APPENDIX H

WATER QUALITY MODEL REPORT

TECHNICAL MEMORANDUM

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TO:	Peter Carter (Atlantic Gold)	**DATE:**	October 29, 2007
FROM:	Mike Gunsinger & Ken DeVos	**JOB NO:**	06-1118-041C (7000/7600)
CC:	Irwin Wislesky (Golder)		
RE:	**WATER QUALITY MODELING TO ASSESS GEOCHEMICAL CHANGES TO THE DOWNGRADIENT WATER BODIES, TOUQUOY GOLD PROJECT, NOVA SCOTIA**		

1.0 INTRODUCTION

Atlantic Gold (Atlantic) has retained Golder Associates Ltd. (Golder) to evaluate tailings management and mine waste geochemistry for the Touquoy Gold Project. In addition to the mine waste geochemistry, a water quality model was developed to estimate the concentrations of various constituents in the tailings management pond. Using the results of the site water quality model, a mixing model was developed to estimate the water quality of the downstream water bodies, including Scraggy Lake, Fish River and Lake Charlotte. The purpose of the model is to evaluate changes to the water quality in the downstream receivers after a long period of mine effluent discharge from the polishing pond. Flow rates were calculated for the various site areas and were coupled with water quality data to simulate the total concentrations of constituents in the receiver water bodies. The purpose of this technical memorandum is to provide preliminary water quality estimates for the water in Scraggy Lake, Fish River and Lake Charlotte.

2.0 DESCRIPTION OF WATER QUALITY MODEL

A mass-balance mixing cell model was developed to estimate the water quality in Scraggy Lake, Fish River and Lake Charlotte. The model consists of a number of site-specific components, consisting of both natural components (e.g., precipitation) and mine-site components (e.g., effluent discharge), that are linked together to form a series of mixing cells. Each mixing cell has two or more sources of mass load that are combined to determine a "mixed" or combined water quality. The model simulates a twelve month period, whereby it utilizes average monthly flow and calculates mass loading rates to determine total concentrations at mixing points in the modeled system. Model conditions are varied to simulate the total concentrations that would occur under extended periods of 'normal' flow, high flow and low flow conditions.

2.1 Mixing Cell Model

A mixing cell model is a useful tool to define discrete chemical mass loads from sub-basins, sub-components and facilities in order to conservatively estimate mixed concentrations downstream of the source. The chemical mass load is the mass of a constituent per unit time transported by a quantity of water. The concentrations within a mixing cell, such as a lake, from two flow components can be derived as follows:

$$C_3 = \frac{(C_1 \times Q_1) + (C_2 \times Q_2)}{(Q_1 + Q_2)} \quad (1)$$

C_1 = Concentration from Component 1

Q_1 = Flow from Component 1

C_2 = Concentration from Component 2

Q_2 = Flow from Component 2

C_3 = Blended Concentration from Mixing Components 1 and 2

2.2 Water Balance Inputs

Average monthly flow rates were derived from a baseline site water balance completed by Conestoga-Rovers and Associates (CRA, 2007). Although the average monthly flow rates cannot be used to evaluate transient or short-term events, such as storm flows, they are useful in establishing flow rates that are representative of typical site conditions. The results of the water quality simulations are therefore useful in qualitatively assessing water quality issues related to waste management, such as treatment criteria or proposed discharge limits.

The site water balance, as completed by CRA, considers the areas of the various subwatersheds that are flowing into each of the model components. The site water balance also incorporates the contributions from direct precipitation to the water bodies and water losses through evaporation, along with contributions from specific subwatersheds. The subwatersheds used to determine the flows entering and leaving each mixing cell are summarized as follows (CRA, 2007):

- Scraggy Lake Subwatersheds – IEL-5G, IEL-5H, IEL-5J, IEL-5K, IEL-5L and IEL-5M.
- Fish River Subwatersheds – IEL-5D, IEL-5E, IEL-5F, IEL-5N, IEL-5P, IEL-5Q, IEL-5R, IEL-5S, IEL-5T, IEL-5U, IEL-5V and IEL-5W.
- Lake Charlotte Subwatersheds – IEL-5C, IEL-5X, IEL-5Y, IEL-5Z and IEL-5AA.

The average flow rates that were used in the model are presented in Table 1. Under operating conditions the flows will slightly change as a consequence of the additional inflow from the mine site. The flow rate from the mine site is referred to as the mine effluent discharge. Thus, the outflow from Scraggy Lake, Fish River and Lake Charlotte were re-calculated to include the inflow of mine water to the system. Descriptions of the flow rates under operating conditions, along with assumptions associated with the water balance inputs, are summarized as follows:

1. Mine Effluent Discharge – mine water will have a set monthly average discharge rate for eight months of the year under 'normal', 'high' and 'low' flow conditions (Flow No. 1), as determined by the site water balance study (Golder, 2007). From December to March, the tailings management pond and the polishing pond will store water, and thus the site will not discharge mine water to Scraggy Lake during these months.

2. Scraggy Lake Subwatershed Net Flow – flow from all the Scraggy Lake subwatersheds. This flow rate was assumed to equal the flow rate at the Scraggy Lake outlet under baseline conditions (Flow BL 1).

3. Scraggy Lake Outflow – total flow that is entering Fish River from Scraggy Lake. This flow rate was calculated by adding the net flow rate from the Scraggy Lake Subwatersheds (Flow No. 2) to the Mine Effluent Discharge (Flow No. 1).

4. Fish River Subwatershed Net Flow – flow from all the Fish River subwatersheds. This flow was calculated by determining the difference between the baseline outflow from Fish River (Flow BL 2) and the baseline outflow from Scraggy Lake (Flow BL 1).

5. Fish River Outflow – total flow that is entering Lake Charlotte from Fish River. This flow was calculated by adding the outflow from Scraggy Lake (Flow No. 3) to the net flow from the Fish River Subwatershed (Flow No. 4).

6. Lake Charlotte Subwatershed Net Flows – flow from all the Lake Charlotte subwatersheds. This flow was calculated by determining the difference between the baseline outflow from Lake Charlotte (Flow BL 3) and the baseline outflow from Fish River (Flow BL 2).

7. Lake Charlotte Outflow – total flow that is leaving Lake Charlotte at the southern outlet of the lake. This flow was calculated by adding the outflows from Fish River (Flow No. 5) to the net flows from the Lake Charlotte Subwatershed (Flow No. 6).

High flow rates and low flow rates were determined based on the water balance completed for the mine area catchments. The percentage difference between the average cases and the high and low flow rate cases for the mine discharge was used to pro-rate the other flows (i.e., the flows for the Scraggy Lake, Fish River, and Lake Charlotte subwatersheds) for the high and low flow scenarios. The high and low flow rate scenarios were completed as part of a general evaluation of the potential long-term changes to water quality that could result from a prolonged dry or wet period.

2.3 Flow Logic

For the purposes of modeling the downgradient water bodies at the Touquoy site, the model is simplified into three main mixing zones. The three main mixing zones are as follows:

- Mix 1 – Scraggy Lake
- Mix 2 – Fish River, and
- Mix 3 – Lake Charlotte.

Each of these mixing zones have inflows with an assigned or calculated flow rate and water quality. The concentrations within each mixing cell are subsequently calculated to determine the final water quality in Lake Charlotte. The flow logic for the model is summarized by mixing zone as follows:

- Mix 1 – Mine Effluent Discharge is mixed with the Scraggy Lake Subwatershed Net Flow to produce the Scraggy Lake Outflow (Flow No. 1 + Flow No. 2 = Flow No. 3).
- Mix 2 – Scraggy Lake Outflow (Mix 1) is mixed with the Fish River Subwatershed Net Flow to produce the Fish River Outflow (Flow No. 3 + Flow No. 4 = Flow No. 5).
- Mix 3 – Fish River Outflow (Mix 2) is mixed with the Lake Charlotte Subwatershed Net Flow to produce the Lake Charlotte Outflow (Flow No. 5 + Flow No. 6 = Flow No. 7).

2.4 Water Chemistry Inputs

Water qualities for each model component used in the simulations are presented in Table 2. The water quality model was developed to determine the concentrations of the following parameters: aluminum, ammonia, antimony, arsenic, cadmium, calcium, chloride, chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, nickel, nitrate, phosphorous, potassium, selenium, silver, sodium, sulphate, uranium and zinc.

Table 2 summarizes the baseline water qualities and the calculated model inputs. Several assumptions were necessary in order to assign flows and water qualities to various site components. The assumptions required as part of the modeling process are summarized as follows:

- Bench scale tests to assess the effectiveness of aging and ferric iron treatment were completed by SGS Lakefield and are described in SGS (2007). In the memo written by SGS (2007), it was recommended to Atlantic that the water chemistry data reported for the detoxified solution after treatment should be used in the water quality model to represent the polishing pond water quality. The water quality of the detoxified solution after treatment was therefore assumed to be representative of the water in the polishing pond.

- The 2007 baseline water quality of Scraggy Lake, collected from four locations throughout the lake, was used to calculate an average water quality for the lake. The four locations are as follows: SL-SW-1, SL-SW-2, SL-SW-3 and SL-SW-4. The average concentrations from the four locations were assumed to be representative of the water quality of the flows from the Scraggy Lake Subwatersheds.

- The Fish River Subwatershed water quality was calculated from the baseline load contribution from the Fish River Subwatershed. The load from the Fish River Subwatershed was assumed to equal the load difference between the Scraggy Lake outlet (SL-SW-3) and the Fish River outlet (LC-SW-2). The load is then divided by the flow from the Fish River Subwatershed to attain concentrations in mg/L (Table 2).

- The 2007 baseline water quality of Weeks Lake, collected at the point where Weeks Lake discharges into Ship Harbour (LC-SW-1), was assumed to be representative of the water quality of the Lake Charlotte Subwatersheds.

- Water qualities of the various subwatersheds within each mixing zone are assumed to be equal. The three main mixing zones each have a defined water quality (Table 2).

- Concentrations of parameters that were below detection were assumed to be present at concentrations that are half of the detection limit.

Finally, it is important to note that water quality calculations for these simulations do not take into consideration geochemical or biological processes that may be controlling concentrations in solution (i.e., biodegradation, precipitation and adsorption reactions). These calculations, therefore, assume that the transport of constituents is conservative.

2.5 Nitrate and Ammonia from Residual Explosives

Site explosive use is a principal source of nitrate and ammonia. The loading of nitrate and ammonia from the dissolution of residual explosives is included into the model and calculated differently than the other parameters. Due to differences in underground blasting rates, different assumptions were used to calculate underground ammonia and nitrate loading rates. The mass loading of nitrate and ammonia is dependent on the usage rate of explosives. The assumptions associated with the underground nitrate and ammonia loading calculations from the residual explosives are summarized as follows:

- ANFO explosives are used for blasting and consist of 94% NH_4NO_3 and 6% fuel oil.
- Explosives use rate is assumed to be 0.7 kilograms of explosives per cubic meter (kg/m^3) of blasted rock.
- Bedrock density is assumed to be 2.6 g/cm^3.
- Complete dissolution of residual (undetonated) explosives is estimated to be 5% of original amount (INCO, 1998; Forsyth et al., 1995).

It is assumed that all ammonia and nitrate will be dissolved by the mine runoff and reports directly to the tailings pond. It is further assumed that the treatment process does not remove significant masses of ammonia and nitrate.

3.0 WATER QUALITY OF DOWNGRADIENT WATER BODIES

The results of the water quality mixing model are presented as annual average concentrations in Table 3. Appendices A, B and C contain the raw results of the load and mixing cell calculations. In Table 3, the simulated concentrations are compared to Federal Canadian Metal Mining Effluent Regulations (MMER, 2002) and to Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2002). The comparisons to CCME guidelines provide insights regarding parameters that may be of environmental concern, and also serves as a standard to gauge the magnitude of concentrations that are present in the water bodies that are located downgradient of the site.

The simulation results suggest that the mass load contribution from the mine water is the major source of load for some constituents (i.e., arsenic). Generally, the concentrations of most constituents are the highest in Scraggy Lake, and decrease as the water moves down through Fish River and into Lake Charlotte. Because the concentrations are lower in the subwatersheds, the concentrations become diluted as the proportion of flow from the subwatersheds increases with increasing distance down gradient. However, it is important to note that the degree to which the concentrations decrease is non-linear, since the mass load contributions from the various subwatersheds do influence the results.

3.1 Influence of Flow Conditions

Three different scenarios were simulated to assess the affect of variable flow conditions: 1) normal flow, 2) high flow and 3) low flow (Appendices A, B and C). Since the mass load contributions from the various subwatersheds do influence the results, the influence of high flow and low flow conditions on the observed parameter concentrations is not linear. In the case of most parameters, the flow conditions do not result in significant changes to the overall water quality. Because the flow from the various areas proportionately increases or decreases, the mixing ratios between the site components will be similar. In other cases (e.g., concentrations governed by mine water discharges that are independent of flows, such as nitrate and ammonia), concentrations are typically lower under high flow conditions due to the additional amount of water mixed with the mass load of these parameters. Under low flow conditions, the converse is true and concentrations in the receiving waters increase.

The specific details of the simulation results for each mixing zone under average or 'normal' conditions are summarized in the following sections.

3.2 Scraggy Lake

The concentrations of most constituents within Scraggy Lake are greater than the concentrations in Fish River and Lake Charlotte. Baseline concentrations of aluminum in Scraggy Lake, Fish River and Lake Charlotte, and baseline concentrations of cadmium in Scraggy Lake are greater than the CCME guidelines. Thus, this comparison implies that the mine water is a minor contributor of mass load of aluminum and cadmium to the Scraggy Lake – Fish River – Lake Charlotte flow system.

The modeling results under normal flow conditions for Scraggy Lake, as compared to CCME guidelines, are summarized as follows:

- Annual average concentrations of total arsenic (0.0082 mg/L) in Scraggy Lake are greater than the CCME guideline (0.005 mg/L; CCME, 2002). Monthly average concentrations of total arsenic range from 0.001 mg/L to 0.036 mg/L over the entire twelve month period, but are expected to exceed the CCME guideline from April to November if arsenic is discharged at a concentration of 0.17 mg/L.
- Annual average concentrations of total aluminum (0.18 mg/L) are greater than the CCME guideline (0.1 mg/L or 0.005 mg/L depending on lake conditions). Monthly average concentrations of total aluminum (0.16–0.19 mg/L) are greater than the CCME guideline over the entire twelve month period due to the influence of the baseline water quality.
- Annual average concentrations of total cadmium (0.000019 mg/L) are marginal greater than the CCME guideline (0.000017 mg/L). Monthly average concentrations of total cadmium are expected to marginally exceed the CCME guideline from October to June of the following year (0.000018–0.000020 mg/L).
- Annual average concentrations of total copper (0.0095 mg/L) are greater than the CCME guideline (0.002 mg/L). Monthly average concentrations of total copper are expected to exceed the CCME guideline from April to November (0.009–0.04 mg/L).
- Annual average concentrations of total iron (0.41 mg/L) are greater than the CCME guideline (0.3 mg/L). Monthly average concentrations of total iron only exceed the CCME guideline from April to November (0.4–1.1 mg/L).
- Annual average concentration of total ammonia is 0.23 mg/L and is below the CCME guideline. Monthly average concentrations of total ammonia range from 0.025 mg/L to 0.63 mg/L.
- Annual average concentration of total nitrate is 0.25 mg/L. Monthly average concentrations of nitrate range from 0.05 mg/L to 0.7 mg/L.

3.3 Fish River

The water quality model results indicate that the concentrations of some parameters in Fish River will increase as a result of mine water being released into Scraggy Lake. The modeling results for Fish River under normal flow conditions, as compared to CCME guidelines, are summarized as follows:

- Annual average concentrations of total arsenic (0.0058 mg/L) are greater than the CCME guideline (0.005 mg/L). Monthly average concentrations of total arsenic are expected to exceed the CCME guideline from April to November (0.006–0.01 mg/L).
- Annual average concentrations of total aluminum (0.17 mg/L) are greater than CCME guidelines (0.1 mg/L or 0.005 mg/L depending on lake conditions). Monthly average concentrations of total aluminum (0.17–0.18 mg/L) are greater than the CCME guideline over the entire twelve month period due to the influence of the baseline water quality.
- Annual average concentrations of total cadmium (0.000007 mg/L) and monthly average concentrations (0.0000069–0.0000073 mg/L) in Fish River are below the CCME guideline (0.000017 mg/L).
- Annual average concentrations of total copper (0.0032 mg/L) are expected to be greater than the CCME guideline (0.002 mg/L). The monthly average concentrations of total copper from April to November (0.003–0.01 mg/L) marginally exceed the CCME guideline.
- Annual average concentrations of total iron (0.27 mg/L) are expected to be below the CCME guideline (0.3 mg/L). However, the monthly average concentrations of total iron from June to September (0.34–0.49 mg/L) marginally exceed the CCME guideline
- Annual average concentrations (0.079 mg/L) and monthly average concentrations (0.025–0.20 mg/L) of total ammonia are expected to be below the CCME guideline in Fish River.
- Annual average concentrations (0.18 mg/L) and monthly average concentrations (0.13–0.31 mg/L) of nitrate are expected to be near or below the average baseline water quality for Fish River, and thus no change in concentration of nitrate is expected in Fish River.

Overall, there is a decrease in concentrations, as compared to Scraggy Lake, as a result of dilution from mixing of the water from the Fish River Subwatersheds with the outflow from Scraggy Lake. This dilution process, however, is not sufficient to reduce arsenic, copper or iron to below CCME guidelines. Other parameters, such as aluminum, that are near or exceed CCME guidelines in Fish River reflect the baseline inflows from which the various subwatersheds contribute to the overall flow into Lake Charlotte.

3.4 Lake Charlotte

The mass load from the mine effluent will be mixed within Scraggy Lake, and then it will get transported to Lake Charlotte via Fish River. The water quality model results indicate that the concentrations of some parameters in Lake Charlotte will increase as a result of mine water being released into Scraggy Lake. As with the Fish River mixing zone, overall concentrations of these parameters within Lake Charlotte decrease relative to the upstream values due to mixing. Again, similar to Fish River, the dilution that occurs as a result of the mixing processes is not sufficient to decrease concentrations of arsenic or copper to below CCME guidelines.

The modeling results for Lake Charlotte under normal flow conditions, as compared to CCME guidelines, are summarized as follows:

- At a treated mine effluent discharge concentration of 0.17 mg/L of total arsenic, annual average concentrations of arsenic (0.0051 mg/L) in Lake Charlotte are marginally greater than the CCME guideline (0.005 mg/L). Monthly average concentrations of total arsenic are expected to exceed the CCME guideline from April to November (0.005–0.01 mg/L).
- Annual average concentrations of total aluminum (0.17 mg/L) in Lake Charlotte are greater than CCME guidelines (0.1 mg/L or 0.005 mg/L depending on lake conditions). Monthly average concentrations of total aluminum are greater than the CCME guideline over the entire twelve month period due to the influence of the baseline water quality.
- Annual average concentrations of total cadmium (0.0000077 mg/L) in Lake Charlotte are below the CCME guideline (0.000017 mg/L).
- Annual average concentrations of total copper (0.0023 mg/L) are expected to be greater than the CCME guideline (0.002 mg/L). The monthly average concentrations of total copper from April to November (0.002–0.009 mg/L) marginally exceed the CCME guideline.
- Annual average concentrations of total iron (0.24 mg/L) are expected to be below the CCME guideline (0.3 mg/L). The monthly average concentrations of total iron from July to September (0.33–0.38 mg/L) marginally exceed the CCME guideline
- Annual average concentrations (0.057 mg/L) and monthly average concentrations (0.02–0.1 mg/L) of total ammonia are expected to be below the CCME guideline in Lake Charlotte.
- Annual average concentrations of nitrate (0.16 mg/L) are estimated to be marginally greater than the average baseline water quality in Lake Charlotte (0.1 mg/L). Monthly average concentrations of nitrate range from 0.1 to 0.2 mg/L. Septic systems from cottages are known to be a source of nutrients, including nitrate, to adjacent surface water bodies. Based on the observed increases in the baseline concentrations of nitrate between the upstream (0.05 mg/L, Scraggy Lake) and downstream sampling locations (0.1 mg/L, Lake Charlotte), the influence that cottages have on concentrations of nitrate in Lake Charlotte is likely significant, and will likely reflect seasonal variations in cottage usage. The influence that cottages have on the water quality of Lake Charlotte is likely greater in the south end of Lake Charlotte where the lakeshore is more greatly populated. Changes to the concentrations of nitrate due to mining operations, therefore, are not expected to be greater than those from the cottages present on the lake.

3.5 Total Concentrations versus Dissolved Concentrations

Because the measured total concentrations includes masses associated with the suspended solids and not only metals in the aqueous phase, total concentrations are higher than dissolved concentrations. The geochemical form of the metals is important with respect to the availability of the constituents. To assess the differences in the simulated concentrations in the downgradient water bodies, a simulation under normal flow conditions was conducted using the dissolved concentration in the detoxified mine effluent after treatment.

The key differences in the simulation results when using dissolved concentrations rather than total concentrations are as follows:

- Annual average concentrations of dissolved arsenic are below the CCME guidelines in Scraggy Lake (0.0012 mg/L), Fish River (0.004 mg/L) and Lake Charlotte (0.004 mg/L).

- Annual average concentrations of dissolved iron are below the CCME guideline in Scraggy Lake (0.23 mg/L), Fish River (0.22 mg/L) and Lake Charlotte (0.22 mg/L).
- Annual average concentrations of copper (0.0016 mg/L) are below the CCME guideline in Lake Charlotte. However, the monthly average concentrations of copper (0.002–0.004 mg/L) are expected to exceed the guideline in Lake Charlotte from June to September. The annual average concentrations still expected to exceed the CCME guideline in Scraggy Lake and Fish River, with concentrations of 0.0047 mg/L and 0.0020 mg/L, respectively.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the input data and simulation results considered as part of this water quality modeling exercise, some key conclusions are as follows:

- At a treated mine effluent discharge concentration of 0.17 mg/L of total arsenic, annual average concentrations of total arsenic are expected to be greater than the CCME guideline in Scraggy Lake, Fish River and Lake Charlotte.
- At a treated mine effluent discharge concentration of 0.20 mg/L of total copper, the concentrations of total copper are expected to be greater than the CCME guideline in Scraggy Lake, Fish River and Lake Charlotte.
- Annual average concentrations of total aluminum are expected to be greater than the CCME guideline in Scraggy Lake, Fish River and Lake Charlotte. However, the simulated concentrations of total aluminum in Scraggy Lake, Fish River and Lake Charlotte are equal to baseline concentrations from each of these water bodies (0.2 mg/L).
- Annual average concentrations of total cadmium are expected to be greater than the CCME guideline in Scraggy Lake. However, dilution of the mass load of total cadmium by the subwatershed flows is sufficient to lower these concentrations to below CCME guidelines in Fish River and Lake Charlotte.
- Comparing the simulation results using dissolved concentrations rather than total concentrations suggests that the dissolved concentrations of some metals, in particular arsenic, copper and iron, are significantly lower as compared to the total concentrations. Whether the total concentrations or dissolved concentrations are more representative of the concentrations of metals under actual field conditions will have significant affects on the mobility and bioavailability.

Based on the results and conclusions, the following is recommended:

- Treatment of arsenic should reduce concentrations to values that will not cause an increase of overall water quality in Lake Charlotte to values elevated relative to CCME guidelines. However, to maintain concentrations at or below baseline levels, the mine effluent will need to achieve a concentration of 0.02 mg/L or lower. Contingency for treatment of arsenic will be required if primary treatment needs to be enhanced.
- An additional water quality sampling program in water bodies located on the mining property (i.e., Square Lake) and downstream of the mine site (i.e., Scraggy Lake – Fish River – Lake Charlotte flow system) should be conducted to refine the water quality estimates, or in support of a detailed mixing model.

- Monitoring programs should consider the distribution and loading of nitrate during various seasons to assess the impact onto Lake Charlotte from cottage occupancy. Thus, it is recommended that additional monitoring points be sampled and distributed in such a way as to gauge the nitrate loading and potential source(s) along the south-western shoreline in Lake Charlotte.
- If concentrations of ammonia and nitrate are observed to be greater than estimated using the current mixing model, an explosive use/reduction plan should be prepared to reduce the load of total nitrate and ammonia in mine waters. An explosive reduction plan would include, for example, a management strategy to use explosives efficiently and minimize the masses of explosive residues and waste.
- Because the model does not consider changes in chemistry based on attenuation processes, the role of geochemical and biological processes in attenuating metals and other contaminants should be investigated with the intention to better estimate changes to the downstream receiver water bodies.
- The model should be updated regularly as process and treatment data becomes more refined.

Based on the overall modeling results, with the exception of arsenic, it is expected that the discharge of mine water into Scraggy Lake, with subsequent flows to the Fish River and Lake Charlotte watersheds, will only have a minor influence on the overall water quality in Lake Charlotte.

MRG/KJD/IW/dh

Attachments:

Table 1	Average Monthly Flow Rates for the Mine Effluent and the Water Bodies Downgradient of the Mine Site, Touquoy Gold Project
Table 2	Baseline Water Qualities from Monitoring Stations and Water Quality Inputs, Touquoy Gold Project
Table 3	Comparison of Water Quality Model Inputs and Simulation Results to Guideline Values, Touquoy Gold Project
Appendix A	Average Monthly Loading Rates and Mixing Cell Calculation for Normal Flow Conditions
Appendix B	Average Monthly Loading Rates and Mixing Cell Calculation for High Flow Conditions
Appendix C	Average Monthly Loading Rates and Mixing Cell Calculation for Low Flow Conditions
Appendix D	Average Monthly Loading Rates and Mixing Cell Calculation for Normal Flow Conditions Using Dissolved Concentrations

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CRA [Conestoga-Rovers and Associates], 2007. Letter Re: Touquoy Gold Project – Water Quality Modeling. Reference No. 820933-D. Dated June 1, 2007.

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MMER [Metal Mining Effluent Regulations], 2002. Metals Mining Effluent Regulations. Canada Gazette Part II, Vol. 136, No. 13. SOR/DORS/2002-222.

TABLE 1
AVERAGE MONTHLY FLOW RATES FOR THE MINE EFFLUENT AND THE WATER BODIES DOWNGRADIENT FROM THE MINE SITE
TOUQUOY GOLD PROJECT

Flow Component		Average Monthly Flow Rates (m^3/s)												Source
Flow No.	Description	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Baseline Conditions														
BL 1	Scraggy Lake Outflow	1.43	1.47	2.06	2.15	1.37	0.79	0.46	0.51	0.33	0.76	1.43	1.68	CRA (2007) [10]
BL 2	Fish River Outflow	5.59	5.74	8.06	8.39	5.35	3.09	1.82	2.00	1.31	2.97	5.60	6.58	CRA (2007) [10]
BL 3	Lake Charlotte Outflow	9.59	9.85	13.84	14.40	9.18	5.30	3.12	3.43	2.24	5.11	9.61	11.29	CRA (2007) [10]
Operating Conditions														
Scenario 1 – Normal Flow														
No. 1	Mine Effluent Discharge[2]	0.00	0.00	0.00	0.09	0.09	0.09	0.09	0.09	0.09	0.039	0.07	0.00	Golder (2007) [11]
No. 2	Scraggy Lake Subwatershed Net Flow[3]	1.43	1.47	2.06	2.15	1.37	0.79	0.46	0.51	0.33	0.76	1.43	1.68	CRA (2007) [10]
No. 3	Scraggy Lake Outflow[4]	1.43	1.47	2.06	2.24	1.46	0.88	0.55	0.60	0.42	0.80	1.50	1.68	Calculated [4]
No. 4	Fish River Subwatershed Net Flow[5]	4.16	4.27	6.00	6.24	3.98	2.30	1.36	1.49	0.98	2.21	4.17	4.90	CRA (2007) [10]
No. 5	Fish River Outflow[6]	5.59	5.74	8.06	8.48	5.44	3.18	1.91	2.09	1.40	3.01	5.67	6.58	Calculated [6]
No. 6	Lake Charlotte Subwatershed Net Flow[7]	4.00	4.11	5.78	6.01	3.83	2.21	1.30	1.43	0.93	2.14	4.01	4.71	CRA (2007) [10]
No. 7	Lake Charlotte Outflow[8]	9.59	9.85	13.84	14.49	9.27	5.39	3.21	3.52	2.33	5.15	9.68	11.29	Calculated [8]
Scenario 2 – High Flow [1]														
No. 1	Mine Effluent Discharge[2]	0.00	0.00	0.00	0.15	0.13	0.12	0.12	0.13	0.13	0.07	0.10	0.00	Golder (2007) [11]
No. 2	Scraggy Lake Subwatershed Net Flow[3]	1.43	1.47	2.06	3.31	1.98	1.15	0.67	0.74	0.48	1.26	1.94	1.68	Calculated [9]
No. 3	Scraggy Lake Outflow[4]	1.43	1.47	2.06	3.45	2.11	1.27	0.79	0.87	0.61	1.32	2.04	1.68	Calculated [9]
No. 4	Fish River Subwatershed Net Flow[5]	4.16	4.27	6.00	9.61	5.76	3.34	1.98	2.16	1.42	3.65	5.66	4.90	Calculated [9]
No. 5	Fish River Outflow[6]	5.59	5.74	8.06	13.06	7.87	4.61	2.77	3.03	2.03	4.98	7.70	6.58	Calculated [9]
No. 6	Lake Charlotte Subwatershed Net Flow[7]	4.00	4.11	5.78	9.25	5.55	3.21	1.89	2.07	1.35	3.54	5.44	4.71	Calculated [9]
No. 7	Lake Charlotte Outflow[8]	9.59	9.85	13.84	22.31	13.42	7.83	4.67	5.10	3.38	8.51	13.14	11.29	Calculated [9]
Scenario 3 – Low Flow [1]														
No. 1	Mine Effluent Discharge[2]	0.00	0.00	0.00	0.06	0.06	0.06	0.06	0.06	0.06	0.02	0.05	0.00	Golder (2007) [11]
No. 2	Scraggy Lake Subwatershed Net Flow[3]	1.43	1.47	2.06	1.26	0.90	0.51	0.30	0.33	0.22	0.35	1.01	1.68	Calculated [9]
No. 3	Scraggy Lake Outflow[4]	1.43	1.47	2.06	1.32	0.95	0.57	0.35	0.39	0.28	0.37	1.06	1.68	Calculated [9]
No. 4	Fish River Subwatershed Net Flow[5]	4.16	4.27	6.00	3.67	2.60	1.50	0.88	0.97	0.65	1.02	2.94	4.90	Calculated [9]
No. 5	Fish River Outflow[6]	5.59	5.74	8.06	4.99	3.56	2.07	1.24	1.36	0.93	1.38	4.00	6.58	Calculated [9]
No. 6	Lake Charlotte Subwatershed Net Flow[7]	4.00	4.11	5.78	3.53	2.51	1.44	0.84	0.93	0.62	0.98	2.83	4.71	Calculated [9]
No. 7	Lake Charlotte Outflow[8]	9.59	9.85	13.84	8.53	6.06	3.50	2.08	2.29	1.55	2.37	6.83	11.29	Calculated [9]
Percent Difference – Mine Effluent Flow														
% Difference b/w Scenario 1 and Scenario 2		0%	0%	0%	54%	45%	45%	46%	45%	45%	65%	36%	0%	Calculated
% Difference b/w Scenario 1 and Scenario 3		0%	0%	0%	-41%	-35%	-35%	-35%	-35%	-34%	-54%	-29%	0%	Calculated

Notes:

- Monthly average flow rates represent the flow rates during the second year of mining operations and onward.

(1) The high and low flow scenarios represent the range of flow rate conditions that may be present at the site over the life of mine. Changes to the flow rates from the subwatersheds reflect the increased or decreased flow rate. The subwatershed flow rates for the high and low flow scenarios were calculated by first determining the percent difference in the mine discharge between the high and normal flow and the low and normal flow, and then increasing (high flow scenario) or decreasing (low flow scenario) the flow rate based on the percent difference.

(2) Flow No. 1 – Mine Effluent Discharge is based on the site water balance for the mine site.

(3) Flow No. 2 – Scraggy Lake Subwatershed Net Flow is the net flow contribution from all the inflows and losses directly affecting Scraggy Lake.

(4) Flow No. 3 – Scraggy Lake Outflow is the cumulative flow from the Scraggy Lake subwatersheds and the mine effluent discharge – Mine Effluent Discharge (Flow No. 1) + Scraggy Lake Subwatershed Net Flow (Flow No. 2).

(5) Flow No. 4 – Fish River Subwatershed Net Flow is the net flow contribution from all the inflows and losses directly affecting Fish River

(6) Flow No. 5 – Fish River Outflow is the cumulative flow from Fish River subwatersheds and from the Scraggy Lake outflow – Scraggy Lake Outflow (Flow No. 3) + Fish River Subwatershed Net Flow (Flow No. 4)

(7) Flow No. 6 – Lake Charlotte Subwatershed Net Flow is the net flow contribution from all the inflows and losses directly affecting Lake Charlotte.

(8) Flow No. 7 – Lake Charlotte outflow is the cumulative flow from the Lake Charlotte subwatersheds and the Fish River outflow – Fish River Outflow (Flow No. 5) + Lake Charlotte Subwatershed Net Flow (Flow No. 6).

(9) Flows No. 2 to No. 7 for Scenarios 2 and 3 are prorated based on the percent difference between the mine effluent flows (see note 1)

(10) CRA (Conestoga-Rovers and Associates), 2007. Letter Re: Touquoy Gold Project – Water Quality Modeling. Reference No. 820933-D. Dated June 1, 2007.

(11) Golder (Golder Associates Ltd.), 2007. Technical memorandum on the Water Balance Study, Touquoy Project. Project No. 06-1118-041C. Dated August 28, 2007.

TABLE 2
BASELINE WATER QUALITIES FROM MONITORING STATIONS AND WATER QUALITY MODEL INPUTS
TOUQUOY GOLD PROJECT

Parameters	Units	Baseline Water Qualities from Monitoring Stations [1]						Water Quality Model Inputs		
		SL-SW-1	SL-SW-2	SL-SW-3	SL-SW-4	LC-SW-1	LC-SW-2	Average Scraggy Lake Baseline Water Quality [2]	Fish River Subwatersheds Water Quality [3]	Lake Charlotte Baseline Water Quality [4]
Aluminum	mg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Ammonia (Total)	mg/L as N	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*0.025*	*0.025*	*0.025*
Antimony	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	*0.001*	*0.001*	*0.001*
Arsenic	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	0.004	*0.001*	0.005	0.004
Cadmium	mg/L	<0.000017	0.00002	0.00003	0.00003	0.00003	<0.000017	0.00002	0.000003	0.000009
Calcium	mg/L	1	1	1	1	1	1	1	1	1
Chloride	mg/L	4	4	4	4	5	4	4	4	4
Chromium	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.005	0.001	*0.001*
Cobalt	mg/L	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	*0.0002*	*0.0002*	*0.0002*
Copper	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	*0.001*	*0.001*	*0.001*
Cyanide	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	*0.001*	*0.001*	*0.001*
Iron	mg/L	0.3	0.4	0.2	0.2	0.1	0.2	0.2	0.2	0.2
Lead	mg/L	<0.0005	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	*0.00031*	*0.00025*	*0.00025*
Magnesium	mg/L	0.4	0.4	0.5	0.4	0.6	0.5	0.4	0.5	0.5
Manganese	mg/L	0.06	0.06	0.04	0.03	0.03	0.05	0.05	0.05	0.05
Nickel	mg/L	<0.002	0.001	0.001	0.001	0.001	0.001	*0.001*	*0.001*	*0.001*
Nitrate	mg/L as N	0.02	0.09	0.02	0.07	0.02	0.1	0.05	0.2	0.1
Phosphorous	mg/L	<0.02	0.02	<0.02	0.02	0.02	<0.02	0.02	*0.01*	*0.01*
Potassium	mg/L	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.3	0.3
Selenium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	*0.0005*	*0.0005*	*0.0005*
Silver	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	*0.00005*	*0.00005*	*0.00005*
Sodium	mg/L	3	3	3	3	3	3	3	3	3
Sulphate	mg/L	<2	<2	<2	<2	<2	<2	*1*	*1*	*1*
Uranium	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	*0.00005*	*0.00005*	*0.00005*
Zinc	mg/L	0.008	0.009	0.01	0.02	0.008	0.02	0.01	0.02	0.02

Notes:

0.001 – Values in red and italics indicates that the value is set at half the detection limit. Concentrations were assumed to be half of the detection limit, if the analysis results were below the detection limit.

(1) Baseline water quality was provided by CRA.

(2) Average Scraggy Lake baseline water quality was calculated by averaging the water qualities from the four Scraggy Lake monitoring stations – SL-SW-1, SL-SW-2, SL-SW-3 and SL-SW-4.

(3) Fish River subwatershed water quality was calculated by determining the load contribution from the Fish River subwatershed. The load contribution was calculated by using the baseline water quality and average annual flow rates from the Scraggy Lake outlet (SL-SW-3) and the Fish River outlet (LC-SW-2) [e.g., mg/L x L/1000 mL x mL/cm^3 x 1000000 cm^3/m^3 x m^3/hr = mg/hr]. The load from the Fish River subwatersheds is then divided by the flow rate from the subwatersheds to determine the concentrations in mg/L [e.g., mg/hr x hr/m^3 x m^3/1000000 cm^3 x cm^3/mL x 1000 mL/L = mg/L].

(4) Lake Charlotte baseline water quality is assumed to be equal to the water quality measured at the Fish River outlet – LC-SW-2.

(5) MMER [Metal Mining Effluent Regulations], 2002. Metals Mining Effluent Regulations. Canada Gazette Part II, Vol. 136, No. 13. SOR/DORS/2002-222.

(6) CCME [Canadian Council of Ministers of the Environment], 2002. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Summary Tables. Updated 2002.

(7) CCME guideline value is set at 2.2 for total ammonia at pH 6.5 and 10°C.

(8) There is no CCME guideline for total cyanide. However, the CCME guideline for free cyanide is 0.005 mg/L.

TABLE 3
COMPARISON OF WATER QUALITY MODEL INPUTS AND SIMULATION RESULTS TO GUIDELINE VALUES FOR NORMAL FLOW CONDITIONS
TOUQUOY GOLD PROJECT

Parameters	Units	Water Quality Model Inputs				Simulation Results			Water Quality Guidelines	
		Scraggy Lake Baseline Water Quality	Fish River Baseline Water Quality	Lake Charlotte Baseline Water Quality	Polishing Pond Water Quality [1]	Scraggy Lake Outlet	Fish River Outlet	Lake Charlotte Outlet	Federal Canadian Metal Mining Effluent Regulations [2]	Canadian Water Quality Guidelines for the Protection of Aquatic Life [3]
Aluminum	mg/L	0.19	0.17	0.17	0.040				-	0.005 [4]
Ammonia (Total)	mg/L as N	<0.05	<0.05	<0.05	17	0.23	0.079	0.057	-	2.2 [5]
Antimony	mg/L	<0.002	<0.002	<0.002	0.011	0.0014	0.0011	0.0011	-	-
Arsenic	mg/L	<0.002	0.005	0.004	0.17				0.5	0.005
Cadmium	mg/L	0.00002	<0.000017	<0.000017	<0.000003		0.0000072	0.0000077	-	0.000017
Calcium	mg/L	1.0	1.3	1.2	215	10	3.6	2.6	-	-
Chloride	mg/L	4.0	4.0	4.0	24	4.8	4.2	4.1	-	-
Chromium	mg/L	0.005	<0.002	<0.002	<0.0005	0.0046	0.0020	0.0016	-	0.0099
Cobalt	mg/L	<0.0004	<0.0004	<0.0004	0.22	0.0094	0.0026	0.0016	-	-
Copper	mg/L	<0.002	<0.002	<0.002	0.20				0.3	0.002 [6]
Cyanide (Total)	mg/L	<0.002	<0.002	<0.002	0.44	0.020	0.0059	0.0039	1	- [7]
Iron	mg/L	0.24	0.22	0.21	4.5		0.27	0.24	-	0.3
Lead	mg/L	<0.0005	<0.0005	<0.0005	0.0018	0.00037	0.00028	0.00027	0.2	0.001 [8]
Magnesium	mg/L	0.43	0.50	0.50	10	0.84	0.59	0.55	-	-
Manganese	mg/L	0.048	0.052	0.048	0.13	0.049	0.052	0.050	-	-
Nickel	mg/L	<0.002	<0.002	<0.002	0.0071	0.0013	0.0011	0.0010	0.5	0.025 [9]
Nitrate	mg/L as N	0.05	0.16	0.13	0.12	0.25	0.18	0.16	-	- [10]
Phosphorous	mg/L	0.015	<0.02	<0.02	0.010	0.015	0.011	0.011	-	-
Potassium	mg/L	0.33	0.30	0.30	67	3.1	1.1	0.74	-	-
Selenium	mg/L	<0.001	<0.001	<0.001	<0.001	0.00050	0.00050	0.00050	-	0.001
Silver	mg/L	<0.0001	<0.0001	<0.0001	0.00032	0.000061	0.000053	0.000052	-	0.0001
Sodium	mg/L	3.0	2.9	2.9	610	29	10	6.9	-	-
Sulphate	mg/L	<2	<2	<2	1400	60	17	10	-	-
Uranium	mg/L	<0.0001	<0.0001	<0.0001	0.0021	0.00014	0.00007	0.00006	-	-
Zinc	mg/L	0.012	0.020	0.018	0.027	0.013	0.018	0.018	0.5	0.03

Notes:

Concentration greater than the CCME guideline.

<0.001 – Values in red indicate that the value is below the detection limit. Concentrations were assumed to be half of the detection limit, if the analysis results were below the detection limit.

(1) Polishing Pond water quality was taken from the water chemistry of the mine effluent after treatment and aging (SGS, 2007).

(2) MMER [Metal Mining Effluent Regulations], 2002. Metals Mining Effluent Regulations. Canada Gazette Part II, Vol. 136, No. 13. SOR/DORS/2002-222.

(3) CCME [Canadian Council of Ministers of the Environment], 2002. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Summary Tables. Updated 2002.

(4) Aluminum guideline = 0.005 mg/L, if pH <6.5, $[Ca^{2+}]$ <4 mg/L and DOC <2 mg/L; aluminum guideline = 0.1 mg/L, if pH ≥6.5, $[Ca^{2+}]$ ≥4 mg/L and DOC ≥2 mg/L.

(5) Total Ammonia guideline = 1.37 mg/L at pH 8.0, T = 10°C; ammonia guideline = 2.20 mg/L at pH 6.5, T = 10°C.

(6) Copper guidline = 0.002 mg/L, if $[CaCO_3]$ = 0–120 mg/L; copper guideline = 0.003 mg/L, if $[CaCO_3]$ = 120–180mg/L; and copper guideline = 0.004 mg/L, if $[CaCO_3]$ >180 mg/L.

(7) There is no CCME guideline for total cyanide. However, the CCME guideline for free cyanide is 0.005 mg/L.

(8) Lead guideline = 0.001 mg/L, if $[CaCO_3]$ = 0–60 mg/L; lead guideline = 0.002 mg/L, if $[CaCO_3]$ = 60–120 mg/L; lead guideline = 0.004 mg/L, if $[CaCO_3]$ = 120–180 mg/L; lead guideline = 0.007 mg/L, if $[CaCO_3]$ >180 mg/L.

(9) Nickel guideline = 0.025 mg/L, if $[CaCO_3]$ = 0–60 mg/L; nickel guideline = 0.065 mg/L, if $[CaCO_3]$ = 60–120 mg/L; nickel guideline = 0.11 mg/L, if $[CaCO_3]$ = 120–180 mg/L; nickel guideline = 0.15 mg/L, if $[CaCO_3]$ >180 mg/L.

(10) Nitrate guideline – there is no specific guideline value, but concentrations that stimulate weed growth should be avoided.

APPENDIX A

AVERAGE MONTHLY LOADING RATES AND MIXING CELL CALULATIONS FOR NORMAL FLOW CONDITIONS

TABLE A1
AVERAGE MONTHLY LOADING RATES FOR THE MINE EFFLUENT DISCHARGE
SCENARIO 1 - NORMAL FLOW
TOUQUOY GOLD PROJECT

Parameter	Mine Effluent Water Quality [1]	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mine Effluent Discharge Rate (m^3/s)		0	0	0	9.45E-02	8.71E-02	8.58E-02	8.56E-02	8.64E-02	8.74E-02	3.94E-02	7.32E-02	0
Ag	0.0003	0	0	0	3.02E-02	2.79E-02	2.75E-02	2.74E-02	2.76E-02	2.80E-02	1.26E-02	2.34E-02	0
Al	0.04	0	0	0	3.78E+00	3.48E+00	3.43E+00	3.43E+00	3.46E+00	3.49E+00	1.57E+00	2.93E+00	0
As	0.2	0	0	0	1.61E+01	1.48E+01	1.46E+01	1.46E+01	1.47E+01	1.49E+01	6.69E+00	1.24E+01	0
Ca	215	0	0	0	2.03E+04	1.87E+04	1.85E+04	1.84E+04	1.86E+04	1.88E+04	8.46E+03	1.57E+04	0
Cd	*0.000002*	0	0	0	1.42E-04	1.31E-04	1.29E-04	1.28E-04	1.30E-04	1.31E-04	5.90E-05	1.10E-04	0
Cl	24	0	0	0	2.27E+03	2.09E+03	2.06E+03	2.06E+03	2.07E+03	2.10E+03	9.45E+02	1.76E+03	0
Co	0.2	0	0	0	2.05E+01	1.89E+01	1.86E+01	1.86E+01	1.87E+01	1.90E+01	8.54E+00	1.59E+01	0
Cr	*0.0003*	0	0	0	2.36E-02	2.18E-02	2.15E-02	2.14E-02	2.16E-02	2.18E-02	9.84E-03	1.83E-02	0
Cu	0.2	0	0	0	1.90E+01	1.75E+01	1.73E+01	1.72E+01	1.74E+01	1.76E+01	7.91E+00	1.47E+01	0
Fe	4	0	0	0	4.22E+02	3.88E+02	3.83E+02	3.82E+02	3.85E+02	3.90E+02	1.76E+02	3.26E+02	0
K	67	0	0	0	6.31E+03	5.82E+03	5.73E+03	5.72E+03	5.77E+03	5.84E+03	2.63E+03	4.89E+03	0
Mg	10	0	0	0	9.74E+02	8.97E+02	8.84E+02	8.82E+02	8.90E+02	9.00E+02	4.05E+02	7.54E+02	0
Mn	0.1	0	0	0	1.25E+01	1.15E+01	1.13E+01	1.13E+01	1.14E+01	1.15E+01	5.20E+00	9.66E+00	0
Na	610	0	0	0	5.77E+04	5.31E+04	5.24E+04	5.22E+04	5.27E+04	5.33E+04	2.40E+04	4.46E+04	0
NH4+NH3	- [2]	0	0	0	1.24E+03	2.58E+02	2.46E+02	2.54E+02	2.52E+02	2.54E+02	2.90E+02	3.19E+02	0
Ni	0.007	0	0	0	6.71E-01	6.18E-01	6.09E-01	6.08E-01	6.13E-01	6.20E-01	2.80E-01	5.20E-01	0
NO3	- [2]	0	0	0	1.24E+03	2.58E+02	2.46E+02	2.54E+02	2.52E+02	2.54E+02	2.90E+02	3.19E+02	0
Pb	0.002	0	0	0	1.65E-01	1.52E-01	1.50E-01	1.50E-01	1.51E-01	1.53E-01	6.89E-02	1.28E-01	0
P	0.01	0	0	0	9.45E-01	8.71E-01	8.58E-01	8.56E-01	8.64E-01	8.74E-01	3.94E-01	7.32E-01	0
Sb	0.01	0	0	0	1.02E+00	9.40E-01	9.27E-01	9.25E-01	9.33E-01	9.44E-01	4.25E-01	7.90E-01	0
Se	*0.0005*	0	0	0	4.73E-02	4.35E-02	4.29E-02	4.28E-02	4.32E-02	4.37E-02	1.97E-02	3.66E-02	0
SO4	1400	0	0	0	1.32E+05	1.22E+05	1.20E+05	1.20E+05	1.21E+05	1.22E+05	5.51E+04	1.02E+05	0
U	0.002	0	0	0	2.01E-01	1.85E-01	1.83E-01	1.82E-01	1.84E-01	1.86E-01	8.39E-02	1.56E-01	0
Zn	0.03	0	0	0	2.55E+00	2.35E+00	2.32E+00	2.31E+00	2.33E+00	2.36E+00	1.06E+00	1.98E+00	0
CN	0.4	0	0	0	4.16E+01	3.83E+01	3.78E+01	3.77E+01	3.80E+01	3.84E+01	1.73E+01	3.22E+01	0

Notes:

0.001 – indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

(1) Concentrations are taken from water chemistry after treatment as outlined in a draft memo by SGS (2007).

(2) Total ammonia and nitrate are input into the model as loads.

TABLE A2
AVERAGE MONTHLY LOADING RATES FOR SCRAGGY LAKE
SCENARIO 1 - NORMAL FLOW
TOUQUOY GOLD PROJECT

Parameter	Scraggy Lake Baseline Water Quality	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Subwatershed Net Flow Rate (m^3/s)		1.43E+00	1.47E+00	2.06E+00	2.15E+00	1.37E+00	7.90E-01	4.60E-01	5.10E-01	3.30E-01	7.60E-01	1.43E+00	1.68E+00
Ag	*0.00005*	7.15E-02	7.35E-02	1.03E-01	1.08E-01	6.85E-02	3.95E-02	2.30E-02	2.55E-02	1.65E-02	3.80E-02	7.15E-02	8.40E-02
Al	0.2	2.68E+02	2.75E+02	3.86E+02	4.03E+02	2.57E+02	1.48E+02	8.61E+01	9.55E+01	6.18E+01	1.42E+02	2.68E+02	3.15E+02
As	*0.001*	1.43E+00	1.47E+00	2.06E+00	2.15E+00	1.37E+00	7.90E-01	4.60E-01	5.10E-01	3.30E-01	7.60E-01	1.43E+00	1.68E+00
Ca	1	1.43E+03	1.47E+03	2.06E+03	2.15E+03	1.37E+03	7.90E+02	4.60E+02	5.10E+02	3.30E+02	7.60E+02	1.43E+03	1.68E+03
Cd	0.00002	2.81E-02	2.88E-02	4.04E-02	4.22E-02	2.69E-02	1.55E-02	9.03E-03	1.00E-02	6.48E-03	1.49E-02	2.81E-02	3.30E-02
Cl	4	5.72E+03	5.88E+03	8.24E+03	8.60E+03	5.48E+03	3.16E+03	1.84E+03	2.04E+03	1.32E+03	3.04E+03	5.72E+03	6.72E+03
Co	*0.0002*	2.86E-01	2.94E-01	4.12E-01	4.30E-01	2.74E-01	1.58E-01	9.20E-02	1.02E-01	6.60E-02	1.52E-01	2.86E-01	3.36E-01
Cr	0.005	6.86E+00	7.06E+00	9.89E+00	1.03E+01	6.58E+00	3.79E+00	2.21E+00	2.45E+00	1.58E+00	3.65E+00	6.86E+00	8.06E+00
Cu	*0.001*	1.43E+00	1.47E+00	2.06E+00	2.15E+00	1.37E+00	7.90E-01	4.60E-01	5.10E-01	3.30E-01	7.60E-01	1.43E+00	1.68E+00
Fe	0.2	3.36E+02	3.46E+02	4.85E+02	5.06E+02	3.22E+02	1.86E+02	1.08E+02	1.20E+02	7.76E+01	1.79E+02	3.36E+02	3.95E+02
K	0.3	4.65E+02	4.78E+02	6.70E+02	6.99E+02	4.45E+02	2.57E+02	1.50E+02	1.66E+02	1.07E+02	2.47E+02	4.65E+02	5.46E+02
Mg	0.4	6.08E+02	6.25E+02	8.76E+02	9.14E+02	5.82E+02	3.36E+02	1.96E+02	2.17E+02	1.40E+02	3.23E+02	6.08E+02	7.14E+02
Mn	0.05	6.55E+01	6.74E+01	9.44E+01	9.85E+01	6.28E+01	3.62E+01	2.11E+01	2.34E+01	1.51E+01	3.48E+01	6.55E+01	7.70E+01
Na	3	4.25E+03	4.37E+03	6.13E+03	6.40E+03	4.08E+03	2.35E+03	1.37E+03	1.52E+03	9.82E+02	2.26E+03	4.25E+03	5.00E+03
NH4+NH3	*0.03*	3.58E+01	3.68E+01	5.15E+01	5.38E+01	3.43E+01	1.98E+01	1.15E+01	1.28E+01	8.25E+00	1.90E+01	3.58E+01	4.20E+01
Ni	*0.001*	1.43E+00	1.47E+00	2.06E+00	2.15E+00	1.37E+00	7.90E-01	4.60E-01	5.10E-01	3.30E-01	7.60E-01	1.43E+00	1.68E+00
NO3	0.05	6.79E+01	6.98E+01	9.79E+01	1.02E+02	6.51E+01	3.75E+01	2.19E+01	2.42E+01	1.57E+01	3.61E+01	6.79E+01	7.98E+01
Pb	*0.0003*	4.47E-01	4.59E-01	6.44E-01	6.72E-01	4.28E-01	2.47E-01	1.44E-01	1.59E-01	1.03E-01	2.38E-01	4.47E-01	5.25E-01
P	0.02	2.15E+01	2.21E+01	3.09E+01	3.23E+01	2.06E+01	1.19E+01	6.90E+00	7.65E+00	4.95E+00	1.14E+01	2.15E+01	2.52E+01
Sb	*0.001*	1.43E+00	1.47E+00	2.06E+00	2.15E+00	1.37E+00	7.90E-01	4.60E-01	5.10E-01	3.30E-01	7.60E-01	1.43E+00	1.68E+00
Se	*0.0005*	7.15E-01	7.35E-01	1.03E+00	1.08E+00	6.85E-01	3.95E-01	2.30E-01	2.55E-01	1.65E-01	3.80E-01	7.15E-01	8.40E-01
SO4	*1*	1.43E+03	1.47E+03	2.06E+03	2.15E+03	1.37E+03	7.90E+02	4.60E+02	5.10E+02	3.30E+02	7.60E+02	1.43E+03	1.68E+03
U	*0.00005*	7.15E-02	7.35E-02	1.03E-01	1.08E-01	6.85E-02	3.95E-02	2.30E-02	2.55E-02	1.65E-02	3.80E-02	7.15E-02	8.40E-02
Zn	0.01	1.76E+01	1.80E+01	2.53E+01	2.64E+01	1.68E+01	9.70E+00	5.65E+00	6.26E+00	4.05E+00	9.33E+00	1.76E+01	2.06E+01
CN	*0.001*	1.43E+00	1.47E+00	2.06E+00	2.15E+00	1.37E+00	7.90E-01	4.60E-01	5.10E-01	3.30E-01	7.60E-01	1.43E+00	1.68E+00

Note:

0.001 – indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

TABLE A3
AVERAGE MONTHLY LOADING RATES FOR FISH RIVER
SCENARIO 1 - NORMAL FLOW
TOUQUOY GOLD PROJECT

Parameter	Fish River Baseline Water Quality	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Subwatershed Net Flow Rate (m^3/s)		4.16E+00	4.27E+00	6.00E+00	6.24E+00	3.98E+00	2.30E+00	1.36E+00	1.49E+00	9.80E-01	2.21E+00	4.17E+00	4.90E+00
Ag	*0.00005*	2.08E-01	2.14E-01	3.00E-01	3.12E-01	1.99E-01	1.15E-01	6.80E-02	7.45E-02	4.90E-02	1.11E-01	2.09E-01	2.45E-01
Al	0.2	7.11E+02	7.30E+02	1.03E+03	1.07E+03	6.81E+02	3.93E+02	2.33E+02	2.55E+02	1.68E+02	3.78E+02	7.13E+02	8.38E+02
As	0.005	2.08E+01	2.14E+01	3.00E+01	3.12E+01	1.99E+01	1.15E+01	6.80E+00	7.45E+00	4.90E+00	1.11E+01	2.09E+01	2.45E+01
Ca	1	5.42E+03	5.56E+03	7.82E+03	8.13E+03	5.19E+03	3.00E+03	1.77E+03	1.94E+03	1.28E+03	2.88E+03	5.43E+03	6.38E+03
Cd	0.000003	1.25E-02	1.28E-02	1.80E-02	1.87E-02	1.19E-02	6.90E-03	4.08E-03	4.47E-03	2.94E-03	6.63E-03	1.25E-02	1.47E-02
Cl	4	1.66E+04	1.71E+04	2.40E+04	2.50E+04	1.59E+04	9.20E+03	5.44E+03	5.96E+03	3.92E+03	8.84E+03	1.67E+04	1.96E+04
Co	*0.0002*	8.32E-01	8.54E-01	1.20E+00	1.25E+00	7.96E-01	4.60E-01	2.72E-01	2.98E-01	1.96E-01	4.42E-01	8.34E-01	9.80E-01
Cr	0.001	4.16E+00	4.27E+00	6.00E+00	6.24E+00	3.98E+00	2.30E+00	1.36E+00	1.49E+00	9.80E-01	2.21E+00	4.17E+00	4.90E+00
Cu	*0.001*	4.16E+00	4.27E+00	6.00E+00	6.24E+00	3.98E+00	2.30E+00	1.36E+00	1.49E+00	9.80E-01	2.21E+00	4.17E+00	4.90E+00
Fe	0.2	9.23E+02	9.47E+02	1.33E+03	1.38E+03	8.83E+02	5.10E+02	3.02E+02	3.31E+02	2.17E+02	4.90E+02	9.25E+02	1.09E+03
K	0.3	1.25E+03	1.28E+03	1.80E+03	1.87E+03	1.19E+03	6.90E+02	4.08E+02	4.47E+02	2.94E+02	6.63E+02	1.25E+03	1.47E+03
Mg	0.5	2.08E+03	2.14E+03	3.00E+03	3.12E+03	1.99E+03	1.15E+03	6.80E+02	7.45E+02	4.90E+02	1.11E+03	2.09E+03	2.45E+03
Mn	0.05	2.18E+02	2.24E+02	3.15E+02	3.27E+02	2.09E+02	1.21E+02	7.13E+01	7.81E+01	5.14E+01	1.16E+02	2.19E+02	2.57E+02
Na	3	1.22E+04	1.25E+04	1.76E+04	1.83E+04	1.17E+04	6.75E+03	3.99E+03	4.37E+03	2.88E+03	6.48E+03	1.22E+04	1.44E+04
NH4+NH3	*0.03*	1.04E+02	1.07E+02	1.50E+02	1.56E+02	9.95E+01	5.75E+01	3.40E+01	3.73E+01	2.45E+01	5.53E+01	1.04E+02	1.23E+02
Ni	*0.001*	4.16E+00	4.27E+00	6.00E+00	6.24E+00	3.98E+00	2.30E+00	1.36E+00	1.49E+00	9.80E-01	2.21E+00	4.17E+00	4.90E+00
NO3	0.2	6.70E+02	6.88E+02	9.66E+02	1.00E+03	6.41E+02	3.70E+02	2.19E+02	2.40E+02	1.58E+02	3.56E+02	6.72E+02	7.89E+02
Pb	*0.0003*	1.04E+00	1.07E+00	1.50E+00	1.56E+00	9.95E-01	5.75E-01	3.40E-01	3.73E-01	2.45E-01	5.53E-01	1.04E+00	1.23E+00
P	*0.01*	4.16E+01	4.27E+01	6.00E+01	6.24E+01	3.98E+01	2.30E+01	1.36E+01	1.49E+01	9.80E+00	2.21E+01	4.17E+01	4.90E+01
Sb	*0.001*	4.16E+00	4.27E+00	6.00E+00	6.24E+00	3.98E+00	2.30E+00	1.36E+00	1.49E+00	9.80E-01	2.21E+00	4.17E+00	4.90E+00
Se	*0.0005*	2.08E+00	2.14E+00	3.00E+00	3.12E+00	1.99E+00	1.15E+00	6.80E-01	7.45E-01	4.90E-01	1.11E+00	2.09E+00	2.45E+00
SO4	*1*	4.16E+03	4.27E+03	6.00E+03	6.24E+03	3.98E+03	2.30E+03	1.36E+03	1.49E+03	9.80E+02	2.21E+03	4.17E+03	4.90E+03
U	*0.00005*	2.08E-01	2.14E-01	3.00E-01	3.12E-01	1.99E-01	1.15E-01	6.80E-02	7.45E-02	4.90E-02	1.11E-01	2.09E-01	2.45E-01
Zn	0.02	8.17E+01	8.39E+01	1.18E+02	1.23E+02	7.82E+01	4.52E+01	2.67E+01	2.93E+01	1.93E+01	4.34E+01	8.19E+01	9.63E+01
CN	*0.001*	4.16E+00	4.27E+00	6.00E+00	6.24E+00	3.98E+00	2.30E+00	1.36E+00	1.49E+00	9.80E-01	2.21E+00	4.17E+00	4.90E+00

Note:
0.001 – indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

TABLE A4
AVERAGE MONTHLY LOADING RATES FOR LAKE CHARLOTTE
SCENARIO 1 - NORMAL FLOW
TOUQUOY GOLD PROJECT

Parameter	Lake Charlotte Baseline Water Quality	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Subwatershed Net Flow Rate (m^3/s)		4.00E+00	4.11E+00	5.78E+00	6.01E+00	3.83E+00	2.21E+00	1.30E+00	1.43E+00	9.30E-01	2.14E+00	4.01E+00	4.71E+00
Ag	***0.00005***	2.00E-01	2.06E-01	2.89E-01	3.01E-01	1.92E-01	1.11E-01	6.50E-02	7.15E-02	4.65E-02	1.07E-01	2.01E-01	2.36E-01
Al	**0.2**	6.80E+02	6.99E+02	9.83E+02	1.02E+03	6.51E+02	3.76E+02	2.21E+02	2.43E+02	1.58E+02	3.64E+02	6.82E+02	8.01E+02
As	**0.004**	1.64E+01	1.69E+01	2.37E+01	2.46E+01	1.57E+01	9.06E+00	5.33E+00	5.86E+00	3.81E+00	8.77E+00	1.64E+01	1.93E+01
Ca	**1**	4.80E+03	4.93E+03	6.94E+03	7.21E+03	4.60E+03	2.65E+03	1.56E+03	1.72E+03	1.12E+03	2.57E+03	4.81E+03	5.65E+03
Cd	***0.000009***	3.40E-02	3.49E-02	4.91E-02	5.11E-02	3.26E-02	1.88E-02	1.11E-02	1.22E-02	7.91E-03	1.82E-02	3.41E-02	4.00E-02
Cl	**4**	1.60E+04	1.64E+04	2.31E+04	2.40E+04	1.53E+04	8.84E+03	5.20E+03	5.72E+03	3.72E+03	8.56E+03	1.60E+04	1.88E+04
Co	***0.0002***	8.00E-01	8.22E-01	1.16E+00	1.20E+00	7.66E-01	4.42E-01	2.60E-01	2.86E-01	1.86E-01	4.28E-01	8.02E-01	9.42E-01
Cr	***0.001***	4.00E+00	4.11E+00	5.78E+00	6.01E+00	3.83E+00	2.21E+00	1.30E+00	1.43E+00	9.30E-01	2.14E+00	4.01E+00	4.71E+00
Cu	***0.001***	4.00E+00	4.11E+00	5.78E+00	6.01E+00	3.83E+00	2.21E+00	1.30E+00	1.43E+00	9.30E-01	2.14E+00	4.01E+00	4.71E+00
Fe	**0.2**	8.20E+02	8.43E+02	1.18E+03	1.23E+03	7.85E+02	4.53E+02	2.67E+02	2.93E+02	1.91E+02	4.39E+02	8.22E+02	9.66E+02
K	**0.3**	1.20E+03	1.23E+03	1.73E+03	1.80E+03	1.15E+03	6.63E+02	3.90E+02	4.29E+02	2.79E+02	6.42E+02	1.20E+03	1.41E+03
Mg	**0.5**	2.00E+03	2.06E+03	2.89E+03	3.01E+03	1.92E+03	1.11E+03	6.50E+02	7.15E+02	4.65E+02	1.07E+03	2.01E+03	2.36E+03
Mn	**0.05**	1.92E+02	1.97E+02	2.77E+02	2.88E+02	1.84E+02	1.06E+02	6.24E+01	6.86E+01	4.46E+01	1.03E+02	1.92E+02	2.26E+02
Na	**3**	1.16E+04	1.19E+04	1.68E+04	1.74E+04	1.11E+04	6.41E+03	3.77E+03	4.15E+03	2.70E+03	6.21E+03	1.16E+04	1.37E+04
NH4+NH3	***0.03***	1.00E+02	1.03E+02	1.45E+02	1.50E+02	9.58E+01	5.53E+01	3.25E+01	3.58E+01	2.33E+01	5.35E+01	1.00E+02	1.18E+02
Ni	***0.001***	4.00E+00	4.11E+00	5.78E+00	6.01E+00	3.83E+00	2.21E+00	1.30E+00	1.43E+00	9.30E-01	2.14E+00	4.01E+00	4.71E+00
NO3	**0.1**	5.00E+02	5.14E+02	7.23E+02	7.51E+02	4.79E+02	2.76E+02	1.63E+02	1.79E+02	1.16E+02	2.68E+02	5.01E+02	5.89E+02
Pb	***0.0003***	1.00E+00	1.03E+00	1.45E+00	1.50E+00	9.58E-01	5.53E-01	3.25E-01	3.58E-01	2.33E-01	5.35E-01	1.00E+00	1.18E+00
P	***0.01***	4.00E+01	4.11E+01	5.78E+01	6.01E+01	3.83E+01	2.21E+01	1.30E+01	1.43E+01	9.30E+00	2.14E+01	4.01E+01	4.71E+01
Sb	***0.001***	4.00E+00	4.11E+00	5.78E+00	6.01E+00	3.83E+00	2.21E+00	1.30E+00	1.43E+00	9.30E-01	2.14E+00	4.01E+00	4.71E+00
Se	***0.0005***	2.00E+00	2.06E+00	2.89E+00	3.01E+00	1.92E+00	1.11E+00	6.50E-01	7.15E-01	4.65E-01	1.07E+00	2.01E+00	2.36E+00
SO4	***1***	4.00E+03	4.11E+03	5.78E+03	6.01E+03	3.83E+03	2.21E+03	1.30E+03	1.43E+03	9.30E+02	2.14E+03	4.01E+03	4.71E+03
U	***0.00005***	2.00E-01	2.06E-01	2.89E-01	3.01E-01	1.92E-01	1.11E-01	6.50E-02	7.15E-02	4.65E-02	1.07E-01	2.01E-01	2.36E-01
Zn	**0.02**	7.24E+01	7.44E+01	1.05E+02	1.09E+02	6.93E+01	4.00E+01	2.35E+01	2.59E+01	1.68E+01	3.87E+01	7.26E+01	8.53E+01
CN	***0.001***	4.00E+00	4.11E+00	5.78E+00	6.01E+00	3.83E+00	2.21E+00	1.30E+00	1.43E+00	9.30E-01	2.14E+00	4.01E+00	4.71E+00

Note:
0.001 – indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

TABLE A5
CALCULATION RESULTS FOR MIX 1
SCENARIO 1 - NORMAL FLOW

Mix 1 = Mine Effluent Load + Scraggy Lake Subwatersheds Load

Parameter	Units	Mix 1 – Water Quality in Scraggy Lake												Annual Average Concentration
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cumulative Flow Rate	m^3/s	1.4E+00	1.5E+00	2.1E+00	2.2E+00	1.5E+00	8.8E-01	5.5E-01	6.0E-01	4.2E-01	8.0E-01	1.5E+00	1.7E+00	1.3E+00
Ag	mg/L	5.0E-05	5.0E-05	5.0E-05	6.1E-05	6.6E-05	7.6E-05	9.2E-05	8.9E-05	1.1E-04	6.3E-05	6.3E-05	5.0E-05	6.1E-05
Al	mg/L	1.9E-01	1.9E-01	1.9E-01	1.8E-01	1.8E-01	1.7E-01	1.6E-01	1.7E-01	1.9E-01	1.9E-01	1.8E-01	1.9E-01	1.8E-01
As	mg/L	1.0E-03	1.0E-03	1.0E-03	8.1E-03	2.1E-02	1.8E-02	2.8E-02	2.6E-02	3.6E-02	9.0E-03	9.2E-03	1.0E-03	1.2E-02
Ca	mg/L	1.0E+00	1.0E+00	1.0E+00	1.0E+01	1.4E+01	2.2E+01	3.5E+01	3.2E+01	4.6E+01	1.2E+01	1.1E+01	1.0E+00	1.0E+01
Cd	mg/L	2.0E-05	2.0E-05	2.0E-05	1.9E-05	1.9E-05	1.8E-05	1.7E-05	1.7E-05	1.6E-05	1.9E-05	1.9E-05	2.0E-05	1.9E-05
Cl	mg/L	4.0E+00	4.0E+00	4.0E+00	4.8E+00	5.2E+00	6.0E+00	7.1E+00	6.9E+00	8.2E+00	5.0E+00	5.0E+00	4.0E+00	4.8E+00
Co	mg/L	2.0E-04	2.0E-04	2.0E-04	9.3E-03	1.3E-02	2.1E-02	3.4E-02	3.2E-02	4.6E-02	1.1E-02	1.1E-02	2.0E-04	9.4E-03
Cr	mg/L	4.8E-03	4.8E-03	4.8E-03	4.6E-03	4.5E-03	4.4E-03	4.1E-03	4.1E-03	3.8E-03	4.6E-03	4.6E-03	4.8E-03	4.6E-03
Cu	mg/L	1.0E-03	1.0E-03	1.0E-03	9.4E-03	1.3E-02	2.1E-02	3.2E-02	3.0E-02	4.3E-02	1.1E-02	1.1E-02	1.0E-03	9.5E-03
Fe	mg/L	2.4E-01	2.4E-01	2.4E-01	4.1E-01	4.9E-01	6.5E-01	9.0E-01	8.5E-01	1.1E+00	4.4E-01	4.4E-01	2.4E-01	5.3E-01
K	mg/L	3.3E-01	3.3E-01	3.3E-01	3.1E+00	4.3E+00	6.8E+00	1.1E+01	1.0E+01	1.4E+01	3.6E+00	3.6E+00	3.3E-01	3.1E+00
Mg	mg/L	4.3E-01	4.3E-01	4.3E-01	8.4E-01	1.0E+00	1.4E+00	2.0E+00	1.9E+00	2.5E+00	9.1E-01	9.1E-01	4.3E-01	8.4E-01
Mn	mg/L	4.6E-02	4.6E-02	4.6E-02	4.9E-02	5.1E-02	5.4E-02	5.9E-02	5.8E-02	6.4E-02	5.0E-02	5.0E-02	4.6E-02	4.9E-02
Na	mg/L	3.0E+00	3.0E+00	3.0E+00	2.9E+01	3.9E+01	6.2E+01	9.8E+01	9.1E+01	1.3E+02	3.3E+01	3.3E+01	3.0E+00	2.9E+01
NH4+NH3	mg/L	2.5E-02	2.5E-02	2.5E-02	5.7E-01	2.0E-01	3.0E-01	4.9E-01	4.4E-01	6.3E-01	3.9E-01	2.4E-01	2.5E-02	2.3E-01
Ni	mg/L	1.0E-03	1.0E-03	1.0E-03	1.3E-03	1.4E-03	1.6E-03	2.0E-03	1.9E-03	2.3E-03	1.3E-03	1.3E-03	1.0E-03	1.3E-03
NO3	mg/L	4.8E-02	4.8E-02	4.8E-02	6.0E-01	2.2E-01	3.2E-01	5.0E-01	4.6E-01	6.5E-01	4.1E-01	2.6E-01	4.8E-02	2.5E-01
Pb	mg/L	3.1E-04	3.1E-04	3.1E-04	3.7E-04	4.0E-04	4.5E-04	5.4E-04	5.2E-04	6.1E-04	3.8E-04	3.8E-04	3.1E-04	3.7E-04
P	mg/L	1.5E-02	1.5E-02	1.5E-02	1.5E-02	1.5E-02	1.5E-02	1.4E-02	1.4E-02	1.4E-02	1.5E-02	1.5E-02	1.5E-02	1.5E-02
Sb	mg/L	1.0E-03	1.0E-03	1.0E-03	1.4E-03	1.6E-03	2.0E-03	2.5E-03	2.4E-03	3.1E-03	1.5E-03	1.5E-03	1.0E-03	1.4E-03
Se	mg/L	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04
SO4	mg/L	1.0E+00	1.0E+00	1.0E+00	6.0E+01	8.5E+01	1.4E+02	2.2E+02	2.0E+02	2.9E+02	7.0E+01	6.9E+01	1.0E+00	6.0E+01
U	mg/L	5.0E-05	5.0E-05	5.0E-05	1.4E-04	1.7E-04	2.5E-04	3.8E-04	3.5E-04	4.9E-04	1.5E-04	1.5E-04	5.0E-05	1.4E-04
Zn	mg/L	1.2E-02	1.2E-02	1.2E-02	1.3E-02	1.3E-02	1.4E-02	1.5E-02	1.4E-02	1.5E-02	1.3E-02	1.3E-02	1.2E-02	1.3E-02
CN (Total)	mg/L	1.0E-03	1.0E-03	1.0E-03	1.9E-02	2.7E-02	4.4E-02	7.0E-02	6.5E-02	9.3E-02	2.3E-02	2.2E-02	1.0E-03	2.0E-02

Note:
1.0E+00 – indicates a value greater than the CCME guideline.

TABLE A6
CALCULATION RESULTS FOR MIX 2
SCENARIO 1 - NORMAL FLOW

Mix 2 = Mix 1 + Fish River Subwatersheds Load

Parameter	Units	Mix 2 – Water Quality in Fish River												Annual Average Concentration
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cumulative Flow Rate	m^3/s	5.6E+00	5.7E+00	8.1E+00	8.5E+00	5.4E+00	3.2E+00	1.9E+00	2.1E+00	1.4E+00	3.0E+00	5.7E+00	6.6E+00	4.8E+00
Ag	mg/L	5.0E-05	5.0E-05	5.0E-05	5.3E-05	5.4E-05	5.7E-05	6.2E-05	6.1E-05	6.7E-05	5.4E-05	5.3E-05	5.0E-05	5.3E-05
Al	mg/L	1.8E-01	2.2E-01	1.8E-01	4.7E-01	9.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.8E-01	1.7E-01
As	mg/L	4.0E-03	4.0E-03	4.0E-03	5.8E-03	9.6E-03	8.5E-03	4.1E-02	4.1E-02	5.4E-02	6.3E-03	5.1E-03	4.0E-03	4.8E-03
Ca	mg/L	1.2E+00	1.2E+00	1.2E+00	3.6E+00	4.6E+00	7.0E+00	1.1E+01	1.0E+01	1.5E+01	4.0E+00	4.0E+00	1.2E+00	3.6E+00
Cd	mg/L	7.3E-06	7.3E-06	7.2E-06	7.2E-06	7.2E-06	7.1E-06	6.9E-06	7.0E-06	6.8E-06	7.2E-06	7.2E-06	7.2E-06	7.2E-06
Cl	mg/L	4.0E+00	4.0E+00	4.0E+00	4.2E+00	4.3E+00	4.5E+00	4.9E+00	4.8E+00	5.3E+00	4.3E+00	4.3E+00	4.0E+00	4.2E+00
Co	mg/L	2.0E-04	2.0E-04	2.0E-04	2.6E-03	3.7E-03	6.1E-03	9.9E-03	9.2E-03	1.4E-02	3.0E-03	3.0E-03	2.0E-04	2.6E-03
Cr	mg/L	2.0E-03	2.0E-03	2.0E-03	2.0E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	2.0E-03	2.0E-03
Cu	mg/L	1.0E-03	1.0E-03	1.0E-03	3.2E-03	5.2E-03	6.4E-03	1.0E-02	9.3E-03	1.4E-02	3.6E-03	3.5E-03	1.0E-03	3.2E-03
Fe	mg/L	2.3E-01	2.3E-01	2.3E-01	2.7E-01	2.9E-01	3.4E-01	4.2E-01	4.0E-01	4.9E-01	2.8E-01	2.8E-01	2.3E-01	2.7E-01
K	mg/L	3.1E-01	3.1E-01	3.1E-01	1.0E+00	1.4E+00	2.1E+00	3.3E+00	3.1E+00	4.5E+00	1.2E+00	1.2E+00	3.1E-01	1.1E+00
Mg	mg/L	4.8E-01	4.8E-01	4.8E-01	5.9E-01	6.4E-01	7.5E-01	9.2E-01	8.9E-01	1.1E+00	6.1E-01	6.1E-01	4.8E-01	5.9E-01
Mn	mg/L	5.1E-02	5.1E-02	5.1E-02	5.2E-02	5.2E-02	5.3E-02	5.4E-02	5.4E-02	5.6E-02	5.2E-02	5.2E-02	5.1E-02	5.2E-02
Na	mg/L	2.9E+00	2.9E+00	2.9E+00	9.7E+00	1.3E+01	1.9E+01	3.0E+01	2.8E+01	4.1E+01	1.1E+01	1.1E+01	2.9E+00	9.7E+00
NH4+NH3	mg/L	2.5E-02	2.5E-02	2.5E-02	1.7E-01	7.2E-02	1.0E-01	1.6E-01	1.4E-01	2.0E-01	1.2E-01	8.1E-02	2.5E-02	7.9E-02
Ni	mg/L	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.1E-03	1.2E-03	1.3E-03	1.3E-03	1.4E-03	1.1E-03	1.1E-03	1.0E-03	1.1E-03
NO3	mg/L	1.3E-01	1.3E-01	1.3E-01	2.8E-01	1.8E-01	2.1E-01	2.6E-01	2.5E-01	3.1E-01	2.3E-01	1.9E-01	1.3E-01	1.8E-01
Pb	mg/L	2.7E-04	2.7E-04	2.7E-04	2.8E-04	2.9E-04	3.1E-04	3.3E-04	3.3E-04	3.6E-04	2.9E-04	2.9E-04	2.7E-04	2.8E-04
P	mg/L	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02
Sb	mg/L	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.2E-03	1.3E-03	1.4E-03	1.4E-03	1.6E-03	1.1E-03	1.1E-03	1.0E-03	1.1E-03
Se	mg/L	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04
SO4	mg/L	1.0E+00	1.0E+00	1.0E+00	1.7E+01	2.3E+01	3.9E+01	6.4E+01	5.9E+01	8.8E+01	1.9E+01	1.9E+01	1.0E+00	1.7E+01
U	mg/L	5.0E-05	5.0E-05	5.0E-05	7.3E-05	8.3E-05	1.1E-04	1.4E-04	1.4E-04	1.8E-04	7.7E-05	7.7E-05	5.0E-05	7.3E-05
Zn	mg/L	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02
CN (Total)	mg/L	1.0E-03	1.0E-03	1.0E-03	5.9E-03	8.0E-03	1.3E-02	2.1E-02	1.9E-02	2.8E-02	6.7E-03	6.7E-03	1.0E-03	5.9E-03

Note:
1.8E-01 – indicates a value greater than the CCME guideline.

TABLE A7
CALCULATION RESULTS FOR MIX 3
SCENARIO 1 - NORMAL FLOW

Mix 3 = Mix 2 + Lake Charlotte Subwatersheds Load

Parameter	Units	Mix 3 – Water Quality in Lake Charlotte												Annual Average Concentration
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cumulative Flow Rate	m^3/s	9.6E+00	9.9E+00	1.4E+01	1.4E+01	9.3E+00	5.4E+00	3.2E+00	3.5E+00	2.3E+00	5.1E+00	9.7E+00	1.1E+01	8.1E+00
Ag	mg/L	5.0E-05	5.0E-05	5.0E-05	5.2E-05	5.3E-05	5.4E-05	5.7E-05	5.7E-05	6.0E-05	5.2E-05	5.2E-05	5.0E-05	5.2E-05
Al	mg/L	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
As	mg/L	4.0E-03	4.0E-03	4.0E-03	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.0E-03	[illegible]
Ca	mg/L	1.2E+00	1.2E+00	1.2E+00	2.6E+00	3.2E+00	4.6E+00	6.9E+00	6.5E+00	9.2E+00	2.8E+00	2.8E+00	1.2E+00	2.6E+00
Cd	mg/L	7.8E-06	7.8E-06	7.8E-06	7.7E-06	7.7E-06	7.7E-06	7.6E-06	7.6E-06	7.5E-06	7.7E-06	7.7E-06	7.8E-06	7.7E-06
Cl	mg/L	4.0E+00	4.0E+00	4.0E+00	4.1E+00	4.2E+00	4.3E+00	4.5E+00	4.5E+00	4.8E+00	4.2E+00	4.2E+00	4.0E+00	4.1E+00
Co	mg/L	2.0E-04	2.0E-04	2.0E-04	1.6E-03	2.2E-03	3.7E-03	6.0E-03	5.5E-03	8.3E-03	1.9E-03	1.8E-03	2.0E-04	1.6E-03
Cr	mg/L	1.6E-03	1.6E-03	1.6E-03	1.6E-03	1.6E-03	1.5E-03	1.5E-03	1.5E-03	1.5E-03	1.6E-03	1.6E-03	1.6E-03	1.6E-03
Cu	mg/L	1.0E-03	1.0E-03	1.0E-03	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.0E-03	[illegible]
Fe	mg/L	2.2E-01	2.2E-01	2.2E-01	2.4E-01	2.6E-01	2.8E-01	[illegible]	[illegible]	2.5E-01	2.5E-01	2.2E-01	2.4E-01	
K	mg/L	3.0E-01	3.0E-01	3.0E-01	7.4E-01	9.3E-01	1.4E+00	2.1E+00	1.9E+00	2.8E+00	8.1E-01	8.1E-01	3.0E-01	7.4E-01
Mg	mg/L	4.9E-01	4.9E-01	4.9E-01	5.5E-01	5.8E-01	6.5E-01	7.5E-01	7.3E-01	8.6E-01	5.6E-01	5.6E-01	4.9E-01	5.5E-01
Mn	mg/L	5.0E-02	5.0E-02	5.0E-02	5.0E-02	5.0E-02	5.1E-02	5.2E-02	5.2E-02	5.3E-02	5.0E-02	5.0E-02	5.0E-02	5.0E-02
Na	mg/L	2.9E+00	2.9E+00	2.9E+00	6.9E+00	8.6E+00	1.3E+01	1.9E+01	1.8E+01	2.6E+01	7.6E+00	7.5E+00	2.9E+00	6.9E+00
NH4+NH3	mg/L	2.5E-02	2.5E-02	2.5E-02	1.1E-01	5.3E-02	7.0E-02	1.0E-01	9.6E-02	1.3E-01	8.1E-02	5.8E-02	2.5E-02	5.7E-02
Ni	mg/L	1.0E-03	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.1E-03	1.2E-03	1.1E-03	1.2E-03	1.0E-03	1.0E-03	1.0E-03	1.0E-03
NO3	mg/L	1.3E-01	1.3E-01	1.3E-01	2.1E-01	1.6E-01	1.7E-01	2.0E-01	2.0E-01	2.3E-01	1.8E-01	1.6E-01	1.3E-01	1.6E-01
Pb	mg/L	2.6E-04	2.6E-04	2.6E-04	2.7E-04	2.7E-04	2.8E-04	3.0E-04	3.0E-04	3.2E-04	2.7E-04	2.7E-04	2.6E-04	2.7E-04
P	mg/L	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02
Sb	mg/L	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.1E-03	1.2E-03	1.3E-03	1.2E-03	1.4E-03	1.1E-03	1.1E-03	1.0E-03	1.1E-03
Se	mg/L	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04
SO4	mg/L	1.0E+00	1.0E+00	1.0E+00	1.0E+01	1.4E+01	2.3E+01	3.8E+01	3.5E+01	5.4E+01	1.2E+01	1.2E+01	1.0E+00	1.0E+01
U	mg/L	5.0E-05	5.0E-05	5.0E-05	6.4E-05	7.0E-05	8.3E-05	1.1E-04	1.0E-04	1.3E-04	6.6E-05	6.6E-05	5.0E-05	6.4E-05
Zn	mg/L	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02
CN (Total)	mg/L	1.0E-03	1.0E-03	1.0E-03	3.9E-03	5.1E-03	8.0E-03	1.3E-02	1.2E-02	1.7E-02	4.4E-03	4.3E-03	1.0E-03	3.9E-03

Note:
[illegible] - indicates a value greater than the CCME guideline.

APPENDIX B

AVERAGE MONTHLY LOADING RATES AND MIXING CELL CALULATIONS FOR HIGH FLOW CONDITIONS

TABLE B1
AVERAGE MONTHLY LOADING RATES FOR THE MINE EFFLUENT DISCHARGE
SCENARIO 2 - HIGH FLOW
TOUQUOY GOLD PROJECT

Parameter	Mine Effluent Water Quality [1]	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mine Effluent Discharge Rate (m^3/s)		0	0	0	1.45E-01	1.26E-01	1.25E-01	1.25E-01	1.25E-01	1.27E-01	0.065095607	0.099285817	0
Ag	0.0003	0	0	0	4.66E-02	4.04E-02	3.99E-02	3.99E-02	4.01E-02	4.06E-02	2.08E-02	3.18E-02	0
Al	0.04	0	0	0	5.82E+00	5.04E+00	4.99E+00	4.98E+00	5.01E+00	5.07E+00	2.60E+00	3.97E+00	0
As	0.2	0	0	0	2.47E+01	2.14E+01	2.12E+01	2.12E+01	2.13E+01	2.15E+01	1.11E+01	1.69E+01	0
Ca	215	0	0	0	3.13E+04	2.71E+04	2.68E+04	2.68E+04	2.70E+04	2.72E+04	1.40E+04	2.13E+04	0
Cd	*0.000002*	0	0	0	2.18E-04	1.89E-04	1.87E-04	1.87E-04	1.88E-04	1.90E-04	9.76E-05	1.49E-04	0
Cl	24	0	0	0	3.49E+03	3.03E+03	2.99E+03	2.99E+03	3.01E+03	3.04E+03	1.56E+03	2.38E+03	0
Co	0.2	0	0	0	3.16E+01	2.74E+01	2.71E+01	2.70E+01	2.72E+01	2.75E+01	1.41E+01	2.15E+01	0
Cr	*0.0003*	0	0	0	3.64E-02	3.15E-02	3.12E-02	3.12E-02	3.13E-02	3.17E-02	1.63E-02	2.48E-02	0
Cu	0.2	0	0	0	2.92E+01	2.53E+01	2.51E+01	2.50E+01	2.52E+01	2.55E+01	1.31E+01	2.00E+01	0
Fe	4	0	0	0	6.49E+02	5.62E+02	5.56E+02	5.56E+02	5.59E+02	5.65E+02	2.90E+02	4.43E+02	0
K	67	0	0	0	9.72E+03	8.42E+03	8.33E+03	8.32E+03	8.37E+03	8.47E+03	4.35E+03	6.63E+03	0
Mg	10	0	0	0	1.50E+03	1.30E+03	1.28E+03	1.28E+03	1.29E+03	1.31E+03	6.70E+02	1.02E+03	0
Mn	0.1	0	0	0	1.92E+01	1.66E+01	1.65E+01	1.64E+01	1.65E+01	1.67E+01	8.59E+00	1.31E+01	0
Na	610	0	0	0	8.88E+04	7.69E+04	7.61E+04	7.60E+04	7.65E+04	7.73E+04	3.97E+04	6.06E+04	0
NH4+NH3	– [2]	0	0	0	1.24E+03	2.58E+02	2.46E+02	2.54E+02	2.52E+02	2.54E+02	2.90E+02	3.19E+02	0
Ni	0.007	0	0	0	1.03E+00	8.95E-01	8.86E-01	8.85E-01	8.90E-01	9.00E-01	4.62E-01	7.05E-01	0
NO3	– [2]	0	0	0	1.24E+03	2.58E+02	2.46E+02	2.54E+02	2.52E+02	2.54E+02	2.90E+02	3.19E+02	0
Pb	0.002	0	0	0	2.55E-01	2.21E-01	2.18E-01	2.18E-01	2.19E-01	2.22E-01	1.14E-01	1.74E-01	0
P	0.01	0	0	0	1.45E+00	1.26E+00	1.25E+00	1.25E+00	1.25E+00	1.27E+00	6.51E-01	9.93E-01	0
Sb	0.01	0	0	0	1.57E+00	1.36E+00	1.35E+00	1.35E+00	1.35E+00	1.37E+00	7.03E-01	1.07E+00	0
Se	*0.0005*	0	0	0	7.27E-02	6.31E-02	6.24E-02	6.23E-02	6.27E-02	6.34E-02	3.25E-02	4.96E-02	0
SO4	1400	0	0	0	2.04E+05	1.77E+05	1.75E+05	1.74E+05	1.76E+05	1.77E+05	9.11E+04	1.39E+05	0
U	0.002	0	0	0	3.10E-01	2.69E-01	2.66E-01	2.65E-01	2.67E-01	2.70E-01	1.39E-01	2.11E-01	0
Zn	0.03	0	0	0	3.93E+00	3.40E+00	3.37E+00	3.36E+00	3.38E+00	3.42E+00	1.76E+00	2.68E+00	0
CN	0.4	0	0	0	6.40E+01	5.55E+01	5.49E+01	5.48E+01	5.52E+01	5.58E+01	2.86E+01	4.37E+01	0

Notes:

0.001 – indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

(1) Concentrations are taken from water chemistry after treatment as outlined in a draft memo by SGS (2007).

(2) Total ammonia and nitrate are input into the model as loads.

TABLE B2
AVERAGE MONTHLY LOADING RATES FOR SCRAGGY LAKE
SCENARIO 2 - HIGH FLOW
TOUQUOY GOLD PROJECT

Parameter	Scraggy Lake Baseline Water Quality	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Subwatershed Net Flow Rate (m^3/s)		1.43E+00	1.47E+00	2.06E+00	3.31E+00	1.98E+00	1.15E+00	6.69E-01	7.40E-01	4.79E-01	1.26E+00	1.94E+00	1.68E+00
Ag	*0.00005*	7.15E-02	7.35E-02	1.03E-01	1.65E-01	9.92E-02	5.74E-02	3.35E-02	3.70E-02	2.39E-02	6.28E-02	9.70E-02	8.40E-02
Al	0.2	2.68E+02	2.75E+02	3.86E+02	6.20E+02	3.72E+02	2.15E+02	1.25E+02	1.39E+02	8.96E+01	2.35E+02	3.63E+02	3.15E+02
As	*0.001*	1.43E+00	1.47E+00	2.06E+00	3.31E+00	1.98E+00	1.15E+00	6.69E-01	7.40E-01	4.79E-01	1.26E+00	1.94E+00	1.68E+00
Ca	1	1.43E+03	1.47E+03	2.06E+03	3.31E+03	1.98E+03	1.15E+03	6.69E+02	7.40E+02	4.79E+02	1.26E+03	1.94E+03	1.68E+03
Cd	0.00002	2.81E-02	2.88E-02	4.04E-02	6.49E-02	3.89E-02	2.25E-02	1.31E-02	1.45E-02	9.39E-03	2.47E-02	3.81E-02	3.30E-02
Cl	4	5.72E+03	5.88E+03	8.24E+03	1.32E+04	7.94E+03	4.59E+03	2.68E+03	2.96E+03	1.91E+03	5.03E+03	7.76E+03	6.72E+03
Co	*0.0002*	2.86E-01	2.94E-01	4.12E-01	6.62E-01	3.97E-01	2.30E-01	1.34E-01	1.48E-01	9.57E-02	2.51E-01	3.88E-01	3.36E-01
Cr	0.005	6.86E+00	7.06E+00	9.89E+00	1.59E+01	9.52E+00	5.51E+00	3.21E+00	3.55E+00	2.30E+00	6.03E+00	9.31E+00	8.06E+00
Cu	*0.001*	1.43E+00	1.47E+00	2.06E+00	3.31E+00	1.98E+00	1.15E+00	6.69E-01	7.40E-01	4.79E-01	1.26E+00	1.94E+00	1.68E+00
Fe	0.2	3.36E+02	3.46E+02	4.85E+02	7.79E+02	4.67E+02	2.70E+02	1.57E+02	1.74E+02	1.13E+02	2.96E+02	4.56E+02	3.95E+02
K	0.3	4.65E+02	4.78E+02	6.70E+02	1.08E+03	6.45E+02	3.73E+02	2.18E+02	2.41E+02	1.56E+02	4.08E+02	6.30E+02	5.46E+02
Mg	0.4	6.08E+02	6.25E+02	8.76E+02	1.41E+03	8.43E+02	4.88E+02	2.85E+02	3.15E+02	2.03E+02	5.34E+02	8.24E+02	7.14E+02
Mn	0.05	6.55E+01	6.74E+01	9.44E+01	1.52E+02	9.09E+01	5.26E+01	3.07E+01	3.39E+01	2.19E+01	5.76E+01	8.89E+01	7.70E+01
Na	3	4.25E+03	4.37E+03	6.13E+03	9.85E+03	5.90E+03	3.42E+03	1.99E+03	2.20E+03	1.42E+03	3.74E+03	5.77E+03	5.00E+03
NH4+NH3	*0.03*	3.58E+01	3.68E+01	5.15E+01	8.27E+01	4.96E+01	2.87E+01	1.67E+01	1.85E+01	1.20E+01	3.14E+01	4.85E+01	4.20E+01
Ni	*0.001*	1.43E+00	1.47E+00	2.06E+00	3.31E+00	1.98E+00	1.15E+00	6.69E-01	7.40E-01	4.79E-01	1.26E+00	1.94E+00	1.68E+00
NO3	0.05	6.79E+01	6.98E+01	9.79E+01	1.57E+02	9.43E+01	5.45E+01	3.18E+01	3.52E+01	2.27E+01	5.97E+01	9.21E+01	7.98E+01
Pb	*0.0003*	4.47E-01	4.59E-01	6.44E-01	1.03E+00	6.20E-01	3.59E-01	2.09E-01	2.31E-01	1.50E-01	3.93E-01	6.06E-01	5.25E-01
P	0.02	2.15E+01	2.21E+01	3.09E+01	4.96E+01	2.98E+01	1.72E+01	1.00E+01	1.11E+01	7.18E+00	1.89E+01	2.91E+01	2.52E+01
Sb	*0.001*	1.43E+00	1.47E+00	2.06E+00	3.31E+00	1.98E+00	1.15E+00	6.69E-01	7.40E-01	4.79E-01	1.26E+00	1.94E+00	1.68E+00
Se	*0.0005*	7.15E-01	7.35E-01	1.03E+00	1.65E+00	9.92E-01	5.74E-01	3.35E-01	3.70E-01	2.39E-01	6.28E-01	9.70E-01	8.40E-01
SO4	*1*	1.43E+03	1.47E+03	2.06E+03	3.31E+03	1.98E+03	1.15E+03	6.69E+02	7.40E+02	4.79E+02	1.26E+03	1.94E+03	1.68E+03
U	*0.00005*	7.15E-02	7.35E-02	1.03E-01	1.65E-01	9.92E-02	5.74E-02	3.35E-02	3.70E-02	2.39E-02	6.28E-02	9.70E-02	8.40E-02
Zn	0.01	1.76E+01	1.80E+01	2.53E+01	4.06E+01	2.44E+01	1.41E+01	8.22E+00	9.08E+00	5.88E+00	1.54E+01	2.38E+01	2.06E+01
CN	*0.001*	1.43E+00	1.47E+00	2.06E+00	3.31E+00	1.98E+00	1.15E+00	6.69E-01	7.40E-01	4.79E-01	1.26E+00	1.94E+00	1.68E+00

Note:
0.001 – indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

TABLE B3
AVERAGE MONTHLY LOADING RATES FOR FISH RIVER
SCENARIO 2 - HIGH FLOW
TOUQUOY GOLD PROJECT

Parameter	Fish River Baseline Water Quality	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Subwatershed Net Flow Rate (m^3/s)		4.16E+00	4.27E+00	6.00E+00	9.61E+00	5.76E+00	3.34E+00	1.98E+00	2.16E+00	1.42E+00	3.65E+00	5.66E+00	4.90E+00
Ag	*0.00005*	2.08E-01	2.14E-01	3.00E-01	4.80E-01	2.88E-01	1.67E-01	9.90E-02	1.08E-01	7.11E-02	1.83E-01	2.83E-01	2.45E-01
Al	0.2	7.11E+02	7.30E+02	1.03E+03	1.64E+03	9.86E+02	5.72E+02	3.39E+02	3.70E+02	2.43E+02	6.25E+02	9.67E+02	8.38E+02
As	0.005	2.08E+01	2.14E+01	3.00E+01	4.80E+01	2.88E+01	1.67E+01	9.90E+00	1.08E+01	7.11E+00	1.83E+01	2.83E+01	2.45E+01
Ca	1	5.42E+03	5.56E+03	7.82E+03	1.25E+04	7.51E+03	4.35E+03	2.58E+03	2.82E+03	1.85E+03	4.76E+03	7.37E+03	6.38E+03
Cd	0.000003	1.25E-02	1.28E-02	1.80E-02	2.88E-02	1.73E-02	1.00E-02	5.94E-03	6.49E-03	4.26E-03	1.10E-02	1.70E-02	1.47E-02
Cl	4	1.66E+04	1.71E+04	2.40E+04	3.84E+04	2.31E+04	1.34E+04	7.92E+03	8.65E+03	5.69E+03	1.46E+04	2.26E+04	1.96E+04
Co	*0.0002*	8.32E-01	8.54E-01	1.20E+00	1.92E+00	1.15E+00	6.68E-01	3.96E-01	4.32E-01	2.84E-01	7.31E-01	1.13E+00	9.80E-01
Cr	0.001	4.16E+00	4.27E+00	6.00E+00	9.61E+00	5.76E+00	3.34E+00	1.98E+00	2.16E+00	1.42E+00	3.65E+00	5.66E+00	4.90E+00
Cu	*0.001*	4.16E+00	4.27E+00	6.00E+00	9.61E+00	5.76E+00	3.34E+00	1.98E+00	2.16E+00	1.42E+00	3.65E+00	5.66E+00	4.90E+00
Fe	0.2	9.23E+02	9.47E+02	1.33E+03	2.13E+03	1.28E+03	7.41E+02	4.39E+02	4.80E+02	3.15E+02	8.11E+02	1.25E+03	1.09E+03
K	0.3	1.25E+03	1.28E+03	1.80E+03	2.88E+03	1.73E+03	1.00E+03	5.94E+02	6.49E+02	4.26E+02	1.10E+03	1.70E+03	1.47E+03
Mg	0.5	2.08E+03	2.14E+03	3.00E+03	4.80E+03	2.88E+03	1.67E+03	9.90E+02	1.08E+03	7.11E+02	1.83E+03	2.83E+03	2.45E+03
Mn	0.05	2.18E+02	2.24E+02	3.15E+02	5.04E+02	3.02E+02	1.75E+02	1.04E+02	1.13E+02	7.45E+01	1.92E+02	2.97E+02	2.57E+02
Na	3	1.22E+04	1.25E+04	1.76E+04	2.82E+04	1.69E+04	9.81E+03	5.81E+03	6.34E+03	4.17E+03	1.07E+04	1.66E+04	1.44E+04
NH4+NH3	*0.03*	1.04E+02	1.07E+02	1.50E+02	2.40E+02	1.44E+02	8.36E+01	4.95E+01	5.41E+01	3.55E+01	9.14E+01	1.41E+02	1.23E+02
Ni	*0.001*	4.16E+00	4.27E+00	6.00E+00	9.61E+00	5.76E+00	3.34E+00	1.98E+00	2.16E+00	1.42E+00	3.65E+00	5.66E+00	4.90E+00
NO3	0.2	6.70E+02	6.88E+02	9.66E+02	1.55E+03	9.28E+02	5.38E+02	3.19E+02	3.48E+02	2.29E+02	5.89E+02	9.11E+02	7.89E+02
Pb	*0.0003*	1.04E+00	1.07E+00	1.50E+00	2.40E+00	1.44E+00	8.36E-01	4.95E-01	5.41E-01	3.55E-01	9.14E-01	1.41E+00	1.23E+00
P	*0.01*	4.16E+01	4.27E+01	6.00E+01	9.61E+01	5.76E+01	3.34E+01	1.98E+01	2.16E+01	1.42E+01	3.65E+01	5.66E+01	4.90E+01
Sb	*0.001*	4.16E+00	4.27E+00	6.00E+00	9.61E+00	5.76E+00	3.34E+00	1.98E+00	2.16E+00	1.42E+00	3.65E+00	5.66E+00	4.90E+00
Se	*0.0005*	2.08E+00	2.14E+00	3.00E+00	4.80E+00	2.88E+00	1.67E+00	9.90E-01	1.08E+00	7.11E-01	1.83E+00	2.83E+00	2.45E+00
SO4	*1*	4.16E+03	4.27E+03	6.00E+03	9.61E+03	5.76E+03	3.34E+03	1.98E+03	2.16E+03	1.42E+03	3.65E+03	5.66E+03	4.90E+03
U	*0.00005*	2.08E-01	2.14E-01	3.00E-01	4.80E-01	2.88E-01	1.67E-01	9.90E-02	1.08E-01	7.11E-02	1.83E-01	2.83E-01	2.45E-01
Zn	0.02	8.17E+01	8.39E+01	1.18E+02	1.89E+02	1.13E+02	6.57E+01	3.89E+01	4.25E+01	2.79E+01	7.18E+01	1.11E+02	9.63E+01
CN	*0.001*	4.16E+00	4.27E+00	6.00E+00	9.61E+00	5.76E+00	3.34E+00	1.98E+00	2.16E+00	1.42E+00	3.65E+00	5.66E+00	4.90E+00

Note:
0.001 - indicates measured concentrations below the detection limit -- assumed to be equal to half the detection limit.

TABLE B4
AVERAGE MONTHLY LOADING RATES FOR LAKE CHARLOTTE
SCENARIO 2 - HIGH FLOW
TOUQUOY GOLD PROJECT

Parameter	Lake Charlotte Baseline Water Quality	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Subwatershed Net Flow Rate (m^3/s)		4.00E+00	4.11E+00	5.78E+00	9.25E+00	5.55E+00	3.21E+00	1.89E+00	2.07E+00	1.35E+00	3.54E+00	5.44E+00	4.71E+00
Ag	*0.00005*	2.00E-01	2.06E-01	2.89E-01	4.63E-01	2.77E-01	1.61E-01	9.46E-02	1.04E-01	6.75E-02	1.77E-01	2.72E-01	2.36E-01
Al	0.2	6.80E+02	6.99E+02	9.83E+02	1.57E+03	9.43E+02	5.46E+02	3.22E+02	3.53E+02	2.29E+02	6.02E+02	9.25E+02	8.01E+02
As	0.004	1.64E+01	1.69E+01	2.37E+01	3.79E+01	2.27E+01	1.32E+01	7.76E+00	8.51E+00	5.53E+00	1.45E+01	2.23E+01	1.93E+01
Ca	1	4.80E+03	4.93E+03	6.94E+03	1.11E+04	6.66E+03	3.85E+03	2.27E+03	2.49E+03	1.62E+03	4.25E+03	6.53E+03	5.65E+03
Cd	*0.000009*	3.40E-02	3.49E-02	4.91E-02	7.86E-02	4.72E-02	2.73E-02	1.61E-02	1.76E-02	1.15E-02	3.01E-02	4.62E-02	4.00E-02
Cl	4	1.60E+04	1.64E+04	2.31E+04	3.70E+04	2.22E+04	1.28E+04	7.57E+03	8.30E+03	5.40E+03	1.42E+04	2.18E+04	1.88E+04
Co	*0.0002*	8.00E-01	8.22E-01	1.16E+00	1.85E+00	1.11E+00	6.42E-01	3.78E-01	4.15E-01	2.70E-01	7.08E-01	1.09E+00	9.42E-01
Cr	*0.001*	4.00E+00	4.11E+00	5.78E+00	9.25E+00	5.55E+00	3.21E+00	1.89E+00	2.07E+00	1.35E+00	3.54E+00	5.44E+00	4.71E+00
Cu	*0.001*	4.00E+00	4.11E+00	5.78E+00	9.25E+00	5.55E+00	3.21E+00	1.89E+00	2.07E+00	1.35E+00	3.54E+00	5.44E+00	4.71E+00
Fe	0.2	8.20E+02	8.43E+02	1.18E+03	1.90E+03	1.14E+03	6.58E+02	3.88E+02	4.25E+02	2.77E+02	7.25E+02	1.12E+03	9.66E+02
K	0.3	1.20E+03	1.23E+03	1.73E+03	2.78E+03	1.66E+03	9.63E+02	5.68E+02	6.22E+02	4.05E+02	1.06E+03	1.63E+03	1.41E+03
Mg	0.5	2.00E+03	2.06E+03	2.89E+03	4.63E+03	2.77E+03	1.61E+03	9.46E+02	1.04E+03	6.75E+02	1.77E+03	2.72E+03	2.36E+03
Mn	0.05	1.92E+02	1.97E+02	2.77E+02	4.44E+02	2.66E+02	1.54E+02	9.08E+01	9.96E+01	6.48E+01	1.70E+02	2.61E+02	2.26E+02
Na	3	1.16E+04	1.19E+04	1.68E+04	2.68E+04	1.61E+04	9.31E+03	5.49E+03	6.02E+03	3.91E+03	1.03E+04	1.58E+04	1.37E+04
NH4+NH3	*0.03*	1.00E+02	1.03E+02	1.45E+02	2.31E+02	1.39E+02	8.03E+01	4.73E+01	5.19E+01	3.37E+01	8.85E+01	1.36E+02	1.18E+02
Ni	*0.001*	4.00E+00	4.11E+00	5.78E+00	9.25E+00	5.55E+00	3.21E+00	1.89E+00	2.07E+00	1.35E+00	3.54E+00	5.44E+00	4.71E+00
NO3	0.1	5.00E+02	5.14E+02	7.23E+02	1.16E+03	6.93E+02	4.01E+02	2.36E+02	2.59E+02	1.69E+02	4.42E+02	6.80E+02	5.89E+02
Pb	*0.0003*	1.00E+00	1.03E+00	1.45E+00	2.31E+00	1.39E+00	8.03E-01	4.73E-01	5.19E-01	3.37E-01	8.85E-01	1.36E+00	1.18E+00
P	*0.01*	4.00E+01	4.11E+01	5.78E+01	9.25E+01	5.55E+01	3.21E+01	1.89E+01	2.07E+01	1.35E+01	3.54E+01	5.44E+01	4.71E+01
Sb	*0.001*	4.00E+00	4.11E+00	5.78E+00	9.25E+00	5.55E+00	3.21E+00	1.89E+00	2.07E+00	1.35E+00	3.54E+00	5.44E+00	4.71E+00
Se	*0.0005*	2.00E+00	2.06E+00	2.89E+00	4.63E+00	2.77E+00	1.61E+00	9.46E-01	1.04E+00	6.75E-01	1.77E+00	2.72E+00	2.36E+00
SO4	*1*	4.00E+03	4.11E+03	5.78E+03	9.25E+03	5.55E+03	3.21E+03	1.89E+03	2.07E+03	1.35E+03	3.54E+03	5.44E+03	4.71E+03
U	*0.00005*	2.00E-01	2.06E-01	2.89E-01	4.63E-01	2.77E-01	1.61E-01	9.46E-02	1.04E-01	6.75E-02	1.77E-01	2.72E-01	2.36E-01
Zn	0.02	7.24E+01	7.44E+01	1.05E+02	1.67E+02	1.00E+02	5.81E+01	3.42E+01	3.76E+01	2.44E+01	6.41E+01	9.85E+01	8.53E+01
CN	*0.001*	4.00E+00	4.11E+00	5.78E+00	9.25E+00	5.55E+00	3.21E+00	1.89E+00	2.07E+00	1.35E+00	3.54E+00	5.44E+00	4.71E+00

Note:
0.001 – indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

TABLE B5
CALCULATION RESULTS FOR MIX 1
SCENARIO 2 - HIGH FLOW

Mix 1 = Mine Effluent Load + Scraggy Lake Subwatersheds Load

Parameter	Units	Mix 1 – Water Quality in Scraggy Lake												Annual Average Concentration
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cumulative Flow Rate	m^3/s	1.4E+00	1.5E+00	2.1E+00	3.5E+00	2.1E+00	1.3E+00	7.9E-01	8.7E-01	6.1E-01	1.3E+00	2.0E+00	1.7E+00	1.6E+00
Ag	mg/L	5.0E-05	5.0E-05	5.0E-05	6.1E-05	6.6E-05	7.6E-05	9.2E-05	8.9E-05	7.1E-04	6.3E-05	6.3E-05	5.0E-05	6.3E-05
Al	mg/L	7.3E-01	7.9E-01	8.3E-01	1.8E-01	1.8E-01	1.7E-01	1.6E-01	1.7E-01	1.6E-01	1.8E-01	1.8E-01	1.9E-01	1.8E-01
As	mg/L	1.0E-03	1.0E-03	1.0E-03	4.1E-03	7.1E-02	3.8E-02	2.8E-02	2.6E-02	3.5E-02	5.3E-03	2.2E-03	1.0E-03	1.3E-03
Ca	mg/L	1.0E+00	1.0E+00	1.0E+00	1.0E+01	1.4E+01	2.2E+01	3.5E+01	3.2E+01	4.6E+01	1.2E+01	1.1E+01	1.0E+00	1.2E+01
Cd	mg/L	2.0E-05	2.0E-05	2.0E-05	1.9E-05	1.9E-05	1.8E-05	1.7E-05	1.7E-05	1.6E-05	1.9E-05	1.9E-05	2.0E-05	1.9E-05
Cl	mg/L	4.0E+00	4.0E+00	4.0E+00	4.8E+00	5.2E+00	6.0E+00	7.1E+00	6.9E+00	8.2E+00	5.0E+00	5.0E+00	4.0E+00	5.0E+00
Co	mg/L	2.0E-04	2.0E-04	2.0E-04	9.3E-03	1.3E-02	2.1E-02	3.4E-02	3.2E-02	4.6E-02	1.1E-02	1.1E-02	2.0E-04	1.1E-02
Cr	mg/L	4.8E-03	4.8E-03	4.8E-03	4.6E-03	4.5E-03	4.4E-03	4.1E-03	4.1E-03	3.8E-03	4.6E-03	4.6E-03	4.8E-03	4.6E-03
Cu	mg/L	1.0E-03	1.0E-03	1.0E-03	9.4E-03	1.3E-02	2.1E-02	3.2E-02	3.0E-02	4.3E-02	1.1E-02	1.1E-02	1.0E-03	1.1E-02
Fe	mg/L	2.4E-01	2.4E-01	2.4E-01	4.1E-01	4.9E-01	6.5E-01	9.0E-01	8.5E-01	1.1E+00	4.4E-01	4.4E-01	2.4E-01	4.4E-01
K	mg/L	3.3E-01	3.3E-01	3.3E-01	3.1E+00	4.3E+00	6.8E+00	1.1E+01	1.0E+01	1.4E+01	3.6E+00	3.6E+00	3.3E-01	3.6E+00
Mg	mg/L	4.3E-01	4.3E-01	4.3E-01	8.4E-01	1.0E+00	1.4E+00	2.0E+00	1.9E+00	2.5E+00	9.1E-01	9.1E-01	4.3E-01	9.1E-01
Mn	mg/L	4.6E-02	4.6E-02	4.6E-02	4.9E-02	5.1E-02	5.4E-02	5.9E-02	5.8E-02	6.4E-02	5.0E-02	5.0E-02	4.6E-02	5.0E-02
Na	mg/L	3.0E+00	3.0E+00	3.0E+00	2.9E+01	3.9E+01	6.2E+01	9.8E+01	9.1E+01	1.3E+02	3.3E+01	3.3E+01	3.0E+00	3.3E+01
NH4+NH3	mg/L	2.5E-02	2.5E-02	2.5E-02	3.8E-01	1.5E-01	2.2E-01	3.4E-01	3.1E-01	4.4E-01	2.4E-01	1.8E-01	2.5E-02	1.9E-01
Ni	mg/L	1.0E-03	1.0E-03	1.0E-03	1.3E-03	1.4E-03	1.6E-03	2.0E-03	1.9E-03	2.3E-03	1.3E-03	1.3E-03	1.0E-03	1.3E-03
NO3	mg/L	4.8E-02	4.8E-02	4.8E-02	4.0E-01	1.7E-01	2.4E-01	3.6E-01	3.3E-01	4.6E-01	2.6E-01	2.0E-01	4.8E-02	2.1E-01
Pb	mg/L	3.1E-04	3.1E-04	3.1E-04	3.7E-04	4.0E-04	4.5E-04	5.4E-04	5.2E-04	6.1E-04	3.8E-04	3.8E-04	3.1E-04	3.8E-04
P	mg/L	1.5E-02	1.5E-02	1.5E-02	1.5E-02	1.5E-02	1.5E-02	1.4E-02	1.4E-02	1.4E-02	1.5E-02	1.5E-02	1.5E-02	1.5E-02
Sb	mg/L	1.0E-03	1.0E-03	1.0E-03	1.4E-03	1.6E-03	2.0E-03	2.5E-03	2.4E-03	3.1E-03	1.5E-03	1.5E-03	1.0E-03	1.5E-03
Se	mg/L	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04
SO4	mg/L	1.0E+00	1.0E+00	1.0E+00	6.0E+01	8.5E+01	1.4E+02	2.2E+02	2.0E+02	2.9E+02	7.0E+01	6.9E+01	1.0E+00	7.0E+01
U	mg/L	5.0E-05	5.0E-05	5.0E-05	1.4E-04	1.7E-04	2.5E-04	3.8E-04	3.5E-04	4.9E-04	1.5E-04	1.5E-04	5.0E-05	1.5E-04
Zn	mg/L	1.2E-02	1.2E-02	1.2E-02	1.3E-02	1.3E-02	1.4E-02	1.5E-02	1.4E-02	1.5E-02	1.3E-02	1.3E-02	1.2E-02	1.3E-02
CN (Total)	mg/L	1.0E-03	1.0E-03	1.0E-03	1.9E-02	2.7E-02	4.4E-02	7.0E-02	6.5E-02	9.3E-02	2.3E-02	2.2E-02	1.0E-03	2.3E-02

Note:
[redacted] – indicates a value greater than the CCME guideline.

TABLE B6
CALCULATION RESULTS FOR MIX 2
SCENARIO 2 - HIGH FLOW

Mix 2 = Mix 1 + Fish River Subwatersheds Load

Parameter	Units	Mix 2 – Water Quality in Fish River												Annual Average Concentration
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cumulative Flow Rate	m^3/s	5.6E+00	5.7E+00	8.1E+00	1.3E+01	7.9E+00	4.6E+00	2.8E+00	3.0E+00	2.0E+00	5.0E+00	7.7E+00	6.6E+00	6.0E+00
Ag	mg/L	5.0E-05	5.0E-05	5.0E-05	5.3E-05	5.4E-05	5.7E-05	6.2E-05	6.1E-05	6.7E-05	5.4E-05	5.3E-05	5.0E-05	5.4E-05
Al	mg/L	1.8E-01	1.8E-01	1.8E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.8E-01	1.7E-01
As	mg/L	4.0E-03	4.0E-03	4.0E-03	5.8E-03	6.6E-03	9.5E-03	1.1E-02	1.1E-02	1.4E-02	5.1E-03	5.1E-03	4.0E-03	5.1E-03
Ca	mg/L	1.2E+00	1.2E+00	1.2E+00	3.6E+00	4.6E+00	7.0E+00	1.1E+01	1.0E+01	1.5E+01	4.0E+00	4.0E+00	1.2E+00	4.0E+00
Cd	mg/L	7.3E-06	7.3E-06	7.2E-06	7.2E-06	7.2E-06	7.1E-06	6.9E-06	7.0E-06	6.8E-06	7.2E-06	7.2E-06	7.2E-06	7.2E-06
Cl	mg/L	4.0E+00	4.0E+00	4.0E+00	4.2E+00	4.3E+00	4.5E+00	4.9E+00	4.8E+00	5.3E+00	4.3E+00	4.3E+00	4.0E+00	4.3E+00
Co	mg/L	2.0E-04	2.0E-04	2.0E-04	2.6E-03	3.7E-03	6.1E-03	9.9E-03	9.2E-03	1.4E-02	3.0E-03	3.0E-03	2.0E-04	3.0E-03
Cr	mg/L	2.0E-03	2.0E-03	2.0E-03	2.0E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	2.0E-03	1.9E-03
Cu	mg/L	1.0E-03	1.0E-03	1.0E-03	3.2E-03	4.2E-03	6.4E-03	1.0E-02	9.3E-03	1.4E-02	3.6E-03	3.6E-03	1.0E-03	3.6E-03
Fe	mg/L	2.3E-01	2.3E-01	2.3E-01	2.7E-01	2.9E-01	3.4E-01	4.2E-01	4.0E-01	4.9E-01	2.8E-01	2.8E-01	2.3E-01	2.8E-01
K	mg/L	3.1E-01	3.1E-01	3.1E-01	1.0E+00	1.4E+00	2.1E+00	3.3E+00	3.1E+00	4.5E+00	1.2E+00	1.2E+00	3.1E-01	1.2E+00
Mg	mg/L	4.8E-01	4.8E-01	4.8E-01	5.9E-01	6.4E-01	7.5E-01	9.2E-01	8.9E-01	1.1E+00	6.1E-01	6.1E-01	4.8E-01	6.1E-01
Mn	mg/L	5.1E-02	5.1E-02	5.1E-02	5.2E-02	5.2E-02	5.3E-02	5.4E-02	5.4E-02	5.6E-02	5.2E-02	5.2E-02	5.1E-02	5.2E-02
Na	mg/L	2.9E+00	2.9E+00	2.9E+00	9.7E+00	1.3E+01	1.9E+01	3.0E+01	2.8E+01	4.1E+01	1.1E+01	1.1E+01	2.9E+00	1.1E+01
NH4+NH3	mg/L	2.5E-02	2.5E-02	2.5E-02	1.2E-01	5.7E-02	7.8E-02	1.2E-01	1.1E-01	1.5E-01	8.3E-02	6.6E-02	2.5E-02	6.8E-02
Ni	mg/L	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.1E-03	1.2E-03	1.3E-03	1.3E-03	1.4E-03	1.1E-03	1.1E-03	1.0E-03	1.1E-03
NO3	mg/L	1.3E-01	1.3E-01	1.3E-01	2.3E-01	1.6E-01	1.8E-01	2.2E-01	2.1E-01	2.5E-01	1.9E-01	1.7E-01	1.3E-01	1.7E-01
Pb	mg/L	2.7E-04	2.7E-04	2.7E-04	2.8E-04	2.9E-04	3.1E-04	3.3E-04	3.3E-04	3.6E-04	2.9E-04	2.9E-04	2.7E-04	2.9E-04
P	mg/L	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02
Sb	mg/L	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.2E-03	1.3E-03	1.4E-03	1.4E-03	1.6E-03	1.1E-03	1.1E-03	1.0E-03	1.1E-03
Se	mg/L	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04
SO4	mg/L	1.0E+00	1.0E+00	1.0E+00	1.7E+01	2.3E+01	3.9E+01	6.4E+01	5.9E+01	8.8E+01	1.9E+01	1.9E+01	1.0E+00	1.9E+01
U	mg/L	5.0E-05	5.0E-05	5.0E-05	7.3E-05	8.3E-05	1.1E-04	1.4E-04	1.4E-04	1.8E-04	7.7E-05	7.7E-05	5.0E-05	7.7E-05
Zn	mg/L	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02
CN (Total)	mg/L	1.0E-03	1.0E-03	1.0E-03	5.9E-03	8.0E-03	1.3E-02	2.1E-02	1.9E-02	2.8E-02	6.7E-03	6.7E-03	1.0E-03	6.7E-03

Note:
[redacted] – indicates a value greater than the CCME guideline.

TABLE B7
CALCULATION RESULTS FOR MIX 3
SCENARIO 2 - HIGH FLOW

Mix 3 = Mix 2 + Lake Charlotte Subwatersheds Load

Parameter	Units	Mix 3 – Water Quality in Lake Charlotte												Annual Average Concentration
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cumulative Flow Rate	m^3/s	9.6E+00	9.9E+00	1.4E+01	2.2E+01	1.3E+01	7.8E+00	4.7E+00	5.1E+00	3.4E+00	8.5E+00	1.3E+01	1.1E+01	1.0E+01
Ag	mg/L	5.0E-05	5.0E-05	5.0E-05	5.2E-05	5.3E-05	5.4E-05	5.7E-05	5.7E-05	6.0E-05	5.2E-05	5.2E-05	5.0E-05	5.2E-05
Al	mg/L	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
As	mg/L	4.0E-03	4.0E-03	4.0E-03	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.0E-03	[illegible]
Ca	mg/L	1.2E+00	1.2E+00	1.2E+00	2.6E+00	3.2E+00	4.6E+00	6.9E+00	6.5E+00	9.2E+00	2.8E+00	2.8E+00	1.2E+00	2.8E+00
Cd	mg/L	7.8E-06	7.8E-06	7.8E-06	7.7E-06	7.7E-06	7.7E-06	7.6E-06	7.6E-06	7.5E-06	7.7E-06	7.7E-06	7.8E-06	7.7E-06
Cl	mg/L	4.0E+00	4.0E+00	4.0E+00	4.1E+00	4.2E+00	4.3E+00	4.5E+00	4.5E+00	4.8E+00	4.2E+00	4.2E+00	4.0E+00	4.2E+00
Co	mg/L	2.0E-04	2.0E-04	2.0E-04	1.6E-03	2.2E-03	3.7E-03	6.0E-03	5.5E-03	8.3E-03	1.9E-03	1.8E-03	2.0E-04	1.9E-03
Cr	mg/L	1.6E-03	1.6E-03	1.6E-03	1.6E-03	1.6E-03	1.5E-03	1.5E-03	1.5E-03	1.5E-03	1.6E-03	1.6E-03	1.6E-03	1.6E-03
Cu	mg/L	1.0E-03	1.0E-03	1.0E-03	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.0E-03	[illegible]
Fe	mg/L	2.2E-01	2.2E-01	2.2E-01	2.4E-01	2.6E-01	2.8E-01	[illegible]	[illegible]	[illegible]	2.5E-01	2.5E-01	2.2E-01	2.5E-01
K	mg/L	3.0E-01	3.0E-01	3.0E-01	7.4E-01	9.3E-01	1.4E+00	2.1E+00	1.9E+00	2.8E+00	8.1E-01	8.1E-01	3.0E-01	8.1E-01
Mg	mg/L	4.9E-01	4.9E-01	4.9E-01	5.5E-01	5.8E-01	6.5E-01	7.5E-01	7.3E-01	8.6E-01	5.6E-01	5.6E-01	4.9E-01	5.6E-01
Mn	mg/L	5.0E-02	5.0E-02	5.0E-02	5.0E-02	5.0E-02	5.1E-02	5.2E-02	5.2E-02	5.3E-02	5.0E-02	5.0E-02	5.0E-02	5.0E-02
Na	mg/L	2.9E+00	2.9E+00	2.9E+00	6.9E+00	8.6E+00	1.3E+01	1.9E+01	1.8E+01	2.6E+01	7.6E+00	7.5E+00	2.9E+00	7.6E+00
NH4+NH3	mg/L	2.5E-02	2.5E-02	2.5E-02	8.0E-02	4.4E-02	5.6E-02	7.9E-02	7.4E-02	9.9E-02	5.9E-02	4.9E-02	2.5E-02	5.0E-02
Ni	mg/L	1.0E-03	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.1E-03	1.2E-03	1.1E-03	1.2E-03	1.0E-03	1.0E-03	1.0E-03	1.0E-03
NO3	mg/L	1.3E-01	1.3E-01	1.3E-01	1.8E-01	1.5E-01	1.6E-01	1.8E-01	1.8E-01	2.0E-01	1.6E-01	1.5E-01	1.3E-01	1.5E-01
Pb	mg/L	2.6E-04	2.6E-04	2.6E-04	2.7E-04	2.7E-04	2.8E-04	3.0E-04	3.0E-04	3.2E-04	2.7E-04	2.7E-04	2.6E-04	2.7E-04
P	mg/L	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02
Sb	mg/L	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.1E-03	1.2E-03	1.3E-03	1.2E-03	1.4E-03	1.1E-03	1.1E-03	1.0E-03	1.1E-03
Se	mg/L	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04
SO4	mg/L	1.0E+00	1.0E+00	1.0E+00	1.0E+01	1.4E+01	2.3E+01	3.8E+01	3.5E+01	5.4E+01	1.2E+01	1.2E+01	1.0E+00	1.2E+01
U	mg/L	5.0E-05	5.0E-05	5.0E-05	6.4E-05	7.0E-05	8.3E-05	1.1E-04	1.0E-04	1.3E-04	6.6E-05	6.6E-05	5.0E-05	6.6E-05
Zn	mg/L	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02
CN (Total)	mg/L	1.0E-03	1.0E-03	1.0E-03	3.9E-03	5.1E-03	8.0E-03	1.3E-02	1.2E-02	1.7E-02	4.4E-03	4.3E-03	1.0E-03	4.3E-03

Note:
[illegible] – indicates a value greater than the CCME guideline.

APPENDIX C

AVERAGE MONTHLY LOADING RATES AND MIXING CELL CALULATIONS FOR LOW FLOW CONDITIONS

TABLE C1
AVERAGE MONTHLY LOADING RATES FOR THE MINE EFFLUENT DISCHARGE
SCENARIO 3 - LOW FLOW
TOUQUOY GOLD PROJECT

Parameter	Mine Effluent Water Quality [1]	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mine Effluent Discharge Rate (m^3/s)		0	0	0	5.56E-02	5.70E-02	5.59E-02	5.56E-02	5.64E-02	5.81E-02	0.018103307	0.051646201	0
Ag	0.0003	0	0	0	1.78E-02	1.82E-02	1.79E-02	1.78E-02	1.80E-02	1.86E-02	5.79E-03	1.65E-02	0
Al	0.04	0	0	0	2.22E+00	2.28E+00	2.23E+00	2.22E+00	2.25E+00	2.32E+00	7.24E-01	2.07E+00	0
As	0.2	0	0	0	9.45E+00	9.69E+00	9.50E+00	9.45E+00	9.58E+00	9.87E+00	3.08E+00	8.78E+00	0
Ca	215	0	0	0	1.20E+04	1.22E+04	1.20E+04	1.19E+04	1.21E+04	1.25E+04	3.89E+03	1.11E+04	0
Cd	*0.000002*	0	0	0	8.34E-05	8.55E-05	8.38E-05	8.34E-05	8.45E-05	8.71E-05	2.72E-05	7.75E-05	0
Cl	24	0	0	0	1.33E+03	1.37E+03	1.34E+03	1.33E+03	1.35E+03	1.39E+03	4.34E+02	1.24E+03	0
Co	0.2	0	0	0	1.21E+01	1.24E+01	1.21E+01	1.21E+01	1.22E+01	1.26E+01	3.93E+00	1.12E+01	0
Cr	*0.0003*	0	0	0	1.39E-02	1.42E-02	1.40E-02	1.39E-02	1.41E-02	1.45E-02	4.53E-03	1.29E-02	0
Cu	0.2	0	0	0	1.12E+01	1.15E+01	1.12E+01	1.12E+01	1.13E+01	1.17E+01	3.64E+00	1.04E+01	0
Fe	4	0	0	0	2.48E+02	2.54E+02	2.49E+02	2.48E+02	2.51E+02	2.59E+02	8.07E+01	2.30E+02	0
K	67	0	0	0	3.71E+03	3.81E+03	3.73E+03	3.71E+03	3.76E+03	3.88E+03	1.21E+03	3.45E+03	0
Mg	10	0	0	0	5.73E+02	5.87E+02	5.75E+02	5.72E+02	5.80E+02	5.98E+02	1.86E+02	5.32E+02	0
Mn	0.1	0	0	0	7.34E+00	7.52E+00	7.37E+00	7.34E+00	7.44E+00	7.67E+00	2.39E+00	6.82E+00	0
Na	610	0	0	0	3.39E+04	3.48E+04	3.41E+04	3.39E+04	3.44E+04	3.54E+04	1.10E+04	3.15E+04	0
NH4+NH3	– [2]	0	0	0	1.24E+03	2.58E+02	2.46E+02	2.54E+02	2.52E+02	2.54E+02	2.90E+02	3.19E+02	0
Ni	0.007	0	0	0	3.95E-01	4.05E-01	3.97E-01	3.95E-01	4.00E-01	4.12E-01	1.29E-01	3.67E-01	0
NO3	– [2]	0	0	0	1.24E+03	2.58E+02	2.46E+02	2.54E+02	2.52E+02	2.54E+02	2.90E+02	3.19E+02	0
Pb	0.002	0	0	0	9.73E-02	9.97E-02	9.77E-02	9.72E-02	9.86E-02	1.02E-01	3.17E-02	9.04E-02	0
P	0.01	0	0	0	5.56E-01	5.70E-01	5.59E-01	5.56E-01	5.64E-01	5.81E-01	1.81E-01	5.16E-01	0
Sb	0.01	0	0	0	6.00E-01	6.15E-01	6.03E-01	6.00E-01	6.09E-01	6.27E-01	1.96E-01	5.58E-01	0
Se	*0.0005*	0	0	0	2.78E-02	2.85E-02	2.79E-02	2.78E-02	2.82E-02	2.90E-02	9.05E-03	2.58E-02	0
SO4	1400	0	0	0	7.78E+04	7.98E+04	7.82E+04	7.78E+04	7.89E+04	8.13E+04	2.53E+04	7.23E+04	0
U	0.002	0	0	0	1.18E-01	1.21E-01	1.19E-01	1.18E-01	1.20E-01	1.24E-01	3.86E-02	1.10E-01	0
Zn	0.03	0	0	0	1.50E+00	1.54E+00	1.51E+00	1.50E+00	1.52E+00	1.57E+00	4.89E-01	1.39E+00	0
CN	0.4	0	0	0	2.45E+01	2.51E+01	2.46E+01	2.45E+01	2.48E+01	2.56E+01	7.97E+0C	2.27E+01	0

Notes:

0.001 – indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

(1) Concentrations are taken from water chemistry after treatment as outlined in a draft memo by SGS (2007).

(2) Total ammonia and nitrate are input into the model as loads.

TABLE C2
AVERAGE MONTHLY LOADING RATES FOR SCRAGGY LAKE
SCENARIO 3 - LOW FLOW
TOUQUOY GOLD PROJECT

Parameter	Scraggy Lake Baseline Water Quality	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Subwatershed Net Flow Rate (m^3/s)		1.43E+00	1.47E+00	2.06E+00	1.26E+00	8.96E-01	5.14E-01	2.99E-01	3.33E-01	2.19E-01	3.49E-01	1.01E+00	1.68E+00
Ag	*0.00005*	7.15E-02	7.35E-02	1.03E-01	6.32E-02	4.48E-02	2.57E-02	1.49E-02	1.66E-02	1.10E-02	1.75E-02	5.05E-02	8.40E-02
Al	0.2	2.68E+02	2.75E+02	3.86E+02	2.37E+02	1.68E+02	9.63E+01	5.59E+01	6.23E+01	4.11E+01	6.54E+01	1.89E+02	3.15E+02
As	*0.001*	1.43E+00	1.47E+00	2.06E+00	1.26E+00	8.96E-01	5.14E-01	2.99E-01	3.33E-01	2.19E-01	3.49E-01	1.01E+00	1.68E+00
Ca	1	1.43E+03	1.47E+03	2.06E+03	1.26E+03	8.96E+02	5.14E+02	2.99E+02	3.33E+02	2.19E+02	3.49E+02	1.01E+03	1.68E+03
Cd	0.00002	2.81E-02	2.88E-02	4.04E-02	2.48E-02	1.76E-02	1.01E-02	5.86E-03	6.53E-03	4.30E-03	6.86E-03	1.98E-02	3.30E-02
Cl	4	5.72E+03	5.88E+03	8.24E+03	5.06E+03	3.59E+03	2.06E+03	1.19E+03	1.33E+03	8.77E+02	1.40E+03	4.04E+03	6.72E+03
Co	*0.0002*	2.86E-01	2.94E-01	4.12E-01	2.53E-01	1.79E-01	1.03E-01	5.97E-02	6.65E-02	4.39E-02	6.99E-02	2.02E-01	3.36E-01
Cr	0.005	6.86E+00	7.06E+00	9.89E+00	6.07E+00	4.30E+00	2.47E+00	1.43E+00	1.60E+00	1.05E+00	1.68E+00	4.84E+00	8.06E+00
Cu	*0.001*	1.43E+00	1.47E+00	2.06E+00	1.26E+00	8.96E-01	5.14E-01	2.99E-01	3.33E-01	2.19E-01	3.49E-01	1.01E+00	1.68E+00
Fe	0.2	3.36E+02	3.46E+02	4.85E+02	2.97E+02	2.11E+02	1.21E+02	7.02E+01	7.83E+01	5.16E+01	8.22E+01	2.37E+02	3.95E+02
K	0.3	4.65E+02	4.78E+02	6.70E+02	4.11E+02	2.91E+02	1.67E+02	9.70E+01	1.08E+02	7.13E+01	1.14E+02	3.28E+02	5.46E+02
Mg	0.4	6.08E+02	6.25E+02	8.76E+02	5.37E+02	3.81E+02	2.18E+02	1.27E+02	1.41E+02	9.32E+01	1.49E+02	4.29E+02	7.14E+02
Mn	0.05	6.55E+01	6.74E+01	9.44E+01	5.79E+01	4.11E+01	2.36E+01	1.37E+01	1.52E+01	1.01E+01	1.60E+01	4.62E+01	7.70E+01
Na	3	4.25E+03	4.37E+03	6.13E+03	3.76E+03	2.67E+03	1.53E+03	8.88E+02	9.90E+02	6.53E+02	1.04E+03	3.00E+03	5.00E+03
NH4+NH3	*0.03*	3.58E+01	3.68E+01	5.15E+01	3.16E+01	2.24E+01	1.29E+01	7.46E+00	8.32E+00	5.48E+00	8.74E+00	2.52E+01	4.20E+01
Ni	*0.001*	1.43E+00	1.47E+00	2.06E+00	1.26E+00	8.96E-01	5.14E-01	2.99E-01	3.33E-01	2.19E-01	3.49E-01	1.01E+00	1.68E+00
NO3	0.05	6.79E+01	6.98E+01	9.79E+01	6.01E+01	4.26E+01	2.44E+01	1.42E+01	1.58E+01	1.04E+01	1.66E+01	4.79E+01	7.98E+01
Pb	*0.0003*	4.47E-01	4.59E-01	6.44E-01	3.95E-01	2.80E-01	1.61E-01	9.33E-02	1.04E-01	6.85E-02	1.09E-01	3.15E-01	5.25E-01
P	0.02	2.15E+01	2.21E+01	3.09E+01	1.90E+01	1.34E+01	7.71E+00	4.48E+00	4.99E+00	3.29E+00	5.24E+00	1.51E+01	2.52E+01
Sb	*0.001*	1.43E+00	1.47E+00	2.06E+00	1.26E+00	8.96E-01	5.14E-01	2.99E-01	3.33E-01	2.19E-01	3.49E-01	1.01E+00	1.68E+00
Se	*0.0005*	7.15E-01	7.35E-01	1.03E+00	6.32E-01	4.48E-01	2.57E-01	1.49E-01	1.66E-01	1.10E-01	1.75E-01	5.05E-01	8.40E-01
SO4	*1*	1.43E+03	1.47E+03	2.06E+03	1.26E+03	8.96E+02	5.14E+02	2.99E+02	3.33E+02	2.19E+02	3.49E+02	1.01E+03	1.68E+03
U	*0.00005*	7.15E-02	7.35E-02	1.03E-01	6.32E-02	4.48E-02	2.57E-02	1.49E-02	1.66E-02	1.10E-02	1.75E-02	5.05E-02	8.40E-02
Zn	0.01	1.76E+01	1.80E+01	2.53E+01	1.55E+01	1.10E+01	6.31E+00	3.66E+00	4.08E+00	2.69E+00	4.29E+00	1.24E+01	2.06E+01
CN	*0.001*	1.43E+00	1.47E+00	2.06E+00	1.26E+00	8.96E-01	5.14E-01	2.99E-01	3.33E-01	2.19E-01	3.49E-01	1.01E+00	1.68E+00

Note:
0.001 – indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

TABLE C3
AVERAGE MONTHLY LOADING RATES FOR FISH RIVER
SCENARIO 3 - LOW FLOW
TOUQUOY GOLD PROJECT

Parameter	Fish River Baseline Water Quality	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Subwatershed Net Flow Rate (m^3/s)		4.16E+00	4.27E+00	6.00E+00	3.67E+00	2.60E+00	1.50E+00	8.83E-01	9.72E-01	6.51E-01	1.02E+00	2.94E+00	4.90E+00
Ag	*0.00005*	2.08E-01	2.14E-01	3.00E-01	1.84E-01	1.30E-01	7.48E-02	4.41E-02	4.86E-02	3.26E-02	5.08E-02	1.47E-01	2.45E-01
Al	0.2	7.11E+02	7.30E+02	1.03E+03	6.28E+02	4.45E+02	2.56E+02	1.51E+02	1.66E+02	1.11E+02	1.74E+02	5.03E+02	8.38E+02
As	0.005	2.08E+01	2.14E+01	3.00E+01	1.84E+01	1.30E+01	7.48E+00	4.41E+00	4.86E+00	3.26E+00	5.08E+00	1.47E+01	2.45E+01
Ca	1	5.42E+03	5.56E+03	7.82E+03	4.78E+03	3.39E+03	1.95E+03	1.15E+03	1.27E+03	8.49E+02	1.32E+03	3.83E+03	6.38E+03
Cd	0.000003	1.25E-02	1.28E-02	1.80E-02	1.10E-02	7.81E-03	4.49E-03	2.65E-03	2.92E-03	1.95E-03	3.05E-03	8.83E-03	1.47E-02
Cl	4	1.66E+04	1.71E+04	2.40E+04	1.47E+04	1.04E+04	5.99E+03	3.53E+03	3.89E+03	2.61E+03	4.07E+03	1.18E+04	1.96E+04
Co	*0.0002*	8.32E-01	8.54E-01	1.20E+00	7.34E-01	5.21E-01	2.99E-01	1.77E-01	1.94E-01	1.30E-01	2.03E-01	5.88E-01	9.80E-01
Cr	0.001	4.16E+00	4.27E+00	6.00E+00	3.67E+00	2.60E+00	1.50E+00	8.83E-01	9.72E-01	6.51E-01	1.02E+00	2.94E+00	4.90E+00
Cu	*0.001*	4.16E+00	4.27E+00	6.00E+00	3.67E+00	2.60E+00	1.50E+00	8.83E-01	9.72E-01	6.51E-01	1.02E+00	2.94E+00	4.90E+00
Fe	0.2	9.23E+02	9.47E+02	1.33E+03	8.14E+02	5.78E+02	3.32E+02	1.96E+02	2.16E+02	1.44E+02	2.25E+02	6.53E+02	1.09E+03
K	0.3	1.25E+03	1.28E+03	1.80E+03	1.10E+03	7.81E+02	4.49E+02	2.65E+02	2.92E+02	1.95E+02	3.05E+02	8.83E+02	1.47E+03
Mg	0.5	2.08E+03	2.14E+03	3.00E+03	1.84E+03	1.30E+03	7.48E+02	4.41E+02	4.86E+02	3.26E+02	5.08E+02	1.47E+03	2.45E+03
Mn	0.05	2.18E+02	2.24E+02	3.15E+02	1.92E+02	1.37E+02	7.85E+01	4.63E+01	5.10E+01	3.42E+01	5.33E+01	1.54E+02	2.57E+02
Na	3	1.22E+04	1.25E+04	1.76E+04	1.08E+04	7.64E+03	4.39E+03	2.59E+03	2.85E+03	1.91E+03	2.98E+03	8.63E+03	1.44E+04
NH4+NH3	*0.03*	1.04E+02	1.07E+02	1.50E+02	9.18E+01	6.51E+01	3.74E+01	2.21E+01	2.43E+01	1.63E+01	2.54E+01	7.36E+01	1.23E+02
Ni	*0.001*	4.16E+00	4.27E+00	6.00E+00	3.67E+00	2.60E+00	1.50E+00	8.83E-01	9.72E-01	6.51E-01	1.02E+00	2.94E+00	4.90E+00
NO3	0.2	6.70E+02	6.88E+02	9.66E+02	5.91E+02	4.19E+02	2.41E+02	1.42E+02	1.57E+02	1.05E+02	1.64E+02	4.74E+02	7.89E+02
Pb	*0.0003*	1.04E+00	1.07E+00	1.50E+00	9.18E-01	6.51E-01	3.74E-01	2.21E-01	2.43E-01	1.63E-01	2.54E-01	7.36E-01	1.23E+00
P	*0.01*	4.16E+01	4.27E+01	6.00E+01	3.67E+01	2.60E+01	1.50E+01	8.83E+00	9.72E+00	6.51E+00	1.02E+01	2.94E+01	4.90E+01
Sb	*0.001*	4.16E+00	4.27E+00	6.00E+00	3.67E+00	2.60E+00	1.50E+00	8.83E-01	9.72E-01	6.51E-01	1.02E+00	2.94E+00	4.90E+00
Se	*0.0005*	2.08E+00	2.14E+00	3.00E+00	1.84E+00	1.30E+00	7.48E-01	4.41E-01	4.86E-01	3.26E-01	5.08E-01	1.47E+00	2.45E+00
SO4	*1*	4.16E+03	4.27E+03	6.00E+03	3.67E+03	2.60E+03	1.50E+03	8.83E+02	9.72E+02	6.51E+02	1.02E+03	2.94E+03	4.90E+03
U	*0.00005*	2.08E-01	2.14E-01	3.00E-01	1.84E-01	1.30E-01	7.48E-02	4.41E-02	4.86E-02	3.26E-02	5.08E-02	1.47E-01	2.45E-01
Zn	0.02	8.17E+01	8.39E+01	1.18E+02	7.21E+01	5.12E+01	2.94E+01	1.73E+01	1.91E+01	1.28E+01	2.00E+01	5.78E+01	9.63E+01
CN	*0.001*	4.16E+00	4.27E+00	6.00E+00	3.67E+00	2.60E+00	1.50E+00	8.83E-01	9.72E-01	6.51E-01	1.02E+00	2.94E+00	4.90E+00

Note:

0.001 – indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

TABLE C4
AVERAGE MONTHLY LOADING RATES FOR LAKE CHARLOTTE
SCENARIO 3 - LOW FLOW
TOUQUOY GOLD PROJECT

Parameter	Lake Charlotte Baseline Water Quality	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Subwatershed Net Flow Rate (m^3/s)		4.00E+00	4.11E+00	5.78E+00	3.53E+00	2.51E+00	1.44E+00	8.44E-01	9.33E-01	6.18E-01	9.84E-01	2.83E+00	4.71E+00
Ag	***0.00005***	2.00E-01	2.06E-01	2.89E-01	1.77E-01	1.25E-01	7.19E-02	4.22E-02	4.66E-02	3.09E-02	4.92E-02	1.41E-01	2.36E-01
Al	**0.2**	6.80E+02	6.99E+02	9.83E+02	6.01E+02	4.26E+02	2.44E+02	1.43E+02	1.59E+02	1.05E+02	1.67E+02	4.81E+02	8.01E+02
As	**0.004**	1.64E+01	1.69E+01	2.37E+01	1.45E+01	1.03E+01	5.90E+00	3.46E+00	3.82E+00	2.53E+00	4.03E+00	1.16E+01	1.93E+01
Ca	**1**	4.80E+03	4.93E+03	6.94E+03	4.24E+03	3.01E+03	1.73E+03	1.01E+03	1.12E+03	7.42E+02	1.18E+03	3.40E+03	5.65E+03
Cd	***0.000009***	3.40E-02	3.49E-02	4.91E-02	3.00E-02	2.13E-02	1.22E-02	7.17E-03	7.93E-03	5.25E-03	8.36E-03	2.41E-02	4.00E-02
Cl	**4**	1.60E+04	1.64E+04	2.31E+04	1.41E+04	1.00E+04	5.75E+03	3.37E+03	3.73E+03	2.47E+03	3.94E+03	1.13E+04	1.88E+04
Co	***0.0002***	8.00E-01	8.22E-01	1.16E+00	7.07E-01	5.01E-01	2.88E-01	1.69E-01	1.87E-01	1.24E-01	1.97E-01	5.66E-01	9.42E-01
Cr	***0.001***	4.00E+00	4.11E+00	5.78E+00	3.53E+00	2.51E+00	1.44E+00	8.44E-01	9.33E-01	6.18E-01	9.84E-01	2.83E+00	4.71E+00
Cu	***0.001***	4.00E+00	4.11E+00	5.78E+00	3.53E+00	2.51E+00	1.44E+00	8.44E-01	9.33E-01	6.18E-01	9.84E-01	2.83E+00	4.71E+00
Fe	**0.2**	8.20E+02	8.43E+02	1.18E+03	7.25E+02	5.14E+02	2.95E+02	1.73E+02	1.91E+02	1.27E+02	2.02E+02	5.80E+02	9.66E+02
K	**0.3**	1.20E+03	1.23E+03	1.73E+03	1.06E+03	7.52E+02	4.31E+02	2.53E+02	2.80E+02	1.85E+02	2.95E+02	8.49E+02	1.41E+03
Mg	**0.5**	2.00E+03	2.06E+03	2.89E+03	1.77E+03	1.25E+03	7.19E+02	4.22E+02	4.66E+02	3.09E+02	4.92E+02	1.41E+03	2.36E+03
Mn	**0.05**	1.92E+02	1.97E+02	2.77E+02	1.70E+02	1.20E+02	6.90E+01	4.05E+01	4.48E+01	2.97E+01	4.72E+01	1.36E+02	2.26E+02
Na	**3**	1.16E+04	1.19E+04	1.68E+04	1.03E+04	7.27E+03	4.17E+03	2.45E+03	2.71E+03	1.79E+03	2.85E+03	8.21E+03	1.37E+04
NH4+NH3	***0.03***	1.00E+02	1.03E+02	1.45E+02	8.84E+01	6.27E+01	3.60E+01	2.11E+01	2.33E+01	1.55E+01	2.46E+01	7.07E+01	1.18E+02
Ni	***0.001***	4.00E+00	4.11E+00	5.78E+00	3.53E+00	2.51E+00	1.44E+00	8.44E-01	9.33E-01	6.18E-01	9.84E-01	2.83E+00	4.71E+00
NO3	**0.1**	5.00E+02	5.14E+02	7.23E+02	4.42E+02	3.13E+02	1.80E+02	1.05E+02	1.17E+02	7.73E+01	1.23E+02	3.54E+02	5.89E+02
Pb	***0.0003***	1.00E+00	1.03E+00	1.45E+00	8.84E-01	6.27E-01	3.60E-01	2.11E-01	2.33E-01	1.55E-01	2.46E-01	7.07E-01	1.18E+00
P	***0.01***	4.00E+01	4.11E+01	5.78E+01	3.53E+01	2.51E+01	1.44E+01	8.44E+00	9.33E+00	6.18E+00	9.84E+00	2.83E+01	4.71E+01
Sb	***0.001***	4.00E+00	4.11E+00	5.78E+00	3.53E+00	2.51E+00	1.44E+00	8.44E-01	9.33E-01	6.18E-01	9.84E-01	2.83E+00	4.71E+00
Se	***0.0005***	2.00E+00	2.06E+00	2.89E+00	1.77E+00	1.25E+00	7.19E-01	4.22E-01	4.66E-01	3.09E-01	4.92E-01	1.41E+00	2.36E+00
SO4	***1***	4.00E+03	4.11E+03	5.78E+03	3.53E+03	2.51E+03	1.44E+03	8.44E+02	9.33E+02	6.18E+02	9.84E+02	2.83E+03	4.71E+03
U	***0.00005***	2.00E-01	2.06E-01	2.89E-01	1.77E-01	1.25E-01	7.19E-02	4.22E-02	4.66E-02	3.09E-02	4.92E-02	1.41E-01	2.36E-01
Zn	**0.02**	7.24E+01	7.44E+01	1.05E+02	6.40E+01	4.54E+01	2.60E+01	1.53E+01	1.69E+01	1.12E+01	1.78E+01	5.12E+01	8.53E+01
CN	***0.001***	4.00E+00	4.11E+00	5.78E+00	3.53E+00	2.51E+00	1.44E+00	8.44E-01	9.33E-01	6.18E-01	9.84E-01	2.83E+00	4.71E+00

Note:
0.001 – indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

Mix 1 = Mine Effluent Load + Scraggy Lake Subwatersheds Load

Parameter	Units	Mix 1 – Water Quality in Scraggy Lake												Annual Average Concentration
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cumulative Flow Rate	m^3/s	1.4E+00	1.5E+00	2.1E+00	1.3E+00	9.5E-01	5.7E-01	3.5E-01	3.9E-01	2.8E-01	3.7E-01	1.1E+00	1.7E+00	9.9E-01
Ag	mg/L	5.0E-05	5.0E-05	5.0E-05	6.1E-05	6.6E-05	7.6E-05	9.2E-05	8.9E-05	1.1E-04	6.3E-05	6.3E-05	5.0E-05	5.9E-05
Al	mg/L	1.9E-01	1.9E-01	1.9E-01	1.8E-01	1.8E-01	1.7E-01	1.6E-01	1.7E-01	1.6E-01	1.8E-01	1.8E-01	1.9E-01	1.8E-01
As	mg/L	1.0E-03	1.0E-03	1.0E-03	8.1E-03	1.1E-02	1.8E-02	2.8E-02	2.6E-02	3.6E-02	9.3E-03	9.2E-03	1.0E-03	1.6E-03
Ca	mg/L	1.0E+00	1.0E+00	1.0E+00	1.0E+01	1.4E+01	2.2E+01	3.5E+01	3.2E+01	4.6E+01	1.2E+01	1.1E+01	1.0E+00	8.3E+00
Cd	mg/L	2.0E-05	2.0E-05	2.0E-05	1.9E-05	1.9E-05	1.8E-05	1.7E-05	1.7E-05	1.6E-05	1.9E-05	1.9E-05	2.0E-05	1.9E-05
Cl	mg/L	4.0E+00	4.0E+00	4.0E+00	4.8E+00	5.2E+00	6.0E+00	7.1E+00	6.9E+00	8.2E+00	5.0E+00	5.0E+00	4.0E+00	4.7E+00
Co	mg/L	2.0E-04	2.0E-04	2.0E-04	9.3E-03	1.3E-02	2.1E-02	3.4E-02	3.2E-02	4.6E-02	1.1E-02	1.1E-02	2.0E-04	7.6E-03
Cr	mg/L	4.8E-03	4.8E-03	4.8E-03	4.6E-03	4.5E-03	4.4E-03	4.1E-03	4.1E-03	3.8E-03	4.6E-03	4.6E-03	4.8E-03	4.6E-03
Cu	mg/L	1.0E-03	1.0E-03	1.0E-03	9.4E-03	1.3E-02	2.1E-02	3.2E-02	3.0E-02	4.3E-02	1.1E-02	1.1E-02	1.0E-03	7.8E-03
Fe	mg/L	2.4E-01	2.4E-01	2.4E-01	4.1E-01	4.9E-01	6.5E-01	9.0E-01	8.5E-01	1.1E+00	3.4E-01	3.4E-01	2.4E-01	5.3E-01
K	mg/L	3.3E-01	3.3E-01	3.3E-01	3.1E+00	4.3E+00	6.8E+00	1.1E+01	1.0E+01	1.4E+01	3.6E+00	3.6E+00	3.3E-01	2.6E+00
Mg	mg/L	4.3E-01	4.3E-01	4.3E-01	8.4E-01	1.0E+00	1.4E+00	2.0E+00	1.9E+00	2.5E+00	9.1E-01	9.1E-01	4.3E-01	7.6E-01
Mn	mg/L	4.6E-02	4.6E-02	4.6E-02	4.9E-02	5.1E-02	5.4E-02	5.9E-02	5.8E-02	6.4E-02	5.0E-02	5.0E-02	4.6E-02	4.9E-02
Na	mg/L	3.0E+00	3.0E+00	3.0E+00	2.9E+01	3.9E+01	6.2E+01	9.8E+01	9.1E+01	1.3E+02	3.3E+01	3.3E+01	3.0E+00	2.4E+01
NH4+NH3	mg/L	2.5E-02	2.5E-02	2.5E-02	9.6E-01	2.9E-01	4.5E-01	7.4E-01	6.7E-01	9.3E-01	8.1E-01	3.2E-01	2.5E-02	2.8E-01
Ni	mg/L	1.0E-03	1.0E-03	1.0E-03	1.3E-03	1.4E-03	1.6E-03	2.0E-03	1.9E-03	2.3E-03	1.3E-03	1.3E-03	1.0E-03	1.2E-03
NO3	mg/L	4.8E-02	4.8E-02	4.8E-02	9.8E-01	3.1E-01	4.7E-01	7.6E-01	6.9E-01	9.5E-01	8.3E-01	3.5E-01	4.8E-02	3.1E-01
Pb	mg/L	3.1E-04	3.1E-04	3.1E-04	3.7E-04	4.0E-04	4.5E-04	5.4E-04	5.2E-04	6.1E-04	3.8E-04	3.8E-04	3.1E-04	3.6E-04
P	mg/L	1.5E-02	1.5E-02	1.5E-02	1.5E-02	1.5E-02	1.5E-02	1.4E-02	1.4E-02	1.4E-02	1.5E-02	1.5E-02	1.5E-02	1.5E-02
Sb	mg/L	1.0E-03	1.0E-03	1.0E-03	1.4E-03	1.6E-03	2.0E-03	2.5E-03	2.4E-03	3.1E-03	1.5E-03	1.5E-03	1.0E-03	1.3E-03
Se	mg/L	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04
SO4	mg/L	1.0E+00	1.0E+00	1.0E+00	6.0E+01	8.5E+01	1.4E+02	2.2E+02	2.0E+02	2.9E+02	7.0E+01	6.9E+01	1.0E+00	4.9E+01
U	mg/L	5.0E-05	5.0E-05	5.0E-05	1.4E-04	1.7E-04	2.5E-04	3.8E-04	3.5E-04	4.9E-04	1.5E-04	1.5E-04	5.0E-05	1.2E-04
Zn	mg/L	1.2E-02	1.2E-02	1.2E-02	1.3E-02	1.3E-02	1.4E-02	1.5E-02	1.4E-02	1.5E-02	1.3E-02	1.3E-02	1.2E-02	1.3E-02
CN (Total)	mg/L	1.0E-03	1.0E-03	1.0E-03	1.9E-02	2.7E-02	4.4E-02	7.0E-02	6.5E-02	9.3E-02	2.3E-02	2.2E-02	1.0E-03	1.6E-02

Note:
1.0E-03 – indicates a value greater than the CCME guideline.

N:\Active\2006\1118\06-1118-041C- Atlantic Gold Touquoy Project\Phase 7000 - WQ Modeling\Task 7600\5 24OCT07 Memo Version\Appendix C - Low Flow.xls

Mix 2 = Mix 1 + Fish River Subwatersheds Load

Parameter	Units	Mix 2 – Water Quality in Fish River												Annual Average Concentration
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cumulative Flow Rate	m^3/s	5.6E+00	5.7E+00	8.1E+00	5.0E+00	3.6E+00	2.1E+00	1.2E+00	1.4E+00	9.3E-01	1.4E+00	4.0E+00	6.6E+00	3.8E+00
Ag	mg/L	5.0E-05	5.0E-05	5.0E-05	5.3E-05	5.4E-05	5.7E-05	6.2E-05	6.1E-05	6.7E-05	5.4E-05	5.3E-05	5.0E-05	5.2E-05
Al	mg/L	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
As	mg/L	4.0E-03	4.0E-03	4.0E-03	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.0E-03	[illegible]
Ca	mg/L	1.2E+00	1.2E+00	1.2E+00	3.6E+00	4.6E+00	7.0E+00	1.1E+01	1.0E+01	1.5E+01	4.0E+00	4.0E+00	1.2E+00	3.1E+00
Cd	mg/L	7.3E-06	7.3E-06	7.2E-06	7.2E-06	7.2E-06	7.1E-06	6.9E-06	7.0E-06	6.8E-06	7.2E-06	7.2E-06	7.2E-06	7.2E-06
Cl	mg/L	4.0E+00	4.0E+00	4.0E+00	4.2E+00	4.3E+00	4.5E+00	4.9E+00	4.8E+00	5.3E+00	4.3E+00	4.3E+00	4.0E+00	4.2E+00
Co	mg/L	2.0E-04	2.0E-04	2.0E-04	2.6E-03	3.7E-03	6.1E-03	9.9E-03	9.2E-03	1.4E-02	3.0E-03	3.0E-03	2.0E-04	2.1E-03
Cr	mg/L	2.0E-03	2.0E-03	2.0E-03	2.0E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	2.0E-03	2.0E-03
Cu	mg/L	1.0E-03	1.0E-03	1.0E-03	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.0E-03	[illegible]
Fe	mg/L	2.3E-01	2.3E-01	2.3E-01	2.7E-01	2.9E-01	[illegible]	[illegible]	[illegible]	[illegible]	2.8E-01	2.8E-01	2.3E-01	2.6E-01
K	mg/L	3.1E-01	3.1E-01	3.1E-01	1.0E+00	1.4E+00	2.1E+00	3.3E+00	3.1E+00	4.5E+00	1.2E+00	1.2E+00	3.1E-01	9.0E-01
Mg	mg/L	4.8E-01	4.8E-01	4.8E-01	5.9E-01	6.4E-01	7.5E-01	9.2E-01	8.9E-01	1.1E+00	6.1E-01	6.1E-01	4.8E-01	5.7E-01
Mn	mg/L	5.1E-02	5.1E-02	5.1E-02	5.2E-02	5.2E-02	5.3E-02	5.4E-02	5.4E-02	5.6E-02	5.2E-02	5.2E-02	5.1E-02	5.1E-02
Na	mg/L	2.9E+00	2.9E+00	2.9E+00	9.7E+00	1.3E+01	1.9E+01	3.0E+01	2.8E+01	4.1E+01	1.1E+01	1.1E+01	2.9E+00	8.4E+00
NH4+NH3	mg/L	2.5E-02	2.5E-02	2.5E-02	2.7E-01	9.7E-02	1.4E-01	2.3E-01	2.1E-01	3.0E-01	2.3E-01	1.0E-01	2.5E-02	9.3E-02
Ni	mg/L	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.1E-03	1.2E-03	1.3E-03	1.3E-03	1.4E-03	1.1E-03	1.1E-03	1.0E-03	1.1E-03
NO3	mg/L	1.3E-01	1.3E-01	1.3E-01	3.8E-01	2.0E-01	2.5E-01	3.3E-01	3.1E-01	4.0E-01	3.4E-01	2.1E-01	1.3E-01	2.0E-01
Pb	mg/L	2.7E-04	2.7E-04	2.7E-04	2.8E-04	2.9E-04	3.1E-04	3.3E-04	3.3E-04	3.6E-04	2.9E-04	2.9E-04	2.7E-04	2.8E-04
P	mg/L	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02
Sb	mg/L	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.2E-03	1.3E-03	1.4E-03	1.4E-03	1.6E-03	1.1E-03	1.1E-03	1.0E-03	1.1E-03
Se	mg/L	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04
SO4	mg/L	1.0E+00	1.0E+00	1.0E+00	1.7E+01	2.3E+01	3.9E+01	6.4E+01	5.9E+01	8.8E+01	1.9E+01	1.9E+01	1.0E+00	1.4E+01
U	mg/L	5.0E-05	5.0E-05	5.0E-05	7.3E-05	8.3E-05	1.1E-04	1.4E-04	1.4E-04	1.8E-04	7.7E-05	7.7E-05	5.0E-05	6.9E-05
Zn	mg/L	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02
CN (Total)	mg/L	1.0E-03	1.0E-03	1.0E-03	5.9E-03	8.0E-03	1.3E-02	2.1E-02	1.9E-02	2.8E-02	6.7E-03	6.7E-03	1.0E-03	4.9E-03

Note:
[illegible] – indicates a value greater than the CCME guideline.

Mix 3 = Mix 2 + Lake Charlotte Subwatersheds Load

Parameter	Units	Mix 3 – Water Quality in Lake Charlotte												Annual Average Concentration
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cumulative Flow Rate	m^3/s	9.6E+00	9.9E+00	1.4E+01	8.5E+00	6.1E+00	3.5E+00	2.1E+00	2.3E+00	1.5E+00	2.4E+00	6.8E+00	1.1E+01	6.5E+00
Ag	mg/L	5.0E-05	5.0E-05	5.0E-05	5.2E-05	5.3E-05	5.4E-05	5.7E-05	5.7E-05	6.0E-05	5.2E-05	5.2E-05	5.0E-05	5.1E-05
Al	mg/L	9.1E-01	9.1E-01	9.1E-01	9.1E-01	9.1E-01	9.1E-01	9.1E-01	9.1E-01	9.1E-01	9.1E-01	9.1E-01	9.1E-01	9.1E-01
As	mg/L	4.0E-03	4.0E-03	4.0E-03	5.1E-03	5.6E-03	6.7E-03	8.5E-03	8.1E-03	1.0E-02	5.3E-03	4.3E-03	4.0E-03	4.9E-03
Ca	mg/L	1.2E+00	1.2E+00	1.2E+00	2.6E+00	3.2E+00	4.6E+00	6.9E+00	6.5E+00	9.2E+00	2.8E+00	2.8E+00	1.2E+00	2.3E+00
Cd	mg/L	7.8E-06	7.8E-06	7.8E-06	7.7E-06	7.7E-06	7.7E-06	7.6E-06	7.6E-06	7.5E-06	7.7E-06	7.7E-06	7.8E-06	7.7E-06
Cl	mg/L	4.0E+00	4.0E+00	4.0E+00	4.1E+00	4.2E+00	4.3E+00	4.5E+00	4.5E+00	4.8E+00	4.2E+00	4.2E+00	4.0E+00	4.1E+00
Co	mg/L	2.0E-04	2.0E-04	2.0E-04	1.6E-03	2.2E-03	3.7E-03	6.0E-03	5.5E-03	8.3E-03	1.9E-03	1.8E-03	2.0E-04	1.3E-03
Cr	mg/L	1.6E-03	1.6E-03	1.6E-03	1.6E-03	1.6E-03	1.5E-03	1.5E-03	1.5E-03	1.5E-03	1.6E-03	1.6E-03	1.6E-03	1.6E-03
Cu	mg/L	1.0E-03	1.0E-03	1.0E-03	2.3E-03	2.9E-03	4.2E-03	6.3E-03	5.9E-03	8.5E-03	2.5E-03	2.5E-03	1.0E-03	2.0E-03
Fe	mg/L	2.2E-01	2.2E-01	2.2E-01	2.4E-01	2.6E-01	2.8E-01	3.3E-01	3.2E-01	3.8E-01	2.5E-01	2.5E-01	2.2E-01	2.4E-01
K	mg/L	3.0E-01	3.0E-01	3.0E-01	7.4E-01	9.3E-01	1.4E+00	2.1E+00	1.9E+00	2.8E+00	8.1E-01	8.1E-01	3.0E-01	6.5E-01
Mg	mg/L	4.9E-01	4.9E-01	4.9E-01	5.5E-01	5.8E-01	6.5E-01	7.5E-01	7.3E-01	8.6E-01	5.6E-01	5.6E-01	4.9E-01	5.4E-01
Mn	mg/L	5.0E-02	5.0E-02	5.0E-02	5.0E-02	5.0E-02	5.1E-02	5.2E-02	5.2E-02	5.3E-02	5.0E-02	5.0E-02	5.0E-02	5.0E-02
Na	mg/L	2.9E+00	2.9E+00	2.9E+00	6.9E+00	8.6E+00	1.3E+01	1.9E+01	1.8E+01	2.6E+01	7.6E+00	7.5E+00	2.9E+00	6.1E+00
NH4+NH3	mg/L	2.5E-02	2.5E-02	2.5E-02	1.7E-01	6.7E-02	9.5E-02	1.5E-01	1.3E-01	1.9E-01	1.5E-01	7.2E-02	2.5E-02	6.5E-02
Ni	mg/L	1.0E-03	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.1E-03	1.2E-03	1.1E-03	1.2E-03	1.0E-03	1.0E-03	1.0E-03	1.0E-03
NO3	mg/L	1.3E-01	1.3E-01	1.3E-01	2.7E-01	1.7E-01	2.0E-01	2.5E-01	2.4E-01	2.9E-01	2.5E-01	1.7E-01	1.3E-01	1.7E-01
Pb	mg/L	2.6E-04	2.6E-04	2.6E-04	2.7E-04	2.7E-04	2.8E-04	3.0E-04	3.0E-04	3.2E-04	2.7E-04	2.7E-04	2.6E-04	2.7E-04
P	mg/L	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02
Sb	mg/L	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.1E-03	1.2E-03	1.3E-03	1.2E-03	1.4E-03	1.1E-03	1.1E-03	1.0E-03	1.1E-03
Se	mg/L	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04
SO4	mg/L	1.0E+00	1.0E+00	1.0E+00	1.0E+01	1.4E+01	2.3E+01	3.8E+01	3.5E+01	5.4E+01	1.2E+01	1.2E+01	1.0E+00	8.3E+00
U	mg/L	5.0E-05	5.0E-05	5.0E-05	6.4E-05	7.0E-05	8.3E-05	1.1E-04	1.0E-04	1.3E-04	6.6E-05	6.6E-05	5.0E-05	6.1E-05
Zn	mg/L	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02
CN (Total)	mg/L	1.0E-03	1.0E-03	1.0E-03	3.9E-03	5.1E-03	8.0E-03	1.3E-02	1.2E-02	1.7E-02	4.4E-03	4.3E-03	1.0E-03	3.3E-03

Note:
[redacted] – indicates a value greater than the CCME guideline.

APPENDIX D

AVERAGE MONTHLY LOADING RATES AND MIXING CELL CALCULATION FOR NORMAL FLOW CONDITIONS USING DISSOLVED CONCENTRATIONS

TABLE D1
AVERAGE MONTHLY LOADING RATES FOR THE MINE EFFLUENT DISCHARGE
SCENARIO 4 - NORMAL FLOW, DISSOLVED CONCENTRATIONS
TOUQUOY GOLD PROJECT

Parameter	Mine Effluent Water Quality [1]	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mine Effluent Discharge Rate (m^3/s)		0	0	0	9.45E-02	8.71E-02	8.58E-02	8.56E-02	8.64E-02	8.74E-02	3.94E-02	7.32E-02	0
Ag	0.00003	0	0	0	3.02E-03	2.79E-03	2.75E-03	2.74E-03	2.76E-03	2.80E-03	1.26E-03	2.34E-03	0
Al	*0.005*	0	0	0	4.73E-01	4.35E-01	4.29E-01	4.28E-01	4.32E-01	4.37E-01	1.97E-01	3.66E-01	0
As	0.006	0	0	0	5.67E-01	5.22E-01	5.15E-01	5.14E-01	5.18E-01	5.24E-01	2.36E-01	4.39E-01	0
Ca	204	0	0	0	1.93E+04	1.78E+04	1.75E+04	1.75E+04	1.76E+04	1.78E+04	8.03E+03	1.49E+04	0
Cd	*0.000002*	0	0	0	1.42E-04	1.31E-04	1.29E-04	1.28E-04	1.30E-04	1.31E-04	5.90E-05	1.10E-04	0
Cl	24	0	0	0	2.27E+03	2.09E+03	2.06E+03	2.06E+03	2.07E+03	2.10E+03	9.45E+02	1.76E+03	0
Co	0.2	0	0	0	2.02E+01	1.86E+01	1.84E+01	1.83E+01	1.85E+01	1.87E+01	8.42E+00	1.57E+01	0
Cr	*0.0003*	0	0	0	2.36E-02	2.18E-02	2.15E-02	2.14E-02	2.16E-02	2.18E-02	9.84E-03	1.83E-02	0
Cu	0.09	0	0	0	8.35E+00	7.69E+00	7.58E+00	7.56E+00	7.63E+00	7.71E+00	3.48E+00	6.46E+00	0
Fe	0.02	0	0	0	1.89E+00	1.74E+00	1.72E+00	1.71E+00	1.73E+00	1.75E+00	7.87E-01	1.46E+00	0
K	63	0	0	0	5.97E+03	5.50E+03	5.42E+03	5.41E+03	5.46E+03	5.52E+03	2.49E+03	4.63E+03	0
Mg	9	0	0	0	8.74E+02	8.05E+02	7.94E+02	7.92E+02	7.99E+02	8.08E+02	3.64E+02	6.77E+02	0
Mn	0.1	0	0	0	1.18E+01	1.09E+01	1.07E+01	1.07E+01	1.08E+01	1.09E+01	4.92E+00	9.15E+00	0
Na	634	0	0	0	5.99E+04	5.52E+04	5.44E+04	5.43E+04	5.48E+04	5.54E+04	2.50E+04	4.64E+04	0
NH4+NH3	– [2]	0	0	0	1.24E+03	2.58E+02	2.46E+02	2.54E+02	2.52E+02	2.54E+02	2.90E+02	3.19E+02	0
Ni	0.006	0	0	0	5.86E-01	5.40E-01	5.32E-01	5.31E-01	5.36E-01	5.42E-01	2.44E-01	4.54E-01	0
NO3	– [2]	0	0	0	1.24E+03	2.58E+02	2.46E+02	2.54E+02	2.52E+02	2.54E+02	2.90E+02	3.19E+02	0
Pb	0.0004	0	0	0	3.50E-02	3.22E-02	3.18E-02	3.17E-02	3.20E-02	3.23E-02	1.46E-02	2.71E-02	0
P	*0.005*	0	0	0	4.73E-01	4.35E-01	4.29E-01	4.28E-01	4.32E-01	4.37E-01	1.97E-01	3.66E-01	0
Sb	0.008	0	0	0	7.56E-01	6.97E-01	6.87E-01	6.85E-01	6.91E-01	6.99E-01	3.15E-01	5.86E-01	0
Se	*0.0005*	0	0	0	4.73E-02	4.35E-02	4.29E-02	4.28E-02	4.32E-02	4.37E-02	1.97E-02	3.66E-02	0
SO4	1400	0	0	0	1.32E+05	1.22E+05	1.20E+05	1.20E+05	1.21E+05	1.22E+05	5.51E+04	1.02E+05	0
U	0.002	0	0	0	1.51E-01	1.39E-01	1.37E-01	1.37E-01	1.38E-01	1.40E-01	6.30E-02	1.17E-01	0
Zn	0.02	0	0	0	1.70E+00	1.57E+00	1.55E+00	1.54E+00	1.56E+00	1.57E+00	7.09E-01	1.32E+00	0
CN	0.4	0	0	0	4.16E+01	3.83E+01	3.78E+01	3.77E+01	3.80E+01	3.84E+01	1.73E+01	3.22E+01	0

Notes:

0.007 – indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

0.001 – indicates total concentrations, as dissolved concentrations were not measured for this parameter.

(1) Concentrations are taken from water chemistry after treatment as outlined in a draft memo by SGS (2007).

(2) Total ammonia and nitrate are input into the model as loads.

TABLE D2
AVERAGE MONTHLY LOADING RATES FOR SCRAGGY LAKE
SCENARIO 4 - NORMAL FLOW, DISOLVED CONCENTRATIONS
TOUQUOY GOLD PROJECT

Parameter	Scraggy Lake Baseline Water Quality	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Subwatershed Net Flow Rate (m^3/s)		1.43E+00	1.47E+00	2.06E+00	2.15E+00	1.37E+00	7.90E-01	4.60E-01	5.10E-01	3.30E-01	7.60E-01	1.43E+00	1.68E+00
Ag	***0.00005***	7.15E-02	7.35E-02	1.03E-01	1.08E-01	6.85E-02	3.95E-02	2.30E-02	2.55E-02	1.65E-02	3.80E-02	7.15E-02	8.40E-02
Al	**0.2**	2.68E+02	2.75E+02	3.86E+02	4.03E+02	2.57E+02	1.48E+02	8.61E+01	9.55E+01	6.18E+01	1.42E+02	2.68E+02	3.15E+02
As	***0.001***	1.43E+00	1.47E+00	2.06E+00	2.15E+00	1.37E+00	7.90E-01	4.60E-01	5.10E-01	3.30E-01	7.60E-01	1.43E+00	1.68E+00
Ca	**1**	1.43E+03	1.47E+03	2.06E+03	2.15E+03	1.37E+03	7.90E+02	4.60E+02	5.10E+02	3.30E+02	7.60E+02	1.43E+03	1.68E+03
Cd	**0.00002**	2.81E-02	2.88E-02	4.04E-02	4.22E-02	2.69E-02	1.55E-02	9.03E-03	1.00E-02	6.48E-03	1.49E-02	2.81E-02	3.30E-02
Cl	**4**	5.72E+03	5.88E+03	8.24E+03	8.60E+03	5.48E+03	3.16E+03	1.84E+03	2.04E+03	1.32E+03	3.04E+03	5.72E+03	6.72E+03
Co	***0.0002***	2.86E-01	2.94E-01	4.12E-01	4.30E-01	2.74E-01	1.58E-01	9.20E-02	1.02E-01	6.60E-02	1.52E-01	2.86E-01	3.36E-01
Cr	**0.005**	6.86E+00	7.06E+00	9.89E+00	1.03E+01	6.58E+00	3.79E+00	2.21E+00	2.45E+00	1.58E+00	3.65E+00	6.86E+00	8.06E+00
Cu	***0.001***	1.43E+00	1.47E+00	2.06E+00	2.15E+00	1.37E+00	7.90E-01	4.60E-01	5.10E-01	3.30E-01	7.60E-01	1.43E+00	1.68E+00
Fe	**0.2**	3.36E+02	3.46E+02	4.85E+02	5.06E+02	3.22E+02	1.86E+02	1.08E+02	1.20E+02	7.76E+01	1.79E+02	3.36E+02	3.95E+02
K	**0.3**	4.65E+02	4.78E+02	6.70E+02	6.99E+02	4.45E+02	2.57E+02	1.50E+02	1.66E+02	1.07E+02	2.47E+02	4.65E+02	5.46E+02
Mg	**0.4**	6.08E+02	6.25E+02	8.76E+02	9.14E+02	5.82E+02	3.36E+02	1.96E+02	2.17E+02	1.40E+02	3.23E+02	6.08E+02	7.14E+02
Mn	**0.05**	6.55E+01	6.74E+01	9.44E+01	9.85E+01	6.28E+01	3.62E+01	2.11E+01	2.34E+01	1.51E+01	3.48E+01	6.55E+01	7.70E+01
Na	**3**	4.25E+03	4.37E+03	6.13E+03	6.40E+03	4.08E+03	2.35E+03	1.37E+03	1.52E+03	9.82E+02	2.26E+03	4.25E+03	5.00E+03
NH4+NH3	***0.03***	3.58E+01	3.68E+01	5.15E+01	5.38E+01	3.43E+01	1.98E+01	1.15E+01	1.28E+01	8.25E+00	1.90E+01	3.58E+01	4.20E+01
Ni	***0.001***	1.43E+00	1.47E+00	2.06E+00	2.15E+00	1.37E+00	7.90E-01	4.60E-01	5.10E-01	3.30E-01	7.60E-01	1.43E+00	1.68E+00
NO3	**0.05**	6.79E+01	6.98E+01	9.79E+01	1.02E+02	6.51E+01	3.75E+01	2.19E+01	2.42E+01	1.57E+01	3.61E+01	6.79E+01	7.98E+01
Pb	***0.0003***	4.47E-01	4.59E-01	6.44E-01	6.72E-01	4.28E-01	2.47E-01	1.44E-01	1.59E-01	1.03E-01	2.38E-01	4.47E-01	5.25E-01
P	**0.02**	2.15E+01	2.21E+01	3.09E+01	3.23E+01	2.06E+01	1.19E+01	6.90E+00	7.65E+00	4.95E+00	1.14E+01	2.15E+01	2.52E+01
Sb	***0.001***	1.43E+00	1.47E+00	2.06E+00	2.15E+00	1.37E+00	7.90E-01	4.60E-01	5.10E-01	3.30E-01	7.60E-01	1.43E+00	1.68E+00
Se	***0.0005***	7.15E-01	7.35E-01	1.03E+00	1.08E+00	6.85E-01	3.95E-01	2.30E-01	2.55E-01	1.65E-01	3.80E-01	7.15E-01	8.40E-01
SO4	***1***	1.43E+03	1.47E+03	2.06E+03	2.15E+03	1.37E+03	7.90E+02	4.60E+02	5.10E+02	3.30E+02	7.60E+02	1.43E+03	1.68E+03
U	***0.00005***	7.15E-02	7.35E-02	1.03E-01	1.08E-01	6.85E-02	3.95E-02	2.30E-02	2.55E-02	1.65E-02	3.80E-02	7.15E-02	8.40E-02
Zn	**0.01**	1.76E+01	1.80E+01	2.53E+01	2.64E+01	1.68E+01	9.70E+00	5.65E+00	6.26E+00	4.05E+00	9.33E+00	1.76E+01	2.06E+01
CN	***0.001***	1.43E+00	1.47E+00	2.06E+00	2.15E+00	1.37E+00	7.90E-01	4.60E-01	5.10E-01	3.30E-01	7.60E-01	1.43E+00	1.68E+00

Note:

0.001 - indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

TABLE D3
AVERAGE MONTHLY LOADING RATES FOR FISH RIVER
SCENARIO 4 - NORMAL FLOW, DISSOLVED CONCENTRATIONS
TOUQUOY GOLD PROJECT

Parameter	Fish River Baseline Water Quality	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Subwatershed Net Flow Rate (m^3/s)		4.16E+00	4.27E+00	6.00E+00	6.24E+00	3.98E+00	2.30E+00	1.36E+00	1.49E+00	9.80E-01	2.21E+00	4.17E+00	4.90E+00
Ag	*0.00005*	2.08E-01	2.14E-01	3.00E-01	3.12E-01	1.99E-01	1.15E-01	6.80E-02	7.45E-02	4.90E-02	1.11E-01	2.09E-01	2.45E-01
Al	0.2	7.11E+02	7.30E+02	1.03E+03	1.07E+03	6.81E+02	3.93E+02	2.33E+02	2.55E+02	1.68E+02	3.78E+02	7.13E+02	8.38E+02
As	0.005	2.08E+01	2.14E+01	3.00E+01	3.12E+01	1.99E+01	1.15E+01	6.80E+00	7.45E+00	4.90E+00	1.11E+01	2.09E+01	2.45E+01
Ca	1	5.42E+03	5.56E+03	7.82E+03	8.13E+03	5.19E+03	3.00E+03	1.77E+03	1.94E+03	1.28E+03	2.88E+03	5.43E+03	6.38E+03
Cd	0.000003	1.25E-02	1.28E-02	1.80E-02	1.87E-02	1.19E-02	6.90E-03	4.08E-03	4.47E-03	2.94E-03	6.63E-03	1.25E-02	1.47E-02
Cl	4	1.66E+04	1.71E+04	2.40E+04	2.50E+04	1.59E+04	9.20E+03	5.44E+03	5.96E+03	3.92E+03	8.84E+03	1.67E+04	1.96E+04
Co	*0.0002*	8.32E-01	8.54E-01	1.20E+00	1.25E+00	7.96E-01	4.60E-01	2.72E-01	2.98E-01	1.96E-01	4.42E-01	8.34E-01	9.80E-01
Cr	0.001	4.16E+00	4.27E+00	6.00E+00	6.24E+00	3.98E+00	2.30E+00	1.36E+00	1.49E+00	9.80E-01	2.21E+00	4.17E+00	4.90E+00
Cu	*0.001*	4.16E+00	4.27E+00	6.00E+00	6.24E+00	3.98E+00	2.30E+00	1.36E+00	1.49E+00	9.80E-01	2.21E+00	4.17E+00	4.90E+00
Fe	0.2	9.23E+02	9.47E+02	1.33E+03	1.38E+03	8.83E+02	5.10E+02	3.02E+02	3.31E+02	2.17E+02	4.90E+02	9.25E+02	1.09E+03
K	0.3	1.25E+03	1.28E+03	1.80E+03	1.87E+03	1.19E+03	6.90E+02	4.08E+02	4.47E+02	2.94E+02	6.63E+02	1.25E+03	1.47E+03
Mg	0.5	2.08E+03	2.14E+03	3.00E+03	3.12E+03	1.99E+03	1.15E+03	6.80E+02	7.45E+02	4.90E+02	1.11E+03	2.09E+03	2.45E+03
Mn	0.05	2.18E+02	2.24E+02	3.15E+02	3.27E+02	2.09E+02	1.21E+02	7.13E+01	7.81E+01	5.14E+01	1.16E+02	2.19E+02	2.57E+02
Na	3	1.22E+04	1.25E+04	1.76E+04	1.83E+04	1.17E+04	6.75E+03	3.99E+03	4.37E+03	2.88E+03	6.48E+03	1.22E+04	1.44E+04
NH4+NH3	*0.03*	1.04E+02	1.07E+02	1.50E+02	1.56E+02	9.95E+01	5.75E+01	3.40E+01	3.73E+01	2.45E+01	5.53E+01	1.04E+02	1.23E+02
Ni	*0.001*	4.16E+00	4.27E+00	6.00E+00	6.24E+00	3.98E+00	2.30E+00	1.36E+00	1.49E+00	9.80E-01	2.21E+00	4.17E+00	4.90E+00
NO3	0.2	6.70E+02	6.88E+02	9.66E+02	1.00E+03	6.41E+02	3.70E+02	2.19E+02	2.40E+02	1.58E+02	3.56E+02	6.72E+02	7.89E+02
Pb	*0.0003*	1.04E+00	1.07E+00	1.50E+00	1.56E+00	9.95E-01	5.75E-01	3.40E-01	3.73E-01	2.45E-01	5.53E-01	1.04E+00	1.23E+00
P	*0.01*	4.16E+01	4.27E+01	6.00E+01	6.24E+01	3.98E+01	2.30E+01	1.36E+01	1.49E+01	9.80E+00	2.21E+01	4.17E+01	4.90E+01
Sb	*0.001*	4.16E+00	4.27E+00	6.00E+00	6.24E+00	3.98E+00	2.30E+00	1.36E+00	1.49E+00	9.80E-01	2.21E+00	4.17E+00	4.90E+00
Se	*0.0005*	2.08E+00	2.14E+00	3.00E+00	3.12E+00	1.99E+00	1.15E+00	6.80E-01	7.45E-01	4.90E-01	1.11E+00	2.09E+00	2.45E+00
SO4	*1*	4.16E+03	4.27E+03	6.00E+03	6.24E+03	3.98E+03	2.30E+03	1.36E+03	1.49E+03	9.80E+02	2.21E+03	4.17E+03	4.90E+03
U	*0.00005*	2.08E-01	2.14E-01	3.00E-01	3.12E-01	1.99E-01	1.15E-01	6.80E-02	7.45E-02	4.90E-02	1.11E-01	2.09E-01	2.45E-01
Zn	0.02	8.17E+01	8.39E+01	1.18E+02	1.23E+02	7.82E+01	4.52E+01	2.67E+01	2.93E+01	1.93E+01	4.34E+01	8.19E+01	9.63E+01
CN	*0.001*	4.16E+00	4.27E+00	6.00E+00	6.24E+00	3.98E+00	2.30E+00	1.36E+00	1.49E+00	9.80E-01	2.21E+00	4.17E+00	4.90E+00

Note:
0.001 – indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

TABLE D4
AVERAGE MONTHLY LOADING RATES FOR LAKE CHARLOTTE
SCENARIO 4 - NORMAL FLOW, DISSOLVED CONCENTRATIONS
TOUQUOY GOLD PROJECT

Parameter	Lake Charlotte Baseline Water Quality	Average Monthly Loading Rates (mg/s)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Subwatershed Net Flow Rate (m^3/s)		4.00E+00	4.11E+00	5.78E+00	6.01E+00	3.83E+00	2.21E+00	1.30E+00	1.43E+00	9.30E-01	2.14E+00	4.01E+00	4.71E+00
Ag	*0.00005*	2.00E-01	2.06E-01	2.89E-01	3.01E-01	1.92E-01	1.11E-01	6.50E-02	7.15E-02	4.65E-02	1.07E-01	2.01E-01	2.36E-01
Al	0.2	6.80E+02	6.99E+02	9.83E+02	1.02E+03	6.51E+02	3.76E+02	2.21E+02	2.43E+02	1.58E+02	3.64E+02	6.82E+02	8.01E+02
As	0.004	1.64E+01	1.69E+01	2.37E+01	2.46E+01	1.57E+01	9.06E+00	5.33E+00	5.86E+00	3.81E+00	8.77E+00	1.64E+01	1.93E+01
Ca	1	4.80E+03	4.93E+03	6.94E+03	7.21E+03	4.60E+03	2.65E+03	1.56E+03	1.72E+03	1.12E+03	2.57E+03	4.81E+03	5.65E+03
Cd	*0.000009*	3.40E-02	3.49E-02	4.91E-02	5.11E-02	3.26E-02	1.88E-02	1.11E-02	1.22E-02	7.91E-03	1.82E-02	3.41E-02	4.00E-02
Cl	4	1.60E+04	1.64E+04	2.31E+04	2.40E+04	1.53E+04	8.84E+03	5.20E+03	5.72E+03	3.72E+03	8.56E+03	1.60E+04	1.88E+04
Co	*0.0002*	8.00E-01	8.22E-01	1.16E+00	1.20E+00	7.66E-01	4.42E-01	2.60E-01	2.86E-01	1.86E-01	4.28E-01	8.02E-01	9.42E-01
Cr	*0.001*	4.00E+00	4.11E+00	5.78E+00	6.01E+00	3.83E+00	2.21E+00	1.30E+00	1.43E+00	9.30E-01	2.14E+00	4.01E+00	4.71E+00
Cu	*0.001*	4.00E+00	4.11E+00	5.78E+00	6.01E+00	3.83E+00	2.21E+00	1.30E+00	1.43E+00	9.30E-01	2.14E+00	4.01E+00	4.71E+00
Fe	0.2	8.20E+02	8.43E+02	1.18E+03	1.23E+03	7.85E+02	4.53E+02	2.67E+02	2.93E+02	1.91E+02	4.39E+02	8.22E+02	9.66E+02
K	0.3	1.20E+03	1.23E+03	1.73E+03	1.80E+03	1.15E+03	6.63E+02	3.90E+02	4.29E+02	2.79E+02	6.42E+02	1.20E+03	1.41E+03
Mg	0.5	2.00E+03	2.06E+03	2.89E+03	3.01E+03	1.92E+03	1.11E+03	6.50E+02	7.15E+02	4.65E+02	1.07E+03	2.01E+03	2.36E+03
Mn	0.05	1.92E+02	1.97E+02	2.77E+02	2.88E+02	1.84E+02	1.06E+02	6.24E+01	6.86E+01	4.46E+01	1.03E+02	1.92E+02	2.26E+02
Na	3	1.16E+04	1.19E+04	1.68E+04	1.74E+04	1.11E+04	6.41E+03	3.77E+03	4.15E+03	2.70E+03	6.21E+03	1.16E+04	1.37E+04
NH4+NH3	*0.03*	1.00E+02	1.03E+02	1.45E+02	1.50E+02	9.58E+01	5.53E+01	3.25E+01	3.58E+01	2.33E+01	5.35E+01	1.00E+02	1.18E+02
Ni	*0.001*	4.00E+00	4.11E+00	5.78E+00	6.01E+00	3.83E+00	2.21E+00	1.30E+00	1.43E+00	9.30E-01	2.14E+00	4.01E+00	4.71E+00
NO3	0.1	5.00E+02	5.14E+02	7.23E+02	7.51E+02	4.79E+02	2.76E+02	1.63E+02	1.79E+02	1.16E+02	2.68E+02	5.01E+02	5.89E+02
Pb	*0.0003*	1.00E+00	1.03E+00	1.45E+00	1.50E+00	9.58E-01	5.53E-01	3.25E-01	3.58E-01	2.33E-01	5.35E-01	1.00E+00	1.18E+00
P	*0.01*	4.00E+01	4.11E+01	5.78E+01	6.01E+01	3.83E+01	2.21E+01	1.30E+01	1.43E+01	9.30E+00	2.14E+01	4.01E+01	4.71E+01
Sb	*0.001*	4.00E+00	4.11E+00	5.78E+00	6.01E+00	3.83E+00	2.21E+00	1.30E+00	1.43E+00	9.30E-01	2.14E+00	4.01E+00	4.71E+00
Se	*0.0005*	2.00E+00	2.06E+00	2.89E+00	3.01E+00	1.92E+00	1.11E+00	6.50E-01	7.15E-01	4.65E-01	1.07E+00	2.01E+00	2.36E+00
SO4	*1*	4.00E+03	4.11E+03	5.78E+03	6.01E+03	3.83E+03	2.21E+03	1.30E+03	1.43E+03	9.30E+02	2.14E+03	4.01E+03	4.71E+03
U	*0.00005*	2.00E-01	2.06E-01	2.89E-01	3.01E-01	1.92E-01	1.11E-01	6.50E-02	7.15E-02	4.65E-02	1.07E-01	2.01E-01	2.36E-01
Zn	0.02	7.24E+01	7.44E+01	1.05E+02	1.09E+02	6.93E+01	4.00E+01	2.35E+01	2.59E+01	1.68E+01	3.87E+01	7.26E+01	8.53E+01
CN	*0.001*	4.00E+00	4.11E+00	5.78E+00	6.01E+00	3.83E+00	2.21E+00	1.30E+00	1.43E+00	9.30E-01	2.14E+00	4.01E+00	4.71E+00

Note:
0.001 – indicates measured concentrations below the detection limit – assumed to be equal to half the detection limit.

TABLE D5
CALCULATION RESULTS FOR MIX 1
SCENARIO 4 - NORMAL FLOW, DISSOLVED CONCENTRATIONS

Mix 1 = Mine Effluent Load + Scraggy Lake Subwatersheds Load

Parameter	Units	Mix 1 – Water Quality in Scraggy Lake												Annual Average Concentration
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cumulative Flow Rate	m^3/s	1.4E+00	1.5E+00	2.1E+00	2.2E+00	1.5E+00	8.8E-01	5.5E-01	6.0E-01	4.2E-01	8.0E-01	1.5E+00	1.7E+00	1.3E+00
Ag	mg/L	5.0E-05	5.0E-05	5.0E-05	4.9E-05	4.9E-05	4.8E-05	4.7E-05	4.7E-05	4.6E-05	4.9E-05	4.9E-05	5.0E-05	4.9E-05
Al	mg/L	1.3E-01	1.9E-01	1.9E-01	1.8E-01	1.8E-01	1.7E-01	1.6E-01	1.6E-01	1.5E-01	1.8E-01	1.8E-01	1.9E-01	1.8E-01
As	mg/L	1.0E-03	1.0E-03	1.0E-03	1.2E-03	1.3E-03	1.5E-03	1.8E-03	1.7E-03	2.0E-03	1.2E-03	1.2E-03	1.0E-03	1.2E-03
Ca	mg/L	1.0E+00	1.0E+00	1.0E+00	9.5E+00	1.3E+01	2.1E+01	3.3E+01	3.0E+01	4.3E+01	1.1E+01	1.1E+01	1.0E+00	9.6E+00
Cd	mg/L	2.0E-05	2.0E-05	2.0E-05	1.9E-05	1.9E-05	1.8E-05	1.7E-05	1.7E-05	1.6E-05	1.8E-05	1.8E-05	2.0E-05	1.8E-05
Cl	mg/L	4.0E+00	4.0E+00	4.0E+00	4.8E+00	5.2E+00	6.0E+00	7.1E+00	6.9E+00	8.2E+00	5.0E+00	5.0E+00	4.0E+00	4.8E+00
Co	mg/L	2.0E-04	2.0E-04	2.0E-04	9.2E-03	1.3E-02	2.1E-02	3.4E-02	3.1E-02	4.5E-02	1.1E-02	1.1E-02	2.0E-04	9.3E-03
Cr	mg/L	4.8E-03	4.8E-03	4.8E-03	4.6E-03	4.5E-03	4.4E-03	4.1E-03	4.1E-03	3.8E-03	4.6E-03	4.6E-03	4.8E-03	4.6E-03
Cu	mg/L	1.0E-03	1.0E-03	1.0E-03	4.3E-03	6.2E-03	9.6E-03	1.5E-02	1.4E-02	1.9E-02	5.3E-03	5.3E-03	1.0E-03	6.7E-03
Fe	mg/L	2.4E-01	2.4E-01	2.4E-01	2.3E-01	2.2E-01	2.1E-01	2.0E-01	2.0E-01	1.9E-01	2.2E-01	2.2E-01	2.4E-01	2.3E-01
K	mg/L	3.3E-01	3.3E-01	3.3E-01	3.0E+00	4.1E+00	6.5E+00	1.0E+01	9.4E+00	1.3E+01	3.4E+00	3.4E+00	3.3E-01	3.0E+00
Mg	mg/L	4.3E-01	4.3E-01	4.3E-01	8.0E-01	9.5E-01	1.3E+00	1.8E+00	1.7E+00	2.3E+00	8.6E-01	8.5E-01	4.3E-01	8.0E-01
Mn	mg/L	4.6E-02	4.6E-02	4.6E-02	4.9E-02	5.1E-02	5.4E-02	5.8E-02	5.7E-02	6.2E-02	5.0E-02	5.0E-02	4.6E-02	4.9E-02
Na	mg/L	3.0E+00	3.0E+00	3.0E+00	3.0E+01	4.1E+01	6.5E+01	1.0E+02	9.4E+01	1.4E+02	3.4E+01	3.4E+01	3.0E+00	3.0E+01
NH4+NH3	mg/L	2.5E-02	2.5E-02	2.5E-02	5.7E-01	2.0E-01	3.0E-01	4.9E-01	4.4E-01	6.3E-01	3.9E-01	2.4E-01	2.5E-02	2.3E-01
Ni	mg/L	1.0E-03	1.0E-03	1.0E-03	1.2E-03	1.3E-03	1.5E-03	1.8E-03	1.8E-03	2.1E-03	1.3E-03	1.3E-03	1.0E-03	1.2E-03
NO3	mg/L	4.8E-02	4.8E-02	4.8E-02	6.0E-01	2.2E-01	3.2E-01	5.0E-01	4.6E-01	6.5E-01	4.1E-01	2.6E-01	4.8E-02	2.5E-01
Pb	mg/L	3.1E-04	3.1E-04	3.1E-04	3.1E-04	3.2E-04	3.2E-04	3.2E-04	3.2E-04	3.2E-04	3.2E-04	3.2E-04	3.1E-04	3.1E-04
P	mg/L	1.5E-02	1.5E-02	1.5E-02	1.5E-02	1.4E-02	1.4E-02	1.3E-02	1.4E-02	1.3E-02	1.5E-02	1.5E-02	1.5E-02	1.5E-02
Sb	mg/L	1.0E-03	1.0E-03	1.0E-03	1.3E-03	1.4E-03	1.7E-03	2.1E-03	2.0E-03	2.5E-03	1.3E-03	1.3E-03	1.0E-03	1.3E-03
Se	mg/L	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04
SO4	mg/L	1.0E+00	1.0E+00	1.0E+00	6.0E+01	8.5E+01	1.4E+02	2.2E+02	2.0E+02	2.9E+02	7.0E+01	6.9E+01	1.0E+00	6.0E+01
U	mg/L	5.0E-05	5.0E-05	5.0E-05	1.2E-04	1.4E-04	2.0E-04	2.9E-04	2.7E-04	3.7E-04	1.3E-04	1.3E-04	5.0E-05	1.2E-04
Zn	mg/L	1.2E-02	1.2E-02	1.2E-02	1.3E-02	1.3E-02	1.3E-02	1.3E-02	1.3E-02	1.3E-02	1.3E-02	1.3E-02	1.2E-02	1.3E-02
CN (Total)	mg/L	1.0E-03	1.0E-03	1.0E-03	1.9E-02	2.7E-02	4.4E-02	7.0E-02	6.5E-02	9.3E-02	2.3E-02	2.2E-02	1.0E-03	2.0E-02

Note:
1.0E+00 – indicates a value greater than the CCME guideline.

TABLE D6
CALCULATION RESULTS FOR MIX 2
SCENARIO 4 - NORMAL FLOW, DISSOLVED CONCENTRATIONS

Mix 2 = Mix 1 + Fish River Subwatersheds Load

Parameter	Units	Mix 2 – Water Quality in Fish River												Annual Average Concentration
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cumulative Flow Rate	m^3/s	5.6E+00	5.7E+00	8.1E+00	8.5E+00	5.4E+00	3.2E+00	1.9E+00	2.1E+00	1.4E+00	3.0E+00	5.7E+00	6.6E+00	4.8E+00
Ag	mg/L	5.0E-05	5.0E-05	5.0E-05	5.0E-05	5.0E-05	5.0E-05	4.9E-05	4.9E-05	4.9E-05	5.0E-05	5.0E-05	5.0E-05	5.0E-05
Al	mg/L	1.8E-01	1.8E-01	1.8E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.8E-01	1.7E-01	1.7E-01	1.8E-01	1.7E-01
As	mg/L	4.0E-03	4.0E-03	4.0E-03	4.0E-03	4.0E-03	4.0E-03	4.1E-03	4.1E-03	4.1E-03	4.0E-03	4.0E-03	4.0E-03	4.0E-03
Ca	mg/L	1.2E+00	1.2E+00	1.2E+00	3.5E+00	4.5E+00	6.7E+00	1.0E+01	9.6E+00	1.4E+01	3.9E+00	3.8E+00	1.2E+00	3.5E+00
Cd	mg/L	7.3E-06	7.3E-06	7.2E-06	7.2E-06	7.2E-06	7.1E-06	6.9E-06	7.0E-06	6.8E-06	7.2E-06	7.2E-06	7.2E-06	7.2E-06
Cl	mg/L	4.0E+00	4.0E+00	4.0E+00	4.2E+00	4.3E+00	4.5E+00	4.9E+00	4.8E+00	5.3E+00	4.3E+00	4.3E+00	4.0E+00	4.2E+00
Co	mg/L	2.0E-04	2.0E-04	2.0E-04	2.6E-03	3.6E-03	6.0E-03	9.8E-03	9.1E-03	1.4E-02	3.0E-03	3.0E-03	2.0E-04	2.6E-03
Cr	mg/L	2.0E-03	2.0E-03	2.0E-03	2.0E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	1.9E-03	2.0E-03	2.0E-03
Cu	mg/L	1.0E-03	1.0E-03	1.0E-03	2.0E-03	2.4E-03	3.4E-03	4.9E-03	4.6E-03	8.3E-03	2.1E-03	2.1E-03	1.0E-03	2.0E-03
Fe	mg/L	2.3E-01	2.3E-01	2.3E-01	2.2E-01	2.2E-01	2.2E-01	2.2E-01	2.2E-01	2.1E-01	2.2E-01	2.2E-01	2.3E-01	2.2E-01
K	mg/L	3.1E-01	3.1E-01	3.1E-01	1.0E+00	1.3E+00	2.0E+00	3.1E+00	2.9E+00	4.2E+00	1.1E+00	1.1E+00	3.1E-01	1.0E+00
Mg	mg/L	4.8E-01	4.8E-01	4.8E-01	5.8E-01	6.2E-01	7.2E-01	8.8E-01	8.4E-01	1.0E+00	6.0E-01	5.9E-01	4.8E-01	5.8E-01
Mn	mg/L	5.1E-02	5.1E-02	5.1E-02	5.2E-02	5.2E-02	5.3E-02	5.4E-02	5.4E-02	5.5E-02	5.2E-02	5.2E-02	5.1E-02	5.2E-02
Na	mg/L	2.9E+00	2.9E+00	2.9E+00	1.0E+01	1.3E+01	2.0E+01	3.1E+01	2.9E+01	4.2E+01	1.1E+01	1.1E+01	2.9E+00	1.0E+01
NH4+NH3	mg/L	2.5E-02	2.5E-02	2.5E-02	1.7E-01	7.2E-02	1.0E-01	1.6E-01	1.4E-01	2.0E-01	1.2E-01	8.1E-02	2.5E-02	7.9E-02
Ni	mg/L	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.1E-03	1.1E-03	1.2E-03	1.2E-03	1.3E-03	1.1E-03	1.1E-03	1.0E-03	1.1E-03
NO3	mg/L	1.3E-01	1.3E-01	1.3E-01	2.8E-01	1.8E-01	2.1E-01	2.6E-01	2.5E-01	3.1E-01	2.3E-01	1.9E-01	1.3E-01	1.8E-01
Pb	mg/L	2.7E-04	2.7E-04	2.7E-04	2.7E-04	2.7E-04	2.7E-04	2.7E-04	2.7E-04	2.7E-04	2.7E-04	2.7E-04	2.7E-04	2.7E-04
P	mg/L	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02
Sb	mg/L	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.1E-03	1.2E-03	1.3E-03	1.3E-03	1.4E-03	1.1E-03	1.1E-03	1.0E-03	1.1E-03
Se	mg/L	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04
SO4	mg/L	1.0E+00	1.0E+00	1.0E+00	1.7E+01	2.3E+01	3.9E+01	6.4E+01	5.9E+01	8.8E+01	1.9E+01	1.9E+01	1.0E+00	1.7E+01
U	mg/L	5.0E-05	5.0E-05	5.0E-05	6.7E-05	7.5E-05	9.2E-05	1.2E-04	1.1E-04	1.5E-04	7.0E-05	7.0E-05	5.0E-05	6.7E-05
Zn	mg/L	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02
CN (Total)	mg/L	1.0E-03	1.0E-03	1.0E-03	5.9E-03	8.0E-03	1.3E-02	2.1E-02	1.9E-02	2.8E-02	6.7E-03	6.7E-03	1.0E-03	5.9E-03

Note:
[redacted] – indicates a value greater than the CCME guideline.

TABLE D7
CALCULATION RESULTS FOR MIX 3
SCENARIO 4 - NORMAL FLOW, DISSOLVED CONCENTRATIONS

Mix 3 = Mix 2 + Lake Charlotte Subwatersheds Load

Parameter	Units	Mix 3 – Water Quality in Lake Charlotte												Annual Average Concentration
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Cumulative Flow Rate	m^3/s	9.6E+00	9.9E+00	1.4E+01	1.4E+01	9.3E+00	5.4E+00	3.2E+00	3.5E+00	2.3E+00	5.1E+00	9.7E+00	1.1E+01	8.1E+00
Ag	mg/L	5.0E-05	5.0E-05	5.0E-05	5.0E-05	5.0E-05	5.0E-05	5.0E-05	5.0E-05	4.9E-05	5.0E-05	5.0E-05	5.0E-05	5.0E-05
Al	mg/L	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01
As	mg/L	4.0E-03	4.0E-03	4.0E-03	4.0E-03	4.0E-03	4.1E-03	4.1E-03	4.1E-03	4.1E-03	4.0E-03	4.0E-03	4.0E-03	4.0E-03
Ca	mg/L	1.2E+00	1.2E+00	1.2E+00	2.5E+00	3.1E+00	4.4E+00	6.6E+00	6.2E+00	8.8E+00	2.8E+00	2.7E+00	1.2E+00	2.5E+00
Cd	mg/L	7.8E-06	7.8E-06	7.8E-06	7.7E-06	7.7E-06	7.7E-06	7.6E-06	7.6E-06	7.5E-06	7.7E-06	7.7E-06	7.8E-06	7.7E-06
Cl	mg/L	4.0E+00	4.0E+00	4.0E+00	4.1E+00	4.2E+00	4.3E+00	4.5E+00	4.5E+00	4.8E+00	4.2E+00	4.2E+00	4.0E+00	4.1E+00
Co	mg/L	2.0E-04	2.0E-04	2.0E-04	1.6E-03	2.2E-03	3.6E-03	5.9E-03	5.5E-03	8.2E-03	1.8E-03	1.8E-03	2.0E-04	1.6E-03
Cr	mg/L	1.6E-03	1.6E-03	1.6E-03	1.6E-03	1.6E-03	1.5E-03	1.5E-03	1.5E-03	1.5E-03	1.6E-03	1.6E-03	1.6E-03	1.6E-03
Cu	mg/L	1.0E-03	1.0E-03	1.0E-03	1.6E-03	1.8E-03	2.4E-03	3.3E-03	3.1E-03	4.3E-03	1.7E-03	1.7E-03	1.0E-03	1.6E-03
Fe	mg/L	2.2E-01	2.2E-01	2.2E-01	2.2E-01	2.1E-01	2.1E-01	2.1E-01	2.1E-01	2.1E-01	2.2E-01	2.2E-01	2.2E-01	2.2E-01
K	mg/L	3.0E-01	3.0E-01	3.0E-01	7.1E-01	8.9E-01	1.3E+00	2.0E+00	1.8E+00	2.7E+00	7.8E-01	7.8E-01	3.0E-01	7.2E-01
Mg	mg/L	4.9E-01	4.9E-01	4.9E-01	5.5E-01	5.7E-01	6.3E-01	7.2E-01	7.0E-01	8.2E-01	5.6E-01	5.6E-01	4.9E-01	5.5E-01
Mn	mg/L	5.0E-02	5.0E-02	5.0E-02	5.0E-02	5.0E-02	5.1E-02	5.2E-02	5.1E-02	5.2E-02	5.0E-02	5.0E-02	5.0E-02	5.0E-02
Na	mg/L	2.9E+00	2.9E+00	2.9E+00	7.0E+00	8.9E+00	1.3E+01	2.0E+01	1.8E+01	2.7E+01	7.8E+00	7.7E+00	2.9E+00	7.1E+00
NH4+NH3	mg/L	2.5E-02	2.5E-02	2.5E-02	1.1E-01	5.3E-02	7.0E-02	1.0E-01	9.6E-02	1.3E-01	8.1E-02	5.8E-02	2.5E-02	5.7E-02
Ni	mg/L	1.0E-03	1.0E-03	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.1E-03	1.1E-03	1.2E-03	1.0E-03	1.0E-03	1.0E-03	1.0E-03
NO3	mg/L	1.3E-01	1.3E-01	1.3E-01	2.1E-01	1.6E-01	1.7E-01	2.0E-01	2.0E-01	2.3E-01	1.8E-01	1.6E-01	1.3E-01	1.6E-01
Pb	mg/L	2.6E-04	2.6E-04	2.6E-04	2.6E-04	2.6E-04	2.6E-04	2.6E-04	2.6E-04	2.6E-04	2.6E-04	2.6E-04	2.6E-04	2.6E-04
P	mg/L	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02
Sb	mg/L	1.0E-03	1.0E-03	1.0E-03	1.0E-03	1.1E-03	1.1E-03	1.2E-03	1.2E-03	1.3E-03	1.1E-03	1.1E-03	1.0E-03	1.0E-03
Se	mg/L	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-04
SO4	mg/L	1.0E+00	1.0E+00	1.0E+00	1.0E+01	1.4E+01	2.3E+01	3.8E+01	3.5E+01	5.4E+01	1.2E+01	1.2E+01	1.0E+00	1.0E+01
U	mg/L	5.0E-05	5.0E-05	5.0E-05	6.0E-05	6.5E-05	7.5E-05	9.1E-05	8.8E-05	1.1E-04	6.2E-05	6.2E-05	5.0E-05	6.0E-05
Zn	mg/L	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02	1.8E-02
CN (Total)	mg/L	1.0E-03	1.0E-03	1.0E-03	3.9E-03	5.1E-03	8.0E-03	1.3E-02	1.2E-02	1.7E-02	4.4E-03	4.3E-03	1.0E-03	3.9E-03

Note:
1.7E-01 – indicates a value greater than the CCME guideline.

APPENDIX I

SUPPLEMENTAL EARD INFORMATION

SUPPLEMENTAL BIOPHYSICAL SURVEYS

A number of field surveys could not be included in the March 2007 EARD submission due to seasonal constraints. These surveys were:

- Spring botany survey of site;
- Spring wetland surveys and peat measurement and characterization;
- Breeding bird survey;
- Herpetile survey of ponds;
- Botany surveys of the existing logging road to be upgraded.

These surveys were conducted in the spring and summer of 2007 and results are provided in the following sections. A 2007 ACCDC request and a 2007 NSM Environmental Screening for the Focus Report Study Area were also conducted, and are provided at the end of this section.

Additional Botany Surveys

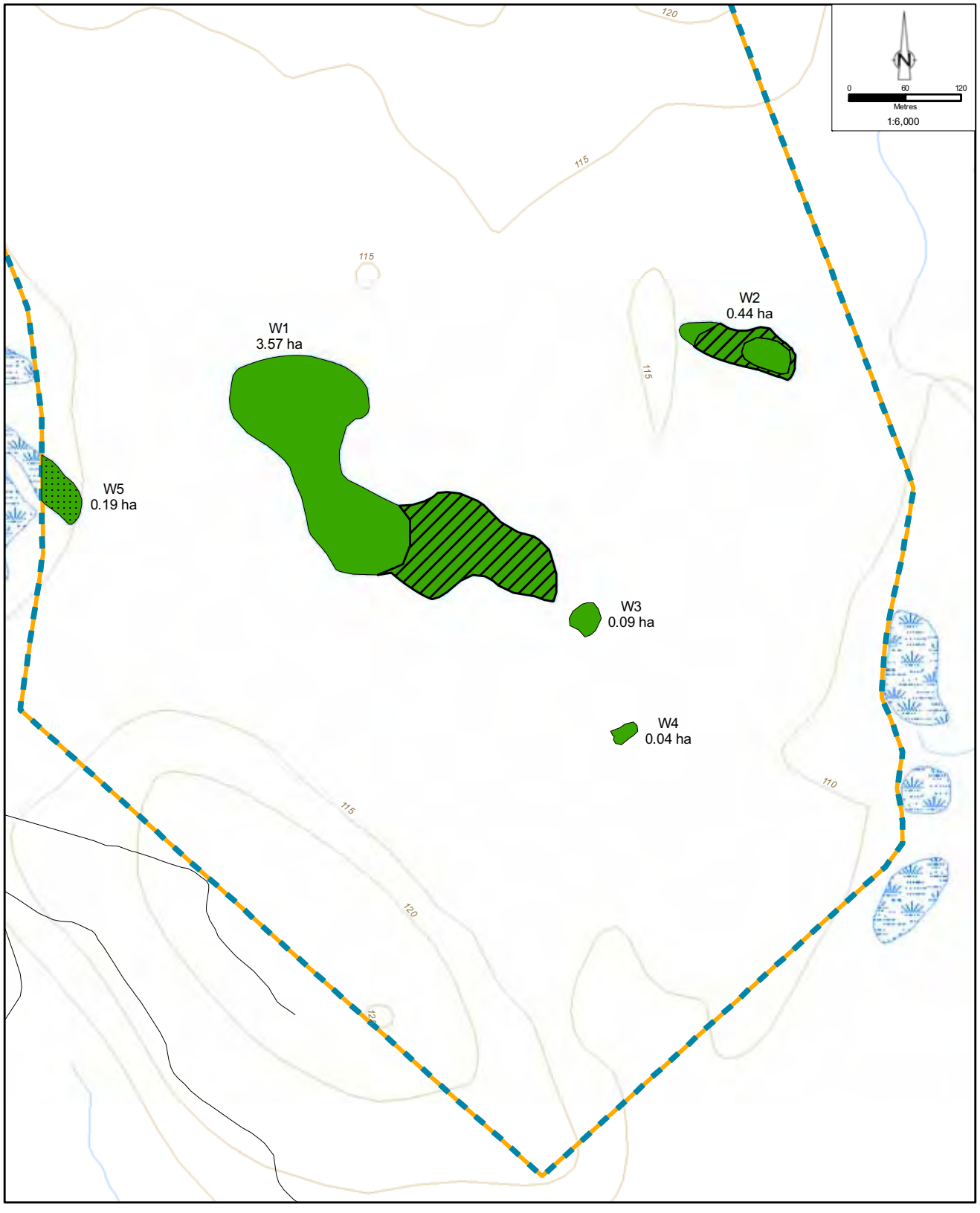
Additional botany surveys on the adjusted Project site were conducted on June 13 and 14 2007, both south and north of Mooseland Road. These were conducted concurrently with wetland, bird, mammal and herpetile surveys. Botanist Dr. Bill Freedman of Dalhousie University assisted with some of these surveys. No rare species of flora were detected.

See the EARD for a further description of rare plant species in the vicinity of the Project site.

Spring Wetland Surveys and Peat Measurement

As promised in section 10.0 of the EA, spring wetland surveys were conducted in June 2007. Wetlands on the Project site which will be affected by the Project are depicted on Figure 1. No rare species of flora or fauna were detected in any of the 5 wetlands to be affected. Peat depth and humification levels were also measured for each bog, and are summarized in the following sections.

Peat in Wetland 1 was determined based on visual examination and the presence of live *Sphagnum* mosses to be sphagnum peat. Peat thickness was measured at 15 locations in this wetland, at 0 m (surface sample), 0.75 m (mid-depth sample) and 1.5 m or at bottom (deep sample). Average peat thickness was 1.27 m. The peat layer (with live *Sphagnum* layer included) ranged from 0.33 m to over 4.57 m in thickness. The von Post scale of peat humification ranks peat according to the level of decomposition, with H1 being undecomposed *Sphagnum* and H10 being fully decomposed, amorphous material. Humification of peat at the surface (just under the layer of live *Sphagnum*) ranged from H2 to H6, with most samples being H4 or H5. Mid-depth samples (0.45 to 2.25 m) ranged from H4 to H8, with H6 being average. Deep samples were all in the H8 to H10 range.



- Building
- Road
- Rivers and Streams
- Surface Contour Line (10 m)
- Shrub Bog
- Treed Bog
- Tall Shrub Swamp
- Lake
- Other Wetlands

Figure 1
WETLANDS LOCATED ON PROJECT SITE
Touquoy Gold Project, DDV Gold Ltd.
Halifax County, Nova Scotia

Peat in Wetland 2 was determined based on visual examination and the presence of a dense surface layer of live *Sphagnum* moss to be sphagnum peat. Peat thickness was measured at six locations in this wetland. The peat layer (with live *Sphagnum* layer included) averaged 1.27 m in depth, and ranged from 0.28 m to 1.98 m. Humification of peat at the surface (just under the layer of live *Sphagnum*) was mostly in the H2 to H4 range of the von Post scale; however one sample was rated as H8. Mid-depth samples ranged from H4 to H8, with H6 being average. Deep samples were all in the H8 to H10 range.

Peat in Wetland 3 was determined based on visual examination, and the presence of live *Sphagnum* mosses to be sphagnum peat. Peat thickness was measured at five locations in this wetland. The peat layer (with live *Sphagnum* layer included) averaged 1.92 m in depth, and ranged from 1.52 to 2.29 m. Humification of peat at the surface (just under the layer of live *Sphagnum*) was mostly in the H2 to H5 range; however one sample was rated as H7. Mid-depth samples ranged from H6 to H8. Deep samples were in the H8 to H10 range, with one exception (H6).

Peat in Wetland 4 was determined based on visual examination and the presence of live *Sphagnum* mosses to be sphagnum peat. Peat thickness was measured at two locations in this tiny wetland. The peat layer (with live *Sphagnum* layer included) was found to be 0.53 and 0.89 m in depth, respectively. Humification of peat at the surface (just under the layer of live *Sphagnum*) was found to be H3 and H5, while deep samples were ranked as H8 and H10.

Complete wetland evaluation reports are provided at the end of this section.

Breeding Bird Survey on Project Site

A breeding bird survey was undertaken in June 2007 to provide a baseline on bird density and diversity on the project site and to identify potential species-at-risk. The area surveyed in 2007 included only the revised project footprint area and excluded the area already surveyed in 2005 for the EARD. Surveys were conducted at 10 listening posts (5-min point counts) at representative locations within major habitat types (Table 1, Figure 2). Birds were identified by an experienced birder based on song and visual observations and followed the Environment Canada protocol. A total of 89 birds representing 31 species were recorded during the breeding bird survey of the 2007. A list of bird data recorded at each survey point in 2007 is provided in Table 2. Potential nesting habitat for species identified covered a full range of nesting types from typical tree and shrub nesting species to cavity and ground nesters. The earliest typical nesting period is identified as April (although Common Ravens, *Corvus corax*, may nest in March), while the latest is in

September (American Robin, Turdus migratorius). During the 2007 surveys, the most abundant species' were the Dark-eyed Junco (*Junco hyemalis*, 11.2%) and Magnolia Warbler (*Dendroica magnolia*, 10.1%). All species detected during 2007 surveys were presumed to be attempting to breed in the revised Project area as suitable habitat was available. The Canada Warbler (*Wilsonia canadensis*) was the only bird species detected during 2007 surveys listed as sensitive to anthropogenic disturbance (yellow-listed). None of the bird species recorded during the 2007 breeding bird survey are considered to be rare in Nova Scotia. Sixteen additional bird species were detected during herpetile, wetland and rare plant surveys in 2007 (Table 3) including three species listed as sensitive to anthropogenic disturbance (yellow-listed); the Common Loon (*Gavia imner*), Common Nighthawk (*Chordeiles minor*) and Barn Swallow (*Hirunda rustica*).

TABLE 1: DESCRIPTION OF POINT COUNT STATIONS FOR THE BREEDING BIRD SURVEY ON THE TOUQUOY GOLD PROJECT SITE IN JUNE 2007

Station No.	Plot Description	Dominant Tree/Shrub Vegetation	Other Observations	UTM Location (NAD 83 ZONE 20T)
PC1	Bog Wetland	Black Spruce, Bog Laurel, Lambskill, Labrador Tea, Leatherleaf	Variable cloudiness, light wind, generally quiet	506320 4980441
PC2	Moist sphagnum mixed forest	Black Spruce (live and dead), Red Maple, False Holly	Overcast, mild wind, generally quiet	506260 4980889
PC3	Upland mixed forest, mixed age	Red Maple, Yellow Birch, Balsam Fir, Trembling Aspen, White Birch	Variable cloudiness, light wind, generally quiet	506175 4980170
PC4	Ecotonal edge between mixed forest and old clearcut, mixed age	Balsam Fir, Red Maple, White Birch, Yellow Birch, Red Spruce	Overcast, mild wind, generally quiet	506185 4981255
PC5	Ecotonal edge of mixed shrub/tree bog and softwood forest	Red Spruce, Balsam Fir, Black Spruce, Larch, Labrador Tea, Lambskill	Overcast, generally quiet	506174 4980821
PC6	Ecotonal edge between recent and old clearcut areas	Red Maple, Speckled Alder, Red Spruce, Wild Raisin, Willow sp.	Overcast, light wind, generally quiet	505333 4982156
PC7	Ecotonal edge between mixed forest and clearcut	Red Maple, Balsam Fir, Yellow Birch, Speckled Alder, Willow sp.		505720 4981250
PC8	Mixed forest, mixed age	Red Maple, Red Spruce, Balsam Fir Speckled Alder, Wild Raisin, Canada Holly	Overcast, light wind, generally quiet	505900 4981915
PC9	Ecotonal edge of mixed forest and softwood forest, mixed age	White Spruce, Balsam Fir, Red Maple, Yellow Birch	Overcast, light wind, generally quiet	505024 4982318
PC10	Hardwood forest, mixed age	Yellow Birch, Red Maple, White Birc Sugar Maple, Balsam Fir	Overcast, mild wind, generally quiet	504710 4982115

See the EARD for a further description of rare bird species in the vicinity of the Project site.

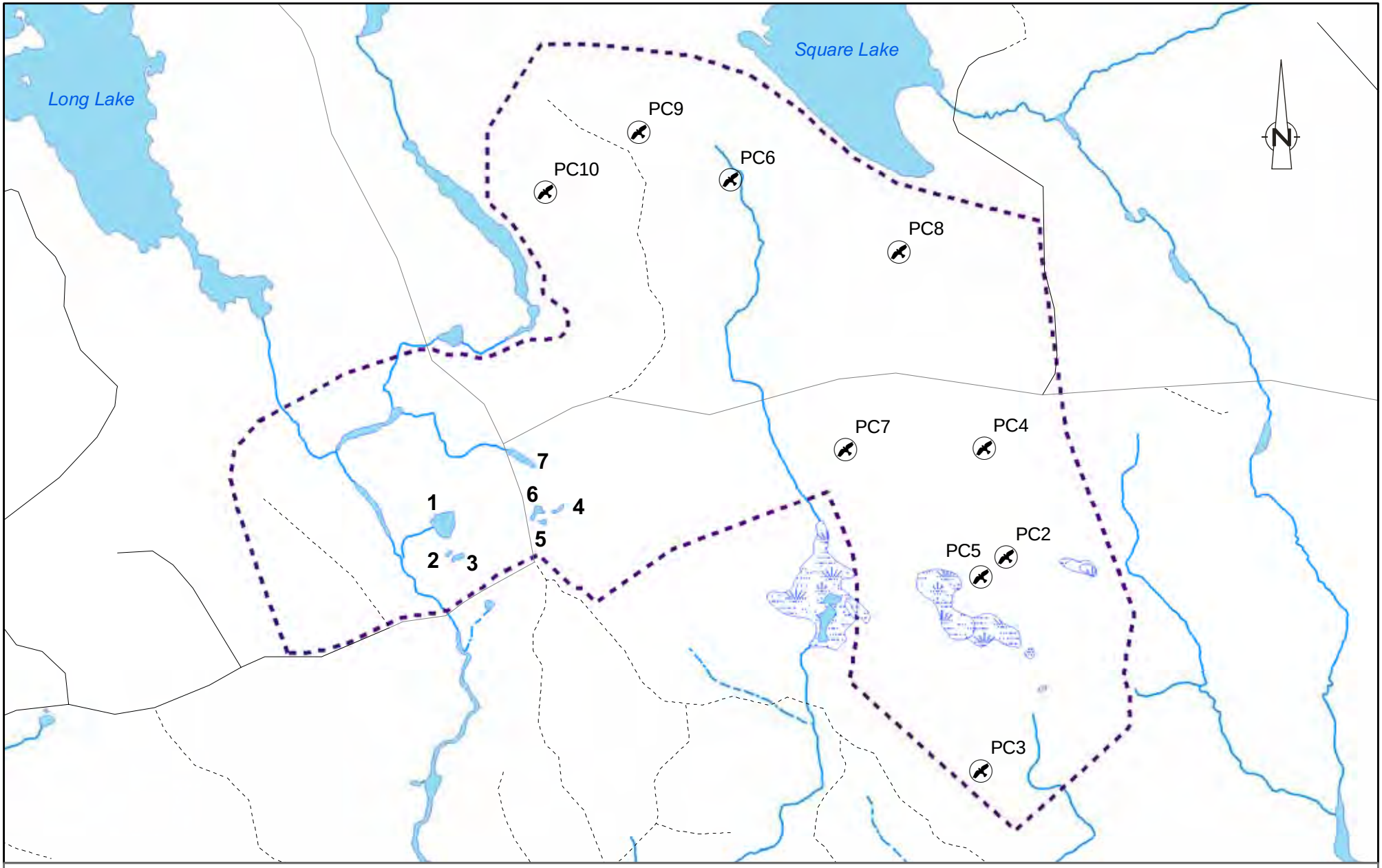


Figure 2
HERPETILE and BIRD SURVEY LOCATIONS
TOUQUOY GOLD PROJECT
DDV GOLD LTD.
Moose River Gold Mines
Halifax County, Nova Scotia

820933-D (8) GIS-DASU2 October 5, 2007

Legend

PC2 Bird Point Survey Locations

2 Herpetile Surveying Locations

Project Study Area

0 0.2 0.4 0.6 0.8 1
Kilometres

CONESTOGA-ROVERS & ASSOCIATES

TABLE 2: BIRD SPECIES DETECTED DURING THE BREEDING BIRD SURVEY ON THE TOUQUOY GOLD PROJECT SITE IN JUNE 2007

Common Name	Scientific Name	NSDNR Status	Preferred Nesting Habitat	Nesting Period	Point Count Station										Number of Individuals
					PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	
Broad-winged Hawk	*Buteo platypterus*	Green	Deciduous and mixed forests	May-August				1							1
Downy Woodpecker	*Picoides pubescens*	Green	Deciduous and mixed forests	Early April-early July									1		1
Hairy Woodpecker	*Picoides villosus*	Green	Deciduous and mixed forests	Late March-late June			1								1
Northern Flicker	*Colaptes auratus*	Green	Deciduous and mixed forests	Late April-late July				1							1
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Green	Damp boreal/coniferous forest, wet areas with sphagnum-moss	Mid June-early August	1	1			1						3
Alder Flycatcher	*Empidonax alnorum*	Green	Birch forests/alder and willow thickets, near wetlands	Mid June-mid August	1					1					2
Blue-headed Vireo	*Vireo salitarius*	Green	Mixed forests	Late May-Late July	1		1			1			1		4
Red-eyed Vireo	*Vireo olivaceus*	Green	Deciduous and mixed forests	Early June-early August			1					1		1	3
Blue Jay	*Cyanocitta cristata*	Green	Deciduous and mixed forests	Early May-mid July							1			1	2
American Crow	*Corvus brachyrhynchos*	Green	Deciduous and mixed forests, near edges	April-July										1	1
Common Raven	*Corvus corax*	Green	Deciduous and mixed forests, cliffs	March-June							2				2
Black-capped Chickadee	*Poecile atricapillus*	Green	Deciduous and mixed forests	Early May-mid Aug								1	1		2
Winter Wren	*Troglodytes troglodytes*	Green	Coniferous and mixed forests, brush piles	Mid May-late June									2		2
Ruby-crowned Kinglet	*Regulus calendula*	Green	Coniferous forests	Mid May- early July	2				1		1				4
Swainson's Thrush	*Catharus ustulatus*	Green	Deciduous and mixed forests	Late May-late July		1								1	2
Hermit Thrush	*Catharus guttatus*	Green	Coniferous and mixed forests	May-late August						1				1	2
American Robin	*Turdus migratorius*	Green	Deciduous and mixed forests	Late April-early September									1		1
Magnolia Warbler	*Dendroica magnolia*	Green	Moist spruce/fir forests	Early June-late July		1	3			2	2			1	9
Yellow-rumpted Warbler	*Dendroica coronata*	Green	Coniferous and mixed forests	Early May-Early July									1		1
Black-throated Green Warbler	*Dendroica virens*	Green	Coniferous and mixed forests	Early June-mid July			1	1		1	1		2	1	7
Blackburnian Warbler	*Dendroica fusca*	Green	Coniferous and mixed forests	Mid May-mid July				1	1						2
Palm Warbler	*Dendroica palmarum*	Green	Muskeg bogs, clearing	Mid May-late July	2	2		1							5
Bay-breasted Warbler	*Dendroica castanea*	Green	Spruce/fir forests, clearings, forest edges	June-July			1								1
Black-and-white Warbler	*Mniotilta varia*	Green	Deciduous and mixed forests, damp woodlands	Early June-mid July			1						1	2	4
Ovenbird	*Seiurus aurocapillus*	Green	Mature deciduous/spruce forests	May-June			1				1	1		3	6
Common Yellowthroat	*Geothlypis trichas*	Green	Swamp edges, brushy/shrub areas	Late May-late June	1					1		1			3
Canada Warbler	*Wilsonia canadensis*	Yellow	Moist mature forests, dense woodlands near streams or swamps	Early June-late July		1									1
Song Sparrow	*Melospiza melodia*	Green	Woodland edges, brushy thickets, cattail marshes	May-August					1						1
Lincoln's Sparrow	*Melospiza lincolnii*	Green	Northern bogs, wet brushy meadows, brambles	Late May-early July						1					1
White-throated Sparrow	*Zonotrichia albicollis*	Green	Coniferous and mixed forests	Mid May-late July				2		2					4
Dark-eyed Junco	*Junco hyemalis*	Green	Coniferous and mixed forests	Early May-late August	2				4	2	1		1		10
Total Number of Species					7	5	8	6	5	9	7	4	8	9	31
Total Number of Individuals					10	6	10	7	8	12	9	4	10	12	89

TABLE 3: ADDITIONAL BIRD SPECIES DETECTED DURING WETLAND, HERPETILE, AND BOTANY SURVEYS IN 2007

Common Name	Scientific Name	NSDNR Status	Preferred Nesting Habitat	Nesting Period
Common Loon	*Gavia immer*	Yellow	Freshwater lakes with undisturbed islands	Late May-late July
Mourning Dove	*Zenaida macroura*	Green	Woodlands, open lands with scattered trees	Early April-mid September
Common Nighthawk	*Chordeiles minor*	Yellow	Open woodlands, forests, meadows, clearings	Mid May-early August
Pileated Woodpecker	*Dryocopus pileatus*	Green	Mature deciduous and coniferous forests	Early April-early July
Barn Swallow	*Hirunda rustica*	Yellow	Human structures, cliffs	Late May-July
Tree Swallow	*Tachycineta bicolor*	Green	Wetlands, wooded habitat near water, abundant dead trees	Late May-July
Boreal Chickadee	*Poecile hudsonica*	Yellow	Coniferous forests of spruce, balsam fir and pine	Early May-mid August
Golden-crowned Kinglet	*Regulus satrapa*	Green	Coniferous forests, spruce woodlands	Early May-mid July
European Starling	*Sturnus vulgais*	Green	Deciduous forests, urban areas	Late April-July
Cedar Waxwing	*Bombycilla cedrorum*	Green	Open woodlands, secondary vegetation	Mid June-early September
Northern Parula	*Parula americana*	Green	Humid coniferous forests or mixed woods near water	Late May-early August
Swamp Sparrow	*Melospiza geogiana*	Green	Wetlands	Late May-mid July
Red-winged Blackbird	*Agelaius phoeniceus*	Green	Wetlands	May-July
Common Grackle	*Quiscalus quiscula*	Green	Woodlands, groves along rivers, swamps	Late April-July
Purple Finch	*Carpodacus purpureus*	Green	Open woodlands, conifer forests	Early June-mid August
American Goldfinch	*Carduelis tristis*	Green	Woodland edges, orchards, riparian areas	Late June-mid September

Herpetile Survey

On May 15 2007, a herpetile survey of the seven small ponds present on the proposed Touquoy Gold Project site was conducted. As requested by DNR, the focus of this survey was to determine if these ponds presented suitable habitat for salamander or turtle species. A brief description of the herpetile fauna observed in each pond is provided in the following paragraphs.

The largest pond (Pond 1) existing on the site is the water-filled pit from a bulk ore sample excavated in the late 1980s (Figure 2). This pit is quite deep (< 10 m) and is filled with very clear water. As the sides of this pit are quite steep, there is no emergent vegetation around the perimeter, with the exception of a small area on the north side where the water has flooded a low-

lying area. Tadpoles, likely of green frogs (*Rana clamitans*), were present in this small pool. Adult green frogs were observed around the margins of the shallow area. There is no suitable habitat for turtles or salamanders in this pit.

Two small ponds within the Provincial Park were also surveyed (Ponds 2 and 3, Figure 2). These ponds, each less than 15 m long by 10 m wide, appear to be small water-filled historical mine excavations. These were found to contain breeding green frogs, as well as yellow-spotted salamander (*Ambystoma maculatum*) egg masses. Northern Spring Peepers are also likely breeding in these ponds. An effort to locate red-backed salamanders (*Plethodon cinereus*) under logs and stones around these pools was unsuccessful. These shallow ponds (likely < 1m) would not be considered suitable habitat for any species of turtle.

Three small ponds west of Moose River Road were also surveyed (Ponds 4, 5 and 6, Figure 2). These ponds are all also artifacts of historical mining activities. These ponds were generally steep-sided and rocky, with water approximately 1 m deep. All three ponds, the largest of which was approximately 30 x 8 m, were found to contain adult green frogs and yellow-spotted salamander egg masses.. None of these ponds were considered to be suitable habitat for any turtle species, nor were they likely productive salamander breeding habitat, due to the presence of bullfrogs. None of these ponds provided suitable turtle habitat.

A large pond (Pond 7, Figure 2), situated between a residential building and the Moose River Road, was approximately 60 m long and 15 m wide, with a small treed island present at one end. This pond had some patchy broad-leaved cattails (*Typha latifolia*) around the perimeter, and at this time of year the water level had risen over a grassy area to the north, creating a shallow grassy flooded area which merged with the Mooseland Road ditch. An adult bullfrog (*Rana catesbiaena*) was observed in this area, and several large tadpoles were also observed, likely bullfrog or green frog tadpoles. Yellow-spotted salamander egg masses were observed around the margins of this pond. This pond was also found to be home to 20 or so goldfish (*Cassarius auratus*), which were observed in the warmer shallow grassy area. The source of these fish appeared to be a neglected preformed plastic fish pond which was situated in the adjacent yard and which appeared to have overflowed into the pond. These voracious fish would have a detrimental effect on the amphibian fauna, particularly larval stages, inhabiting this pond. This pond might provide some habitat for Eastern painted turtles (*Chrysemys picta picta*); however it would be poor quality habitat due to the rocky nature of the pond. No turtles were observed.

An additional pond (Pond 8, Figure 2), located on a property across the road from the entrance to the Provincial Park, was approximately 15 by 15 m in size, and was likely over 1 m deep. This pond was ringed by alders (*Alnus incana*) around half the perimeter and had a large patch of cattails on the other side. This pond was likely anthropogenic. It was found to contain adult and larval bullfrogs. A single yellow-spotted salamander egg mass was also detected. This pond might provide very limited habitat for painted turtles, however, none were observed. This Pond is actually outside of the Project footprint, and so will not be disturbed.

In summary, most of the ponds were found to be suitable breeding habitat for larger frog species and possibly for yellow-spotted salamanders and northern spring peepers. The possibility of any turtle species using these ponds is very low. No rare or sensitive herpetiles, nor habitat for such species, was observed.

Vegetation Survey of Logging Road to Upgrade

As discussed on page 71 of the Touquoy Gold Project EARD, an upgrading of an existing logging road around the western perimeter of the site, west of Moose River Gold Mines, will be required to maintain existing public access to those areas west of Moose River Gold Mines and south of the mine site. The existing logging road begins on Moose River Road and extends west though a recently clear-cut area. It then passes through harvested areas in various stages of regrowth, which are dominated by balsam fir (*Abies balsamea*). The proposed road then crosses a tributary of Moose River flowing from Long Lake, and extends southward to join the dirt road just past the bridge over Moose River itself.

Botanical surveys of this old logging road were conducted in June and August of 2007 by CRA ecologists Beth Cameron and Jeff Balsdon. No listed plant species were detected during either the early – or late-season botanical surveys. Construction of this road will not have a significant impact on forest habitat in the area, as much of the route has already been clear-cut or currently exists as old logging road.

2007 ACCDC Database Search for Uncommon to Rare Species Records within 100 km of Moose River Gold Mines

Binomial	Common Name	S-Rank	DNR Status	Nearest Observation
Hemidactylium scutatum	Four-toed Salamander	S3	Green	41Km +/-10
Anas acuta	Northern Pintail	S2B	Green	40Km +/-5
Aythya marila	Greater Scaup	S3N	Green	54Km +/-5
Bucephala clangula	Common Goldeneye	S2B,S4N	Green	33Km +/-5
Bucephala islandica	Barrow's Goldeneye - Eastern population	S1N	Yellow	84Km +/-0.1
Mergus serrator	Red-breasted Merganser	S3B	Green	25Km +/-5
Accipiter gentilis	Northern Goshawk	S3B	Yellow	24Km +/-1
Falco peregrinus anatum	American Peregrine Falcon	S1B	Red	92Km +/-50.1
Rallus limicola	Virginia Rail	S2B	Green	40Km +/-5
Gallinula chloropus	Common Moorhen	S1B	Green	86Km +/-5
Fulica americana	American Coot	S2B	Green	82Km +/-1
Pluvialis dominica	American Golden-Plover	S3S4M	Green	40Km +/-0
Charadrius semipalmatus	Semipalmated Plover	S2B,S5M	Green	84Km +/-1
Charadrius melodus	Piping Plover	S1B	Red	28Km +/-0.5
Tringa melanoleuca	Greater Yellowlegs	S2B,S5M	Green	19Km +/-5
Tringa solitaria	Solitary Sandpiper	S1B	Green	41Km +/-0
Numenius phaeopus	Whimbrel	S3M	Green	35Km +/-0
Limosa haemastica	Hudsonian Godwit	S2S3M	Undetermined	50Km +/-0
Calidris canutus	Red Knot	S3M	Yellow	35Km +/-0
Calidris minutilla	Least Sandpiper	S1B,S5M	Green	60Km +/-1
Calidris bairdii	Baird's Sandpiper	S2M	Green	46Km +/-0
Calidris maritima	Purple Sandpiper	S2N	Yellow	46Km +/-0
Phalaropus lobatus	Red-necked Phalarope	S3S4M	Green	53Km +/-0
Larus ridibundus	Black-headed Gull	S3N	Green	28Km +/-5
Sterna dougallii	Roseate Tern	S1B	Red	30Km +/-0.1
Sterna hirundo	Common Tern	S3B	Yellow	19Km +/-0.1
Sterna paradisaea	Arctic Tern	S3B	Yellow	19Km +/-0.1
Alca torda	Razorbill	S1B,SZN	Yellow	52Km +/-1
Cepphus grylle	Black Guillemot	S3	Green	46Km +/-1
Coccyzus erythropthalmus	Black-billed Cuckoo	S3B	Green	54Km +/-1
Caprimulgus vociferus	Whip-Poor-Will	S1?B	Green	23Km +/-1
Sayornis phoebe	Eastern Phoebe	S2S3B	Green	44Km +/-5
Myiarchus crinitus	Great Crested Flycatcher	S2S3B	Green	47Km +/-5
Eremophila alpestris	Horned Lark	S2B,S4N	Green	46Km +/-1
Sialia sialis	Eastern Bluebird	S2S3B	Yellow	29Km +/-1
Hylocichla mustelina	Wood Thrush	S2B	Green	66Km +/-5
Mimus polyglottos	Northern Mockingbird	S3B	Green	50Km +/-1
Toxostoma rufum	Brown Thrasher	S1?B	Green	65Km +/-5
Vireo philadelphicus	Philadelphia Vireo	S1?B	Green	28Km +/-5

2007 ACCDC Database Search for Uncommon to Rare Species Records within 100 km of Moose River Gold Mines

Binomial	Common Name	S-Rank	DNR Status	Nearest Observation
Piranga olivacea	Scarlet Tanager	S2B	Green	29Km +/-1
Passerina cyanea	Indigo Bunting	S2S3B	Green	67Km +/-1
Pooecetes gramineus	Vesper Sparrow	S2S3B	Yellow	66Km +/-5
Passerculus sandwichensis princeps	"Ipswich" Savannah Sparrow	S1B	Yellow	92Km +/-1
Ammodramus nelsoni	Nelson's Sharp-tailed Sparrow	S3B	Green	25Km +/-5
Dolichonyx oryzivorus	Bobolink	S3B	Yellow	16Km +/-1
Euphagus carolinus	Rusty Blackbird	S3B	Yellow	16Km +/-5
Icterus galbula	Baltimore Oriole	S3B	Green	40Km +/-5
Loxia curvirostra	Red Crossbill	S3S4	Undetermined	25Km +/-5
Salmo salar	Atlantic Salmon	S2	Red	10Km +/-50.1
Sorex dispar	Long-tailed Shrew	S1	Red	82Km +/-10
Pipistrellus subflavus	Eastern Pipistrelle	S1?	Yellow	58Km +/-1
Lasiurus cinereus	Hoary Bat	S2?	Yellow	35Km +/-10
Alces alces americanus	Mainland Moose	S1	Red	18Km +/-10
Dermochelys coriacea	Leatherback Turtle	S1S2N	None available	96Km +/-5
Glyptemys insculpta	Wood Turtle	S3	Yellow	12Km +/-10
Thorybes pylades	Northern Cloudywing	S2	Yellow	70Km +/-1
Erynnis juvenalis	Juvenal's Duskywing	S2S3	Green	57Km +/-1
Hesperia comma	Common Branded Skipper	S3	Green	52Km +/-1
Hesperia comma laurentina	Laurentian Skipper	S3		22Km +/-1
Amblyscirtes hegon	Pepper and Salt Skipper	S2	Green	48Km +/-1
Amblyscirtes vialis	Common Roadside-Skipper	S2	Green	53Km +/-1
Pieris oleracea	Mustard White	S2	Undetermined	51Km +/-1
Feniseca tarquinius	Harvester	S3S4	Green	39Km +/-1
Lycaena hyllus	Bronze Copper	S1	Green	53Km +/-1
Lycaena dospassosi	Salt Marsh Copper	S2		89Km +/-0
Satyrium acadicum	Acadian Hairstreak	S1	Undetermined	80Km +/-1
Satyrium calanus	Banded Hairstreak	S2	Undetermined	65Km +/-1
Satyrium liparops	Striped Hairstreak	S3	Undetermined	57Km +/-1
Callophrys polios	Hoary Elfin	S3S4	None available	53Km +/-1
Callophrys henrici	Henry's Elfin	S2	None available	58Km +/-1
Callophrys niphon	Eastern Pine Elfin	S2	None available	57Km +/-1
Callophrys lanoraieensis	Bog Elfin	S1S2	None available	55Km +/-1
Plebejus saepiolus	Greenish Blue	S1	Green	67Km +/-1
Speyeria aphrodite	Aphrodite Fritillary	S3S4	Green	51Km +/-1
Boloria chariclea	Arctic Fritillary	S2	Yellow	66Km +/-1
Euphydryas phaeton	Baltimore Checkerspot	S3	Green	50Km +/-1
Polygonia interrogationis	Question Mark	S3B	Green	51Km +/-1

2007 ACCDC Database Search for Uncommon to Rare Species Records within 100 km of Moose River Gold Mines

Binomial	Common Name	S-Rank	DNR Status	Nearest Observation
Polygonia comma	Eastern Comma	S2	Yellow	65Km +/-1
Polygonia satyrus	Satyr Comma	S1	Yellow	68Km +/-1
Polygonia faunus	Green Comma	S3	Green	51Km +/-1
Polygonia gracilis	Hoary Comma	S1	Yellow	51Km +/-1
Polygonia progne	Gray Comma	S3S4	Green	42Km +/-10
Nymphalis vaualbum	Compton Tortoiseshell	S1S2	Green	51Km +/-1
Aglais milberti	Milbert's Tortoiseshell	S2	None available	50Km +/-1
Enodia anthedon	Northern Pearly-Eye	S3	Green	58Km +/-1
Oeneis jutta	Jutta Arctic	S1	Red	75Km +/-1
Danaus plexippus	Monarch Butterfly	S2B	Yellow	51Km +/-1
Cordulegaster diastatops	Delta-Spotted Spiketail	S3	Green	52Km +/-1
Cordulegaster maculata	Twin-Spotted Spiketail	S3	Green	42Km +/-1
Dromogomphus spinosus	Black-Shouldered Spinyleg	S2	Green	26Km +/-0.1
Gomphus ventricosus	Skillet Clubtail	S1	Red	48Km +/-0.1
Gomphus borealis	Beaverpond Clubtail	S2	Green	41Km +/-0.1
Gomphus descriptus	Harpoon Clubtail	S2	Yellow	97Km +/-0.1
Gomphus exilis	Lancet Clubtail	S3	Green	29Km +/-1
Gomphus spicatus	Dusky Clubtail	S2	Green	30Km +/-10
Gomphus adelphus	Moustached Clubtail	S2	Green	46Km +/-1
Hagenius brevistylus	Dragonhunter	S3	Green	23Km +/-0.1
Lanthus parvulus	Northern Pygmy Clubtail	S2	Yellow	88Km +/-1
Stylogomphus albistylus	Least Clubtail	S3	Green	37Km +/-1
Ophiogomphus aspersus	Brook Snaketail	S1	Red	88Km +/-0.1
Ophiogomphus carolus	Riffle Snaketail	S3	Green	37Km +/-1
Ophiogomphus mainensis	Maine Snaketail	S1	Red	90Km +/-0.1
Ophiogomphus rupinsulensis	Rusty Snaketail	S1	Red	48Km +/-0.1
Aeshna canadensis	Canada Darner	S3	Green	39Km +/-0.1
Aeshna clepsydra	Mottled Darner	S2	Green	43Km +/-1
Aeshna constricta	Lance-Tipped Darner	S2	Undetermined	45Km +/-0.1
Aeshna eremita	Lake Darner	S3	Green	14Km +/-1
Aeshna sitchensis	Zigzag Darner	S2	Green	74Km +/-1
Aeshna subarctica	Subarctic Darner	S3	Green	45Km +/-1
Aeshna tuberculifera	Black-Tipped Darner	S3	Green	20Km +/-1
Aeshna verticalis	Green-Striped Darner	S2	Green	42Km +/-0.1
Anax junius	Common Green Darner	S3	Green	39Km +/-0.1
Basiaeschna janata	Springtime Darner	S3	Green	40Km +/-1
Boyeria grafiana	Ocellated Darner	S2	Undetermined	52Km +/-1
Boyeria vinosa	Fawn Darner	S3	Green	26Km +/-1
Gomphaeschna furcillata	Harlequin Darner	S1	Yellow	62Km +/-1
Didymops transversa	Stream Cruiser	S3	Green	41Km +/-0.1

2007 ACCDC Database Search for Uncommon to Rare Species Records within 100 km of Moose River Gold Mines

Binomial	Common Name	S-Rank	DNR Status	Nearest Observation
Macromia illinoiensis	Illinois River Cruiser	S3	Green	23Km +/-0.1
Cordulia shurtleffii	American Emerald	S3	Green	42Km +/-0.1
Dorocordulia lepida	Petite Emerald	S3	Green	40Km +/-0.1
Dorocordulia libera	Racket-Tailed Emerald	S2	Green	45Km +/-0.1
Epitheca princeps	Prince Baskettail	S2	Yellow	57Km +/-0.5
Epitheca canis	Beaverpond Baskettail	S3	Green	16Km +/-1
Epitheca cynosura	Common Baskettail	S3	Undetermined	30Km +/-10
Epitheca spinigera	Spiny Baskettail	S3	Green	51Km +/-1
Helocordulia uhleri	Uhler's Sundragon	S3	Green	40Km +/-0.1
Somatochlora cingulata	Lake Emerald	S2	Green	41Km +/-0.1
Somatochlora elongata	Ski-Tailed Emerald	S3	Green	38Km +/-1
Somatochlora forcipata	Forcipate Emerald	S2	Undetermined	65Km +/-1
Somatochlora franklini	Delicate Emerald	S1	Undetermined	75Km +/-0.1
Somatochlora incurvata	Incurvate Emerald	S3	Green	25Km +/-1
Somatochlora minor	Ocellated Emerald	S2	Green	40Km +/-0.1
Somatochlora tenebrosa	Clamp-Tipped Emerald	S2	Yellow	74Km +/-0.1
Somatochlora walshii	Brush-Tipped Emerald	S3	Green	42Km +/-1
Williamsonia fletcheri	Ebony Boghaunter	S1	Red	96Km +/-0.1
Celithemis elisa	Calico Pennant	S2	Green	33Km +/-1
Celithemis martha	Martha's Pennant	S2	Green	43Km +/-1
Leucorrhinia frigida	Frosted Whiteface	S3	Green	40Km +/-1
Leucorrhinia glacialis	Crimson-Ringed Whiteface	S3	Green	52Km +/-1
Leucorrhinia hudsonica	Hudsonian Whiteface	S3	Green	40Km +/-0.1
Leucorrhinia intacta	Dot-Tailed Whiteface	S3	Green	14Km +/-1
Leucorrhinia proxima	Red-Waisted Whiteface	S3	Green	14Km +/-1
Libellula incesta	Slaty Skimmer	S3	Green	43Km +/-1
Libellula luctuosa	Widow Skimmer	SH		75Km +/-0.1
Libellula pulchella	Twelve-Spotted Skimmer	S2	Green	39Km +/-0.1
Ladona exusta	White Corporal	S3		29Km +/-1
Plathemis lydia (Syn. Libellula lydia)	Common Whitetail	S3	Green	40Km +/-0.1
Libellula julia	Chalk-Fronted Corporal	S3	Green	45Km +/-0.1
Nannothemis bella	Elfin Skimmer	S2	Green	72Km +/-1
Sympetrum costiferum	Saffron-Winged Meadowhawk	S3	Green	26Km +/-0.1
Sympetrum danae	Black Meadowhawk	S2	Green	97Km +/-1
Sympetrum obtrusum	White-Faced Meadowhawk	S3	Green	37Km +/-5
Sympetrum rubicundulum	Ruby Meadowhawk	S2	Undetermined	43Km +/-1

2007 ACCDC Database Search for Uncommon to Rare Species Records within 100 km of Moose River Gold Mines

Binomial	Common Name	S-Rank	DNR Status	Nearest Observation
Sympetrum semicinctum	Band-Winged Meadowhawk	S3	Green	26Km +/-0.1
Sympetrum vicinum	Yellow-Legged Meadowhawk	S3	Green	30Km +/-10
Calopteryx aequabilis	River Jewelwing	S3	Green	23Km +/-0.1
Calopteryx amata	Superb Jewelwing	S3	Green	26Km +/-1
Lestes dryas	Emerald Spreadwing	S3	Green	39Km +/-0.1
Lestes forcipatus	Sweetflag Spreadwing	S2	Undetermined	39Km +/-1
Lestes congener	Spotted Spreadwing	S3	Green	23Km +/-0.1
Lestes eurinus	Amber-Winged Spreadwing	S2	Undetermined	40Km +/-0.1
Lestes rectangularis	Slender Spreadwing	S3	Green	30Km +/-10
Lestes unguiculatus	Lyre-Tipped Spreadwing	S2	Green	53Km +/-1
Lestes vigilax	Swamp Spreadwing	S2	Undetermined	30Km +/-10
Argia fumipennis violacea	Variable Dancer	S3	Green	30Km +/-10
Argia moesta	Powdered Dancer	S3	Green	37Km +/-1
Coenagrion resolutum	Taiga Bluet	S1	Red	57Km +/-0.5
Enallagma boreale	Boreal Bluet	S3	Green	40Km +/-1
Enallagma carunculatum	Tule Bluet	S1	Undetermined	75Km +/-0.1
Enallagma cyathigerum vernale	Springtime Bluet	S2	Undetermined	39Km +/-0.1
Enallagma minusculum	Little Bluet	S2	Yellow	30Km +/-10
Enallagma aspersum	Azure Bluet	S2	Green	35Km +/-0.1
Enallagma civile	Familiar Bluet	S3	Green	40Km +/-0.1
Enallagma ebrium	Marsh Bluet	S3	Green	40Km +/-0.1
Enallagma exsulans	Stream Bluet	S2	Green	34Km +/-1
Enallagma hageni	Hagen's Bluet	S3	Green	30Km +/-10
Enallagma signatum	Orange Bluet	S1	Undetermined	67Km +/-0.1
Ischnura posita	Fragile Forktail	S3	Green	39Km +/-1
Nehalennia irene	Sedge Sprite	S3	Green	32Km +/-1
Nehalennia gracilis	Sphagnum Sprite	S2	Undetermined	74Km +/-0.1
Amphiagrion saucium	Eastern Red Damsel	S2	Green	53Km +/-1
Chromagrion conditum	Aurora Damsel	S3	Green	41Km +/-0.1
Stylurus scudderi	Zebra Clubtail	S1	Undetermined	46Km +/-1
Alasmidonta undulata	Triangle Floater	S2S3	Yellow	20Km +/-0.1
Alasmidonta varicosa	Brook Floater	S1S2	Yellow	37Km +/-0.1
Lampsilis radiata	Eastern Lampmussel	S2	Green	27Km +/-0.1
Desmatodon obtusifolius	a Moss	S1	None available	52Km +/-1
Erioderma pedicellatum	Boreal Felt Lichen	S1S2	Red	10Km +/-0
Conioselinum chinense	Hemlock Parsley	S2S3	Yellow	62Km +/-5
Osmorhiza longistylis	Smoother Sweet-Cicely	S2	Yellow	56Km +/-0
Sanicula odorata	Black Snake-Root	S1	Red	55Km +/-10
Zizia aurea	Common Alexanders	S1S2	Yellow	18Km +/-1

2007 ACCDC Database Search for Uncommon to Rare Species Records within 100 km of Moose River Gold Mines

Binomial	Common Name	S-Rank	DNR Status	Nearest Observation
Panax trifolius	Dwarf Ginseng	S3	Green	47Km +/-1
Asclepias incarnata	Swamp Milkweed	S3	Green	14Km +/-10
Asclepias incarnata ssp. pulchra	Swamp Milkweed	S2S3	Green	19Km +/-1
Antennaria parlinii	a Pussytoes	S1	Red	63Km +/-10
Bidens connata	Purple-Stem Swamp Beggar-Ticks	S3?	Yellow	66Km +/-0.5
Erigeron hyssopifolius	Daisy Fleabane	S2S3	Yellow	56Km +/-0.5
Erigeron philadelphicus	Philadelphia Fleabane	S2	Yellow	17Km +/-1
Euthamia galetorum	Narrow-Leaf Fragrant Golden-Rod	S3S4	Green	16Km +/-10
Euthamia caroliniana	Grass-Leaved Goldenrod	S3	Yellow	24Km +/-5
Hieracium kalmii	Kalm's Hawkweed	S2?	Undetermined	71Km +/-1
Hieracium kalmii var. fasciculatum	Kalm's Hawkweed	S1?	Undetermined	61Km +/-5
Hieracium kalmii var. kalmii	Kalm's Hawkweed	S2?	Undetermined	65Km +/-5
Hieracium robinsonii	Robinson's Hawkweed	S2	Yellow	50Km +/-1
Hieracium umbellatum	Umbellate Hawkweed	S2?	Undetermined	52Km +/-5
Lactuca hirsuta var. sanguinea	Hairy Wild Lettuce	S2	Yellow	40Km +/-10
Megalodonta beckii	Beck Water-Marigold	S3	Yellow	28Km +/-0.5
Rudbeckia laciniata	Cut-Leaved Coneflower	S2S3	Yellow	51Km +/-0
Rudbeckia laciniata var. gaspereauensis	Cut-Leaved Coneflower	S2S3	Yellow	46Km +/-10
Packera paupercula	Balsam Groundsel	S3	Green	55Km +/-1
Senecio pseudoarnica	Seabeach Groundsel	S2	Yellow	39Km +/-10
Solidago hispida	Hairy Goldenrod	S1?	Red	38Km +/-10
Solidago simplex var. randii	Mountain Goldenrod	SH	Blue	73Km +/-1
Symphyotrichum boreale	Boreal American-Aster	S2?	Yellow	54Km +/-10
Symphyotrichum undulatum	Wavy-leaf American-Aster	S2	Yellow	66Km +/-10
Symphyotrichum ciliolatum	Lindley's Aster	S2S3	Yellow	19Km +/-5
Impatiens pallida	Pale Jewel-Weed	S2	Yellow	91Km +/-10
Caulophyllum thalictroides	Blue Cohosh	S2	Red	43Km +/-10
Cynoglossum virginianum var. boreale	Northern Wild Comfrey	S1	Red	89Km +/-1
Arabis drummondii	Drummond Rockcress	S2	Yellow	81Km +/-1
Cardamine parviflora var. arenicola	Small-Flower Bitter-Cress	S2	Yellow	95Km +/-50.1

2007 ACCDC Database Search for Uncommon to Rare Species Records within 100 km of Moose River Gold Mines

Binomial	Common Name	S-Rank	DNR Status	Nearest Observation
Cochlearia tridactylites	Limestone Scurvy-grass	S1	Red	64Km +/-1
Campanula aparinoides	Marsh Bellflower	S3?	Yellow	56Km +/-0
Lobelia spicata	Pale-Spiked Lobelia	S1S2SE	Red	68Km +/-10
Minuartia groenlandica	Mountain Sandwort	S2	Yellow	26Km +/-10
Stellaria humifusa	Creeping Sandwort	S2	Yellow	18Km +/-0.1
Stellaria longifolia	Longleaf Stitchwort	S3	Yellow	19Km +/-0.1
Atriplex acadiensis	Maritime Saltbush	S1?	Undetermined	84Km +/-10
Atriplex franktonii	Frankton's Saltbush	S3S4	Yellow	92Km +/-1
Chenopodium rubrum	Coast-Blite Goosefoot	S1?	Red	77Km +/-10
Suaeda calceoliformis	American Sea-Blite	S2S3	Green	62Km +/-10
Helianthemum canadense	Canada Frostweed	S1	Red	78Km +/-1
Hudsonia ericoides	Golden-Heather	S2	Yellow	62Km +/-10
Hudsonia tomentosa	Sand-Heather	S1	Red	80Km +/-10
Clethra alnifolia	Coast Pepper-Bush	S1S2	Yellow	63Km +/-0.1
Hypericum dissimulatum	Disguised St. John's-Wort	S2S3	Yellow	60Km +/-0.5
Hypericum majus	Larger Canadian St. John's Wort	S1	Red	62Km +/-10
Triosteum aurantiacum	Coffee Tinker's-Weed	S2	Yellow	49Km +/-10
Crassula aquatica	Water Pigmy-Weed	S2	Yellow	96Km +/-0.1
Cuscuta cephalanthi	Button-Bush Dodder	S1	Red	76Km +/-1
Shepherdia canadensis	Canada Buffalo-Berry	S2	Yellow	81Km +/-10
Empetrum eamesii	Rock Crowberry	S2S3	Yellow	62Km +/-10
Empetrum eamesii ssp. atropurpureum	Purple Crowberry	S2S3	Yellow	69Km +/-0.5
Empetrum eamesii ssp. eamesii	Purple Crowberry	S2S3	Yellow	69Km +/-0.5
Vaccinium boreale	Northern Blueberry	S2	Red	65Km +/-1
Vaccinium caespitosum	Dwarf Blueberry	S2	Yellow	47Km +/-1
Vaccinium uliginosum	Alpine Blueberry	S2	Yellow	69Km +/-10
Desmodium canadense	Showy Tick-Trefoil	S1	Red	50Km +/-0.1
Desmodium glutinosum	Large Tick-Trefoil	S2	Red	81Km +/-0
Bartonia virginica	Yellow Screwstem	S3	Green	51Km +/-10
Halenia deflexa	Spurred Gentian	S2S3	Yellow	75Km +/-1
Ribes americanum	Wild Black Currant	S1SE	Undetermined	52Km +/-5
Myriophyllum farwellii	Farwell's Water-Milfoil	S2	Yellow	28Km +/-0.1
Myriophyllum verticillatum	Whorled Water-Milfoil	S2	Yellow	72Km +/-10
Proserpinaca palustris var. crebra	Marsh Mermaid-Weed	S3S4	Green	19Km +/-5
Proserpinaca pectinata	Comb-Leaved Mermaid-Weed	S3	Green	32Km +/-1
Hedeoma pulegioides	American Pennyroyal	S2S3	Yellow	6Km +/-5
Teucrium canadense	American Germander	S2S3	Yellow	41Km +/-5

2007 ACCDC Database Search for Uncommon to Rare Species Records within 100 km of Moose River Gold Mines

Binomial	Common Name	S-Rank	DNR Status	Nearest Observation
Floerkea proserpinacoides	False Mermaid-Weed	S2S3	Yellow	49Km +/-10
Utricularia gibba	Humped Bladderwort	S2	Yellow	22Km +/-10
Utricularia radiata	Small Swollen Bladderwort	S3	Green	98Km +/-1
Fraxinus nigra	Black Ash	S3	Yellow	55Km +/-1
Fraxinus pennsylvanica	Green Ash	S1	Red	73Km +/-0.5
Epilobium coloratum	Purple-Leaf Willow-Herb	S2?	Yellow	69Km +/-0.1
Oenothera fruticosa ssp. glauca	Shrubby Sundrops	S2SE	Undetermined	54Km +/-10
Sanguinaria canadensis	Bloodroot	S3S4	Green	56Km +/-0
Polygala polygama	Racemed Milkwort	S1SE	Undetermined	65Km +/-1
Polygala sanguinea	Field Milkwort	S2S3	Yellow	28Km +/-5
Polygonum arifolium	Halberd-Leaf Tearthumb	S2	Yellow	97Km +/-0.1
Polygonum buxiforme	Small's Knotweed	S2S3SE	Undetermined	54Km +/-10
Polygonum pensylvanicum	Pennsylvania Smartweed	S3	Green	38Km +/-1
Polygonum scandens	Climbing False-Buckwheat	S2	Yellow	54Km +/-10
Rumex salicifolius var. mexicanus	Willow Dock	S2	Yellow	89Km +/-1
Plantago rugelii	Black-Seed Plantain	S1SE	Undetermined	54Km +/-10
Montia fontana	Fountain Miner's-Lettuce	S1	Red	66Km +/-1
Lysimachia thyrsiflora	Water Loosestrife	S3S4	Green	50Km +/-1
Primula mistassinica	Bird's-Eye Primrose	S2	Yellow	27Km +/-1
Pyrola asarifolia	Pink Wintergreen	S3	Green	26Km +/-50.1
Anemone canadensis	Canada Anemone	S2	Yellow	81Km +/-10
Anemone quinquefolia	Wood Anemone	S2	Yellow	28Km +/-0.1
Anemone virginiana	Virginia Anemone	S1S2	Yellow	54Km +/-10
Anemone virginiana var. alba	River Anemone	S1S2	Yellow	50Km +/-0.1
Anemone virginiana var. virginiana	River Anemone	S2	Yellow	46Km +/-10
Caltha palustris	Marsh Marigold	S2	Yellow	83Km +/-0.1
Hepatica nobilis var. obtusa	Round-Leaved Liverleaf	S1	Red	24Km +/-0.1
Ranunculus flammula var. flammula	Greater Creeping Spearwort	S2	Green	49Km +/-10
Ranunculus gmelinii	Small Yellow Water-Crowfoot	S3?	Green	56Km +/-0.5
Ranunculus pensylvanicus	Bristly Crowfoot	S1	Red	92Km +/-0
Ranunculus sceleratus	Cursed Crowfoot	S1S2	Red	61Km +/-0.5

2007 ACCDC Database Search for Uncommon to Rare Species Records within 100 km of Moose River Gold Mines

Binomial	Common Name	S-Rank	DNR Status	Nearest Observation
Rhamnus alnifolia	Alderleaf Buckthorn	S3	Yellow	36Km +/-1
Agrimonia gryposepala	Tall Hairy Groovebur	S3?		56Km +/-0
Crataegus robinsonii	A Hawthorn	S1?	Undetermined	52Km +/-5
Crataegus submollis	A Hawthorn	S1?	Undetermined	51Km +/-10
Galium boreale	Northern Bedstraw	S2	Red	90Km +/-1
Salix pedicellaris	Bog Willow	S2	Yellow	16Km +/-0.1
Salix petiolaris	Meadow Willow	S3	Green	26Km +/-0
Salix sericea	Silky Willow	S2	Yellow	51Km +/-1
Geocaulon lividum	Northern Comandra	S2S3	Yellow	35Km +/-0.1
Tiarella cordifolia	Heart-Leaved Foam-Flower	S2	Yellow	23Km +/-5
Gratiola neglecta	Clammy Hedge-Hyssop	S1	Yellow	32Km +/-0.1
Limosella australis	Mudwort	S2S3	Yellow	23Km +/-5
Lindernia dubia	Yellow-Seed False-Pimpernel	S3S4	Green	62Km +/-0
Dirca palustris	Eastern Leatherwood	S1	Red	43Km +/-1
Laportea canadensis	Wood Nettle	S3	Yellow	33Km +/-0.1
Pilea pumila	Canada Clearweed	S1	Red	40Km +/-0
Verbena hastata	Blue Vervain	S3	Green	40Km +/-0
Viola canadensis	Canada Violet	S1	Blue	49Km +/-10
Viola nephrophylla	Northern Bog Violet	S2	Yellow	18Km +/-1
Viola sagittata var. ovata	Arrow-Leaved Violet	S3S4	Green	85Km +/-0
Thuja occidentalis	Northern White Cedar	S1S2	Red	57Km +/-1
Alisma gramineum	Narrow-Leaf Water-Plantain	S1SE	Undetermined	70Km +/-5
Carex adusta	Crowded Sedge	S2S3	Yellow	32Km +/-10
Carex bebbii	Bebb's Sedge	S1S2	Red	87Km +/-5
Carex bromoides	Brome-Like Sedge	S3	Green	26Km +/-0.1
Carex castanea	Chestnut-Colored Sedge	S2	Red	82Km +/-0
Carex comosa	Bristly Sedge	S2	Yellow	61Km +/-0.1
Carex eburnea	Ebony Sedge	S3	Yellow	53Km +/-0.1
Carex foenea	Dry-Spike Sedge	S3?	Green	55Km +/-0
Carex garberi	Elk Sedge	S1	Red	50Km +/-0
Carex haydenii	Cloud Sedge	S1	Red	53Km +/-1
Carex hirtifolia	Pubescent Sedge	S2S3	Yellow	40Km +/-10
Carex houghtoniana	A Sedge	S2?	Yellow	38Km +/-5
Carex hystericina	Porcupine Sedge	S1S2	Red	93Km +/-1
Carex pellita	Woolly Sedge	S1	Red	14Km +/-10
Carex livida var. radicaulis	Livid Sedge	S1	Red	96Km +/-10
Carex lupulina	Hop Sedge	S3	G	26Km +/-0
Carex peckii	White-Tinged Sedge	S2?	Red	56Km +/-0.1
Carex pensylvanica	Pennsylvania Sedge	S1S2	Undetermined	49Km +/-0.1

2007 ACCDC Database Search for Uncommon to Rare Species Records within 100 km of Moose River Gold Mines

Binomial	Common Name	S-Rank	DNR Status	Nearest Observation
Carex plantaginea	Plantain-Leaved Sedge	S1	Red	52Km +/-0.1
Carex rosea	Rosy Sedge	S3	Green	51Km +/-0.5
Carex tenera	Slender Sedge	S1S2	Yellow	62Km +/-5
Carex tuckermanii	Tuckerman Sedge	S1	Red	70Km +/-0.1
Eleocharis nitida	Slender Spike-Rush	S3	Green	70Km +/-5
Eleocharis olivacea	Capitate Spikerush	S2	Yellow	95Km +/-0.1
Eleocharis ovata	Ovate Spikerush	S2?	Yellow	66Km +/-0.5
Eriophorum gracile	Slender Cotton-Grass	S2	Yellow	47Km +/-10
Scirpus pedicellatus	Stalked Bulrush	S1	Undetermined	40Km +/-1
Vallisneria americana	Eel-Grass	S2	Red	26Km +/-10
Iris prismatica	Slender Blue Flag	S1	Red	77Km +/-10
Sisyrinchium angustifolium	Pointed Blue-Eyed-Grass	S3S4	Green	65Km +/-0
Juncus greenei	Greene's Rush	S1S2	Red	65Km +/-10
Juncus marginatus	Grassleaf Rush	S2S3	Yellow	81Km +/-10
Juncus nodosus	Knotted Rush	S3S4	Green	62Km +/-0
Juncus subcaudatus	Woods-Rush	S3	Undetermined	14Km +/-10
Juncus dudleyi	Dudley's Rush	S2?	Yellow	51Km +/-1
Luzula parviflora	Small-Flowered Wood-Rush	S3	Green	90Km +/-0
Allium schoenoprasum var. sibiricum	Wild Chives	S2	Undetermined	54Km +/-10
Allium tricoccum	Small White Leek	S1	Red	56Km +/-0.1
Lilium canadense	Canada Lily	S2S3	Yellow	43Km +/-10
Trillium erectum	Ill-Scent Trillium	S3	Green	53Km +/-0.1
Najas gracillima	Thread-Like Naiad	S1S2	Undetermined	79Km +/-0.1
Coeloglossum viride var. virescens	Long-Bract Green Orchis	S2	Red	83Km +/-0.1
Corallorhiza trifida	Early Coralroot	S3	Green	50Km +/-0.5
Cypripedium arietinum	Ram's-Head Lady's-Slipper	S1	Red	84Km +/-5
Cypripedium parviflorum	Small Yellow Lady's-Slipper	S2S3	Yellow	79Km +/-5
Cypripedium parviflorum var. pubescens	Large Yellow Lady's-Slipper	S2	Yellow	63Km +/-10
Cypripedium parviflorum var. makasin	Small Yellow Lady's-Slipper	S2	Yellow	89Km +/-5
Cypripedium reginae	Showy Lady's-Slipper	S2	Red	17Km +/-5
Goodyera pubescens	Downy Rattlesnake-Plantain	S1	Red	35Km +/-1
Goodyera tesselata	Checkered Rattlesnake-Plantain	S3	Green	46Km +/-1
Liparis loeselii	Loesel's Twayblade	S3S4	Green	52Km +/-5
Listera australis	Southern Twayblade	S1	Red	50Km +/-0.1
Listera convallarioides	Broad-Leaved	S3	Green	83Km +/-0.1

2007 ACCDC Database Search for Uncommon to Rare Species Records within 100 km of Moose River Gold Mines

Binomial	Common Name	S-Rank	DNR Status	Nearest Observation
	Twayblade			
Platanthera flava	Southern Rein-Orchid	S2	Yellow	55Km +/-10
Platanthera flava var. herbiola	Pale Green Orchid	S1S2	Yellow	81Km +/-0
Platanthera grandiflora	Large Purple-Fringe Orchis	S3	Green	38Km +/-1
Platanthera hookeri	Hooker Orchis	S3	Green	89Km +/-1
Platanthera orbiculata	Large Roundleaf Orchid	S3	Yellow	54Km +/-10
Platanthera macrophylla	Large Round-Leaved Orchid	S2	Green	61Km +/-1
Spiranthes lucida	Shining Ladies'-Tresses	S2	Red	41Km +/-0.1
Spiranthes ochroleuca	Yellow Nodding Ladies'-Tresses	S2	Yellow	69Km +/-1
Spiranthes romanzoffiana	Hooded Ladies'-Tresses	S3S4	Green	51Km +/-5
Alopecurus aequalis	Short-Awn Foxtail	S2S3	Yellow	47Km +/-5
Dichanthelium acuminatum var. lindheimeri	Panic Grass	S1?	Green	70Km +/-0.1
Dichanthelium clandestinum	Deer-Tongue Witchgrass	S3	Yellow	34Km +/-0
Dichanthelium linearifolium	Slim-Leaf Witchgrass	S2?	Yellow	67Km +/-10
Elymus wiegandii	Wiegand's Wild Rye	S1	Red	56Km +/-0
Elymus hystrix var. bigeloviana	Bottlebrush Grass	S1	Red	55Km +/-1
Festuca subverticillata	Nodding Fescue	S1S2	Red	60Km +/-5
Milium effusum var. cisatlanticum	Tall Millet-Grass	S3	Green	56Km +/-0.5
Piptatherum canadense	Canada Mountain-Ricegrass	S2	Yellow	44Km +/-1
Panicum philadelphicum	Philadelphia Panic Grass	S2S3SE	Yellow	81Km +/-0
Poa glauca	White Bluegrass	S2S3	Yellow	81Km +/-1
Sphenopholis intermedia	Slender Wedge Grass	S3S4	Yellow	41Km +/-0
Trisetum spicatum	Narrow False Oats	S3	Green	62Km +/-0
Potamogeton confervoides	Algae-Like Pondweed	S3S4	Green	32Km +/-1
Potamogeton friesii	Fries' Pondweed	S2	Undetermined	50Km +/-1
Potamogeton nodosus	Longleaf Pondweed	S1	Undetermined	73Km +/-5
Potamogeton obtusifolius	Blunt-Leaf Pondweed	S2	Yellow	74Km +/-10
Potamogeton praelongus	White-Stem Pondweed	S3?	Undetermined	56Km +/-1
Potamogeton pulcher	Spotted Pondweed	S1	Undetermined	17Km +/-5
Potamogeton richardsonii	Redhead Grass	S3?	Undetermined	76Km +/-1

2007 ACCDC Database Search for Uncommon to Rare Species Records within 100 km of Moose River Gold Mines

Binomial	Common Name	S-Rank	DNR Status	Nearest Observation
Potamogeton zosteriformis	Flatstem Pondweed	S2S3	Yellow	11Km +/-10
Sparganium fluctuans	Floating Bur-Reed	S3?	Undetermined	63Km +/-0.5
Sparganium natans	Small Bur-Reed	S3	Green	19Km +/-1
Adiantum pedatum	Northern Maidenhair-Fern	S1	Red	53Km +/-1
Cryptogramma stelleri	Fragile Rockbrake	S1	Red	92Km +/-0
Asplenium trichomanes-ramosum	Green Spleenwort	S2	Yellow	89Km +/-10
Cystopteris bulbifera	Bulblet Fern	S3S4	Green	41Km +/-0.1
Cystopteris tenuis	A Bladderfern	S3?	Green	50Km +/-0
Dryopteris fragrans var. remotiuscula	Fragrant Fern	S2	Yellow	58Km +/-10
Polystichum braunii	Braun's Holly-Fern	S3S4	Green	70Km +/-1
Equisetum pratense	Meadow Horsetail	S2	Yellow	41Km +/-0
Equisetum scirpoides	Dwarf Scouring Rush	S3S4	Green	47Km +/-0
Equisetum variegatum	Variegated Horsetail	S3	Green	46Km +/-0.1
Isoetes acadiensis	Acadian Quillwort	S3	Yellow	79Km +/-1
Isoetes lacustris	Lake Quillwort	S3?	Green	72Km +/-0.5
Isoetes prototypus	Prototype Quillwort	S2	Red	85Km +/-0.1
Lycopodium complanatum	Trailing Clubmoss	S3?	Green	79Km +/-0
Lycopodium sabinifolium	Ground-Fir	S3?	Green	62Km +/-0.1
Lycopodium sitchense	Alaskan Clubmoss	S3?	Green	56Km +/-5
Lycopodium hickeyi	Hickey's Clubmoss	S2?	Green	53Km +/-1
Huperzia selago	Fir Clubmoss	S1S3	Undetermined	60Km +/-5
Lycopodiella appressa	Southern Bog Clubmoss	S3	Green	19Km +/-1
Botrychium dissectum	Cutleaf Grape-Fern	S3	Green	53Km +/-1
Botrychium lanceolatum var. angustisegmentum	Lance-Leaf Grape-Fern	S2	Yellow	70Km +/-1
Botrychium lunaria	Moonwort Grape-Fern	S1	Red	50Km +/-5
Botrychium simplex	Least Grape-Fern	S2S3	Yellow	36Km +/-0.1
Ophioglossum pusillum	Adder's Tongue	S2S3	Yellow	47Km +/-10
Polypodium appalachianum	Appalachian Polypody	S3?	Undetermined	47Km +/-0
Schizaea pusilla	Curly-Grass Fern	S3	Green	37Km +/-1

NOVA SCOTIA
Tourism, Culture and Heritage
Heritage Division

820933-D

1747 Summer Street
Halifax, Nova Scotia
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In Reply Please Quote Our File Number:

September 28, 2007

Beth Cameron
Conestoga-Rovers & Associates
31 Gloster Court
Dartmouth, NS B3B 1X9

Dear Ms. Cameron:

RE: Environmental Screening 07-0928b
Touquoy Gold Mine

Further to your request of September 28, 2007, staff of the Heritage Division have reviewed their files for reference to the presence of heritage resources in the study area. Please be aware that our information is not comprehensive, in that it is incomplete and of varying degrees of accuracy with respect to the precise location and condition of heritage resources.

It should be noted that the amount and degree of disturbance from previous developments could have a significant role in establishing the presence, absence or condition of heritage resources in this area. Also, because the map included both terrestrial and aquatic environs, both were addressed in this response.

Natural Heritage
The staff of the Nova Scotia Museum Collections Unit (Natural History) have reviewed their records and make the following observations:

Botany
Staff have reviewed the museum records for the area provided and offer the following list of species-at-risk that could be impacted by development at this site. The presence or absence of the following species should be determined prior to site disturbance and recorded in the site report. any field assessment should be conducted when the species can be positively identified.

Anemone quinquefolia Yellow
Arenaria groenlandica (*Minuartia g.*) Yellow
Betula michauxii Yellow
Bidens connata Yellow
Botrychium lunaria Red
Botrychium simplex Yellow
Carex hirtifolia Yellow
Caulophyllum thalictroides Red
Cypripedium reginae Red
Dirca palustris Red

Eleocharis olivacea Yellow
Elymus wiegandii Red
Empetrum eamesii Yellow
Epilobium strictum Yellow
Eriophorum gracile Yellow
Euthamia caroliniana Yellow
Fraxinus nigra Yellow
Geocaulon lividum Yellow
Hepatica americana Red
Hudsonia ericoides Yellow
Hypericum majus Red
Juncus greenei Red
Lilium canadense Yellow
Listera australis Red
Megalodonta beckii Yellow
Ophioglossum pusillum Yellow
Polygala sanguinea Yellow
Potamogeton zosteriformis Yellow
Rhamnus alnifolia Yellow
Rudbeckia laciniata Yellow
Salix candida Red
Salix sericea Yellow
Senecio pseudoarnica Yellow
Spiranthes ochroleuca Yellow
Stellaria longifolia Yellow
Tiarella cordifolia Yellow
Triosteum aurantiacum Yellow
Utricularia gibba Yellow
Viola nephophylla Yellow
Zizia aurea Yellow

The colour rank refers to the designation assigned under the NS Department of Natural Resources status review process.

I have attached an invoice for the staff time spent reviewing our records and compiling this response. If you have any questions, please contact me at 424-6475.

If you have any questions, please let me know.

Sincerely,

Robert Ogilvie
Manager, Special Places

Enclosure

WETLAND 1 REPORT

Wetland Delineation

Wetland 1 encompasses 3.57 ha and consists of low shrub bog and treed bog centered on 4980678 N, 506067 E. Its geographical boundaries are listed in Table 1. See Figure 1 for the location of this wetland on the Project site.

Table 1. Geographical Boundaries of Wetland 1 (NAD 83)

Boundary	Northing	Easting
North	4980819 N	506051 E
South	4980611 N	506044 E
East	4980829 N	505956 E
West	4980585 N	506044 E

During the field surveys on September 13, 2006 and June 13, 2007, all species of plant, bird, mammal, reptile and amphibian detected within the wetland were recorded. Evidence of wildlife species such as sightings, vocalizations, tracks, faeces, skeletal remains, and characteristic bite marks or dens was recorded.

Ecological Characterization

Plants

Wetland 1 is predominately a low shrub bog. It is characterized by a low layer of ericaceous shrubs (< 1m) consisting of leatherleaf (*Chamaedaphne calyculata*), lambkill (*Kalmia angustifolia*), pale laurel (*K. polifolia*), Labrador tea (*Ledum groenlandicum*), and rhodora (*Rhododendron canadense*) are also present. Ground vegetation consists of low-growing ericaceous plants such as small cranberry (*Vaccinium oxycoccos*) and black crowberry (*Empterum nigrum*), as well as sphagnum (*Sphagnum* spp.), goldthread (*Coptis trifolia*), and bog goldenrod (*Solidago uliginosa*), with a considerable patch of northern pitcher plant (*Sarracenia purpurea*) located in the northeast corner of the wetland.

At the eastern edge of the wetland, the low shrub bog grades into treed bog. This area is dominated by black spruce (*Picea mariana*), with scattered larch (*Larix laracina*) and immature red maple (*Acer rubrum*). The shrub layer consists of lambkill, possum-haw viburnum (*Viburnum nudum*), and rhodora. Ground vegetation consists of sphagnum, small cranberry and goldthread.

The Atlantic Canada Conservation Data Centre (ACCDC) database consists of records of uncommon to rare plant and animal species from the 1850s to the present. A review in 2007 for information or rare plants within 100 km of the project site yielded a list of five plants with habitat requirements similar to habitat present in the wetland. These are listed in Table 2. In addition, an environmental screening of all natural heritage resources in the area (within an approximate 10 km radius of the site) was compiled by the Nova Scotia Museum (NSM) in 2004, encompassing all their data from 1847 to 2004. As the Museum is a government department, not all of it its species records are available to the non-governmental ACCDC database. Thus the NSM screening generated a list of seven additional species known from the general area or from similar habitats. Of these, two species had potential to occur in habitats present in Wetland 1 (Table 2). None of the species listed by the ACCDC or the NSM are listed as rare or endangered under the Nova Scotia Endangered Species Act (NSESA) or Committee on the Status of Endangered Wildlife in Canada/*Species at Risk Act* (COSEWIC/SARA).

Table 2. Phenology and Habitat Preferences of Rare Vascular Plants Reported within 100 km (ACCDC search) or 10 km (NSM screening) of Wetland 1

Species	Common Name	NSDNR Status	Bloom Period	Preferred Habitat	Record Source
Coeloglossum viride	Long-bract green orchis	Yellow	May-August	Boggy spots, damp mature (sugar maple) woods, fir or floodplain forest	ACCDC
Listera australis	Southern twayblade	Red	June	Sphagnum bog	ACCDC
Plotanthera flava	Southern rein orchid	Yellow	May-August	Sandy gravelly beach, wet peat, lake edge, bog	ACCDC
Salix pedicellaris	Bog willow	Yellow	Late May-Early June	Sphagnous lakeshores, acid bogs	ACCDC
Utricularia gibba	Humped bladderwort	Yellow	Late June-Sept	Shallow lake edge, small pool, pond in peaty area	ACCDC
Betula michauxii	Michaux's dwarf birch	Yellow	June and July	Peat and sphagnous bogs	NSM
Viola nephrophylla	Northern bog violet	Yellow	May to July	Cool mossy bogs, borders of streams, and damp woods	NSM

None of these plants were observed in the wetland on the survey on September 13, 2006.

Birds

During the field surveys for Wetland 1 on September 13 2006 and June 13 2007, no bird species were observed within the wetland. A breeding bird survey conducted in the area encompassing the wetland was conducted in June 2007. One yellow-listed species, Canada Warbler (*Wilsonia canadensis*), was detected during this survey. Three other yellow-listed species were detected during other field surveys in the area encompassing the wetland. These were Common Loon (*Gavia immer*), Common Nighthawk (*Chordeiles minor*), and Barn Swallow (*Hirundo rustica*). These birds were observed or heard in the vicinity of the wetland, not in it. Canada warblers nest in cool wooded areas, while Common loons nest on lakeshores. Common Nighthawks breed in a wide variety of habitats, including urban areas, as do Barn Swallows, which tend to nest around buildings or under bridges. None of these species would be expected to utilize habitats present in this wetland. Removal of this wetland will not have a significant effect on the Provincial populations of any of these species.

A desktop review of bird species known to breed in the area where the wetland is located was conducted using the Atlas of Breeding Birds of the Maritime Provinces (Erskine 1990). A list of the status of each breeding bird species recorded from the 10 x 10 km atlas square containing Wetland 1 is provided in Table 3.

Table 3. Breeding Status of Birds Listed in the Atlas Square in Which Wetland 1 is Located

Common Name	Species Name	Breeding Status in Atlas Square
Common Loon	*Gavia immer*	Possible
Canada Goose	*Branta canadensis*	Probable
American Black Duck	*Anas rubripes*	Probable
Ring-Necked Duck	*Aythya collaris*	Confirmed
Common Merganser	*Mergus merganser*	Confirmed
Sharp-Shinned Hawk	*Accipiter striatus*	Possible
Broad-Winged Hawk	*Buteo platypterus*	Probable
American Kestrel	*Falco sparverius*	Possible
Common Nighthawk	*Chordeiles minor*	Confirmed
Chimney Swift	*Chaetura pelagica*	Possible
Belted Kingfisher	*Ceryle alcyon*	Possible
Hairy Woodpecker	*Picoides villosus*	Confirmed
Northern Flicker	*Colaptes auratus*	Confirmed
Pileated Woodpecker	*Dryocopus pileatus*	Possible
Olive-sided Flycatcher	*Contopus borealis*	Possible
Eastern Wood-pewee	*Contopus virens*	Possible
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Confirmed
Alder Flycatcher	*Empidonax alnorum*	Possible
Least Flycatcher	*Empidonax minimus*	Probable
Tree Swallow	*Tachycineta bicolor*	Confirmed

Table 3. Breeding Status of Birds Listed in the Atlas Square in Which Wetland 1 is Located		
Common Name	**Species Name**	**Breeding Status in Atlas Square**
Barn Swallow	*Hirundo rustica*	Confirmed
Gray Jay	*Perisoreus canadensis*	Confirmed
Blue Jay	*Cyanocitta cristata*	Possible
American Crow	*Corvus brachyrhynchos*	Confirmed
Common Raven	*Corvus corax*	Possible
Black-capped Chickadee	*Poecile atricapillus*	Confirmed
Boreal Chickadee	*Poecile hudsonicus*	Confirmed
Red-breasted Nuthatch	*Sitta Canadensis*	Confirmed
Winter Wren	*Troglodytes troglodytes*	Confirmed
Golden-crowned Kinglet	*Regulus satrapa*	Confirmed
Ruby-crowned Kinglet	*Regulus calendula*	Confirmed
Swainson's Thrush	*Catharus ustulatus*	Confirmed
Hermit Thrush	*Catharus guttatus*	Confirmed
American Robin	*Turdus migratorius*	Confirmed
Cedar Waxwing	*Bombycilla cedrorum*	Probable
Blue-headed Vireo	*Vireo solitarius*	Confirmed
Red-eyed Vireo	*Vireo olivaceus*	Probable
Tennessee Warbler	*Vermivora peregrine*	Possible
Nashville Warbler	*Vermivora ruficappilla*	Confirmed
Northern Parula Warbler	*Parula americana*	Confirmed
Chestnut-sided Warbler	*Dendroica pensylvanica*	Confirmed
Magnolia Warbler	*Dendroica magnolia*	Confirmed
Black-throated Blue Warbler	*Dendroica caerulescens*	Possible
Yellow-Rumped Warbler	*Dendroica coronata*	Confirmed
Black-throated Green Warbler	*Dendroica virens*	Confirmed
Blackburnian Warbler	*Dendroica fusca*	Confirmed
Palm Warbler	*Dendroica palmarum*	Confirmed
Bay-breasted Warbler	*Dendroica castanea*	Confirmed
Black-and-white Warbler	*Mniotilta varia*	Confirmed
American Redstart	*Setophaga ruticilla*	Confirmed
Ovenbird	*Seiurus aurocapillus*	Confirmed
Mourning Warbler	*Oporinis philadelphia*	Confirmed
Common Yellowthroat	*Geothlypis trichas*	Confirmed
Canada Warbler	*Wilsonia canadensis*	Confirmed
Song Sparrow	*Melospiza melodia*	Confirmed
Lincoln's Sparrow	*Melospiza lincolnii*	Confirmed
Swamp Sparrow	*Melospiza georgiana*	Confirmed
White-throated Sparrow	*Zonotrichia albicollis*	Confirmed
Dark-eyed Junco	*Junco hyemalis*	Confirmed
Red-winged Blackbird	*Agelaius phoeniceus*	Possible
Rusty Blackbird	*Euphagus carolinus*	Confirmed
Common Grackle	*Quiscalus quiscula*	Confirmed
Pine Grosbeak	*Pinicola enucleator*	Probable

Table 3. Breeding Status of Birds Listed in the Atlas Square in Which Wetland 1 is Located		
Common Name	**Species Name**	**Breeding Status in Atlas Square**
Purple Finch	*Carpodacus purpureus*	Possible
White Winged Crossbill	*Loxia leucoptera*	Probable
Pine Siskin	*Carduelis pinus*	Possible
American Goldfinch	*Carduelis tristis*	Possible
Evening Grosbeak	*Coccothraustes vespertinus*	Probable

None of these bird species were observed in Wetland 1 during the field surveys. Wetland 1 is not considered to be critical breeding habits for any of these species.

A review of the ACCDC database of rare species records revealed fourteen at–risk species reported in the region. Three red-listed and eleven yellow-listed bird species were listed within 100 km by the ACCDC search. Each species' habitat preference was determined based on Erksine's 1990 data, and the likelihood of their presence on site was determined based on comparison of known habitat preferences with habitats present in the wetland. A summary of the rare bird species, their provincial status and their habitat preferences is provided in Table 4.

Table 4. Habitat Preferences of Listed Bird Species Reported within 100 km of Wetland 1			
NSDNR Status	**Common Name**	**Binomial**	**Habitat Preference**
Red	Roseate Tern	*Sterna dougallii*	Coast
Red	Peregrine Falcon	*Falco peregrinus*	Rocky cliffs
Red	Piping Plover	*Charadrius melodus*	Sandy Beaches
Yellow	Common Tern	*Sterna hirundo*	Coast
Yellow	Arctic Tern	*Sterna paradisea*	Coast
Yellow	Barrow's Goldeneye	*Bucephala islandica*	Small clear lakes and ponds
Yellow	Northern Goshawk	*Accipiter gentiles*	Mature woods
Yellow	Semipalmated Sandpiper	*Calidris pusilla*	Beaches, mudflats, shallow estuaries, and inlets.
Yellow	Eastern Meadowlark	*Sturnella magna*	Grassy fields, pastures, cultivated areas
Yellow	Razorbill	*Alca torda*	Coastal islands
Yellow	Eastern Bluebird	*Sialia sialis*	Areas with scattered trees and short ground cover.
Yellow	Vesper Sparrow	*Poecetes gramineus*	Areas with short grass or low shrubs
Yellow	Sharp-tailed Sparrow	*Ammodramus caudacutus*	Breed in meadows adjacent to salt marshes
Yellow	Bobolink	*Dolichonyx Oryzivorus*	Grasslands

Arctic Terns, Common Terns, and Razorbills are coastal species, and so should not be present in Wetland 1. Sharp-tailed Sparrows breed in meadows adjacent to salt marshes. Vesper Sparrows are characteristic of areas with short grass or low shrubs, such as sandy pastures, blueberry fields, and clearings. Goshawks prefer heavily wooded areas, and prefer to breed in mature mixed wood. Eastern Bluebirds (*Sialis sialis*) nest in clear-cut areas, which are adjacent to the wetland, and in woodpecker cavities. Eastern Meadowlarks and Bobolinks are grassland/meadow species. Semipalmated Sandpipers and Barrow's Goldeneyes inhabit areas near large bodies of water. None of these three red-listed species or the eleven yellow-listed bird species is expected to be present in the Wetland 1 or to use Wetland 1 due to the lack of suitable habitat (Table 4). None of the birds listed in the ACCDC search were observed during the wetland survey and the area is not critical habitat for any of these species. The environmental screening conducted by the NSM found no records of rare or endangered birds on the Project site.

Mammals

Evidence of varying (snowshoe) hare (*Lepas americana*) and white-tailed deer (*Odocoileus virginianus*) was noted in Wetland 1 during the Sept 13 2006 and June 13 2007 wetland surveys.

Four uncommon to rare mammals were listed in the ACCDC 100 km database search. Two species of rare bat, the hoary bat, (*Lasiurus cinereus*), and the eastern pipistrelle (*Pipstrellus subflavus*), were reported within 100 km; however, bats are not expected to make use of any habitat in this wetland. The eastern moose (*Alces alces americana*) is listed as endangered in Nova Scotia and was listed on the ACCDC database search for this area. The low density of moose in the area, and the tiny size of Wetland 1 results in the removal of this wetland having very low potential to affect moose. A Moose Mitigation Plan has been developed for the Touquoy Gold Project.

The fourth rare mammal listed by the ACCDC request is the long-tailed shrew (*Sorex dispar*), which lives only on talus slopes, thus they would be not be expected to occur within this wetland. The environmental screening conducted by the NSM found no records of rare or endangered mammals on the Project site.

Reptiles and Amphibians

No reptiles or amphibians were observed during the wetland survey. The ACCDC request and the environmental screening conducted by the NSM both noted the presence of wood turtles and four-toed salamanders within 100 km of the site. Wood turtles (*Glyptemys insculpta*) are listed as yellow by NSDNR. There is no hibernating or breeding habitat for turtles in this wetland, as they require deep sections of rivers in which to hibernate, and sandy or gravelly

banks for nesting. Four-toed salamanders (*Hemidactylium scutatum*) were previously yellow-listed by NSDNR; however, their status has been recently changed to green, indicating they are not considered to be sensitive or at-risk in Nova Scotia. The dry nature of Wetland 1 in summer makes the possibility of four-toed salamanders breeding in this wetland unlikely. There is no suitable habitat for any rare or endangered reptiles or amphibians in Wetland 1.

Odonates

The ACCDC search reported several rare odonates within a 100 km radius of Wetland 1. Most odonates (dragonflies and damselflies) lay their eggs in bodies of water, where they hatch and develop through several larval stages before emerging from the water and metamorphosing into the adult form. In most species, this larval stage lasts for about one year. The fact that Wetland 1 is a low shrub bog which contains no standing water in late summer indicates that most odonate species would be unable to complete larval development in this bog. As see in Table 5, most rare odonates listed in the ACCDC 100 km search inhabit areas near streams or rivers. Two species present in Nova Scotia, the ebony boghaunter (*Williamsonia fletcheri*) and the harlequin darner (*Gomphhaeschna furcillata*) are known to breed in sphagnum bogs (Table 4).

The ebony boghaunter is red-listed by NSDNR, and was reported once in the ACCDC 100 km search, from a location 95 km away. No ebony boghaunters were observed in Wetland 1 during the survey on September 13, 2004, however, they are an early-flying species (June) and adults would not be expected to be present at this time. The harlequin darner is a yellow-listed species for which there were two records in the ACCDC 100 km list. The closest record was 60 km from Wetland 1. No harlequin darners were observed in Wetland 1 during the survey on September 13, 2004, however, they are also an early-flying species (early June) and adults would not be expected to be present at this time. In addition, the dry nature of Wetland 1 in summer indicates this wetland is not suitable breeding habitat for these species, which require bogs containing standing water. None of these species were detected during wetland surveys in 2007.

Table 5. Rare Odonates Reported Within 100 km of Wetland 1

Scientific Name	Common Name	Status	Preferred Habitat
Ophiogomphus rupinsulensis	Rusty Snaketail	RED	Large clear flowing streams and rivers
Gomphus ventricosus	Skillet Clubtail	RED	Slow-moving rivers
Coenagrion resolutum	Taiga Bluet	RED	Small ponds with grassy or marshy borders, often shaded
Ophiogomphus mainensis	Twinhorned Snaketail	RED	Streams and small rivers
Williamsonia fletcheri	Ebony Boghaunter	RED	Small pools in sphagnum bogs
Gomphaeschna furcillata	Harlequin Darner	YELLOW	Sphagnum bogs and wooded swamps
Lanthus parvulus	Zorro Clubtail	YELLOW	Mountain streams with muddy substrate

Hydrological Characterization

There is no surface connection between this wetland and any surface watercourses or lakes in the immediate area, based on 1:10,000 topographical mapping, air photography, and field surveys. As a bog, this wetland is not expected to receive surface runoff and thus, its role in surface flow regulation is expected to be minimal. It has no role as a supply for local surface watercourse flow.

Hydrogeological Characterization

This wetland lies in an area with a thin layer of coarse till overlying the bedrock. The bedrock consists of quartzite and slate, and thus is relatively impermeable. The till tends to be coarse-grained and thus the layer is hydrologically conductive. The groundwater level is very shallow (likely < 2m) in this area. General movement of groundwater is from north to south over the project site, mirroring surface water patterns. Bogs are not fed by groundwater discharge. There are no seeps or springs visible.

Peat Characterization

Peat in this wetland was determined based on visual examination, and the presence of live *Sphagnum* mosses to be sphagnum peat. Peat thickness was measured at 15 locations in this wetland at 0 m (surface sample), 0.75 m (mid-depth sample and 1.5 m or the bottom of the peat layer (deep sample). Where peat was less than ~0.5 m thick, a mid-depth measurement was not conducted. The peat layer (with live *Sphagnum* layer included) averaged 1.27 m in depth, and ranged from 0.33 m to over 4.57 m in depth. Average peat thickness was 1.27 m. The van Post scale of peat humification ranks peat according to the level of decomposition, with H1 being undecomposed Sphagnum and H10 being fully decomposed, amorphous material. Humification of peat at the surface (just under the thin surface layer of live *Sphagnum*) ranged from H2 to H6, with most samples being H4 or H5. Mid-depth samples ranged from H4 to H8, with H6 being average. Deep samples were all in the H8 to H10 range.

Reason for the Alteration

The wetland in question will be removed due to the construction of a tailings pond for an adjacent open-pit gold mine being constructed on the site.

Nature of the Proposed Alteration

The wetland will be entirely removed.

Alternatives That Have Been Considered

Alternative positions for the tailings management facility have been considered, however, positions either to the east or west of the proposed location would have significant impacts on Moose River or Fish River with their sensitive fish habitat, and would impact additional wetlands. Moving the tailings management facility north could result in impacts to Square Lake, while moving it south might impact Scraggy Lake, which is considered significant habitat for brook trout, Atlantic salmon, and gaspereau by NSDNR. The project boundary has already been adjusted to avoid the wetland complex located southeast of the Project site, and to avoid impacting Moose River.

Gold mining can be undertaken by either underground or open pit methods. In this particular instance the gold is relatively uniformly distributed, and at relatively low grades, throughout the local rock mass to the extent that large scale, high volume throughput from an open pit is commercially viable. Concentrations of gold of sufficient grade, continuity or predictability in quartz veins or other specific sites at Touquoy to support a commercial underground operation are not present. Commercial underground gold mining at Touquoy is not an option. There are no options for re-positioning of the open pit – the site of concentration of gold is fixed in nature.

Identifiable Impacts to Wetland

Wetland 1 will be entirely removed by the mine project. There are no species at risk or species of conservation concern known to be present in this wetland.

No aquatic habitats or fish species are present, as the wetland is a low shrub bog which is dry during late summer months.

Past Impacts to the Wetland

Possible past impacts to the wetland may have arisen from forestry clear-cutting activities that have occurred in the area, which may have impacted drainage patterns to some extent. Aerial photography of the site dating from 1964, 1974, 1982, 1993, and 2003 was reviewed to provide information on historical forestry activities in the area.

Clearing occurred less than 1 km to the north of Wetland 1 prior to 1992. Extensive clearing, as well as the creation of logging roads, occurred less than 1 km south of the wetland during the period between 1992 and 2003.

Mitigation

The project footprint has been adjusted so as to minimize impacts to wetlands and watercourses in the area. DDV Gold Limited (DDVG) will work with NSDNR to develop the required mitigation measures including wetland compensation at a ratio agreed upon with NSDNR.

DDVG is considering various approaches to the wetland compensation issue. The first approach, preferred by NSDNR, is to create wetland habitat within the same watershed as the wetland which is to be altered. DDVG is considering creating wetland habitat onsite once mine operations are completed by ensuring that the flooded quarry pit has sufficiently shallow edges to support a marsh-type wetland. If this is not possible, the proponent will consider a wetland enhancement or creation project outside of the local watershed. Contribution to wetland education and/or protection programs may also be considered.

Summary

In summary, assuming that the proposed mitigation measures are applied, and that existing site drainage conditions are maintained, the Touquoy Gold Project is not likely to have significant effects on wetland functional attributes in the area. Removal of this wetland is not expected to have negative impacts on any rare or endangered species in the area, as known have been found in this wetland.

Evaluation Expertise

Conestoga-Rovers & Associates is a multi-disciplinary engineering, environmental consulting, construction, and information technology (IT) services firm. Since its inception in 1976, CRA has provided practical, innovative, and effective services in the areas of environmental site assessment, impact assessment, environmental remediation, regulatory compliance and permitting, risk assessment, hydrology, solid and hazardous waste management, air quality management, and municipal infrastructure planning and design. We are an established, reputable company with a strong history of solving engineering and environmental challenges in a responsive and cost-efficient manner.

The CRA Family of Companies employs more than 2,600 professional and support staff in over 70 offices located throughout North America, with additional offices in Brazil and England. Our headquarter office is located in Waterloo, Ontario, Canada.

Beth Cameron, B.Sc. M.Sc., is a Terrestrial Ecologist with Conestoga-Rover & Associates' Halifax office. She has significant experience conducting surveys for flora and fauna, as well as wetland surveys, and has worked on federal and provincial environmental screenings involving wetland alterations. She has also completed a Wetland Delineation and Classification course on the US Army Corps of Engineers wetland delineation protocol and has also taken a course on identifying grasses, sedges, and rushes.

Jeffrey Balsdon, B.Sc., M.Sc. (Candidate), is a Terrestrial Ecologist with Conestoga-Rover & Associates' Halifax office. He has considerable experience conducting surveys for flora and

fauna, as well as wetland surveys. He has also completed a course on identifying grasses, sedges, and rushes.

Kristen Nyborg is an Environmental Technologist with Conestoga-Rover & Associates' Halifax office. She holds an Ontario Wetland Evaluation System Certificate, and has significant wetland field experience. She has also completed a Wetland Delineation and Classification course on the US Army Corps of Engineers wetland delineation protocol.

Susan Belford, B.Sc., M.Sc., is a Senior Project Manager with Conestoga-Rovers & Associates' Halifax office. She is very familiar with wetland legislation, having worked on many environmental assessment projects involving provincial and federal regulations and processes.

Dave Strajt, M. Eng., is a Water Resources Engineer/Hydrologist with Conestoga-Rovers & Associates' Halifax office. He is very familiar with surface water processes as they relate to mining process.

Peter Oram, CESA, P.Geo. is a Geologist with Conestoga-Rovers & Associates' Halifax office. He has assisted with ten wetland alteration permits, providing hydrogeological advice. He is very familiar with wetland legislation, having worked on many environmental assessment projects involving provincial and federal legislative processes.

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WETLAND 2 REPORT

Wetland Delineation

Wetland 2 is a small 0.44 ha wetland complex consisting of treed bog and two areas of low shrub bog. The two areas of low shrub bog are connected by a band of treed bog, as seen in Figure 1. Wetland 2 is centered on 4980867 N, 506474 E and its geographical boundaries are listed in Table 1. See Figure 1 for the location of this wetland on the Project site.

Table 1. Geographical Boundaries of Wetland 2 (NAD 83)

Boundary	Northing	Easting
North	4980885 N	506498 E
South	4980842 N	506492 E
East	4980878 N	506412 E
West	4980835 N	506546 E

During the field surveys on September 14, 2006 and June 13, 2007 all species of plant, bird, mammal, reptile and amphibian detected within the wetland were recorded. Evidence of wildlife species such as sightings, vocalizations, tracks, faeces, skeletal remains, and characteristic bite marks or dens was recorded.

Ecological Characterization

Plants

The treed bog supports a plant community dominated by black spruce, *Picea mariana* and larch, *Larix laracina*, with a few scattered Red maple, *Acer rubrum*. Shrubs consist of possum-haw viburnum (*Viburnum nudum)* and black holly (*Ilex verticillata)*, while ground vegetation consists of dwarf dogwood (*Cornus sanadensis)*, bristly dewberry (*Rubus hispidus),* and violets *(Viola* spp).

The low shrub bog areas are characterized by a low layer of ericaceous shrubs (< 1m) consisting of leatherleaf (*Chamaedaphne calyculata)*, lambkill (*Kalmia angustifolia)*, and Labrador tea (*Ledum groenlandicum)*, while the ground vegetation consists of sphagnum mosses (*Sphagnum* spp.), reindeer lichens (*Cladonia* spp.), small cranberry (*Vaccinium oxycoccos)*, tawny cottongrass (*Eriophorum virginicum*), three-leaved false Solomon's seal (*Smilacina trifolia)*, bog goldenrod (*Solidago uliginosa)*, and round-leaved sundew (*Drosera rotundifolia).*

The Atlantic Canada Conservation Data Centre (ACCDC) database consist of records of uncommon to rare plant and animal species from the 1850s to the present. A review in 2007 for

information or rare plants within 100 km of the project site yielded a list of five plants with habitat requirements similar to habitat present in the wetland. These are listed in Table 2. In addition, an environmental screening of all natural heritage resources in the area (within an approximate 10 km radius of the site) was compiled by the Nova Scotia Museum (NSM) in 2004, encompassing all their data from 1847 to 2004. As the Museum is a government department, not all of it its species records are available to the non-governmental ACCDC database. Thus the NSM screening generated a list of seven additional species known from the general area or from similar habitats. Of these, two species had potential to occur in habitats present in Wetland 2 (Table 2). None of the species listed by the ACCDC or the NSM are listed as rare or endangered under the *Nova Scotia Endangered Species Act* (NSESA) or Committee On the Status of Endangered Wildlife in Canada/ *Species at Risk Act* (COSEWIC/SARA).

Table 2. Phenology and Habitat Preferences of Rare Vascular Plants Reported Within 100 km (ACCDC search) or 10 km (NSM screening) of Wetland 2

Species	Common Name	NSDNR Status	Bloom Period	Preferred Habitat	Record Source
Coeloglossum viride	Long-bract green orchis	Yellow	May-August	Boggy spots, damp mature (sugar maple) woods, fir or floodplain forest	ACCDC
Listera australis	Southern twayblade	Red	June	Sphagnum bog	ACCDC
Plotanthera flava	Southern rein orchid	Yellow	May-August	Sandy gravelly beach, wet peat, lake edge, bog	ACCDC
Salix pedicellaris	Bog willow	Yellow	Late May-Early June	Sphagnous lakeshore, acid bog	ACCDC
Utricularia gibba	Humped bladderwort	Yellow	Late June-Sept	Shallow lake edge, small pool, pond in peaty area	ACCDC
Betula michauxii	Michaux's dwarf birch	Yellow	June and July	Peat and sphagnous bogs	NSM
Viola nephrophylla	Northern bog violet	Yellow	May to July	Cool mossy bogs, borders of streams, and damp woods	NSM

None of these plants were observed in the wetland during the surveys on September 14, 2006 and June 13, 2007.

Birds

During the field surveys for Wetland 2 on September 14, 2006 and June 13, 2007, no bird species were observed within the wetland. A breeding bird survey conducted in the area encompassing the wetland was conducted in June 2007. One yellow-listed species, Canada Warbler (*Wilsonia canadensis*), was detected during this survey. Three other yellow-listed species were detected during other field surveys in the area encompassing the wetland. These were Common Loon (*Gavia immer)*, Common Nighthawk (*Chordeiles minor)*, and Barn Swallow (*Hirundo rustica)*. These birds were observed or heard in the vicinity of the wetland, not in it. Canada warblers nest in cool wooded areas, while Common loons nest on lakeshores. Common Nighthawks breed in a wide variety of habitats, including urban areas, as do Barn Swallows, which tend to nest around buildings or under bridges. None of these species would be expected to utilize habitats present in this wetland. Removal of this wetland will not have a significant effect on the Provincial populations of any of these species.

A desktop review of bird species known to breed in the area where the wetland is located was conducted using the Atlas of Breeding Birds of the Maritime Provinces (Erskine 1990). A list of the status of each breeding bird species recorded from the 10 x 10 km atlas square containing Wetland 2 is provided in Table 3.

Table 3. Breeding Status of Birds Listed in the Atlas Square in Which Wetland 2 is Located

Common Name	Species Name	Breeding Status in Atlas Square
Common Loon	*Gavia immer*	Possible
Canada Goose	*Branta canadensis*	Probable
American Black Duck	*Anas rubripes*	Probable
Ring-Necked Duck	*Aythya collaris*	Confirmed
Common Merganser	*Mergus merganser*	Confirmed
Sharp-Shinned Hawk	*Accipiter striatus*	Possible
Broad-Winged Hawk	*Buteo platypterus*	Probable
American Kestrel	*Falco sparverius*	Possible
Common Nighthawk	*Chordeiles minor*	Confirmed
Chimney Swift	*Chaetura pelagica*	Possible
Belted Kingfisher	*Ceryle alcyon*	Possible

Table 3. Breeding Status of Birds Listed in the Atlas Square in Which Wetland 2 is Located		
Common Name	**Species Name**	**Breeding Status in Atlas Square**
Hairy Woodpecker	*Picoides villosus*	Confirmed
Northern Flicker	*Colaptes auratus*	Confirmed
Pileated Woodpecker	*Dryocopus pileatus*	Possible
Olive-sided Flycatcher	*Contopus borealis*	Possible
Eastern Wood-pewee	*Contopus virens*	Possible
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Confirmed
Alder Flycatcher	*Empidonax alnorum*	Possible
Least Flycatcher	*Empidonax minimus*	Probable
Tree Swallow	*Tachycineta bicolor*	Confirmed
Barn Swallow	*Hirundo rustica*	Confirmed
Gray Jay	*Perisoreus canadensis*	Confirmed
Blue Jay	*Cyanocitta cristata*	Possible
American Crow	*Corvus brachyrhynchos*	Confirmed
Common Raven	*Corvus corax*	Possible
Black-capped Chickadee	*Poecile atricapillus*	Confirmed
Boreal Chickadee	*Poecile hudsonicus*	Confirmed
Red-breasted Nuthatch	*Sitta Canadensis*	Confirmed
Winter Wren	*Troglodytes troglodytes*	Confirmed
Golden-crowned Kinglet	*Regulus satrapa*	Confirmed
Ruby-crowned Kinglet	*Regulus calendula*	Confirmed
Swainson's Thrush	*Catharus ustulatus*	Confirmed
Hermit Thrush	*Catharus guttatus*	Confirmed
American Robin	*Turdus migratorius*	Confirmed
Cedar Waxwing	*Bombycilla cedrorum*	Probable
Blue-headed Vireo	*Vireo solitarius*	Confirmed
Red-eyed Vireo	*Vireo olivaceus*	Probable

Table 3. Breeding Status of Birds Listed in the Atlas Square in Which Wetland 2 is Located		
Common Name	**Species Name**	**Breeding Status in Atlas Square**
Tennessee Warbler	*Vermivora peregrine*	Possible
Nashville Warbler	*Vermivora ruficappilla*	Confirmed
Northern Parula Warbler	*Parula americana*	Confirmed
Chestnut-sided Warbler	*Dendroica pensylvanica*	Confirmed
Magnolia Warbler	*Dendroica magnolia*	Confirmed
Black-throated Blue Warbler	*Dendroica caerulescens*	Possible
Yellow-Rumped Warbler	*Dendroica coronata*	Confirmed
Black-throated Green Warbler	*Dendroica virens*	Confirmed
Blackburnian Warbler	*Dendroica fusca*	Confirmed
Palm Warbler	*Dendroica palmarum*	Confirmed
Bay-breasted Warbler	*Dendroica castanea*	Confirmed
Black-and-white Warbler	*Mniotilta varia*	Confirmed
American Redstart	*Setophaga ruticilla*	Confirmed
Ovenbird	*Seiurus aurocapillus*	Confirmed
Mourning Warbler	*Oporinis philadelphia*	Confirmed
Common Yellowthroat	*Geothlypis trichas*	Confirmed
Canada Warbler	*Wilsonia canadensis*	Confirmed
Song Sparrow	*Melospiza melodia*	Confirmed
Lincoln's Sparrow	*Melospiza lincolnii*	Confirmed
Swamp Sparrow	*Melospiza georgiana*	Confirmed
White-throated Sparrow	*Zonotrichia albicollis*	Confirmed
Dark-eyed Junco	*Junco hyemalis*	Confirmed
Red-winged Blackbird	*Agelaius phoeniceus*	Possible
Rusty Blackbird	*Euphagus carolinus*	Confirmed
Common Grackle	*Quiscalus quiscula*	Confirmed
Pine Grosbeak	*Pinicola enucleator*	Probable

Table 3. Breeding Status of Birds Listed in the Atlas Square in Which Wetland 2 is Located		
Common Name	**Species Name**	**Breeding Status in Atlas Square**
Purple Finch	*Carpodacus purpureus*	Possible
White Winged Crossbill	*Loxia leucoptera*	Probable
Pine Siskin	*Carduelis pinus*	Possible
American Goldfinch	*Carduelis tristis*	Possible
Evening Grosbeak	*Coccothraustes vespertinus*	Probable

None of these bird species were observed in Wetland 2 during the field surveys. Wetland 2 is not considered to be critical breeding habits for any of these species.

A review of the ACCDC database of rare species records revealed fourteen at–risk species reported in the region. Three red-listed and eleven yellow-listed bird species were listed within 100 km by the ACCDC search. Each species' habitat preference was determined based on Erksine's 1990 data, and the likelihood of their presence on site was determined based on comparison of known habitat preferences with habitats present in the wetland. A summary of the rare bird species, their provincial status and their habitat preferences is provided in Table 4.

Table 4. Habitat Preferences of Listed Bird Species Reported Within 100 km of Wetland 2			
NSDNR Status	**Common Name**	**Binomial**	**Habitat Preference**
Red	Roseate Tern	*Sterna dougallii*	Coast
Red	Peregrine Falcon	*Falco peregrinus*	Rocky cliffs
Red	Piping Plover	*Charadrius melodus*	Sandy Beaches
Yellow	Common Tern	*Sterna hirundo*	Coast
Yellow	Arctic Tern	*Sterna paradisea*	Coast
Yellow	Barrow's Goldeneye	*Bucephala islandica*	Small clear lakes and ponds
Yellow	Northern Goshawk	*Accipiter gentiles*	Mature woods

Table 4. Habitat Preferences of Listed Bird Species Reported Within 100 km of Wetland 2			
NSDNR Status	**Common Name**	**Binomial**	**Habitat Preference**
Yellow	Semipalmated Sandpiper	*Calidris pusilla*	Beaches, mudflats, shallow estuaries, and inlets.
Yellow	Eastern Meadowlark	*Sturnella magna*	Grassy fields, pastures, cultivated areas
Yellow	Razorbill	*Alca torda*	Coastal islands
Yellow	Eastern Bluebird	*Sialia sialis*	Areas with scattered trees and short ground cover.
Yellow	Vesper Sparrow	*Poecetes gramineus*	Areas with short grass or low shrubs
Yellow	Sharp-tailed Sparrow	*Ammodramus caudacutus*	Breed in meadows adjacent to salt marshes
Yellow	Bobolink	*Dolichonyx oryzivorus*	Grasslands

Arctic Terns, Common Terns, and Razorbills are coastal species, and so should not be present in Wetland 2. Sharp-tailed Sparrows breed in meadows adjacent to salt marshes. Vesper Sparrows are characteristic of areas with short grass or low shrubs, such as sandy pastures, blueberry fields, and clearings. Goshawks prefer heavily wooded areas, and prefer to breed in mature mixed woods. Eastern Bluebirds, (*Sialis sialis*) nest in clear-cut areas, which are adjacent to the wetland, and in woodpecker cavities. Eastern Meadowlarks and Bobolinks are grassland/meadow species. Semipalmated Sandpipers and Barrow's Goldeneyes inhabit areas near large bodies of water. None of these three red-listed species or the eleven yellow-listed bird species is expected to be present in Wetland 2 or to use Wetland 2 due to the lack of suitable habitat (Table 4). None of the birds listed in the ACCDC search were observed during the wetland survey and the area is not critical habitat for any of these species The environmental screening conducted by the NSM found no records of rare or endangered birds on the Project site.

Mammals

Evidence of varying (snowshoe) hare (*Lepas americana*) was noted in Wetland 2 during the Sept 14 2006 wetland survey.

Four uncommon to rare mammals were listed in the ACCDC 100 km database search. Two species of rare bat, the hoary bat, (*Lasiurus cinereus*), and the eastern pipistrelle (*Pipstrellus*

subflavus), were reported within 100 km; however, bats are not expected to make use of any habitat in this wetland. The eastern moose (A*lces alces americana*) is listed as endangered in Nova Scotia and was listed on the ACCDC database search for this area. The low density of moose in the area, and the tiny size of Wetland 2 results in the removal of this wetland having very low potential to affect moose. A Moose Mitigation Plan has been developed for the Touquoy Gold Project.

The fourth rare mammal listed by the ACCDC request is the long-tailed shrew (*Sorex dispar*), which lives only on talus slopes, thus they would be not be expected to occur within this wetland. The environmental screening conducted by the NSM found no records of rare or endangered mammals on the Project site.

Reptiles and Amphibians

No reptiles or amphibians were observed during the wetland surveys. The ACCDC request and the environmental screening conducted by the NSM both noted the presence of wood turtles and four-toed salamanders within 100 km of the site. Wood turtles (*Glyptemys insculpta*) are listed as yellow by NSDNR. There is no hibernating or breeding habitat for turtles in this wetland, as they require deep sections of rivers in which to hibernate, and sandy or gravelly banks for nesting. Four-toed salamanders (*Hemidactylium scutatum*) were previously yellow-listed by NSDNR; however, their status has been recently changed to green, indicating they are not considered to be sensitive or at-risk in Nova Scotia. The dry nature of Wetland 2 in summer makes the possibility of four-toed salamanders breeding in this wetland unlikely. There is no suitable habitat for any rare or endangered reptiles or amphibians in Wetland 2.

Odonates

The ACCDC search reported several rare odonates within a 100 km radius of Wetland 2. Most odonates (dragonflies and damselflies) lay their eggs in bodies of water, where they hatch and develop through several larval stages before emerging from the water and metamorphosing into the adult form. In most species, this larval stage lasts for about one year. The fact that Wetland 2 is a low shrub bog/treed bog complex which contains no standing water in late summer indicates that most odonate species would be unable to complete larval development in this bog. As see in Table 5, most rare odonates listed in the ACCDC 100 km search inhabit areas near streams or rivers. Two species present in Nova Scotia, the ebony boghaunter (*Williamsonia fletcheri*) and the harlequin darner (*Gomphhaeschna furcillata*) are known to breed in sphagnum bogs (Table 5).

The ebony boghaunter is red-listed by NSDNR, and was reported once in the ACCDC 100 km search, from a location 95 km away. No ebony boghaunters were observed in Wetland 2 during the survey on September 14, 2004, however, they are an early-flying species (June) and adults would not be expected to be present at this time. The harlequin darner is a yellow-listed species

for which there were two records in the ACCDC 100 km list. The closest record was 60 km from Wetland 2. No harlequin darners were observed in Wetland 2 during the survey on September 14, 2004, however, they are also an early-flying species (early June) and adults would not be expected to be present at this time. In addition, the dry nature of Wetland 2 in summer indicates this wetland is not suitable breeding habitat for these species, which require bogs containing standing water. No at-risk odonates were identified in the wetland during the June 13, 2007 survey.

Table 5. Rare Odonates Reported Within 100 km of Wetland 2

Scientific Name	Common Name	Status	Preferred Habitat
Ophiogomphus rupinsulensis	Rusty Snaketail	RED	Large clear flowing streams and rivers
Gomphus ventricosus	Skillet Clubtail	RED	Slow-moving rivers
Coenagrion resolutum	Taiga Bluet	RED	Small ponds with grassy or marshy borders, often shaded
Ophiogomphus mainensis	Twinhorned Snaketail	RED	Streams and small rivers
Williamsonia fletcheri	Ebony Boghaunter	RED	Small pools in sphagnum bogs
Gomphaeschna furcillata	Harlequin Darner	YELLOW	Sphagnum bogs and wooded swamps
Lanthus parvulus	Zorro Clubtail	YELLOW	Mountain streams with muddy substrate

Hydrological Characterization

There is no surface connection between this wetland and any surface watercourses or lakes in the immediate area, based on 1:10,000 topographical mapping, air photography, and field surveys. As a bog, this wetland is not expected to receive surface runoff and thus its role in surface flow regulation is expected to be minimal. It has no role as a supply for local surface watercourse flow.

Hydrogeological Characterization

This wetland lies in an area with a thin layer of coarse till overlying the bedrock. The bedrock consists of quartzite and slate, and thus is relatively impermeable. The till tends to be coarse-grained and thus the layer is hydrologically conductive. The groundwater level is likely very shallow (< 2m) in this area. General movement of groundwater is from north to south over the project site, mirroring surface water patterns. Bogs are not fed by groundwater discharge. There are no seeps or springs visible.

Peat Characterization

Peat in this wetland was determined based on visual examination and the presence of a dense surface layer of live *Sphagnum* moss to be sphagnum peat. Peat thickness was measured at six locations in this wetland. The peat layer (with live *Sphagnum* layer included) averaged 1.27 m in depth, and ranged from 0.28 m to 1.98 m. Humification of peat at the surface (just under the layer of live *Sphagnum*) was mostly in the H2 to H4 range of the von Post scale, however one sample was rated as H8. Mid-depth samples ranged form H4 to H8, with H6 being average. Deep samples were all in the H8 to H10 range, indicating they were very decomposed.

Reason for the Alteration

The wetland in question will be removed due to the construction of a tailings pond from an adjacent open-pit gold mine being constructed on the site.

Nature of the Proposed Alteration

The wetland will be entirely removed.

Alternatives That Have Been Considered

Alternative positions for the tailings management facilty have been considered, however, positions either to the east or west of the proposed location would have significant impacts on Moose River or Fish River with their sensitive fish habitat, and would impact additional wetlands. Moving the tailings management facilty north could result in impacts to Square Lake, while moving it south might impact Scraggy Lake, which is considered significant habitat for brook trout, Atlantic salmon, and gaspereau by NSDNR. The project boundary has already been adjusted to avoid the wetland complex located southeast of the Project site, and to avoid impacting Moose River.

Gold mining can be undertaken by either underground or open pit methods. In this particular instance the gold is relatively uniformly distributed, and at relatively low grades, throughout the local rock mass to the extent that large scale, high volume throughput from an open pit is commercially viable. Concentrations of gold of sufficient grade, continuity or predictability in quartz veins or other specific sites at Touquoy to support a commercial underground operation are not present. Commercial underground gold mining at Touquoy is not an option. There are no options for re-positioning of the open pit – the site of concentration of gold is fixed in nature.

Identifiable Impacts to Wetland

Wetland 2 will be entirely removed by the mine project. There are no species at risk or species of conservation concern known to be present in this wetland.

No aquatic habitats or fish species are present, as the wetland is a low shrub bog/treed complex without any permanent standing water.

Past Impacts to the Wetland

Possible past impacts to the wetland may have arisen from forestry clear-cutting activities that have occurred in the area, which may have impacted drainage patterns to some extent. Aerial photography of the site dating from 1964, 1974, 1982, 1993, and 2003 was reviewed to provide information on historical forestry activities in the area. Clearing occurred less than 1 km to the north of Wetland 2 prior to 1992. Extensive clearing, as well as the creation of logging roads, occurred less than 1km south of the wetland during the period between 1992 and 2003.

Mitigation

The project footprint has been adjusted so as to minimize impacts to wetlands and watercourses in the area. As per NSDNR regulations, three times the wetland area to be removed must be recreated as compensation. DDV Gold Limited (DDVG) will work with NSDNR to develop the required mitigation measures including wetland compensation. DDVG is considering various approaches to the wetland compensation issue. The first approach, preferred by NSDNR, is to create wetland habitat within the same watershed as the wetland which is to be altered. DDVG is considering creating wetland habitat onsite once mine operations are completed by ensuring that the flooded quarry pit has sufficiently shallow edges to support a marsh-type wetland. If this is not possible, the proponent will consider a wetland enhancement or creation project outside of the local watershed. Contribution to wetland education and/or protection programs may also be considered.

Summary

In summary, assuming that the proposed mitigation measures are applied, and that existing site drainage conditions are maintained, the Touquoy Gold Project is not likely to have significant effects on wetland functional attributes in the area. Removal of this wetland is not expected to have negative impacts on any rare or endangered species in the area, as none have been detected in this wetland.

Evaluation Expertise

Conestoga-Rovers & Associates is a multi-disciplinary engineering, environmental consulting, construction, and information technology (IT) services firm. Since its inception in 1976, CRA has provided practical, innovative, and effective services in the areas of environmental site assessment, impact assessment, environmental remediation, regulatory compliance and permitting, risk assessment, hydrology, solid and hazardous waste management, air quality management, and municipal infrastructure planning and design. We are an established, reputable company with a strong history of solving engineering and environmental challenges in a responsive and cost-efficient manner.

The CRA Family of Companies employs more than 2,600 professional and support staff in over 70 offices located throughout North America, with additional offices in Brazil and England. Our headquarter office is located in Waterloo, Ontario, Canada.

Beth Cameron, B.Sc. M.Sc., is a Terrestrial Ecologist with Conestoga-Rover & Associates' Halifax office. She has significant experience conducting surveys for flora and fauna, as well as wetland surveys, and has worked on federal and provincial environmental screenings involving wetland alterations. She has also completed a Wetland Delineation and Classification course on the US Army Corps of Engineers wetland delineation protocol and has also taken a course on identifying grasses, sedges, and rushes.

Jeffrey Balsdon, B.Sc., M.Sc., is a Terrestrial Ecologist with Conestoga-Rover & Associates' Halifax office. He has considerable experience conducting surveys for flora and fauna, as well as wetland surveys. He has also taken a course on identifying grasses, sedges, and rushes.

Kristen Nyborg is an Environmental Technologist with Conestoga-Rover & Associates' Halifax office. She holds an Ontario Wetland Evaluation System Certificate, and has significant wetland field experience. She has also completed a Wetland Delineation and Classification course on the US Army Corps of Engineers wetland delineation protocol.

Susan Belford, B.Sc., M.Sc., is a Senior Project Manager with Conestoga-Rovers & Associates' Halifax office. She is very familiar with wetland legislation, having worked on many environmental assessment projects involving provincial and federal regulations and processes.

Dave Strajt, M. Eng., is a Water Resources Engineer/Hydrologist with Conestoga-Rovers & Associates' Halifax office. He is very familiar with surface water processes as they relate to mining process.

Peter Oram, CESA, P.Geo. is a Geologist with Conestoga-Rovers & Associates' Halifax office. He has assisted with ten wetland alteration permits, providing hydrogeological advice. He is very familiar with wetland legislation, having worked on many environmental assessment projects involving provincial and federal legislative processes.

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WETLAND 3 REPORT

Wetland Delineation

Wetland 3 is a very small wetland dominated by low shrub bog. This wetland is 0.09 ha in area and is centred on 4980582 N, 506334 E. See Figure 1 for the location of this wetland on the Project site.

During the field surveys on September 21, 2006 and June 13, 2007, all species of plant, bird, mammal, reptile and amphibian detected within the wetland were recorded. Evidence of wildlife species such as sightings, vocalizations, tracks, faeces, skeletal remains, and characteristic bite marks or dens was recorded.

Ecological Characterization

Plants

Wetland 3 supports a plant community dominated by bog shrubs such as leatherleaf (*Chamaedaphne calyculata*), lambkill (*Kalmia angustifolia*), Labrador tea (*Ledum groendlandicum*), pale laurel (*K. polifolia)*, and stunted black spruce (*Picea mariana*). Some possum-haw viburnum (*Viburnum nudum)* is also present around the margins of the bog. A few tree-height black spruce are also present. Ground vegetation consists of reindeer lichens (*Cladonia* spp.), sphagnum mosses (*Sphagnum* spp.) and black crowberry (*Empetrum nigrum)*, with some tussock sedge (*Carex stricta)* and goldthread (*Coptis trifolia*) as well.

The Atlantic Canada Conservation Data Centre (ACCDC) database consists of records of uncommon to rare plant and animal species from the 1850s to the present. A review in 2007 for information or rare plants within 100 km of the project site yielded a list of five plants with habitat requirements similar to habitat present in the wetland. These are listed in Table 1. In addition, an environmental screening of all natural heritage resources in the area (within an approximate 10 km radius of the site) was compiled by the Nova Scotia Museum (NSM) in 2004, encompassing all their data from 1847 to 2004. As the Museum is a government department, not all of it its species records are available to the non-governmental ACCDC database. Thus the NSM screening generated a list of seven additional species known from the general area or from similar habitats. Of these, two species had potential to occur in habitats present in Wetland 3 (Table 1). None of the species listed by the ACCDC or the NSM are listed as rare or endangered under the *Nova Scotia Endangered Species Act* (NSESA) or Committee on the Status of Endangered Wildlife in Canada/ *Species at Risk Act* (COSEWIC/SARA).

Table 1. Phenology and Habitat Preferences of Rare Vascular Plants Reported Within 100 km (ACCDC search) or 10 km (NSM screening) of Wetland 3					
Species	**Common Name**	**NSDNR Status**	**Bloom Period**	**Preferred Habitat**	**Record Source**
Coeloglossum viride	long-bract green orchis	Yellow	May-August	Boggy spots, damp mature (sugar maple) woods, fir or floodplain forest	ACCDC
Listera australis	southern twayblade	Red	June	Sphagnum bog	ACCDC
Plotanthera flava	southern rein orchid	Yellow	May-August	Sandy gravelly beach, wet peat, lake edge, bog	ACCDC
Salix pedicellaris	bog willow	Yellow	Late May-Early June	Sphagnous lakeshore, acid bog	ACCDC
Utricularia gibba	humped bladderwort	Yellow	Late June-Sept	Shallow lake edge, small pool, pond in peaty area	ACCDC
Betula michauxii	Michaux's dwarf birch	Yellow	June and July	Peat and sphagnous bogs	NSM
Viola nephrophylla	northern bog violet	Yellow	May to July	Cool mossy bogs, borders of streams, and damp woods	NSM

None of these plants were observed in the wetland on the surveys on September 21, 2006 and June 13, 2001.

Birds

During the field surveys for Wetland 3 on September 21, 2006 and June 13, 2007, no bird species were observed within the wetland. A breeding bird survey conducted in the area encompassing the wetland was conducted in June 2007. One yellow-listed species, Canada Warbler (*Wilsonia canadensis*), was detected during this survey. Three other yellow-listed species were detected during other field surveys in the area encompassing the wetland. These were Common Loon (*Gavia immer)*, Common Nighthawk (*Chordeiles minor)*, and Barn Swallow (*Hirundo rustica)*. These birds were observed or heard in the vicinity of the wetland, not in it. Canada warblers nest in cool wooded areas, while Common loons nest on lakeshores. Common Nighthawks breed in a wide variety of habitats, including urban areas, as do Barn Swallows, which tend to nest around buildings or under bridges. None of these species would be expected to utilize habitats present in this wetland. Removal of this wetland will not have a significant effect on the Provincial populations of any of these species.

A desktop review of bird species known to breed in the area where the wetland is located was conducted using the Atlas of Breeding Birds of the Maritime Provinces (Erskine 1990). A list of the status of each breeding bird species recorded from the 10 x 10 km atlas square containing Wetland 3 is provided in Table 2.

Table 2. Breeding Status of Birds Listed in the Atlas Square in Which Wetland 3 is Located		
Common Name	**Species Name**	**Breeding Status in Atlas Square**
Common Loon	*Gavia immer*	Possible
Canada Goose	*Branta Canadensis*	Probable
American Black Duck	*Anas rubripes*	Probable
Ring-Necked Duck	*Aythya collaris*	Confirmed
Common Merganser	*Mergus merganser*	Confirmed
Sharp-Shinned Hawk	*Accipiter striatus*	Possible
Broad-Winged Hawk	*Buteo platypterus*	Probable
American Kestrel	*Falco sparverius*	Possible
Common Nighthawk	*Chordeiles minor*	Confirmed
Chimney Swift	*Chaetura pelagica*	Possible
Belted Kingfisher	*Ceryle alcyon*	Possible
Hairy Woodpecker	*Picoides villosus*	Confirmed
Northern Flicker	*Colaptes auratus*	Confirmed
Pileated Woodpecker	*Dryocopus pileatus*	Possible
Olive-sided Flycatcher	*Contopus borealis*	Possible
Eastern Wood-pewee	*Contopus virens*	Possible
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Confirmed
Alder Flycatcher	*Empidonax alnorum*	Possible
Least Flycatcher	*Empidonax minimus*	Probable
Tree Swallow	*Tachycineta bicolor*	Confirmed
Barn Swallow	*Hirundo rustica*	Confirmed
Gray Jay	*Perisoreus canadensis*	Confirmed
Blue Jay	*Cyanocitta cristata*	Possible
American Crow	*Corvus brachyrhynchos*	Confirmed
Common Raven	*Corvus corax*	Possible
Black-capped Chickadee	*Poecile atricapillus*	Confirmed
Boreal Chickadee	*Poecile hudsonicus*	Confirmed
Red-breasted Nuthatch	*Sitta Canadensis*	Confirmed
Winter Wren	*Troglodytes troglodytes*	Confirmed
Golden-crowned Kinglet	*Regulus satrapa*	Confirmed
Ruby-crowned Kinglet	*Regulus calendula*	Confirmed
Swainson's Thrush	*Catharus ustulatus*	Confirmed
Hermit Thrush	*Catharus guttatus*	Confirmed
American Robin	*Turdus migratorius*	Confirmed
Cedar Waxwing	*Bombycilla cedrorum*	Probable
Blue-headed Vireo	*Vireo solitarius*	Confirmed
Red-eyed Vireo	*Vireo olivaceus*	Probable
Tennessee Warbler	*Vermivora peregrine*	Possible
Nashville Warbler	*Vermivora ruficappilla*	Confirmed
Northern Parula Warbler	*Parula americana*	Confirmed
Chestnut-sided Warbler	*Dendroica pensylvanica*	Confirmed
Magnolia Warbler	*Dendroica magnolia*	Confirmed
Black-throated Blue Warbler	*Dendroica caerulescens*	Possible
Yellow-Rumped Warbler	*Dendroica coronata*	Confirmed

Table 2. Breeding Status of Birds Listed in the Atlas Square in Which Wetland 3 is Located		
Common Name	**Species Name**	**Breeding Status in Atlas Square**
Black-throated Green Warbler	*Dendroica virens*	Confirmed
Blackburnian Warbler	*Dendroica fusca*	Confirmed
Palm Warbler	*Dendroica palmarum*	Confirmed
Bay-breasted Warbler	*Dendroica castanea*	Confirmed
Black-and-white Warbler	*Mniotilta varia*	Confirmed
American Redstart	*Setophaga ruticilla*	Confirmed
Ovenbird	*Seiurus aurocapillus*	Confirmed
Mourning Warbler	*Oporinis philadelphia*	Confirmed
Common Yellowthroat	*Geothlypis trichas*	Confirmed
Canada Warbler	*Wilsonia canadensis*	Confirmed
Song Sparrow	*Melospiza melodia*	Confirmed
Lincoln's Sparrow	*Melospiza lincolnii*	Confirmed
Swamp Sparrow	*Melospiza georgiana*	Confirmed
White-throated Sparrow	*Zonotrichia albicollis*	Confirmed
Dark-eyed Junco	*Junco hyemalis*	Confirmed
Red-winged Blackbird	*Agelaius phoeniceus*	Possible
Rusty Blackbird	*Euphagus carolinus*	Confirmed
Common Grackle	*Quiscalus quiscula*	Confirmed
Pine Grosbeak	*Pinicola enucleator*	Probable
Purple Finch	*Carpodacus purpureus*	Possible
White Winged Crossbill	*Loxia leucoptera*	Probable
Pine Siskin	*Carduelis pinus*	Possible
American Goldfinch	*Carduelis tristis*	Possible
Evening Grosbeak	*Coccothraustes vespertinus*	Probable

None of these bird species were observed in Wetland 3 during the field surveys on September 21 2006 and June 13 2007. Wetland 3 is not considered to be critical breeding habits for any of these species.

A review of the ACCDC database of rare species records revealed fourteen at–risk species reported in the region. Three red-listed and eleven yellow-listed bird species were listed within 100 km by the ACCDC search. Each species' habitat preference was determined based on Erksine's 1990 data, and the likelihood of their presence on site was determined based on comparison of known habitat preferences with habitats present in the wetland. A summary of the rare bird species, their provincial status and their habitat preferences is provided in Table 3.

Table3. Habitat Preferences of Listed Bird Species Reported within 100 km of Wetland 3			
NSDNR Status	**Common Name**	**Binomial**	**Habitat Preference**
Red	Roseate Tern	*Sterna dougallii*	Coast
Red	Peregrine Falcon	*Falco peregrinus*	Rocky cliffs
Red	Piping Plover	*Charadrius melodus*	Sandy Beaches
Yellow	Common Tern	*Sterna hirundo*	Coast
Yellow	Arctic Tern	*Sterna paradisea*	Coast
Yellow	Barrow's Goldeneye	*Bucephala islandica*	Small clear lakes and ponds
Yellow	Northern Goshawk	*Accipiter gentiles*	Mature woods
Yellow	Semipalmated Sandpiper	*Calidris pusilla*	Beaches, mudflats, shallow estuaries, and inlets.
Yellow	Eastern Meadowlark	*Sturnella magna*	Grassy fields, pastures, cultivated areas
Yellow	Razorbill	*Alca torda*	Coastal islands
Yellow	Eastern Bluebird	*Sialia sialis*	Areas with scattered trees and short ground cover.
Yellow	Vesper Sparrow	*Poecetes gramineus*	Areas with short grass or low shrubs
Yellow	Sharp-tailed Sparrow	*Ammodramus caudacutus*	Breed in meadows adjacent to salt marshes
Yellow	Bobolink	*Dolichonyx oryzivorus*	Grasslands

Arctic Terns, Common Terns, and Razorbills are coastal species, and so should not be present in Wetland 3. Sharp-tailed Sparrows breed in meadows adjacent to salt marshes. Vesper Sparrows are characteristic of areas with short grass or low shrubs, such as sandy pastures, blueberry fields, and clearings. Goshawks prefer heavily wooded areas, and prefer to breed in mature mixed woods. Eastern Bluebird, (*Sialis sialis*) nests in clear-cut areas, which are adjacent to the wetland, and in woodpecker cavities. Eastern Meadowlarks and Bobolinks are grassland/meadow species. Semipalmated Sandpipers and Barrow's Goldeneyes inhabit areas near large bodies of water. None of these three red-listed species or the eleven yellow-listed bird species is expected to be present in the Wetland 3 or to use Wetland 3 due to the lack of suitable habitat (Table 3). None of the birds listed in the ACCDC search were observed during the wetland survey and the area is not critical habitat for any of these species. The environmental screening conducted by the NSM found no records of rare or endangered birds on the Project site.

Mammals

Evidence of varying (snowshoe) hare (*Lepas americana*) was noted in Wetland 3 during the Sept 21, 2006 wetland survey.

Four uncommon to rare mammals were listed in the ACCDC 100 km database search. Two species of rare bat, the hoary bat, (*Lasiurus cinereus*), and the eastern pipistrelle (*Pipstrellus*

subflavus), were reported within 100 km; however, bats are not expected to make use of any habitat in this wetland. The eastern moose (A*lces alces americana*) is listed as endangered in Nova Scotia and was listed on the ACCDC database search for this area. The low density of moose in the area, and the tiny size of Wetland 3 results in the removal of this wetland having very low potential to affect moose. A Moose Mitigation Plan has been developed for the Touquoy Gold Project.

The fourth rare mammal listed by the ACCDC request is the long-tailed shrew (*Sorex dispar*), which lives only on talus slopes, thus they would be not be expected to occur within this wetland. The environmental screening conducted by the NSM found no records of rare or endangered mammals on the Project site.

Reptiles and Amphibians

No reptiles or amphibians were observed during the wetland surveys. The ACCDC request and the environmental screening conducted by the NSM both noted the presence of wood turtles and four-toed salamanders within 100 km of the site. Wood turtles (*Glyptemys insculpta*) are listed as yellow by NSDNR. There is no hibernating or breeding habitat for turtles in this wetland, as they require deep sections of rivers in which to hibernate, and sandy or gravelly banks for nesting. Four-toed salamanders (*Hemidactylium scutatum*) were previously yellow-listed by NSDNR; however, their status has been recently changed to green, indicating they are not considered to be sensitive or at-risk in Nova Scotia. The dry nature of Wetland 3 in summer makes the possibility of four-toed salamanders breeding in this wetland unlikely. There is no suitable habitat for any rare or endangered reptiles or amphibians in Wetland 3.

Odonates

The ACCDC search reported several rare odonates within a 100 km radius of Wetland 3. Most odonates (dragonflies and damselflies) lay their eggs in bodies of water, where they hatch and develop through several larval stages before emerging from the water and metamorphosing into the adult form. In most species, this larval stage lasts for about one year. The fact that Wetland 3 is a low shrub bog which contains no standing water in late summer indicates that most odonate species would be unable to complete larval development in this bog. As see in Table 4, most rare odonates listed in the ACCDC 100 km search inhabit areas near streams or rivers. Two species present in Nova Scotia, the ebony boghaunter (*Williamsonia fletcheri*) and the harlequin darner (*Gomphhaeschna furcillata*) are known to breed in sphagnum bogs (Table 4).

The ebony boghaunter is red-listed by NSDNR, and was reported once in the ACCDC 100 km search, from a location 95 km away. No ebony boghaunters were observed in Wetland 3 during the surveys on September 21, 2004 and June 13 2007. The harlequin darner is a yellow-listed species for which there were two records in the ACCDC 100 km list. The closest record was 60 km from Wetland 3. No harlequin darners were observed in Wetland 3 during the survey on September 21, 2004 and June 13, 2007. In addition, the dry nature of Wetland 3 in summer

indicates this wetland is not suitable breeding habitat for these species, which require bogs containing standing water.

Table 4. Rare Odonates Reported Within 100 km of Wetland 3

Scientific Name	Common Name	Status	Preferred Habitat
Ophiogomphus rupinsulensis	Rusty Snaketail	RED	Large clear flowing streams and rivers
Gomphus ventricosus	Skillet Clubtail	RED	Slow-moving rivers
Coenagrion resolutum	Taiga Bluet	RED	Small ponds with grassy or marshy borders, often shaded
Ophiogomphus mainensis	Twinhorned Snaketail	RED	Streams and small rivers
Williamsonia fletcheri	Ebony Boghaunter	RED	Small pools in sphagnum bogs
Gomphaeschna furcillata	Harlequin Darner	YELLOW	Sphagnum bogs and wooded swamps
Lanthus parvulus	Zorro Clubtail	YELLOW	Mountain streams with muddy substrate

Hydrological Characterization

There is no surface connection between this wetland and any surface watercourses or lakes in the immediate area as it is a bog, this is based on 1:10,000 topographical mapping, air photography, and field surveys. As a bog, this wetland is not expected to receive surface water flow and thus has no role in surface flow regulation. It has no role as a supply for local surface watercourse flow.

Hydrogeological Characterization

This wetland lies in an area with a thin layer of coarse till overlying the bedrock. The bedrock consists of quartzite and slate, and thus is relatively impermeable. The till tends to be coarse-grained and thus the layer is hydrologically conductive. The groundwater level is very shallow (likely < 2m) in this area. General movement of groundwater is from north to south over the project site, mirroring surface water patterns. Bogs are not fed by groundwater discharge. There are no seeps or springs visible.

Peat Characterization

Peat in this wetland was determined based on visual examination, and the presence of live *Sphagnum* mosses to be sphagnum peat. Peat thickness was measured at five locations in this wetland. The peat layer (with live *Sphagnum* layer included) averaged 1.92 m in depth, and ranged from 1.52 to 2.29 m. Humification of peat at the surface (just under the layer of live *Sphagnum*) was mostly in the H2 to H5 range, however one sample was rated as H7. Mid-depth samples ranged from H6 to H8. Deep samples were in the H8 to H10 range, with one exception (H6).

Reason for the Alteration
The wetland in question will be removed due to the construction of a tailings pond from an adjacent open-pit gold mine being constructed on the site.

Nature of the Proposed Alteration
The wetland will be entirely removed.

Alternatives That Have Been Considered
Alternative positions for the tailings management facilty have been considered, however, positions either to the east or west of the proposed location would have significant impacts on Moose River or Fish River with their sensitive fish habitat, and would impact additional wetlands. Moving the tailings management facilty north could result in impacts to Square Lake, while moving it south might impact Scraggy Lake, which is considered significant habitat for brook trout, Atlantic salmon, and gaspereau by NSDNR. The project boundary has already been adjusted to avoid the wetland complex located southeast of the Project site, and to avoid impacting Moose River.

Gold mining can be undertaken by either underground or open pit methods. In this particular instance the gold is relatively uniformly distributed, and at relatively low grades, throughout the local rock mass to the extent that large scale, high volume throughput from an open pit is commercially viable. Concentrations of gold of sufficient grade, continuity or predictability in quartz veins or other specific sites at Touquoy to support a commercial underground operation are not present. Commercial underground gold mining at Touquoy is not an option. There are no options for re-positioning of the open pit – the site of concentration of gold is fixed in nature.

Identifiable Impacts to Wetland
Wetland 3 will be entirely removed by the mine project. There are no species at risk or species of conservation concern known to be present in this wetland

No aquatic habitats or fish species are present, as the wetland is a low shrub bog which is dry during late summer months.

Past Impacts to the Wetland
Possible past impacts to the wetland may have arisen from forestry clear-cutting activities that have occurred in the area, which may have impacted drainage patterns to some extent. Aerial photography of the site dating from 1964, 1974, 1982, 1993, and 2003 was reviewed to provide information on historical forestry activities in the area. Clearing occurred less than 1 km to the north of Wetland 3 prior to 1992. Extensive clearing, as well as the creation of logging roads, occurred less than 1km south of the wetland during the period between 1992 and 2003.

Mitigation

The project footprint has been adjusted so as to minimize impacts to wetlands and watercourses in the area. As per NSDNR regulations, three times the wetland area to be removed must be recreated as compensation. DDV Gold Limited (DDVG) will work with NSDNR to develop the required mitigation measures including wetland compensation. DDVG is considering various approaches to the wetland compensation issue. The first approach, preferred by NSDNR, is to create wetland habitat within the same watershed as the wetland which is to be altered. DDVG is considering creating wetland habitat onsite once mine operations are completed by ensuring that the flooded quarry pit has sufficiently shallow edges to support a marsh-type wetland. If this is not possible, the proponent will consider a wetland enhancement or creation project outside of the local watershed. Contribution to wetland education and/or protection programs may also be considered.

Summary

In summary, assuming that the proposed mitigation measures are applied, and that existing site drainage conditions are maintained, the Touquoy Gold Project is not likely to have significant effects on wetland functional attributes in the area. Removal of this wetland is not expected to have negative impacts on any rare or endangered species in the area, as known are known to occur in this wetland.

Evaluation Expertise

Conestoga-Rovers & Associates is a multi-disciplinary engineering, environmental consulting, construction, and information technology (IT) services firm. Since its inception in 1976, CRA has provided practical, innovative, and effective services in the areas of environmental site assessment, impact assessment, environmental remediation, regulatory compliance and permitting, risk assessment, hydrology, solid and hazardous waste management, air quality management, and municipal infrastructure planning and design. We are an established, reputable company with a strong history of solving engineering and environmental challenges in a responsive and cost-efficient manner.

The CRA Family of Companies employs more than 2,600 professional and support staff in over 70 offices located throughout North America, with additional offices in Brazil and England. Our headquarter office is located in Waterloo, Ontario, Canada.

Beth Cameron, B.Sc. M.Sc., is a Terrestrial Ecologist with Conestoga-Rover & Associates' Halifax office. She has significant experience conducting surveys for flora and fauna, as well as wetland surveys, and has worked on federal and provincial environmental screenings involving wetland alterations. She has also completed a Wetland Delineation and Classification course on the US Army Corps of Engineers wetland delineation protocol and has also taken a course on identifying grasses, sedges, and rushes.

Jeffrey Balsdon, B.Sc., M.Sc., is a Terrestrial Ecologist with Conestoga-Rover & Associates' Halifax office. He has considerable experience conducting surveys for flora and fauna, as well as wetland surveys. He has also taken a course on identifying grasses, sedges, and rushes.

Kristen Nyborg is an Environmental Technologist with Conestoga-Rover & Associates' Halifax office. She holds an Ontario Wetland Evaluation System Certificate, and has significant wetland field experience. She has also completed a Wetland Delineation and Classification course on the US Army Corps of Engineers wetland delineation protocol.

Susan Belford, B.Sc., M.Sc., is a Senior Project Manager with Conestoga-Rovers & Associates' Halifax office. She is very familiar with wetland legislation, having worked on many environmental assessment projects involving provincial and federal regulations and processes.

Dave Strajt, M. Eng., is a Water Resources Engineer/Hydrologist with Conestoga-Rovers & Associates' Halifax office. He is very familiar with surface water processes as they relate to mining process.

Peter Oram, CESA, P.Geo. is a Geologist with Conestoga-Rovers & Associates' Halifax office. He has assisted with ten wetland alteration permits, providing hydrogeological advice. He is very familiar with wetland legislation, having worked on many environmental assessment projects involving provincial and federal legislative processes.

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WETLAND 4 REPORT

Wetland Delineation

Wetland 4 is a very small wetland dominated by low shrub bog. This wetland is 0.04 ha in area and is centered on 4980452 N, 506366 E. See Figure 1 for the location of this wetland on the Project site.

During the field surveys on September 21, 2006 and June 13, 2007, all species of plant, bird, mammal, reptile and amphibian detected within the wetland were recorded. Evidence of wildlife species such as sightings, vocalizations, tracks, faeces, skeletal remains, and characteristic bite marks or dens was recorded.

Ecological Characterization

Plants

This wetland is dominated by leatherleaf (*Chamaedaphne calyculata*) and lambkill (*Kalmia angustifolia*), with some Labrador tea (*Ledum groenlandicum*), and a few stunted larch (*Larix laricina*) and black spruce (*Picea mariana*). Ground vegetation consists of three-leaved false solomon's seal (*Smilacina trifolia*), small cranberry (*Vaccinium oxycoccos)*, black crowberry (*Empetrum nigrum)*, and cottongrass (*Eriophorum virginicum*). Dwarf dogwood (*Cornus canadensis)* and goldthread (*Coptis trifolia*) are also present. This wetland also contains open mucky areas which were considerably wetter at the time of the survey than all other wetlands on the study site.

The Atlantic Canada Conservation Data Centre (ACCDC) database consist of records of uncommon to rare plant and animal species records from the 1850s to the present. A review in 2005 for information or rare plants within 100 km of the project site yielded a list of five plants with habitat requirements similar to habitats present in the wetland. These are listed in Table 1. In addition, an environmental screening of all natural heritage resources in the area (within an approximate 10 km radius of the site) was compiled by the Nova Scotia Museum (NSM) in 2004, encompassing all their data from 1847 to 2004. As the Museum is a government department, not all of it its species records are available to the non-governmental ACCDC database. Thus the NSM screening generated a list of seven additional species known from the general area or from similar habitats. Of these, two species had potential to occur in habitats present in Wetland 4 (Table 1). None of the species listed by the ACCDC or the NSM are listed as rare or endangered under the *Nova Scotia Endangered Species Act* (NSESA) or Committee on the Status of Endangered Wildlife in Canada/ *Species at Risk Act* (COSEWIC/SARA).

Table 1. Phenology and Habitat Preferences of Rare Vascular Plants Reported Within 100 km (ACCDC search) or 10 km (NSM screening) of Wetland 4					
Species	**Common Name**	**NSDNR Status**	**Bloom Period**	**Preferred Habitat**	**Record Source**
Coeloglossum viride	long-bract green orchis	Yellow	May-August	Boggy spots, damp mature (sugar maple) woods, fir or floodplain forest	ACCDC
Listera australis	southern twayblade	Red	June	Sphagnum bog	ACCDC
Plotanthera flava	southern rein orchid	Yellow	May-August	Sandy gravelly beach, wet peat, lake edge, bog	ACCDC
Salix pedicellaris	bog willow	Yellow	Late May-Early June	Sphagnous lakeshore, acid bog	ACCDC
Utricularia gibba	humped bladderwort	Yellow	Late June-Sept	Shallow lake edge, small pool, pond in peaty area	ACCDC
Betula michauxii	Michaux's dwarf birch	Yellow	June and July	Peat and sphagnous bogs	NSM
Viola nephrophylla	northern bog violet	Yellow	May to July	Cool mossy bogs, borders of streams, and damp woods	NSM

None of these plants were observed in the wetland on the survey on September 21, 2006.

Birds

During the field survey for Wetland 4 on September 21, 2006 and June 13, 2007, no bird species were observed within the wetland. A breeding bird survey conducted in the area encompassing the wetland was conducted in June 2007. One yellow-listed species, Canada Warbler (*Wilsonia canadensis*), was detected during this survey. Three other yellow-listed species were detected during other field surveys in the area encompassing the wetland. These were Common Loon (*Gavia immer)*, Common Nighthawk (*Chordeiles minor)*, and Barn Swallow (*Hirundo rustica)*. These birds were observed or heard in the vicinity of the wetland, not in it. Canada warblers nest in cool wooded areas, while Common loons nest on lakeshores. Common Nighthawks breed in a wide variety of habitats, including urban areas, as do Barn Swallows, which tend to nest around buildings or under bridges. None of these species would be expected to utilize habitats present in this wetland. Removal of this wetland will not have a significant effect on the Provincial populations of any of these species.

A desktop review of bird species known to breed in the area where the wetland is located was conducted using the Atlas of Breeding Birds of the Maritime Provinces (Erskine 1990). A list of the status of each breeding bird species recorded from the 10 x 10 km atlas square containing Wetland 4 is provided in Table 2.

Table 2. Breeding Status of Birds Listed in the Atlas Square in Which Wetland 4 is Located

Common Name	Species Name	Breeding Status in Atlas Square
Common Loon	*Gavia immer*	Possible
Canada Goose	*Branta Canadensis*	Probable
American Black Duck	*Anas rubripes*	Probable
Ring-Necked Duck	*Aythya collaris*	Confirmed
Common Merganser	*Mergus merganser*	Confirmed
Sharp-Shinned Hawk	*Accipiter striatus*	Possible
Broad-Winged Hawk	*Buteo platypterus*	Probable
American Kestrel	*Falco sparverius*	Possible
Common Nighthawk	*Chordeiles minor*	Confirmed
Chimney Swift	*Chaetura pelagica*	Possible
Belted Kingfisher	*Ceryle alcyon*	Possible
Hairy Woodpecker	*Picoides villosus*	Confirmed
Northern Flicker	*Colaptes auratus*	Confirmed
Pileated Woodpecker	*Dryocopus pileatus*	Possible
Olive-sided Flycatcher	*Contopus borealis*	Possible
Eastern Wood-pewee	*Contopus virens*	Possible
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Confirmed
Alder Flycatcher	*Empidonax alnorum*	Possible
Least Flycatcher	*Empidonax minimus*	Probable
Tree Swallow	*Tachycineta bicolor*	Confirmed
Barn Swallow	*Hirundo rustica*	Confirmed
Gray Jay	*Perisoreus canadensis*	Confirmed
Blue Jay	*Cyanocitta cristata*	Possible
American Crow	*Corvus brachyrhynchos*	Confirmed
Common Raven	*Corvus corax*	Possible
Black-capped Chickadee	*Poecile atricapillus*	Confirmed
Boreal Chickadee	*Poecile hudsonicus*	Confirmed
Red-breasted Nuthatch	*Sitta Canadensis*	Confirmed
Winter Wren	*Troglodytes troglodytes*	Confirmed
Golden-crowned Kinglet	*Regulus satrapa*	Confirmed
Ruby-crowned Kinglet	*Regulus calendula*	Confirmed
Swainson's Thrush	*Catharus ustulatus*	Confirmed
Hermit Thrush	*Catharus guttatus*	Confirmed
American Robin	*Turdus migratorius*	Confirmed
Cedar Waxwing	*Bombycilla cedrorum*	Probable
Blue-headed Vireo	*Vireo solitarius*	Confirmed
Red-eyed Vireo	*Vireo olivaceus*	Probable

Table 2. Breeding Status of Birds Listed in the Atlas Square in Which Wetland 4 is Located		
Common Name	**Species Name**	**Breeding Status in Atlas Square**
Tennessee Warbler	*Vermivora peregrine*	Possible
Nashville Warbler	*Vermivora ruficappilla*	Confirmed
Northern Parula Warbler	*Parula americana*	Confirmed
Chestnut-sided Warbler	*Dendroica pensylvanica*	Confirmed
Magnolia Warbler	*Dendroica magnolia*	Confirmed
Black-throated Blue Warbler	*Dendroica caerulescens*	Possible
Yellow-Rumped Warbler	*Dendroica coronata*	Confirmed
Black-throated Green Warbler	*Dendroica virens*	Confirmed
Blackburnian Warbler	*Dendroica fusca*	Confirmed
Palm Warbler	*Dendroica palmarum*	Confirmed
Bay-breasted Warbler	*Dendroica castanea*	Confirmed
Black-and-white Warbler	*Mniotilta varia*	Confirmed
American Redstart	*Setophaga ruticilla*	Confirmed
Ovenbird	*Seiurus aurocapillus*	Confirmed
Mourning Warbler	*Oporinis philadelphia*	Confirmed
Common Yellowthroat	*Geothlypis trichas*	Confirmed
Canada Warbler	*Wilsonia canadensis*	Confirmed
Song Sparrow	*Melospiza melodia*	Confirmed
Lincoln's Sparrow	*Melospiza lincolnii*	Confirmed
Swamp Sparrow	*Melospiza georgiana*	Confirmed
White-throated Sparrow	*Zonotrichia albicollis*	Confirmed
Dark-eyed Junco	*Junco hyemalis*	Confirmed
Red-winged Blackbird	*Agelaius phoeniceus*	Possible
Rusty Blackbird	*Euphagus carolinus*	Confirmed
Common Grackle	*Quiscalus quiscula*	Confirmed
Pine Grosbeak	*Pinicola enucleator*	Probable
Purple Finch	*Carpodacus purpureus*	Possible
White Winged Crossbill	*Loxia leucoptera*	Probable
Pine Siskin	*Carduelis pinus*	Possible
American Goldfinch	*Carduelis tristis*	Possible
Evening Grosbeak	*Coccothraustes vespertinus*	Probable

None of these bird species were observed in Wetland 4 during the field survey on September 21, 2006 and June 13, 2007. Wetland 4 is not considered to be critical breeding habits for any of these species.

A review of the ACCDC database of rare species records revealed fourteen at–risk species reported in the region. Three red-listed and eleven yellow-listed bird species were listed within 100 km by the ACCDC search. Each species' habitat preference was determined based on

Erksine's 1990 data, and the likelihood of their presence on site was determined based on comparison of known habitat preferences with habitats present in the wetland. A summary of the rare bird species, their provincial status and their habitat preferences is provided in Table 3.

Table 3. Habitat Preferences of Listed Bird Species Reported Within 100 km of Wetland 4

NSDNR Status	Common Name	Binomial	Habitat Preference
Red	Roseate Tern	*Sterna dougallii*	Coast
Red	Peregrine Falcon	*Falco peregrinus*	Rocky cliffs
Red	Piping Plover	*Charadrius melodus*	Sandy Beaches
Yellow	Common Tern	*Sterna hirundo*	Coast
Yellow	Arctic Tern	*Sterna paradisea*	Coast
Yellow	Barrow's Goldeneye	*Bucephala islandica*	Small clear lakes and ponds
Yellow	Northern Goshawk	*Accipiter gentiles*	Mature woods
Yellow	Semipalmated Sandpiper	*Calidris pusilla*	Beaches, mudflats, shallow estuaries, and inlets.
Yellow	Eastern Meadowlark	*Sturnella magna*	Grassy fields, pastures, cultivated areas
Yellow	Razorbill	*Alca torda*	Coastal islands
Yellow	Eastern Bluebird	*Sialia sialis*	Areas with scattered trees and short ground cover.
Yellow	Vesper Sparrow	*Poecetes gramineus*	Areas with short grass or low shrubs
Yellow	Sharp-tailed Sparrow	*Ammodramus caudacutus*	Breed in meadows adjacent to salt marshes
Yellow	Bobolink	*Dolichonyx oryzivorus*	Grasslands

Arctic Terns, Common Terns, and Razorbills are coastal species, and so should not be present in Wetland 4. Sharp-tailed Sparrows breed in meadows adjacent to salt marshes. Vesper Sparrows are characteristic of areas with short grass or low shrubs, such as sandy pastures, blueberry fields, and clearings. Goshawks prefer heavily wooded areas, and prefer to breed in mature mixed woods. Eastern Bluebirds, (Sialis sialis) nest in clear-cut areas, which are adjacent to the wetland, and in woodpecker cavities. Eastern Meadowlarks and Bobolinks are grassland/meadow species. Semipalmated Sandpipers and Barrow's Goldeneyes inhabit areas near large bodies of water. None of these three red-listed species or the eleven yellow-listed bird species is expected to be present in the Wetland 4 or to use Wetland 4 due to the lack of suitable habitat (Table 3). None of the birds listed in the ACCDC search were observed during the wetland survey and the area is not critical habitat for any of these species.

The environmental screening conducted by the NSM found no records of rare or endangered birds on the Project site.

Mammals

Evidence of varying (snowshoe) hare (*Lepas americana*), white-tailed deer (*Odocoileus virginanus*), and eastern moose (*Alces alces americana*) was noted in Wetland 4 during the September 21, 2006 wetland survey. One of these mammals, the mainland population of eastern moose, is listed as endangered in Nova Scotia and was listed on the ACCDC database search for this area. A small number of old moose tracks were observed around the perimeter of this bog. Survey by the Coucnil of Mainland Mi'kmaq in October and December of 2007 did not detect any moose sign. A Moose Mitigation Plan has been developed for the Touquoy Gold Project.

Three other rare mammals were also listed in the ACCDC database search. Two species of rare bat, the hoary bat, (*Lasiurus cinereus*), and the eastern pipistrelle (*Pipstrellus subflavus*), were reported; however, bats are not expected to make use of any habitat in this wetland. The fourth rare mammal listed by the ACCDC request is the long-tailed shrew (*Sorex dispar*), which lives only on talus slopes, thus they would be not be expected to occur within this wetland.

The environmental screening conducted by the NSM found no records of rare or endangered mammals on the Project site.

One endangered species, the eastern moose, has been shown to be present in this wetland on an infrequent basis. The results of the field survey suggest that the wetland does not provide significant habitat for moose. Important habitats for moose tend to be wintering and spring calving (late May) areas. Preferred wintering habitat typically consists of mature conifer or mixed conifer stands where snow tends to be less deep and browse is available, reducing winter energy demands. Calving areas are often associated with aquatic/wetland areas; however moose will use a wide range of habitats for calving such as islands on beaver ponds and wetland areas with standing water. The low density of moose in the area, and the tiny size of Wetland 4 results in the removal of this wetland having very low potential to affect wintering or calving of moose. The low shrub bog habitat that occupies most of the wetland is a common wetland type in this area, so this particular wetland is not considered to provide a unique habitat type for wildlife.

Reptiles and Amphibians

No reptiles or amphibians were observed during the wetland surveys. The ACCDC request and the environmental screening conducted by the NSM both noted the presence of wood turtles and four-toed salamanders within 100 km of the site. Wood turtles (*Glyptemys insculpta*) are listed as yellow by NSDNR. There is no hibernating or breeding habitat for turtles in this wetland, as they require deep sections of rivers in which to hibernate, and sandy or gravelly

banks for nesting. Four-toed salamanders (*Hemidactylium scutatum*) were previously yellow-listed by NSDNR; however, their status has been recently changed to green, indicating they are not considered to be sensitive or at-risk in Nova Scotia. Four-toed salamanders may nest in the sphagnum moss hummocks around the margins of small pools in Wetland 4. Thus, with the recent change in status rank for four-toed salamanders, there is no suitable habitat for any rare or endangered reptiles or amphibians in Wetland 4.

Odonates

The ACCDC search reported several rare odonates within a 100 km radius of Wetland 4. Most odonates (dragonflies and damselflies) lay their eggs in bodies of water, where they hatch and develop through several larval stages before emerging from the water and metamorphosing into the adult form. In most species, this larval stage lasts for about one year. The fact that Wetland 4 is a low shrub bog which frequently contains only very shallow (< 15 cm) ephemeral pools indicates that most odonate species would be unable to complete larval development in this bog. As see in Table 4, most rare odonates listed in the ACCDC 100 km search inhabit areas near streams or rivers. However, at least two species present in Nova Scotia, the ebony boghaunter (*Williamsonia fletcheri*) and the harlequin darner (*Gomphhaeschna furcillata*) are known to breed in sphagnum bogs (Table 4).

The ebony boghaunter is red-listed by NSDNR, and was reported once in the ACCDC 100 km search, from a location 95 km away. No ebony boghaunters were observed in Wetland 4 during the surveys on September 21, 2004 and June 13, 2007. The harlequin darner is a yellow-listed species for which there were two records in the ACCDC 100 km list. The closest record was 60 km from Wetland 4. No harlequin darners were observed in Wetland 4 during the surveys on September 21, 2004 and June 13, 2007.

Table 4. Rare Odonates Reported Within 100 km of Wetland 4

Scientific Name	Common Name	Status	Preferred Habitat
Ophiogomphus rupinsulensis	Rusty Snaketail	Red	Large clear flowing streams and rivers
Gomphus ventricosus	Skillet Clubtail	Red	Slow-moving rivers
Coenagrion resolutum	Taiga Bluet	Red	Small ponds with grassy or marshy borders, often shaded
Ophiogomphus mainensis	Twinhorned Snaketail	Red	Streams and small rivers
Williamsonia fletcheri	Ebony Boghaunter	Red	Small pools in sphagnum bogs
Gomphaeschna furcillata	Harlequin Darner	Yellow	Sphagnum bogs and wooded swamps
Lanthus parvulus	Zorro Clubtail	Yellow	Mountain streams with muddy substrate

Hydrological Characterization

There is no surface connection between this wetland and any surface watercourses or lakes in the immediate area, based on 1:10,000 topographical mapping, air photography, and field surveys. As a bog, this wetland is not expected to receive surface water flow and thus its role in surface flow regulation is expected to be minimal. It has no role as a supply for local surface watercourse flow.

Hydrogeological Characterization

This wetland lies in an area with a thin layer of coarse till overlying the bedrock. The bedrock consists of quartzite and slate, and thus is relatively impermeable. The till tends to be coarse-grained and thus the layer is hydrologically conductive. The groundwater level is very shallow (likely < 2m) in this area. General movement of groundwater is from north to south over the project site, mirroring surface water patterns. Bogs are not fed by groundwater discharge. There are no seeps or springs visible.

Peat Characterization

Peat in this wetland was determined based on visual examination, and the presence of live *Sphagnum* mosses to be sphagnum peat. Peat thickness was measured at two locations in this tiny wetland. The peat layer (with live sphagnum layer included) was found to be 0.53 and 0.89 m in depth, respectively. Humification of peat at the surface (just under the layer of live *Sphagnum*) was found to be H3 and H5, while deep samples (0.53 and 0.89 m) were ranked as H8 and H10.

Reason for the Alteration

The wetland in question will be removed due to the construction of a polishing pond from an adjacent open-pit gold mine being constructed on the site.

Nature of the Proposed Alteration

The wetland will be entirely removed.

Alternatives That Have Been Considered

Alternative positions for the tailings management facilty have been considered, however, positions either to the east or west of the proposed location would have significant impacts on Moose River or Fish River with their sensitive fish habitat, and would impact additional wetlands. Moving the tailings management facilty north could result in impacts to Square Lake, while moving it south might impact Scraggy Lake, which is considered significant habitat for brook trout, Atlantic salmon, and gaspereau by NSDNR. The project boundary has already

been adjusted to avoid the wetland complex located southeast of the Project site, and to avoid impacting Moose River.

Gold mining can be undertaken by either underground or open pit methods. In this particular instance the gold is relatively uniformly distributed, and at relatively low grades, throughout the local rock mass to the extent that large scale, high volume throughput from an open pit is commercially viable. Concentrations of gold of sufficient grade, continuity or predictability in quartz veins or other specific sites at Touquoy to support a commercial underground operation are not present. Commercial underground gold mining at Touquoy is not an option. There are no options for re-positioning of the open pit – the site of concentration of gold is fixed in nature.

Identifiable Impacts to Wetland

Wetland 4 will be entirely removed by the mine project. There are no species at risk or species of conservation concern known to be present in this wetland, although it may be visited infrequently by mainland moose.

No aquatic habitats or fish species are present, as the wetland is a low shrub bog which is dry during late summer months.

Past Impacts to the Wetland

Possible past impacts to the wetland may have arisen from forestry clear-cutting activities that have occurred in the area, which may have impacted drainage patterns to some extent. Aerial photography of the site dating from 1964, 1974, 1982, 1993, and 2003 was reviewed to provide information on historical forestry activities in the area. Clearing occurred less than 1 km to the north of Wetland 4 prior to 1992. Extensive clearing, as well as the creation of logging roads, occurred less than 1km south of the wetland during the period between 1992 and 2003.

Mitigation

The project footprint has been adjusted so as to minimize impacts to wetlands and watercourses in the area. As per NSDNR regulations, three times the wetland area to be removed must be recreated as compensation. DDV Gold Limited (DDVG) will work with NSDNR to develop the required mitigation measures including wetland compensation. The client is considering various approaches to the wetland compensation issue. The first approach, preferred by NSDNR, is to create wetland habitat within the same watershed as the wetland which is to be altered. DDVG is considering creating wetland habitat onsite once mine operations are completed by ensuring that the flooded quarry pit has sufficiently shallow edges to support a marsh-type wetland. If this is not possible, the proponent will consider a wetland enhancement or creation project outside of the local watershed. Contribution to wetland education and/or protection programs may also be considered.

Summary

In summary, assuming that the proposed mitigation measures are applied, and that existing site drainage conditions are maintained, the Touquoy Gold Project is not likely to have significant effects on wetland functional attributes in the area. Removal of this wetland is not expected to have negative impacts on any rare or endangered species in the area.

Evaluation Expertise

Conestoga-Rovers & Associates is a multi-disciplinary engineering, environmental consulting, construction, and information technology (IT) services firm. Since its inception in 1976, CRA has provided practical, innovative, and effective services in the areas of environmental site assessment, impact assessment, environmental remediation, regulatory compliance and permitting, risk assessment, hydrology, solid and hazardous waste management, air quality management, and municipal infrastructure planning and design. We are an established, reputable company with a strong history of solving engineering and environmental challenges in a responsive and cost-efficient manner.

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Jeffrey Balsdon, B.Sc., M.Sc., is a Terrestrial Ecologist with Conestoga-Rover & Associates' Halifax office. He has considerable experience conducting surveys for flora and fauna, as well as wetland surveys. He has also taken a course on identifying grasses, sedges, and rushes.

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Susan Belford, B.Sc., M.Sc., is a Senior Project Manager with Conestoga-Rovers & Associates' Halifax office. She is very familiar with wetland legislation, having worked on many environmental assessment projects involving provincial and federal regulations and processes.

Dave Strajt, M. Eng., is a Water Resources Engineer/Hydrologist with Conestoga-Rovers & Associates' Halifax office. He is very familiar with surface water processes as they relate to mining process.

Peter Oram, CESA, P.Geo. is a Geologist with Conestoga-Rovers & Associates' Halifax office. He has assisted with ten wetland alteration permits, providing hydrogeological advice. He is very familiar with wetland legislation, having worked on many environmental assessment projects involving provincial and federal legislative processes.

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WETLAND 5 REPORT

Wetland Delineation

The wetland referred to as Wetland 5 was assessed by Dillon Consulting Limited on behalf of CRA on June 13, July 14, and September 14, 2005. The entire wetland is a 6.0 ha wetland consisting of open water wetland surrounded by shrub bog with tall shrub swamp around the perimeter.

This wetland is centered on 4980758 N, 0505629 E. Its geographical boundaries are listed in Table 1. See Figure 1 for the location of this wetland on the Project site.

Table 1. Geographical Boundaries of Wetland 5 (NAD 83)

Boundary	Northing	Easting
North	4890667	505786
South	4980590	505595
East	4890744	505496
West	4981019	505615

A small portion (0.19 ha) of the easternmost section of the wetland, lies within the Project footprint. Conestoga-Rovers & Associates surveyed this area on September 13, 2006 and June 13, 2007.

During the field surveys in 2005, 2006, and 2007, all species of plant, bird, mammal, reptile and amphibian detected within the wetland were recorded. Evidence of wildlife species such as sightings, vocalizations, tracks, faeces, skeletal remains, and characteristic bite marks or dens was recorded.

Ecological Characterization

Plants

The open water portion of this wetland is home to submerged and emergent aquatic species such as pipewort (*Eriocaulon aquaticum*) and pondweeds (*Potamogeton* spp. (confirmed not to be the listed pondweed species)). The bog portion surrounding the open water contains shrub species such as pale laurel (*Kalmia polifola*), Labrador tea (*Ledum groenlandicum*), speckled alder (*Alnus rugosa*), and meadowsweet (*Spiraea alba*), with rhodora (*Rhododendron canadense*) and leatherleaf (*Chamaedaphne calyculata*) in wetter areas. There are also a few black spruce (*Picea mariana*) and tamarack (*Larix laracina*) scattered throughout and around the perimeter. There are scattered pockets of sphagnum development containing typical species such as northern

pitcher plant (*Sarracenia purpurea*) and round-leaved sundew (*Drosera rotundifolia*). Surrounding the bog, there are areas of tall shrub swamp containing larch, speckled alder, meadowsweet, red maple, and Labrador tea.

It is a small portion (0.20 ha) of the tall shrub swamp area which will be impacted by the proposed Project. The tree layer in this region consists of scattered larch (*Larix laracina*) and black spruce. Shrubs such as speckled alder, meadowsweet, possum-haw viburnum (*Viburnum nudum)*, immature red maple, and Labrador tea. Ground vegetation consists of sphagnum mosses (*Sphagnum* spp.), dewberry (*Rubus hispidus*), dwarf dogwood (*Cornus canadensis*), and scattered sedges (*Carex trisperma* and *C. imtumescens*), all common and upiquitous species in Nova Scotia.

The Atlantic Canada Conservation Data Centre (ACCDC) database consist of records of uncommon to rare plant and animal species from the 1850s to the present. A review in 2005 for information or rare plants within 100 km of the project site yielded a list of five plants with habitat requirements similar to habitat present in the wetland. These are listed in Table 1.

In addition, an environmental screening of all natural heritage resources in the area (within an approximate 10 km radius of the site) was compiled by the Nova Scotia Museum (NSM) in 2004, encompassing all their data from 1847 to 2004. As the Museum is a government department, not all of it its species records are available to the non-governmental ACCDC database. Thus the NSM screening generated a list of seven additional species known from the general area or from similar habitats. Of these, none had potential to occur in habitats present in Wetland 5 (Table 1). None of the species listed by the ACCDC or the NSM are listed as rare or endangered under the *Nova Scotia Endangered Species Act* (NSESA) or Committee on the Status of Endangered Wildlife in Canada/ *Species at Risk Act* (COSEWIC/SARA).

Table 2. Phenology and Habitat Preferences of Rare Vascular Plants Reported Within 100 km (ACCDC search) or 10 km (NSM screening) of Wetland 5

Species	Common Name	NSDNR Status	Bloom Period	Preferred Habitat	Record Source
Coeloglossum viride	long-bract green orchis	Yellow	May-August	Boggy spots, damp mature (sugar maple) woods, fir or floodplain forest	ACCDC
Listera australis	southern twayblade	Red	June	Sphagnum bog	ACCDC
Plotanthera flava	southern rein orchid	Yellow	May-August	Sandy gravelly beach, wet peat, lake edge, bog	ACCDC
Salix pedicellaris	Bog willow	Yellow	Late May-Early June	Sphagnous lakeshore, acid bog	ACCDC
Utricularia gibba	Humped	Yellow	Late June-	Shallow lake edge, small	ACCDC

Table 2. Phenology and Habitat Preferences of Rare Vascular Plants Reported Within 100 km (ACCDC search) or 10 km (NSM screening) of Wetland 5					
Species	**Common Name**	**NSDNR Status**	**Bloom Period**	**Preferred Habitat**	**Record Source**
	bladderwort		Sept	pool, pond in peaty area	
Betula michauxii	Michaux's dwarf birch	Yellow	June and July	Peat and sphagnous bogs	NSM
Viola nephrophylla	northern bog violet	Yellow	May to July	Cool mossy bogs, borders of streams, and damp woods	NSM

None of these plants were observed in the wetland on the surveys in 2005, 2006, or 2007.

Birds

Due to the field survey being conducted in late summer, a breeding bird survey was not possible for this wetland. A desktop review of bird species known to breed in the area where the wetland is located was conducted using the Atlas of Breeding Birds of the Maritime Provinces (Erskine 1990). A list of the status of each breeding bird species recorded from the 10 x 10 km atlas square containing Wetland 5 is provided in Table 2.

Table 3. Breeding Status of Birds Listed in the Atlas Square in Which Wetland 5 is Located		
Common Name	**Species Name**	**Breeding Status in Atlas Square**
Common Loon	*Gavia immer*	Possible
Canada Goose	*Branta canadensis*	Probable
American Black Duck	*Anas rubripes*	Probable
Ring-Necked Duck	*Aythya collaris*	Confirmed
Common Merganser	*Mergus merganser*	Confirmed
Sharp-Shinned Hawk	*Accipiter striatus*	Possible
Broad-Winged Hawk	*Buteo platypterus*	Probable
American Kestrel	*Falco sparverius*	Possible
Common Nighthawk	*Chordeiles minor*	Confirmed
Chimney Swift	*Chaetura pelagica*	Possible
Belted Kingfisher	*Ceryle alcyon*	Possible
Hairy Woodpecker	*Picoides villosus*	Confirmed
Northern Flicker	*Colaptes auratus*	Confirmed
Pileated Woodpecker	*Dryocopus pileatus*	Possible
Olive-sided Flycatcher	*Contopus borealis*	Possible
Eastern Wood-pewee	*Contopus virens*	Possible
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Confirmed
Alder Flycatcher	*Empidonax alnorum*	Possible
Least Flycatcher	*Empidonax minimus*	Probable

Table 3. Breeding Status of Birds Listed in the Atlas Square in Which Wetland 5 is Located		
Common Name	**Species Name**	**Breeding Status in Atlas Square**
Tree Swallow	*Tachycineta bicolor*	Confirmed
Barn Swallow	*Hirundo rustica*	Confirmed
Gray Jay	*Perisoreus canadensis*	Confirmed
Blue Jay	*Cyanocitta cristata*	Possible
American Crow	*Corvus brachyrhynchos*	Confirmed
Common Raven	*Corvus corax*	Possible
Black-capped Chickadee	*Poecile atricapillus*	Confirmed
Boreal Chickadee	*Poecile hudsonicus*	Confirmed
Red-breasted Nuthatch	*Sitta Canadensis*	Confirmed
Winter Wren	*Troglodytes troglodytes*	Confirmed
Golden-crowned Kinglet	*Regulus satrapa*	Confirmed
Ruby-crowned Kinglet	*Regulus calendula*	Confirmed
Swainson's Thrush	*Catharus ustulatus*	Confirmed
Hermit Thrush	*Catharus guttatus*	Confirmed
American Robin	*Turdus migratorius*	Confirmed
Cedar Waxwing	*Bombycilla cedrorum*	Probable
Blue-headed Vireo	*Vireo solitarius*	Confirmed
Red-eyed Vireo	*Vireo olivaceus*	Probable
Tennessee Warbler	*Vermivora peregrine*	Possible
Nashville Warbler	*Vermivora ruficappilla*	Confirmed
Northern Parula Warbler	*Parula americana*	Confirmed
Chestnut-sided Warbler	*Dendroica pensylvanica*	Confirmed
Magnolia Warbler	*Dendroica magnolia*	Confirmed
Black-throated Blue Warbler	*Dendroica caerulescens*	Possible
Yellow-Rumped Warbler	*Dendroica coronata*	Confirmed
Black-throated Green Warbler	*Dendroica virens*	Confirmed
Blackburnian Warbler	*Dendroica fusca*	Confirmed
Palm Warbler	*Dendroica palmarum*	Confirmed
Bay-breasted Warbler	*Dendroica castanea*	Confirmed
Black-and-white Warbler	*Mniotilta varia*	Confirmed
American Redstart	*Setophaga ruticilla*	Confirmed
Ovenbird	*Seiurus aurocapillus*	Confirmed
Mourning Warbler	*Oporinis philadelphia*	Confirmed
Common Yellowthroat	*Geothlypis trichas*	Confirmed
Canada Warbler	*Wilsonia canadensis*	Confirmed
Song Sparrow	*Melospiza melodia*	Confirmed
Lincoln's Sparrow	*Melospiza lincolnii*	Confirmed
Swamp Sparrow	*Melospiza georgiana*	Confirmed
White-throated Sparrow	*Zonotrichia albicollis*	Confirmed
Dark-eyed Junco	*Junco hyemalis*	Confirmed
Red-winged Blackbird	*Agelaius phoeniceus*	Possible
Rusty Blackbird	*Euphagus carolinus*	Confirmed
Common Grackle	*Quiscalus quiscula*	Confirmed
Pine Grosbeak	*Pinicola enucleator*	Probable

Table 3. Breeding Status of Birds Listed in the Atlas Square in Which Wetland 5 is Located		
Common Name	**Species Name**	**Breeding Status in Atlas Square**
Purple Finch	*Carpodacus purpureus*	Possible
White Winged Crossbill	*Loxia leucoptera*	Probable
Pine Siskin	*Carduelis pinus*	Possible
American Goldfinch	*Carduelis tristis*	Possible
Evening Grosbeak	*Coccothraustes vespertinus*	Probable

None of these bird species were observed in Wetland 5 during the field survey on September 13, 2006. Wetland 5 is not considered to be critical breeding habits for any of these species. During the field survey for Wetland 5 on September 13, 2006, three bird species were observed in vicinity of the wetland. These were Spruce Grouse, Pileated Woodpecker and Common Crow. None of these birds are expected to breed in tall shrub swamp.

A review of the ACCDC database of rare species records revealed fourteen NSDNR- listed species reported in the region. Three red-listed and eleven yellow-listed bird species were listed within 100 km by the ACCDC search. Each species' habitat preference was determined based on Erksine's 1990 data, and the likelihood of their presence on site was determined based on comparison of known habitat preferences with habitats present in the wetland. A summary of the rare bird species, their provincial status and their habitat preferences is provided in Table 3.

Table 4. Habitat Preferences of NSDNR-Listed Bird Species Reported Within 100 km of Wetland 5			
NSDNR Status	**Common Name**	**Binomial**	**Habitat Preference**
Red	Roseate Tern	*Sterna dougallii*	Coast
Red	Peregrine Falcon	*Falco peregrinus*	Rocky cliffs
Red	Piping Plover	*Charadrius melodus*	Sandy Beaches
Yellow	Common Tern	*Sterna hirundo*	Coast
Yellow	Arctic Tern	*Sterna paradisea*	Coast
Yellow	Barrow's Goldeneye	*Bucephala islandica*	Small clear lakes and ponds
Yellow	Northern Goshawk	*Accipiter gentiles*	Mature woods
Yellow	Semipalmated Sandpiper	*Calidris pusilla*	Beaches, mudflats, shallow estuaries, and inlets.
Yellow	Eastern Meadowlark	*Sturnella magna*	Grassy fields, pastures, cultivated areas
Yellow	Razorbill	*Alca torda*	Coastal islands
Yellow	Eastern Bluebird	*Sialia sialis*	Areas with scattered trees and short ground cover.

Table 4. Habitat Preferences of NSDNR-Listed Bird Species Reported Within 100 km of Wetland 5			
NSDNR Status	**Common Name**	**Binomial**	**Habitat Preference**
Yellow	Vesper Sparrow	*Poecetes gramineus*	Areas with short grass or low shrubs
Yellow	Sharp-tailed Sparrow	*Ammodramus Caudacutus*	Breed in meadows adjacent to salt marshes
Yellow	Bobolink	*Dolichonyx Oryzivorus*	Grasslands

Arctic Terns, Common Terns, and Razorbills are coastal species, and so should not be present in Wetland 5. Sharp-tailed Sparrows breed in meadows adjacent to salt marshes. Vesper Sparrows are characteristic of areas with short grass or low shrubs, such as sandy pastures, blueberry fields, and clearings. Goshawks prefer heavily wooded areas, and prefer to breed in mature mixed woods. Eastern Bluebirds, (*Sialis sialis*) nest in clear-cut areas, which are adjacent to the wetland, and in woodpecker cavities. Eastern Meadowlarks and Bobolinks are grassland/meadow species. Semipalmated Sandpipers and Barrow's Goldeneyes inhabit areas near large bodies of water. None of these three red-listed species or the eleven yellow-listed bird species is expected to be present in the Wetland 5 or to use Wetland 5 due to the lack of suitable habitat (Table 3). None of the birds listed in the ACCDC search were observed during the wetland survey and the area is not critical habitat for any of these species. A breeding bird survey will be conducted in spring of 2007. The environmental screening conducted by the NSM found no records of rare or endangered birds on the Project site.

Mammals

Evidence of black bear (*Ursus americana*), red squirrel (*Tamiasciurius hudsonicus*) and eastern chipmunk (*Tamias striatus*) was noted in Wetland 5 during the September 13, 2006 wetland survey.

Four uncommon to rare mammals were listed in the ACCDC 100 km database search. Two species of rare bat, the hoary bat, (*Lasiurus cinereus*), and the eastern pipistrelle (*Pipstrellus subflavus*), were reported within 100 km; however, bats are not expected to make use of any habitat in this wetland. The eastern moose (A*lces alces americana*) is listed as endangered in Nova Scotia and was listed on the ACCDC database search for this area. The low density of moose in the area, and the tiny size of the portion of Wetland 5 to be impacted results in the removal of this wetland having very low potential to affect moose. A Moose Mitigation Plan has been developed for the Touquoy Gold Project.

The fourth rare mammal listed by the ACCDC request is the long-tailed shrew (*Sorex dispar*), which lives only on talus slopes, thus they would be not be expected to occur within this wetland. Additional mammal observations will be taken concurrently with the spring botany surveys in 2007. The environmental screening conducted by the NSM found no records of rare or endangered mammals on the Project site.

Reptiles and Amphibians

No reptiles or amphibians were observed during the wetland survey. The ACCDC request and the environmental screening conducted by the NSMNH both noted the presence of wood turtles and four-toed salamanders within 100 km of the site. Wood turtles (*Glyptemys insculpta*) are listed as yellow by NSDNR. There is no hibernating or breeding habitat for turtles in the relevant portion of this wetland, as they require deep sections of rivers in which to hibernate, and sandy or gravelly banks for nesting. Four-toed salamanders (*Hemidactylium scutatum*) were previously yellow-listed by NSDNR; however, their status has been recently changed to green, indicating they are not considered to be sensitive or at-risk in Nova Scotia. There is no suitable habitat for any rare or endangered reptiles or amphibians in the 0.20 ha portion of Wetland 5 to be removed.

Odonates

The ACCDC search reported several rare odonates within a 100 km radius of Wetland 5. Most odonates (dragonflies and damselflies) lay their eggs in bodies of water, where they hatch and develop through several larval stages before emerging from the water and metamorphosing into the adult form. In most species, this larval stage lasts for about one year. The fact that the portion of Wetland 5 to be impacted is a tall shrub swamp which contains no pools of water in summer indicates that most odonate species would be unable to complete larval development in this environment. As seen in Table 4, most rare odonates listed in the ACCDC 100 km search inhabit areas near streams or rivers or in sphagnum bogs, and thus are not expected to occur in the relevant portion of Wetland 5. None of these rare odonates, with the exception of the Harlequin darner (*Gomphaeschna furcillata)* are expected to breed in the portion of Wetland 5 to be impacted. No harlequin darners were observed in this wetland during field surveys.

Table 5. Rare Odonates Reported Within 100 km of Wetland 5

Scientific Name	Common Name	Status	Preferred Habitat
Ophiogomphus rupinsulensis	Rusty Snaketail	Red	Large clear flowing streams and rivers
Gomphus ventricosus	Skillet Clubtail	Red	Slow-moving rivers
Coenagrion resolutum	Taiga Bluet	Red	Small ponds with grassy or marshy borders, often shaded
Ophiogomphus mainensis	Twinhorned Snaketail	Red	Streams and small rivers

Table 5. Rare Odonates Reported Within 100 km of Wetland 5			
Scientific Name	**Common Name**	**Status**	**Preferred Habitat**
Williamsonia fletcheri	Ebony Boghaunter	Red	Small pools in sphagnum bogs
Gomphaeschna furcillata	Harlequin Darner	Yellow	Sphagnum bogs and wooded swamps
Lanthus parvulus	Zorro Clubtail	Yellow	Mountain streams with muddy substrate

Hydrological Characterization

This wetland is fed by an unnamed tributary of Moose River which runs from north to south through the centre of the project site. It lies within the Moose Rover watershed (IEL-5P). Calculations by CRA indicate that this particular wetland is fed by a drainage basin of 150 ha in area. The wetland is expected to flood during periods of high surface water flow, and thus plays a role in surface water regulation within its watershed. The very small portion (<4%) of the wetland to be impacted will not result in significant adverse effects to the wetland as a whole.

Hydrogeological Characterization

This wetland lies in an area with a thin layer of coarse till overlying the bedrock. The bedrock consists of quartzite and slate, and thus is relatively impermeable. The till tends to be coarse-grained and thus the layer is moderately conductive. The groundwater level is likely very shallow (<2m depth) in this area. General movement of groundwater is from north to south over the project site, mirroring surface water patterns. There are no seeps or springs visible, and this wetland is not expected to be a strong recharge or discharge area for groundwater.

Reason for the Alteration

A small portion (4%) of the wetland will be altered due to the construction of a tailings management facility for an adjacent open-pit gold mine being constructed in the area.

Nature of the Proposed Alteration

A small portion (0.25 ha, or 4%) of Wetland 5 will be removed due to the construction of a tailings management facility for an adjacent open-pit gold mine being constructed in the area. A containment dam for the tailings management facility will be constructed over the easternmost lobe of this wetland.

Alternatives That Have Been Considered

Alternative positions for the tailings management facility have been considered, however, positions either to the east or west of the proposed location would have significant impacts on Moose River or Fish River with their sensitive fish habitat, and would impact additional wetlands. Moving the tailings management facility north could result in impacts to Square

Lake, while moving it south might impact Scraggy Lake, which is considered significant habitat for brook trout, Atlantic salmon, and gaspereau by NSDNR. The project boundary has already been adjusted to avoid the wetland complex located southeast of the Project site, and to avoid impacting Moose River. Geotechnical and engineering aspects of the tailings management facility design make it difficult to move the dam any further eastward at this particular location.

Mitigation

During construction of the dam, standard Nova Scotia Environment and Labour sedimentation and erosion control guidelines will be adhered to (Nova Scotia Sediment and Erosion Control Handbook for Construction Sites). This will prevent negative impacts to the rest of this wetland. This section of the wetland is located at the eastern boundary of its watershed, and so likely provides very little surface runoff to Wetland 5. Thus removal of this portion of Wetland 5 will not interfere with water supply to the wetland as a whole.

There are no species at risk or species of conservation concern known to be present in this wetland.

The project footprint has been adjusted so as to minimize impacts to wetlands and watercourses in the area. DDV Gold Limited (DDVG) will work with NSDNR to develop the required mitigation measures including wetland compensation and the preferred compensation ratio. DDVG is considering various approaches to the wetland compensation issue. The first approach, preferred by NSDNR, is to create wetland habitat within the same watershed as the wetland which is to be altered. DDVG is considering creating wetland habitat onsite once mine operations are completed by ensuring that the flooded quarry pit has sufficiently shallow edges to support a marsh-type wetland. If this is not possible, the proponent will consider a wetland enhancement or creation project outside of the local watershed. Contribution to wetland education and/or protection programs may also be considered.

Summary

In summary, assuming that the proposed mitigation measures are applied, and that existing site drainage conditions are maintained, the Touquoy Gold Project is not likely to have significant effects on wetland functional attributes in the area. Removal of 4% of Wetland 5 is not expected to have negative impacts on any rare or endangered species in the area.

Evaluation Expertise

Conestoga-Rovers & Associates is a multi-disciplinary engineering, environmental consulting, construction, and information technology (IT) services firm. Since its inception in 1976, CRA has provided practical, innovative, and effective services in the areas of environmental site assessment, impact assessment, environmental remediation, regulatory compliance and permitting, risk assessment, hydrology, solid and hazardous waste management, air quality

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Aerial photography of the site dating from 1964, 1974, 1982, 1993, and 2003 was reviewed to provide information on historical forestry activities in the area.

Beth Cameron, B.Sc. M.Sc., is a Terrestrial Ecologist with Conestoga-Rover & Associates' Halifax office. She has significant experience conducting surveys for flora and fauna, as well as wetland surveys, and has worked on federal and provincial environmental screenings involving wetland alterations. She has also completed a Wetland Delineation and Classification course on the US Army Corps of Engineers wetland delineation protocol and has also taken a course on identifying grasses, sedges, and rushes.

Jeffrey Balsdon, B.Sc., M.Sc., is a Terrestrial Ecologist with Conestoga-Rover & Associates' Halifax office. He has considerable experience conducting surveys for flora and fauna, as well as wetland surveys. He has also taken a course on identifying grasses, sedges, and rushes.

Kristen Nyborg is an Environmental Technologist with Conestoga-Rover & Associates' Halifax office. She holds an Ontario Wetland Evaluation System Certificate, and has significant wetland field experience. She has also completed a Wetland Delineation and Classification course on the US Army Corps of Engineers wetland delineation protocol.

Susan Belford, B.Sc., M.Sc., is a Senior Project Manager with Conestoga-Rovers & Associates' Halifax office. She is very familiar with wetland legislation, having worked on many environmental assessment projects involving provincial and federal regulations and processes.

Dave Strajt, M. Eng., is a Water Resources Engineer/Hydrologist with Conestoga-Rovers & Associates' Halifax office. He is very familiar with surface water processes as they relate to mining process.

Peter Oram, CESA, P.Geo. is a Geologist with Conestoga-Rovers & Associates' Halifax office. He has assisted with ten wetland alteration permits, providing hydrogeological advice. He is very familiar with wetland legislation, having worked on many environmental assessment projects involving provincial and federal legislative processes.

References

Davis, Derek, Sue Brown, 1997. The Natural History of Nova Scotia, Nova Scotia Museum.

Erskine, A.J. 1992. Atlas of Breeding Bird of the Maritime Provinces. Nova Scotia Museum.

Nova Scotia Environment and Labour, 1988. The Erosion and Sedimentation Control Handbook for Construction Sites.

Nova Scotia Department of Natural Resources, Nova Scotia General Status Ranks
http://www.gov.ns.ca/natr/wildlife/genstatus/ranks.asp

Nova Scotia Department of Natural Resources, Significant Species and Habitats Database.
http://www.gov.ns.ca/natr/wildlife/Thp/disclaim.htm

Nova Scotia Department of Natural Resources. Wetlands Database

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APPENDIX J

GEOCHEMICAL DATA

This Appendix Includes:

- Report M1496 and Hg assays A4COA
- VO07104119: Assay certificate for the McGregor tailings
- VO07102220 and VO07104831: Assay certificates for the site soil sampling (samples SS058-176)Note that sample 61 also comes from McGregor tailings
- VO07055647: Assay certificate for the other two tailings areas (Moose River Gold Mines and G&K)
- VO07046023 and VO07046024: More accurate As and Hg assays from high values in MRGM and G&K tailings areas detected in VO07055647

metcon
LABORATORIES

DETERMINATION OF LOW LEVEL MERCURY VALUES IN TOUQUOY COMPOSITE SAMPLES

REPORT NUMBER M1496

CLIENT Atlantic Gold NL

DATE 3rd August, 2007

TEST SAMPLES The thirteen composite samples as listed in Table 2 of Metcon Laboratories report M1142.

TAM	Argillite master composite
TWT	Argillite location composite - western section top
TWM	Argillite location composite - western section middle
TWB	Argillite location composite - western section bottom
TET	Argillite location composite - eastern section top
TEB	Argillite location composite - eastern section bottom
TGA	Argillite grade composite
TGB	Argillite grade composite
TGC	Argillite grade composite
TGD	Argillite grade composite
TGE	Argillite grade composite
TGW	Greywacke composite
TMX	Mixed lithology composite

OBJECTIVE The previous mercury assays reported were all <1ppm, which was the detection limit for the analytical method used. However, for environmental reasons more quantitative assays were required. Therefore, the composites were re-assayed using an analytical procedure with a lower detection limit.

RESULTS The new mercury assays are shown in the table overleaf.. All the assays were carried out by ALS Chemex (Brisbane). They were completed using the same acid digestion procedure as before, but with the initial ICP-AES finish replaced by an ICP-MS (mass spectrometry) finish, which reduces the detection limit from 1ppm to 5ppb.

S. F. RAYNER

Table 1 below shows the original head assays in Report M1142, but with the new mercury assays inserted.

Table 1. Composite Head Assays

Compo -site	Expected Au g/t *	Au assays g/t	Au average g/t	Ag g/t	Total S %	Sulphate S %	Sulphide S %	Org C %	Cu ppm	Pb ppm	Zn ppm	As ppm	Hg ppb	SG
TAM				<0.2	0.55	0.02	0.53	0.40	55	49	108	1495	11	2.83
TWT				<0.2	0.59	0.03	0.56	0.43	57	23	102	784	5	2.84
TWM				<0.2	0.57	0.02	0.55	0.44	55	22	97	969	9	2.81
TWB				0.2	0.67	0.03	0.64	0.37	66	120	221	1390	6	2.81
TET				0.6	0.38	0.02	0.36	0.34	56	27	98	1390	9	2.79
TEB				<0.2	0.51	0.01	0.50	0.42	71	30	122	1815	7	2.81
TGA				<0.2	0.44	0.01	0.43	0.35	41	19	95	1095	5	2.82
TGB				0.5	0.33	0.01	0.32	0.43	46	24	101	406	6	2.82
TGC				<0.2	0.71	0.02	0.69	0.41	66	28	98	1370	6	2.84
TGD				<0.2	0.59	0.02	0.57	0.40	56	19	96	2110	12	2.83
TGE				0.2	0.63	0.02	0.61	0.39	56	28	103	1820	5	2.83
TGW				<0.2	0.18	0.01	0.17	0.41	25	6	55	210	<5	2.73
TMX				<0.2	0.29	0.01	0.28	0.47	40	16	73	770	5	2.77

The ALS assay certificate is attached

ALS Chemex
EXCELLENCE IN ANALYTICAL CHEMISTRY
ALS Canada Ltd.
212 Brooksbank Avenue
North Vancouver BC V7J 2C1
Phone: 604 984 0221 Fax: 604 984 0218 www.alschemex.com

To: **DDV GOLD**
SUITE 701 - 220 PACIFIC HIGHWAY
CROWS NEST NSW 2065
AUSTRALIA

Finalized Date: 16-JUN-2007
Account: DDVGO

CERTIFICATE VO07046023

Project: TOUQUOY

P.O. No.:

This report is for 2 Sediment samples submitted to our lab in Val d'Or, QC, Canada on 7-JUN-2007.

The following have access to data associated with this certificate:

WALLY BUCKNELL ROBERT MURPHY	JULI FIDLER JOHN UTLEY	DDV GOLD

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
FND-02a	Find Sample at Branch Lab

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
As-AA62	Ore grade As - four acid / AAS	AAS

To: **DDV GOLD**
ATTN: WALLY BUCKNELL
SUITE 701 - 220 PACIFIC HIGHWAY
CROWS NEST NSW 2065
AUSTRALIA

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:

Lawrence Ng, Laboratory Manager - Vancouver

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AUSTRALIA

Finalized Date: 16-JUN-2007
Account: DDVGO

Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07046023

Sample Description	Method	As-AA62
	Analyte	As
	Units	%
	LOR	0.01
MRT-07-05		2.05
MRT-07-08		3.50

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Finalized Date: 7-JUN-2007
Account: DDVGO

CERTIFICATE VO07046024

Project: TOUQUOY

P.O. No.:

This report is for 8 Sediment samples submitted to our lab in Val d'Or, QC, Canada on 7-JUN-2007.

The following have access to data associated with this certificate:

WALLY BUCKNELL ROBERT MURPHY	JULI FIDLER JOHN UTLEY	DDV GOLD

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
Hg-CV41	Trace Hg - cold vapor/AAS	FIMS

To: **DDV GOLD**
ATTN: WALLY BUCKNELL
SUITE 701 - 220 PACIFIC HIGHWAY
CROWS NEST NSW 2065
AUSTRALIA

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:

Lawrence Ng, Laboratory Manager - Vancouver

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CROWS NEST NSW 2065
AUSTRALIA

Finalized Date: 7-JUN-2007
Account: DDVGO

Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07046024

Sample Description	Method	Hg-CV41
	Analyte	Hg
	Units	ppm
	LOR	0.01
MRT-07-01		5.10
MRT-07-02		7.03
MRT-07-03		6.40
MRT-07-04		60.2
MRT-07-05		9.38
MRT-07-06		4.36
MRT-07-07		16.90
MRT-07-08		3.85

Comments: Hg-CV41 data on all samples were originally reported on VO07055647.

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Finalized Date: 6-JUN-2007
Account: DDVGO

CERTIFICATE VO07055647

Project: TOUQUOY

P.O. No.: DDV-283

This report is for 8 Sediment samples submitted to our lab in Val d'Or, QC, Canada on 30-MAY-2007.

The following have access to data associated with this certificate:

WALLY BUCKNELL ROBERT MURPHY	JULI FIDLER JOHN UTLEY	DDV GOLD

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
DRY-22	Drying - Maximum Temp 60C
PUL-21	Pulverize entire sample
HOM-01	Homogenise Sample
LOG-22	Sample login - Rcd w/o BarCode

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME-ICP41	35 Element Aqua Regia ICP-AES	ICP-AES
Hg-CV41	Trace Hg - cold vapor/AAS	FIMS

To: **DDV GOLD**
ATTN: WALLY BUCKNELL
SUITE 701 - 220 PACIFIC HIGHWAY
CROWS NEST NSW 2065
AUSTRALIA

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature: 

Lawrence Ng, Laboratory Manager - Vancouver

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AUSTRALIA

Finalized Date: 6-JUN-2007
Account: DDVGO

Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07055647

Sample Description	Method	WEI-21	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Recvd Wt.	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga
	Units	kg	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm
	LOR	0.02	0.2	0.01	2	10	10	0.5	2	0.01	0.5	1	1	1	0.01	10
MRT-07-01		3.30	<0.2	1.49	866	<10	30	<0.5	2	0.09	<0.5	15	15	80	4.35	<10
MRT-07-02		3.32	<0.2	2.11	895	<10	50	<0.5	2	0.12	<0.5	15	22	60	4.53	10
MRT-07-03		2.27	0.3	1.37	637	<10	40	<0.5	<2	0.13	<0.5	14	14	46	3.14	<10
MRT-07-04		4.25	0.9	1.60	9650	<10	20	<0.5	2	0.04	<0.5	9	17	18	5.87	<10
MRT-07-05		2.85	0.5	1.07	>10000	<10	10	<0.5	2	0.08	<0.5	6	12	14	5.71	<10
MRT-07-06		3.48	0.2	2.13	3260	<10	40	<0.5	2	0.14	<0.5	10	23	58	5.19	10
MRT-07-07		4.15	<0.2	2.05	5740	<10	30	<0.5	2	0.07	<0.5	10	28	267	4.84	10
MRT-07-08		2.07	0.5	1.16	>10000	<10	90	<0.5	3	0.37	<0.5	154	10	113	13.15	<10

Comments: It took 2 days to have dry samples in drying oven that is controlled to a maximum temperature of 60C.

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Finalized Date: 6-JUN-2007
Account: DDVGO

Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07055647

Sample Description	Method	Hg-CV41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Hg	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sr	Ti
	Units	ppm	%	ppm	%	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm	ppm	%
	LOR	0.01	0.01	10	0.01	5	1	0.01	1	10	2	0.01	2	1	1	0.01
MRT-07-01		5.10	0.14	20	0.66	902	<1	<0.01	33	310	17	0.06	<2	2	8	0.01
MRT-07-02		7.03	0.18	30	0.94	745	<1	<0.01	28	460	29	0.01	<2	2	11	<0.01
MRT-07-03		6.40	0.11	20	0.64	2210	<1	<0.01	24	410	37	0.01	<2	1	14	0.01
MRT-07-04		60.2	0.12	20	0.86	288	1	<0.01	24	440	297	0.19	40	1	5	0.01
MRT-07-05		9.38	0.05	20	0.57	220	<1	<0.01	22	180	44	0.07	4	1	23	0.01
MRT-07-06		4.36	0.17	30	1.07	508	<1	<0.01	25	500	29	0.01	<2	2	10	0.01
MRT-07-07		16.9	0.14	20	0.98	262	<1	<0.01	19	820	34	0.33	<2	3	6	0.01
MRT-07-08		3.85	0.08	20	0.34	15400	2	0.01	108	610	43	0.12	4	1	30	0.01

Comments: It took 2 days to have dry samples in drying oven that is controlled to a maximum temperature of 60C.

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Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07055647

Sample Description	Method	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Tl	U	V	W	Zn
	Units	ppm	ppm	ppm	ppm	ppm
	LOR	10	10	1	10	2
MRT-07-01		<10	<10	11	<10	66
MRT-07-02		<10	<10	16	<10	87
MRT-07-03		<10	<10	10	<10	60
MRT-07-04		<10	<10	13	<10	81
MRT-07-05		<10	<10	12	<10	57
MRT-07-06		<10	<10	16	<10	98
MRT-07-07		<10	<10	14	<10	80
MRT-07-08		<10	<10	12	<10	149

Comments: It took 2 days to have dry samples in drying oven that is controlled to a maximum temperature of 60C.

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AUSTRALIA

Finalized Date: 19-OCT-2007
Account: DDVGO

CERTIFICATE VO07102220

Project: TOUQUOY

P.O. No.: DDV-307

This report is for 71 Soil samples submitted to our lab in Val d'Or, QC, Canada on 12-SEP-2007.

The following have access to data associated with this certificate:

WALLY BUCKNELL ROBERT MURPHY	JULI FIDLER JOHN UTLEY	DDV GOLD

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
SCR-41	Screen to -180um and save both
DRY-22	Drying - Maximum Temp 60C

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME-ICP41	35 Element Aqua Regia ICP-AES	ICP-AES
Au-ICP21	Au 30g FA ICP-AES Finish	ICP-AES

To: **DDV GOLD**
ATTN: WALLY BUCKNELL
SUITE 701 - 220 PACIFIC HIGHWAY
CROWS NEST NSW 2065
AUSTRALIA

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature: Lawrence Ng, Laboratory Manager - Vancouver

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CROWS NEST NSW 2065
AUSTRALIA

Finalized Date: 19-OCT-2007
Account: DDVGO

Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07102220

Sample Description	Method	WEI-21	Au-ICP21	Au-ICP21	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Recvd Wt.	Au	Au Check	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu
	Units	kg	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
	LOR	0.02	0.001	0.001	0.2	0.01	2	10	10	0.5	2	0.01	0.5	1	1	1
SS-07-58		0.56			<0.2	1.10	39	<10	20	<0.5	<2	0.02	<0.5	3	12	4
SS-07-59		0.41			<0.2	1.41	31	<10	10	<0.5	<2	0.01	<0.5	1	16	3
SS-07-60		0.44			0.2	1.44	11	<10	20	<0.5	<2	0.01	<0.5	3	18	7
SS-07-61		0.52			0.4	1.21	4550	<10	10	<0.5	2	0.04	<0.5	5	14	16
SS-07-62		0.38			<0.2	1.22	34	<10	20	<0.5	<2	0.01	<0.5	2	11	2
SS-07-63		0.53			0.3	1.96	23	<10	20	<0.5	2	0.02	<0.5	5	20	29
SS-07-64		0.46			0.2	2.26	21	<10	20	<0.5	<2	0.03	<0.5	5	25	9
SS-07-65		0.44			0.2	2.65	107	<10	60	<0.5	<2	0.02	<0.5	15	29	9
SS-07-66		0.45			<0.2	1.03	8	<10	20	<0.5	2	0.02	<0.5	5	16	10
SS-07-67		0.50			0.2	3.87	30	<10	20	<0.5	3	0.01	<0.5	4	43	19
SS-07-68		0.34			<0.2	2.55	144	<10	20	<0.5	2	0.03	<0.5	7	26	16
SS-07-69		0.56			0.2	1.39	88	<10	20	<0.5	<2	0.03	<0.5	10	18	21
SS-07-70		0.50			<0.2	1.91	34	<10	20	<0.5	<2	0.01	<0.5	3	21	9
SS-07-71		0.55			<0.2	1.02	90	<10	20	<0.5	<2	0.03	<0.5	4	13	2
SS-07-72		0.58			<0.2	0.28	<2	<10	10	<0.5	<2	0.01	<0.5	<1	3	1
SS-07-73		0.64			<0.2	1.22	19	<10	10	<0.5	<2	0.01	<0.5	5	15	9
SS-07-74		0.61			<0.2	1.23	17	<10	10	<0.5	<2	0.01	<0.5	5	15	9
SS-07-75		0.43			0.2	1.47	31	<10	40	<0.5	<2	0.04	<0.5	18	17	9
SS-07-76		0.68			<0.2	1.38	27	<10	20	<0.5	2	0.03	<0.5	9	19	21
SS-07-77		0.46			<0.2	1.47	17	<10	10	<0.5	3	<0.01	<0.5	4	19	10
SS-07-78		0.39			0.3	2.11	28	<10	30	<0.5	<2	0.01	<0.5	14	21	12
SS-07-79		0.37			0.2	1.20	13	<10	60	0.6	<2	0.08	<0.5	11	13	9
SS-07-80		0.44			<0.2	0.84	4	<10	20	<0.5	<2	0.01	<0.5	4	11	3
SS-07-81		0.45			<0.2	1.61	11	<10	30	<0.5	<2	0.01	<0.5	7	22	11
SS-07-82		0.49			0.2	1.49	9	<10	30	<0.5	<2	0.01	<0.5	6	20	10
SS-07-83		0.38			0.2	1.81	7	<10	40	0.5	<2	0.02	<0.5	10	19	8
SS-07-84		0.49			<0.2	1.45	8	<10	40	<0.5	<2	0.01	<0.5	7	19	8
SS-07-85		0.39			0.2	1.62	7	<10	40	<0.5	<2	0.01	<0.5	10	20	9
SS-07-86		0.58			<0.2	1.26	<2	<10	30	<0.5	<2	0.01	<0.5	4	14	6
SS-07-87		0.62			<0.2	0.94	4	<10	20	<0.5	<2	0.01	<0.5	3	9	2
SS-07-88		0.41			0.2	2.45	23	<10	20	<0.5	2	0.01	<0.5	6	23	10
SS-07-89		0.59			<0.2	1.80	20	<10	10	<0.5	<2	0.01	<0.5	5	20	14
SS-07-90		0.48			<0.2	1.26	4	<10	20	<0.5	2	0.01	<0.5	4	13	5
SS-07-91		0.54			<0.2	1.16	8	<10	30	<0.5	<2	0.01	<0.5	4	14	5
SS-07-92		0.46			0.2	2.48	31	<10	20	<0.5	<2	0.01	<0.5	6	29	14
SS-07-93		0.56			0.2	2.47	120	<10	20	<0.5	2	0.01	<0.5	12	28	11
SS-07-94		0.40			0.3	1.92	18	<10	10	<0.5	<2	0.01	<0.5	4	21	12
SS-07-95		0.34			<0.2	1.94	8	<10	40	<0.5	<2	0.01	<0.5	9	21	9
SS-07-96		0.43			<0.2	1.92	8	<10	50	0.5	<2	0.01	<0.5	11	23	11
SS-07-97		0.40			<0.2	1.74	8	<10	40	<0.5	2	0.01	<0.5	6	19	8

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To: **DDV GOLD**
SUITE 701 - 220 PACIFIC HIGHWAY
CROWS NEST NSW 2065
AUSTRALIA

Finalized Date: 19-OCT-2007
Account: DDVGO

Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07102220

Sample Description	Method	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Fe	Ga	Hg	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc
	Units	%	ppm	ppm	%	ppm	%	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.01	10	1	0.01	10	0.01	5	1	0.01	1	10	2	0.01	2	1
SS-07-58		1.12	10	1	0.03	10	0.21	150	<1	<0.01	7	80	11	0.02	<2	1
SS-07-59		2.81	10	1	0.02	10	0.12	78	<1	<0.01	2	190	8	0.02	<2	1
SS-07-60		3.24	10	<1	0.02	10	0.09	198	<1	<0.01	6	280	14	0.03	<2	1
SS-07-61		4.71	<10	19	0.01	20	0.63	245	1	<0.01	5	360	65	0.06	5	1
SS-07-62		2.17	10	1	0.02	<10	0.19	161	<1	<0.01	4	50	4	0.03	<2	1
SS-07-63		2.61	10	<1	0.02	10	0.18	266	<1	<0.01	8	340	10	0.03	<2	1
SS-07-64		4.92	10	1	0.02	10	0.29	353	<1	<0.01	8	410	15	0.06	<2	2
SS-07-65		5.23	10	1	0.04	10	0.37	649	7	<0.01	33	400	29	0.05	<2	2
SS-07-66		1.70	<10	<1	0.03	10	0.30	274	1	<0.01	14	120	6	0.02	<2	1
SS-07-67		5.15	10	2	0.03	10	0.16	200	1	<0.01	7	460	16	0.08	<2	2
SS-07-68		3.25	10	1	0.02	10	0.14	838	1	<0.01	8	350	16	0.05	<2	2
SS-07-69		2.09	<10	<1	0.03	10	0.36	405	1	<0.01	25	200	10	0.02	<2	1
SS-07-70		3.42	10	1	0.01	10	0.21	173	<1	<0.01	5	210	5	0.03	<2	2
SS-07-71		2.12	<10	1	0.01	10	0.37	232	<1	<0.01	6	100	3	0.02	2	1
SS-07-72		0.12	<10	1	0.01	10	0.01	34	<1	<0.01	<1	30	4	0.01	<2	<1
SS-07-73		2.05	<10	1	0.03	10	0.27	303	1	<0.01	9	150	8	0.03	<2	1
SS-07-74		1.98	<10	1	0.03	10	0.25	286	<1	<0.01	8	160	8	0.04	<2	1
SS-07-75		2.21	<10	1	0.03	10	0.23	738	1	<0.01	11	330	18	0.03	<2	1
SS-07-76		2.65	<10	1	0.03	20	0.37	528	1	<0.01	18	250	11	0.02	<2	1
SS-07-77		4.92	10	1	0.01	10	0.19	136	<1	<0.01	6	260	4	0.03	<2	1
SS-07-78		3.50	10	1	0.05	20	0.22	705	2	<0.01	8	370	17	0.05	<2	1
SS-07-79		2.17	<10	1	0.03	10	0.17	4350	4	<0.01	12	460	18	0.04	<2	1
SS-07-80		1.19	<10	2	0.03	10	0.13	316	<1	<0.01	3	140	9	0.01	<2	1
SS-07-81		2.81	10	1	0.05	10	0.28	436	1	<0.01	11	280	11	0.03	<2	2
SS-07-82		2.65	10	<1	0.05	10	0.26	432	1	<0.01	12	280	10	0.03	<2	1
SS-07-83		2.66	10	<1	0.05	20	0.24	1085	1	<0.01	12	380	11	0.04	<2	1
SS-07-84		2.13	<10	1	0.05	10	0.28	804	1	<0.01	10	320	7	0.05	<2	1
SS-07-85		2.63	10	1	0.05	10	0.25	1290	1	<0.01	10	350	9	0.04	<2	1
SS-07-86		1.52	<10	1	0.04	10	0.23	248	1	<0.01	8	180	7	0.02	2	1
SS-07-87		0.88	<10	<1	0.04	10	0.12	114	1	<0.01	3	90	10	0.02	<2	1
SS-07-88		4.05	10	1	0.03	10	0.17	257	<1	<0.01	7	460	12	0.11	2	2
SS-07-89		2.88	<10	1	0.02	10	0.23	287	<1	<0.01	9	260	10	0.04	<2	2
SS-07-90		1.92	10	1	0.04	10	0.16	241	1	<0.01	5	210	7	0.02	<2	1
SS-07-91		1.91	10	1	0.05	10	0.22	290	1	<0.01	7	160	7	0.02	<2	1
SS-07-92		5.63	10	2	0.02	20	0.33	263	<1	<0.01	12	640	7	0.05	<2	2
SS-07-93		3.84	10	1	0.02	20	0.44	450	1	<0.01	9	290	5	0.04	<2	2
SS-07-94		4.49	10	1	0.02	10	0.14	276	1	<0.01	5	380	12	0.04	2	1
SS-07-95		2.70	10	1	0.05	10	0.22	1575	1	<0.01	10	400	11	0.04	<2	1
SS-07-96		2.95	10	1	0.05	10	0.32	920	1	<0.01	15	210	13	0.03	2	2
SS-07-97		2.75	10	1	0.05	10	0.21	412	1	<0.01	7	320	14	0.03	<2	1

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AUSTRALIA

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CERTIFICATE OF ANALYSIS VO07102220

Sample Description	Method	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Sr	Th	Ti	Tl	U	V	W	Zn
	Units	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm
	LOR	1	20	0.01	10	10	1	10	2
SS-07-58		2	<20	0.07	<10	<10	18	<10	20
SS-07-59		4	<20	0.04	<10	<10	31	<10	14
SS-07-60		3	<20	0.05	<10	<10	33	<10	21
SS-07-61		3	<20	0.01	<10	<10	10	<10	52
SS-07-62		2	<20	0.05	<10	<10	22	<10	15
SS-07-63		4	<20	0.03	<10	<10	23	<10	80
SS-07-64		3	<20	0.13	<10	<10	28	<10	45
SS-07-65		5	<20	0.04	<10	<10	35	<10	67
SS-07-66		4	<20	0.04	<10	<10	15	<10	33
SS-07-67		3	<20	0.05	<10	<10	33	<10	33
SS-07-68		4	<20	0.04	<10	<10	27	<10	27
SS-07-69		5	<20	0.04	<10	<10	13	<10	42
SS-07-70		2	<20	0.05	<10	<10	32	<10	32
SS-07-71		4	<20	0.02	<10	<10	12	<10	33
SS-07-72		3	<20	0.03	<10	<10	8	<10	2
SS-07-73		4	<20	0.04	<10	<10	15	<10	32
SS-07-74		4	<20	0.04	<10	<10	15	<10	31
SS-07-75		6	<20	0.03	<10	<10	18	<10	56
SS-07-76		6	<20	0.05	<10	<10	15	<10	49
SS-07-77		1	<20	0.01	<10	<10	36	<10	29
SS-07-78		5	<20	0.04	<10	<10	27	<10	37
SS-07-79		9	<20	0.02	<10	<10	19	<10	36
SS-07-80		4	<20	0.03	<10	<10	17	<10	16
SS-07-81		6	<20	0.04	<10	<10	22	<10	39
SS-07-82		6	<20	0.04	<10	<10	22	<10	35
SS-07-83		6	<20	0.02	<10	<10	23	<10	39
SS-07-84		6	<20	0.03	<10	<10	18	<10	40
SS-07-85		5	<20	0.03	<10	<10	22	<10	39
SS-07-86		5	<20	0.03	<10	<10	17	<10	26
SS-07-87		5	<20	0.02	<10	<10	15	<10	16
SS-07-88		3	<20	0.06	<10	<10	25	<10	31
SS-07-89		4	<20	0.05	<10	<10	19	<10	31
SS-07-90		4	<20	0.02	<10	<10	20	<10	21
SS-07-91		5	<20	0.02	<10	<10	20	<10	26
SS-07-92		3	<20	0.02	<10	<10	22	<10	43
SS-07-93		2	<20	0.01	<10	<10	22	<10	55
SS-07-94		3	<20	0.06	<10	<10	30	<10	26
SS-07-95		5	<20	0.02	<10	<10	23	<10	44
SS-07-96		5	<20	0.02	<10	<10	24	<10	52
SS-07-97		5	<20	0.02	<10	<10	27	<10	28

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CERTIFICATE OF ANALYSIS VO07102220

Method	WEI-21	Au-ICP21	Au-ICP21	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
Analyte	Recvd Wt.	Au	Au Check	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu
Units	kg	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
Sample Description LOR	0.02	0.001	0.001	0.2	0.01	2	10	10	0.5	2	0.01	0.5	1	1	1
SS-07-98	0.35			0.2	1.51	10	<10	20	<0.5	2	0.01	<0.5	5	18	8
SS-07-99	0.44			<0.2	0.78	7	<10	10	<0.5	<2	0.01	<0.5	3	10	4
SS-07-100	0.53			<0.2	1.40	14	<10	20	<0.5	<2	0.01	<0.5	6	16	12
SS-07-101	0.64			<0.2	0.99	3	<10	20	<0.5	<2	0.01	<0.5	5	13	6
SS-07-102	0.40			0.2	1.49	9	<10	30	<0.5	2	0.01	<0.5	5	16	8
SS-07-103	0.57			<0.2	1.06	4	<10	20	<0.5	<2	0.01	<0.5	3	12	5
SS-07-104	0.39			0.2	2.19	19	<10	10	<0.5	2	0.01	<0.5	4	22	9
SS-07-105	0.53			<0.2	1.27	5	<10	10	<0.5	<2	0.01	<0.5	3	14	5
SS-07-106	0.51			<0.2	1.21	11	<10	10	<0.5	<2	<0.01	<0.5	1	12	3
SS-07-107	0.44			<0.2	2.21	38	<10	10	<0.5	3	0.01	<0.5	4	21	14
SS-07-108	0.41			0.2	1.16	24	<10	10	<0.5	<2	0.01	<0.5	2	16	7
SS-07-109	0.47			<0.2	1.32	10	<10	30	<0.5	<2	0.01	<0.5	5	17	7
SS-07-110	0.46			<0.2	0.88	5	<10	20	<0.5	<2	0.01	<0.5	4	10	5
SS-07-111	0.37			0.3	1.94	9	<10	40	<0.5	<2	0.01	<0.5	7	21	12
SS-07-112	0.51			<0.2	1.21	8	<10	30	<0.5	<2	0.01	<0.5	7	16	7
SS-07-113	0.52			0.2	2.27	15	<10	50	0.7	<2	0.02	<0.5	12	24	14
SS-07-114	0.53			0.2	1.80	11	<10	40	<0.5	<2	0.01	<0.5	7	22	9
SS-07-115	0.53			<0.2	1.75	2	<10	30	<0.5	<2	0.01	<0.5	11	20	10
SS-07-116	0.49			0.2	1.95	9	<10	30	<0.5	<2	0.01	<0.5	6	20	10
SS-07-117	0.75			<0.2	1.03	9	<10	10	<0.5	<2	0.02	<0.5	4	14	11
SS-07-118	0.52			<0.2	1.07	13	<10	10	<0.5	<2	0.01	<0.5	2	12	4
SS-07-119	0.68			<0.2	0.76	4	<10	10	<0.5	<2	0.01	<0.5	3	11	3
SS-07-120	0.65			<0.2	0.69	6	<10	10	<0.5	<2	<0.01	<0.5	1	6	3
SS-07-121	0.49			<0.2	2.90	62	<10	10	<0.5	<2	0.01	<0.5	6	27	20
SS-07-122	0.59			<0.2	1.60	71	<10	10	<0.5	<2	0.01	<0.5	4	18	8
SS-07-123	0.39			0.2	0.70	116	<10	10	<0.5	<2	<0.01	<0.5	1	7	6
SS-07-124	0.42			<0.2	0.77	4	<10	<10	<0.5	2	0.01	<0.5	1	9	1
SS-07-125	0.60			<0.2	1.11	9	<10	10	<0.5	<2	0.02	<0.5	4	13	3
SS-07-126	0.49			<0.2	1.72	16	<10	10	<0.5	<2	0.01	<0.5	3	25	11
SS-07-127	0.59			<0.2	0.75	<2	<10	20	<0.5	<2	0.01	<0.5	1	6	2
SS-07-128	0.44			0.2	3.28	5	<10	30	0.5	2	0.02	<0.5	8	30	19

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CERTIFICATE OF ANALYSIS VO07102220

Sample Description	Method	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Fe	Ga	Hg	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc
	Units	%	ppm	ppm	%	ppm	%	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm
	LOR	0.01	10	1	0.01	10	0.01	5	1	0.01	1	10	2	0.01	2	1
SS-07-98		2.96	10	1	0.03	10	0.20	424	1	<0.01	7	290	11	0.03	2	1
SS-07-99		1.48	<10	1	0.02	10	0.16	181	1	<0.01	5	150	7	0.01	2	1
SS-07-100		2.40	10	1	0.02	10	0.19	405	1	<0.01	7	270	8	0.03	<2	1
SS-07-101		1.58	<10	1	0.03	10	0.22	258	1	<0.01	7	140	8	0.02	<2	1
SS-07-102		2.44	10	1	0.04	10	0.20	327	1	<0.01	9	320	12	0.03	<2	1
SS-07-103		1.68	<10	1	0.03	10	0.12	201	1	<0.01	4	120	6	0.01	<2	1
SS-07-104		4.35	10	1	0.02	10	0.13	163	1	<0.01	5	290	10	0.06	<2	2
SS-07-105		2.17	10	1	0.03	10	0.19	180	<1	<0.01	5	110	7	0.01	<2	1
SS-07-106		3.01	10	1	0.02	<10	0.06	74	<1	<0.01	2	300	4	0.02	<2	1
SS-07-107		4.18	10	2	0.01	10	0.14	156	<1	<0.01	4	580	11	0.05	<2	1
SS-07-108		3.60	10	1	0.01	10	0.09	197	<1	<0.01	4	280	12	0.03	<2	1
SS-07-109		2.28	<10	1	0.04	10	0.20	597	1	<0.01	8	260	7	0.03	<2	1
SS-07-110		1.47	<10	<1	0.03	10	0.16	511	1	<0.01	5	200	5	0.02	<2	1
SS-07-111		2.94	10	1	0.05	10	0.32	494	1	<0.01	12	340	10	0.04	<2	1
SS-07-112		2.09	<10	1	0.04	10	0.24	1200	1	<0.01	9	220	7	0.02	<2	1
SS-07-113		3.19	10	2	0.06	20	0.28	1145	2	<0.01	15	420	16	0.04	<2	2
SS-07-114		2.61	10	2	0.05	10	0.34	765	2	<0.01	14	340	10	0.04	<2	1
SS-07-115		2.34	10	1	0.04	10	0.24	500	1	<0.01	13	230	10	0.03	<2	1
SS-07-116		2.96	10	1	0.05	10	0.21	421	1	<0.01	8	400	12	0.04	<2	1
SS-07-117		1.47	<10	<1	0.02	10	0.24	237	1	<0.01	9	150	7	0.02	<2	1
SS-07-118		3.08	10	1	0.02	10	0.06	83	<1	<0.01	3	250	7	0.02	<2	1
SS-07-119		1.32	<10	<1	0.03	10	0.18	193	<1	<0.01	6	70	4	0.01	2	1
SS-07-120		1.08	10	1	0.01	<10	0.03	48	<1	<0.01	2	60	2	0.01	<2	1
SS-07-121		5.09	10	2	0.02	10	0.25	234	<1	<0.01	9	420	15	0.06	<2	2
SS-07-122		5.11	10	1	0.02	10	0.32	171	1	<0.01	6	280	7	0.03	2	1
SS-07-123		2.87	<10	2	0.01	10	0.06	80	<1	<0.01	2	140	2	0.01	2	<1
SS-07-124		1.11	10	<1	0.01	<10	0.17	123	<1	<0.01	<1	50	7	0.01	<2	1
SS-07-125		1.82	10	<1	0.02	10	0.41	244	<1	<0.01	8	100	5	0.01	<2	1
SS-07-126		5.11	10	1	0.02	10	0.17	180	2	<0.01	5	330	14	0.04	2	1
SS-07-127		0.89	10	1	0.03	<10	0.09	62	1	<0.01	3	80	6	0.01	<2	1
SS-07-128		3.79	10	2	0.03	10	0.53	421	<1	<0.01	20	510	22	0.04	3	2

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To: **DDV GOLD**
SUITE 701 - 220 PACIFIC HIGHWAY
CROWS NEST NSW 2065
AUSTRALIA

Finalized Date: 19-OCT-2007
Account: DDVGO

Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07102220

Sample Description	Method	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Sr	Th	Ti	Tl	U	V	W	Zn
	Units	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm
	LOR	1	20	0.01	10	10	1	10	2
SS-07-98		3	<20	0.04	<10	<10	24	<10	29
SS-07-99		3	<20	0.03	<10	<10	15	<10	16
SS-07-100		4	<20	0.03	<10	<10	18	<10	29
SS-07-101		4	<20	0.02	<10	<10	14	<10	25
SS-07-102		4	<20	0.02	<10	<10	20	<10	28
SS-07-103		4	<20	0.02	<10	<10	19	<10	16
SS-07-104		3	<20	0.06	<10	<10	36	<10	26
SS-07-105		4	<20	0.03	<10	<10	20	<10	19
SS-07-106		1	<20	0.09	<10	<10	44	<10	8
SS-07-107		2	<20	0.03	<10	<10	26	<10	23
SS-07-108		2	<20	0.05	<10	<10	24	<10	28
SS-07-109		4	<20	0.02	<10	<10	19	<10	28
SS-07-110		4	<20	0.02	<10	<10	14	<10	20
SS-07-111		5	<20	0.03	<10	<10	23	<10	43
SS-07-112		4	<20	0.02	<10	<10	17	<10	30
SS-07-113		5	<20	0.04	<10	<10	25	<10	53
SS-07-114		5	<20	0.03	<10	<10	20	<10	50
SS-07-115		4	<20	0.03	<10	<10	19	<10	42
SS-07-116		5	<20	0.02	<10	<10	25	<10	30
SS-07-117		4	<20	0.05	<10	<10	13	<10	24
SS-07-118		2	<20	0.07	<10	<10	33	<10	10
SS-07-119		5	<20	0.03	<10	<10	14	<10	17
SS-07-120		1	<20	0.05	<10	<10	26	<10	5
SS-07-121		3	<20	0.05	<10	<10	26	<10	36
SS-07-122		2	<20	0.03	<10	<10	39	<10	39
SS-07-123		1	<20	0.01	<10	<10	20	<10	12
SS-07-124		1	<20	0.16	<10	<10	19	<10	16
SS-07-125		3	<20	0.03	<10	<10	14	<10	35
SS-07-126		3	<20	0.06	<10	<10	32	<10	26
SS-07-127		2	<20	0.08	<10	<10	17	<10	9
SS-07-128		3	<20	0.07	<10	<10	21	<10	62

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Finalized Date: 22-OCT-2007
Account: DDVGO

CERTIFICATE VO07104119

Project: TOUQUOY

P.O. No.: DDV-312

This report is for 4 Soil samples submitted to our lab in Val d'Or, QC, Canada on 21-SEP-2007.

The following have access to data associated with this certificate:

WALLY BUCKNELL ROBERT MURPHY	JULI FIDLER JOHN UTLEY	DDV GOLD

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
DRY-22	Drying - Maximum Temp 60C
LOG-22	Sample login - Rcd w/o BarCode
SCR-41	Screen to -180um and save both

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME-ICP41	35 Element Aqua Regia ICP-AES	ICP-AES
Hg-CV41	Trace Hg - cold vapor/AAS	FIMS

To: **DDV GOLD**
ATTN: WALLY BUCKNELL
SUITE 701 - 220 PACIFIC HIGHWAY
CROWS NEST NSW 2065
AUSTRALIA

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature: 

Lawrence Ng, Laboratory Manager - Vancouver

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AUSTRALIA

Finalized Date: 22-OCT-2007
Account: DDVGO

Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07104119

Sample Description	Method	WEI-21	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Recvd Wt.	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga
	Units	kg	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm
	LOR	0.02	0.2	0.01	2	10	10	0.5	2	0.01	0.5	1	1	1	0.01	10
MRT-07-09		0.57	0.8	1.70	>10000	<10	<10	<0.5	<2	0.05	<0.5	82	17	189	5.64	<10
MRT-07-10		0.66	<0.2	1.48	3630	<10	<10	<0.5	<2	0.24	<0.5	33	16	137	4.69	<10
MRT-07-11		0.58	<0.2	1.49	733	<10	10	<0.5	<2	0.03	<0.5	2	16	44	2.98	<10
MRT-07-12		0.53	<0.2	1.23	1770	<10	<10	<0.5	<2	0.03	<0.5	7	14	55	3.07	<10

Comments: Detection limits on samples requiring dilutions for Hg-CV41, due to inteferences or high concentration levels, have been increased according to the dilution factor.

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Finalized Date: 22-OCT-2007
Account: DDVGO

Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07104119

Sample Description	Method	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Hg	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sr	Th
	Units	ppm	%	ppm	%	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
	LOR	1	0.01	10	0.01	5	1	0.01	1	10	2	0.01	2	1	1	20
MRT-07-09		52	0.02	20	0.89	286	1	<0.01	75	440	55	1.51	12	1	4	<20
MRT-07-10		10	0.01	20	0.83	416	<1	<0.01	50	480	53	1.29	<2	1	12	<20
MRT-07-11		8	0.01	20	0.77	255	<1	<0.01	9	270	17	0.02	<2	1	4	<20
MRT-07-12		17	0.01	20	0.68	200	<1	<0.01	12	290	20	0.22	<2	1	4	<20

Comments: Detection limits on samples requiring dilutions for Hg-CV41, due to inteferences or high concentration levels, have been increased according to the dilution factor.

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AUSTRALIA

Finalized Date: 22-OCT-2007
Account: DDVGO

Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07104119

Sample Description	Method	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	Hg-CV41
	Analyte	Ti	Tl	U	V	W	Zn	Hg
	Units	%	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.01	10	10	1	10	2	0.01
MRT-07-09		0.01	<10	<10	12	<10	77	47.4
MRT-07-10		<0.01	<10	<10	11	<10	71	10.3
MRT-07-11		0.01	<10	<10	11	<10	59	7.53
MRT-07-12		0.01	<10	<10	10	<10	52	17.0

Comments: Detection limits on samples requiring dilutions for Hg-CV41, due to inteferences or high concentration levels, have been increased according to the dilution factor.

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To: **DDV GOLD**
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AUSTRALIA

Finalized Date: 19-OCT-2007
Account: DDVGO

CERTIFICATE VO07104831

Project: TOUQUOY

P.O. No.: DDV-310

This report is for 48 Soil samples submitted to our lab in Val d'Or, QC, Canada on 18-SEP-2007.

The following have access to data associated with this certificate:

WALLY BUCKNELL ROBERT MURPHY	JULI FIDLER JOHN UTLEY	DDV GOLD

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
SCR-41	Screen to -180um and save both
DRY-22	Drying - Maximum Temp 60C

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME-ICP41	35 Element Aqua Regia ICP-AES	ICP-AES
Au-ICP21	Au 30g FA ICP-AES Finish	ICP-AES

To: **DDV GOLD**
ATTN: WALLY BUCKNELL
SUITE 701 - 220 PACIFIC HIGHWAY
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This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature: Lawrence Ng

Lawrence Ng, Laboratory Manager - Vancouver

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Account: DDVGO

Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07104831

Sample Description	Method	WEI-21	Au-ICP21	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Recvd Wt.	Au	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%
	LOR	0.02	0.001	0.2	0.01	2	10	10	0.5	2	0.01	0.5	1	1	1	0.01
SS-07-129		0.38		<0.2	2.17	9	<10	30	<0.5	<2	0.01	<0.5	7	22	11	3.55
SS-07-130		0.47		<0.2	1.47	4	<10	20	<0.5	<2	0.01	<0.5	4	16	6	2.15
SS-07-131		0.42		<0.2	1.73	3	<10	30	<0.5	<2	0.01	<0.5	6	18	7	2.38
SS-07-132		0.68		<0.2	1.56	<2	<10	10	<0.5	<2	0.01	<0.5	2	13	4	1.91
SS-07-133		0.59		<0.2	1.01	8	<10	10	<0.5	<2	0.01	<0.5	1	11	7	2.93
SS-07-134		0.29		<0.2	1.84	6	<10	10	<0.5	2	<0.01	<0.5	3	16	5	3.35
SS-07-135		0.49		<0.2	1.37	25	<10	20	<0.5	2	0.01	<0.5	17	16	34	2.95
SS-07-136		0.31		<0.2	0.74	33	<10	10	<0.5	<2	0.01	<0.5	1	11	5	2.59
SS-07-137		0.46		0.2	2.47	11	<10	20	<0.5	<2	0.01	<0.5	3	23	14	3.52
SS-07-138		0.56		0.2	1.36	9	<10	20	<0.5	<2	0.01	<0.5	3	16	10	3.14
SS-07-139		0.44		<0.2	1.44	11	<10	20	<0.5	<2	0.01	<0.5	3	18	9	4.66
SS-07-140		0.47		<0.2	2.06	12	<10	20	<0.5	<2	0.01	<0.5	8	20	12	2.85
SS-07-141		0.37		0.2	3.34	21	<10	10	<0.5	3	0.01	<0.5	2	41	15	8.36
SS-07-142		0.74		<0.2	1.18	12	<10	10	<0.5	<2	0.01	<0.5	4	14	8	2.02
SS-07-143		0.61		<0.2	1.32	2	<10	10	<0.5	<2	0.02	<0.5	4	16	8	2.20
SS-07-144		0.37		<0.2	4.05	7	<10	20	<0.5	<2	0.01	<0.5	5	33	13	4.00
SS-07-145		0.37		<0.2	2.58	11	<10	20	<0.5	<2	0.01	<0.5	3	25	11	3.74
SS-07-146		0.44		<0.2	1.44	5	<10	10	<0.5	<2	<0.01	<0.5	3	11	8	1.69
SS-07-147		0.61		<0.2	1.37	10	<10	50	<0.5	<2	0.03	<0.5	11	16	11	2.45
SS-07-148		0.58		<0.2	3.75	18	<10	20	<0.5	2	0.02	<0.5	8	40	16	4.67
SS-07-149		0.76		<0.2	0.66	<2	<10	10	<0.5	<2	0.02	<0.5	3	8	3	1.12
SS-07-150		0.63		0.2	1.26	7	<10	10	<0.5	<2	0.01	<0.5	2	15	7	2.89
SS-07-151		0.60		<0.2	1.45	6	<10	30	<0.5	2	0.01	<0.5	4	18	9	3.23
SS-07-152		0.61		<0.2	0.51	<2	<10	10	<0.5	<2	<0.01	<0.5	<1	2	<1	0.10
SS-07-153		0.49		<0.2	1.73	15	<10	10	<0.5	2	0.01	<0.5	3	18	12	3.53
SS-07-154		0.71		<0.2	0.37	<2	<10	<10	<0.5	<2	<0.01	<0.5	<1	2	<1	0.19
SS-07-155		0.62		<0.2	2.85	5	<10	20	<0.5	<2	0.02	<0.5	5	26	11	3.46
SS-07-156		0.39		0.2	1.82	4	<10	20	<0.5	<2	0.02	<0.5	3	19	6	3.60
SS-07-157		0.38		<0.2	3.22	18	<10	20	<0.5	<2	0.01	<0.5	3	27	12	4.09
SS-07-158		0.52		0.2	2.00	8	<10	20	<0.5	<2	0.01	<0.5	4	21	7	3.62
SS-07-159		0.58		<0.2	1.59	6	<10	30	<0.5	2	0.01	<0.5	3	16	6	2.32
SS-07-160		0.46		<0.2	1.06	5	<10	10	<0.5	<2	0.01	<0.5	1	9	3	2.17
SS-07-161		0.39		<0.2	0.89	12	<10	20	<0.5	2	0.01	<0.5	1	13	4	3.06
SS-07-162		0.58		<0.2	0.60	5	<10	10	<0.5	<2	0.02	<0.5	2	9	2	1.37
SS-07-163		0.64		<0.2	1.58	15	<10	30	<0.5	<2	0.01	<0.5	7	18	21	2.61
SS-07-164		0.77		0.2	1.03	7	<10	20	<0.5	<2	0.01	<0.5	4	11	7	1.68
SS-07-165		0.58		<0.2	1.28	4	<10	30	<0.5	<2	0.01	<0.5	4	16	7	1.93
SS-07-166		0.56		<0.2	1.41	11	<10	20	<0.5	<2	0.01	<0.5	2	17	6	2.65
SS-07-167		0.54		<0.2	1.29	11	<10	20	<0.5	2	0.02	<0.5	4	14	5	1.80
SS-07-168		0.64		<0.2	1.45	11	<10	30	<0.5	<2	0.02	<0.5	5	16	5	2.15

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Finalized Date: 19-OCT-2007
Account: DDVGO

Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07104831

Sample Description	Method	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Ga	Hg	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sr
	Units	ppm	ppm	%	ppm	%	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm	ppm
	LOR	10	1	0.01	10	0.01	5	1	0.01	1	10	2	0.01	2	1	1
SS-07-129		10	1	0.05	10	0.28	497	1	<0.01	15	360	15	0.05	668	2	5
SS-07-130		<10	1	0.02	10	0.22	327	<1	<0.01	10	240	4	0.02	93	1	4
SS-07-131		<10	2	0.05	10	0.22	488	1	<0.01	10	210	12	0.02	53	1	5
SS-07-132		10	<1	0.02	10	0.12	91	<1	<0.01	7	150	13	0.03	17	1	4
SS-07-133		10	<1	0.02	<10	0.07	72	<1	<0.01	4	160	6	0.01	12	1	2
SS-07-134		10	<1	0.02	<10	0.15	111	<1	<0.01	8	250	6	0.02	10	1	1
SS-07-135		<10	1	0.03	20	0.48	794	1	<0.01	27	380	11	0.02	13	2	5
SS-07-136		10	<1	0.02	10	0.08	108	<1	<0.01	5	160	5	0.03	11	1	2
SS-07-137		<10	2	0.02	10	0.21	200	1	<0.01	13	290	9	0.08	6	2	4
SS-07-138		10	1	0.03	10	0.15	276	1	<0.01	8	190	10	0.03	4	1	4
SS-07-139		10	1	0.03	10	0.13	195	1	<0.01	6	250	10	0.02	<2	1	4
SS-07-140		10	<1	0.03	10	0.20	405	1	0.01	12	420	13	0.03	<2	2	5
SS-07-141		10	1	0.02	10	0.11	101	<1	<0.01	8	690	19	0.07	4	2	2
SS-07-142		10	<1	0.04	10	0.32	261	<1	<0.01	12	100	18	0.01	<2	1	4
SS-07-143		10	2	0.05	10	0.32	256	<1	<0.01	12	130	17	0.02	3	1	5
SS-07-144		<10	1	0.02	10	0.26	354	<1	<0.01	12	550	12	0.06	6	3	2
SS-07-145		10	<1	0.03	10	0.24	231	<1	<0.01	10	400	11	0.05	<2	2	3
SS-07-146		10	1	0.01	10	0.08	126	<1	<0.01	4	250	11	0.03	3	1	3
SS-07-147		<10	1	0.03	20	0.34	635	1	<0.01	24	110	12	0.02	4	2	7
SS-07-148		<10	1	0.02	10	0.23	215	<1	<0.01	17	320	22	0.10	5	4	5
SS-07-149		<10	<1	0.03	10	0.16	159	<1	<0.01	6	100	8	0.01	<2	1	5
SS-07-150		10	<1	0.03	10	0.17	194	<1	<0.01	5	200	8	0.02	3	1	3
SS-07-151		10	1	0.04	10	0.23	370	<1	<0.01	9	250	11	0.02	4	1	4
SS-07-152		10	<1	0.02	<10	0.01	27	<1	<0.01	<1	20	3	<0.01	<2	<1	1
SS-07-153		10	<1	0.02	10	0.13	112	<1	<0.01	7	220	13	0.03	3	1	2
SS-07-154		<10	1	0.01	10	0.01	27	<1	<0.01	1	20	<2	<0.01	2	<1	1
SS-07-155		10	<1	0.03	10	0.36	277	<1	<0.01	13	380	11	0.06	<2	2	2
SS-07-156		10	1	0.02	10	0.25	262	<1	<0.01	9	340	10	0.03	<2	1	2
SS-07-157		10	1	0.02	10	0.16	210	<1	<0.01	8	530	14	0.05	3	2	3
SS-07-158		10	1	0.03	10	0.16	204	<1	<0.01	9	260	8	0.04	<2	2	4
SS-07-159		10	<1	0.02	10	0.15	197	<1	<0.01	6	190	7	0.02	2	1	4
SS-07-160		10	<1	0.02	<10	0.08	49	<1	<0.01	3	140	4	0.01	<2	1	2
SS-07-161		10	<1	0.04	<10	0.12	106	<1	<0.01	5	320	9	0.01	<2	1	3
SS-07-162		10	<1	0.04	<10	0.16	107	<1	<0.01	5	60	8	0.01	3	1	3
SS-07-163		<10	1	0.04	20	0.41	421	<1	<0.01	19	220	10	0.02	<2	2	5
SS-07-164		10	<1	0.03	10	0.25	249	<1	<0.01	9	180	11	0.02	<2	1	4
SS-07-165		10	<1	0.05	10	0.28	284	<1	<0.01	11	120	7	0.01	<2	1	5
SS-07-166		10	<1	0.02	10	0.15	251	<1	<0.01	5	190	7	0.03	<2	1	3
SS-07-167		10	<1	0.03	10	0.16	203	<1	<0.01	5	370	13	0.03	2	1	4
SS-07-168		10	<1	0.03	10	0.17	281	1	<0.01	6	420	20	0.04	<2	1	4

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To: **DDV GOLD**
SUITE 701 - 220 PACIFIC HIGHWAY
CROWS NEST NSW 2065
AUSTRALIA

Finalized Date: 19-OCT-2007
Account: DDVGO

Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07104831

Sample Description	Method	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Th	Ti	Tl	U	V	W	Zn
	Units	ppm	%	ppm	ppm	ppm	ppm	ppm
	LOR	20	0.01	10	10	1	10	2
SS-07-129		<20	0.04	<10	<10	25	<10	38
SS-07-130		<20	0.02	<10	<10	16	<10	31
SS-07-131		<20	0.03	<10	<10	20	<10	33
SS-07-132		<20	0.09	<10	<10	25	<10	13
SS-07-133		<20	0.10	<10	<10	29	<10	10
SS-07-134		<20	0.09	<10	<10	39	<10	16
SS-07-135		<20	0.05	<10	<10	15	10	55
SS-07-136		<20	0.06	<10	<10	24	<10	12
SS-07-137		<20	0.04	<10	<10	16	<10	31
SS-07-138		<20	0.02	<10	<10	25	<10	21
SS-07-139		<20	0.05	<10	<10	35	<10	22
SS-07-140		<20	0.03	<10	<10	19	<10	43
SS-07-141		<20	0.32	<10	<10	87	<10	33
SS-07-142		<20	0.15	<10	<10	21	<10	34
SS-07-143		<20	0.14	<10	<10	22	<10	33
SS-07-144		<20	0.06	<10	<10	30	<10	41
SS-07-145		<20	0.08	<10	<10	29	<10	38
SS-07-146		<20	0.03	<10	<10	17	<10	18
SS-07-147		<20	0.05	<10	<10	16	<10	42
SS-07-148		<20	0.06	<10	<10	30	<10	36
SS-07-149		<20	0.02	<10	<10	12	<10	17
SS-07-150		<20	0.03	<10	<10	24	<10	21
SS-07-151		<20	0.02	<10	<10	24	<10	31
SS-07-152		<20	0.05	<10	<10	9	<10	4
SS-07-153		<20	0.08	<10	<10	36	<10	21
SS-07-154		<20	0.03	<10	<10	10	<10	2
SS-07-155		<20	0.09	<10	<10	24	<10	38
SS-07-156		<20	0.07	<10	<10	22	<10	31
SS-07-157		<20	0.05	<10	<10	31	<10	38
SS-07-158		<20	0.04	<10	<10	27	<10	27
SS-07-159		<20	0.02	<10	<10	21	<10	24
SS-07-160		<20	0.14	<10	<10	38	<10	7
SS-07-161		<20	0.15	<10	<10	36	<10	12
SS-07-162		<20	0.13	<10	<10	20	<10	14
SS-07-163		<20	0.06	<10	<10	16	<10	50
SS-07-164		<20	0.04	<10	<10	15	<10	26
SS-07-165		<20	0.02	<10	<10	21	<10	28
SS-07-166		<20	0.03	<10	<10	24	<10	25
SS-07-167		<20	0.04	<10	<10	25	<10	24
SS-07-168		<20	0.05	<10	<10	29	<10	25

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To: **DDV GOLD**
SUITE 701 - 220 PACIFIC HIGHWAY
CROWS NEST NSW 2065
AUSTRALIA

Finalized Date: 19-OCT-2007
Account: DDVGO

Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07104831

Sample Description	Method	WEI-21	Au-ICP21	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Recvd Wt.	Au	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe
	Units	kg	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%
	LOR	0.02	0.001	0.2	0.01	2	10	10	0.5	2	0.01	0.5	1	1	1	0.01
SS-07-169		0.43		<0.2	1.58	6	<10	10	<0.5	2	0.01	<0.5	1	14	4	3.25
SS-07-170		0.53		<0.2	1.72	9	<10	10	<0.5	2	0.01	<0.5	2	21	6	4.70
SS-07-171		0.65		<0.2	0.30	<2	<10	10	<0.5	<2	<0.01	<0.5	<1	2	<1	0.10
SS-07-172		0.52		<0.2	0.36	<2	<10	10	<0.5	<2	<0.01	<0.5	<1	2	1	0.18
SS-07-173		0.54		<0.2	1.19	18	<10	10	<0.5	<2	0.01	<0.5	2	12	4	2.25
SS-07-174		0.61		<0.2	0.71	3	<10	10	<0.5	<2	0.01	<0.5	2	9	3	1.04
SS-07-175		0.74		<0.2	0.74	5	<10	20	<0.5	<2	0.01	<0.5	4	10	7	1.33
SS-07-176		0.38		0.2	1.34	9	<10	20	<0.5	<2	0.01	<0.5	10	15	7	2.47

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CERTIFICATE OF ANALYSIS VO07104831

Sample Description	Method	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Ga	Hg	K	La	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sr
	Units	ppm	ppm	%	ppm	%	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm	ppm
	LOR	10	1	0.01	10	0.01	5	1	0.01	1	10	2	0.01	2	1	1
SS-07-169		10	1	0.02	<10	0.11	84	<1	<0.01	5	190	7	0.02	3	1	2
SS-07-170		10	<1	0.02	10	0.16	111	<1	<0.01	6	350	9	0.02	2	2	2
SS-07-171		<10	<1	0.02	<10	0.01	13	<1	<0.01	1	20	3	0.01	<2	<1	1
SS-07-172		<10	<1	0.02	<10	0.01	15	<1	<0.01	<1	20	4	0.01	2	<1	1
SS-07-173		10	1	0.02	10	0.12	231	<1	<0.01	4	160	6	0.01	<2	1	3
SS-07-174		<10	<1	0.02	10	0.16	156	<1	<0.01	6	80	5	0.01	<2	1	4
SS-07-175		<10	<1	0.03	10	0.22	228	<1	<0.01	10	80	9	0.01	<2	1	4
SS-07-176		<10	<1	0.04	10	0.18	346	1	<0.01	9	200	11	0.02	<2	1	3

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Finalized Date: 19-OCT-2007
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Project: TOUQUOY

CERTIFICATE OF ANALYSIS VO07104831

Sample Description	Method	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41	ME-ICP41
	Analyte	Th	Ti	Tl	U	V	W	Zn
	Units	ppm	%	ppm	ppm	ppm	ppm	ppm
	LOR	20	0.01	10	10	1	10	2
SS-07-169		<20	0.09	<10	<10	33	<10	11
SS-07-170		<20	0.19	<10	<10	50	<10	15
SS-07-171		<20	0.04	<10	<10	7	<10	2
SS-07-172		<20	0.06	<10	<10	12	<10	2
SS-07-173		<20	0.03	<10	<10	24	<10	17
SS-07-174		<20	0.03	<10	<10	13	<10	16
SS-07-175		<20	0.03	<10	<10	10	<10	24
SS-07-176		<20	0.02	<10	<10	21	<10	26

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Finalized Date: 31-JUL-2007
This copy reported on 22-OCT-2007
Account: METLAB

CERTIFICATE BR07079766

Project: M1496

P.O. No.: M12486

This report is for 13 Pulp samples submitted to our lab in Brisbane, QLD, Australia on 26-JUL-2007.

The following have access to data associated with this certificate:

STEVE RAYNER

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
LOG-22	Sample login - Rcd w/o BarCode
LEV-01	Waste Disposal Levy

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
ME-MS42	Up to 34 elements by ICP-MS	ICP-MS

To: **METCON LABORATORIES PTY LTD**
ATTN: STEVE RAYNER
16 ETHEL AVENUE
BROOKVALE NSW 2100

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Comments: Sample marked as TGW on paperwork indicated as TWG on pulp bag.

Signature:

Shaun Kenny, Brisbane Laboratory Manager

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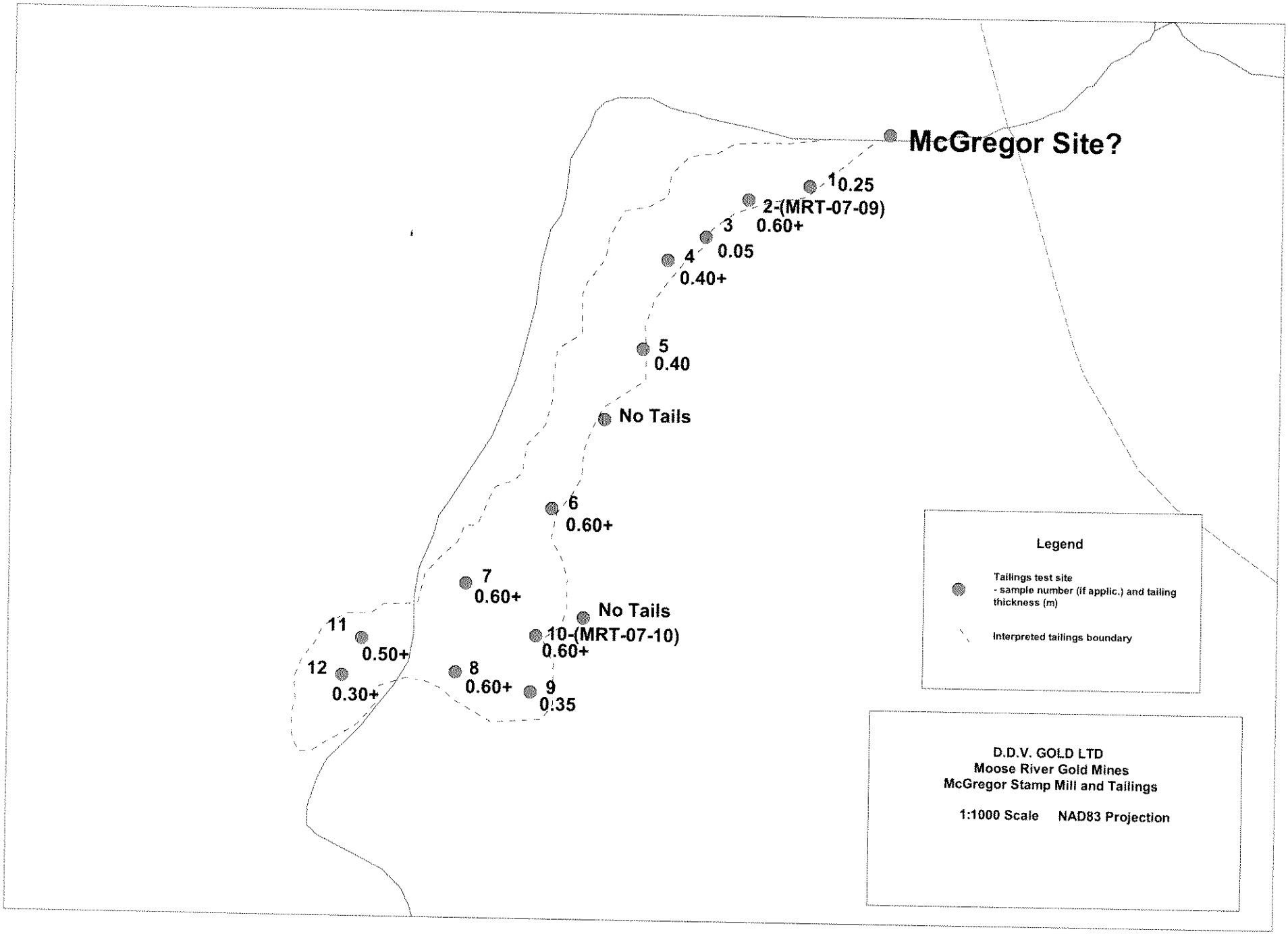
Project: M1496

Finalized Date: 31-JUL-2007
Account: METLAB

CERTIFICATE OF ANALYSIS BR07079766

Sample Description	Method / Analyte / Units / LOR	ME-MS42 Hg ppm 0.005
TAM		0.011
TGA		0.005
TGB		0.009
TGC		0.006
TGD		0.008
TGE		0.007
TGW		0.005
TWB		0.006
TWM		0.006
TWT		0.012
TEB		0.005
TET		<0.005
TMX		0.005

Comments: Sample marked as TGW on paperwork indicated as TWG on pulp bag.


McGregor Site?
1
0.25
2-(MRT-07-09)
0.60+
3
0.05
4
0.40+
5
0.40
No Tails
6
0.60+
7
0.60+
No Tails
10-(MRT-07-10)
0.60+
11
0.50+
12
0.30+
8
0.60+
9
0.35
Legend
Tailings test site
- sample number (if applic.) and tailing thickness (m)
Interpreted tailings boundary
D.D.V. GOLD LTD
Moose River Gold Mines
McGregor Stamp Mill and Tailings
1:1000 Scale NAD83 Projection

APPENDIX K

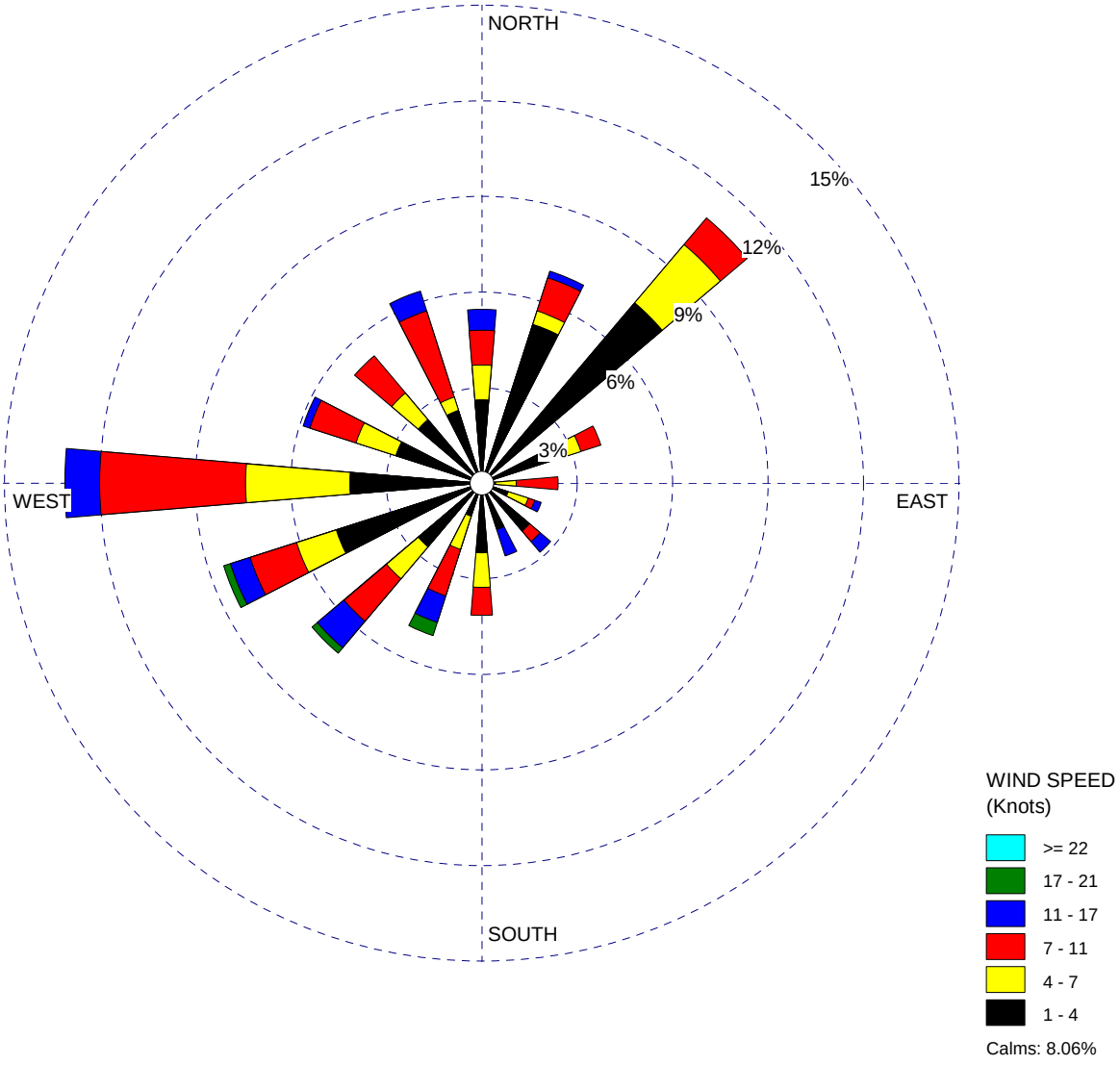
METEOROLOGIC DATA - WIND ROSE DIAGRAMS

WIND ROSE PLOT:

Station #71753 - Upper Stewiacke

DISPLAY:

Wind Speed
Direction (blowing from)



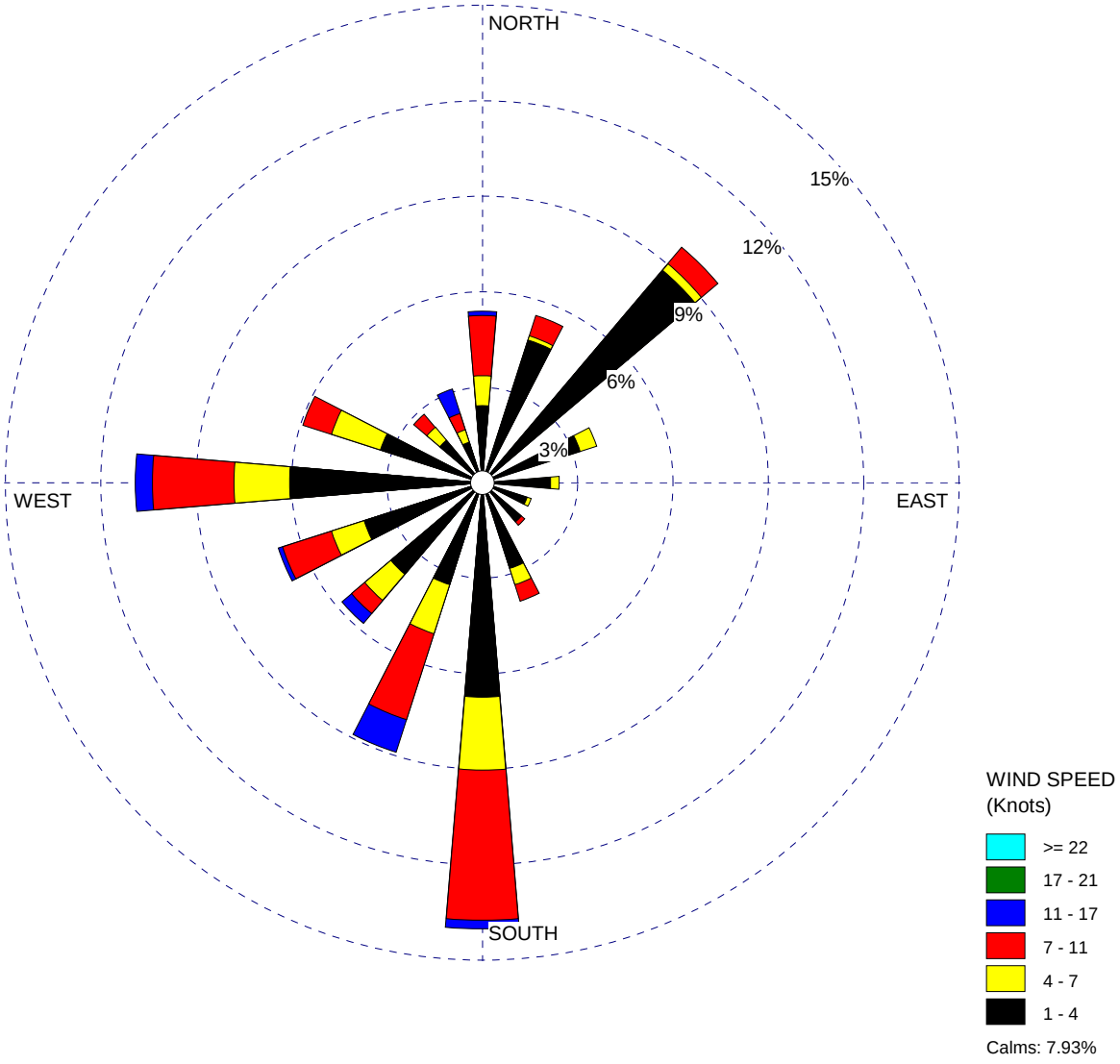
COMMENTS:	DATA PERIOD: **2007** **Sep 1 - Sep 30** **00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **8.06%**	TOTAL COUNT: **459 hrs.**	
	AVG. WIND SPEED: **4.96 Knots**	DATE: **9/22/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Upper Stewiacke

DISPLAY:

Wind Speed
Direction (blowing from)



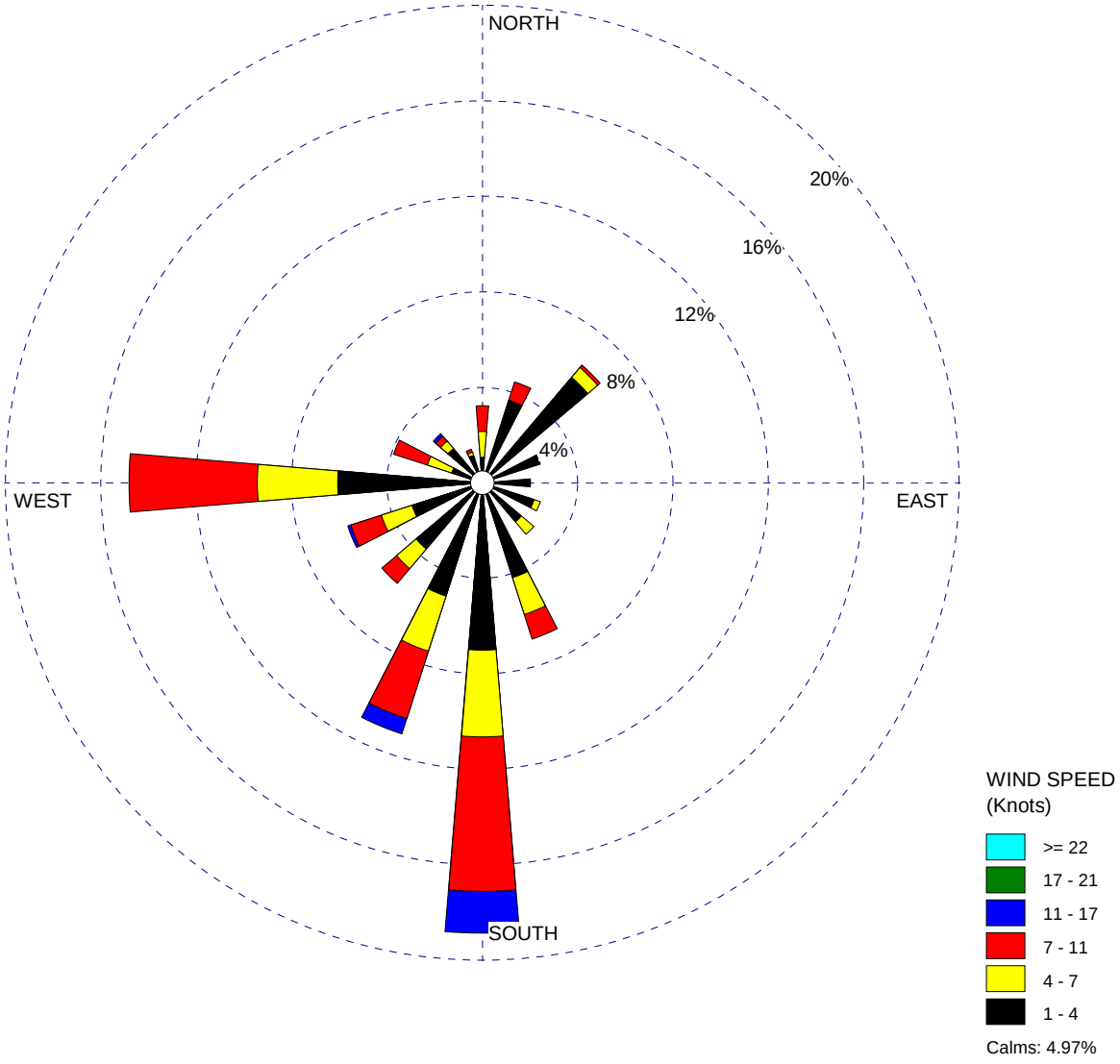
COMMENTS:	DATA PERIOD: **2007** **Aug 1 - Aug 31** **00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **7.93%**	TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **4.03 Knots**	DATE: **9/21/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Upper Stewiacke

DISPLAY:

Wind Speed
Direction (blowing from)



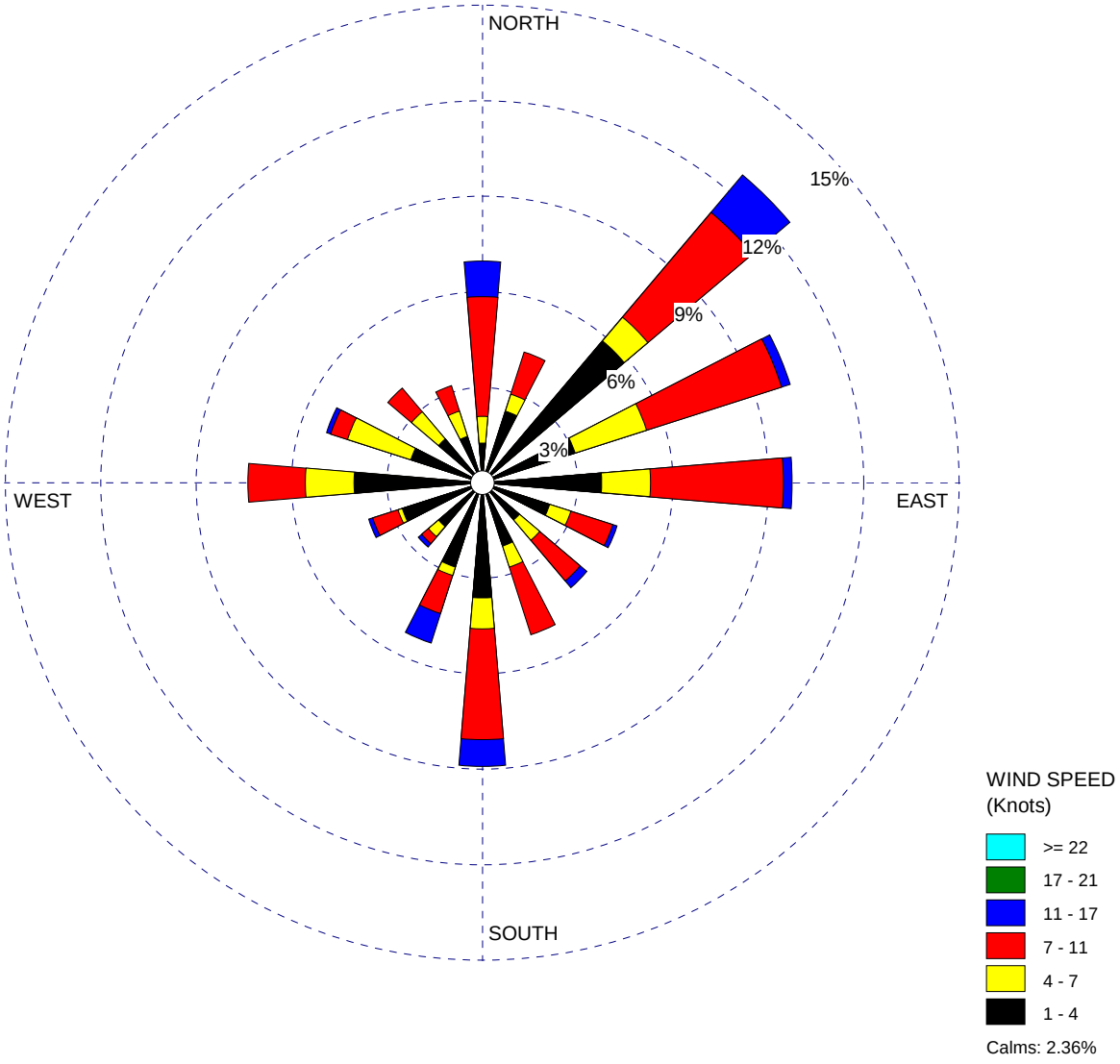
COMMENTS:	DATA PERIOD: **2007** **Jul 1 - Jul 31** **00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **4.97%**	TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **4.56 Knots**	DATE: **9/24/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Upper Stewiacke

DISPLAY:

Wind Speed
Direction (blowing from)



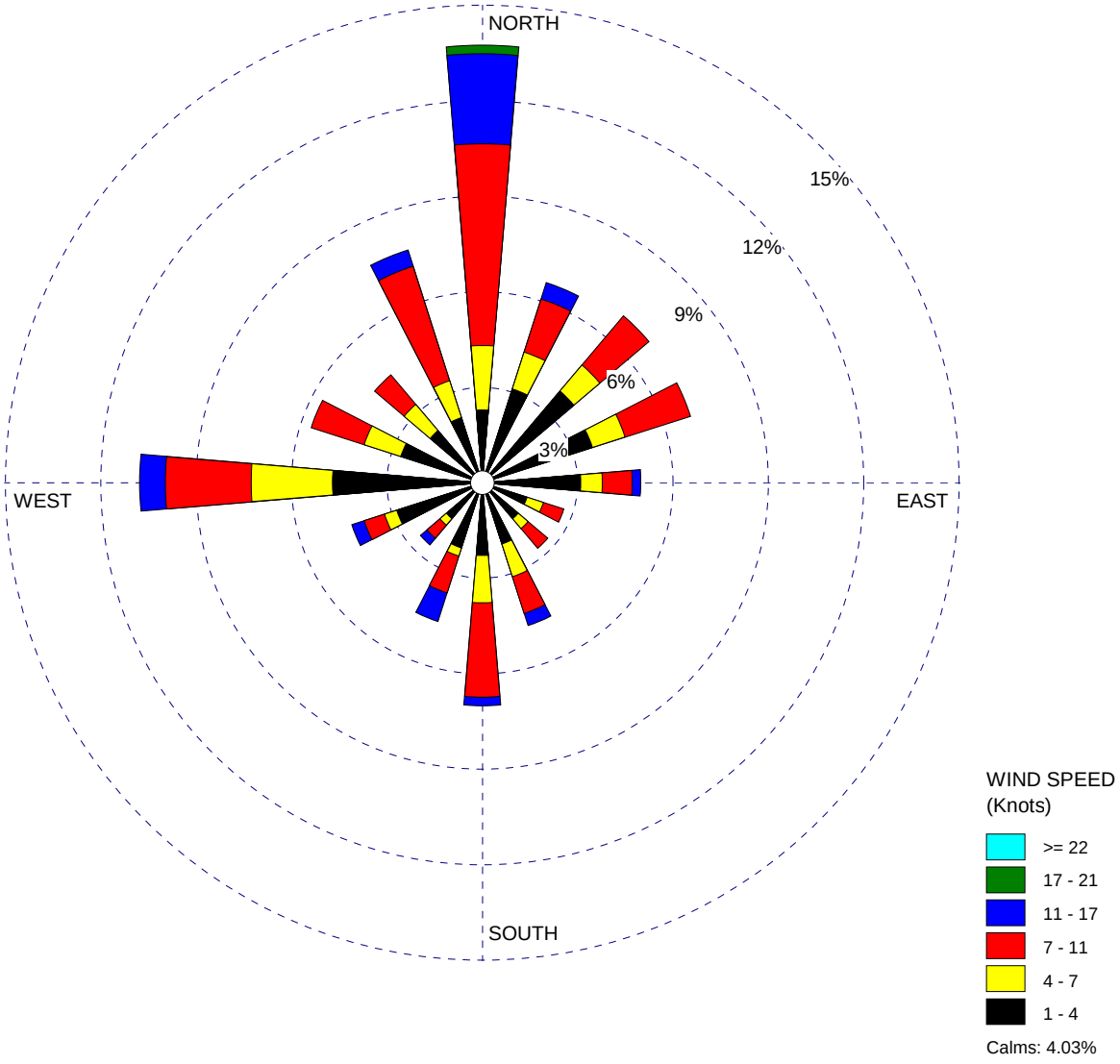
COMMENTS:	DATA PERIOD: **2007** **Jun 1 - Jun 30** **00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **2.36%**	TOTAL COUNT: **720 hrs.**	
	AVG. WIND SPEED: **5.65 Knots**	DATE: **9/24/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Upper Stewiacke

DISPLAY:

Wind Speed
Direction (blowing from)



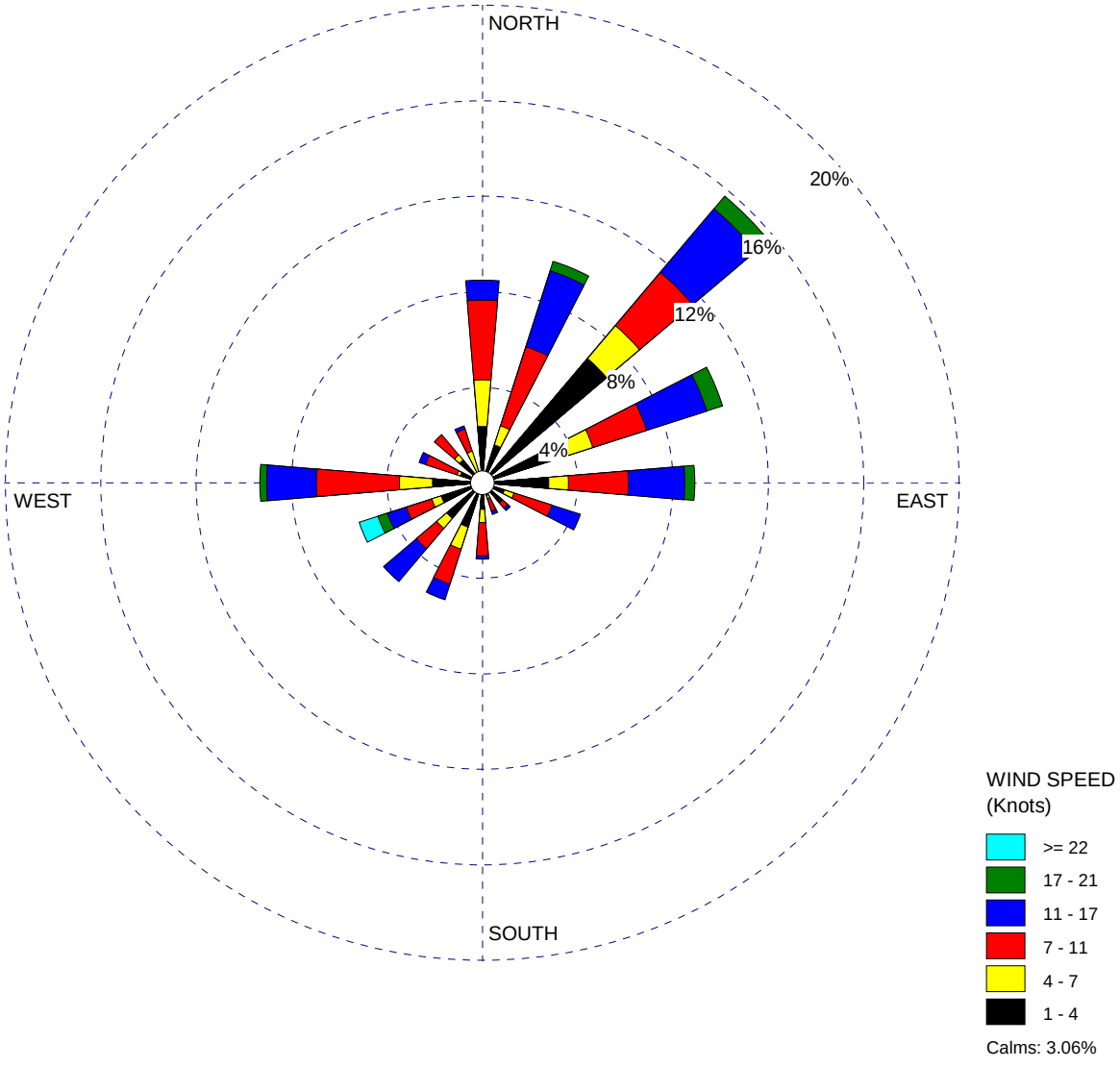
COMMENTS:	DATA PERIOD: **2007** **May 1 - May 31** **00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **4.03%**	TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **5.68 Knots**	DATE: **9/24/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Upper Stewiacke

DISPLAY:

Wind Speed
Direction (blowing from)



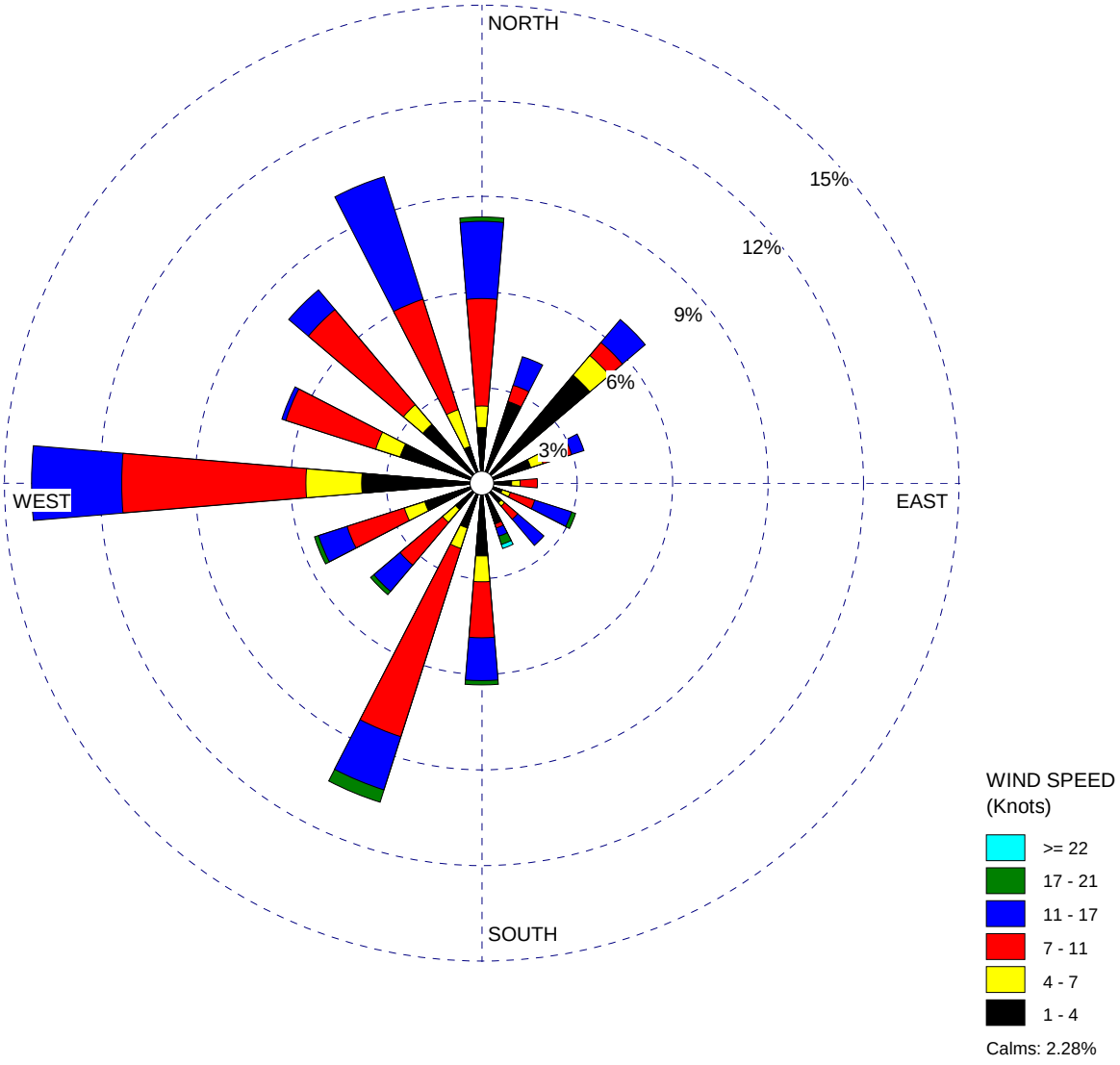
COMMENTS:	DATA PERIOD: **2007 Apr 1 - Apr 30 00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **3.06%**	TOTAL COUNT: **720 hrs.**	
	AVG. WIND SPEED: **7.68 Knots**	DATE: **10/2/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Upper Stewiacke

DISPLAY:

Wind Speed
Direction (blowing from)



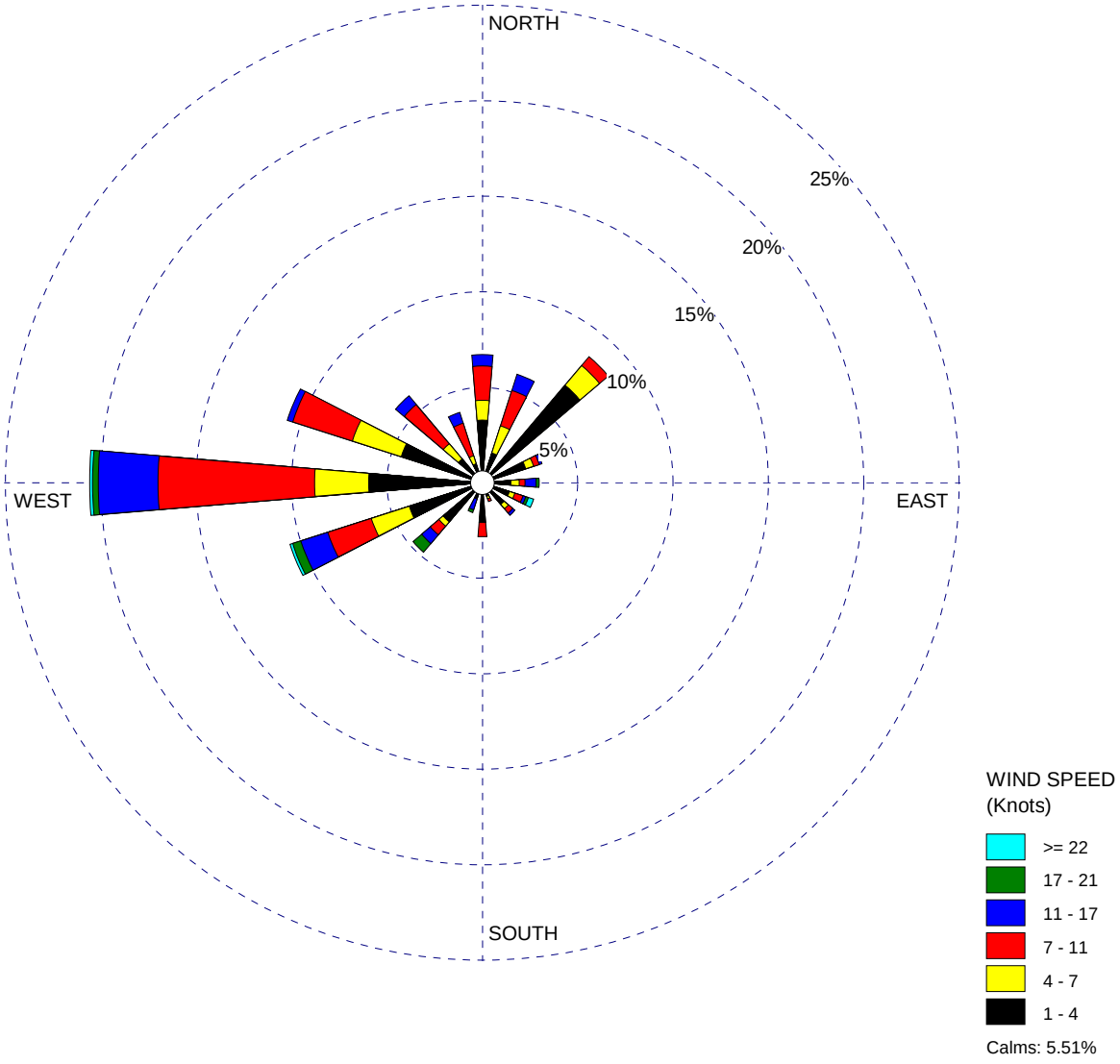
COMMENTS:	DATA PERIOD: **2007** **Mar 1 - Mar 31** **00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **2.28%**	TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **7.51 Knots**	DATE: **9/24/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Upper Stewiacke

DISPLAY:

Wind Speed
Direction (blowing from)



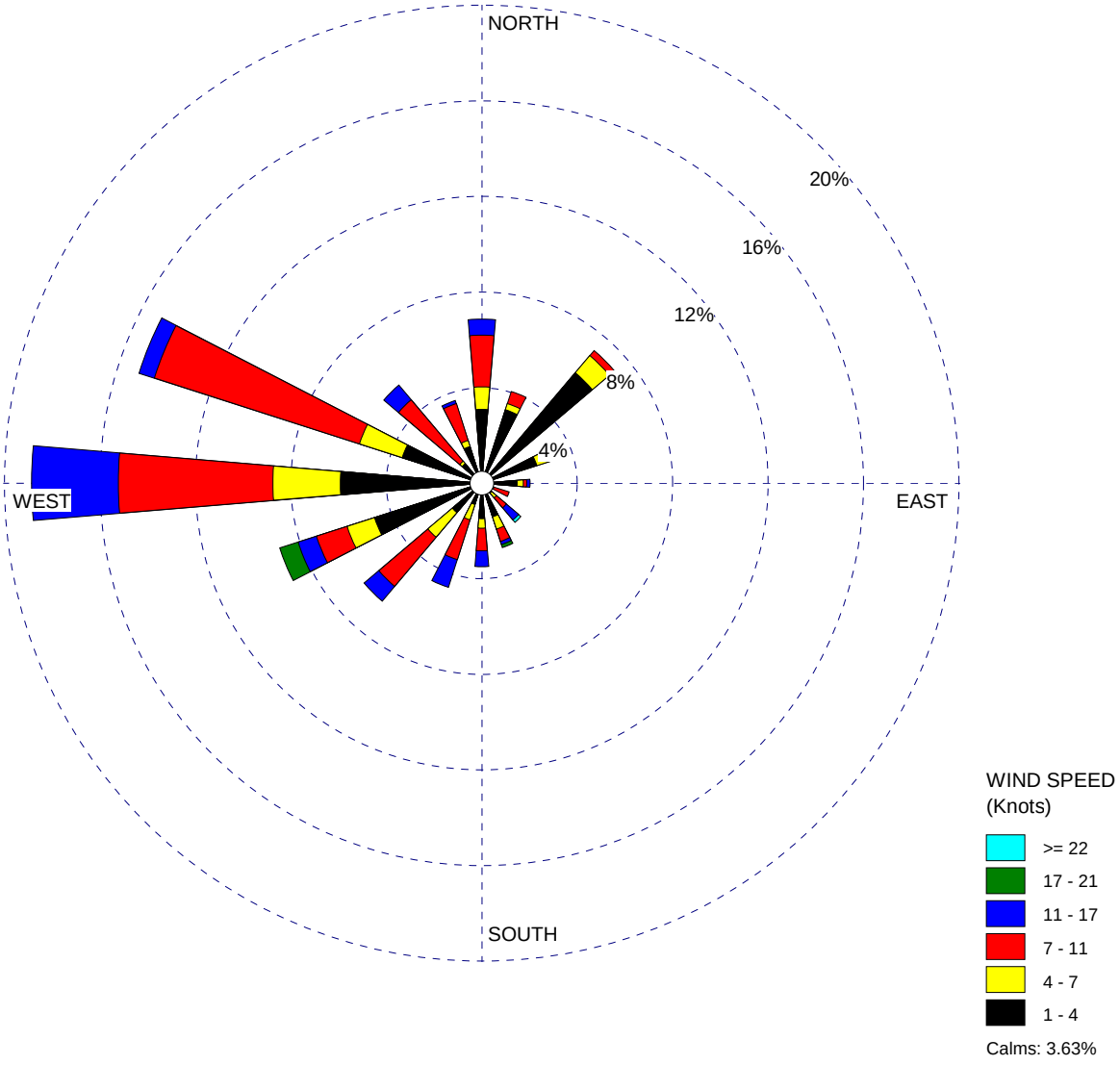
COMMENTS:	DATA PERIOD: **2007** **Feb 1 - Feb 28** **00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **5.51%**	TOTAL COUNT: **672 hrs.**	
	AVG. WIND SPEED: **5.88 Knots**	DATE: **9/24/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Upper Stewiacke

DISPLAY:

Wind Speed
Direction (blowing from)



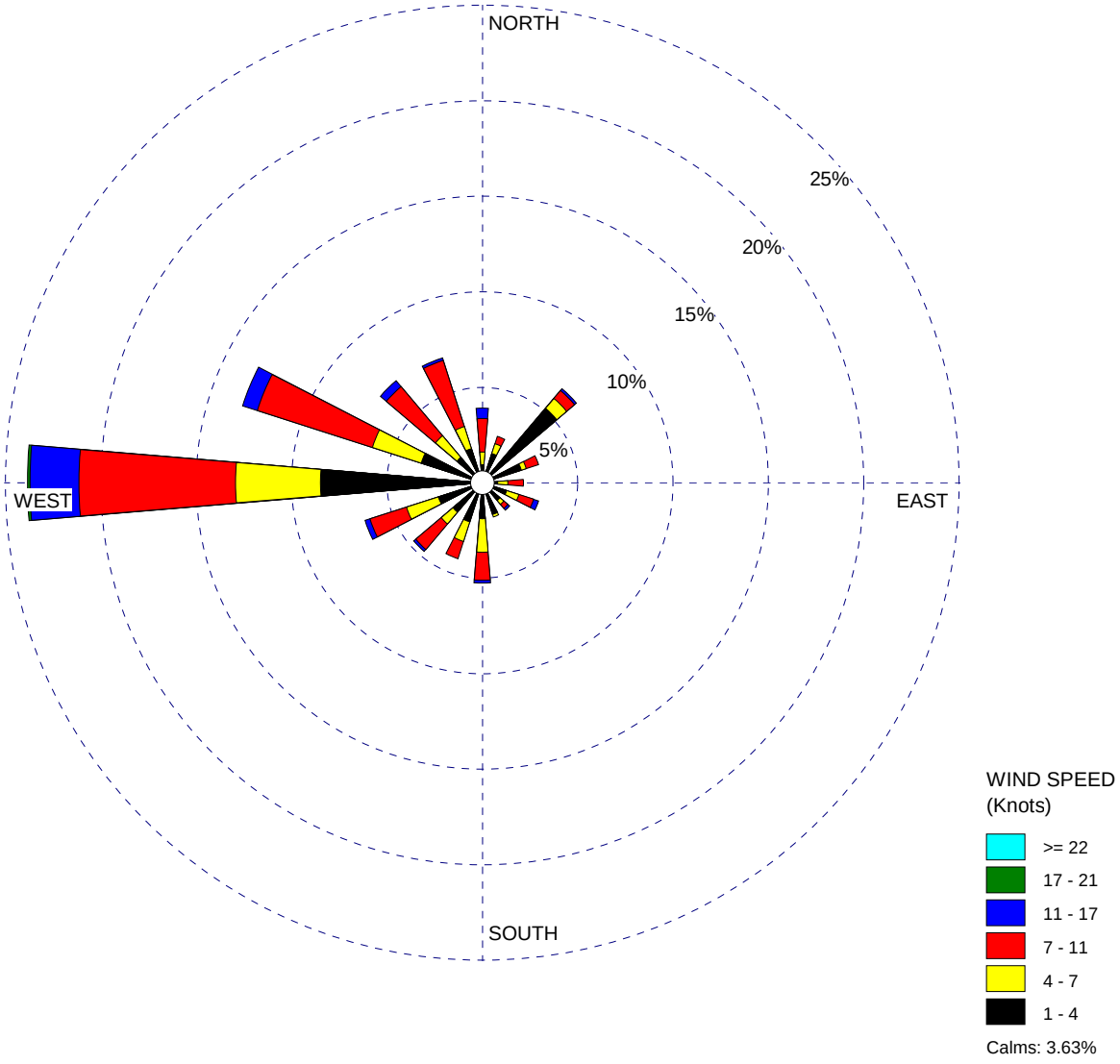
COMMENTS:	DATA PERIOD: **2007** **Jan 1 - Jan 31** **00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **3.63%**	TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **6.13 Knots**	DATE: **9/25/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Upper Stewiacke

DISPLAY:

Wind Speed
Direction (blowing from)



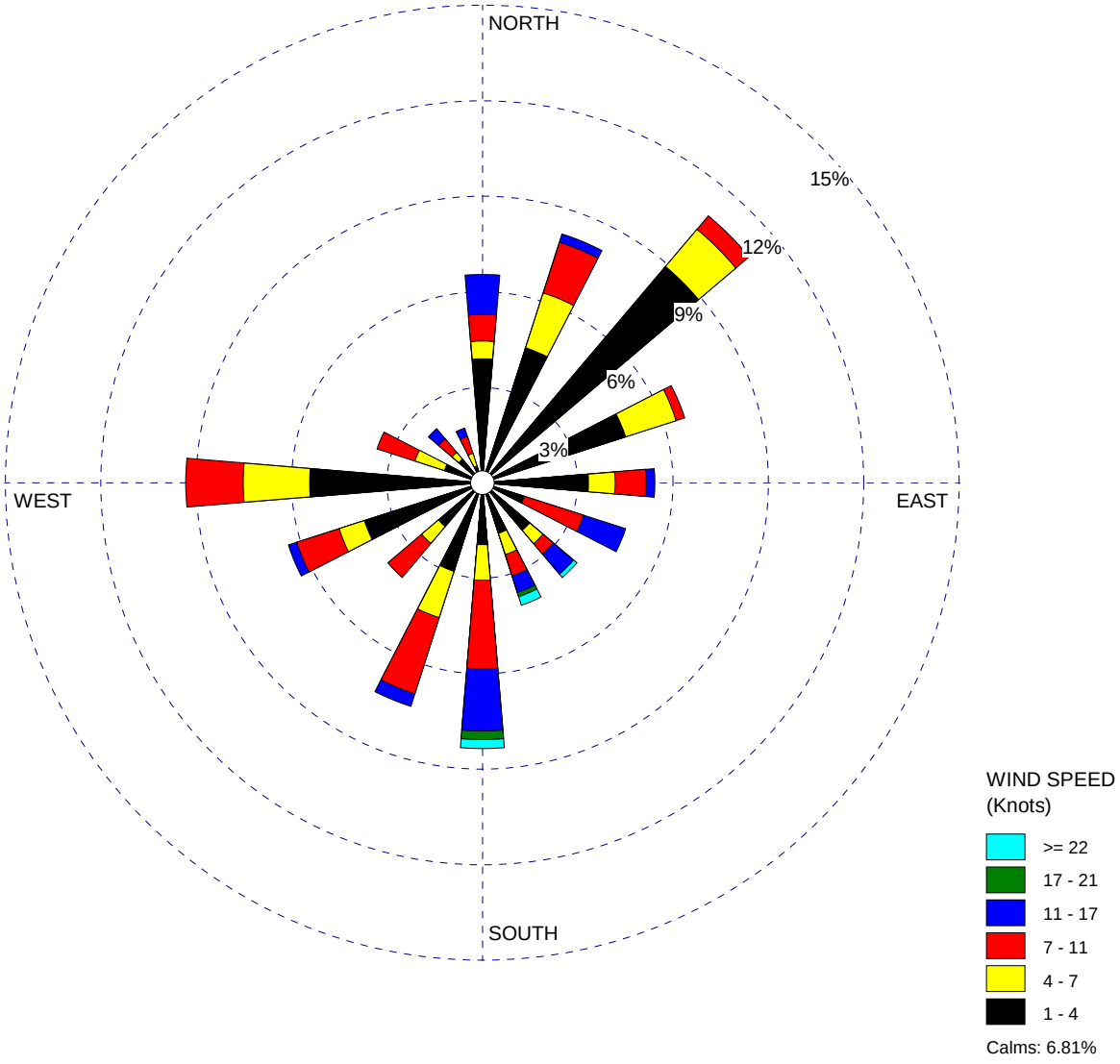
COMMENTS:	DATA PERIOD: **2006** **Dec 1 - Dec 31** **00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **3.63%**	TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **5.66 Knots**	DATE: **9/24/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Upper Stewiacke

DISPLAY:

Wind Speed
Direction (blowing from)



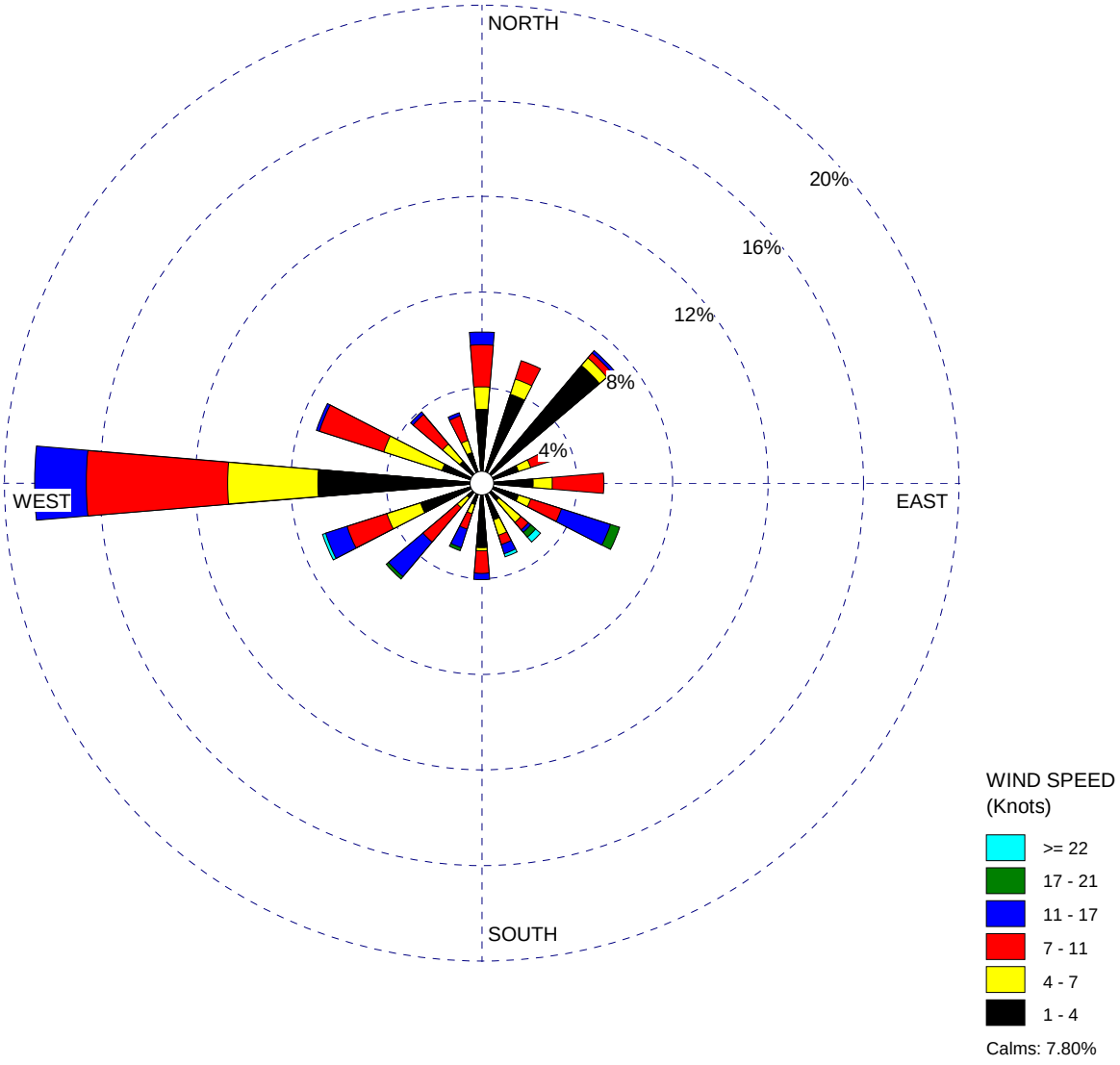
COMMENTS:	DATA PERIOD: **2006** **Nov 1 - Nov 30** **00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **6.81%**	TOTAL COUNT: **720 hrs.**	
	AVG. WIND SPEED: **5.05 Knots**	DATE: **9/25/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Upper Stewiacke

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **2006** **Oct 1 - Oct 31** **00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
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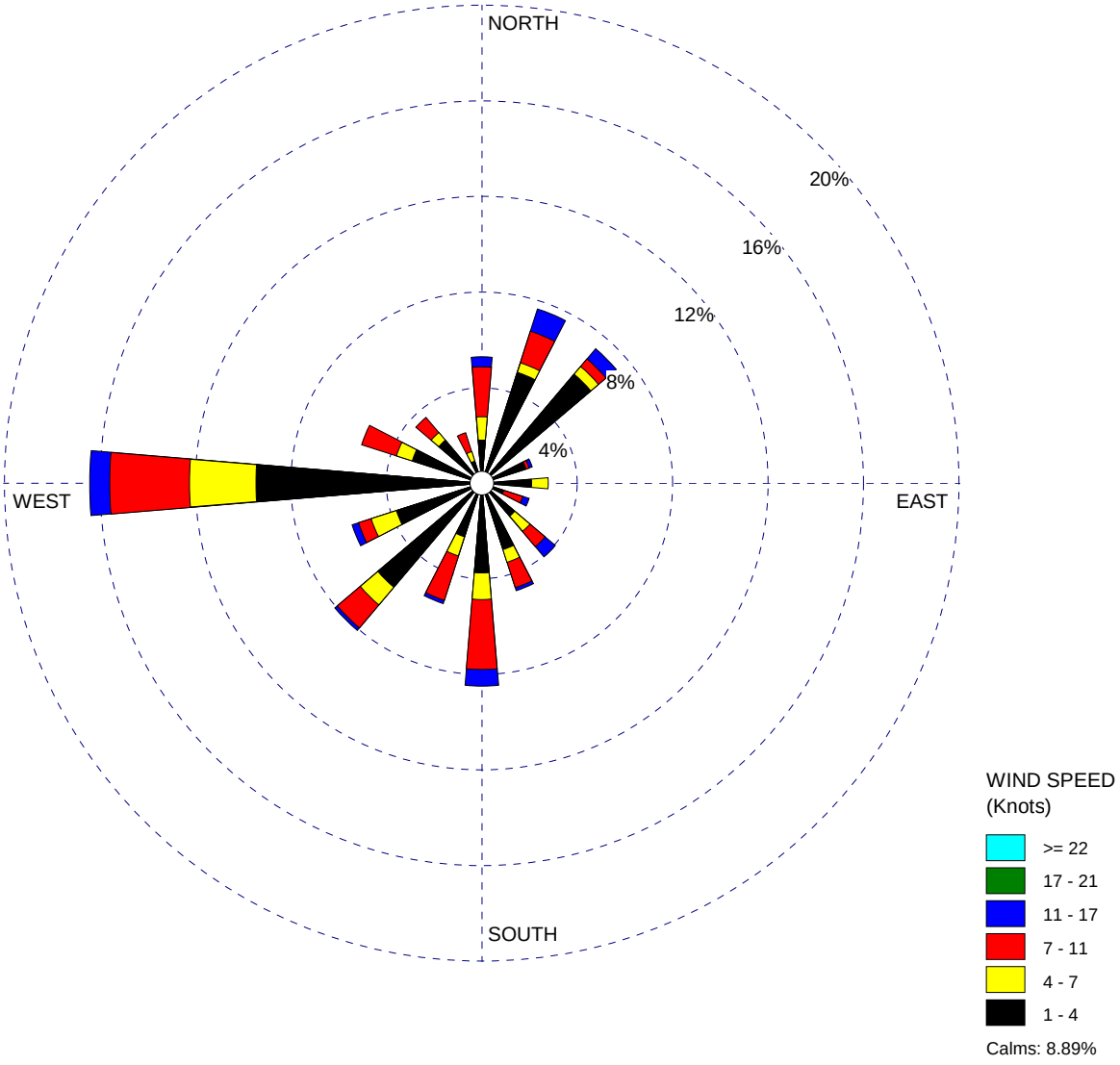
	CALM WINDS: **7.80%**	TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **5.68 Knots**	DATE: **9/25/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Upper Stewiacke

DISPLAY:

Wind Speed
Direction (blowing from)



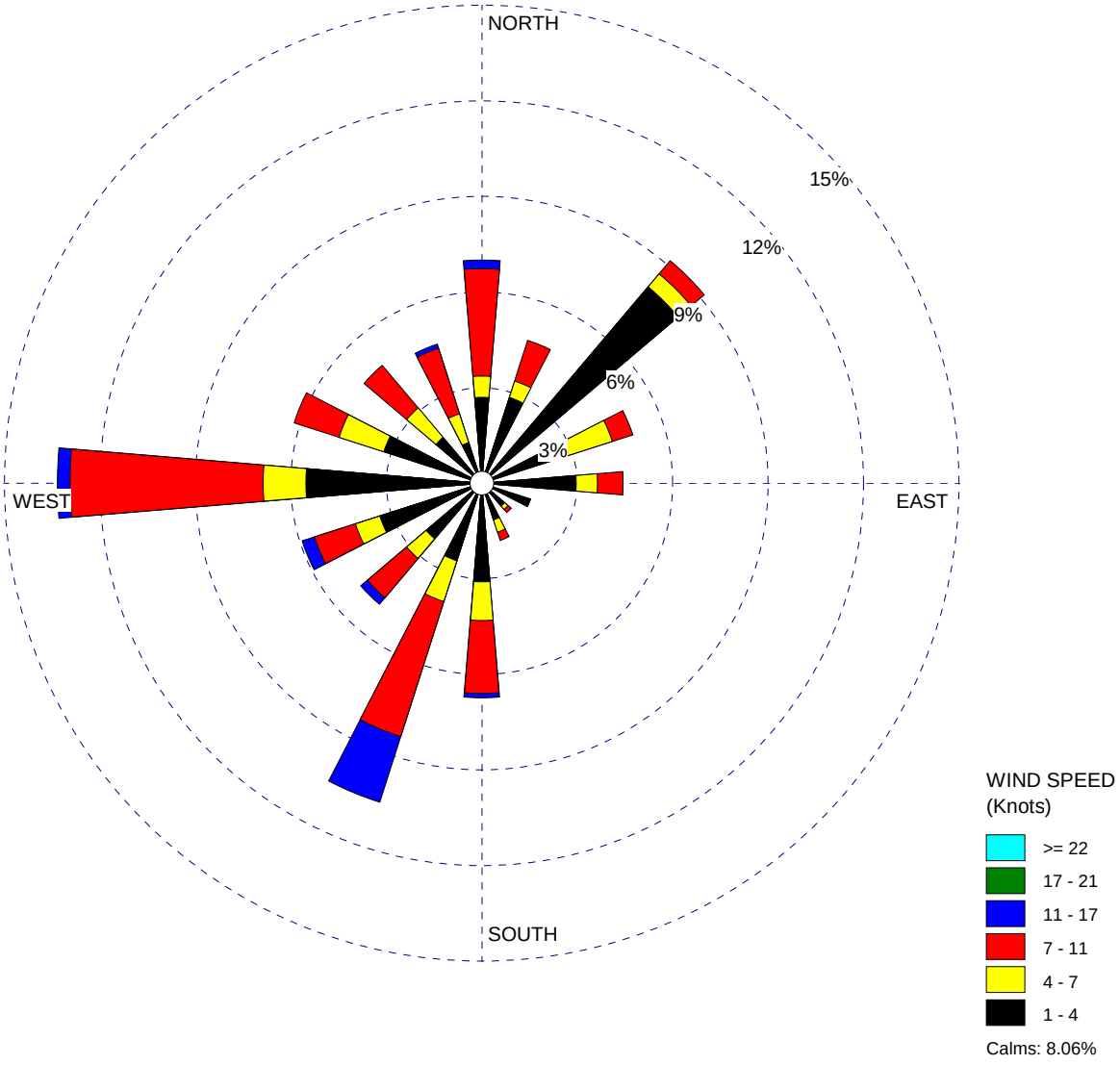
COMMENTS:	DATA PERIOD: **2006** **Sep 1 - Sep 30** **00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **8.89%**	TOTAL COUNT: **720 hrs.**	
	AVG. WIND SPEED: **4.31 Knots**	DATE: **9/25/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Upper Stewiacke 2006

DISPLAY:

Wind Speed
Direction (blowing from)



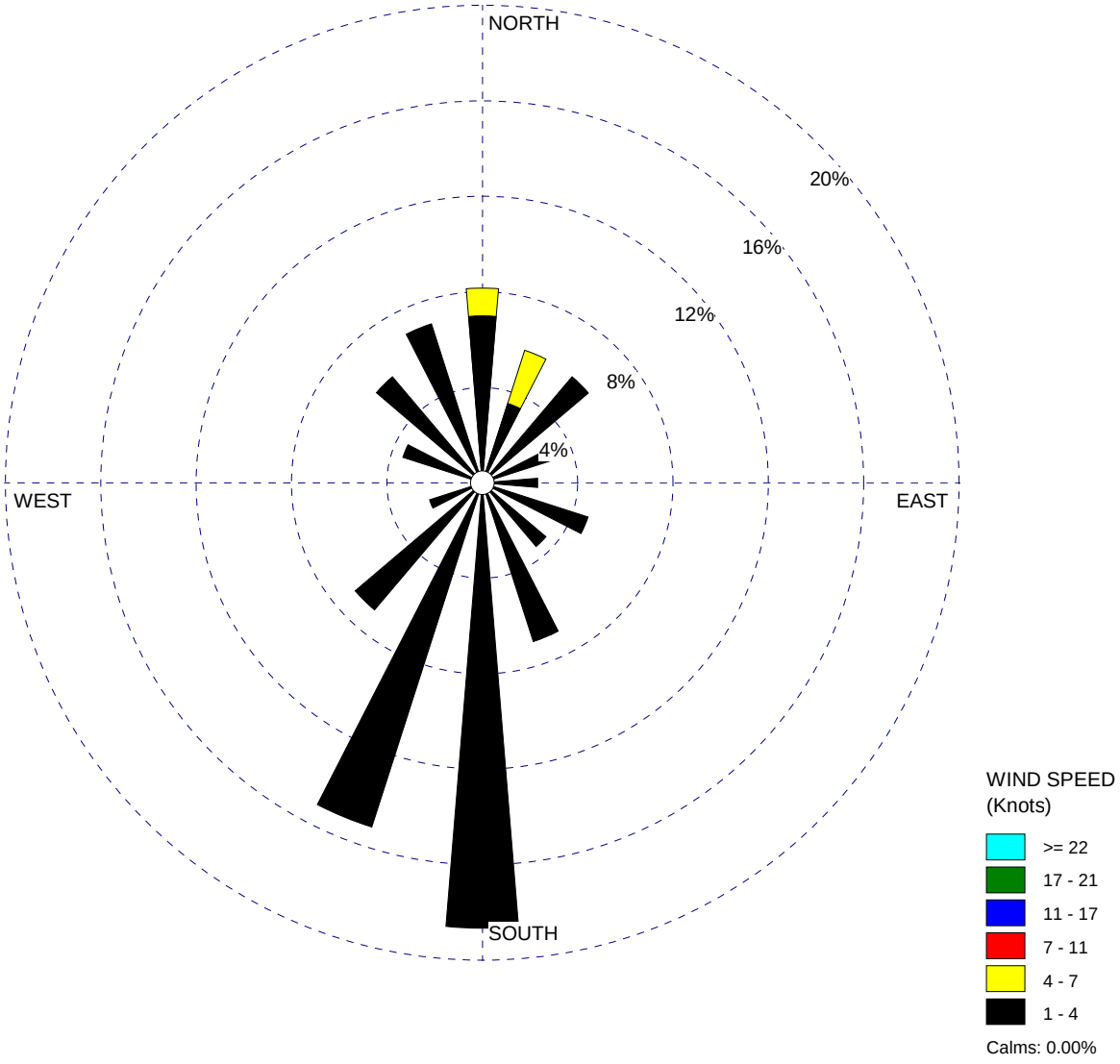
COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2006 **Aug 1 - Aug 31** **00:00 - 23:00**	**Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **8.06%**	TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **4.72 Knots**	DATE: **9/24/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Moose River

DISPLAY:

Wind Speed
Direction (blowing from)



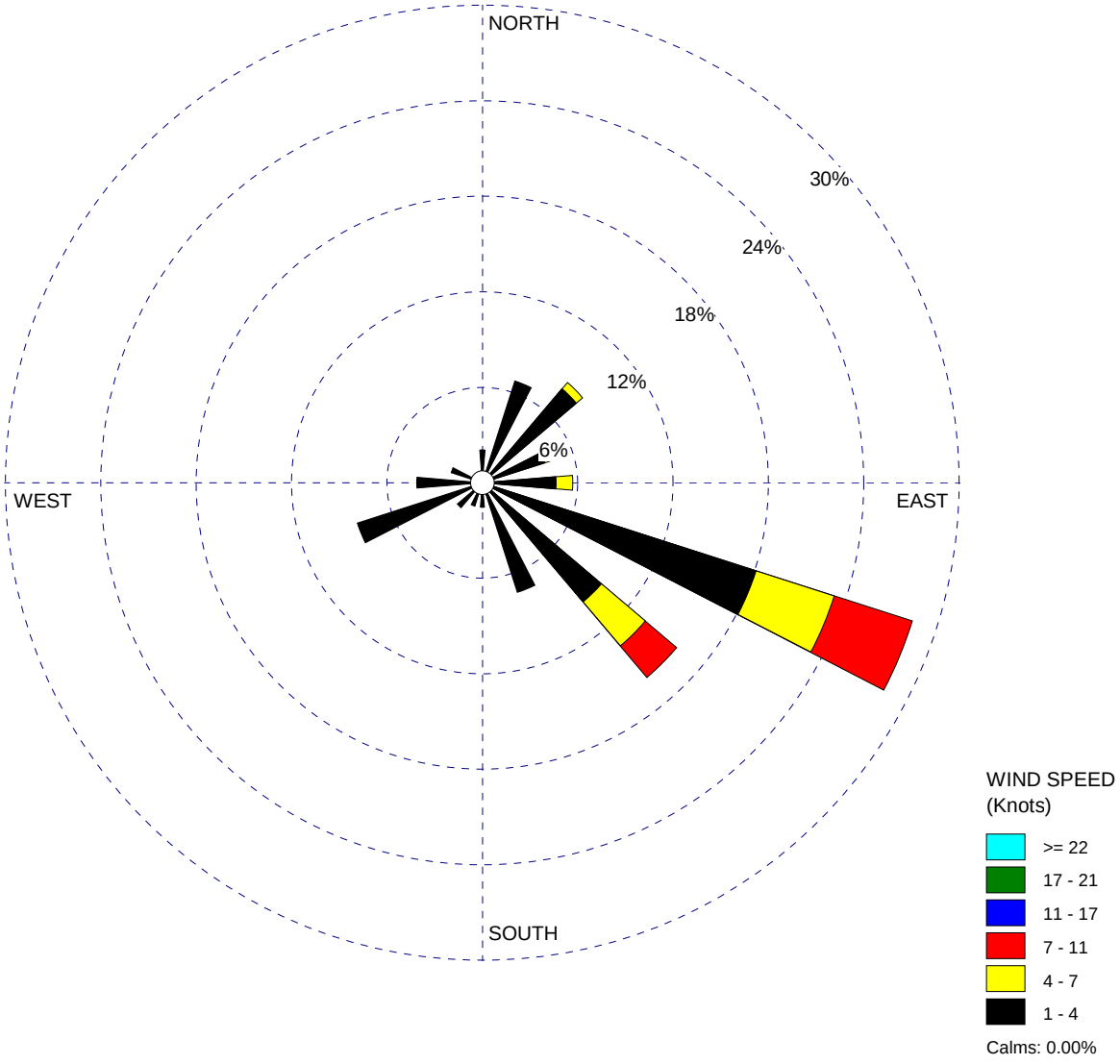
COMMENTS:	DATA PERIOD: **2007** **Sep 11 - Sep 18** **00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **0.00%**	TOTAL COUNT: **86 hrs.**	
	AVG. WIND SPEED: **1.83 Knots**	DATE: **9/22/2007**	PROJECT NO.: **820933**

WIND ROSE PLOT:

Station #71753 - Tangier Fire Department

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **2007** **Aug 29 - Sep 11** **00:00 - 23:00**	COMPANY NAME: **Conestoga Rovers and Associates**	
		MODELER:	
	CALM WINDS: **0.00%**	TOTAL COUNT: **194 hrs.**	
	AVG. WIND SPEED: **3.02 Knots**	DATE: **9/22/2007**	PROJECT NO.: **820933**

APPENDIX L

EMISSION SUMMARY AND DISPERSION MODELLING REPORT

EMISSION SUMMARY AND DISPERSION MODELLING REPORT

TOUQUOY GOLD PROJECT
MOOSE RIVER, HALIFAX COUNTY, NOVA SCOTIA

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Prepared by:
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OCTOBER 2007
REF. NO. 820933 (7)

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1.0 INTRODUCTION AND SITE DESCRIPTION

Conestoga-Rovers & Associates has prepared this Emission Summary and Dispersion Modelling (ESDM) Report for the Touquoy Gold Project at the Moose River Gold Mines development (Site) in Halifax County, Nova Scotia. The mine will be operated by DDV Gold Limited (DDVG).

The mine is planned as a surface operation with drill-and-blast, load-and-haul, process-on-site type development. Production is estimated at approximately 4,500 tonnes of ore per day with a total ore production estimate over the life of the mine of at least 9 million tonnes for recovery of almost 0.5 million ounces (oz) of gold. Following a 12 month construction and commissioning phase, the mine life is estimated to be six years for production and two years for closure.

The proposed active surface footprint of the Site is approximately 265 ha within a total property area of 400 ha and encompasses the settlement of Moose River Gold Mines, part of a small provincial park and undeveloped forest.

The Site will operate 24 hours per day, seven days a week, up to 52 weeks per year.

2.0 PURPOSE AND SCOPE OF ESDM REPORT

This ESDM Report was prepared to assess potential air releases to the atmosphere and their impact on surrounding receptors in support of a Class I Environmental Assessment under the Nova Scotia *Environment Act* and *Environmental Assessment Regulations*.

The location of the Facility is presented on Figure 1. The location of the discharges from each of the sources are presented on Figures 2A and 2B; the location of each of the sources is specified with the source reference number.

3.0 DESCRIPTION OF PROCESSES AND AIR EMISSIONS

The processing operations at the Site have been classified into two types.

Front-End Processing of Raw Ore

Activities included in this group include:

- Primary Crushing;
- Secondary Crushing;
- Tertiary Crushing;
- Wet Grinding (Ball Milling);
- Gravity Concentration;
- Classification;
- Handling, Transferring and Conveying Operations;
- Loading to Ore Stockpiles; and
- Unloading from Ore Stockpiles.

Chemical Processing

Activities included in this group include:

- Carbon-in-Leach (CIL);
- High Intensity Cyanidation (HIC);
- Elution;
- Carbon Reactivation;
- Electrowinning;
- Calcination Oven;
- Smelting Furnace;
- Cyanide Destruction; and
- Tailings Pond.

A summary of the potential air contaminants being emitted by each of the processing activities is listed in Table 1. A process flow diagram illustrating the interaction between these process stages is provided on Figure 3.

Of the processing activities listed above, the following have negligible emissions and have not been assessed further:

- Classification (activity occurs indoors);
- Wet Grinding (Ball Milling) (activity is saturated with water and occurs indoors); and
- Cyanide Destruction (INCO SO_2/air process results in negligible air emissions).

3.1 ORE CRUSHING, HANDLING, AND CONVEYING

Run-of-mine (ROM) ore will be delivered to the crushing circuit via the ROM bin by trucks or the front-end loader. The primary jaw crusher will reduce 600 mm (24 inch) material to 80 percent passing 150 mm. Second and third stage crushing will further reduce the ore to 30 mm (1 1/4 inch) and finally 10 mm (3/8 inch). A triple-deck screen in closed circuit with the secondary and tertiary crushers will ensure that fines are bypassed directly to the crushed ore stockpile.

The crushed product will be conveyed to a 15,000 tonne covered stockpile, which will provide 72 hours of surge capacity ahead of the ball mill in the event of shutdown of the crushing circuit for maintenance or weather. Vibrating feeders located beneath the stockpile will reclaim crushed ore onto a conveyor, which feeds the ball mill.

The air emissions associated with ore crushing, handling and conveying operations include:

- Total Suspended Particulate (TSP);
- Particulate Matter less than 10 microns (PM-10); and
- Heavy metals contained in the ore.

3.2 HIGH INTENSITY CYANIDATION

After grinding, 30 percent of the hydro-cyclone underflow is directed to gravity concentration while the remainder is re-circulated to the ball mill. Gravity concentration uses centrifugal forces to separate the material into light and heavy fractions. The

lighter fraction, gravity tails, is directed back to the ball mill while the heavy fraction is subjected to high-intensity cyanidation (HIC) to take the gold present into solution.

The leach solution is made up in the Reaction Vessel Feed Tank by combining potable water with sodium cyanide, caustic soda, and LeachAid. Approximately 10 kg of sodium cyanide is used per batch. Caustic soda is used to adjust pH and LeachAid (lead nitrate) accelerates the reaction. At the conclusion of an HIC run, the pregnant (gold-bearing) solution is sampled for gold content and pumped to a holding tank where it is available for electrowinning. The residual solids are rinsed and discharged to the grinding circuit.

The air emissions associated with HIC operations include:

- Cyanide (as hydrogen cyanide).

3.3 CARBON-IN-LEACH

After the ore is processed in the ball mill, the overflow is screened and thickened to 50 percent solids in a pre-leach thickener with the aid of a polymer-type flocculant. Pre-leach thickening is possible as the low-cyanide consuming nature of the ore eliminates the need to recover cyanide after leaching.

The thickener underflow is then pumped to the carbon-in-leach (CIL) circuit where gold dissolution and adsorption occurs. Cyanide is added only in the CIL circuit and is done so by means of a pipeline which permits transfer from the mixing tank to the CIL feed box where dosing occurs automatically.

The leach circuit is composed of six CIL tanks, each approximately 900 m^3 in volume measuring 12 metres in diameter and 12 metres high. Leaching occurs primarily in the first tank. Lime is added to maintain a slurry pH of 10 to 11 to keep cyanide volatilization to a minimum. The slurry is agitated and aerated to accelerate leaching which will occur over a 16 to 24 hour period.

Activated carbon is added to the last CIL tank and progressively pumped forward from tank to tank counter to the slurry flow. The carbon adsorbs gold from solution as it moves forward in the circuit until it is fully "loaded" when it reaches the first CIL tank. The loaded carbon is removed from the CIL circuit at the first tank, screened, and transferred to the elution circuit for stripping. The barren slurry is screened to capture

carbon and treated in the cyanide destruction circuit prior to transfer to the tailings management facility (TMF).

The air emissions associated with elution operations include:

- Cyanide (as hydrogen cyanide).

3.4 ELUTION

The loaded carbon transferred from the CIL circuit is washed with dilute (3 percent) hydrochloric acid in the acid wash column to remove inorganic contaminants. Used acid is discharged to the TMF where it is neutralized by the lime in the tailings.

The gold is then "stripped" from the carbon under heat and pressure in a circulating, dilute solution of caustic soda and sodium cyanide.

The air emissions associated with CIL operations include:

- Products of liquefied petroleum gas combustion associated with the elution heater.

3.5 CARBON REACTIVATION

Once elution is complete, the barren carbon is then screened and heated in a kiln to 700°C to reactivate the carbon surfaces. The reactivated carbon is recycled to the last CIL tank to be re-used.

The air emissions associated with carbon reactivation operations include:

- Products of liquefied petroleum gas combustion associated with the kiln.

3.6 ELECTROWINNING

During elution, the gold-rich (pregnant) solution from the elution circuit is circulated through an electrolytic or "electrowinning" cell. The gold is deposited in the form of a thick sludge on stainless steel wool cathodes via an electro-chemical process.

The pregnant solution from the HIC circuit is similarly treated on a batch basis in a separate, dedicated electrowinning cell. After electrowinning is complete, the barren solution (eluate) is discharged to the CIL circuit.

Extraction fans above the electrowinning cells remove any off-gases from the gold room. This exhaust is treated by a modern wet scrubber system prior to release to atmosphere.

The air emissions associated with electrowinning operations include:

- Ammonia;
- Mercury vapour;
- Sulphur Dioxide (negligible once scrubbed out);
- Acid mist (negligible once scrubbed out); and
- Cyanide (negligible amount).

3.7 CALCINATION OVEN

The sludge recovered by electrowinning is dewatered and the resulting filter cake dried in an oven (calcined) prior to smelting.

The air emissions associated with calcination operations include:

- Products of liquefied petroleum gas combustion associated with the drying oven.

3.8 SMELTING FURNACE

The calcined filter cake is then charged in a smelting furnace together with a standard flux mixture and heated to 1100 degrees C° for 6-7 hours. Impurities are separated from the molten metal and doré (near pure gold) is poured into bars.

Similarly to the electrowinning, the smelting furnace exhaust is treated by a modern wet scrubber system prior to release to atmosphere.

The air emissions associated with smelting furnace operations include:

- Products of liquefied petroleum gas combustion;
- Sulphur Dioxide;
- Mercury vapour;
- Total Suspended Particulate (TSP);
- PM-10; and
- Heavy Metals.

3.9 CYANIDE DESTRUCTION

While emissions from this process are insignificant, this descriptive section has been included to illustrate the level of cyanide reduction from the chemical processing to its final destination in the tailings pond.

The widely used INCO SO_2/air process will be employed to destroy almost all of the residual cyanide in CIL tailings prior to disposal. The cyanide destruction reaction is described by the following equation:

$$CN^{-Free} + SO_2 + O_2 + H_2O = OCN^- + H_2SO_4$$

Sodium meta-bisulphite will be added to the tailings in two agitated and aerated tanks to provide sulphur dioxide (SO_2), which transforms the toxic free cyanide ion to more stable cyanate (OCN^-). Copper sulphate is used to catalyze the reaction while pH control is maintained through lime addition.

Laboratory testing conducted on the Touquoy ore samples by SGS Lakefield Research Limited employing the INCO SO_2/Air process indicates that total cyanide (CN_{Total}) concentrations in the tailings can be reduced from more than 189 ppm to a level of 0.85 ppm in less than 90 minutes using relatively low concentrations of reagents. This equates to a cyanide destruction efficiency of approximately 99.5 percent.

3.10 TAILINGS POND

The treatment processes occurring in the tailings pond include the natural degradation of cyanide, the breakdown of cyanate resulting from the cyanide destruction process, and settlement of suspended solids.

In the adjacent effluent treatment facility, the precipitation of dissolved arsenic, metals, suspended solids, and the co-precipitation of cyanide-metal complexes occurs.

The air emissions associated with tailings pond include:

- Cyanide (as hydrogen cyanide).

4.0 FUGITIVE DUST EMISSIONS

There will be sources of fugitive dust emissions present at the Site, which are all part of normal operation. These sources are the open-pit operations, unpaved haulroads, and storage piles. Specifically, these include:

Open-pit operations

- Blasting;
- Truck Loading;
- Bulldozing; and
- Grading.

Unpaved Haulroads

- Road surrounding perimeter of the pit;
- Road from pit to ROM pad;
- Road from pit to waste rock pile; and
- Road from the chemical processing area to the effluent treatment plant.

Storage Piles

- Wind erosion of the ROM stockpile;
- Wind erosion of the waste rock pile; and
- Wind erosion of the tailings beach pile.

As per guidance from the Ontario Ministry of the Environment from the document entitled "Procedure for Preparing an ESDM Report", these sources of fugitive dust can be excluded from the ESDM and subsequent air dispersion modelling if the Site implements a best management practices plan (BMPP) to monitor and control releases of fugitive dust.

Several mitigative measures will be utilized to reduce particulate emissions from these fugitive sources.

- Wet suppression controls on unpaved surfaces;
- Stabilized slopes of either mulch or vegetation for waste rock piles;

- Hardened surfaces where practical;
- Speed reduction;
- Use of large haul vehicles so as to minimize trip frequency; and
- Storage piles will be sprayed as necessary to minimize emissions.

The BMPP will provide additional detail on the protocols and procedures in place to minimize the occurrence of fugitive dust releases, and will list frequency of specific measures to be implemented and monitoring protocols to ensure these measures are having the desired effect.

5.0 EXPLANATION OF THE METHODS USED TO CALCULATE EMISSION RATES

5.1 CYANIDE EMISSIONS

As identified in Section 3 of this report, hydrogen cyanide will be emitted from the CIL tanks, the HIC tank, and the tailings pond. These sources are open to atmosphere and therefore volatilization of the cyanide will occur.

A mass-balance approach was used to estimate the emissions of cyanide from each source. Table 2 summarizes the calculations and results, and Figure 5 provides a visual representation of the inputs and outputs used for the mass balance calculations.

Cyanide will be input as sodium cyanide (NaCN), a common reagent used for the dissolution of gold from gold ores. Sodium cyanide will be added to both the CIL feed box and the HIC Reaction Vessel feed tank. As provided in the "Environmental Assessment Registration Document for the Touquoy Gold Project" prepared by CRA, 10 kg/hr of sodium cyanide will be used in the HIC tank and 83.21 kg/hr will be used in the CIL tanks.

In both the HIC tank and the CIL tanks the slurry pH will be maintained between 10 and 11 by the addition of caustic soda or lime, which will significantly limit the volatilization of cyanide above the tanks. To be conservative, it was assumed that 1 percent of the cyanide input will be released to atmosphere through volatilization. The estimated emission rate of cyanide from the CIL tanks was estimated as follows:

CN^- emission rate = NaCN usage rate x molar ratio (CN : NaCN) x 1% volatilized

$$CN^- = 83.21\frac{kg}{hr}(NaCN)\times\frac{26\frac{g}{mol}(CN^-)}{49\frac{g}{mol}(NaCN)}\times 1\%\times 1000\frac{g}{kg}\div 3600\frac{s}{hr} = 0.1226\frac{g}{s}$$

The same method was utilized to estimate the cyanide emissions from the HIC tank.

The tailings from the CIL tanks will be subject to the INCO SO_2/Air cyanide destruction process described in Section 3.9 of this report. The small percentage of cyanide that will not be converted to cyanate by this process (~0.5 percent) will be carried on to the tailings pond. The cyanide input to the tailings pond was estimated as follows:

$$CN^-_{\text{input to tailings}} = (CN^-_{\text{input to CIL tanks}}) - (CN^-_{\text{emitted from CIL}}) - (CN^-_{\text{converted to cyanate}})$$

As per the Metal Mining Effluent Regulations (MMER), the maximum allowable concentration of cyanide in the discharge from a tailings pond is 1 ppm CN_{TOT}. As indicated by laboratory testing conducted by SGS Lakefield Research Limited, the effluent from the Touquoy project will typically contain 0.21 ppm CN_{TOT}. The water return from the tailings pond will be treated to effluent quality. Both the effluent and the water return have been considered outputs in the mass balance around the tailings pond, as indicated on Figure 5.

The Australian National Pollutant Inventory document, "Emissions estimation technique manual for Gold Ore Processing", recommends assuming a 10 percent groundwater seepage rate, with a cyanide concentration equal to that in the return water. In accordance with this document, CRA has considered groundwater seepage as an output from the mass balance around the tailings pond.

The cyanide in the tailings pond is intended to break down via natural degradation, and the pH is not controlled with the addition of reagents as it is in the HIC tank and CIL tanks. Therefore, it has been conservatively assumed that 100 percent of the cyanide that will not be exiting the tailings pond in the effluent water, return water, or through groundwater seepage will be emitted to atmosphere. The estimated emissions of cyanide from the tailings pond were estimated as follows:

$$CN^- = CN^-_{INPUT} - CN^-_{RETURN.W} - CN^-_{EFFLUENT} - CN^-_{SEEPAGE}$$

$$CN^- \frac{g}{s} = 0.219 \frac{kg}{hr} - 0.0312 \frac{kg}{hr} - 0.0312 \frac{kg}{hr} - (10\% \times 0.0312 \frac{kg}{hr}) \times 1000 \frac{g}{s} \div 3600 \frac{s}{hr} = 0.0425 \frac{g}{s}$$

A more detailed breakdown of the calculation inputs and assumptions is provided in Table 2.

5.2 SMELTING EMISSIONS

Section 3.8 of this report identifies the potential emissions from the smelting furnace. A scrubber will significantly reduce the emissions from the smelter. Because the furnace will be fired by liquefied petroleum gas (LPG), the products of LPG combustion (particulate matter, sulphur dioxide, oxides of nitrogen, carbon monoxide, and carbon dioxide) were considered in the emissions evaluation. Additional particulate matter and sulphur dioxide will be released to atmosphere during the firing of the calcined filter cake. This additional particulate matter will contain heavy metals.

Due to the unavailability of emission factors for gold smelting, emission factors for copper smelting were adjusted with a safety factor of 10 and incorporated into the calculations. Emission factors for particulate matter and sulphur dioxide were obtained from The Pollution Prevention and Abatement Handbook published by the World Bank Group. The emission rate of sulphur dioxide was then estimated as follows:

SO_2 emission rate = gold extraction rate x emission factor x safety factor

$$SO_2 = 9.49 \frac{oz}{hr} \div 37524 \frac{oz}{tonne} \div 3600 \frac{s}{hr} \times 25 \frac{kgSO2}{tonne} \times 1000 \frac{g}{kg} \times 10(SF)$$

The same approach was used to estimate the emission rate of particulate matter from the smelter.

A report prepared by Golder Associates entitled "Report on Geochemical Study Static and Kinetic Testing of Waste Rock and Tailings, Touquoy Project" provides the results of an ore assay at the Site. Based upon the known concentrations of heavy metals in the ore, the metals emissions were calculated. Because the metals will be emitted as particulate, the weight fractions of metals were assumed to represent the fraction of the total suspended particulate matter (TSP) emission rate that will be attributed to each metal. For example, the emission rate of nickel was estimated as follows:

Ni emission rate = wt. % Ni x TSP emission rate

$$Ni = 0.003\% \times 8.24\text{E}-4 \frac{g}{s} = 2.43\text{E}-8 \frac{g}{s}$$

The smelter process emissions are summarized on Table 3, and combustion emissions are summarized on Table 5. While mercury was present in the ore assay, a different method has been used for estimating an emission rate, as detailed in Section 5.3 of this report. The methodology for LPG combustion emissions calculations is presented in Section 5.4 of this report.

5.3 MERCURY EMISSIONS

Mercury is a typical component in gold ores, and because of its physical and chemical properties can be emitted to the air in significant amounts during certain gold processing activities. At the DDV Gold Site, Mercury will be emitted from the carbon regeneration kiln, the electrowinning units, and the smelting furnace. Emissions were estimated for mercury from each of these three sources using the methodology

presented in the document "Mercury Mass Balance and Emissions Factor Estimates for Gold Ore Processing Facilities", prepared for the USEPA by Booz Allen & Hamilton, Inc.

The equation presented in the aforementioned document for estimating mercury emissions from the carbon regeneration kiln is as follows:

Hg emission rate = kiln feed rate x Hg concentration in stripped carbon

The equation for estimating mercury emissions from the electrowinning units is:

Hg emission rate (lb/hr) = cathode area (ft^2) x Hg fraction in plated metal x 0.02 ($lbs/ft^2/hr$)

Table 4 details the assumptions made for each equation variable and further explains the estimation of mercury emission rates from these two sources.

A mass balance approach was used to estimate the mercury emissions from the smelting furnace. The mercury content of the doré was estimated to be 1000 mg/kg and the furnace throughput was assumed to be 0.23 tonnes/hr based on typical values for gold mine presented in the Booz Allen & Hamilton report. Using this information, the emission rate of mercury from the smelting furnace was estimated as follows:

Hg emission rate = furnace throughput x Hg content of doré

5.4 LPG COMBUSTION EMISSIONS

Liquefied petroleum gas (LPG) will be used as fuel for the elution heater, carbon regeneration kiln, calcinations oven, and the smelting furnace. Emissions were estimated using emission factors presented in USEPA AP-42 Chapter 1.5 - Liquefied Petroleum Gas Combustion. It is estimated that the annual usage of LPG at the Site will be 19.05 x 10^3 L/yr. Using this information, emissions were calculated for each product of combustion. For example, the emission rate of carbon monoxide was calculated as follows:

CO emission rate = LPG usage x CO emission factor

$$CO = 19.05\text{E}+10^3 \frac{L(LPG)}{yr} \times 0.384 \frac{kg}{10^3 L} = 2.32\text{E}-4 \frac{g}{s}$$

Table 5 summarizes the estimated emission rates of the products of LPG combustion.

5.5 EMISSIONS FROM ELECTROWINNING

As discussed in Section 3.6 of this report, the emissions from the electrowinning processes at the Site that will not be completely scrubbed out are ammonia and mercury vapour. The emission estimation technique for mercury vapour is detailed in Section 5.3 of this report.

The emission rate of ammonia from the electrowinning units was estimated using an emission factor presented in the report "Development and Selection of Ammonia Emission Factors" prepared for the USEPA by Battye, Battye, Overcash and Fudge in August 1994.

$$NH_3 = 187.5 \frac{tonnes(ore)}{hr} \times 0.029 \frac{kg}{Mg} \times \frac{1000 \frac{g}{kg}}{3600 \frac{s}{hr}} = 1.51 \frac{g}{s}$$

NH_3 emission rate = ore processing rate x NH3 emission factor (kg/Mg of ore processed)

Tables 4 and 6 summarize the expected emissions from electrowinning.

5.6 EMISSIONS FROM FRONT-END OPERATIONS

The physical processes that will occur at the front end of the mine to prepare the ore for gold extraction in the plant are described in Section 3.0 of this report. These operations will generate total suspended particulate, and PM_{10}. The TSP will potentially contain heavy metals, and so these have been included in the emissions estimates.

Emission factors for TSP and PM_{10} from various front-end gold mining operations are published in the Australian National Pollutant Inventory document, "Emissions estimation technique manual for Gold Ore Processing", Version 2.0. The emission factors for high moisture content ores were chosen in this case because the moisture content of the Touquoy ore is greater than 5 percent. Using the provided emission factors, the estimated emission rates of TSP and PM_{10} from each operation were determined. For example, the emission rate of TSP from primary crushing was estimated as follows:

TSP emission rate = ore processing rate x TSP emission factor (high moisture content ores)

Because the metals will be emitted as particulate, the weight fractions of metals in the ore were assumed to represent the fraction of the total suspended particulate matter (TSP) emission rate that will be attributed to each metal. Using this approach, the metal emissions from each of the front-end operations were estimated. For example, the emission rate of cadmium from primary crushing was estimated as follows:

Cd emission rate = TSP emission rate x wt. fraction Cd

$$Cd = 0.52\frac{g}{s} \times 0.12\frac{\mu g}{g} \times 10^{-6}\frac{g}{\mu g} = 6.25\text{E}-8\frac{g}{s}$$

Tables 7 and 8 summarize the front-end operations emission estimates and any necessary assumptions.

5.7 EQUIPMENT ENGINE COMBUSTION EMISSIONS

The emissions from the equipment used in the open pit will include products of diesel combustion from the engines. The emissions were estimated using the USEPA Tiered Emission Standards for NonRoad Diesel Engines, an average load factor for the equipment, and the maximum equipment horsepower (hp) rating. The USEPA Tiered Emission Standards do not specify emission standards for SO_2 from nonroad engines and therefore, the USEPA AP-42 emission factors for Gasoline and Diesel Industrial Engines (Chapter 3.3) were used for SO_2.

The USEPA nonroad emission standards are a tiered system for equipment engines of various power ratings. The tiers relate to specific model years of equipment for specific engine sizes. The equipment used at the Facility will follow USEPA Tier 3 standards, which apply to 2006 vehicle model years.

Along with the USEPA standards and emission factors, an average engine load of 55 percent was assumed for all equipment to obtain the maximum emission rate for all contaminants. Emissions from the equipment were estimated on a 1-hour and 24-hour basis to account for the operating hours of the equipment. For example, the CO emissions from the Loader 980G were estimated as follows:

1-hour:

$$CO = 3.5\frac{g}{kW \cdot hr} \times 317hp \times \frac{0.7457kW}{1hp} \times 55\% \times \frac{1hr}{3600s}$$
$$CO = 1.26\text{E} - 1g/s$$

24-hour:

$$CO = 1.26\text{E} - 1g/s \times \frac{10.6hours}{day} \times \frac{1day}{24hours}$$
$$CO = 5.57\text{E} - 2g/s$$

Detailed emission calculations for the equipment engines are provided in Table 14.

5.8 VEHICLE IDLING EMISSIONS

The vehicles at the Site will idle for a period of time during normal operations. The emissions of the idling vehicles were estimated based on the USEPA MOBILE6 Vehicle Emissions Model, the number of trucks on-site per day, and an assumed vehicle speed for idling vehicles.

The USEPA MOBILE6 emissions factor model predicts vehicle emission rates, in grams per vehicle mile traveled (g/VMT), for combustion products from gasoline- and diesel-fuelled highway motor vehicles. MOBILE6 uses a wide range of inputs to predict emission rates, such as: mileage accumulation rates, fraction of vehicle fleet that is diesel powered, age distribution of the vehicle fleet, fuel evaporative pressure (Reid Vapour Pressure), fuel sulphur content, typical daytime temperatures, and evaluation year. The model is able to calculate predictive emission rates for expected tailpipe emissions such as SO_2, PM, VOCs, NOx, and a small number of air toxics. Not all of MOBILE6's input options are required to calculate vehicle emission rates.

Along with the emission factors determined from MOBILE6, it was assumed that vehicles will idle 10 percent of the time and the idling vehicles were assumed to be equivalent to those moving at a speed of 4.02 kilometers per hour (km/hr). This assumption is consistent with the MOBILE6 guidance provided in the USEPA document *Technical Guidance on the Use of MOBILE6.2 for Emission Inventory Preparation* (August 2004). Emissions from idling vehicles were estimated as follows:

CO Emissions from Idling Service Truck

$$CO = 0.55\frac{VKT}{d} \times 3.48\frac{g}{VKT} \times \frac{1d}{24hr} \times \frac{1hr}{3600s}$$
$$CO = 2.22\text{E} - 5$$

5.9 TAILPIPE EMISSIONS

Tailpipe emissions from the mine service vehicles were estimated using the USEPA MOBILE6 Model as described in Section 5.8 in this report. Tailpipe emissions from all vehicles travelling on-site were estimated based on the MOBILE6 emission factors, the provided maximum operational hours per year, and estimated vehicle speed. The tailpipe emissions from each vehicle type were summed to obtain the total estimated emission rate for each contaminant. For modelling purposes it was assumed that all vehicles will be operating simultaneously, which provides conservative results.

The tailpipe and idling emissions from the on-site roads are summarized in Table 13.

6.0 DESCRIPTION OF SENSITIVE RECEPTORS

In order to determine the potential worst-case off-Site ambient air impacts, sensitive receptors were selected for inclusion in the air dispersion modelling.

The nearest sensitive receptor has been considered to be at a point in Scraggy Lake, where a camper may be situated.

The second closest sensitive receptor is a children's overnight camp (Camp Kidston) located at a distance of approximately 3 km northwest from the open-pit area.

The third closest sensitive receptor is a permanent residential dwelling located at a distance of approximately 5 km northwest from the open-pit area.

Figure 4 illustrates the locations of these three sensitive receptors relative to the Site.

Ground-level concentrations for all contaminants were calculated at various averaging times from the air dispersion modelling. These values were compared to available criterion for each of the receptors to determine the off-Site ambient air impacts potentially occurring from the Site operations.

7.0 DISPERSION MODELLING

Dispersion modelling was performed to assess the proposed Facility's maximum ground level concentrations for the following air contaminants:

- carbon monoxide (CO);
- nitrogen oxides (NOx);
- sulphur dioxide (SO_2);
- total suspended particulates (TSP);
- particulate matter less than 10 microns in diameter (PM_{10});
- aluminum oxide;
- ammonia;
- antimony;
- arsenic;
- barium;
- beryllium
- bismuth
- cadmium;
- cobalt;
- chromium;
- copper;
- cyanide;
- ferric oxide;
- iron;
- lead;
- lithium;
- magnesium oxide;
- manganese;
- mercury;
- molybdenum;
- nickel;
- phosphorous;
- selenium;

- strontium;
- tin;
- titanium;
- thallium;
- uranium;
- vanadium; and
- zinc.

The dispersion modelling was performed using the United States Environmental Protection Agency (USEPA) multi-source dispersion model AERMOD (Version 06341). AERMOD is an advanced steady-state plume model that has the ability to incorporate building cavity downwash, actual source parameters, emission rates, terrain and historical meteorological information to predict ground level concentrations (GLCs) at specified locations.

7.1 MODELLING METHODOLOGY

As Nova Scotia does not have an air dispersion modelling guidance document, the Ontario air compliance regulation (Ontario Regulation 419/05; O. Reg. 419/05) and dispersion modelling guidance ("Air Dispersion Modelling Guideline for Ontario", July 2005) were referenced to develop the modelling methodology.

7.1.1 METEOROLOGICAL DATA

Five years of hourly meteorological data was processed using the AERMOD meteorological preprocessor, AERMET (Version 06341). AERMET enters raw surface and upper air recorded data, and processes this data with user provided land-use characteristics, to produce surface and upper air meteorological files that are suitable for use with AERMOD.

For the Facility's assessment, five years of meteorological data was obtained and processed. The raw surface data is from Halifax, NS. The raw upper air file is from Yarmouth, NS. The meteorological data covers the years 2002 to 2006 inclusive. The hourly data included many factors which affect the dispersion of air contaminants including wind speed, wind direction, temperature, ceiling height, and atmospheric stability.

7.1.2 AVERAGING PERIODS

Averaging periods for modelled compounds were specified based on the type of air contaminant and available air standards as listed by the Nova Scotia Ministry of Environment and Labour (NSMEL) as per Nova Scotia Regulation 28/2005 (N.S. Reg. 28/05), and by the Environment Canada (EC) document "Environmental Code of Practice for Base Metal Smelter and Refiners" (Environment Canada, March 2006). For those modelled compounds that do not have a published air standard, the following regulations and guidances were used:

- Ontario Ministry of the Environment (MOE) standards as per O. Reg. 419/05; and
- Summary of O. Reg. 419/05 Standards and Point of Impingement Guidelines & Ambient Air Quality Criteria (AAQCs) (Ontario MOE, December 2005).

The majority of the air contaminant models used a 24-hour averaging period. Only the following air contaminants were modelled with averaging periods instead of, or in addition to, the 24-hour period:

- CO – 1-hour and 8-hours;
- NOx – 1-hour and annual;
- SO2 – 1-hour, 24-hour and annual;
- TSP – 24-hours and annual;
- lead – 24-hour and 30-day; and
- nickel – 1-hour and 24-hour.

7.1.3 DIGITAL ELEVATION MAPPING DATA

Canadian digital elevation mapping (DEM) data for the vicinity around the Facility was obtained from the GeoBase geospatial website (www.geobase.ca). DEM data was downloaded and processed using the AERMOD terrain processor AERMAP (Version 04300). AERMAP calculates digital terrain elevation data for all sources, receptors and buildings, and provides the user with a suitable input file for use with AERMOD.

Note that an older version of AERMAP was used as the most recent version of the model (Version 06341) contains a bug that prevents the model from successfully processing the terrain data from GeoBase. The bug primarily affects terrain files located further north than the continental United States.

7.1.4 SOURCE INPUT PARAMETERS

Sources at the Facility were modelled as a point source, volume source or area source based on the physical orientation or process operations associated with the source. All source parameters were estimated based on known described operations.

Of particular note are a number of sources that are identified as potentially fitted with rain caps or are potentially oriented horizontally. Both rain caps and horizontal orientation of exhausts will inhibit the vertical momentum of exhaust gases from stacks and can have an impact on the dispersion modelling. These capped or horizontal sources were modified as per the Ontario MOE guidance for horizontal sources and rain caps. The guidance states that, if:

V = actual stack gas exit velocity
V' = stack gas exit velocity as entered into the model
D = actual stack inside diameter
D' = stack inside diameter as entered into the model
H = actual stack height
H' =stack height entered into the model

Then a rain capped source would have its parameters modified as follows:

1. Set $V' = 0.1$ m/s;
2. Set $D' = D \times \text{SQRT}(V/V')$; and
3. $H' = H - 3D$ (to account for the frequent stack tip downwash from the capped source; may not be less than the roof height).

A summary of the AERMOD source input parameters is provided in Table 10. The locations of the modelled sources are shown on Figures 2A and 2B.

7.1.5 SENSITIVE RECEPTORS

Receptors were placed at three locations identified as potentially impacted by the Facility. The locations were previously identified as:

- POR-1 – residential receptor;
- POR-2 – children day camp; and
- POR-3 – Scraggy Lake.

A single receptor was placed at both POR-1 and POR-2. A discrete receptor grid with a spacing interval of 25 m was placed over POR-3.

7.1.6 ON-SITE BUILDING DATA

The Facility's main buildings were modelled in AERMOD to account for building cavity downwash. Cavity downwash can result in air contaminants being forced to ground level prematurely under certain meteorological conditions, which can result in higher than expected near-field GLCs.

The USEPA building downwash model BPIP was used to predict downwash effects for use with the AERMOD models.

7.2 DISPERSION MODELLING RESULTS

All AERMOD models were developed and executed following the methodology described above.

The five years of meteorological data included over 43,800 hours of data. The AERMOD model was run to calculate the maximum GLCs for each of the air contaminants and averaging periods previously described. The meteorological conditions, which would result in the maximum concentration, would typically be stable atmospheric conditions such as an inversion with low wind speed. The maximum hour out of 43,800 hours of data would not occur at each grid point simultaneously since the wind can only blow in one direction during one hour.

The maximum GLCs for each air contaminant at each of the sensitive receptors are predicted to be well below the established limits. Table 12 summarizes the maximum

concentration predicted for each air contaminant at each sensitive receptor. Table 12 also summarizes the limits used for evaluation, and the percentage of predicted GLC relative to the limit at each sensitive receptor.

8.0 EMISSION SUMMARY TABLE AND CONCLUSIONS

8.1 EMISSION SUMMARY TABLE

For each source of significant contaminants the following parameters are referenced in Table 12:

- Contaminant name;
- CAS number;
- Total facility emission rate;
- Maximum concentrations at each sensitive receptor;
- Averaging period for the dispersion modelling;
- Ambient air criteria; and
- The percentage of criteria at each sensitive receptor.

The concentrations listed in Table 12 were compared against criteria from various jurisdictions, also listed in Table 12.

9.0 CONCLUSIONS

Based on the estimated maximum emissions scenario presented in this ESDM, the predicted maximum ground level ambient air concentrations of all potential contaminants calculated from the air dispersion modelling are all well below applicable criterion at the three sensitive points of reception (PORs).

This ESDM Report demonstrates that the Site operations under worse-case meteorological conditions will not adversely impact human health or the surrounding environment at these PORs.

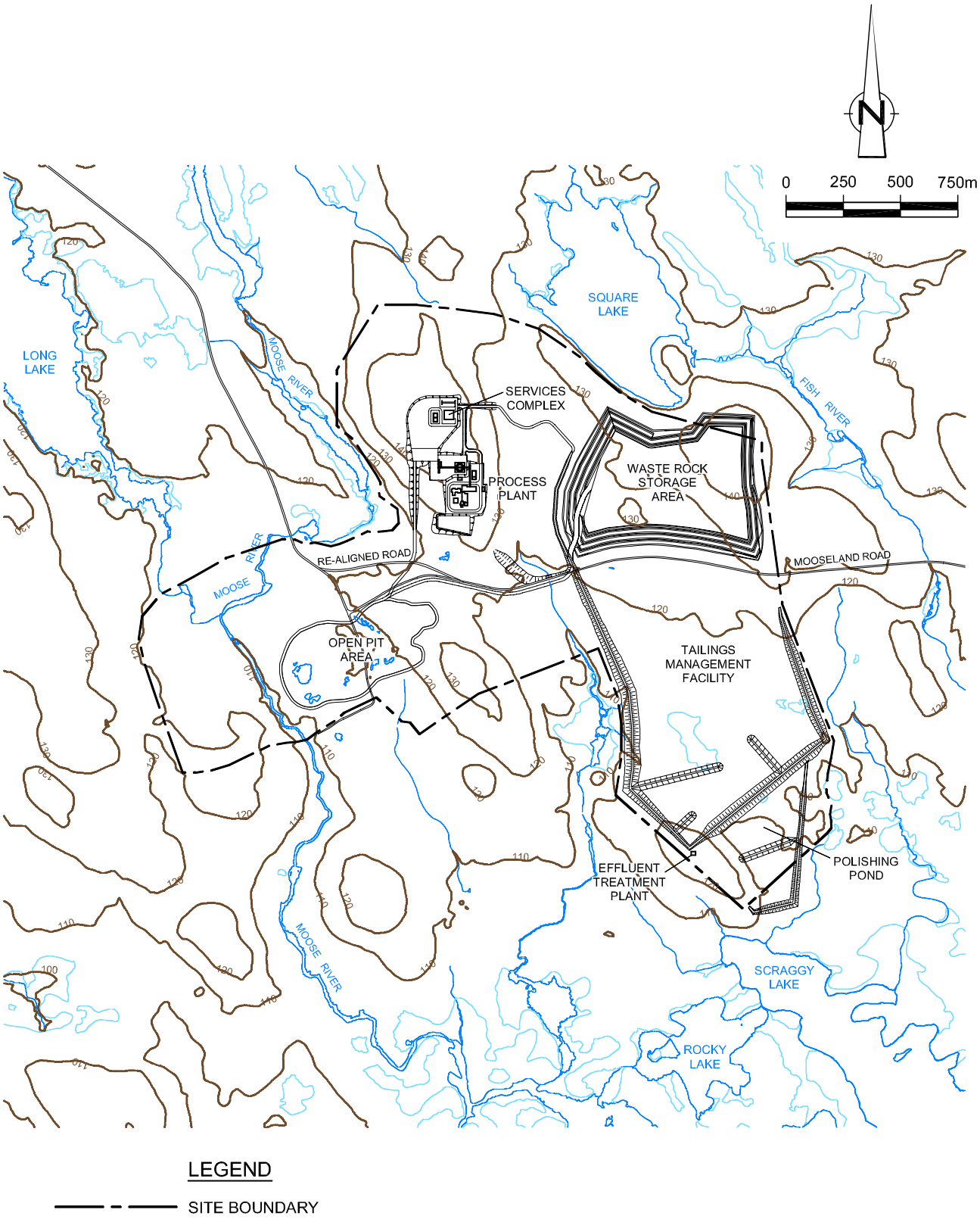


figure 1

SITE PLAN
EMISSIONS SUMMARY AND DISPERSION MODELLING REPORT
TOUQUOY GOLD PROJECT
Moose River, Nova Scotia

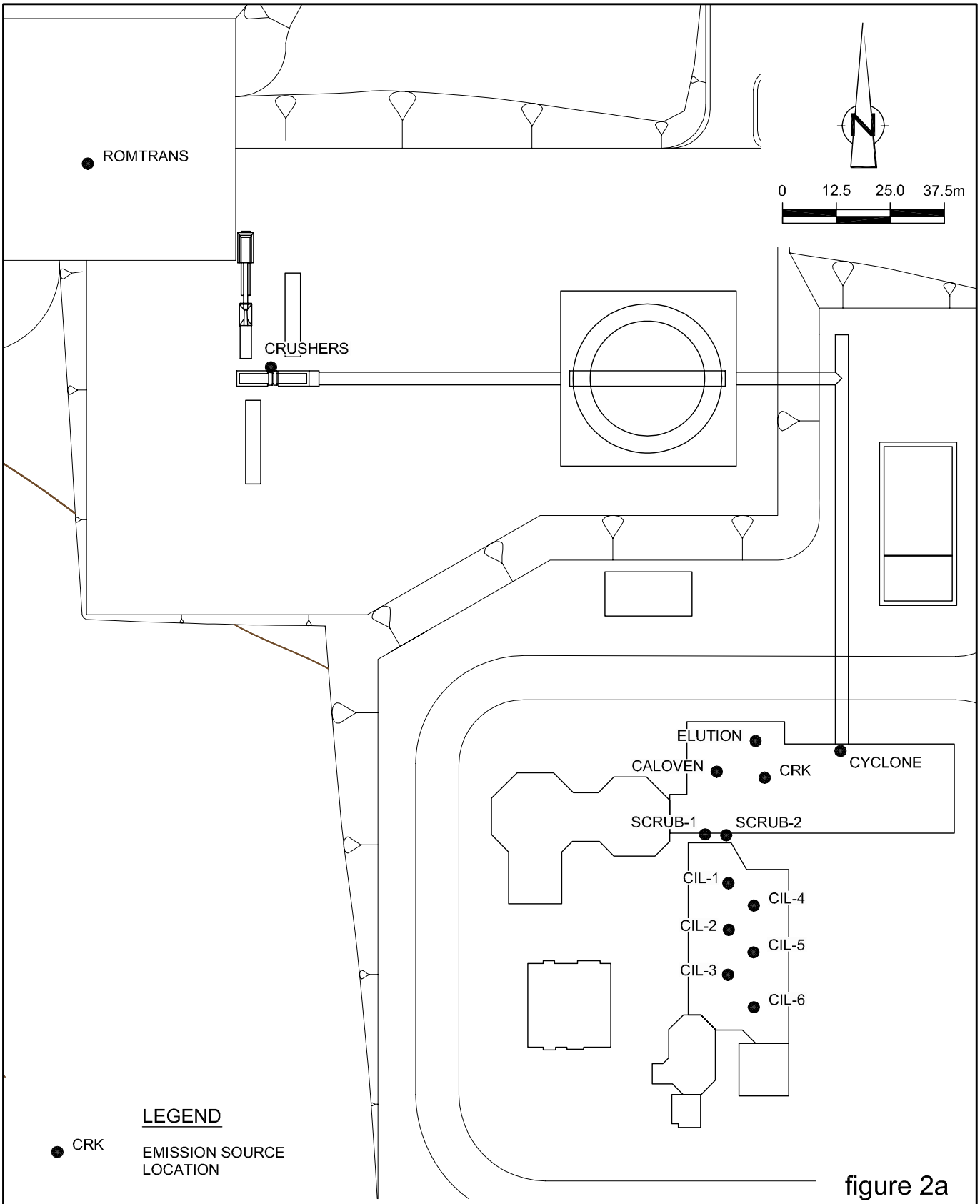


figure 2a

AIR EMISSION SOURCE LOCATIONS
EMISSIONS SUMMARY AND DISPERSION MODELLING REPORT
TOUQUOY GOLD PROJECT

Moose River, Nova Scotia

820933-D(007)GN-WA002 SEP 24/2007

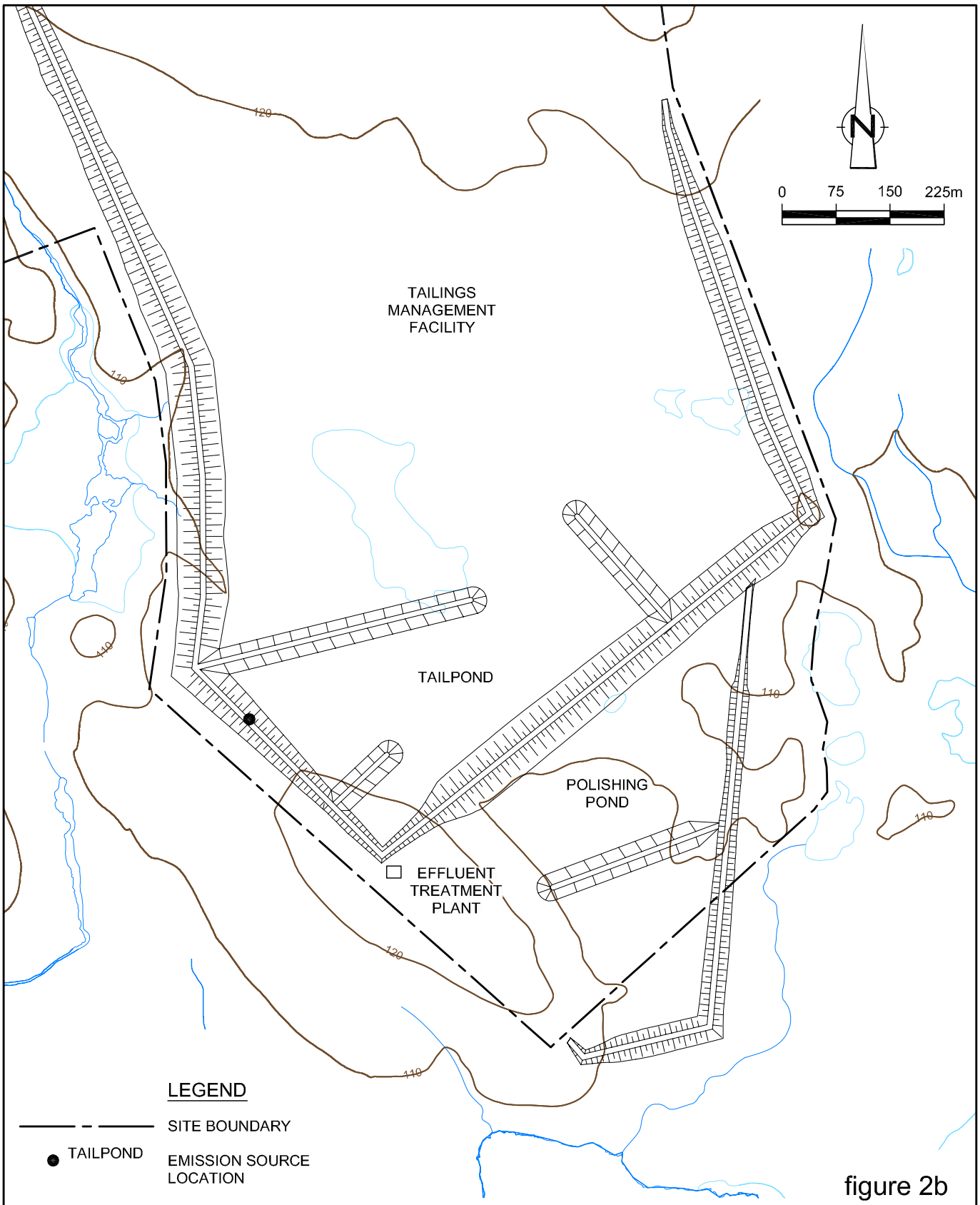
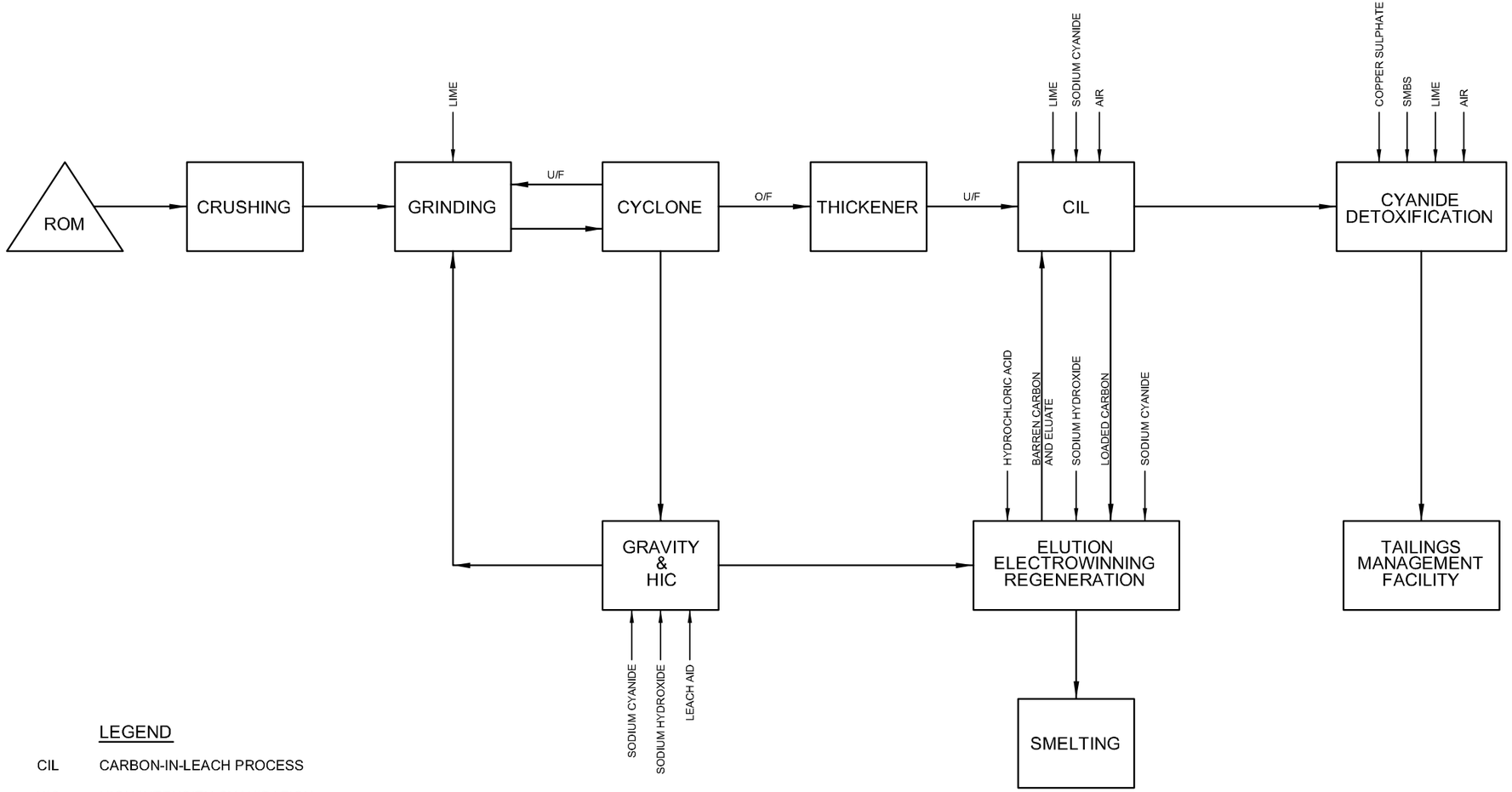


figure 2b

AIR EMISSION SOURCE LOCATIONS
EMISSIONS SUMMARY AND DISPERSION MODELLING REPORT
TOUQUOY GOLD PROJECT

Moose River, Nova Scotia

820933-D(007)GN-WA002 SEP 24/2007



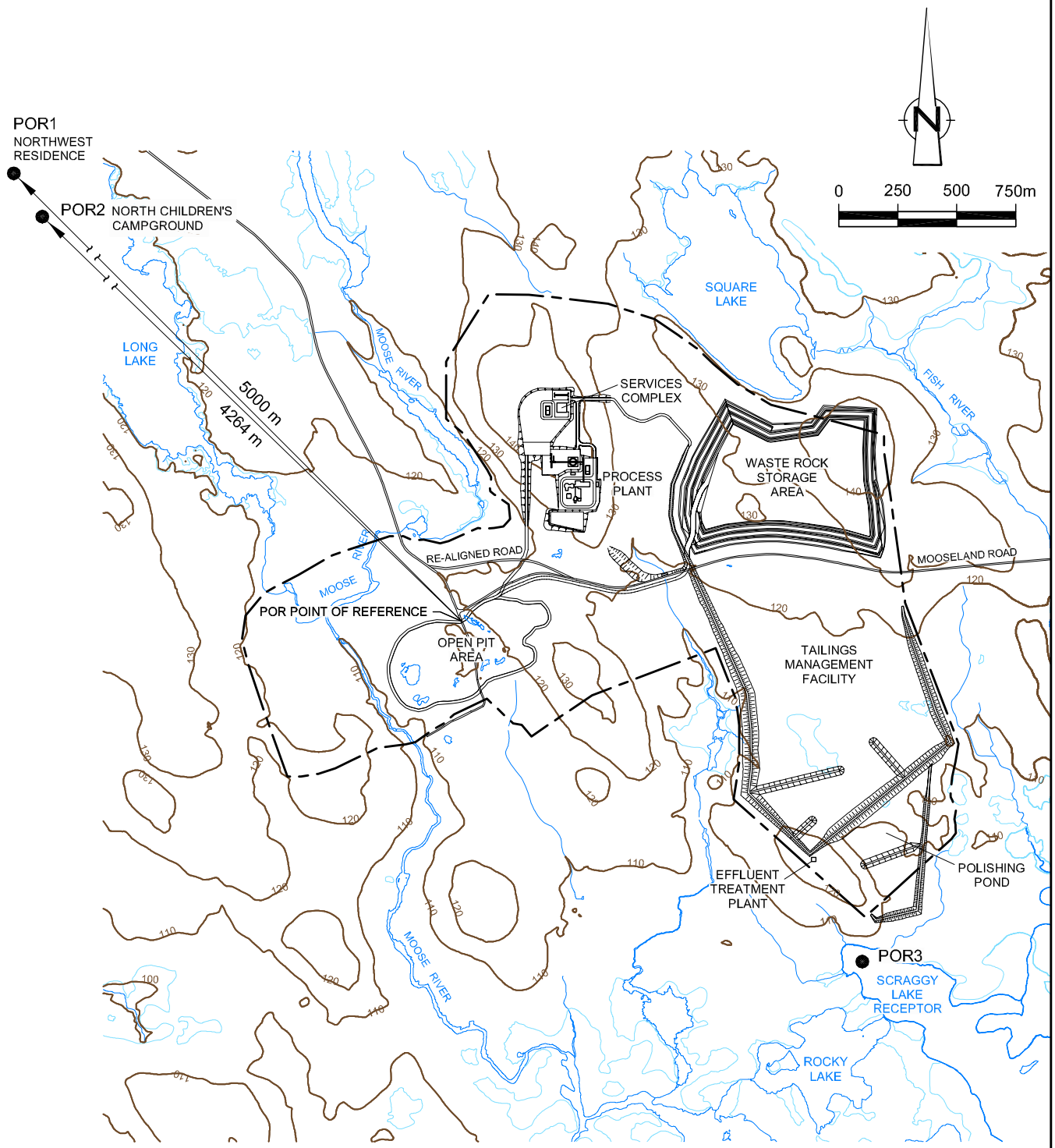
LEGEND

CIL	CARBON-IN-LEACH PROCESS
HIC	HIGH INTENSITY CYANIDATION
SMBS	SODIUM METABISULPHITE
U/F	UNDERFLOW
O/F	OVERFLOW
⟶	PROCESS INPUTS

NOTE: DRAWING ADAPTED FROM AUSENCO LTD. DRAWING NO. 1666-F-100

figure 3

PROCESS FLOW DIAGRAM
EMISSIONS SUMMARY AND DISPERSION MODELLING REPORT
TOUQUOY GOLD PROJECT
Moose River, Nova Scotia



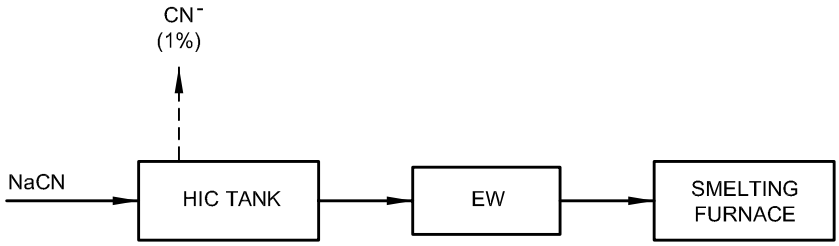
LEGEND

SITE BOUNDARY

POR2 POINT OF RECEPTION

figure 4

POINT OF RECEPTION LOCATIONS
EMISSIONS SUMMARY AND DISPERSION MODELLING REPORT
TOUQUOY GOLD PROJECT
Moose River, Nova Scotia



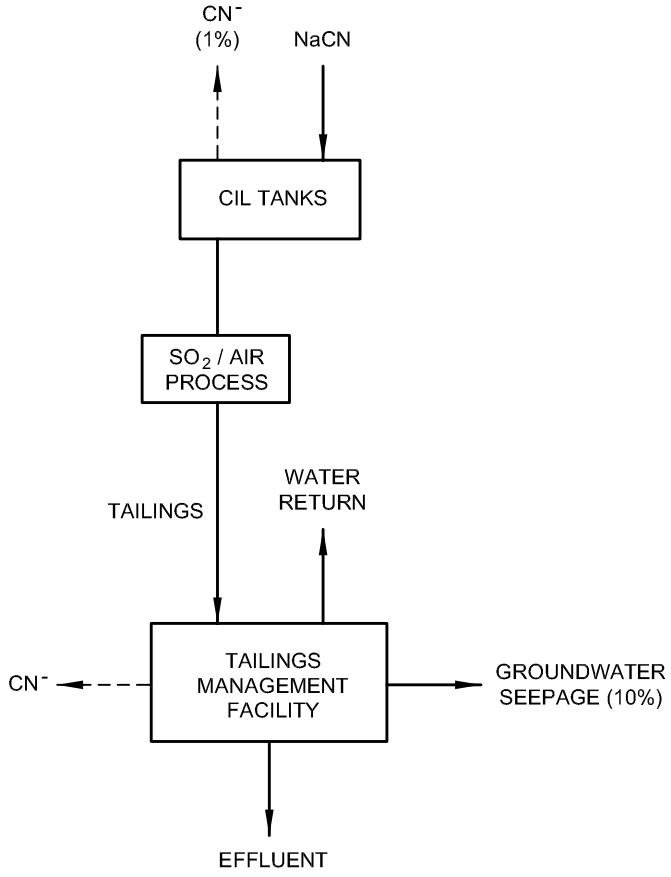


figure 5

CYANIDE MASS BALANCE FLOW DIAGRAM
EMISSIONS SUMMARY AND DISPERSION MODELLING REPORT
TOUQUOY GOLD PROJECT
Moose River, Nova Scotia

TABLE 1

SUMMARY OF AIR EMISSIONS SOURCES
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

Source ID		*Description*	*Expected Contaminants*	*Reference*
CIL-1 to CIL-6	CIL Tanks	General Tank Exhaust	Cyanide	Table 2
CIL-1 to CIL-6	HIC Leach Feed Tank	General Tank Exhaust	Cyanide	Table 2
SCRUB-1	EW Cells (with scrubber) -HIC stream -CIL stream	EW Cell Fumes to Atmosphere	Ammonia Mercury SO_2- negligible once scrubbed out. Hydrochloric acid mist- negligible once scrubbed out. Cyanide- negligible amount (1)	Table 3.2, 5
CRK	Carbon Reactivation Kiln	Vapour emitted through stack	Products of Combustion (LPG) Mercury Cyanide- negligible amount (1)	Table 3.2, 4
ELUTION	Elution Heater	Combustion Process	Products of Combustion (LPG) Cyanide- negligible amount (1)	Table 4
CALCOVEN	Calcination Oven	Combustion Process	Products of Combustion (LPG)	Table 4
SCRUB-2	Smelting Furnace (with Scrubber)	Fume to Atmosphere	Products of Combustion (LPG) SO_2 gas Mercury Total Suspended Particulate (TSP) PM_{10} Metals	Table 3.1, 3.2
TAILPOND	Tailings Pond	Off-gas	Cyanide	Table 2
CRUSHERS	-Crushing/Handling and Transfers/Conveyance	Front-End Operations	Total Suspended Particulate (TSP) PM_{10} Metals	Table 8.1, 8.2, 8.3
ROMTRANS	-Loading/Unloading ROM stockpile	Front-End Operations	Total Suspended Particulate (TSP) PM_{10} Metals	Table 8.1, 8.2, 8.3

Note:

(1) Identified as negligible based on criteria presented in the Australian National Pollutant Inventory document, "Emissions estimation technique manual for Gold Ore Processing", Version 2.0.

TABLE 2

CYANIDE EMISSIONS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

Source ID	*Description*	*NaCN input (kg/hr)*	*CN^- input (kg/hr)*	*% volatized*	*Water return*	*CN^- emission rate (g/s)*
CIL-1 to CIL-6	CIL Tanks	83.21	44.15	1%	NA	0.1226
CIL-1 to CIL-6	HIC Tank	10.00	5.31	1%	NA	0.0147
TAILINGS	Tailings Pond	NA	0.219 (1)	100%	0.0312	0.0430 (2)

Knowns:

Sodium Cyanide usage:	816,480	kg/yr
Cyanide (CN^-) usage (total facility):	433,234	kg/yr

Molecular weights

NaCN	49	g/mol
CN^-	26	g/mol

	TMF carry through (TMF_{ct})	*TMF water return (TMF_{wr})*
L/yr	1.44E+09	1.3E+09
'total' cyanide (ppm)	0.85	0.21
tonnes/yr	1.224	0.27
WAD cyanide (ppm)	0.64	below detection
free cyanide (ppm)	0	0

Notes:

(1) The cyanide input to the tailing pond represents the cyanide that remains after volatilization above the CIL tanks and the conversion to cyanate by the SO2/Air Process.

(2) Calculated using a mass-balance approach, following the methodology presented in the Australian National Pollutant Inventory document, "Emissions estimation technique manual for Gold Ore Processing", Version 2.0.

(3) Seepage rate to groundwater was assumed to be 0.4%, as indicated by the client per the TMF design specifications.

TABLE 3

PROCESS EMISSIONS FROM SMELTING
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

Gold Extraction Rate (1) (oz/hr)	*Emission Factor (2) (kg/tonne gold extracted)*	*Compound*	*(µg/g)*	*wt. % (3)*	*Emission Rate (4) (5) (g/s)*
9.49	1.0	*Total Particulate*		100%	8.20E-04
		Aluminum oxide		16.87%	1.38E-04
		Arsenic	1042	0.10%	8.55E-07
		Barium	551.31	0.055%	4.52E-07
		Beryllium	1.88	0.00019%	1.54E-09
		Bismuth	0.37	0.000037%	3.04E-10
		Cadmium	0.12	0.000012%	9.84E-11
		Cobalt	14.74	0.0015%	1.21E-08
		Chromium	56.07	0.0056%	4.60E-08
		Copper	47.32	0.0047%	3.88E-08
		Ferric Oxide		7.26%	5.96E-05
		Iron		5.02%	4.12E-05
		Phosphorus		3.06%	2.51E-05
		Lithium	30.02	0.0030%	2.46E-08
		Magnesium oxide		2.2%	1.80E-05
		Manganese	814.89	0.081%	6.68E-07
		Molybdenum	1.66	0.00017%	1.36E-09
		Nickel	29.67	0.0030%	2.43E-08
		Lead	17.66	0.0018%	1.45E-08
		Antimony	0.85	0.000085%	6.97E-10
		Selenium	2.2	0.00022%	1.80E-09
		Tin	2.41	0.00024%	1.98E-09
		Strontium	96.04	0.0096%	7.88E-08
		Titanium	1806.74	0.18%	1.48E-06
		Thallium	0.69	0.000069%	5.66E-10
		Uranium	1.61	0.00016%	1.32E-09
		Vanadium	104.47	0.010%	8.57E-08
		Zinc	94.84	0.0095%	7.78E-08
		Mercury	See table 3.1		
	25	SO_2		100%	1.87E-02

Notes:

(1) Based on knowns:

500,000.00	oz gold/6 years	
9,000,000.00	tonnes ore/6 years	
Ratio (gold/ore)	1.57E-06	
Ore processing rate	187.5	tonnes/hr
Gold Extraction Rate =	9.49	oz/hr

(2) From the 'Pollution Prevention and Abatement Handbook' published by the World Bank Group, July 1998
This factor is the recommended maximum release of TSP from a moden smelting operation in the presence of emission controls (scrubber) from copper smelting. It has been assumed that the gold smelting operations would achieve this value at a minimum.

(3) The worst case scenario for each metal from the generic ore assays presented in Table A1 of the Australian National Pollutant Inventory document, "Emissions estimation technique manual for Gold Ore Processing", Version 2.0 has been used in this table.

(4) Estimates have been adjusted upwards by a safety factor of 10 to account for values stemming from an emission factor of TSP from copper smelting and not gold smelting (no literature exists). The factor has been applied to be conservative in lieu of this uncertainty.
Safety Factor 10

(5) The total particulate and sulfur dioxide emissions presented in this table represent those resulting from propane combustion as well as those generated as by-products during the smelting process.

TABLE 4

MERCURY EMISSIONS FROM CHEMICAL PROCESSES
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

Source ID	*Description*	*Mercury Emission Rate (g/s)*
CRK	Carbon Regeneration Kiln	7.64E-02 (1)
SCRUB-1	Electrowinning Cells	1.16E-01 (2)
SCRUB-2	Smelting Furnace	6.30E-02 (3)

Notes:

(1) Based on the following equation:

Mercury Emission Rate = Kiln Feed Rate x Mercury Concentration in Stripped Carbon

Kiln Feed Rate: 0.25 tonnes/hour

The kiln feed rate was assumed based on the typical range presented in "Mercury Mass Balance and Emissions Factor Estimates for Gold Ore Processing Facilities", prepared for the USEPA by Booz Allen & Hamilton, Inc.

Mercury concentration in stripped carbon: 1,100 mg/kg

The mercury concentration in stripped carbon was assumed based on the provided typical mid-point in "Mercury Mass Balance and Emissions Factor Estimates for Gold Ore Processing Facilities", prepared for the USEPA by Booz Allen & Hamilton, Inc.

(2) Based on the following equation: Emission Rate (lb/hr) = Cathode Area (ft^2) x Mercury Fraction in plated metal x 0.02 ($lbs/ft^2/hr$)

Emission Rate (lb/hr) = Cathode Area (ft2) x Mercury Fraction in plated metal x 0.02 (lbs/ft2/hr)

Cathode Area: 115 ft^2

Cathode area assumed based on the cathode area of a typical electrowinning unit configuration, as presented in "Mercury Mass Balance and Emissions Factor Estimates for Gold Ore Processing Facilities", prepared for the USEPA by Booz Allen & Hamilton, Inc.

(3) The mercury content of the dore and the furnace throughput were assumed based on the typical ranges presented in "Mercury Mass Balance and Emissions Factor Estimates for Gold Ore Processing Facilities", prepared for the USEPA by Booz Allen & Hamilton, Inc.

Mercury content of dore: 1000 mg/kg
Furnace throughput: 0.23 tonnes/hour

TABLE 5

LPG COMBUSTION EMISSIONS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

LPG Usage:	**378,000**	**kg/yr**
	19.05	**10^3L/yr**

Compound	*Emission Factor (1) (kg/10^3 L)*	*Emission Rate (g/s)*
NOx	2.28	1.38E-03
CO	0.384	2.32E-04
SO_2	3.396 (2)	2.05E-03
PM_{10}	0.072	4.35E-05
CO_2	1,500	9.06E-01

Notes:

(1) LPG Emission Factors were obtained from USEPA AP-42, (Chapter 1.5, Liquified Petroleum Gas Combustion) for Industrial Boilers.

(2) Based on the maximum sulfur content of propane, 10ppm.

(3) Facility-wide propane usage has been estimated to be divided as follows:
- Elution Heater (22%)
- Carbon Regeneration Kiln (22%)
- Calcination Oven (22%)
- Smelting Furnace (33%)

TABLE 6

EMISSIONS FROM ELECTROWINNING CELLS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

Ore Processing Rate: 187.5 tonnes/ hr

Compound	*Emission Factor (1) (kg/Mg ore processed)*	*EF Rating*	*Emission Rate (g/s)*
Ammonia	0.029	D	1.51
Mercury	See Table 3.2		

Note:

(1) Source: "Development and Selection of Ammonia Emission Factors" Final Report, prepared for USEPA.
http://www.factoryfarm.org/docs/Battye_Report.pdf

TABLE 7

TSP AND PM10 EMISSIONS FROM FRONT-END GOLDMINE OPERATIONS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

Process Tonnage **187.5 tonnes / hour**

	High Moisture Content Ores (3)			
	TSP		PM10	
	Emission Factor (kg/tonne)	Emission Rate (g/s)	Emission Factor	Emission Rate (g/s)
Mechanical Reduction Process				
Primary Crushing	0.01	0.52	0.0040	0.21
Secondary Crushing	0.03	1.56	0.0120	0.63
Tertiary Crushing	0.03	1.56	0.0100	0.52
Wet Grinding (Milling) (1)	0	0.00	0.0000	0.00
Material Handling and Storage				
Handling, Transferring and Conveying	0.005	0.26	0.0020	0.10
Loading ROM Stockpiles (2)	0.004	0.10	0.0017	0.04
Unloading from ROM Stockpiles (2)	0.03	0.78	0.0130	0.34
Total Emissions (g/s)		4.79		1.84

Percentage of Material Processed Emitted as TSP 0.009

Notes:

(1) Emission factors are not provided for wet grinders because the high-moisture content in these operations reduce emissions to negligible level, as provided in the Australian National Pollutant Inventory document, "Emissions estimation technique manual for Gold Ore Processing", Version 2.0.)

(2) Total Emissions of TSP and PM10 from stockpiles have been reduced by 50% to account for wetting of the piles.

(3) A high moisture content ore is defined as having a moisture content of more than 5%, by the Australian National Pollutant Inventory document, "Emissions estimation technique manual for Gold Ore Processing", Version 2.0. The ore from the Touquoy Gold Project has a moisture content of greater than 5%, and emission factors were selected accordingly.

TABLE 8

METAL EMISSIONS FROM FRONT-END GOLDMINE OPERATIONS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

		High Moisture Content Ores	
	Metal	*Metal Emission Factor (µg/g) (1)*	*TSP Metal Emission Rate (g/s)*
Mechanical Reduction Process			
Primary Crushing	Aluminum oxide	16.87%	8.79E-02
	Arsenic	1042	5.43E-04
	Barium	551.31	2.87E-04
	Beryllium	1.88	9.79E-07
	Bismuth	0.37	1.93E-07
	Cadmium	0.12	6.25E-08
	Cobalt	14.74	7.68E-06
	Chromium	56.07	2.92E-05
	Copper	47.32	2.46E-05
	Ferric Sulphate	7.26%	3.78E-02
	Iron	5.02%	2.61E-02
	Phosphorus	3.06%	1.59E-02
	Lithium	30.02	1.56E-05
	Magnesium oxide	2.20%	1.15E-02
	Manganese	814.89	4.24E-04
	Mercury	0.1	5.21E-08
	Molybdenum	1.66	8.65E-07
	Nickel	29.67	1.55E-05
	Lead	17.66	9.20E-06
	Antimony	0.85	4.43E-07
	Selenium	2.2	1.15E-06
	Tin	2.41	1.26E-06
	Strontium	96.04	5.00E-05
	Titanium	1806.74	9.41E-04
	Thallium	0.69	3.59E-07
	Uranium	1.61	8.39E-07
	Vanadium	104.47	5.44E-05
	Zinc	94.84	4.94E-05

TABLE 8

METAL EMISSIONS FROM FRONT-END GOLDMINE OPERATIONS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

		High Moisture Content Ores	
	Metal	*Metal Emission Factor (µg/g) (1)*	*TSP Metal Emission Rate (g/s)*
Secondary Crushing	Aluminum oxide	16.87%	2.64E-01
	Arsenic	1042	1.63E-03
	Barium	551.31	8.61E-04
	Beryllium	1.88	2.94E-06
	Bismuth	0.37	5.78E-07
	Cadmium	0.12	1.88E-07
	Cobalt	14.74	2.30E-05
	Chromium	56.07	8.76E-05
	Copper	47.32	7.39E-05
	Ferric oxide	7.26%	1.13E-01
	Iron	5.02%	7.84E-02
	Phosphorus	3.06%	4.78E-02
	Lithium	30.02	4.69E-05
	Magnesium oxide	2.20%	3.44E-02
	Manganese	814.89	1.27E-03
	Mercury	0.1	1.56E-07
	Molybdenum	1.66	2.59E-06
	Nickel	29.67	4.64E-05
	Lead	17.66	2.76E-05
	Antimony	0.85	1.33E-06
	Selenium	2.2	3.44E-06
	Tin	2.41	3.77E-06
	Strontium	96.04	1.50E-04
	Titanium	1806.74	2.82E-03
	Thallium	0.69	1.08E-06
	Uranium	1.61	2.52E-06
	Vanadium	104.47	1.63E-04
	Zinc	94.84	1.48E-04

TABLE 8

METAL EMISSIONS FROM FRONT-END GOLDMINE OPERATIONS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

		High Moisture Content Ores	
	Metal	*Metal Emission Factor (µg/g) (1)*	*TSP Metal Emission Rate (g/s)*
Tertiary Crushing	Aluminum oxide	16.87%	2.64E-01
	Arsenic	1042	1.63E-03
	Barium	551.31	8.61E-04
	Beryllium	1.88	2.94E-06
	Bismuth	0.37	5.78E-07
	Cadmium	0.12	1.88E-07
	Cobalt	14.74	2.30E-05
	Chromium	56.07	8.76E-05
	Copper	47.32	7.39E-05
	Ferric oxide	7.26%	1.13E-01
	Iron	5.02%	7.84E-02
	Phosphorus	3.06%	4.78E-02
	Lithium	30.02	4.69E-05
	Magnesium oxide	2.20%	3.44E-02
	Manganese	814.89	1.27E-03
	Mercury	0.1	1.56E-07
	Molybdenum	1.66	2.59E-06
	Nickel	29.67	4.64E-05
	Lead	17.66	2.76E-05
	Antimony	0.85	1.33E-06
	Selenium	2.2	3.44E-06
	Tin	2.41	3.77E-06
	Strontium	96.04	1.50E-04
	Titanium	1806.74	2.82E-03
	Thallium	0.69	1.08E-06
	Uranium	1.61	2.52E-06
	Vanadium	104.47	1.63E-04
	Zinc	94.84	1.48E-04

TABLE 8

METAL EMISSIONS FROM FRONT-END GOLDMINE OPERATIONS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

		High Moisture Content Ores	
	Metal	*Metal Emission Factor (µg/g) (1)*	*TSP Metal Emission Rate (g/s)*
Material Handling and Storage	Aluminum oxide	16.87%	4.39E-02
Handling, Transferring and Conveying	Arsenic	1042	2.71E-04
	Barium	551.31	1.44E-04
	Beryllium	1.88	4.90E-07
	Bismuth	0.37	9.64E-08
	Cadmium	0.12	3.13E-08
	Cobalt	14.74	3.84E-06
	Chromium	56.07	1.46E-05
	Copper	47.32	1.23E-05
	Ferric oxide	7.26%	1.89E-02
	Iron	5.02%	1.31E-02
	Phosphorus	3.06%	7.97E-03
	Lithium	30.02	7.82E-06
	Magnesium oxide	2.20%	5.73E-03
	Manganese	814.89	2.12E-04
	Mercury	0.1	2.60E-08
	Molybdenum	1.66	4.32E-07
	Nickel	29.67	7.73E-06
	Lead	17.66	4.60E-06
	Antimony	0.85	2.21E-07
	Selenium	2.2	5.73E-07
	Tin	2.41	6.28E-07
	Strontium	96.04	2.50E-05
	Titanium	1806.74	4.71E-04
	Thallium	0.69	1.80E-07
	Uranium	1.61	4.19E-07
	Vanadium	104.47	2.72E-05
	Zinc	94.84	2.47E-05

TABLE 8

METAL EMISSIONS FROM FRONT-END GOLDMINE OPERATIONS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

		High Moisture Content Ores	
	Metal	*Metal Emission Factor (µg/g) (1)*	*TSP Metal Emission Rate (g/s)*
Loading Stockpiles	Aluminum oxide	16.87%	1.76E-02
	Arsenic	1042	1.09E-04
	Barium	551.31	5.74E-05
	Beryllium	1.88	1.96E-07
	Bismuth	0.37	3.85E-08
	Cadmium	0.12	1.25E-08
	Cobalt	14.74	1.54E-06
	Chromium	56.07	5.84E-06
	Copper	47.32	4.93E-06
	Ferric oxide	7.26%	7.56E-03
	Iron	5.02%	5.23E-03
	Phosphorus	3.06%	3.19E-03
	Lithium	30.02	3.13E-06
	Magnesium oxide	2.20%	2.29E-03
	Manganese	814.89	8.49E-05
	Mercury	0.1	1.04E-08
	Molybdenum	1.66	1.73E-07
	Nickel	29.67	3.09E-06
	Lead	17.66	1.84E-06
	Antimony	0.85	8.85E-08
	Selenium	2.2	2.29E-07
	Tin	2.41	2.51E-07
	Strontium	96.04	1.00E-05
	Titanium	1806.74	1.88E-04
	Thallium	0.69	7.19E-08
	Uranium	1.61	1.68E-07
	Vanadium	104.47	1.09E-05
	Zinc	94.84	9.88E-06

TABLE 8

METAL EMISSIONS FROM FRONT-END GOLDMINE OPERATIONS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

		High Moisture Content Ores	
	Metal	*Metal Emission Factor (µg/g) (1)*	*TSP Metal Emission Rate (g/s)*
Unloading from Stockpiles	Aluminum oxide	16.87%	1.32E-01
	Arsenic	1042	8.14E-04
	Barium	551.31	4.31E-04
	Beryllium	1.88	1.47E-06
	Bismuth	0.37	2.89E-07
	Cadmium	0.12	9.38E-08
	Cobalt	14.74	1.15E-05
	Chromium	56.07	4.38E-05
	Copper	47.32	3.70E-05
	Ferric oxide	7.26%	5.67E-02
	Iron	5.02%	3.92E-02
	Phosphorus	3.06%	2.39E-02
	Lithium	30.02	2.35E-05
	Magnesium oxide	2.20%	1.72E-02
	Manganese	814.89	6.37E-04
	Mercury	0.1	7.81E-08
	Molybdenum	1.66	1.30E-06
	Nickel	29.67	2.32E-05
	Lead	17.66	1.38E-05
	Antimony	0.85	6.64E-07
	Selenium	2.2	1.72E-06
	Tin	2.41	1.88E-06
	Strontium	96.04	7.50E-05
	Titanium	1806.74	1.41E-03
	Thallium	0.69	5.39E-07
	Uranium	1.61	1.26E-06
	Vanadium	104.47	8.16E-05
	Zinc	94.84	7.41E-05

Note:

(1) The worst-case scenario for each metal from the generic ore assays presented in Table A1 of the Australian National Pollutant Inventory document, "Emissions estimation technique manual for Gold Ore Processing", Version 2.0.

TABLE 9

FACILITY-WIDE SUMMARY OF EMISSIONS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

Source ID	*Source Description*	*Compound*	*CAS No.*	*Emission Rate*	*% of Overall Emissions*
CIL-1 to CIL-6	CIL Tanks	Cyanide	57-12-5	1.23E-01	67.97%
CIL-1 to CIL-6	HIC Leach Feed Tank	Cyanide	57-12-5	1.47E-02	8.17%
SCRUB-1	EW Cells (with scrubber)	Ammonia	7664-41-7	1.51E+00	100%
		Mercury	7439-97-6	1.16E-01	45.41%
CRK	Carbon Reactivation Kiln	Oxides of Nitrogen	10102-44-0	3.03E-04	22.22%
		Carbon Monoxide	630-08-0	5.10E-05	22.22%
		Sulphur Dioxide	7446-09-5	4.51E-04	2.25%
		PM_{10}	NA	9.57E-06	<1%
		Carbon Dioxide	124-38-9	1.99E-01	22.22%
		Mercury	7439-97-6	7.64E-02	29.92%
ELUTION	Elution Heater	Oxides of Nitrogen	10102-44-0	3.03E-04	22.22%
		Carbon Monoxide	630-08-0	5.10E-05	22.22%
		Sulphur Dioxide	7446-09-5	4.51E-04	2.25%
		PM_{10}	NA	9.57E-06	<1%
		Carbon Dioxide	124-38-9	1.99E-01	22.22%
CALCOVEN	Calcination Oven	Oxides of Nitrogen	10102-44-0	3.03E-04	22.22%
		Carbon Monoxide	630-08-0	5.10E-05	22.22%
		Sulphur Dioxide	7446-09-5	4.51E-04	2.25%
		PM_{10}	NA	9.57E-06	<1%
		Carbon Dioxide	124-38-9	1.99E-01	22.22%
SCRUB-2	Smelting Furnace (with Scrubber)	Oxides of Nitrogen	10102-44-0	4.55E-04	33.33%
		Carbon Monoxide	630-08-0	7.66E-05	33.33%
		Sulphur Dioxide	7446-09-5	1.87E-02	93.25%
		Total Suspended Particulate	NA	8.20E-04	<1%
		Carbon Dioxide	124-38-9	2.99E-01	33.33%
		Aluminum oxide	1344-28-1	1.38E-04	<1%
		Arsenic	7440-38-2	8.55E-07	<1%
		Barium	7440-39-3	4.52E-07	<1%
		Beryllium	7440-41-7	1.54E-09	<1%
		Bismuth	7440-69-9	3.04E-10	<1%
		Cadmium	7440-43-9	9.84E-11	<1%
		Cobalt	7440-48-4	1.21E-08	<1%
		Chromium	7440-47-3	4.60E-08	<1%
		Copper	7440-50-8	3.88E-08	<1%
		Ferric oxide	1309-37-1	5.96E-05	<1%
		Iron	7439-89-6	4.12E-05	<1%
		Phosphorus	7723-14-0	2.51E-05	<1%
		Lithium	7439-93-2	2.46E-08	<1%
		Magnesium oxide	1309-48-4	1.80E-05	<1%
		Manganese	7439-96-5	6.68E-07	<1%
		Mercury	7439-97-6	6.30E-02	24.67%
		Molybdenum	7439-98-7	1.36E-09	<1%
		Nickel	7440-02-0	2.43E-08	<1%
		Lead	7439-92-1	1.45E-08	<1%
		Antimony	7440-36-0	6.97E-10	<1%
		Selenium	7782-49-2	1.80E-09	<1%
		Tin	7440-31-5	1.98E-09	<1%
		Strontium	7440-24-6	7.88E-08	<1%
		Titanium	7440-32-6	1.48E-06	<1%
		Thallium	7440-28-0	5.66E-10	<1%
		Uranium	7440-61-1	1.32E-09	<1%
		Vanadium	7440-62-2	8.57E-08	<1%
		Zinc	7440-66-6	7.78E-08	<1%

TABLE 9

FACILITY-WIDE SUMMARY OF EMISSIONS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

Source ID	*Source Description*	*Compound*	*CAS No.*	*Emission Rate*	*% of Overall Emissions*
TAILPOND	Tailings Pond	Cyanide	57-12-5	4.30E-02	23.86%
CRUSHERS	-Crushing	Total Suspended Particulate	NA	3.65E+00	76.07%
		PM_{10}	NA	1.35E+00	73.55%
		Aluminum oxide	1344-28-1	6.15E-01	76.07%
		Arsenic	7440-38-2	3.80E-03	76.07%
		Barium	7440-39-3	2.01E-03	76.07%
		Beryllium	7440-41-7	6.85E-06	76.07%
		Bismuth	7440-69-9	1.35E-06	76.07%
		Cadmium	7440-43-9	4.38E-07	76.07%
		Cobalt	7440-48-4	5.37E-05	76.07%
		Chromium	7440-47-3	2.04E-04	76.07%
		Copper	7440-50-8	1.73E-04	76.07%
		Ferric oxide	1309-37-1	2.65E-01	76.07%
		Iron	7439-89-6	1.83E-01	76.07%
		Phosphorus	7723-14-0	1.12E-01	76.07%
		Lithium	7439-93-2	1.09E-04	76.07%
		Magnesium oxide	1309-48-4	8.02E-02	76.07%
		Manganese	7439-96-5	2.97E-03	76.07%
		Mercury	7439-97-6	3.65E-07	<1%
		Molybdenum	7439-98-7	6.05E-06	76.07%
		Nickel	7440-02-0	1.08E-04	76.07%
		Lead	7439-92-1	6.44E-05	76.07%
		Antimony	7440-36-0	3.10E-06	76.07%
		Selenium	7782-49-2	8.02E-06	76.07%
		Tin	7440-31-5	8.79E-06	76.07%
		Strontium	7440-24-6	3.50E-04	76.07%
		Titanium	7440-32-6	6.59E-03	76.07%
		Thallium	7440-28-0	2.52E-06	76.07%
		Uranium	7440-61-1	5.87E-06	76.07%
		Vanadium	7440-62-2	3.81E-04	76.07%
		Zinc	7440-66-6	3.46E-04	76.07%

TABLE 9

FACILITY-WIDE SUMMARY OF EMISSIONS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

Source ID	*Source Description*	*Compound*	*CAS No.*	*Emission Rate*	*% of Overall Emissions*
CRUSHERS	-Handling, Transfering and Conveying	Total Suspended Particulate	NA	2.60E-01	5.43%
		PM_{10}	NA	1.04E-01	5.66%
		Aluminum oxide	1344-28-1	4.39E-02	5.43%
		Arsenic	7440-38-2	2.71E-04	5.43%
		Barium	7440-39-3	1.44E-04	5.43%
		Beryllium	7440-41-7	4.90E-07	5.43%
		Bismuth	7440-69-9	9.64E-08	5.43%
		Cadmium	7440-43-9	3.13E-08	5.43%
		Cobalt	7440-48-4	3.84E-06	5.43%
		Chromium	7440-47-3	1.46E-05	5.43%
		Copper	7440-50-8	1.23E-05	5.43%
		Ferric oxide	1309-37-1	1.89E-02	5.43%
		Iron	7439-89-6	1.31E-02	5.43%
		Phosphorus	7723-14-0	7.97E-03	5.43%
		Lithium	7439-93-2	7.82E-06	5.43%
		Magnesium oxide	1309-48-4	5.73E-03	5.43%
		Manganese	7439-96-5	2.12E-04	5.43%
		Mercury	7439-97-6	2.60E-08	<1%
		Molybdenum	7439-98-7	4.32E-07	5.43%
		Nickel	7440-02-0	7.73E-06	5.43%
		Lead	7439-92-1	4.60E-06	5.43%
		Antimony	7440-36-0	2.21E-07	5.43%
		Selenium	7782-49-2	5.73E-07	5.43%
		Tin	7440-31-5	6.28E-07	5.43%
		Strontium	7440-24-6	2.50E-05	5.43%
		Titanium	7440-32-6	4.71E-04	5.43%
		Thallium	7440-28-0	1.80E-07	5.43%
		Uranium	7440-61-1	4.19E-07	5.43%
		Vanadium	7440-62-2	2.72E-05	5.43%
		Zinc	7440-66-6	2.47E-05	5.43%
ROMTRANS	Unloading and Loading of ROM pile	Total Suspended Particulate	NA	8.85E-01	18.48%
		PM_{10}	NA	3.83E-01	20.79%
		Aluminum oxide	1344-28-1	1.49E-01	18.48%
		Arsenic	7440-38-2	9.23E-04	18.48%
		Barium	7440-39-3	4.88E-04	18.48%
		Beryllium	7440-41-7	1.66E-06	18.48%
		Bismuth	7440-69-9	3.28E-07	18.48%
		Cadmium	7440-43-9	1.06E-07	18.48%
		Cobalt	7440-48-4	1.31E-05	18.48%
		Chromium	7440-47-3	4.96E-05	18.48%
		Copper	7440-50-8	4.19E-05	18.48%
		Ferric oxide	1309-37-1	6.43E-02	18.48%
		Iron	7439-89-6	4.44E-02	18.48%
		Phosphorus	7723-14-0	2.71E-02	18.48%
		Lithium	7439-93-2	2.66E-05	18.48%
		Magnesium oxide	1309-48-4	1.95E-02	18.48%
		Manganese	7439-96-5	7.22E-04	18.48%
		Mercury	7439-97-6	8.85E-08	<1%
		Molybdenum	7439-98-7	1.47E-06	18.48%
		Nickel	7440-02-0	2.63E-05	18.48%
		Lead	7439-92-1	1.56E-05	18.48%
		Antimony	7440-36-0	7.53E-07	18.48%
		Selenium	7782-49-2	1.95E-06	18.48%
		Tin	7440-31-5	2.13E-06	18.48%
		Strontium	7440-24-6	8.50E-05	18.48%
		Titanium	7440-32-6	1.60E-03	18.48%
		Thallium	7440-28-0	6.11E-07	18.48%
		Uranium	7440-61-1	1.43E-06	18.48%
		Vanadium	7440-62-2	9.25E-05	18.48%
		Zinc	7440-66-6	8.40E-05	18.48%

TABLE 10

AERMOD DISPERSION MODEL INPUT PARAMETERS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER GOLD, NOVA SCOTIA

Table 10A: Point Sources

Source Identifier	*Description*	*Coordinates (1)*		*Exhaust Orientation (2)*	*Release Height (m)*	*Exit Velocity (m/s)*	*Exit Diameter (m)*	*Exit Temperature (K)*
		X (m)	*Y (m)*					
CIL-1	Carbon-In-Leach Vent	505071.1	4981781.9	vertical, capped	24.9	0.1	4.3	293.15
CIL-2	Carbon-In-Leach Vent	505071.2	4981771.1	vertical, capped	24.9	0.1	4.3	293.15
CIL-3	Carbon-In-Leach Vent	505071.0	4981760.7	vertical, capped	24.9	0.1	4.3	293.15
CIL-4	Carbon-In-Leach Vent	505077.0	4981776.7	vertical, capped	24.9	0.1	4.3	293.15
CIL-5	Carbon-In-Leach Vent	505076.9	4981765.9	vertical, capped	24.9	0.1	4.3	293.15
CIL-6	Carbon-In-Leach Vent	505077.0	4981753.2	vertical, capped	24.9	0.1	4.3	293.15
SCRUB-1	Electrowinning	505065.7	4981793.2	horizontal	9.0	0.1	4.0	293.15
SCRUB-2	Smelting Furnace	505070.6	4981793.0	horizontal	9.0	0.1	4.0	293.15
CRK	Carbon Reactivation Furnace	505079.5	4981806.3	vertical	22.0	20.0	0.4	573.15
ELUTION	Elution Heater Stack	505077.4	4981814.8	vertical	22.0	12.8	0.2	333.15
CALCOVEN	Calcination Oven	505068.4	4981807.7	vertical	15.2	12.8	0.2	333.15

TABLE 10

AERMOD DISPERSION MODEL INPUT PARAMETERS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER GOLD, NOVA SCOTIA

Table 10B: Volume Sources

Source Identifier	*Description*	*Coordinates (1)*		*Release Height*	*Length of Side*	*Initial Dimensions*	
		X (m)	*Y (m)*	*(m)*	*(m)*	*Laterla (m)*	*Vertical (m)*
CRUSHERS	Primary/Secondary, Tertiary Crushing, Screening and Conveying Near Raw Materials Storage Pile	504965.2	4981901.3	2.5	26.8	6.2	2.3
ROMTRANS	Transfer Operations Around Raw Materials Storage Pile	504922.8	4981948.4	2.0	39.8	9.3	1.9

Table 10C: Area Sources

Source Identifier	*Description*	*Coordinates (1)*		*Release Height*	*Length of Side*	
		X (m)	*Y (m)*	*(m)*	*X-Side (m)*	*Y-Side (m)*
TAILPOND	Tailings Pond	505872.5	4980425.6	0	500	300
PIT	Mining Pit	504358.4	4981180.2	0	188735 m^2 (3)	

TABLE 10

AERMOD DISPERSION MODEL INPUT PARAMETERS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER GOLD, NOVA SCOTIA

Table 10D: Line Sources

Source Identifier	*Description*	*Coordinates (1)*		*Release Height*	*Length of Side*	*Vertical Dimension*	*Total Sources (4)*
		X (m)	*Y (m)*	*(m)*	*(m)*	*(m)*	
RD_ROMPD	Road - Between Mining Pit and Raw Materials Storage Pile	504742.2	4981338.1	0	17	4	23
RD_TAIL	Road - Between Facility and Tailings Management Area	505069.0	4982164.3	0	17	4	82

Notes:

(1) Reference projection is in Universal Transverse Mercator (UTM), North American Datum reference of 1983 (NAD83), Zone 20.
(2) Exhaust orientation affects exit parameters for point sources. Capped and horizontal exhaust parameters are calculated as per Ontario MOE guidance.
(3) Mining pit modelled as a polygon area, therefore it has no fixed dimensions other than a total area.
(4) Total number of volume sources required by model to approximate emissions from the roadways.

TABLE 11

AERMOD DISPERSION MODEL EMISSION RATES BY AIR CONTAMINANT AND SOURCE
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER, NOVA SCOTIA

Air Contaminant	*CAS No.*	*Facility-Wide Emission Rate*	*Emission Rate By Source*													
			CIL-1	*CIL-2*	*CIL-3*	*CIL-4*	*CIL-5*	*CIL-6*	*SCRUB-1*	*SCRUB-2*	*CRK*	*ELUTION*	*CALCOVEN*	*CRUSHERS*	*ROMTRANS*	*TAILPOND*
			(g/s)	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s-m^2)*
CO	630-0-3	2.30E-04	--	--	--	--	--	--	--	7.66E-05	5.10E-05	5.10E-05	5.10E-05	--	--	--	--
NOx	10102-44-0	1.36E-03	--	--	--	--	--	--	--	4.55E-04	3.03E-04	3.03E-04	3.03E-04	--	--	--	--
TSP	N/A	4.80E+00	--	--	--	--	--	--	--	8.20E-04	9.57E-06	9.57E-06	9.57E-06	3.91E+00	8.85E-01	--	--
PM_{10}	N/A	1.84E+00	--	--	--	--	--	--	--	--	--	--	--	1.45E+00	3.83E-01	--	--
SO_2	7446-09-5	2.01E-02	--	--	--	--	--	--	--	1.87E-02	4.51E-04	4.51E-04	4.51E-04	--	--	--	--
Ammonia	7664-41-7	1.51E+00	--	--	--	--	--	--	1.51E+00	--	--	--	--	--	--	--	--
Arsenic	7440-38-2	4.99E-03	--	--	--	--	--	--	--	8.55E-07	--	--	--	4.07E-03	9.23E-04	--	--
Cadmium	7440-43-9	5.75E-07	--	--	--	--	--	--	--	9.84E-11	--	--	--	4.69E-07	1.06E-07	--	--
Cyanide	57-12-5	1.80E-01	2.29E-02	2.29E-02	2.29E-02	2.29E-02	2.29E-02	2.29E-02	--	--	--	--	--	--	--	4.25E-02	2.83E-07
Lead	7439-92-1	8.46E-05	--	--	--	--	--	--	--	1.45E-08	--	--	--	6.90E-05	1.56E-05	--	--
Mercury	7439-97-6	2.55E-01	--	--	--	--	--	--	1.16E-01	6.30E-02	7.64E-02	--	--	3.91E-07	8.85E-08	--	--
Nickel	7440-02-0	1.42E-04	--	--	--	--	--	--	--	2.43E-08	--	--	--	1.16E-04	2.63E-05	--	--
Aluminum Oxide	1344-24-1	8.08E-01	--	--	--	--	--	--	--	1.38E-04	--	--	--	6.59E-01	1.49E-01	--	--
Barium	7440-39-3	2.64E-03	--	--	--	--	--	--	--	4.52E-07	--	--	--	2.15E-03	4.88E-04	--	--
Beryllium	7440-41-7	9.00E-06	--	--	--	--	--	--	--	1.54E-09	--	--	--	7.34E-06	1.66E-06	--	--
Bismuth	7440-69-9	1.77E-06	--	--	--	--	--	--	--	3.04E-10	--	--	--	1.45E-06	3.28E-07	--	--
Cobalt	7440-48-4	7.07E-05	--	--	--	--	--	--	--	1.21E-08	--	--	--	5.75E-05	1.31E-05	--	--
Chromium, II/III/VI	7440-47-3	2.68E-04	--	--	--	--	--	--	--	4.60E-08	--	--	--	2.19E-04	4.96E-05	--	--
Copper	7440-50-8	2.27E-04	--	--	--	--	--	--	--	3.88E-08	--	--	--	1.85E-04	4.19E-05	--	--
Ferric Oxide	1309-37-1	3.48E-01	--	--	--	--	--	--	--	5.96E-05	--	--	--	2.84E-01	6.43E-02	--	--
Iron	7439-89-6	2.41E-01	--	--	--	--	--	--	--	4.12E-05	--	--	--	1.96E-01	4.44E-02	--	--
Phosphorous	7723-14-0	1.47E-01	--	--	--	--	--	--	--	2.51E-05	--	--	--	1.20E-01	2.71E-02	--	--
Lithium	7439-93-2	1.43E-04	--	--	--	--	--	--	--	2.46E-08	--	--	--	1.17E-04	2.66E-05	--	--
Magnesium Oxide	1309-48-4	1.05E-01	--	--	--	--	--	--	--	1.80E-05	--	--	--	8.59E-02	1.95E-02	--	--
Manganese	7439-96-5	3.90E-03	--	--	--	--	--	--	--	6.68E-07	--	--	--	3.18E-03	7.22E-04	--	--
Molybdenum	7439-98-7	7.95E-06	--	--	--	--	--	--	--	1.36E-09	--	--	--	6.48E-06	1.47E-06	--	--
Antimony	7440-36-0	4.07E-06	--	--	--	--	--	--	--	6.97E-10	--	--	--	3.32E-06	7.53E-07	--	--
Selenium	7782-49-2	1.05E-05	--	--	--	--	--	--	--	1.80E-09	--	--	--	8.59E-06	1.95E-06	--	--
Tin	7440-31-5	1.15E-05	--	--	--	--	--	--	--	1.98E-09	--	--	--	9.42E-06	2.13E-06	--	--
Strontium	7440-24-6	4.60E-04	--	--	--	--	--	--	--	7.88E-08	--	--	--	3.75E-04	8.50E-05	--	--
Titanium	7440-32-6	8.66E-03	--	--	--	--	--	--	--	1.48E-06	--	--	--	7.06E-03	1.60E-03	--	--
Thallium	7440-28-0	3.31E-06	--	--	--	--	--	--	--	5.66E-10	--	--	--	2.70E-06	6.11E-07	--	--
Uranium	7440-61-1	7.72E-06	--	--	--	--	--	--	--	1.32E-09	--	--	--	6.29E-06	1.43E-06	--	--
Vanadium	7440-62-2	5.01E-04	--	--	--	--	--	--	--	8.57E-08	--	--	--	4.08E-04	9.25E-05	--	--
Zinc	7440-66-6	4.55E-04	--	--	--	--	--	--	--	7.78E-08	--	--	--	3.71E-04	8.40E-05	--	--

TABLE 12

SUMMARY OF MAXIMUM PREDICTED GROUND LEVEL CONCENTRATION AT SENSITIVE RECEPTORS
DDV GOLD LIMITED
TOUQUOY GOLD PROJECT
MOOSE RIVER GOLD, NOVA SCOTIA

						Scaggy Lake		*POR-1, Residential Dwelling*		*POR-2, Day Camp*	
Air Contaminant	*CAS No.*	*Facility-Wide Emission Rate*	*Averaging Period (hours) (1)*	*Criterium (ug/m^3)*	*Reference*	*Maximum Predicted GLC (ug/m^3)*	*Percentage of Criterium (%)*	*Maximum Predicted GLC (ug/m^3)*	*Percentage of Criterium (%)*	*Maximum Predicted GLC (ug/m^3)*	*Percentage of Criterium (%)*
CO	630-0-3	2.30E-04	1	34600	(2)	5.04E+01	0.1%	1.64E+01	< 0.1%	1.70E+01	< 0.1%
			8	12700	(2)	9.52E+00	< 0.1%	4.69E+00	< 0.1%	4.78E+00	< 0.1%
NOx	10102-44-0	1.36E-03	1	400	(2)	5.82E+01	14.5%	1.88E+01	4.7%	1.96E+01	4.9%
			annual	100	(2)	2.50E-01	0.3%	2.84E-02	< 0.1%	3.68E-02	< 0.1%
TSP	N/A	4.80E+00	24	120	(2)	8.37E+00	7.0%	2.12E+00	1.8%	2.52E+00	2.1%
			annual	70	(2)	6.26E-01	0.9%	1.39E-01	0.2%	1.77E-01	0.3%
PM_{10}	N/A	1.84E+00	24	50	(3)	3.26E+00	6.5%	8.12E-01	1.6%	9.71E-01	1.9%
SO_2	7446-09-5	2.01E-02	1	900	(2)	1.79E+01	2.0%	5.83E+00	0.6%	6.03E+00	0.7%
			24	300	(2)	1.06E+00	0.4%	6.50E-01	0.2%	6.61E-01	0.2%
			annual	60	(2)	6.48E-02	0.1%	7.85E-03	< 0.1%	9.99E-03	< 0.1%
Ammonia	7664-41-7	1.51E+00	24	100	(6)	5.33E+00	5.3%	1.13E+00	1.1%	1.19E+00	1.2%
Arsenic	7440-38-2	4.99E-03	24	0.3	(4)	8.67E-03	2.9%	2.20E-03	0.7%	2.62E-03	0.9%
Cadmium	7440-43-9	5.75E-07	24	2	(4)	< 1.00E-05	< 0.1%	< 1.00E-05	< 0.1%	< 1.00E-05	< 0.1%
Cyanide (as Hydrogen Cyanide)	74-90-8	1.80E-01	24	8	(5)	1.06E+00	13.3%	1.82E-01	2.3%	1.51E-01	1.9%
Lead	7439-92-1	8.46E-05	24	2	(4)	2.71E-03	0.1%	4.00E-05	< 0.1%	4.00E-05	< 0.1%
			30-day	0.7	(6)	4.20E-04	< 0.1%	< 1.00E-05	< 0.1%	1.00E-05	< 0.1%
Mercury	7439-97-6	2.55E-01	24	2	(6)	6.20E-01	31.0%	1.39E-01	6.9%	1.47E-01	7.4%
Nickel	7440-02-0	1.42E-04	1	5	(4)	2.38E-03	< 0.1%	7.90E-04	< 0.1%	1.03E-03	< 0.1%
			24	2	(6)	2.50E-04	< 0.1%	6.00E-05	< 0.1%	7.00E-05	< 0.1%
Aluminum Oxide	1344-24-1	8.08E-01	24	120	(4)	1.40E+00	1.2%	3.56E-01	0.3%	4.24E-01	0.4%
Barium	7440-39-3	2.64E-03	24	10	(4)	4.59E-03	< 0.1%	1.16E-03	< 0.1%	1.39E-03	< 0.1%
Beryllium	7440-41-7	9.00E-06	24	0.01	(6)	2.00E-05	0.2%	< 1.00E-05	0.1%	< 1.00E-05	0.1%
Bismuth	7440-69-9	1.77E-06	24	N/A	--	< 1.00E-05	N/A	< 1.00E-05	N/A	< 1.00E-05	N/A
Cobalt	7440-48-4	7.07E-05	24	0.1	(4)	1.20E-04	0.1%	3.00E-05	< 0.1%	4.00E-05	< 0.1%
Chromium, II/III/VI	7440-47-3	2.68E-04	24	1.5	(4)	4.70E-04	< 0.1%	1.20E-04	< 0.1%	1.40E-04	< 0.1%
Copper	7440-50-8	2.27E-04	24	50	(6)	3.90E-04	< 0.1%	1.00E-04	< 0.1%	1.20E-04	< 0.1%
Ferric Oxide	1309-37-1	3.48E-01	24	25	(6)	6.05E-01	2.4%	1.53E-01	0.6%	1.83E-01	0.7%
Iron	7439-89-6	2.41E-01	24	4	(6)	4.18E-01	10.4%	1.06E-01	2.6%	1.26E-01	3.2%
Phosphorous	7723-14-0	1.47E-01	24	N/A	--	2.55E-01	N/A	6.48E-02	N/A	2.55E-01	N/A
Lithium	7439-93-2	1.43E-04	24	20	(6)	2.50E-04	< 0.1%	6.00E-05	< 0.1%	8.00E-05	< 0.1%
Magnesium Oxide	1309-48-4	1.05E-01	24	120	(6)	1.83E-01	0.2%	4.64E-02	< 0.1%	5.53E-02	< 0.1%
Manganese	7439-96-5	3.90E-03	24	2.5	(4)	6.78E-03	0.3%	1.72E-03	< 0.1%	2.05E-03	< 0.1%
Molybdenum	7439-98-7	7.95E-06	24	120	(4)	1.00E-05	< 0.1%	< 1.00E-05	< 0.1%	< 1.00E-05	< 0.1%
Antimony	7440-36-0	4.07E-06	24	25	(6)	1.00E-05	< 0.1%	< 1.00E-05	< 0.1%	< 1.00E-05	< 0.1%
Selenium	7782-49-2	1.05E-05	24	10	(4)	2.00E-05	< 0.1%	< 1.00E-05	< 0.1%	1.00E-05	< 0.1%
Tin	7440-31-5	1.15E-05	24	10	(6)	1.70E-04	< 0.1%	4.00E-05	< 0.1%	5.00E-05	< 0.1%
Strontium	7440-24-6	4.60E-04	24	120	(4)	8.00E-04	< 0.1%	2.00E-04	< 0.1%	2.40E-04	< 0.1%
Titanium	7440-32-6	8.66E-03	24	120	(6)	1.50E-02	< 0.1%	3.82E-03	< 0.1%	4.55E-03	< 0.1%
Thallium	7440-28-0	3.31E-06	24	N/A	--	1.00E-05	N/A	< 1.00E-05	N/A	< 1.00E-05	N/A
Uranium	7440-61-1	7.72E-06	24	N/A	--	1.00E-05	N/A	< 1.00E-05	N/A	< 1.00E-05	N/A
Vanadium	7440-62-2	5.01E-04	24	2	(6)	8.70E-04	< 0.1%	2.20E-04	< 0.1%	2.60E-04	< 0.1%
Zinc	7440-66-6	4.55E-04	24	120	(6)	7.90E-04	< 0.1%	2.00E-04	< 0.1%	2.40E-04	< 0.1%

Notes:

N/A - Not Available.
(1) Unless otherwise noted.
(2) Nova Scotia Reg. 28/2005.
(3) Ontario PM_{10} interim guideline.
(4) Environment Canada Environmental Code of Practice for Base Metals Smelters and Refiners (March 2006).
(5) Ontario MOE ambient air quality criteria guideline.
(6) Ontario Reg. 419/05 standard.