitat as originally indicated in the model. In 2006, additional ground water monitoring wells were installed just outside of the path of the plume to monitor the plume's progression. Water within deep and shallow points beneath the ground are now being sampled and analyzed on a regular basis. During the 2006 project, the mine was unable to determine if or where the ground water might be entering Zeemel Lake.

Ground water samples collected near the shore of Zeemel Lake in late 2006 were sent to a laboratory for chronic toxicity testing. The water proved to be non toxic to fish and water fleas. This indicates that, should ground water be entering Zeemel Lake at this time, the water would not be toxic to the fish in the lake.

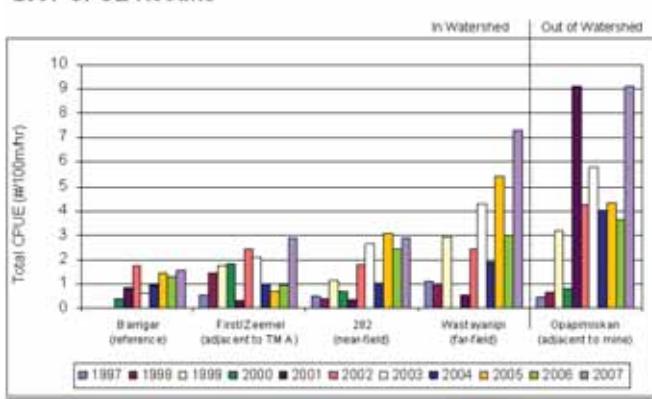
In attempts to determine if and where the ground water might enter the lake, field work completed in August of 2007 mapped out the shallow ground water under Zeemel Lake using a grid pattern. A custom-made conductivity probe was used to check conductance levels in shallow ground water at approximately 30 – 50 meter intervals. A consultant with the assistance of mine personnel spent several days collecting data. The results indicate potential areas of groundwater discharge, however further work is required. Another field program is planned for 2008 to tighten the grid pattern..

Four additional ground water wells were installed to intersect the plume parallel to the ring road beneath Dam B. Two of the wells were used for pump tests while the other two were used as monitoring changes in the ground water while the pump tests were running. The initial test showed a pumping capacity between 60 – 110 gpm. This data will be used to design a groundwater pump back system to return the seepage from beneath Dam B to the tailings dam. It is

expected that the design work will be completed towards the end of 2008 to allow time for government approvals to be obtained prior to installation as early as 2009. Investigations will continue to determine the preferred closure scenario for the tailings area in relation to ground water mitigation.

Since the mine has been operating an annual fall aquatic study has been completed in water bodies around the mine and in the vicinity of the communities. Each year a fish assessment has been completed in Zeemel Lake and the water quality is sampled by mine personnel. There has been no evidence of mine-related effects on concentrations of metals in the muscle and livers of the walleye and lake whitefish. The 2005 report noted that the catch per unit effort (CPUE) of fish net used had declined in each of the last three years but that catches were within the range of natural variability. The CPUE was slightly better in 2006, however still lower than most years. The reduced catch is likely the result of the number, size, location and how the nets were set, as the objective of the study is to target 5 walleye and 5 lake whitefish while not over fishing or collecting other types of fish unnecessarily. In 2007 a computer randomly generated a plot showing where to set the fish nets with no consideration for specific fish habitat. This new sampling approach resulted in the highest CPUE for Zeemel Lake to date.

#### 2007 CPUE Results



The monitoring of Zeemel Lake increased in 2007 with seasonal sampling of the water column in the two deep basins. The data collected in the fall indicated that the water in the basins was mixing with the natural changes in the water temperature. During the spring sample session the probe did not reach the lake bottom due to not enough cable. Additional cable was purchased to facilitate the monitoring. The August sample set was postponed until early September due to limited staff with vacations and



assisting the consultant with their project. The September and October sample sets also indicated mixing taking place.

The extensive ground water monitoring program has been successful with indicating early in the mine operation the signs of the seep from the tailings facility. Musselwhite mine is monitoring the progress and determining the implications to the local surface waters. With input from the local communities, specialists and regulators, short term and long solutions will be investigated and implemented.

#### Reclamation

Musselwhite Mine is committed to the reclamation of land disturbed during the life of the mine. Work done in past years has included resloping/revegetating 8 hectares of disturbed land and removing large amounts of waste tires, scrap metal, and other waste products from the mine property. In 2007 one hectare of land near the airport was cleared of scrap metal, levelled and planted with native grass seeds.



Re-vegetation test plots were installed near the tailings impoundment area during the summer. Each pail holds desulphurized tailings generated during the pilot study conducted for the removal of sulphide minerals from Musselwhite Mine tailings. When fully operational in 2008, the test plots will be prepared with various depths of growth medium then planted with combinations of trees and grasses. Soil and plant combinations will be used to

explore the effectiveness of re-vegetation options for the final design of the tailings cover. Such a dry cover would be concurrently re-vegetated during mine operation to control dust-fly and erosion with final re-vegetation upon closure of the facility. Summer students working at the mine provided assistance in installing the test plots and planting.



## Reclamation Planning

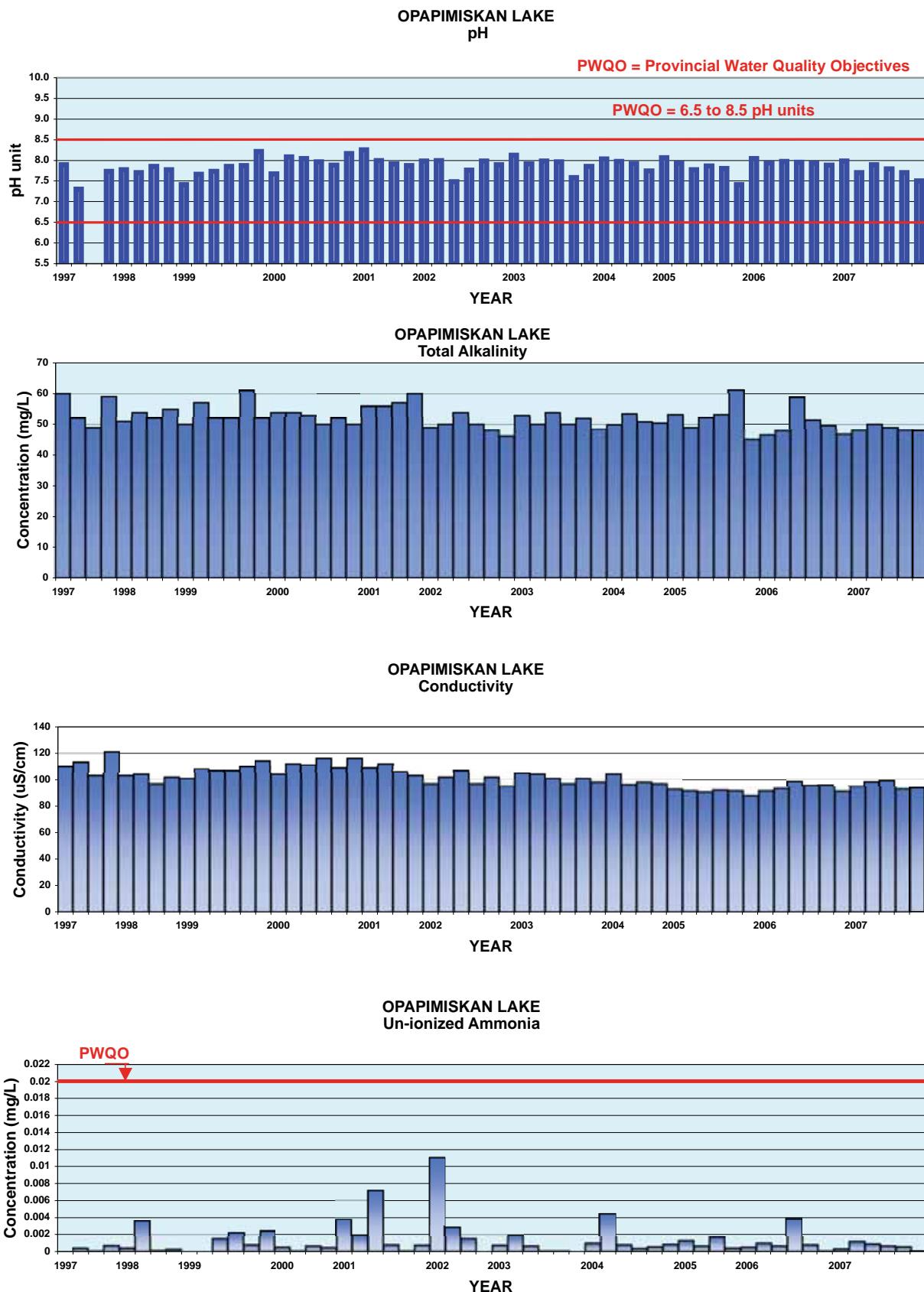
The Provincial government through the Ministry of Northern Development and Mines amended the Mining Act in 1993 which requires mining companies in the province of Ontario to submit Closure Plans prior to start up of new operations. The intent of the plan is to describe how the mine plans on returning the land to near pre-mining conditions based on safety and environmental standards set out in the Mining Act. If there is a potential for other land uses post mining, these are also listed in the plan. The Plan describes how the mine intends on removing the building, sealing any openings to the underground, ensuring ground stability with regards to open pits, broken rock piles or tailings storage areas and environmental monitoring of re-vegetation programs, surface and ground water monitoring on the property and downstream of the mine. A key component of the Plan is the estimated cost of completing all the work. A financial assurance package is required to be submitted to the government to ensure sufficient funds are available to close the mine should the site close unexpectedly.

Musselwhite Mine submitted its Closure Plan prior to start up in 1996 and the plan was re-submitted to describe the

changing conditional at the mine in 2005 at which time the financial assurance package was also modified. The existing financial assurance package submitted by the Joint Venture Owners to account for the physical rehabilitation and long term monitoring of the facility is in the form of an insurance bond for approximately \$17,500,000. Components of the Closure Plan are in the process of being reviewed at each Environmental Working Committee to keep community representative informed of the mining process and the planning involved in closing an operation. This is also an opportunity for communities to express concerns with concepts within the plan, which allows the mine opportunity to address concerns, if possible.

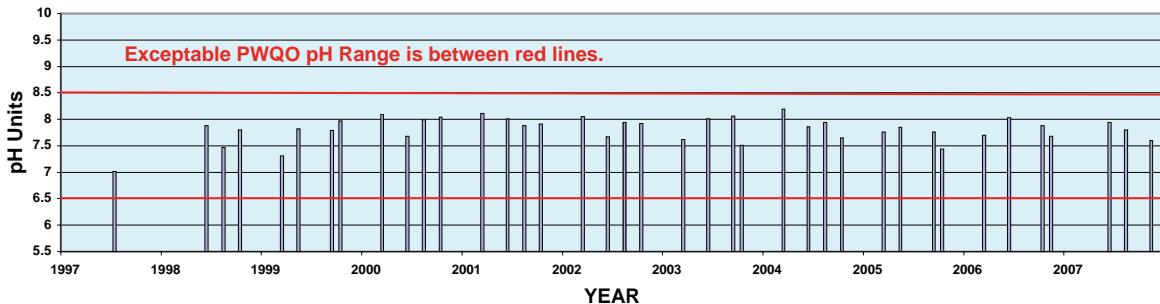
A Notice of Material Change was submitted to the Ministry of Northern Development and Mines for the installation of a fresh air raise out on the esker, the installation of a flotation circuit and dry cover scenario to close the tailings facility. Musselwhite was given notice from MNDM that the Closure Plan would require amending and the Financial Assurance provided would require updated based on the proposed changes. The Closure Plan Amendment is required to be submitted for April 1st, 2008.

# Opapimiskan Lake

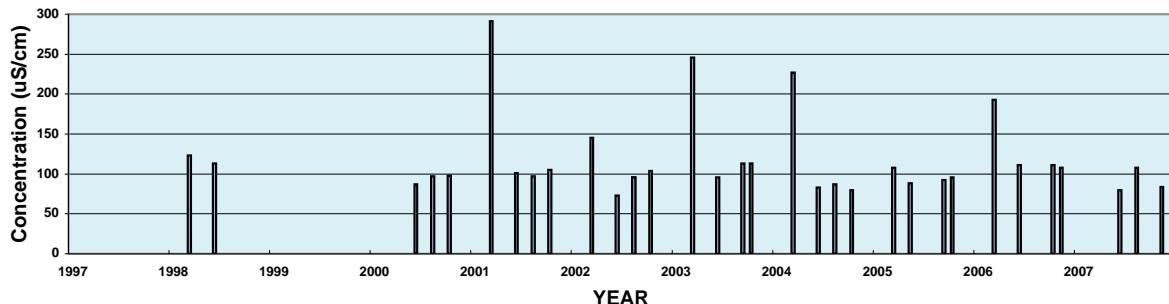


# Big Beaver House Lake

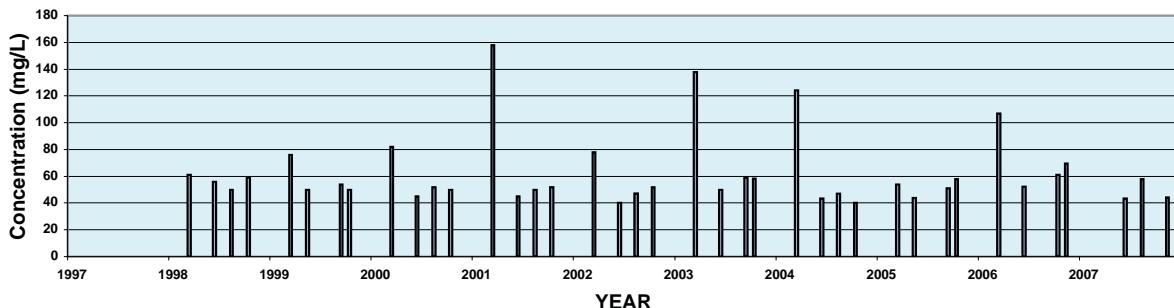
BIG BEAVER HOUSE LAKE  
pH



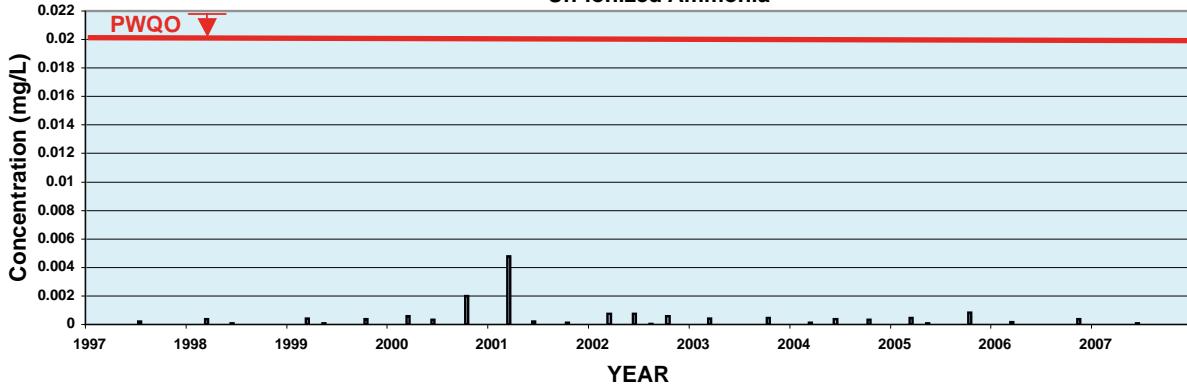
BIG BEAVER HOUSE LAKE  
Specific Conductivity



BIG BEAVER HOUSE LAKE  
Total Alkalinity

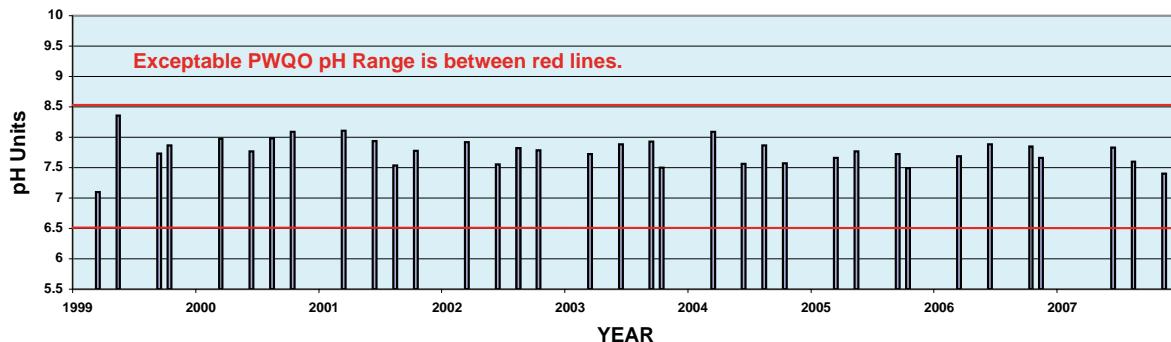


BIG BEAVER HOUSE LAKE  
Un-ionized Ammonia

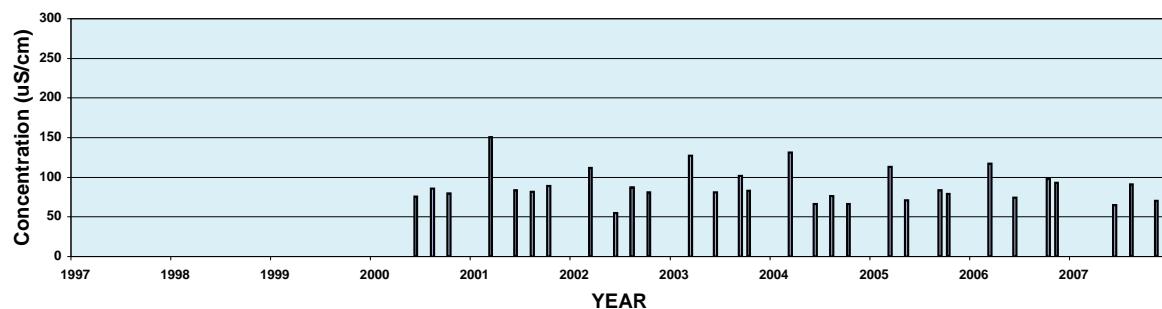


# Wunnumin Lake

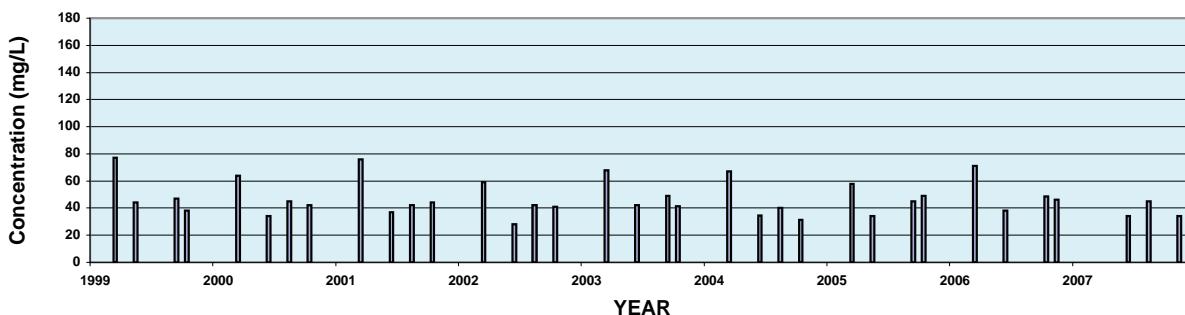
WUNNUMIN LAKE  
pH



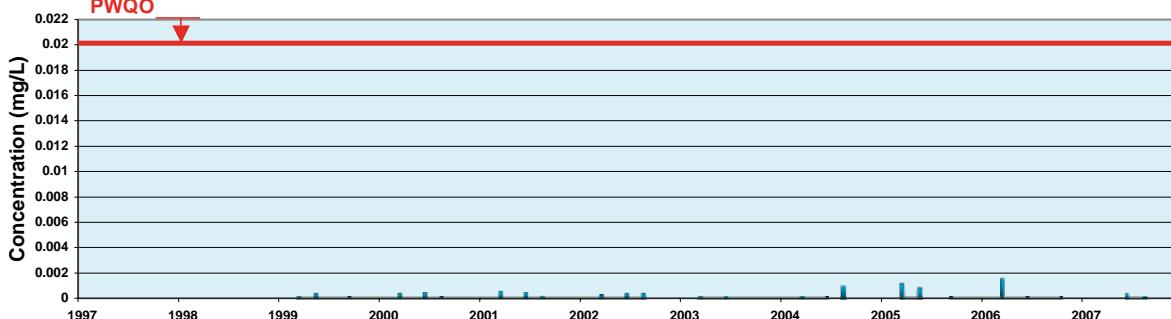
WUNNUMIN LAKE  
Specific Conductivity



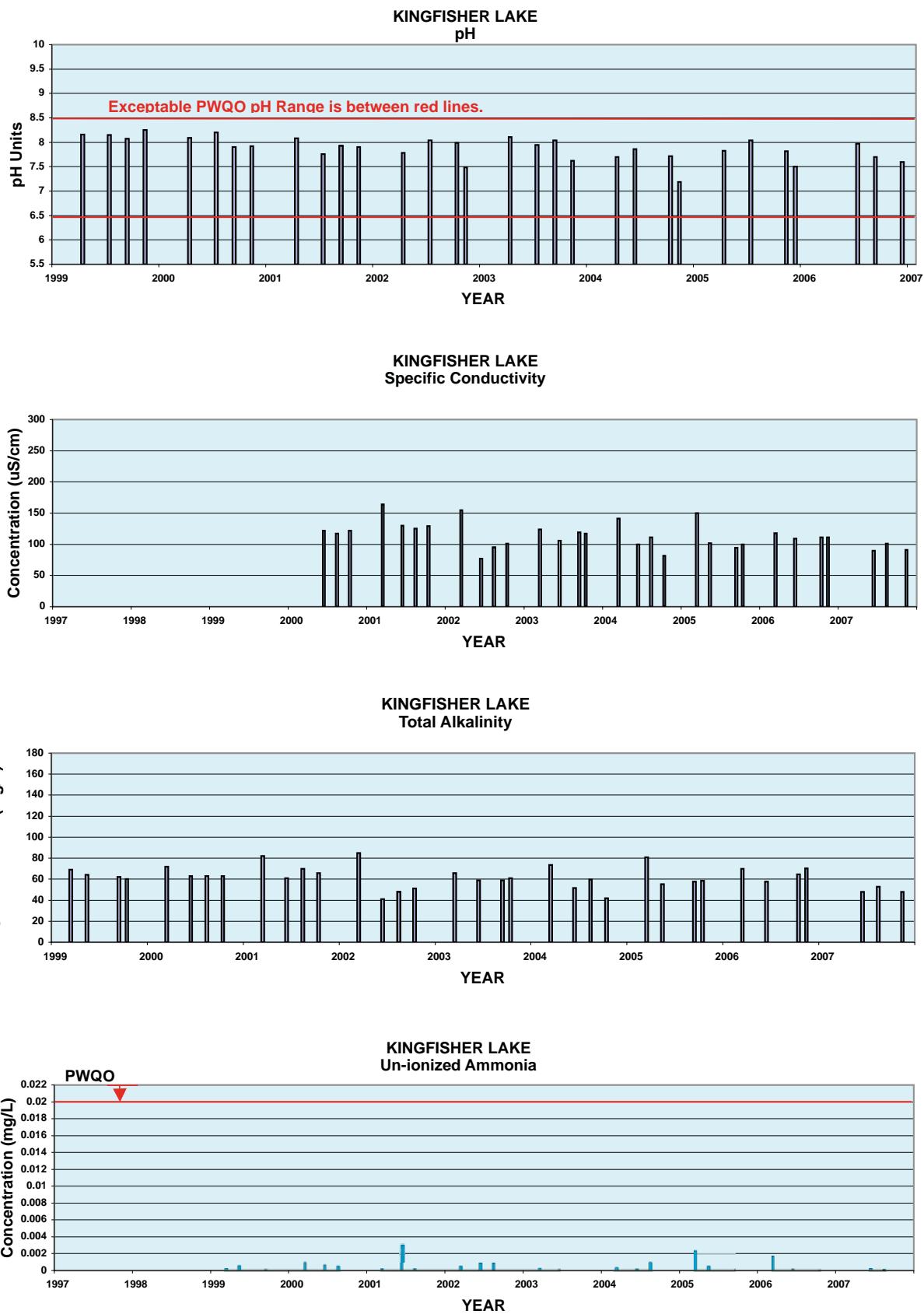
WUNNUMIN LAKE  
Total Alkalinity



WUNNUMIN LAKE  
Un-ionized Ammonia



# Kingfisher Lake





Musselwhite Sustainability Values Logo

The Sustainability Department at Musselwhite Mine is a small department of four employees who guide the mine in environmental protection and obligations under the Musselwhite Agreement. To symbolize what this mission means to each of us we developed the Musselwhite Sustainability Values Logo. It is our hope that each of our co-workers will connect with something within the logo and through respect continue to protect the environment in which Musselwhite Mine is located.

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