URS

Assessment of Closure Options and Impacts, Shear Lake Zone Waste Rock Dump

Cullaton Lake Mine, Nunavut

for **HOMESTAKE CANADA INC.**

March 2003
File 35672-005-310

ASSESSMENT OF CLOSURE OPTIONS AND IMPACTS, SHEAR LAKE ZONE WASTE ROCK DUMP

CULLATON LAKE MINE, NUNAVUT

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CULLATON LAKE MINE, NUNAVUT

1.0 INTRODUCTION

The Shear Lake waste rock dump is located at the former Cullaton Lake Mine, approximately 400 km northwest of Churchill Manitoba, in Nunavut Territory (Figure 1). The mine was acquired in 1993 by Homestake Canada Inc. (Homestake) as part of its purchase of Corona Corporation. In 2001, Homestake was purchased by Barrick Gold Corporation. Two mineralized areas, the B-Zone and the Shear Zone, were mined from underground workings during the operation of the mine, from 1981 to 1985. Tailings from the operation were identified to be acid generating and are now partially capped and stored in a flooded impoundment near the B-Zone adit. Waste rock from the two zones was stored near each surface portal to the underground workings. The Shear Zone waste rock was stored next to a small lake named Shear Lake in an area that is downstream of the lake catchment.

During a site visit by Homestake staff in 2000, apparent 'impact zones' downgradient of the Shear Zone waste dump were observed. The pattern of the vegetation suggested that water flowing downgradient of the dump was the cause.

In October 2000, Homestake requested URS Norecol Dames & Moore Inc. (URS) to provide an assessment of the acid generation and metal leaching potential of the Shear Zone waste rock pile and an apparent 'impact zone' downgradient of the waste pile. This assessment included analysis and interpretation of acid-base accounting data, leachate quality, and kinetic testing data. In addition, URS provided Homestake with closure options for the waste rock pile, including water quality predictions for Shear Lake related to subaqueous disposal of the waste rock.

This document presents the results and interpretation of the previous investigations, and provides an assessment of closure options and their potential impacts. The methodologies used in this report conform to those recommended in "Guidelines for ARD Prediction in the North" (DIAND, 1992).

2.0 MINE SITE HISTORY

2.1 MINE OPERATIONS

The location of the Cullaton Lake Gold Mine is shown in Figure 1. O'Brien Gold Mines began underground mine development in 1976. Cullaton Lake Gold Mines Ltd. completed construction of on-site mill facilities, and milling commenced October 1981 and ran until September 1985. A total of 383,000 tonnes of ore were processed in the mill: 150,000 tonnes from the B-Zone, located near the mill site, and 233,000 tonnes from the Shear Zone, located approximately 5 km to the north. 100,000 ounces of gold were produced. The B-Zone was mined first and the waste rock was used mainly for road and containment dam construction, the remainder was deposited near the B-Zone decline portal. The Shear Zone was mined in the latter years, and the waste rock was deposited beside the decline portal. Tailings were discharged into Tailings Pond #1, with overflow into the adjacent Tailings Pond #2.

2.2 SITE CLOSURE AND RECLAMATION

Reclamation work began in 1991. A 1991 report prepared by the Canada Centre for Mineral and Energy Technology (CANMET) addressed the acid generation potential of Cullaton Lake mine tailings and waste rock. Acid-base accounting tests indicated that the tailings and portions of the waste rock had a net acid generating potential. Reclamation work on Tailings Pond #1 was carried out in 1991-1992. To prevent the possible generation of acidic leachate, the exposed tailings beach adjacent to Tailings Pond #1 was capped with 1.0 m of mine rock and till, and the remaining 80% of the tailings were permanently flooded. All buildings and debris were removed by 1996. Revegetation of the soil cover on Tailings Pond #1 was initiated in 1997.

3.0 SAMPLE COLLECTION AND ANALYSIS

During September 2000 a local helicopter pilot under direction from Homestake environmental staff collected eleven surface samples from the waste rock dump (Figure 2), and two soil samples downgradient of the waste dump. Four surface water samples were collected near the dump, including two seepages immediately downgradient of the dump, a sample from Shear Lake, and a sample from Shear Lake Creek. In addition, the pilot collected three surface water samples from the Kognak River as part of the regular monitoring program. The samples were forwarded by Homestake to URS for analysis by a commercial environmental laboratory.

In May and July 2001, surface water samples were collected from Shear Lake Creek by Homestake staff.

The waste dump samples were analysed for acid-base accounting (ABA) parameters and total (ICP) metals (Tables 1 and 2). The water samples were analysed for total and dissolved (ICP) metals as well as pH, sulphate, alkalinity, acidity, chloride and hardness (Tables 3, 4 and 5).

In addition, the thirteen rock and soil samples were analysed using the SWEP (Special Waste Extraction Procedure) test to determine the quantity of leachable metals present (Table 6). Based on the results of the ABA, total metals and SWEP analyses, two waste rock samples ('Toe 3' and 'Pad Orange') were selected for kinetic testing using humidity cells. The samples were selected to represent the average and worst-case characteristics of the waste rock pile. Crushed rock from the samples was placed in standard humidity cells. During each weekly cycle, the cells were treated to 3 days of dry air and 3 days of moist air, followed by a rinsing of the oxidation products on the seventh day. Leachate from the cells was analysed for pH, conductivity, sulphate and dissolved metals. The humidity cells were used to aid in the determination of acid generation rates and to develop estimates for time until sulphide exhaustion in the waste rock pile. Although these laboratory tests do not fully simulate field conditions, they are an accepted, conservative method to estimate potential field rates of sulphide oxidation and metal leaching.

In addition to the humidity cells, a subaqueous column was constructed to simulate the subaqueous disposal of the waste rock in Shear Lake. The material tested in the column consisted of a composite from all the available waste rock samples. The composite sample was placed in the column and filled from the bottom up to ensure that the sample was completely inundated. Approximately 1 metre of water covered the composite sample. Water was circulated once per week by drawing it from near the sample surface and pumping it to the top of the column. The circulated water was discharged under the water surface to minimize oxygenation. The column was situated in a room with a constant temperature of 5°C. Samples for analysis were collected from a port near the sample surface and analysed for pH, Eh, conductivity, dissolved oxygen, sulphate and dissolved metals.

4.0 ACID ROCK DRAINAGE AND METAL LEACHING INVESTIGATION

4.1 WATER QUALITY DATA

Surface water samples were collected from seven locations (Figure 2). Three of the samples were taken from three locations along the Kognak River. The remaining samples (D-Edge, L-Zone, Shear Lake, and Shear Lake Creek) were collected from locations in the immediate vicinity of the waste dump. The D-Edge and L-Zone samples were collected from the tundra downgradient of the dump in the area of the 'impact zone'. In May and July 2001, water samples were collected from Shear Lake Creek, immediately downstream of Shear Lake (Figure 2). Analytical data for all samples collected in 2000 and 2001 are shown in Tables 1, 2 and 3.

The Kognak River samples are characterized by low concentrations of total and dissolved metals with neutral pH values. Sulphate levels were at or below detection limit (1 mg/L). The D-Edge sample had a pH of 2.9, a sulphate concentration of 830 mg/L and elevated metal concentrations, notably dissolved zinc (0.3 mg/L). The L-Zone sample had a neutral pH and sulphate concentration of 45 mg/L with metal concentrations generally below detection limits (Tables 3 and 4). In September 2000, Shear Lake had a pH of 6.0 and 15 mg/L sulphate whereas Shear Lake Creek downgradient of the waste pile reported a pH of 4.2 and a similar sulphate concentration of 14 mg/L. Results from the May 2001 and July 2002 sampling of Shear Lake Creek indicate that stream water upgradient of the waste pile had near-neutral pH and low metals concentrations comparable to the Shear Lake water quality. Dissolved metal concentrations for the lake and creek were generally below detection limit.

The data suggested that acidic water was leaching from the dump and entering Shear Lake Creek. The dissolved metal load from the dump appeared to be low.

4.2 ACID-BASE ACCOUNTING (ABA)

Thirteen samples were collected for ABA analysis. Two of the samples (D-Zone and L-Zone) were soils collected downgradient of the waste dump. The remaining eleven samples were collected across the dump surface (Figure 2). The sampler was instructed to collect waste material that represented the different colours observed in the dump in order to simplify the sampling procedure and to obtain a representative suite of samples.

Acid-base accounting results are shown in Table 4. The waste rock samples are characterized by paste pH values of 4.0 to 5.5. Sulphide sulphur concentrations ranged from less than detection limit (<0.02%) to 1.2%. This is a similar range to data reported for earlier ABA work on waste rock from both the Shear and B Zones (CANMET, 1991). Sulphate sulphur concentrations were at or below the detection limit. Five of the eleven samples have sulphide sulphur contents above 0.3%. Comparison of total sulphur to sulphide sulphur concentrations suggests that sulphur is in the form of sulphides (Figure 3). Neutralization potentials (NP) of the samples were very low, indicating that there is virtually no capacity for these materials to neutralize acid. The acid generation potential (AP) for approximately half of the samples was very low. However, five of the eleven rock samples had AP values greater than 9 kg $CaCO_3$/t (0.3% sulphide) and no neutralizing capacity. Therefore they are classified as potentially acid generating (PAG). Resultant Net Neutralization Potentials (NNP) were near zero or negative (Figure 4). Due to the zero or negative NP values, NP/AP ratios (NPR) cannot be calculated. However, a plot of NP versus AP is shown in Figure 5.

The two soil samples contained very little or no neutralizing capacity. The D-Zone sample contained approximately 0.1% sulphate.

Total metal concentrations of the samples are low (Table 5). This is expected due to the type of waste rock (orthoquartzite) that is essentially pure quartz with accessory sulphides. The two soil samples generally contain higher metal concentrations than the waste rock samples, but still have low concentrations.

4.3 SWEP TEST

SWEP tests were run on the eleven waste rock and two soil samples. Data are presented in Tables 6 and 7. Leachable metal contents in the soils were generally an order of magnitude higher than in the waste rock. The soils were collected from the toe of the waste dump, within the 'impact zone', and likely have been enriched in metals due to transport and deposition of metals in water seeping from the dump. The higher values may be due in part to the finer grained nature and therefore larger surface area of the soils compared to the waste rock.

4.4 HUMIDITY CELL TEST WORK

Two samples were selected for kinetic testing in humidity cells. One sample (Toe 3) was chosen to represent the average composition of waste rock, the second (Pad "Orange") was chosen to represent the "worst case" characteristics of the Shear Lake waste rock. The two humidity cells were operated from December 4, 2000 to September 10, 2001. pH of the cell leachates was monitored weekly. Laboratory humidity cell data are presented in Appendix A. The pH of the two cells was somewhat different (Figure 6). Cell HC1 (Pad "Orange") varied from pH 3.2 to 4.1, whereas HC2 (Toe 3) ranged from pH 3.8 to 5.3. The trend of HC1 pH values suggested a gradual decrease during the operation of the cell. Alternately, cell HC2 pH values indicated a gradual increase during the testing period. Sulphate loadings decreased to near-constant rates within the first five weeks of cell operation (Figure 7).

In general, metal loading rates for the two cells decreased rapidly following their start up and reached low near-constant rates that continued throughout the length of the tests. An exception to this was aluminum loading from cell HC1 that appeared to have increased from approximately week 15 to the end of the test at week 40 (Figure 8). This coincides with a decrease in the pH of cell HC1 that also began at approximately week 15. The increased aluminum loading is likely a result of the pH-controlled dissolution of aluminum hydroxide minerals in the sample. Copper loading from cell HC1 also showed a slight increasing pattern during this period that may also be a result of the decreasing cell pH (Figure 9).

An estimate of the time until sulphide exhaustion was made using the sulphate production results from the humidity cells (Figure 7). The estimate was carried out by subtracting the observed mass of leached sulphur (in sulphate) from the known mass of sulphide sulphur in the sample. This result was then extrapolated over time by using the averaged sulphate production rate to determine the time period until all of the sulphide present in the material is consumed. Using this procedure, the estimated time for sulphide exhaustion is approximately 30 years for HC1 and 64 years for HC2 (Figure 10). However, these laboratory tests may not accurately reflect the cold, low precipitation conditions of the site. It may be expected that the actual weathering rates of the waste rock will be notably lower than that observed in the laboratory. These rates should be considered conservative, and these estimated times until sulphide exhaustion should be regarded as the probable minimum time period.

4.5 SUBAQUEOUS COLUMN TEST WORK

The subaqueous column test was set up using a composited sample from the waste rock samples and operated from February 13, 2001 to September 4, 2001. Over the weekend of March 3, a piece of tubing in the recirculation system ruptured, causing approximately 3/4 of the column water to leak, but did not expose the sample material to air. This was noticed the following Monday and corrected. Metal concentrations in the column water were adjusted to account for the water and load loss. Metal concentrations were also recalculated to account for the load lost from the weekly sampling procedure.

Figure 11 shows the sulphate and metal concentrations of the column for the duration of the testing period. Concentrations are generally constant with the exception of a fluctuation at week 4 that corresponds with the rupture of the circulation tubing. Arsenic and antimony concentrations are near detection limit whereas the highest concentrations are shown for sulphate, iron, manganese and aluminium. Zinc, nickel, cobalt and copper had concentrations in the range of 0.01 to 0.1 mg/L. The consistency of these results indicates that the waste rock contains a readily soluble mineral component that dissolves upon immersion in water; however, the rate of further dissolution appears to be very slow.

4.6 CHARACTERISTICS OF THE SHEAR LAKE WASTE ROCK

The Shear Lake waste rock consists mainly of orthoquartzite with pyrite and pyrrhotite as the primary sulphides. The waste rock has been exposed to weathering since its placement in the 1980's. The rock is classified as potentially acid generating (PAG) and contains little to no neutralization capacity. Although metal concentrations in the rock are generally low, soluble metal phases are present and can result in the leaching of dissolved metals to the surrounding environment.

5.0 CLOSURE ISSUES AND ASSESSMENT OF OPTIONS

5.1 CLOSURE ISSUES

The Shear Zone waste rock has the potential to generate acid rock drainage (ARD) and to leach metals into the surrounding area for at least 30 to 60 years. Seepage from the waste rock potentially has the ability to discharge dissolved metals into the surrounding surface waters of Shear Lake, Shear Lake Creek and possibly downstream to the Kognak River. Historic seepage from the waste rock has resulted in the formation of downgradient vegetation impact zones.

The Cullaton Lake mine site is situated in an area of deep and continuous permafrost. Annual precipitation is in the order of 40 cm, and the average annual temperature is -7^{o} C. The site is subject to harsh weather conditions and is extremely remote, being accessible only by air. Any sustainable long-term mine waste management plan must recognise the difficulties in accessing the site, while preventing the generation of acid rock drainage and metal leaching from the waste.

5.2 CLOSURE OPTIONS

A successful closure plan for the waste rock will minimize the discharge of acidic metal-rich seepage to the surrounding environment. Primary control methods include the prevention of oxidation/leaching of the waste, or treatment of the resultant leachate to remove acidity and metals. Conventional methods to achieve these goals include subaqueous disposal, blending, water treatment and encapsulation. For the Shear Lake site, the following closure options were considered potential alternatives for long-term waste rock management:

- Place in tailings impoundment and submerge;
- Blend with B-Zone waste rock, to provide neutralization capacity;
- Collect and treat dump seepage
- Subaqueous disposal in Shear Lake;
- Consolidate and encapsulate with local till;

5.2.1 Disposal of Shear Lake Waste Rock in Tailings Pond #1

Tailings Pond #1 is located approximately 5 km south of the Shear Lake waste rock dump. It has been successful at mitigating acid rock drainage and metal leaching from tailings covered by water and/or till. Effluent water quality in the pond has shown a continuous improvement since 1986, and water quality parameters are well below limits prescribed in the water licence.

To prevent continued oxidation of the Shear Lake waste rock, the material could be hauled to Tailings Pond #1, and submerged in the flooded portion of the impoundment. However, there is insufficient water volume to submerge the additional waste. The water depth in the pond is approximately 1 meter and can not be easily increased as the water depth is controlled by the pond spillway elevation. The pond discharges during the summer months. There will also be an initial addition of dissolved metals as secondary minerals are dissolved which may have an unacceptable impact on the pond water quality and cause the discharge to be out of compliance. In addition, placing additional waste rock in Tailings Pond #1 would require hauling the waste rock a distance of approximately 5 km and requires disturbing areas which have been successfully reclaimed.

Based on these considerations, use of Tailings Pond No. 1 was not considered a viable alternative for disposal of the waste rock.

5.2.2 Blending of Waste Rock

Blending consists of mixing at least two rock types of different acid generation, neutralization potential and metal content to produce a material that has a discharge water quality with neutral pH and low dissolved metal content. The success of blending depends on the availability of sufficient quantities of alkaline material to neutralize the acidity produced, and adequate mixing of the materials to internally consume all the acid produced. Blended waste rock piles should ideally be constructed as mining progresses. In the case of vein-type deposits, the combination of high carbonate rock with the waste rock is generally considered the most suitable blend.

Two options were considered for the blending of the Shear Lake waste dump: blending with waste rock from the B-Zone waste rock dump, and blending with dolomite quarried from a location approximately 2 km to the east.

Studies of B-Zone material (CANMET, 1991) indicate it has a net neutralization potential (NNP) of 69-127 kg $CaCO_3$/tonne. Thus, this option is dependent upon having sufficient volume of B-Zone waste rock available and on its ability to neutralize any acid generated by the Shear Lake waste rock. Most of B-Zone tailings were used for road and containment construction early in the mine life and it is unlikely that this option could be pursued.

Alternatively, dolomite could be quarried from a location approximately 2 km to the east, transported to the site, crushed and mixed with the waste rock. Dolomite has less neutralization capacity than limestone and would likely require a greater volume of material. Use of the dolomite would require the construction of a haulage road and development of a quarry. Both these activities would result in impacts to undeveloped land in the vicinity of the mine. In addition, a rock crusher would also have to be flown in to prepare the dolomite for blending.

Therefore, based on these considerations, blending using B-Zone waste rock or a nearby dolomite source were not considered to be viable closure options.

5.2.3 Collection and Treatment of Surface Runoff and Seepage

An alternative approach to reducing or preventing the production of acidic water with elevated metal contents is to let oxidation of the waste rock proceed, and to collect and treat the contaminated seepage and runoff. Various methods are available to neutralize acidic metal bearing water and precipitate the metals prior to release into the environment. Active treatment processes, such as lime or hydroxide addition, can be used to neutralize acidity and precipitate metals. However, active treatment processes require near-constant human supervision, and are therefore not viable for remote locations such as Cullaton Lake. They are also not viable for low flow settings such as the Shear Lake waste dump, where seepage from the dump likely occurs at low rates. Disposal of sludges produced by active treatment is also an issue and would require assessment.

A passive water treatment system is believed to be the only viable treatment option for a remote location such as Cullaton Lake. However, conventional passive systems (such as an oxic limestone channel) usually require sufficient stream gradient to prevent clogging of the system with iron-aluminum precipitates. It is likely that they would not perform efficiently in the relatively flat terrain near the mine site. Further, passive treatment systems have not been demonstrated to be effective under the cold conditions of high northern latitudes, and would be subject to freeze-thaw problems. The available neutralizing material, dolomite, may not be able to produce sufficient alkalinity to effectively neutralize the seepage. Based on these reasons, ongoing treatment of the waste rock seepage was not considered a viable closure option.

5.2.4 Subaqueous Disposal in Shear Lake

Disposal of waste rock underwater inhibits further oxidation of sulphides and acid generation. Generally, wastes need to be covered by at least one metre of water to be effective. Local wind and wave conditions may also require a thicker water layer to prevent agitation and oxygenation of the waste. Natural sedimentation processes in water bodies may also assist by depositing a layer of organic material on the waste, which consumes available oxygen at the sediment/waste interface and will tend to precipitate sulphides. Subaqueous disposal of the Shear Lake waste rock in Shear Lake was evaluated.

Estimates of water quality impacts to Shear Lake following deposition of the waste rock were made using the SWEP test and subaqueous column test results. SWEP test results were used to estimate the initial release of metals from the waste during deposition in Shear Lake whereas the subaqueous column test data was used to estimate the long-term water quality of the lake following deposition of the waste rock.

Initial Water Quality

Estimates of the water quality of Shear Lake following deposition of the waste rock were made using the following assumptions:

- Estimated waste rock volume of 1000 m^3;
- Estimated waste rock density of 2000 kg/m^3; and
- Estimated Shear Lake water volume of 42,000 m^3, based on a 2001 bathymetric survey.

Revised estimates of 'average' and 'worst case' water quality were made using the median and highest leachate concentrations. Results of the estimates are shown in Table 8. This calculation assumes the accumulated weathering products in the waste rock would be released into the surrounding lake water in the same manner as metals liberated during the SWEP tests. Results of these calculations suggest that concentrations of cadmium, iron and possibly zinc would exceed Canadian Council of Ministers of the Environment (CCME) freshwater aquatic life criteria (FAL). Concentrations of aluminum, arsenic, copper and nickel may exceed these criteria. However, the concentrations used for these elements (September 2000 Shear Lake concentrations) reported below detection limit values that are above the applicable CCME guidelines. Therefore, predicted concentrations using these values likely overestimate the probable water quality after deposition of the waste rock.

Shear Lake has a maximum estimated catchment area of approximately 2 km^2. With an estimated annual precipitation of 40 cm and evapotranspiration of 40%, Shear Lake may receive as much as 480,000 m^3 of inflowing water per year. Therefore, if adequate mixing occurs, the total lake volume (42,000 m^3) may be replaced numerous times annually, and the predicted elevated metal concentrations would be expected to decrease.

Long-Term Water Quality

The results of the subaqueous column test were used to estimate the long-term water quality of Shear Lake following deposition of the waste rock. A scaling factor was developed based on the known water/rock quantities of the column and the measured volumes of Shear Lake and the waste rock dump. Details of the calculation are included in Appendix B. Results of the water quality estimate suggest that the dissolved metal concentrations of aluminum, cadmium copper and iron in the lake may exceed the CCME FAL guidelines (Table 9). However, depending upon the mixing dynamics of the lake, dilution of the lake water by catchment inflows could significantly reduce these predicted concentrations.

The initial flushing of secondary soluble metals from the waste rock could be minimized by draining Shear Lake and placing the waste rock in the deep portion of the lake. The waste rock would be covered by any available lake bottom sediments to provide an oxygen limiting cover. The lake could then be allowed to refill. While this option would avoid extensive mixing of waste rock with lake water, and the consequent release of soluble minerals, it would require a very significant disturbance to Shear Lake, including the construction of a system to drain the lake, and a haulage way to allow vehicle access to the lake bed.

Based on the predicted exceedances of aluminum, cadmium, copper and iron, and possible disturbance to Shear Lake, subaqueous disposal in Shear Lake was not considered a viable alternative for disposal of the waste rock.

5.2.5 Encapsulation of Waste Rock

Encapsulation can be used to restrict the access of water and oxygen to mine waste. Restricting the flow of water and oxygen will reduce the rate of sulphide oxidation and metal leaching from the wastes. Capping materials must have low permeability to oxygen and/or water and not be subject to cracking, erosion or punctures that could increase the permeability. A wide variety of materials and methods can be used to cap mine wastes. Dry covers or saturated soils can also be employed to limit oxygen diffusion. These covers tend to be thick (1-3m) and may be expensive to construct. Limiting water infiltration can be achieved using a variety of types of soil covers, geotextile (synthetic) materials and other materials such as asphalt or concrete. Effective application of a particular capping method is dependent upon many factors, including cost, and is generally site-specific.

In sites with continuous permafrost, freezing of waste rock or tailings piles may occur naturally. Infiltrating water becomes trapped in waste rock as ice when it encounters sub-freezing internal temperatures. In these conditions, the rate of chemical oxidation of sulphides is an order of magnitude lower than reaction rates at 25°C, and biological sulphide oxidation is inhibited below 4°C. Construction of a toe berm will limit runoff water from the waste rock pile and enhance formation of ice within the pile. The use of permafrost to reclaim waste rock piles or form barriers to prevent water and oxygen infiltration has been successfully employed at several sites in the north, including the Ekati Mine.

.In the summer of 2001, the Shear Lake waste rock was consolidated onto a one metre thick pad of compacted fine grained till and capped with a one metre thick layer of compacted fine grained till and a final one metre thick layer of compacted coarser till. The cap was revegetated using a local seed mix. The average hydraulic conductivity of an uncompacted till is approximately 10^{-6} m/s. Lower values are expected for the compacted layer. Therefore, when revegetated, the capping layer will form an effective, erosion-resistant capillary barrier and significantly reduce infiltration into the pile.

Permafrost migration into the waste may be an added benefit to capping the material. The site is in an area of deep and continuous permafrost. Site evidence indicates that the portals to the underground workings have frozen over as the permafrost reclaimed the mined areas. It is likely the movement of the permafrost into the pile will occur naturally, further limiting sulphide oxidation and metal leaching. Any runoff from the surface of the cap will be captured by the toe berm. The low precipitation and the low temperatures at the site are expected to minimize the infiltration of water into the pile, but for water that does infiltrate, will promote the formation of permafrost within the waste.

Due to the remote location of the site, capping with imported materials such as synthetic materials, clay, concrete or asphalt was not considered practical. Further, the long-term integrity of these materials in the harsh conditions of the site has not been established.

5.3 RECOMMENDED CLOSURE OPTION AND CLOSURE ACTIVITIES

The remote location of the Shear Lake site requires a closure option that minimizes the ARD/ML impacts for the waste rock, but also limits the necessity of ongoing human intervention and performance monitoring. Application of subaqueous disposal, blending and water treatment methods to the Shear Lake waste dump have technical requirements or potential impacts that do not meet the closure goals of the site.

Given the relatively small volume of waste rock material, consolidating and encapsulating the material with local till is considered the best option. The two metre cap of vegetated compacted till will significantly reduce infiltration into the pile. The toe berm will collect run off water and keep it contained within the waste pile. Permafrost is expected to aggrade into the pile over time and further limit any oxidation or metal leaching from the waste.

In 2000, based on observations that the Shear Lake waste rock dump appeared to be generating acidic seepage, a preliminary assessment of the site was initiated. In 2001, Homestake began reclamation of the Shear Lake waste dump and mine roads on the site. On-site assessment of the waste rock, based on trenching, indicated that the volume of material was approximately 1,000 m^3. The waste rock was stockpiled on a base of fine grained till. During the summer of 2001, reclamation of the waste dump was completed (Photos 1-4). Reclamation consisted of:

- Excavation and consolidation of the waste into a single pile;
- Construction of an approximately 1m thick pad of fine grained till with a toe berm;
- Placement of the waste onto the till pad; and
- Capping of the waste with a 1m thick layer of compacted fine grained till, overlain by a 1m thick layer of coarser, compacted till. The cap was revegetated using a local seed mix.

5.4 PERFORMANCE MONITORING

Performance of the capped waste rock pile should be assessed by carrying out an annual monitoring program. This program should include the following:

- Installation and monitoring of thermistors placed within the capped dump to assess the development of permafrost within the pile.

- Water quality monitoring of Shear Lake Creek downgradient of the capped dump should also be carried out annually.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

Based on the review of the available data, the following conclusions are made:

- A vegetation 'impact zone' downgradient of the Shear Zone waste rock dump was likely a result of acidic water seeping from the dump; however, the seepage appeared to be low in metals.
- The Shear Zone waste rock dump is composed mainly of orthoquartzite containing variable amounts of sulphide, primarily in the form of pyrrhotite and pyrite. The dump rock appears to have no neutralizing capacity. Sulphide contents range up to 1.2%. Approximately one half of the rock samples analysed were classified as potentially acid generating.
- The 'impact zone' is likely related to the consumption of the available NP within the waste dump and the subsequent production of acidic leachate.
- Acidic water from the dump was influencing Shear Lake Creek. There was no apparent influence on the Kognak River.
- The SWEP tests, humidity cell and column test results indicate that the waste rock contains a notable component of water soluble minerals that release metals upon immersion in water. Metal loading from the humidity cells is generally low. However, acidic pH values continued throughout the length of the humidity cell testing period, likely due to the lack of neutralizing capacity in the material.
- The estimated minimum time until sulphide exhaustion is approximately 30 to 60 years. Under natural weathering conditions, the waste rock can be expected to generate acid for at least this length of time.
- Consolidating and encapsulating the waste rock with local till is the most effective method of minimizing further acid drainage and metal leaching. Reduced infiltration and eventual freezing of the waste due to permafrost formation will significantly reduce the risk of acid drainage and metal leaching from the waste.

6.2 RECOMMENDATIONS

Monitoring of the capped waste and adjacent environment should be carried out to determine the performance of the cap. This monitoring should include:

- Annual measurements of the internal temperature of the capped waste using thermistors; and
- Annual water sampling of Shear Lake Creek downgradient of the capped waste pile.

Thank you for selecting URS for this project. Please call either of the undersigned at (604) 681-1672 if you require any clarification.

URS NORECOL DAMES & MOORE INC.

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7.0 REFERENCES

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TABLE 1
GENERAL PARAMETERS OF SURFACE WATER SAMPLES
SHEAR LAKE ZONE WASTE ROCK
CULLATON LAKE, NUNAVUT
µg/L (ppb)

Sample No.	Location	Date	Alkalinity (Total) mg/L $CaCO_3$	Conductivity (µS/cm)	Hardness mg/L $CaCO_3$	Chloride	pH	Sulphate	Total Dissolved Solids
		CCME FAL	NS	NS	NS	NS	6.5-9	NS	NS
D-Edge	Downgradient of waste dump	Sept. 2000	4.	1700.	409.	6.	2.93	830.	---
L-Zone	Downgradient of waste dump	Sept. 2000	122.	346.	169.	1.5	7.82	45.	---
940-S	Shear Lake, upgradient of waste dump	Sept. 2000	4.	61.	19.	<0.5	6.00	15.	---
940-SC	Shear Lake Creek, adjacent to waste dump	Sept. 2000	4.	87.	18.5	<0.5	4.22	14.	---
940-SC01	Shear Lake Creek, upgradient of waste dump	May 28, 2001	---	---	6.2	---	6.58	---	3.
940-SC02	Shear Lake Creek, upgradient of waste dump	July 30, 2001	---	---		---	6.87	---	<3.
940-1	Kognak River, background	Sept. 2000	7.	31.	8.3	<0.5	7.35	1.	---
940-13	Kognak River, downstream of Tailings Pond	Sept. 2000	7.	20.	6.7	<0.5	6.98	<1.	---
940-14	Kognak River, downstream of Shear Lake	Sept. 2000	7.	23.	9.	<0.5	7.09	1.	---
Method Detection Limit			---	---	---	0.5	---	1.	3.

CCME - Canadian Council of Ministers of the Environment, Canadian Water Quality Guidelines (1999)
FAL - Freshwater Aquatic Life guidelines
< - less than the method detection limit indicated
NS - no standard established
--- Not analyzed

TABLE 2
CONCENTRATIONS OF TOTAL METALS IN SURFACE WATER SAMPLES
SHEAR LAKE ZONE WASTE ROCK
CULLATON LAKE, NUNAVUT
µg/L (ppb)

Sample	Location	Date	pH	Hardness (mg/L $CaCO_3$)	Aluminum*	Antimony	Arsenic	Barium	Calcium	Cadmium*	Chromium	Cobalt	Copper*	Iron	Lead*	Magnesium	Manganese	Mercury	Nickel*	Potassium	Sodium	Strontium	Titanium	Vanadium	Zinc
		CCME FAL	NS	NS	5-100	NS	5.	NS	NS	0.	8.9	NS	2-4	300.	1-7	NS	NS	0.1	25-150	NS	NS	NS	NS	NS	30.
D-Edge	Downgradient of waste dump	Sept. 2000	2.93	409.	48200.	<200.	500.	20.	94000.	---	50.	500.	270.	55000.	<50.	41800.	14500.	0.09	420.	2000.	3000.	310.	50.	<30.	304.
L-Zone	Downgradient of waste dump	Sept. 2000	7.82	169.	6900.	<200.	<200.	710.	111000.	---	40.	20.	50.	453000.	<50.	20800.	4270.	0.76	<50.	3000.	8000.	726.	320.	80.	75.
940-S	Shear Lake, upgradient of waste dump	Sept. 2000	6.	19.	300.	<200.	<200.	10.	5500.	---	<10.	<10.	<10.	830.	<50.	1500.	75.	<0.05	<50.	<2000.	<2000.	25.	<10.	<30.	<5.
940-SC	Shear Lake Creek, adjacent to waste dump	Sept. 2000	4.22	18.5	200.	<200.	<200.	10.	4990.	---	<10.	<10.	<10.	670.	<50.	1400.	52.	<0.05	<50.	<2000.	<2000.	24.	<10.	<30.	<5.
940-SC01	Shear Lake Creek, upgradient of waste dump	May 28, 2001	6.58	6.2	---	< .1	0.3	<10.	1690.	<10.	<10.	<10.	3.	610.	<1.	500.	107.	<0.05	<20.	<2000.	<2000.	6.	<10.	<30.	<5.
940-SC02	Shear Lake Creek, upgradient of waste dump	July 30, 2002	6.87	---	---	---	0.4	---	---	---	---	---	3.	---	<1.	---	---	<0.05	4.	---	<2000.	---	---	---	<5.
940-1	Kognak River, background	Sept. 2000	7.35	8.3	<200.	<200.	<200.	<10.	2070.	---	<10.	<10.	<10.	30.	<50.	800.	9.	<0.05	<50.	<2000.	<2000.	17.	<10.	<30.	<5.
940-13	Kognak River, downstream of Tailings Pond	Sept. 2000	6.98	6.7	<200.	<200.	<200.	<10.	1680.	---	<10.	<10.	<10.	<30.	<50.	700.	5.	<0.05	<50.	<2000.	<2000.	15.	<10.	<30.	<5.
940-14	Kognak River, downstream of Shear Lake	Sept. 2000	7.09	9.	<200.	<200.	<200.	10.	2240.	---	<10.	<10.	<10.	<30.	<50.	800.	<5.	<0.05	<50.	<2000.	<2000.	19.	<10.	<30.	<5.
Method Detection Limit			---		200.	200.	200.	10.		10.	10.	10.	10.	30.	50.		5.	0.05	50.	2000.	2000.		10.	30.	5.

CCME - Canadian Council of Ministers of the Environment (September 1999)
FAL - Freshwater Aquatic Life criteria
NS - no standard established
--- - not analysed
▭ - Greater than CCME criterion for freshwater aquatic life (FAL)
* - Standard depends on pH or hardness of sample

TABLE 3
CONCENTRATIONS OF DISSOLVED METALS IN SURFACE WATER SAMPLES
SHEAR LAKE ZONE WASTE ROCK
CULLATON LAKE, NUNAVUT
µg/l (ppb)

Sample	Location	Date	pH	Conductivity (µS/cm)	Hardness (mg/L $CaCO_3$)	Aluminum*	Antimony	Arsenic	Barium	Calcium	Cadmium*	Chromium	Cobalt	Copper*	Iron	Lead*	Magnesium	Manganese	Nickel*	Potassium	Sodium	Strontium	Titanium	Vanadium	Zinc
		CCME FAL	NS	NS	NS	5-100	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
D-Edge	Downgradient waste dump	Sept. 2000	2.93	1700.	409.	**[49100.]**	<200.	<200.	30.	94000.	---	40.	50.	270.	51800.	<50.	42400.	14600.	41.	<2000.	3000.	312.	<10.	<30.	300.
L-Zone	Downgradient waste dump	Sept. 2000	7.82	346.	169.	<200.	<200.	<200.	10.	45900.	---	<10.	<10.	<10.	<30.	<50.	13200.	125.	<50.	<2000.	8000.	240.	<10.	<30.	<5.
940-S	Shear Lake, upgradient waste dump	Sept. 2000	6.	61.	19.	<200.	<200.	<200.	10.	5230.	---	<10.	<10.	<10.	290.	<50.	1400.	70.	<50.	<2000.	<2000.	25.	<10.	<30.	<5.
940-SC	Shear Lake Creek, adjacent to waste dump	Sept. 2000	4.22	87.	18.5	<200.	<200.	<200.	10.	5130.	---	<10.	<10.	<10.	260.	<50.	1400.	51.	<50.	<2000.	<2000.	25.	<10.	<30.	<5.
940-1	Kognak River, background	Sept. 2000	7.35	31.	8.3	<200.	<200.	<200.	<10.	1980.	---	<10.	<10.	<10.	<30.	<50.	800.	<5.	<50.	<2000.	<2000.	16.	<10.	<30.	<5.
940-13	Kognak River, downstream of Tailings Pond	Sept. 2000	6.98	20.	6.7	<200.	<200.	<200.	<10.	1590.	---	<10.	<10.	<10.	<30.	<50.	700.	<5.	<50.	<2000.	<2000.	15.	<10.	<30.	<5.
940-14	Kognak River, downstream of Shear Lake	Sept. 2000	7.09	23.	9.	<200.	<200.	<200.	10.	2250.	---	<10.	<10.	<10.	<30.	<50.	800.	<5.	<50.	<2000.	<2000.	19.	<10.	<30.	<5.
Method Detection Limit			---	---	---	200.	200.	200.	10.		---	10.	10.	10.	30.	50.		5.	50.	2000.	2000.		10.	30.	5.

CCME - Canadian Council of Ministers of the Environment (September 1999)
FAL - Freshwater Aquatic Life criteria
< - less than the method detection limit indicated
NS - no standard established
--- not analysed
[box] - Greater than CCME criterion for freshwater aquatic life (FAL)
* - Standard depends on pH or hardness of sample

TABLE 4
ACID-BASE ACCOUNTING RESULTS
SHEAR LAKE ZONE WASTE ROCK
CULLATON LAKE, NUNAVUT

Sample	Material Type	Paste pH	CO_2 Inorg. (Wt.%)	$CaCO_3$ Equiv. (Kg $CaCO_3$/Tonne)	Total Sulphur (Wt.%)	Sulphate Sulphur (Wt.%)	Sulphide Sulphur* (Wt.%)	Maximum Potential Acidity** (Kg $CaCO_3$/Tonne)	Neutralization Potential (Kg $CaCO_3$/Tonne)	Net Neutralization Potential (Kg $CaCO_3$/Tonne)	Fizz Rating
D-Zone	soil	3.1	0.07	1.6	0.09	0.09	0.00	0.0	-0.2	-0.2	none
L-Zone	soil	4.1	<0.05	<1.1	0.03	0.02	0.01	0.3	2.5	2.2	none
Pad "White" 1	waste rock	4.2	<0.05	<1.1	0.36	<0.01	0.36	11.3	1.0	-10.3	none
Pad "White" 2	waste rock	5.2	0.1	2.3	< .02	<0.01	< .02	<0.6	0.0	0.0	none
Pad "White" 3	waste rock	4.5	<0.05	<1.1	0.56	<0.01	0.56	17.5	-0.5	-18.0	none
Pad "Orange"	waste rock	4.0	<0.05	<1.1	0.68	0.01	0.67	20.9	0.0	-20.9	none
Pad "Yellow"	waste rock	5.3	<0.05	<1.1	< 0.02	<0.01	< 0.02	<0.6	0.7	0.7	none
Pad "Red"	waste rock	4.1	<0.05	<1.1	0.04	0.02	0.02	0.6	-0.2	-0.8	none
Toe 1	waste rock	5.5	0.07	1.6	0.03	<0.01	0.03	0.9	0.0	-0.9	none
Toe 2	waste rock	4.1	<0.05	<1.1	1.17	<0.01	1.17	36.6	-1.0	-37.6	none
Toe 3	waste rock	4.5	<0.05	<1.1	0.08	<0.01	0.08	2.5	0.0	-2.5	none
Toe 5	waste rock	4.6	0.1	2.3	0.07	<0.01	0.07	2.2	-0.2	-2.4	none
Toe 6	waste rock	4.5	<0.05	<1.1	0.45	<0.01	0.45	14.1	-0.2	-14.3	none

*Based on difference between total sulphur and sulphate-sulphur
**Based on sulphide-sulphur
< - Less than method detection limit

TABLE 5
TOTAL METALS IN
WASTE ROCK AND SOILS
SHEAR LAKE ZONE WASTE ROCK
CULLATON LAKE, NUNAVUT
mg/kg (ppm)

Sample	SO_4 Wt%	Aluminum%	Iron %	Arsenic	Cadmium	Cobalt	Copper	Manganese	Nickel	Zinc
D-Zone	0.09	0.99	2.47	5.	<0.2	10.	26.	344.	33.	26.
L-Zone	0.02	0.86	1.64	4.	<0.2	9.	18.	509.	30.	31.
Pad "White" 1	<0.01	0.03	0.54	2.	<0.2	7.	2.	54.	5.	1.
Pad "White" 2	<0.01	0.03	0.22	1.	<0.2	1.	2.	55.	3.	1.
Pad "White" 3	<0.01	0.02	0.78	3.	<0.2	11.	3.	77.	4.	1.
Pad "Orange"	0.01	0.04	1.34	4.	<0.2	8.	8.	37.	5.	4.
Pad "Yellow"	<0.01	0.02	0.25	1.	<0.2	1.	2.	100.	3.	1.
Pad "Red"	0.02	0.06	0.88	2.	<0.2	3.	6.	89.	4.	4.
Toe 1	<0.01	0.03	0.31	2.	<0.2	3.	2.	46.	3.	1.
Toe 2	<0.01	0.02	1.1	2.	<0.2	7.	5.	38.	2.	2.
Toe 3	<0.01	0.03	0.32	1.	<0.2	2.	2.	27.	3.	1.
Toe 5	<0.01	0.02	0.35	2.	<0.2	6.	3.	41.	4.	1.
Toe 6	<0.01	0.02	0.84	3.	<0.2	3.	5.	64.	4.	2.
RE Toe 6	---	0.02	0.81	3.	<0.2	3.	5.	52.	4.	2.
RE Pad Red	---	0.07	0.91	3.	<0.2	3.	6.	84.	4.	4.

TABLE 6
GENERAL PARAMETERS OF MODIFIED SWEP TEST
SHEAR LAKE ZONE WASTE ROCK
CULLATON LAKE, NUNAVUT

Sample	pH	EC (umhos/cm^2)	Acidity (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Sulphate (mg/L)
D-Zone	3.49	242	*30/94	nil	53
L-Zone	4.52	150	60	<1	2
Pad "White" 1	4.64	18	6	1	4
Pad "White" 2	7.62	4	<1	<1	1
Pad "White" 3	4.80	11	4	<1	3
Pad "Orange"	4.91	27	6	<1	10
Pad "Yellow"	5.70	5	1	<1	1
Pad "Red"	4.73	49	12	<1	19
Toe 1	6.33	3	<1	1	1
Toe 2	4.81	11	4	<1	3
Toe 3	5.12	33	3	<1	3
Toe 5	5.48	8	3	<1	2
Toe 6	4.78	16	4	<1	4
Blank	6.00	0.8	<1	1	<1
QA/QC					
Duplicates					
Pad "White" 1				1/<1	
Toe 2	4.81/4.85				
Toe 5	5.48/5.39				
Toe 6		16/16			
Blank				1/<1	<1/<1

*Acidity to pH 4.5 and total acidity to pH 8.3

TABLE 7
ICP-MS METAL ANALYSIS OF MODIFIED SWEP EXTRACTS
SHEAR LAKE ZONE WASTE ROCK
CULLATON LAKE, NUNAVUT
µg/L (ppb)

Sample	Al	As	Ba	Be	Br	Ca	Cd	Ce	Co	Cr	Cs	Cu	Dy	Er	Eu	Fe	Ga	Gd	Hf	Hg	Ho	I	Ir	K	La	Lu	Mg	Mn
D-Zone	1994.	2.	51.63	0.74	17.	3009.	0.36	6.72	25.64	6.1	0.03	20.3	0.18	0.09	0.07	17784.	0.12	0.26	0.22	<0.1	0.03	13.	<0.05	1674.	1.66	0.02	2718.	1753.5
L-Zone	3120.	10.	52.43	0.28	31.	7377.	0.32	5.54	6.94	6.	0.04	7.4	0.17	0.1	0.05	1574.	0.35	0.22	0.37	0.1	0.03	46.	0.08	17948.	1.71	0.02	6749.	2231.01
Pad "White" 1	4.	2.	21.56	<0.05	<5.	81.	0.73	0.01	3.52	<0.5	<0.01	0.4	<0.01	<0.01	<0.01	1016.	<0.05	<0.01	<0.02	<0.1	<0.01	<1.	<0.05	173.	<0.01	<0.01	<50.	385.33
Pad "White" 2	6.	<1.	67.03	<0.05	<5.	142.	0.32	<0.01	0.36	<0.5	<0.01	0.1	<0.01	<0.01	<0.01	19.	<0.05	<0.01	<0.02	<0.1	<0.01	<1.	<0.05	125.	<0.01	<0.01	<50.	50.39
Pad "White" 3	4.	<1.	8.82	<0.05	<5.	111.	0.13	0.04	2.04	<0.5	<0.01	0.8	<0.01	<0.01	<0.01	346.	<0.05	<0.01	<0.02	<0.1	<0.01	<1.	<0.05	150.	<0.01	<0.01	<50.	332.45
Pad "Orange"	65.	1.	60.09	0.09	<5.	353.	0.09	0.26	5.11	<0.5	<0.01	1.7	0.01	<0.01	<0.01	1743.	<0.05	0.01	<0.02	<0.1	<0.01	<1.	<0.05	260.	0.08	<0.01	140.	856.08
Pad "Yellow"	6.	1.	67.19	<0.05	<5.	392.	<0.05	0.02	0.75	<0.5	<0.01	0.3	<0.01	<0.01	<0.01	86.	<0.05	<0.01	<0.02	<0.1	<0.01	<1.	<0.05	127.	<0.01	<0.01	<50.	179.16
Pad "Red"	70.	<1.	52.28	0.15	<5.	1011.	0.18	1.53	8.88	<0.5	0.07	1.9	0.03	0.01	<0.01	3036.	<0.05	0.04	<0.02	<0.1	<0.01	<1.	<0.05	310.	0.5	<0.01	329.	1723.42
Toe 1	18.	2.	1.08	<0.05	<5.	81.	<0.05	0.01	0.07	<0.5	<0.01	0.1	<0.01	<0.01	<0.01	17.	<0.05	<0.01	<0.02	<0.1	<0.01	<1.	<0.05	153.	<0.01	<0.01	<50.	10.73
Toe 2	7.	<1.	5.53	<0.05	<5.	71.	<0.05	0.05	0.94	<0.5	<0.01	0.2	<0.01	<0.01	<0.01	646.	<0.05	<0.01	<0.02	<0.1	<0.01	<1.	<0.05	121.	<0.01	<0.01	<50.	473.61
Toe 3	2.	<1.	46.09	<0.05	<5.	67.	0.06	0.03	1.28	<0.5	<0.01	0.6	<0.01	<0.01	<0.01	328.	<0.05	<0.01	<0.02	<0.1	<0.01	<1.	<0.05	170.	<0.01	<0.01	<50.	440.09
Toe 5	2.	4.	84.53	<0.05	<5.	102.	0.07	<0.01	1.5	<0.5	0.01	0.4	<0.01	<0.01	<0.01	177.	<0.05	<0.01	<0.02	<0.1	<0.01	<1.	<0.05	140.	<0.01	<0.01	<50.	365.53
Toe 6	4.	<1.	109.4	<0.05	<5.	171.	0.06	0.03	1.73	<0.5	<0.01	0.2	<0.01	<0.01	<0.01	527.	<0.05	<0.01	<0.02	<0.1	<0.01	<1.	<0.05	129.	<0.01	<0.01	50.	483.03
Blank	1.	<1.	0.07	<0.05	<5.	<50.	<0.05	0.01	<0.02	<0.5	<0.01	<0.1	<0.01	<0.01	<0.01	<10.	<0.05	<0.01	<0.02	<0.1	<0.01	<1.	<0.05	<50.	<0.01	<0.01	<50.	<0.05
Toe 1 Repeat	17.	2.	1.	<0.05	<5.	76.	<0.05	0.01	0.06	<0.5	<0.01	0.1	<0.01	<0.01	<0.01	17.	<0.05	<0.01	<0.02	<0.1	<0.01	<1.	<0.05	150.	<0.01	<0.01	<50.	10.84

Sample	Mo	Na	Nb	Nd	Ni	Os	P	Pr	Rb	Sb	Sc	Se	Si	Sm	Sr	Tb	Te	Th	Ti	Tl	U	V	W	Y	Yb	Zn	Zr
D-Zone	<0.1	503.	0.07	1.98	22.5	<0.05	191.	0.42	3.93	0.1	1.64	0.7	7447.	0.38	16.59	0.03	<0.05	4.2	<10.	0.07	2.	1.	<0.1	0.67	0.1	26.9	5.8
L-Zone	0.3	658.	0.35	1.5	10.4	<0.05	5166.	0.33	12.02	0.19	1.84	0.6	4765.	0.3	38.66	0.03	0.06	35.45	29.	0.1	1.99	2.	1.2	0.86	0.11	37.8	10.4
Pad "White" 1	<0.1	<50.	<0.01	<0.01	1.8	<0.05	<20.	<0.01	0.15	<0.05	0.11	<0.5	390.	<0.05	1.07	<0.01	<0.05	<0.05	<10.	0.01	0.2	<1.	<0.1	<0.01	<0.01	18.1	<0.5
Pad "White" 2	<0.1	<50.	<0.01	<0.01	0.3	<0.05	72.	<0.01	0.08	0.09	0.09	<0.5	366.	<0.05	0.74	<0.01	<0.05	<0.05	<10.	<0.01	<0.05	<1.	<0.1	<0.01	<0.01	7.8	<0.5
Pad "White" 3	<0.1	<50.	<0.01	<0.01	1.4	<0.05	71.	<0.01	0.12	<0.05	0.11	<0.5	358.	<0.05	1.07	<0.01	<0.05	<0.05	<10.	0.01	0.07	<1.	<0.1	<0.01	<0.01	12.	<0.5
Pad "Orange"	<0.1	<50.	<0.01	0.05	5.4	<0.05	<20.	0.01	0.21	<0.05	0.17	<0.5	579.	<0.05	2.64	<0.01	<0.05	<0.05	<10.	0.01	0.12	<1.	<0.1	0.04	<0.01	21.7	<0.5
Pad "Yellow"	<0.1	<50.	<0.01	<0.01	0.8	<0.05	66.	<0.01	0.09	<0.05	0.1	<0.5	375.	<0.05	1.6	<0.01	<0.05	<0.05	<10.	<0.01	<0.05	<1.	<0.1	<0.01	<0.01	9.5	<0.5
Pad "Red"	0.1	<50.	<0.01	0.27	10.1	<0.05	78.	0.07	0.41	<0.05	0.2	<0.5	689.	<0.05	4.05	<0.01	<0.05	<0.05	<10.	0.01	0.17	<1.	<0.1	0.16	0.01	58.2	<0.5
Toe 1	<0.1	<50.	<0.01	<0.01	<0.2	<0.05	148.	<0.01	0.15	<0.05	0.07	<0.5	483.	<0.05	0.4	<0.01	<0.05	<0.05	<10.	<0.01	<0.05	<1.	<0.1	<0.01	<0.01	<0.5	<0.5
Toe 2	<0.1	<50.	<0.01	<0.01	0.8	<0.05	143.	<0.01	0.06	<0.05	0.12	<0.5	921.	<0.05	0.91	<0.01	<0.05	<0.05	<10.	<0.01	0.06	<1.	<0.1	<0.01	<0.01	8.8	<0.5
Toe 3	<0.1	<50.	<0.01	<0.01	2.	<0.05	<20.	<0.01	0.12	<0.05	0.09	<0.5	477.	<0.05	0.9	<0.01	<0.05	<0.05	<10.	0.01	<0.05	<1.	<0.1	<0.01	<0.01	6.3	<0.5
Toe 5	<0.1	<50.	<0.01	<0.01	3.9	<0.05	<20.	<0.01	0.13	<0.05	0.12	<0.5	323.	<0.05	1.35	<0.01	<0.05	<0.05	<10.	0.01	<0.05	<1.	<0.1	<0.01	<0.01	7.	<0.5
Toe 6	<0.1	<50.	<0.01	<0.01	1.9	<0.05	129.	<0.01	0.15	<0.05	0.1	<0.5	371.	<0.05	2.36	<0.01	<0.05	<0.05	<10.	0.01	<0.05	<1.	<0.1	<0.01	<0.01	28.3	<0.5
Blank	<0.1	<50.	<0.01	<0.01	<0.2	<0.05	133.	<0.01	<0.01	<0.05	0.06	<0.5	392.	<0.05	<0.01	<0.01	<0.05	<0.05	<10.	<0.01	<0.05	<1.	<0.1	<0.01	<0.01	<0.5	<0.5
Toe 1 Repeat	<0.1	<50.	<0.01	<0.01	<0.2	<0.05	65.	<0.01	0.16	<0.05	0.08	<0.5	524.	<0.05	0.39	<0.01	<0.05	<0.05	<10.	<0.01	<0.05	<1.	<0.1	<0.01	<0.01	<0.5	<0.5

TABLE 8
SHEAR LAKE INITIAL WATER QUALITY ESTIMATES
FOR SUBAQUEOUS DISPOSAL OF WASTE ROCK
SHEAR LAKE WASTE ROCK
CULLATON LAKE, NUNAVUT

Parameter	CCME FAL Criteria (mg/L)	Initial Lake Conc * (mg/L)	Average Lake Conc (mg/L)	Worst case Lake Conc (mg/L)
Aluminum	0.005	<0.2	**0.206**	**0.267**
Arsenic	0.005	<0.2	**0.201**	**0.201**
Cadmium	0.000017	---	**0.00010**	**0.00018**
Copper	0.002	<0.01	**0.010**	**0.012**
Iron	0.3	0.29	**0.620**	**3.181**
Nickel	0.025	<0.05	**0.052**	**0.060**
Zinc	0.03	<0.005	0.014	**0.060**

CCME - Canadian Council of Ministers of the Environment (September 1999)
FAL - Freshwater Aquatic Life criteria
* Detection limits for Initial lake concentrations for Al, As, Cu and Ni were above CCME FAL criteria
--- Not analysed
Bold text - Greater than CCME criterion for freshwater aquatic life (FAL)

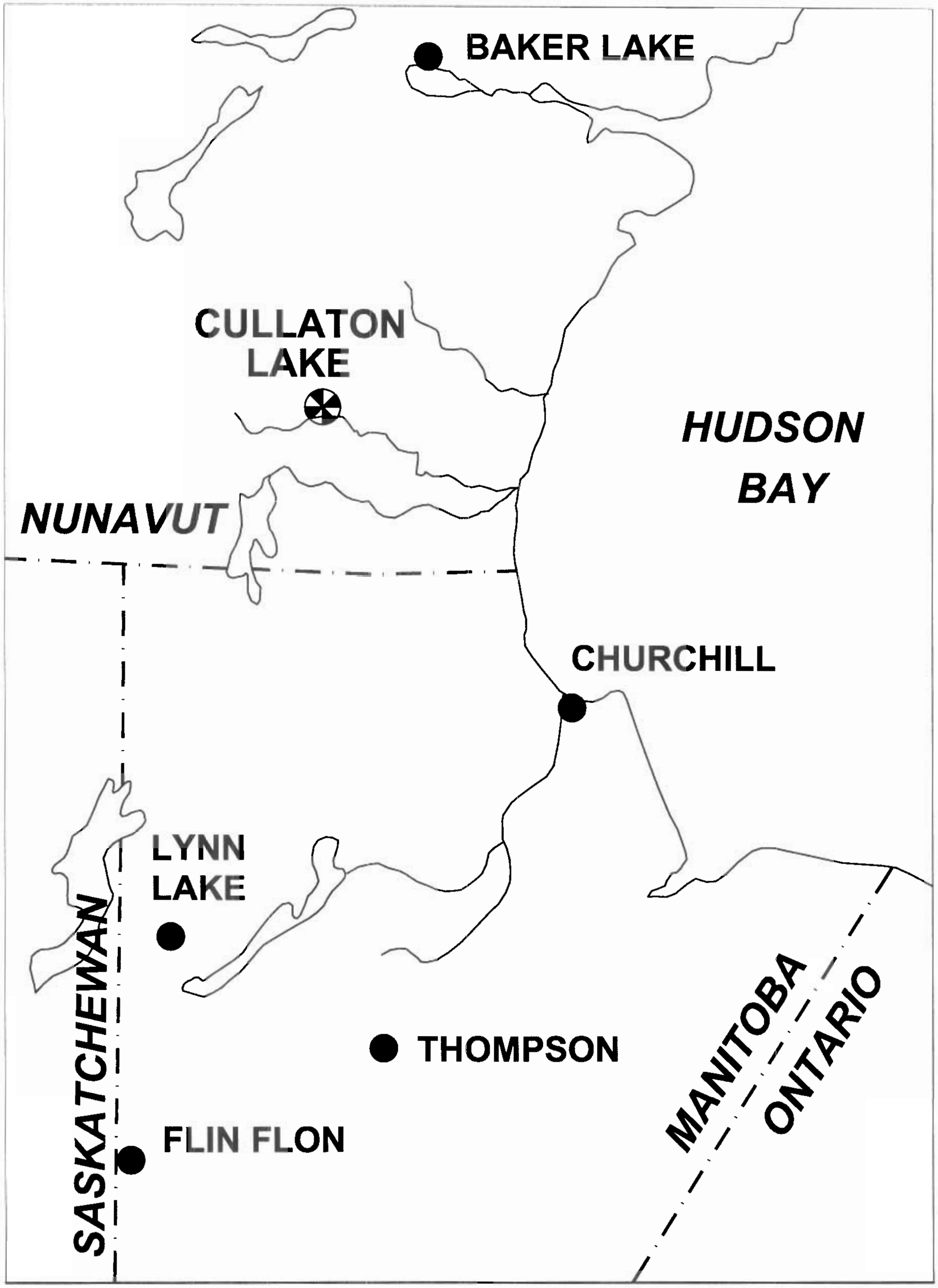
Numbers used to calculate concentrations:
Volume of Shear Lake = 42000 m^3
Volume of Waste Rock = 1000 m^3
Density of Waste Rock = 2000 kg/m^3

TABLE 9
SHEAR LAKE LONG TERM WATER QUALITY ESTIMATES FOR SUBAQUEOUS DISPOSAL OF WASTE ROCK
SHEAR LAKE WASTE ROCK
CULLATON LAKE, NUNAVUT

Parameter	CCME FAL Criteria (mg/L)	Lake Conc (mg/L)
Aluminum	0.005	**0.121**
Arsenic	0.005	0.00020
Cadmium	0.000017	**0.00022**
Copper	0.002	**0.0039**
Iron	0.3	**1.36**
Nickel	0.025	0.0057
Zinc	0.03	0.021

CCME - Canadian Council of Ministers of the Environment (September 1999)
FAL - Freshwater Aquatic Life criteria
Bold text - Greater than CCME criterion for freshwater aquatic life (FAL)

FIGURES



LEGEND:

N
W E
S

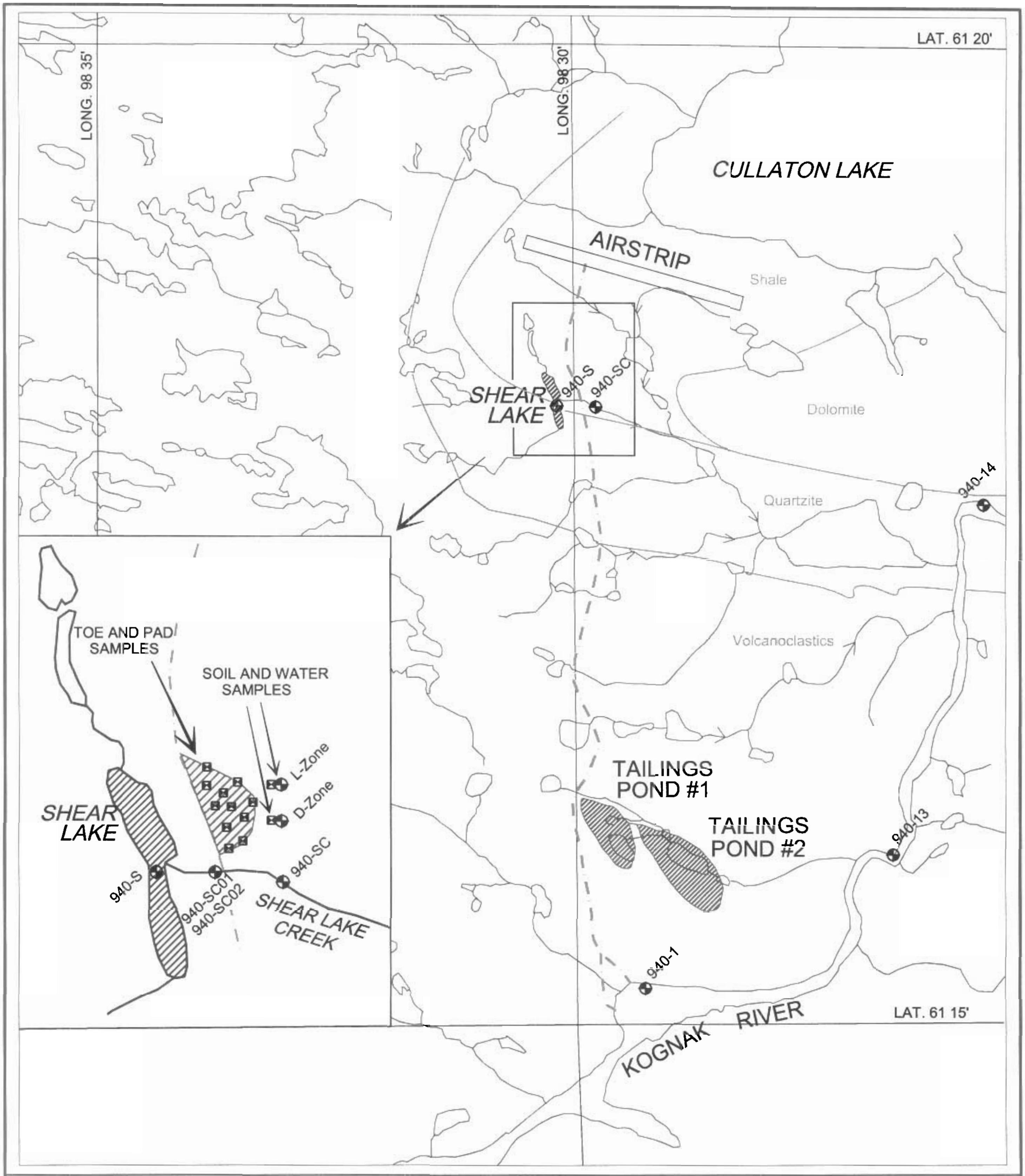
LOCATION MAP

Assessment of Closure Options and Impacts Report
Cullaton Lake, Nunavut

HOMESTAKE CANADA INC.

URS	SCALE: 1: kilometers 0 100 200 300	DATE: March 2003	PROJECT NO.: 35672-005	DRAWN BY: KR	REVISION NO.: 0	DRAWING NO.: FIGURE 1

Project Number\Location



SAMPLE LOCATION MAP
SHEAR LAKE WASTE ROCK

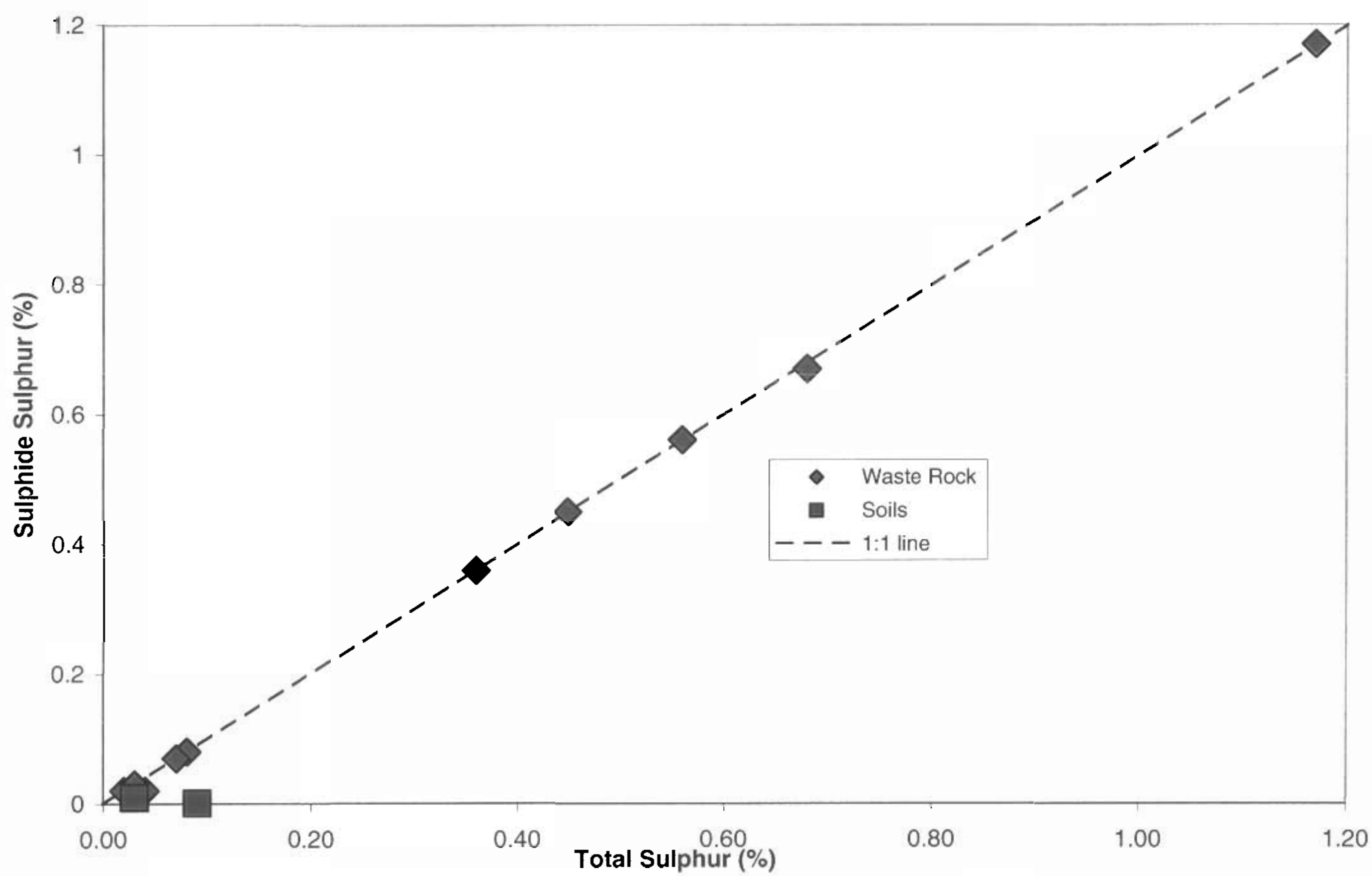
Assessment of Closure Options and Impacts Report
Cullaton Lake, Nunavut

HOMESTAKE CANADA INC.

URS

SCALE:	DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
metres 0 500 1000 1500 2000	March 2003	35672-005	KR	0	FIGURE 2

35672-005/draftreport/drawing1.dwg

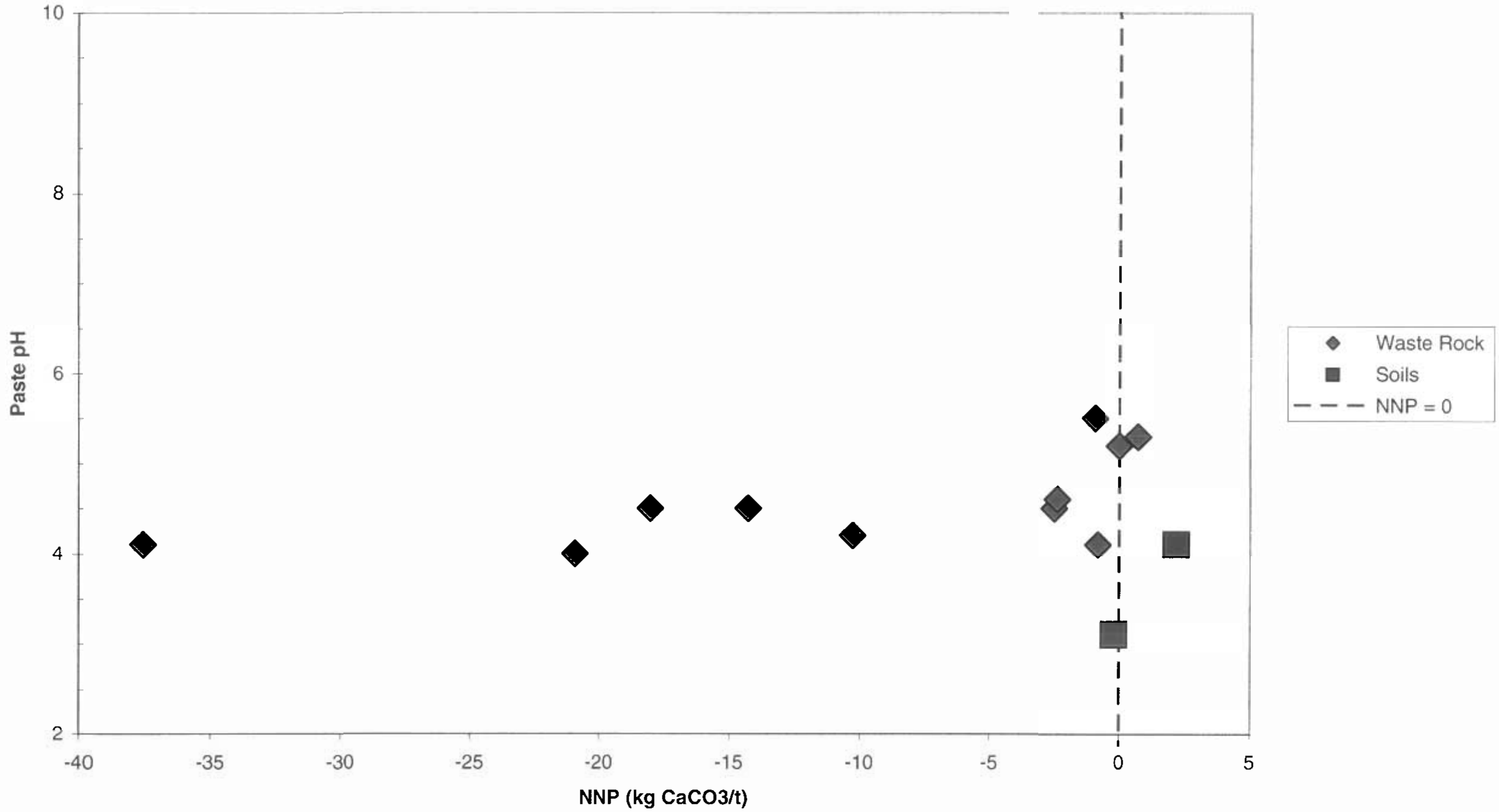


Sulphide Sulphur versus
Total Sulphur
Shear Lake Zone Waste Rock

HOMESTAKE CANADA INC.	
MARCH 2003	FIGURE 3

Job No. 35672-005

URS



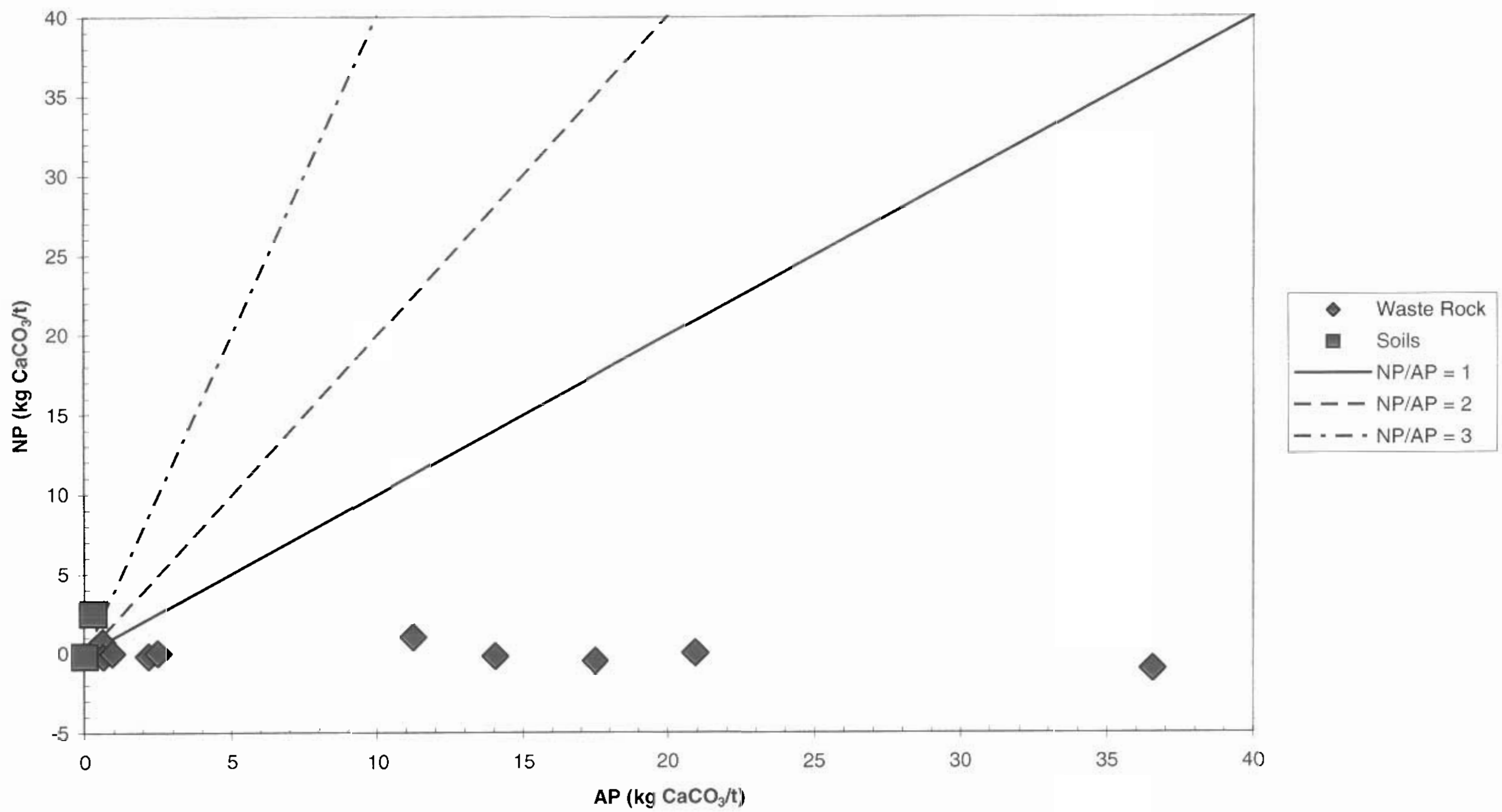
Net Neutralization Potential
versus pH
Shear Lake Zone Waste Rock

HOMESTAKE CANADA INC.

MARCH 2003 | FIGURE 4

Job No. 35672-005

URS



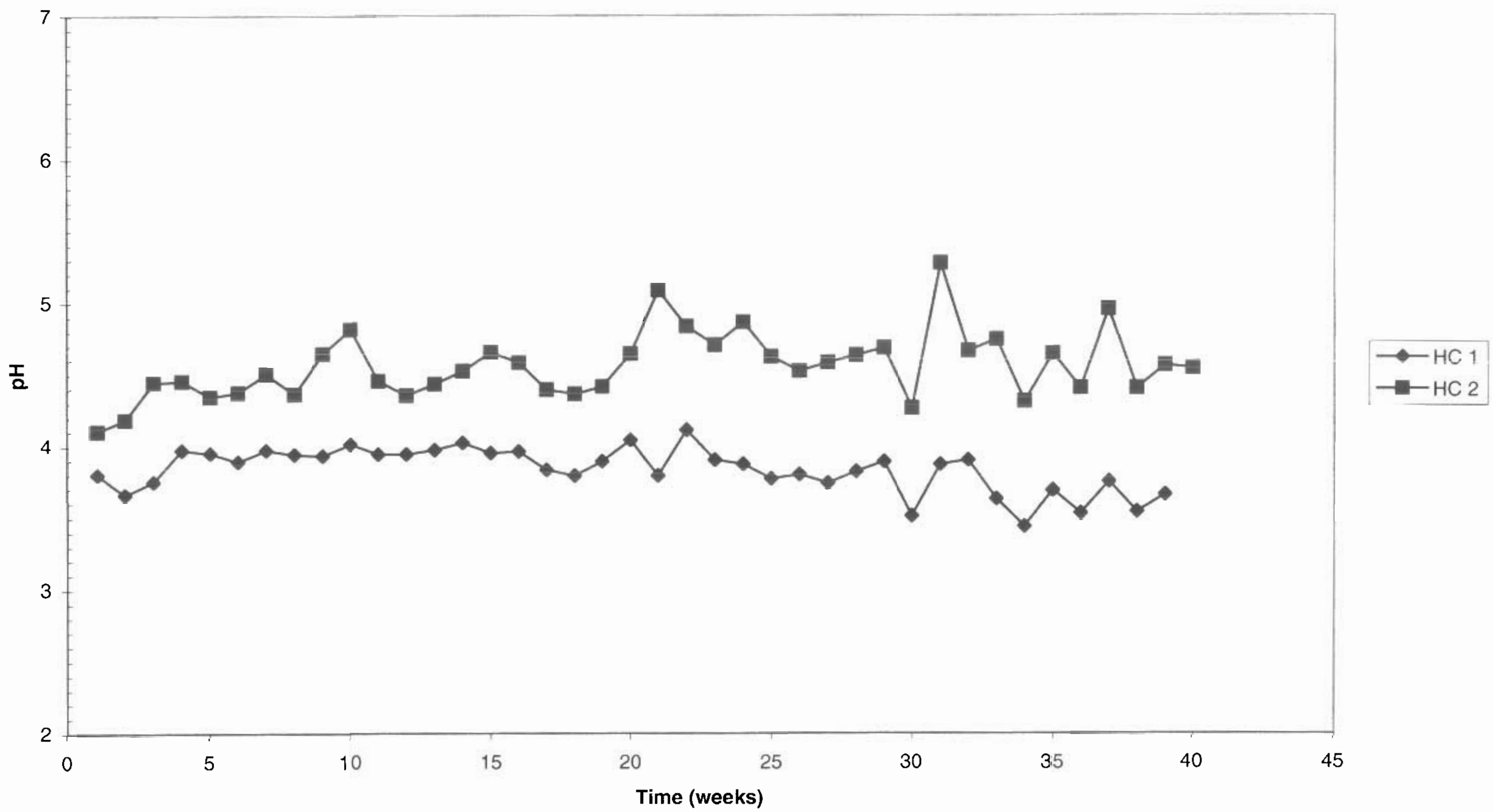
Acid Potential versus
Neutralization Potential
Shear Lake Zone Waste Rock

HOMESTAKE CANADA INC.

MARCH 2003 | FIGURE 5

URS

Job No. 35672-005



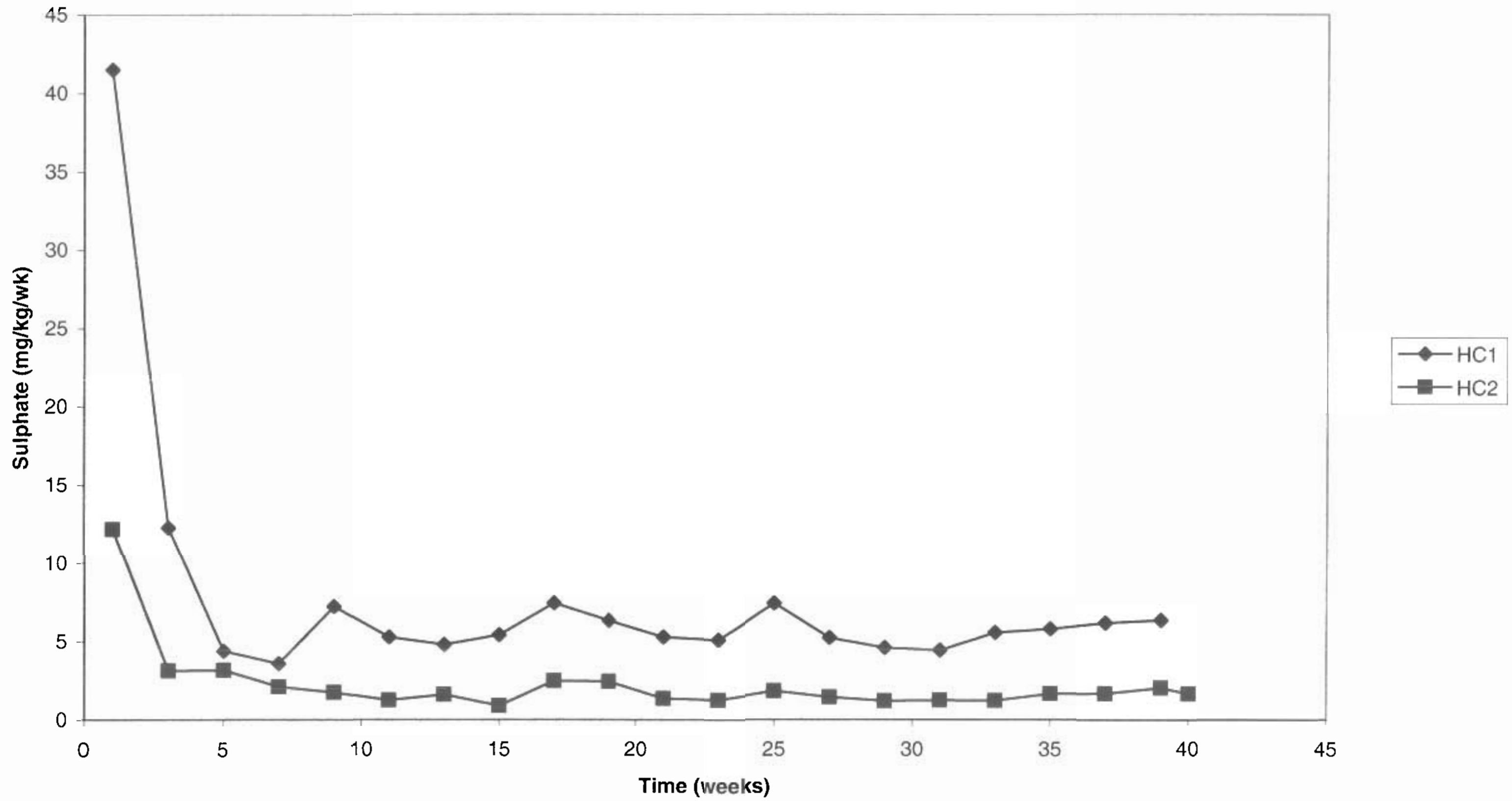
Humidity Cell
pH Values
Shear Lake Zone Waste Rock

HOMESTAKE CANADA INC.

MARCH 2003 | FIGURE 6

Job No. 35672-005

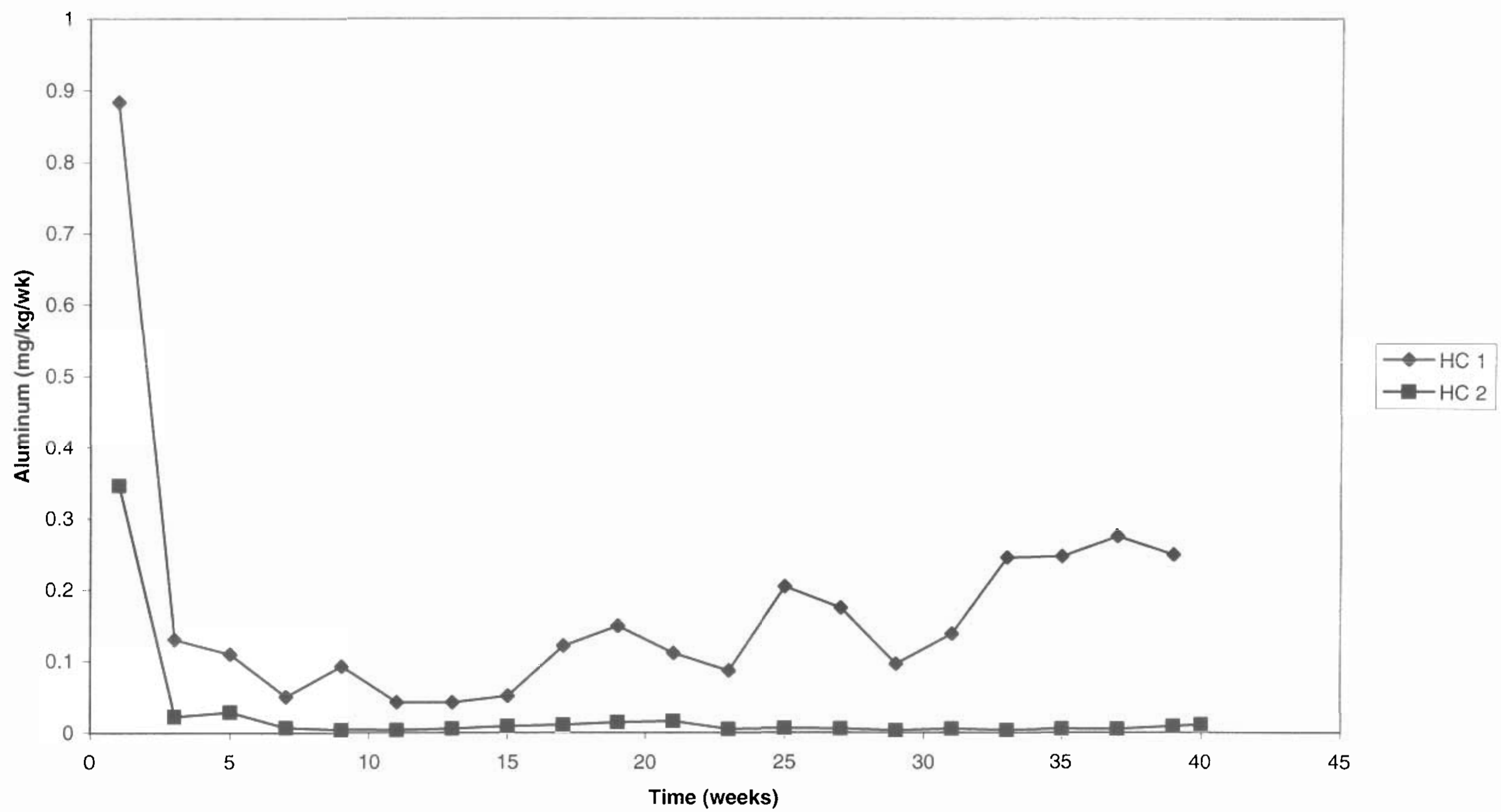
URS



Humidity Cell Sulphate Loading versus Time Shear Lake Zone Waste Rock	
HOMESTAKE CANADA INC.	
MARCH 2003	FIGURE 7

Job No. 35672-005

URS



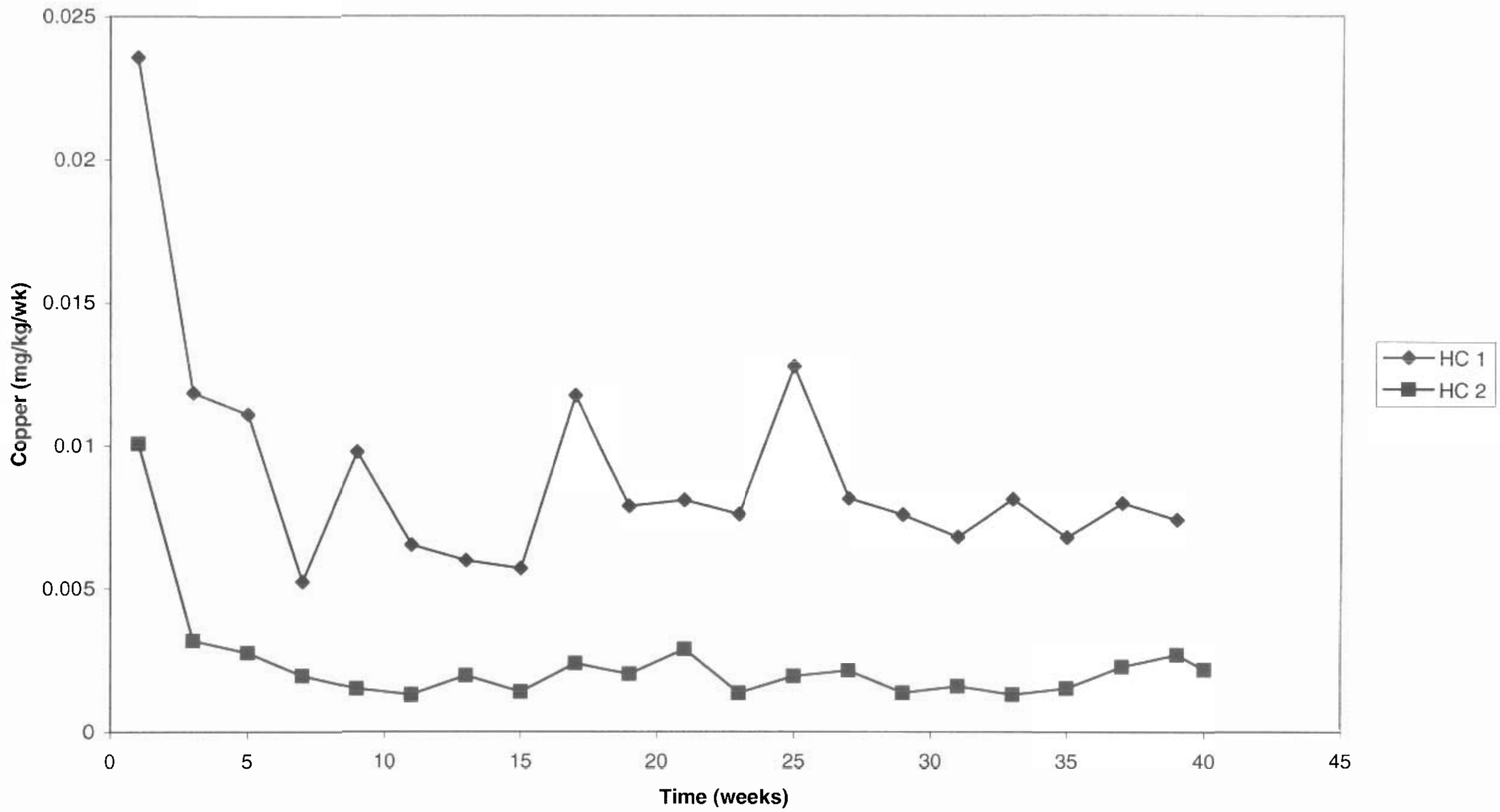
Humidity Cell Aluminum Loading versus Time
Shear Lake Zone Waste Rock

HOMESTAKE CANADA INC.

MARCH 2003 | FIGURE 8

Job No. 35672-005

URS

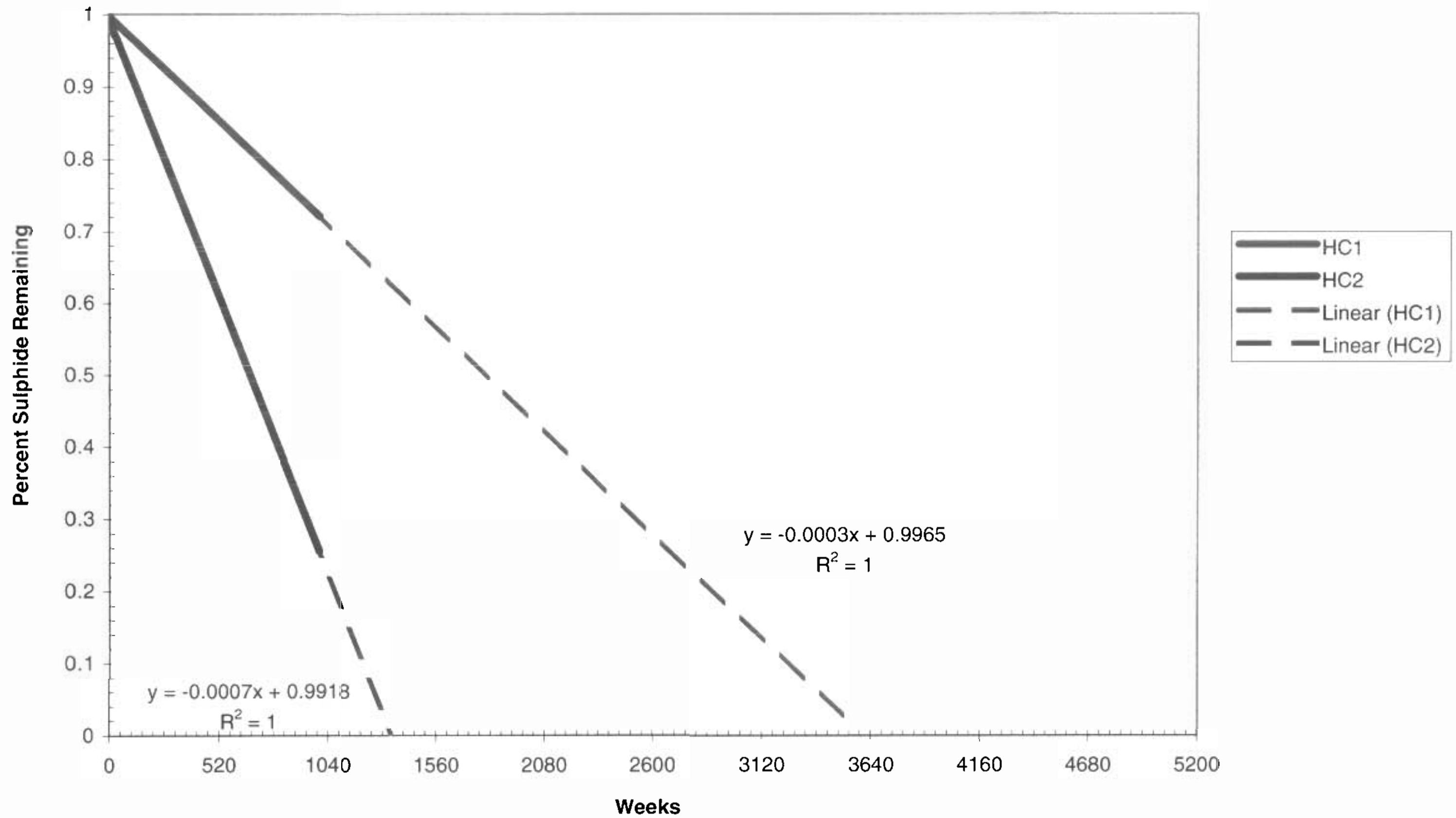


Humidity Cell Copper Loading versus Time
Shear Lake Zone Waste Rock

HOMESTAKE CANADA INC.

MARCH 2003	FIGURE 9

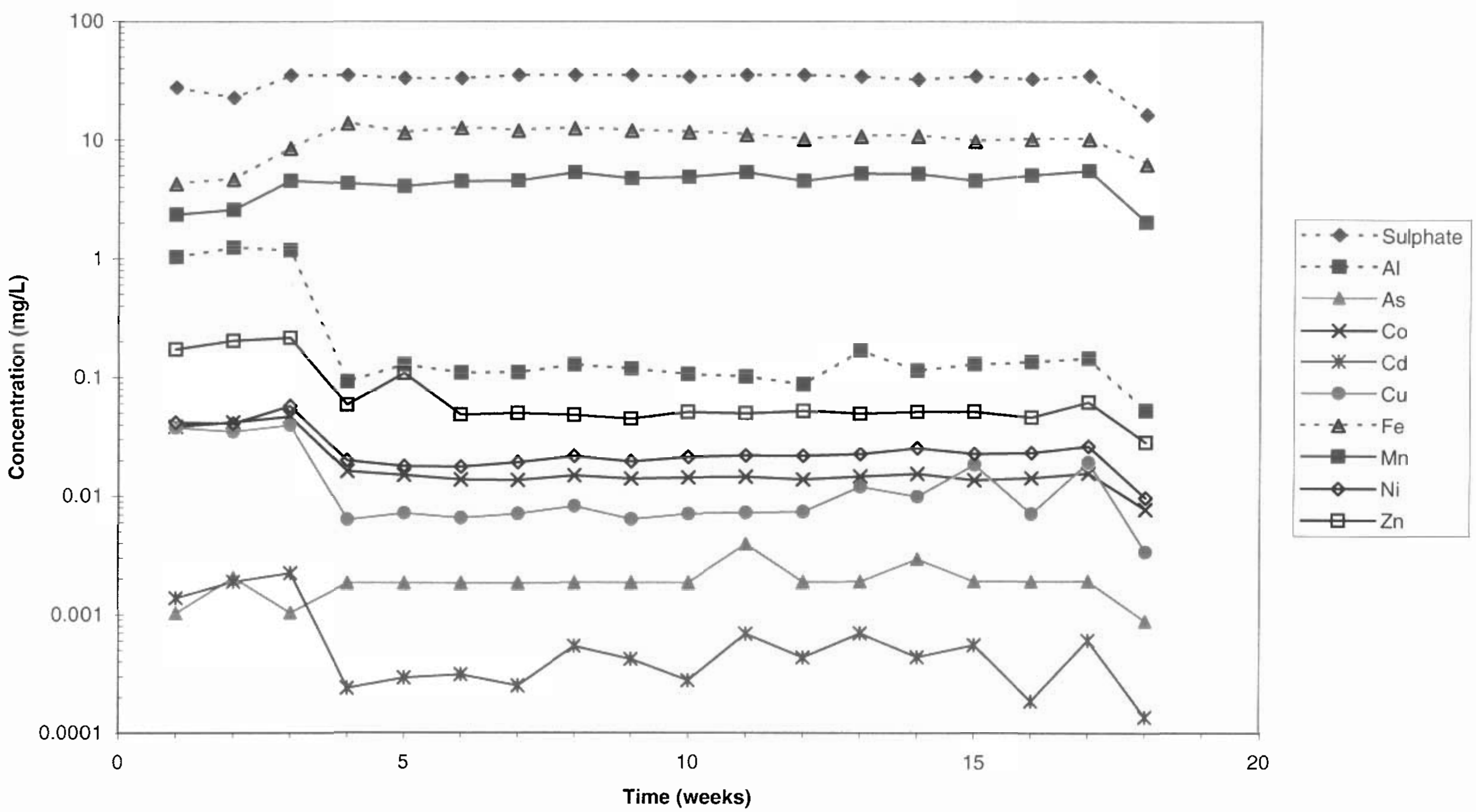
Job No. 35672-005



Estimated time to Sulphide Depletion Shear Lake Zone Waste Rock	
HOMESTAKE CANADA INC.	
MARCH 2003	FIGURE 10

Job No. 35672-005

URS



Subaqueous Column
Concentrations
Shear Lake Zone Waste Rock

HOMESTAKE CANADA INC.

MARCH 2003 | FIGURE 11

Job No. 35672-005

URS

PHOTOS

PHOTO 1: Aerial view of completed capped Shear Lake waste rock pile (center), with Shear Lake to the right. Note toe berm ringing the pile. View looking south.

PHOTO 2: Ground view of the capped Shear Lake waste rock pile during construction. View looking southwest.

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ASSESSMENT OF CLOSURE OPTIONS AND IMPACTS,
SHEAR LAKE ZONE WASTE ROCK
Cullaton Lake Mine, Nunavat

HOMESTAKE CANADA INC.

PHOTO 3: Aerial view of the completed capped Shear Lake waste rock pile. Shear Lake is visible in the lower right corner. The original site of the waste rock pile is located across the road from the capped pile. View to the east.

PHOTO 4: Ground view of waste rock pile under construction. Area in foreground is part of the original waste rock pile. View looking northwest.

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ASSESSMENT OF CLOSURE OPTIONS AND IMPACTS,
SHEAR LAKE ZONE WASTE ROCK
Cullaton Lake Mine, Nunavat

HOMESTAKE CANADA INC.

APPENDIX A

LABORATORY REPORTS

APPENDIX A
TOTAL METALS BY AQUA REGIA, WASTE ROCK AND SOIL SAMPLES
SHEAR LAKE WASTE ROCK
CULLATON LAKE, NUNAVUT
µg/g (ppm)

	Aluminum %	Calcium %	Iron %	Potassium %	Magnesium %	Sodium %	Phosphorous %	Titanium %	Silver	Arsenic	Gold	Boron	Barium	Bismuth	Cadmium	Cobalt	Chromium
D-Zone	0.99	0.16	2.47	0.38	0.65	0.018	0.057	0.08	<0.1	5	<2	1	117	<0.5	<0.2	10	102
L-Zone	0.86	0.31	1.64	0.27	0.6	0.016	0.058	0.057	<0.1	4	<2	1	113	<0.5	<0.2	9	90
Pad "White" 1	0.03	<0.01	0.54	0.01	<0.01	0.005	0.003	<0.001	<0.1	2	<2	<1	13	0.6	<0.2	7	154
Pad "White" 2	0.03	<0.01	0.22	0.01	0.01	0.003	0.002	<0.001	<0.1	1	<2	<1	6	<0.5	<0.2	1	132
Pad "White" 3	0.02	<0.01	0.78	0.01	<0.01	0.001	0.002	<0.001	0.3	3	<2	<1	8	<0.5	<0.2	11	139
Pad "Orange"	0.04	0.01	1.34	0.01	<0.01	0.004	0.006	<0.001	1.4	4	3	<1	41	1.7	<0.2	8	115
Pad "Yellow"	0.02	<0.01	0.25	0.01	<0.01	0.002	0.002	<0.001	<0.1	1	<2	<1	45	<0.5	<0.2	1	142
Pad "Red"	0.06	0.01	0.88	0.01	0.01	0.002	0.004	0.001	0.7	2	2	<1	38	1	<0.2	3	106
Toe 1	0.03	<0.01	0.31	0.02	<0.01	0.002	0.002	<0.001	<0.1	2	<2	1	42	<0.5	<0.2	3	139
Toe 2	0.02	<0.01	1.1	0.01	<0.01	0.001	0.001	<0.001	0.8	2	4	<1	4	0.7	<0.2	7	88
Toe 3	0.03	<0.01	0.32	0.01	<0.01	0.004	0.002	<0.001	<0.1	1	<2	<1	36	<0.5	<0.2	2	112
Toe 5	0.02	<0.01	0.35	0.01	<0.01	0.002	0.002	<0.001	<0.1	2	<2	<1	108	<0.5	<0.2	6	127
Toe 6	0.02	<0.01	0.84	0.01	<0.01	0.003	0.002	<0.001	0.2	3	<2	<1	27	<0.5	<0.2	3	209
RE Toe 6	0.02	<0.01	0.81	0.01	<0.01	0.002	0.002	<0.001	0.2	3	<2	<1	26	0.5	<0.2	3	197
RE Pad Red	0.07	0.01	0.91	0.01	0.01	0.003	0.004	0.001	0.7	3	6	<1	39	1	<0.2	3	111

	Copper	Gallium	Mercury	Lanthanium	Manganese	Molybdenum	Nickel	Lead	Antimony	Scandium	Strontium	Thorium	Tellurium	Uranium	Vanadium	Tungsten	Zinc
D-Zone	26	5	<1	17	344	4.1	33	6	<0.5	4	12	5	<1	3	32	2	26
L-Zone	18	4	<1	14	509	3.9	30	5	<0.5	3.1	22	3	<1	1	28	2	31
Pad "White" 1	2	<1	<1	5	54	14.9	5	<2	<0.5	0.1	<1	<1	<1	<1	<1	1	1
Pad "White" 2	2	<1	<1	3	55	10	3	<2	<0.5	0.1	1	1	<1	<1	<1	1	1
Pad "White" 3	3	<1	<1	3	77	12.1	4	<2	<0.5	<0.1	1	1	<1	<1	<1	7	1
Pad "Orange"	8	<1	<1	2	37	8.5	5	6	<0.5	0.1	1	1	<1	1	2	75	4
Pad "Yellow"	2	<1	<1	4	100	14.3	3	<2	<0.5	0.1	<1	<1	<1	<1	<1	1	1
Pad "Red"	6	<1	<1	4	89	8.5	4	2	<0.5	0.2	1	1	<1	1	2	80	4
Toe 1	2	<1	<1	5	46	9.9	3	<2	<0.5	0.1	2	1	<1	<1	<1	2	1
Toe 2	5	<1	<1	3	38	7.1	2	2	<0.5	<0.1	1	<1	<1	1	<1	1	2
Toe 3	2	<1	<1	4	27	8.7	3	5	0.7	0.1	1	<1	<1	<1	<1	1	1
Toe 5	3	<1	<1	4	41	10.6	4	<2	<0.5	0.1	3	<1	<1	<1	<1	1	1
Toe 6	5	<1	<1	3	64	16	4	2	0.5	0.1	1	1	<1	1	1	9	2
RE Toe 6	5	<1	<1	3	52	15.6	4	2	0.5	0.1	1	1	<1	<1	1	9	2
RE Pad Red	6	<1	<1	4	84	8.1	4	2	<0.5	0.2	1	<1	<1	1	2	83	4

APPENDIX A
HUMIDITY CELL #1 WEEKLY DATA,
SHEAR LAKE WASTE ROCK
CULLATON LAKE, NUNAVUT

Date	Volume (ml)		pH	Conductivity	Sulphate	Acidity (mgCaCO3/L)		Alkalinity	Ag	Al	As	Au	B	Ba	Be	Bi	Br	Ca	Cd	Ce	Cl	Co	Cr	Cs	Cu	Dy
	Input	Output		(umhos/cm)	(mg/L)	pH 4.5	pH 8.3	($mgCaCO^3/L$)	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppm	ppb	ppb	ppb	ppb	ppb
4-Dec-00	750	515	3.23	410	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11-Dec-00	500	395	3.80	320	105	7	108	---	0.05	2235	2	0.08	20	25.32	1.12	0.05	13	14139	1.07	27.67	1	99.09	4.9	0.02	59.6	1.38
18-Dec-00	500	380	3.66	290	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
26-Dec-00	500	395	3.75	130	31	6	22	---	0.05	328	1	0.05	20	37.12	0.29	0.05	5	2151	0.46	2.19	1	28.85	0.7	0.01	29.9	0.11
2-Jan-01	500	415	3.97	98	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8-Jan-01	500	335	3.95	89	13	4	12	---	0.17	325	1	0.05	20	43.14	0.33	0.05	5	1262	0.22	0.94	1	18.1	1.3	0.02	33	0.06
15-Jan-01	500	335	3.89	87	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
22-Jan-01	500	355	3.97	71	10	3	11	---	0.1	139	1	0.11	20	32.65	0.24	0.05	5	1033	0.24	0.78	1	18.55	0.6	0.01	14.7	0.06
29-Jan-01	500	350	3.94	75	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5-Feb-01	500	450	3.93	90	16	4	13	---	0.05	205	1	0.05	20	47.1	0.32	0.05	5	1262	0.42	1.25	1	23.29	0.8	0.04	21.7	0.06
12-Feb-01	500	360	4.01	69	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19-Feb-01	500	375	3.94	71	14	4	26	---	0.05	110	1	0.05	20	37.08	0.12	0.05	5	757	0.14	0.69	1	15.98	0.8	0.01	17.4	0.03
26-Feb-01	500	360	3.94	70	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5-Mar-01	500	340	3.97	69	14	2	16	---	0.06	122	1	0.05	20	36.32	0.17	0.05	5	581	0.09	0.43	1	18.07	0.6	0.01	17.6	0.03
12-Mar-01	500	365	4.02	61	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19-Mar-01	500	385	3.95	65	14	4	10	---	0.1	132	1	0.05	20	34.15	0.19	0.05	5	466	0.11	0.63	1	18.3	0.5	0.01	14.8	0.02
26-Mar-01	500	355	3.96	74	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2-Apr-01	500	495	3.83	73	15	5	11	---	0.21	244	1	0.05	20	40.39	0.29	0.12	5	596	0.38	0.99	3	22.42	0.5	0.01	23.7	0.06
9-Apr-01	500	325	3.79	97	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
16-Apr-01	500	350	3.89	81	18	4	14	---	0.06	424	1	0.05	20	29.36	0.27	0.05	5	721	0.11	2.07	3	23.51	1.1	0.01	22.5	0.14
23-Apr-01	500	375	4.04	79	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
30-Apr-01	500	350	3.79	88	15	4	12	---	0.05	316	1	0.05	20	32.2	0.31	0.05	5	1758	0.21	1.26	2	20.87	0.8	0.01	23.1	0.09
7-May-01	500	340	4.11	79	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14-May-01	500	360	3.90	88	14	6	13	---	0.1	238	2	0.05	20	33.62	0.36	0.54	5	375	0.16	0.75	5	15.58	0.5	0.01	21.1	0.04
21-May-01	500	335	3.87	83	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
28-May-01	500	435	3.77	92	17	8	14	---	0.06	468	1	0.05	48	34.71	0.35	0.54	5	554	0.18	2.49	1	21.8	0.8	0.01	29.3	0.12
4-Jun-01	500	335	3.80	93	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11-Jun-01	500	370	3.74	93	14	8	18	---	0.05	470	1	0.05	20	30.18	0.27	0.05	5	498	0.35	2.31	1	17.05	1.4	0.01	22	0.12
18-Jun-01	500	380	3.82	93	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
25-Jun-01	500	350	3.89	103	13	8	16	---	0.05	271	1	0.05	20	33.86	0.23	0.05	10	324	0.05	1.63	1	12.87	1.1	0.01	21.6	0.09
2-Jul-01	500	350	3.51	105	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
9-Jul-01	500	365	3.87	79	12	8	16	---	0.05	376	1	0.05	20	31.24	0.25	0.05	10	279	0.22	1.39	6	12.26	1.2	0.01	18.6	0.09
16-Jul-01	500	390	3.90	97	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
23-Jul-01	500	345	3.63	113	16	6	12	---	0.74	708	2	0.08	20	22.85	0.53	0.05	10	611	0.42	3.55	22	17.1	2.3	0.01	23.5	0.17
30-Jul-01	500	445	3.44	147	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6-Aug-01	500	360	3.69	127	16	6	18	---	0.05	683	1	0.05	20	18.42	0.3	0.05	10	316	0.13	3.37	10	10.7	2.1	0.02	18.8	0.22
13-Aug-01	500	450	3.53	146	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
20-Aug-01	500	360	3.75	141	17	14	26	---	0.05	761	1	0.05	20	23.16	0.25	0.05	5	753	0.05	3.71	4	12.97	2.4	0.01	22.1	0.25
27-Aug-01	500	365	3.54	140	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3-Sep-01	500	350	3.66	119	18	10	32	---	0.16	710	1	0.05	20	20.73	0.38	0.71	5	248	0.15	2.26	3	12.86	2.6	0.01	21.1	0.24
10-Sep-01	500	420	3.47	139	19	14	30	---	0.06	655	1	0.05	20	20.96	0.15	0.05	5	353	0.14	2.13	15	13.4	2.5	0.01	20.7	0.55
Final Rinse	3000	2960	4.05	40	6	4	8	---	0.05	49	1	0.05	20	91.69	0.05	0.05	5	140	0.51	0.11	7	2.65	0.5	0.01	4.6	0.03

--- Not Analysed

APPENDIX A
HUMIDITY CELL #1 WEEKLY DATA,
SHEAR LAKE WASTE ROCK
CULLATON LAKE, NUNAVUT

Date	Er	Eu	Fe	Ga	Gd	Ge	Hf	Hg	Ho	I	In	Ir	K	La	Li	Lu	Mg	Mn	Mo	Na	Nb	Nd	Ni	Os	P	Pb	Pd
	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
4-Dec-00	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11-Dec-00	0.62	0.46	24446	0.8	1.99	0.2	0.02	1.4	0.23	1	0.01	0.05	956	13.93	50	0.06	2497	18721.18	0.2	738	0.01	11.36	117.4	0.05	20	5	0.2
18-Dec-00	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
26-Dec-00	0.05	0.03	1957	0.19	0.15	0.05	0.02	1.2	0.02	23	0.01	0.05	840	1.19	50	0.01	562	7251.48	0.1	79	0.01	1.03	41.1	0.05	20	2	0.2
2-Jan-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8-Jan-01	0.03	0.02	1188	0.14	0.08	0.06	0.02	0.1	0.01	3	0.01	0.05	964	0.72	50	0.01	459	5495.79	0.1	90	0.01	0.46	35.2	0.05	20	2	0.2
15-Jan-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
22-Jan-01	0.03	0.03	771	0.14	0.09	0.05	0.02	2.5	0.01	1	0.01	0.05	925	0.54	50	0.01	232	3347.29	0.1	57	0.01	0.47	28.4	0.05	20	2	0.2
29-Jan-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5-Feb-01	0.03	0.02	1020	0.06	0.09	0.06	0.02	0.1	0.01	7	0.01	0.05	1247	0.72	50	0.01	317	5183.08	0.2	85	0.01	0.55	40.1	0.05	20	2	0.2
12-Feb-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19-Feb-01	0.01	0.01	584	0.07	0.05	0.05	0.02	0.1	0.01	3	0.01	0.05	1098	0.4	50	0.01	339	3072.61	0.1	99	0.01	0.34	29.2	0.05	25	2	0.2
26-Feb-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5-Mar-01	0.01	0.01	728	0.05	0.04	0.05	0.02	0.1	0.01	1	0.01	0.05	979	0.31	50	0.01	179	2902.04	0.1	71	0.01	0.25	29.7	0.05	20	2	0.2
12-Mar-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19-Mar-01	0.01	0.01	679	0.11	0.04	0.05	0.02	0.7	0.01	1	0.01	0.05	677	0.38	50	0.01	126	1706.71	0.1	88	0.01	0.25	25.9	0.05	20	2	0.2
26-Mar-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2-Apr-01	0.03	0.02	565	0.05	0.09	0.05	0.02	0.7	0.01	1	0.01	0.05	870	0.65	50	0.01	174	2703.67	0.1	50	0.01	0.47	28.8	0.05	20	2	0.2
9-Apr-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
16-Apr-01	0.06	0.03	332	0.07	0.2	0.05	0.02	0.1	0.01	1	0.01	0.05	855	1.39	50	0.01	176	2826.08	0.1	57	0.01	1.11	33.4	0.05	20	2	0.2
23-Apr-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
30-Apr-01	0.05	0.03	384	0.05	0.12	0.05	0.02	0.1	0.02	1	0.01	0.05	1148	1.01	50	0.01	175	2124.2	0.1	50	0.01	0.71	27.3	0.05	20	2	0.2
7-May-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14-May-01	0.02	0.01	256	0.05	0.07	0.05	0.02	1	0.01	1	0.01	0.05	1017	0.68	50	0.01	107	1310.75	0.4	50	0.01	0.32	16.1	0.05	20	2	0.2
21-May-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
28-May-01	0.04	0.03	165	0.05	0.17	0.05	0.02	0.3	0.01	1	0.01	0.05	876	1.34	50	0.01	141	1785.23	0.1	50	0.01	1.1	23.2	0.05	20	3	0.2
4-Jun-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11-Jun-01	0.04	0.03	226	0.05	0.16	0.05	0.02	0.1	0.01	1	0.01	0.05	733	1.16	50	0.01	109	1229.13	0.1	50	0.01	1.15	16.7	0.05	20	2	0.2
18-Jun-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
25-Jun-01	0.04	0.03	293	0.05	0.11	0.05	0.02	0.1	0.01	10	0.01	0.05	783	0.79	50	0.01	82	704.06	0.1	50	0.01	0.66	12.6	0.05	20	2	0.2
2-Jul-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
9-Jul-01	0.04	0.03	131	0.05	0.11	0.05	0.02	0.1	0.01	10	0.01	0.05	847	0.89	50	0.01	88	771.83	0.1	50	0.01	0.72	10.4	0.05	20	2	0.2
16-Jul-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
23-Jul-01	0.07	0.05	192	0.05	0.24	0.15	0.02	1.9	0.02	10	0.01	0.05	600	1.95	50	0.01	120	886.79	0.2	63	0.01	1.57	12.9	0.05	20	2	0.2
30-Jul-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6-Aug-01	0.09	0.07	171	0.05	0.29	0.05	0.02	0.3	0.03	10	0.01	0.05	554	1.57	50	0.01	114	472.88	0.1	50	0.01	1.9	7.5	0.05	20	4	0.2
13-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
20-Aug-01	0.1	0.07	248	0.05	0.31	0.05	0.02	0.1	0.03	1	0.01	0.05	693	2.03	1	0.01	83	541.33	0.1	50	0.01	2.04	8.4	0.05	20	2.6	0.2
27-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3-Sep-01	0.1	0.07	310	0.05	0.3	0.05	0.02	0.8	0.04	1	0.01	0.05	602	1.83	1	0.01	78	486.83	0.2	50	0.01	1.66	8	0.05	20	2.3	0.2
10-Sep-01	0.23	0.18	172	0.05	0.68	0.05	0.02	0.1	0.1	1	0.01	0.05	575	3.76	1	0.02	72	418.79	0.1	50	0.01	3.73	8.9	0.05	20	2.2	0.2
Final Rinse	0.01	0.04	90	0.05	0.04	0.05	0.02	0.1	0.01	1	0.01	0.05	292	0.15	1	0.01	50	112.73	0.1	50	0.01	0.19	2.3	0.05	20	1.6	0.2

--- Not Analysed

APPENDIX A
HUMIDITY CELL #1 WEEKLY DATA,
SHEAR LAKE WASTE ROCK
CULLATON LAKE, NUNAVUT

Date	Pr ppb	Pt ppb	Rb ppb	Re ppb	Rh ppb	Ru ppb	Sb ppb	Sc ppb	Se ppb	Si ppb	Sm ppb	Sn ppb	Sr ppb	Ta ppb	Tb ppb	Te ppb	Th ppb	Ti ppb	Tl ppb	Tm ppb	U ppb	V ppb	W ppb	Y ppb	Yb ppb	Zn ppb	Zr ppb
4-Dec-00	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11-Dec-00	2.83	0.01	1.18	0.01	0.01	0.05	0.44	1	2.4	2569	2.1	0.08	59.27	0.05	0.3	0.49	0.05	10	0.1	0.07	3.08	1	0.1	4.98	0.44	222.9	0.5
18-Dec-00	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
26-Dec-00	0.25	0.01	0.55	0.01	0.01	0.05	0.05	0.12	0.8	880	0.19	0.14	15.37	0.05	0.02	0.14	0.1	10	0.05	0.01	0.63	1	0.1	0.54	0.04	65.4	0.5
2-Jan-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8-Jan-01	0.11	0.01	0.63	0.01	0.01	0.05	0.05	0.22	0.5	556	0.09	0.14	10.61	0.05	0.01	0.24	0.05	10	0.03	0.01	0.43	1	0.1	0.29	0.03	40.5	0.5
15-Jan-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
22-Jan-01	0.12	0.01	0.29	0.01	0.01	0.05	0.05	0.28	0.5	546	0.09	0.14	9.47	0.05	0.02	0.28	0.21	10	0.04	0.01	0.32	1	0.1	0.28	0.02	31.0	0.5
29-Jan-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5-Feb-01	0.14	0.01	0.41	0.01	0.01	0.05	0.05	0.87	0.5	1006	0.11	0.23	11.67	0.05	0.01	0.19	0.05	10	0.02	0.01	0.39	1	0.1	0.3	0.02	35.3	0.5
12-Feb-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19-Feb-01	0.08	0.01	0.23	0.01	0.01	0.05	0.26	0.49	0.5	882	0.06	0.08	7.28	0.05	0.01	0.18	0.05	10	0.01	0.01	0.28	1	0.1	0.18	0.01	20.6	0.5
26-Feb-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5-Mar-01	0.06	0.01	0.32	0.01	0.01	0.05	0.05	0.18	0.5	438	0.05	0.05	6.81	0.05	0.01	0.12	0.05	10	0.02	0.01	0.33	1	0.1	0.15	0.01	21.5	0.5
12-Mar-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19-Mar-01	0.05	0.01	0.2	0.01	0.01	0.05	0.42	0.16	0.5	942	0.05	0.08	7.25	0.05	0.01	0.15	0.05	10	0.02	0.01	0.28	1	0.1	0.14	0.01	21.6	0.5
26-Mar-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2-Apr-01	0.12	0.01	0.34	0.01	0.01	0.05	0.05	0.86	0.5	3215	0.1	0.14	7.33	0.05	0.01	0.19	0.05	10	0.05	0.01	0.42	1	0.1	0.29	0.01	24.3	0.5
9-Apr-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
16-Apr-01	0.27	0.01	0.42	0.01	0.01	0.05	0.05	0.18	0.5	699	0.2	0.15	9.43	0.05	0.01	0.2	0.05	10	0.03	0.01	0.66	1	0.1	0.63	0.02	23.2	0.5
23-Apr-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
30-Apr-01	0.17	0.01	0.25	0.01	0.01	0.05	0.05	0.29	0.5	1024	0.13	0.1	7.31	0.05	0.02	0.19	0.05	10	0.01	0.01	0.62	1	0.1	0.43	0.03	32.8	0.5
7-May-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14-May-01	0.09	0.01	0.16	0.01	0.01	0.05	0.05	0.23	0.7	1588	0.07	0.31	4.9	0.05	0.01	0.54	0.05	10	0.06	0.01	0.47	1	0.1	0.25	0.01	11.5	0.5
21-May-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
28-May-01	0.22	0.01	0.22	0.01	0.01	0.05	0.05	27.8	0.5	8098	0.18	0.52	6.35	0.05	0.01	0.36	0.05	10	0.02	0.01	0.91	1	0.1	0.6	0.02	20.1	0.5
4-Jun-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11-Jun-01	0.26	0.01	0.25	0.01	0.01	0.05	0.05	1.23	0.5	794	0.21	0.06	4.82	0.05	0.02	0.23	0.05	10	0.01	0.01	0.72	1	0.1	0.65	0.04	19.1	0.5
18-Jun-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
25-Jun-01	0.18	0.01	0.3	0.01	0.01	0.05	0.05	0.27	0.5	616	0.14	0.05	3.82	0.05	0.02	0.18	0.05	10	0.02	0.01	0.64	1	0.1	0.45	0.03	16.2	0.5
2-Jul-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
9-Jul-01	0.18	0.01	0.25	0.01	0.01	0.05	0.05	0.17	0.5	1345	0.13	0.05	3.63	0.05	0.01	0.09	0.05	10	0.01	0.01	0.45	1	0.1	0.44	0.03	16	0.5
16-Jul-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
23-Jul-01	0.39	0.01	0.23	0.01	0.01	0.05	0.34	0.29	0.8	961	0.31	0.36	4.73	0.05	0.03	1.25	0.16	10	0.21	0.01	1.22	1	0.5	0.83	0.06	17.5	0.5
30-Jul-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6-Aug-01	0.43	0.01	0.42	0.01	0.01	0.05	0.05	0.22	0.5	779	0.35	0.05	3.02	0.05	0.05	0.18	0.05	10	0.04	0.01	0.64	1	0.1	0.96	0.07	12.4	0.5
13-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
20-Aug-01	0.46	0.01	0.26	0.01	0.01	0.05	0.05	0.15	0.5	791	0.37	0.05	2.74	0.05	0.04	0.21	0.05	10	0.01	0.01	0.98	1	0.1	1.15	0.07	15.2	0.5
27-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3-Sep-01	0.45	0.01	0.33	0.01	0.01	0.05	0.05	0.19	0.5	845	0.34	0.14	2.56	0.05	0.05	0.69	0.07	10	0.35	0.01	0.85	1	0.5	1.13	0.08	21.4	0.5
10-Sep-01	0.98	0.01	0.27	0.01	0.01	0.05	0.05	2.64	0.5	1607	0.8	0.12	2.93	0.05	0.12	0.19	0.05	10	0.01	0.03	0.99	1	0.1	2.41	0.19	21	0.5
Final Rinse	0.06	0.01	0.18	0.01	0.01	0.05	0.05	1.34	0.5	787	0.05	0.05	1.66	0.05	0.01	0.06	0.05	10	0.01	0.01	0.18	1	0.1	0.12	0.01	28.2	0.5

--- Not Analysed

APPENDIX A
HUMIDITY CELL #2 WEEKLY DATA
CULLATON LAKE, NUNAVUT

Date	Volume (ml)		pH	Conductivity	Sulphate	Acidity(mgCaCO³/L)		Alkalinity	Ag	Al	As	Au	B	Ba	Be	Bi	Br	Ca	Cd	Ce	Cl	Co	Cr	Cs	Cu	Dy
	Input	Output		(umhos/cm)	(mg/L)	pH 4.5	pH 8.3	(mgCaCO³/L)	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppm	ppb	ppb	ppb	ppb	ppb
4-Dec-00	750	580	3.76	112	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11-Dec-00	500	450	4.10	96	27	2	23	---	0.05	767	1	0.05	20	38.52	0.18	0.05	5	3032	1.26	4.35	1	31.85	1	0.02	22.3	0.29
18-Dec-00	500	465	4.18	48	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
25-Dec-00	500	385	4.44	34	8	<2	6	---	0.05	55	1	0.05	20	30.3	0.06	0.05	5	870	0.17	0.16	1	7.24	0.5	0.01	8.2	0.01
1-Jan-01	500	530	4.45	33	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8-Jan-01	500	390	4.34	37	8	<2	4	---	0.05	71	1	0.05	20	28.35	0.06	0.05	5	632	0.14	0.28	1	5.85	0.5	0.01	7	0.02
15-Jan-01	500	385	4.37	32	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
22-Jan-01	500	410	4.50	22	5	---	4	---	0.06	14	1	0.05	20	24	0.05	0.05	5	263	0.11	0.07	1	4.2	0.5	0.01	4.7	0.01
29-Jan-01	500	435	4.36	26	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5-Feb-01	500	425	4.64	19	4	---	4	1	0.05	7	1	0.05	20	23	0.05	0.05	5	182	0.13	0.04	1	2.64	0.5	0.03	3.5	0.01
12-Feb-01	500	415	4.81	15	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19-Feb-01	500	400	4.45	17	3	<2	4	---	0.05	5	1	0.05	20	21.62	0.05	0.05	5	156	0.05	0.03	1	2.4	0.5	0.01	3.2	0.01
26-Feb-01	500	450	4.35	26	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5-Mar-01	500	390	4.43	26	4	<2	12	---	0.05	11	1	0.05	20	24.77	0.05	0.05	5	199	0.05	0.04	1	4.39	0.5	0.01	5	0.01
12-Mar-01	500	465	4.52	19	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19-Mar-01	500	415	4.65	17	2	---	3	1	0.07	19	1	0.05	20	20.51	0.05	0.05	5	1297	0.05	0.05	1	2.8	0.5	0.01	3.3	0.01
26-Mar-01	500	390	4.58	19	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2-Apr-01	500	485	4.39	25	5	<2	4	---	0.12	20	1	0.05	20	40.83	0.07	0.05	5	229	0.16	0.09	1	5.03	0.5	0.01	4.9	0.01
9-Apr-01	500	430	4.36	28	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
16-Apr-01	500	400	4.41	26	6	<2	4	---	0.05	34	1	0.05	20	30.33	0.05	0.05	5	343	0.05	0.24	4	5.44	0.5	0.01	5	0.03
23-Apr-01	500	430	4.64	20	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
30-Apr-01	500	435	5.08	13	3	---	4	1	0.05	35	1	0.05	20	16.85	0.05	0.05	5	150	0.14	0.05	1	2.98	0.5	0.01	6.6	0.01
7-May-01	500	380	4.83	18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14-May-01	500	400	4.70	17	3	---	4	1	0.05	9	1	0.05	20	18.23	0.07	0.05	5	303	0.12	0.03	2	2.4	0.5	0.01	3.3	0.01
21-May-01	500	370	4.86	14	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
28-May-01	500	445	4.62	18	4	---	4	1	0.05	11	1	0.05	36	31.17	0.05	0.07	5	343	0.08	0.06	1	3.91	0.5	0.01	4.3	0.01
4-Jun-01	500	380	4.52	18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11-Jun-01	500	460	4.58	18	3	---	4	1	0.05	9	1	0.05	20	23.97	0.05	0.05	5	107	0.26	0.05	1	3.35	0.5	0.01	4.6	0.01
18-Jun-01	500	405	4.63	17	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
25-Jun-01	500	380	4.68	20	3	---	4	1	0.05	4	1	0.05	20	24.95	0.05	0.05	10	114	0.05	0.02	1	2.7	0.5	0.01	3.5	0.01
2-Jul-01	500	395	4.26	19	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
9-Jul-01	500	390	5.27	12	3	---	3	1	0.05	11	1	0.05	20	27.95	0.05	0.05	10	116	0.34	0.01	4	2.62	0.5	0.01	4	0.01
16-Jul-01	500	410	4.66	18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
23-Jul-01	500	385	4.74	18	3	---	4	1	0.39	5	1	0.05	20	27.56	0.05	0.05	10	170	0.05	0.02	10	2.93	0.5	0.01	3.3	0.01
30-Jul-01	500	415	4.31	22	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6-Aug-01	500	400	4.64	23	4	---	4	1	0.05	10	1	0.05	20	27.45	0.05	0.05	10	181	0.08	0.05	10	2.81	0.5	0.01	3.7	0.01
13-Aug-01	500	410	4.40	24	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
20-Aug-01	500	405	4.95	21	4	---	4	1	0.05	9	1	0.05	20	30.6	0.05	0.05	5	143	0.05	0.05	5	3.42	0.5	0.01	5.5	0.01
27-Aug-01	500	430	4.40	21	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3-Sep-01	500	395	4.56	26	5	---	5	1	0.08	20	1	0.05	20	44.48	0.05	0.38	5	199	0.13	0.07	2	5.05	0.5	0.01	6.7	0.01
10-Sep-01	500	400	4.54	21	4	---	6	1	0.05	25	1	0.05	20	38.11	0.05	0.05	5	235	0.16	0.04	13	3.76	0.5	0.01	5.3	0.02
Final Rinse	3000	2860	4.99	10	2	---	4	1	0.05	7	1	0.05	20	80.8	0.06	0.05	5	122	0.18	0.01	10	1.54	0.5	0.01	2.2	0.01

--- Not analysed

APPENDIX A
HUMIDITY CELL #2 WEEKLY DATA
CULLATON LAKE, NUNAVUT

Date	Er ppb	Eu ppb	Fe ppb	Ga ppb	Gd ppb	Ge ppb	Hf ppb	Hg ppb	Ho ppb	I ppb	In ppb	Ir ppb	K ppb	La ppb	Li ppb	Lu ppb	Mg ppb	Mn ppb	Mo ppb	Na ppb	Nb ppb	Nd ppb	Ni ppb	Os ppb	P ppb	Pb ppb	Pd ppb
4-Dec-00	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11-Dec-00	0.12	0.11	3496	0.4	0.45	0.07	0.02	0.7	0.04	1	0.01	0.05	677	1.96	50	0.01	1023	5426.58	0.1	563	0.01	2.15	54.9	0.05	27	2	0.2
18-Dec-00	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
25-Dec-00	0.01	0.01	150	0.08	0.02	0.05	0.02	0.7	0.01	15	0.01	0.05	413	0.08	50	0.01	177	2143.17	0.1	50	0.01	0.11	18.9	0.05	20	2	0.2
1-Jan-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8-Jan-01	0.01	0.01	45	0.1	0.04	0.05	0.02	0.1	0.01	1	0.01	0.05	305	0.18	50	0.01	211	3007.96	0.1	57	0.01	0.17	25.8	0.05	20	2	0.2
15-Jan-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
22-Jan-01	0.01	0.01	27	0.08	0.01	0.05	0.02	1.7	0.01	1	0.01	0.05	220	0.05	50	0.01	78	1306.06	0.1	50	0.01	0.06	15.7	0.05	20	2	0.2
29-Jan-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5-Feb-01	0.01	0.01	24	0.05	0.01	0.05	0.02	0.1	0.01	3	0.01	0.05	269	0.02	50	0.01	67	992.85	0.1	50	0.01	0.01	10.3	0.05	20	2	0.2
12-Feb-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19-Feb-01	0.01	0.01	25	0.05	0.01	0.05	0.02	0.1	0.01	2	0.01	0.05	269	0.01	50	0.01	115	792.58	0.1	65	0.01	0.02	10.4	0.05	26	2	0.2
26-Feb-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5-Mar-01	0.01	0.01	22	0.05	0.01	0.05	0.02	0.1	0.01	1	0.01	0.05	279	0.02	50	0.01	92	1324.44	0.1	59	0.01	0.02	17	0.05	20	2	0.2
12-Mar-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19-Mar-01	0.01	0.01	10	0.05	0.01	0.05	0.02	0.5	0.01	1	0.01	0.05	152	0.01	50	0.01	68	558.91	0.1	50	0.01	0.02	9.2	0.05	20	2	0.2
26-Mar-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2-Apr-01	0.01	0.01	23	0.05	0.01	0.05	0.02	0.4	0.01	1	0.01	0.05	272	0.04	50	0.01	95	1313.97	0.1	50	0.01	0.05	16.8	0.05	20	2	0.2
9-Apr-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
16-Apr-01	0.01	0.01	18	0.05	0.03	0.05	0.02	0.1	0.01	1	0.01	0.05	257	0.1	50	0.01	101	1434.85	0.1	51	0.01	0.17	20.7	0.05	20	2	0.2
23-Apr-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
30-Apr-01	0.01	0.01	13	0.05	0.01	0.05	0.02	0.1	0.01	1	0.01	0.05	261	0.03	50	0.01	59	828.49	0.1	50	0.01	0.03	11	0.05	20	2	0.2
7-May-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14-May-01	0.01	0.01	13	0.05	0.01	0.05	0.02	0.3	0.01	1	0.01	0.05	217	0.02	50	0.01	50	762.58	0.1	50	0.01	0.01	8.1	0.05	20	2	0.2
21-May-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
28-May-01	0.01	0.01	10	0.05	0.01	0.05	0.02	0.2	0.01	1	0.01	0.05	252	0.01	50	0.01	70	1125.5	0.1	50	0.01	0.01	14.8	0.05	20	2	0.2
4-Jun-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11-Jun-01	0.01	0.01	12	0.05	0.01	0.05	0.02	0.1	0.01	1	0.01	0.05	196	0.01	50	0.01	52	883.37	0.1	50	0.01	0.02	12.2	0.05	20	2	0.2
18-Jun-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
25-Jun-01	0.01	0.01	17	0.05	0.01	0.05	0.02	0.1	0.01	10	0.01	0.05	212	0.01	50	0.01	50	659.92	0.1	50	0.01	0.01	10.6	0.05	20	2	0.2
2-Jul-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
9-Jul-01	0.01	0.01	10	0.05	0.01	0.05	0.02	0.1	0.01	10	0.01	0.05	249	0.01	50	0.01	50	749.2	0.1	50	0.01	0.01	9.7	0.05	20	2	0.2
16-Jul-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
23-Jul-01	0.01	0.01	11	0.05	0.01	0.05	0.02	0.9	0.01	10	0.01	0.05	202	0.01	50	0.01	55	775.78	0.3	50	0.01	0.01	11.5	0.05	20	2	0.2
30-Jul-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6-Aug-01	0.01	0.01	10	0.05	0.01	0.05	0.02	0.2	0.01	10	0.01	0.05	202	0.01	50	0.01	68	642.74	0.1	50	0.01	0.04	10.1	0.05	20	2	0.2
13-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
20-Aug-01	0.01	0.01	10	0.05	0.01	0.05	0.02	0.1	0.01	1	0.01	0.05	208	0.03	1	0.01	61	874.96	0.1	50	0.01	0.03	12.1	0.05	20	0.3	0.2
27-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3-Sep-01	0.01	0.01	10	0.05	0.01	0.05	0.02	0.5	0.01	1	0.01	0.05	188	0.02	1	0.01	80	1171.77	0.1	50	0.01	0.06	16.2	0.05	20	0.3	0.2
10-Sep-01	0.01	0.02	10	0.05	0.03	0.05	0.02	0.1	0.01	1	0.01	0.05	205	0.04	1	0.01	61	729.9	0.1	50	0.01	0.08	12.2	0.05	20	0.4	0.2
Final Rinse	0.01	0.02	10	0.05	0.01	0.05	0.02	0.1	0.01	1	0.01	0.05	250	0.01	1	0.01	50	353.01	0.1	50	0.01	0.01	5.4	0.05	20	0.1	0.2

--- Not analysed

APPENDIX A
HUMIDITY CELL #2 WEEKLY DATA
CULLATON LAKE, NUNAVUT

Date	Pr ppb	Pt ppb	Rb ppb	Re ppb	Rh ppb	Ru ppb	Sb ppb	Sc ppb	Se ppb	Si ppb	Sm ppb	Sn ppb	Sr ppb	Ta ppb	Tb ppb	Te ppb	Th ppb	Ti ppb	Tl ppb	Tm ppb	U ppb	V ppb	W ppb	Y ppb	Yb ppb	Zn ppb	Zr ppb
4-Dec-00	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11-Dec-00	0.46	0.01	0.83	0.01	0.01	0.05	0.15	0.7	1	1629	0.45	0.05	13.91	0.05	0.07	0.07	0.05	10	0.07	0.01	2.81	1	0.1	1.05	0.07	87.9	0.5
18-Dec-00	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
25-Dec-00	0.02	0.01	0.54	0.01	0.01	0.05	0.05	0.05	0.5	380	0.05	0.05	4.48	0.05	0.01	0.05	0.05	10	0.04	0.01	0.39	1	0.1	0.06	0.01	19.7	0.5
1-Jan-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8-Jan-01	0.04	0.01	0.34	0.01	0.01	0.05	0.05	0.1	0.5	387	0.05	0.07	4.17	0.05	0.01	0.05	0.05	10	0.02	0.01	0.36	1	0.1	0.1	0.01	14.1	0.5
15-Jan-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
22-Jan-01	0.01	0.01	0.19	0.01	0.01	0.05	0.05	0.15	0.5	326	0.05	0.08	2.59	0.05	0.01	0.08	0.05	10	0.02	0.01	0.19	1	0.1	0.04	0.01	14.8	0.5
29-Jan-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5-Feb-01	0.01	0.01	0.19	0.01	0.01	0.05	0.05	0.36	0.5	195	0.05	0.21	1.84	0.05	0.01	0.05	0.05	10	0.01	0.01	0.13	1	0.1	0.01	0.01	7.4	0.5
12-Feb-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19-Feb-01	0.01	0.01	0.12	0.01	0.01	0.05	0.15	0.34	0.5	425	0.05	0.05	1.46	0.05	0.01	0.05	0.05	10	0.01	0.01	0.1	1	0.1	0.01	0.01	5.9	0.5
26-Feb-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5-Mar-01	0.01	0.01	0.18	0.01	0.01	0.05	0.05	0.08	0.5	269	0.05	0.05	2.45	0.05	0.01	0.05	0.05	10	0.01	0.01	0.17	1	0.1	0.02	0.01	7.8	0.5
12-Mar-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19-Mar-01	0.01	0.01	0.09	0.01	0.01	0.05	0.48	0.05	0.5	428	0.05	0.1	2.64	0.05	0.01	0.05	0.05	10	0.01	0.01	0.1	1	0.1	0.01	0.01	17.6	0.5
26-Mar-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2-Apr-01	0.01	0.01	0.21	0.01	0.01	0.05	0.05	0.43	0.5	1798	0.05	0.05	2.92	0.05	0.01	0.05	0.05	10	0.03	0.01	0.19	1	0.1	0.04	0.01	8.8	0.5
9-Apr-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
16-Apr-01	0.02	0.01	0.18	0.01	0.01	0.05	0.05	0.06	0.5	380	0.05	0.08	3.57	0.05	0.01	0.05	0.05	10	0.02	0.01	0.31	1	0.1	0.11	0.01	9.9	0.5
23-Apr-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
30-Apr-01	0.01	0.01	0.23	0.01	0.01	0.05	0.05	0.16	0.5	523	0.05	0.06	1.86	0.05	0.01	0.05	0.05	10	0.03	0.01	0.15	1	0.1	0.03	0.01	8.3	0.5
7-May-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14-May-01	0.01	0.01	0.07	0.01	0.01	0.05	0.05	0.11	0.5	964	0.05	0.1	1.67	0.05	0.01	0.09	0.05	10	0.03	0.01	0.11	1	0.1	0.01	0.01	4.9	0.5
21-May-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
28-May-01	0.01	0.01	0.12	0.01	0.01	0.05	0.05	18.76	0.5	5751	0.05	0.14	2.52	0.05	0.01	0.07	0.05	10	0.01	0.01	0.19	1	0.1	0.01	0.01	9.1	0.5
4-Jun-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11-Jun-01	0.01	0.01	0.09	0.01	0.01	0.05	0.05	1.03	0.5	498	0.05	0.05	1.74	0.05	0.01	0.05	0.05	10	0.01	0.01	0.14	1	0.1	0.01	0.01	10.1	0.5
18-Jun-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
25-Jun-01	0.01	0.01	0.13	0.01	0.01	0.05	0.05	0.18	0.5	404	0.05	0.05	1.69	0.05	0.01	0.05	0.05	10	0.01	0.01	0.13	1	0.1	0.01	0.01	10	0.5
2-Jul-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
9-Jul-01	0.01	0.01	0.11	0.01	0.01	0.05	0.05	0.05	0.5	333	0.05	0.05	1.6	0.05	0.01	0.05	0.05	10	0.01	0.01	0.06	1	0.1	0.01	0.01	7.4	0.5
16-Jul-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
23-Jul-01	0.01	0.01	0.08	0.01	0.01	0.05	0.05	0.17	0.5	600	0.05	0.12	1.74	0.05	0.01	0.39	0.05	10	0.04	0.01	0.11	1	0.2	0.01	0.01	7	0.5
30-Jul-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6-Aug-01	0.01	0.01	0.09	0.01	0.01	0.05	0.05	0.16	0.5	509	0.05	0.05	1.71	0.05	0.01	0.05	0.05	10	0.02	0.01	0.1	1	0.1	0.02	0.01	7.8	0.5
13-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
20-Aug-01	0.01	0.01	0.08	0.01	0.01	0.05	0.05	0.1	0.5	479	0.05	0.05	1.9	0.05	0.01	0.05	0.05	10	0.01	0.01	0.14	1	0.1	0.01	0.01	11.9	0.5
27-Aug-01	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3-Sep-01	0.01	0.01	0.11	0.01	0.01	0.05	0.05	0.21	0.5	1024	0.05	0.05	2.63	0.05	0.01	0.13	0.05	10	0.12	0.01	0.24	1	0.2	0.06	0.01	20.4	0.5
10-Sep-01	0.02	0.01	0.17	0.01	0.01	0.05	0.05	1.6	0.5	612	0.05	0.05	2.37	0.05	0.01	0.05	0.05	10	0.01	0.01	0.17	1	0.1	0.08	0.01	16.5	0.5
Final Rinse	0.01	0.01	0.15	0.01	0.01	0.05	0.05	2	0.5	752	0.05	0.05	1.4	0.05	0.01	0.05	0.05	10	0.01	0.01	0.05	1	0.1	0.01	0.01	13	0.5

--- Not analysed

APPENDIX A
SUBAQUEOUS COLUMN TEST, WEEKLY DATA
SHEAR LAKE WASTE ROCK
CULLATON LAKE, NUNAVUT

Date	Volume (ml) Removed	Volume (ml) Replaced	Temp. (C)	pH	Cond. (umhos/cm)	ORP	DO (ppm)	Sulfate (mg/L)	Acidity(mgCaCO3/L) pH 4.5	Acidity(mgCaCO3/L) pH 8.3	Alkalinity ($mgCaCO_3/L$)	Ag ppb	Al ppb	As ppb	Au ppb	B ppb	Ba ppb	Be ppb	Bi ppb	Br ppb	Ca ppb	Cd ppb	Ce ppb	Cl ppm	Co ppb	Cr ppb	Cs ppb	Cu ppb
		22290																										
13-Feb-01	100	-	5	4.08	89	300	16.8	25	4	34	---	0.05	1198	2	0.05	20	46.14	0.32	0.1	5	4225	1.81	8.45	1	37.38	1.4	0.05	42.7
20-Feb-01	100	-	5	3.94	90	315	16.9	27	4	22	---	0.05	1011	1	0.05	20	45.81	0.22	0.1	5	4006	1.35	8.62	5	38.39	1.4	0.02	37.1
27-Feb-01	100	-	5	4.23	98	282	15.1	22	2	38	---	0.08	1209	2	0.05	20	43.36	0.29	0.05	5	3720	1.84	7.37	2	41.8	1.2	0.04	34.3
6-Mar-01	17395	17395	5	4.48	90	259	16.9	34	<2	96	---	0.05	1141	1	0.05	20	45.21	0.25	0.05	5	4160	2.16	6.74	2	46.39	2.4	0.03	38.7
13-Mar-01	100	100	5	5.65	50	200	16.6	19	---	16	1	0.27	42	1	0.05	20	44.85	0.05	0.33	5	1496	0.12	0.28	6	8.7	0.5	0.01	3.2
20-Mar-01	100	200	5	5.05	49	190	16.3	17	---	18	<1	0.08	78	1	0.05	20	41.08	0.05	0.08	5	4704	0.17	0.6	3	7.52	0.5	0.02	4
3-Apr-01	100	150	5	4.99	54	160	16.9	17	---	16	<1	0.09	59	1	0.05	20	43.17	0.05	0.08	5	1174	0.19	0.45	4	6.27	0.5	0.02	3.4
17-Apr-01	100	110	5	4.88	50	193	16.3	19	---	16	<1	0.05	59	1	0.05	20	38.52	0.05	0.07	10	1230	0.13	0.54	7	6.1	0.5	0.04	3.9
1-May-01	100	120	5	4.53	49	211	16.5	19	---	14	<1	0.18	77	1	0.05	20	46.56	0.05	0.05	5	1220	0.41	0.56	1	7.36	0.5	0.05	5
15-May-01	100	305	5	4.72	46	243	17.0	19	---	16	<1	0.05	67	1	0.05	20	39.98	0.05	0.05	5	995	0.29	0.38	3	6.43	0.5	0.01	3.2
29-May-01	100	125	5	4.96	45	237	17.4	18	---	14	<1	0.51	56	1	0.05	20	40.5	0.05	0.75	5	1308	0.15	0.55	2	6.79	0.5	0.02	3.9
12-Jun-01	100	110	5	4.65	55	239	17.4	19	---	16	<1	0.05	51	3	0.05	20	37.89	0.05	0.05	5	1128	0.55	0.43	2	6.9	0.5	0.01	4
26-Jun-01	100	110	5	5.83	54	220	13.0	19	---	20	<1	0.05	37	1	0.05	20	36.7	0.05	0.05	10	1005	0.3	0.39	1	6.16	0.5	0.03	4.1
10-Jul-01	100	120	5	5.32	63	178	17.4	18	---	16	<1	1.01	116	1	0.05	20	41.08	0.05	0.05	10	1170	0.55	0.57	6	6.93	0.5	0.04	8.6
24-Jul-01	100	120	5	4.60	64	266	16.6	16	---	16	<1	0.93	63	2	0.05	20	35.64	0.05	0.05	10	1775	0.3	0.63	9	7.73	0.5	0.01	6.5
7-Aug-01	100	90	5	4.96	54	260	16.9	18	---	16	<1	0.05	78	1	0.05	20	36.57	0.05	0.05	10	1348	0.41	0.42	16	5.91	0.5	0.03	14.8
21-Aug-01	100	115	5	4.8	60	269	16.4	16	---	16	<1	0.05	81	1	0.05	20	37.86	0.05	0.05	5	1320	0.05	0.63	8	6.51	0.5	0.01	3.7
4-Sep-01	100	180	5	4.26	56	272	17.3	18	---	36	<1	0.07	90	1	0.05	20	41.67	0.08	0.26	5	1386	0.46	0.45	1	7.83	0.5	0.02	15.5
Terminated																												

Date	Dy ppb	Er ppb	Eu ppb	Fe ppb	Ga ppb	Gd ppb	Ge ppb	Hf ppb	Hg ppb	Ho ppb	I ppb	In ppb	Ir ppb	K ppb	La ppb	Li ppb	Lu ppb	Mg ppb	Mn ppb	Mo ppb	Na ppb	Nb ppb	Nd ppb	Ni ppb	Os ppb	P ppb	Pb ppb	Pd ppb
13-Feb-01	0.5	0.22	0.16	4454	0.06	0.65	0.05	0.02	0.1	0.09	16	0.01	0.05	1865	4.55	50	0.02	1116	2278.95	0.2	799	0.01	3.71	38.2	0.05	314	3	0.2
20-Feb-01	0.46	0.24	0.16	4212	0.06	0.75	0.05	0.02	0.1	0.09	13	0.01	0.05	1315	4.56	50	0.02	1706	2290.38	0.1	806	0.01	4.12	41.7	0.05	197	4	0.2
27-Feb-01	0.57	0.28	0.17	4572	0.05	0.83	0.05	0.02	0.1	0.1	1	0.01	0.05	1916	4.72	50	0.02	1185	2504.69	0.2	907	0.01	4.22	40.7	0.05	246	3	0.2
6-Mar-01	0.52	0.24	0.16	8373	0.05	0.74	0.05	0.02	0.1	0.09	1	0.01	0.05	910	4.44	50	0.02	1297	4404.56	0.1	626	0.01	3.99	56.7	0.05	34	3	0.2
13-Mar-01	0.01	0.01	0.01	7594	0.12	0.01	0.05	0.02	1.4	0.01	1	0.01	0.05	627	0.16	50	0.01	347	2330.54	0.2	402	0.01	0.1	10.7	0.05	34	2	0.2
20-Mar-01	0.02	0.01	0.01	5268	0.12	0.03	0.05	0.02	0.4	0.01	1	0.01	0.05	451	0.35	50	0.01	365	2085.85	0.1	299	0.01	0.23	8.6	0.05	20	2	0.2
3-Apr-01	0.03	0.01	0.01	6442	0.05	0.04	0.05	0.02	0.3	0.01	1	0.01	0.05	503	0.27	50	0.01	324	2477.75	0.1	158	0.01	0.19	8.4	0.05	20	2	0.2
17-Apr-01	0.04	0.02	0.01	5790	0.06	0.03	0.05	0.02	0.1	0.01	18	0.01	0.05	489	0.33	50	0.01	301	2526.62	0.1	221	0.01	0.26	10	0.05	20	2	0.2
1-May-01	0.04	0.02	0.01	6343	0.07	0.06	0.05	0.02	0.1	0.01	3	0.01	0.05	667	0.4	50	0.01	352	3287.99	0.1	290	0.01	0.3	12.4	0.05	20	2	0.2
15-May-01	0.02	0.01	0.01	5744	0.06	0.03	0.05	0.02	0.2	0.01	1	0.01	0.05	454	0.32	50	0.01	262	2713.8	0.2	227	0.01	0.15	10.3	0.05	20	2	0.2
29-May-01	0.01	0.01	0.01	5457	0.05	0.03	0.05	0.02	0.4	0.01	1	0.01	0.05	430	0.22	50	0.01	291	2864.89	0.1	229	0.01	0.21	12	0.05	20	2	0.2
12-Jun-01	0.01	0.01	0.01	4899	0.05	0.03	0.05	0.02	0.1	0.01	1	0.01	0.05	409	0.2	50	0.01	283	3288.4	0.1	272	0.01	0.19	12.6	0.05	20	2	0.2
26-Jun-01	0.02	0.01	0.01	3966	0.08	0.04	0.05	0.02	0.1	0.01	10	0.01	0.05	446	0.18	50	0.01	281	2476.74	0.1	209	0.01	0.14	12.4	0.05	20	2	0.2
10-Jul-01	0.03	0.01	0.01	4574	0.05	0.05	0.05	0.02	0.1	0.01	10	0.01	0.05	479	0.32	50	0.01	298	3171.29	0.1	174	0.01	0.27	13.1	0.05	20	2	0.2
24-Jul-01	0.02	0.01	0.01	4586	0.05	0.03	0.05	0.02	0.7	0.01	13	0.01	0.05	432	0.23	50	0.01	337	3123.74	0.2	262	0.01	0.22	15.8	0.05	20	2	0.2
7-Aug-01	0.03	0.01	0.01	3541	0.06	0.04	0.05	0.02	0.1	0.01	10	0.01	0.05	542	0.18	50	0.01	305	2479.28	0.1	213	0.01	0.21	13.2	0.05	29	6	0.2
21-Aug-01	0.03	0.01	0.01	3925	0.07	0.05	0.05	0.02	0.1	0.01	1	0.01	0.05	543	0.32	1	0.01	262	2984.42	0.1	224	0.01	0.33	13.5	0.05	41	1.3	0.2
4-Sep-01	0.04	0.02	0.01	3886	0.07	0.06	0.07	0.02	0.2	0.01	1	0.01	0.05	561	0.32	1	0.01	286	3404.53	0.1	229	0.01	0.33	16.5	0.05	69	1.4	0.2
Terminated																												

Date	Pr ppb	Pt ppb	Rb ppb	Re ppb	Rh ppb	Ru ppb	Sb ppb	Sc ppb	Se ppb	Si ppb	Sm ppb	Sn ppb	Sr ppb	Ta ppb	Tb ppb	Te ppb	Th ppb	Ti ppb	Tl ppb	Tm ppb	U ppb	V ppb	W ppb	Y ppb	Yb ppb	Zn ppb	Zr ppb
13-Feb-01	0.93	0.01	1.27	0.01	0.01	0.05	0.12	0.29	0.5	128	0.69	0.29	18.53	0.05	0.12	0.14	0.05	10	0.04	0.03	1.38	1	0.1	2.53	0.16	207.4	0.5
20-Feb-01	0.98	0.01	1.07	0.01	0.01	0.05	0.39	0.35	0.5	323	0.75	0.21	16.12	0.05	0.11	0.09	0.06	10	0.05	0.02	1.55	1	0.1	2.46	0.17	170.7	0.5
27-Feb-01	1.03	0.01	1.21	0.01	0.01	0.05	0.14	0.11	0.5	222	0.78	0.18	17.25	0.05	0.13	0.05	0.05	10	0.04	0.03	1.51	1	0.1	2.73	0.18	200.6	0.5
6-Mar-01	0.93	0.01	1.18	0.01	0.01	0.05	0.08	0.19	0.5	479	0.73	0.11	20.44	0.05	0.11	0.05	0.05	10	0.04	0.03	1.23	1	0.1	2.63	0.17	212.1	0.5
13-Mar-01	0.01	0.01	1.05	0.01	0.01	0.05	0.84	0.21	0.5	740	0.05	0.42	21.37	0.05	0.01	0.11	0.05	10	0.06	0.01	0.07	1	0.5	0.06	0.01	31	0.5
20-Mar-01	0.05	0.01	0.48	0.01	0.01	0.05	0.44	0.16	0.5	751	0.05	0.14	13.2	0.05	0.01	0.05	0.05	10	0.03	0.01	0.08	1	0.2	0.18	0.01	81.1	0.5
3-Apr-01	0.05	0.01	0.53	0.01	0.01	0.05	0.05	0.18	0.5	776	0.05	0.06	7.91	0.05	0.01	0.05	0.05	10	0.03	0.01	0.05	1	0.1	0.14	0.01	20.7	0.5
17-Apr-01	0.06	0.01	0.68	0.01	0.01	0.05	0.05	0.21	0.5	662	0.05	0.11	9.22	0.05	0.01	0.05	0.05	10	0.03	0.01	0.37	1	0.2	0.15	0.01	22	0.5
1-May-01	0.07	0.01	0.59	0.01	0.01	0.05	0.05	0.33	0.5	1145	0.05	0.07	10.47	0.05	0.01	0.05	0.05	10	0.02	0.01	0.12	1	0.1	0.2	0.01	20.4	0.5
15-May-01	0.04	0.01	0.29	0.01	0.01	0.05	0.05	0.08	0.5	863	0.05	0.08	9.2	0.05	0.01	0.05	0.05	10	0.04	0.01	0.09	1	0.1	0.13	0.01	16.8	0.5
29-May-01	0.01	0.01	0.51	0.01	0.01	0.05	0.05	3.86	0.5	1147	0.05	0.24	9.25	0.05	0.01	0.15	0.05	10	0.03	0.01	0.1	1	0.1	0.12	0.01	24	0.5
12-Jun-01	0.04	0.01	0.66	0.01	0.01	0.05	0.05	1.61	0.5	782	0.05	0.3	8.79	0.05	0.01	0.05	0.05	10	0.01	0.01	0.11	1	0.1	0.13	0.01	22.5	0.5
26-Jun-01	0.04	0.01	0.76	0.01	0.01	0.05	0.05	0.31	0.5	1126	0.05	0.55	9.28	0.05	0.01	0.05	0.05	10	0.02	0.01	0.4	1	0.1	0.14	0.01	24.8	0.5
10-Jul-01	0.05	0.01	0.45	0.01	0.01	0.05	0.05	0.14	0.5	1258	0.05	0.05	8.92	0.05	0.01	0.05	0.05	10	0.01	0.01	0.1	1	0.1	0.17	0.01	21.7	0.5
24-Jul-01	0.05	0.01	0.6	0.01	0.01	0.05	0.05	0.29	0.5	960	0.05	0.13	9.93	0.05	0.01	0.18	0.05	10	0.05	0.01	0.14	1	0.2	0.14	0.01	23.1	0.5
7-Aug-01	0.04	0.01	0.52	0.01	0.01	0.05	0.05	0.27	0.5	930	0.05	0.05	7.77	0.05	0.01	0.05	0.05	10	0.1	0.01	0.13	1	0.1	0.14	0.01	23.5	0.5
21-Aug-01	0.06	0.01	0.5	0.01	0.01	0.05	0.05	0.19	0.5	894	0.05	0.05	8.32	0.05	0.01	0.05	0.05	10	0.01	0.01	0.16	1	0.1	0.19	0.01	17.9	0.5
4-Sep-01	0.08	0.01	0.61	0.01	0.01	0.05	0.05	0.23	0.5	1065	0.06	0.06	9.66	0.05	0.01	0.05	0.05	10	0.12	0.01	0.22	1	0.2	0.27	0.01	33.2	0.5
Terminated																											

--- Not Analysed

APPENDIX B

SHEAR LAKE CONCENTRATION ESTIMATES

APPENDIX B
SHEAR LAKE WATER QUALITY ESTIMATES,
BASED ON SUBAQUEOUS COLUMN TESTS
SHEAR LAKE ZONE WASTE ROCK
CULLATON LAKE, NUNAVUT

Numbers used for calculation:		
Volume of Shear Lake	42000	m^3
	42000000	L
Volume of Waste Rock	1000	m^3
Density of Waste Rock	2000	kg/m^3
Mass of Waste Rock	2000000	kg
Water Volume in Column	22.29	L
Rock mass in Column	10.69	kg
Column rock/water ratio	0.47958726	kg/L
Lake rock/water ratio	0.047619	kg/L
Scaling factor (lake/column)	0.099292	

Adjusted Concentrations (mg/L) = (Column conc X Scaling Factor)

Week	Sulphate	Al	As	Co	Cd	Cu	Fe	Mn	Ni	Zn
1	2.69	0.101	0.00010	0.0038	0.000135	0.0037	0.420	0.228	0.0042	0.017
2	2.21	0.121	0.00020	0.0042	0.000184	0.0034	0.458	0.251	0.0041	0.020
3	3.41	0.115	0.00010	0.0047	0.000217	0.0039	0.839	0.441	0.0057	0.021
4	3.42	0.009	0.00018	0.0016	0.000024	0.0006	1.358	0.419	0.0020	0.006
5	3.23	0.013	0.00018	0.0015	0.000029	0.0007	1.130	0.395	0.0018	0.011
6	3.23	0.011	0.00018	0.0014	0.000031	0.0006	1.246	0.434	0.0017	0.005
7	3.43	0.011	0.00018	0.0014	0.000025	0.0007	1.183	0.440	0.0019	0.005
8	3.44	0.013	0.00018	0.0015	0.000053	0.0008	1.240	0.517	0.0021	0.005
9	3.44	0.012	0.00018	0.0014	0.000041	0.0006	1.183	0.461	0.0019	0.004
10	3.34	0.010	0.00018	0.0014	0.000027	0.0007	1.151	0.476	0.0021	0.005
11	3.45	0.010	0.00038	0.0014	0.000067	0.0007	1.097	0.519	0.0022	0.005
12	3.45	0.009	0.00018	0.0014	0.000042	0.0007	1.006	0.439	0.0022	0.005
13	3.36	0.017	0.00018	0.0014	0.000067	0.0012	1.068	0.510	0.0022	0.005
14	3.17	0.011	0.00028	0.0015	0.000043	0.0010	1.071	0.506	0.0025	0.005
15	3.37	0.013	0.00018	0.0013	0.000054	0.0018	0.968	0.443	0.0023	0.005
16	3.18	0.013	0.00018	0.0014	0.000018	0.0007	1.008	0.495	0.0023	0.005
17	3.39	0.014	0.00019	0.0015	0.000059	0.0019	1.006	0.538	0.0026	0.006
18	1.59	0.005	0.00009	0.0008	0.000013	0.0003	0.618	0.199	0.0010	0.003