MEMORANDUM

PROJECT NO.: MESH #M028-002

DATE: September 28, 2007

TO: David Abernethy and Jim Rogers (INAC)

FROM: Shannon Shaw, MESH Environmental Inc.

RE: **Cullaton Lake Project Site Inspection, July 5th, 2007**

INTRODUCTION

Under a call-up contract on Standing Offer Agreement 01-07-6013 a site inspection of the Cullaton Lake Project (Figure 1) was conducted on July 5th, 2007. Shannon Shaw, of MESH Environmental Inc. (MESH) accompanied three members of INAC (David Abernethy, Ian Rumbolt and Jeff Holwell), as well as Holger Hartmeier of BGC Engineering Inc. to the Cullaton Lake site for a one day site inspection. The inspection team left from Rankin Inlet at approximately 8:00 am and returned the same day at approximately 5:30 pm, with approximately 5.5 hours at site. On site the team was met by Paul Brugger, Ron Aubry, and Kolby Ozerkevich of Barrick Gold Inc. (Barrick), and Demetri Georgiou of Trow Associates Inc. who served as Barrick's consultant. The inspection started at the B Zone and tailings area and concluded with an inspection of the Shear Zone area. The weather was sunny with scattered clouds and considerable wind.

The discussion provided in this memorandum consists of observations and notes made during that site inspection. It also provides a summary of the water quality results collected by INAC and Barrick during the site inspection and the results of geochemical testing of two tailings samples collected by Shannon Shaw on July 5th.

FIELD OBSERVATIONS

The field observations provided here are organized into two sections; the B Zone area and the Shear Zone area. Figure 2 shows the location of these areas in relation to the airstrip and to one another.

B ZONE AREA

The components inspected at the B Zone area included the tailings facility, the mill area, the quarry area and the B Zone portal area.

Tailings facility

An inspection of the tailings facility was carried out via a tour around the entire facility and on the tailings beach. Occasional field measurements of water pH and electrical conductivity (EC) were reported, field observations were documented and two samples of tailings solids were collected.

At the time of the inspection, water from the tailings facility was flowing out of the facility via the spillway. The water at this location had a pH of 7.9 and an EC of 0.6 mS/cm. Photo 1 provides a panoramic view of the water covered tailings taken from the spillway. Along the dam, areas constructed of quartzite are easily contrasted with volcaniclastic and iron formation materials based on colour. Quartzite in the dam was light orangey-white in colour and durable, while the metasediments were predominantly dark grey to reddish grey. Sulphides were present in much of the quartzite predominantly as veins and stringers and often iron stained, producing orangish-red colouration (Photo 2). Photo 3 provides a view of the dam looking northward showing the spillway in the lower portion of the photo. As indicated by the colour differentiation, the rock in the spillway was predominantly volcaniclastics and iron formation rock, with some visible sulphides (pyrite). Rock type differentiation was also evident vertically in the dam (Photo 4) with the darker areas being comprised largely of metasediment rock and the lighter areas containing significant quartzite rock.

A pond collecting water from the spillway immediately downgradient of the tailings dam was inspected. The water was clear, pH was 8.0 and the EC was 0.7 mS/cm. There were no evident signs of ARD/ML.

South of the spillway along the tailings dam, field measurements of the water cover on the tailings indicated pH of 8.1 and EC of 0.7 mS/cm (Photo 5). The wave action due to the wind was significant, with the predominant wind direction to the south. The turbidity in the water column was unexpectedly minimal given these conditions. Visibility in the pond was estimated to be to a depth of ~0.5m^{+}/.0.25m. The water level was relatively high as would be expected at that time of the year due to spring thaw. The location of tailings under the water cover could be estimated based on the distinct colouration of the Shear Zone tailings (orangey-red). While not easily quantified, in areas it looked as though there were tailings present in less than 1m water cover depth. Minor degrees of bottom suspension (i.e. suspension near the bottom, but not to surface) were observed, but again it was difficult to quantify with confidence.

On the southeast end of the dam, another pond was inspected (Photo 6). It is not clear whether this is a seepage pond per se, or not. There was an older sampling station marked there, but the label could not be read. The pH of the pond water was 8.2 and the EC was 1.8 mS/cm, higher than measured elsewhere in and around the tailings facility.

On the north-eastern portion of the dam, in an area previously reported as having shown signs of tailings resuspension and iron staining (H. Hartmeier, pers. comm.), there were no current indications of tailings near the surface, although the water level was likely higher on this trip than when the previous observations were made. The water cover in this area had a field pH of 8.0 and an EC of 0.7 mS/cm. The dam material in contact with the water was comprised of quartzite that was significantly stained orangey-red (Photo 7). It seemed probable that the source of the staining was from sulphides within the quartzite itself, with the greater amount of staining potentially a factor of the seasonal wetting and drying of the quartzite near the water level.

Volcaniclastic rock and iron formation material near the water cover, or in areas on the dam where water may pond, showed minor white surface precipitates, possibly gypsum given the colour. The source of solutes for these precipitates is thought to be the rock material itself rather than from tailings facility water.

On the northern portion of the facility, on the upstream portion of the dam, ‘patches’ or ‘strips’ of exposed tailings could occasionally be seen. These patches were in general approximately 30 cm wide and up to 2 m in length. A sample of orange (Shear Zone) tailings was collected from one of these exposures (labeled CL-TL-01). The tailings sampled were silty sand, moist and orangey-red in colour with a very thin veneer of black staining on the surface of the tailings (Photos 8 and 9). This may be a Mn oxide coating or a bio-coating of some form. The geochemical test results of this sample are discussed in detail on page 8 of this memo. Based on the general shape and spacing of the exposed areas of tailings along this portion of the dam, it is considered possible that these tailings were from a previous beach horizon that may have been at one point covered with rock and subsequently exposed during reclamation by the teeth of an excavator (Photo 10). There was no visible evidence of staining in the area around the exposed patches; however the cover depth was obviously less than 1 m thick in this portion of the facility and tailings in this zone are likely susceptible to seasonal freeze-thaw and oxidation processes.

The water cover on the north end of the tailings facility reported a pH of 8.1 and an EC of 0.7 mS/cm.

A small pond to the north of the facility had a paste pH of 7.8 and an EC value of 1.3 mS/cm. If seepage reported out of the facility in this direction, it is possible that it surfaced in this pond, although there were no apparent signs of seepage or upwelling.

Inspection of the transition zone between the water cover tailings and the till cover (beach) tailings proved unsuccessful (Photo 11). The water level in the pond was high enough that the tailings in this transition zone were not accessible for sampling. It appeared however that there were tailings, predominantly grey (or B Zone) tailings, within approximately 0.5m to 1m of the water level.

The till cover showed no signs of staining and there were no exposed patches of tailings seen on the main beach part of the facility (Photo 12). A few standing ponds of water on the covered beach were present in the drainage swales. Water in two of these ponds reported field pH values of 8.2 and 8.4 and EC values of 3.9 and 4.6 mS/cm, possibly indicating that while buffered, the water in contact with the till has a higher conductivity and therefore total dissolved solids content associated with it, as compared to the water within the water cover and the ponds surrounding the tailings facility. This may be influenced by effects of evapo-concentration within standing water ponds on the till cover.

A hole dug by Ron Aubry and Kolby Ozerkevich of Barrick through the cover down to frozen surface was available for inspection (Photos 13 and 14). It indicated 0.9m of till cover and 0.3m of thawed tailings above the frozen horizon. The tailings were comprised predominantly of dark grey (B Zone) tailings with a thin layer (5 cm) of orange (Shear Zone) tailings immediately above the frozen base. A sample was collected (labeled CL-TL-02) consisting most substantially of B Zone tailings. The sample was silty and moist to wet with a greater moisture content nearer the frozen horizon. Geochemical results of that sample are discussed on page 8 of this memo.

Mill Complex Area

The mill complex area was also inspected. The foundation of the old mill building is now being used to store core (Photo 15). Behind the old foundation are three larger piles of rock. The intent of these rock piles is unclear, although they may have been used to bury equipment etc. There was no seepage or ponding evident around these piles and, other than localized in-situ iron staining (i.e. on individual rock particles), no evidence of ARD/ML such as patches of stained rock.

Quarry Area

On the south end of the tailings facility there is an old ditch that previously connected the quarry with the tailings facility (Photo 16). This no longer functions as a ditch as it appears that water flow was in the opposite direction than originally intended (i.e. currently would flow from the tailings facility to the quarry pond). The water on the tailings facility side of the cut-off had a pH of 8.1 and an EC of 0.7 mS/cm, similar to that measured elsewhere in the water cover. The quarry pond itself (Photo 17) reported a pH of 7.9 and an EC of 0.1 mS/cm.

While the quarry cover showed some signs of subsidence, there were no noted obvious signs of ARD/ML from the cover itself, or seepage through the cover. Surface staining was not apparent and no ‘patches’ of surface precipitates were identified (Photo 18).

To the south of the quarry was an area that appears to have possibly been used as a source of topsoil for other reclamation activities. Some silt on the bedrock was evident and may be a source of suspended solids if eroded. A pond draining this area however showed no indication of this at present, such as elevated conductivity or turbidity, and had a pH of 7.9 and an EC of 0.0 mS/cm (Photo 19).

B Zone Portal Area

The B Zone portal area currently consists of two piles of rock, one piled against the portal and the other piled over the raise (Photo 20). There is a substantial amount of rock spread on the ground in the general area of the portal, including what could have been potentially low grade ore or waste rock. No water was available for sampling in this vicinity and again, other than in-situ sulphide oxidation and weathering, no signs of ARD/ML were seen such as seepage or impaired vegetation (Photos 21 and 22).

SHEAR ZONE AREA

The Shear Zone area consists of the backfilled portal area, an encapsulated waste rock dump recontoured against the rock outcrop where the portal existed, a pile of quartzite recontoured against a natural quartzite outcrop, and a thin residual veneer of waste rock spread out in the area where the original waste rock dump was located (Photos 23 and 24 for overview pictures). The quartzite pile may have been a low grade stockpile as it appears to have been specifically sorted and kept separate from the waste rock area and is notably sulphidic.

The cover on the encapsulated waste rock dump was grassed, and the grass appeared to be in good condition. Very minor erosion rilling was evident and no signs of upward migration of salts, seepage or exposure of waste rock through the cover were seen. Minor ‘stains’ of puddles or seeps from the encapsulated waste rock dump within and immediately below the berm surrounding the waste rock dump were evident, but no water was present on the day of the inspection (Photos 25, 26 and 27).

The area where the waste rock dump used to be located is shown in Photo 28. Surface staining is still evident within the old footprint area; however there were no signs of impact beyond the original dump footprint and no water available for sampling.

The rock pad around the portal area (seen in Photo 28), as well as a diversion structure in Shear Lake just north of the encapsulated waste rock dump (Photo 29) were comprised substantially of quartzite that was sulphidic and quite stained. This appeared to be similar in composition to the quartzite pile immediately south of the portal area.

A pond north of the general footprint of the Shear Zone area, created by the base and the road impeding flow, had a field pH of 5.5 and an EC of 0.0 mS/cm. The rocks along the edge of this pond were quartzite that was highly stained red (Photos 30 and 31). Surface evidence (accumulation of ‘fines’ and ‘staining’) of standing water between this ponded water and the northeast corner of the encapsulated waste rock dump was seen. It is possible therefore that this ponded water on occasion flowed onto the Shear Zone area and may have been sampled and erroneously identified as waste rock dump seepage in the past (Paul Brugger, pers. comm.).

The field pH of Shear Lake itself immediately west of the portal area was 6.1 and an EC of 0.0 mS/cm. Again, immediately at the bank of Shear Lake and into the lake as far as could be seen was a substantial amount of quartzite rock with heavy red staining (Photos 32, 33 and 34).

A pond that appeared to be seepage from the quartzite pile was evident and reported a field pH of 2.4 and EC of 2.9 mS/cm. The area around the pond was highly stained, and a seepage pathway from the quartzite to the pond could be delineated based on higher degrees of surface staining (Photos 35 and 36).

GEOCHEMICAL TESTING

WATER QUALITY

During the site inspection, both INAC and Barrick collected water samples. The analytical results of those samples were made available for evaluation. Table 1 provides the results of the water quality testing for both sets of data. Bolded values shown on the table indicate where a sample has exceeded the CCME maximum allowable water quality guidelines for a grab sample and the yellow shaded values are those that exceed the Cullaton Lake Water License NWB1CUL0207 maximum concentrations in a grab sample. Note that the water license values are generally higher than the CCME water quality guidelines; therefore, while a number of samples exceed CCME guidelines for certain parameters, they are within the Water License values. Only pH at two locations (upstream Shear Zone and the quartzite pond) is outside the allowable range for both CCME and the Water License.

In general, the water quality around the B Zone area and associated with the tailings storage facility is neutral to slightly alkaline and of relatively good quality. Concentrations of parameters typically indicative of ARD/ML (e.g. SO_4, Fe, Al and trace metals) are generally low. Sulphate concentrations in water associated with the tailings storage facility are on the order of 200 mg/L. A few samples have marginally elevated total Fe concentrations above the CCME guidelines; however it is likely that these are present as suspended particulates. Total Se concentrations are slightly elevated above the CCME guidelines in nearly all samples from the B Zone area.

One sampling location shows a discrepancy between the Taiga analysed and Maxxam analysed samples (940-20, or seepage pond at southeast of dam #1). The Maxxam lab samples, 940-20A and 940-20B reported SO_4 concentrations on the order of 429 to 479 mg/L and concentrations of other parameters generally much higher than seen in the Taiga sample. The water quality differences at this sample location may have resulted in samples being collected in different areas of the pond. It is possible that the water in the pond was relatively stagnant and therefore not well mixed. If this is the case, the water quality provided from Taiga and Maxaam may indicate the variability within the pond itself.

Water collected from the Shear Zone area is consistently lower in pH than that in the B Zone area, typically by one pH unit. This dataset suggests the water around the Shear Zone is slightly acidic with pH ranging from ~ 6.1 to 6.7. This likely reflects the difference in the bedrock geology between the two areas, with the Shear Zone being underlain by orthoquartzite and the B Zone area being primarily within metasediments and volcaniclastics which generally contain greater buffering capacity.

Also of note however is that SO_4 concentrations around Shear Zone are typically lower than seen around the B Zone area, with values around 10 mg/L. Previous work has also noted the unexpectedly low concentrations of parameters in the Shear Zone material that are typically elevated in mine-associated waters (e.g. SO_4). Even the acidic pond (field pH ~2.4, lab pH ~2.6) located near the quartzite pile has SO_4 concentrations that, while elevated, are generally lower than one would anticipated from ARD with these pH values (594 to 680 mg/L). This acidic pond however also reported elevated concentrations of Al, Cd, Cr, Cu, Fe, Ni, Se, and Zn. Concentrations of Ca in the acidic pond are quite low and indicate the absence of Ca buffering minerals (e.g. calcite) in the quartzite itself. There would be very little buffering expected from a quartzite rock unit as quartz itself is a very durable and slow weathering mineral. It is therefore anticipated that any acidity produced from the oxidation of sulphides in the quartzite unit would result in locally depressed pH values as is seen in the pond collecting seepage from this pile. As described in the field observations sections above, it did not appear that any surface drainage from this pond was occurring and the concentrations of parameters may well have been affected by processes such as evapo-concentration in a standing pond of water.

TAILINGS GEOCHEMISTRY

The geochemical testing on the tailings solids samples included Sobek acid-base accounting (ABA) as well as shake flask extraction procedures. The results of these tests are shown in Tables 2 and 3 respectively. The results show significant differences between the tailings sample representative of the Shear Zone tailings (orange) and the B Zone tailings (grey) as has been previously reported. The Shear Zone tailings had a rinse pH of 3.42 and an EC of 1.05 mS/cm. This sample is currently acidic however there are very little residual sulphides in the sample (0.19% total S, 0.05% sulphide S, and 0.14% as sulphate S) and no residual neutralization potential.

The B Zone tailings however reported a rinse pH of 6.06 and EC of 0.9 mS/cm. The paste pH (on a crushed sample) was slightly higher at 7.27 illustrating the effects of crushing the sample and thereby liberating neutralization potential in the process. The sample contains a significant residual sulphur content of 2.37 % total S (0.17% as sulphate S and 2.20% as sulphide S) and a significant proportion of carbonate (1.52% as total inorganic carbon). The associated neutralization potential as carbonate is calculated to be 126.7 kg/t as CaCO3 which is in good agreement with the Sobek neutralization potential of 149 kg CaCO3/t. The Net NP value suggests this sample is strongly net neutralizing and therefore non-potentially acid generating (or non-PAG), although the NP/AP ratios suggest that this sample could be classified as uncertain with respect to acid generating potential. Based on field observations and location of this sample (i.e. beneath 0.9m of till), the potential for acid generation from this material (i.e. B Zone tailings) is considered unlikely.

Shake flask extraction tests on these samples provide an indication of the metal leaching potential from the materials in their current geochemical state. The results, provided in Table 3, again show significant differences between the Shear Zone tailings sample and the B Zone tailings sample although leachate chemistry of both samples was dominated by SO_4, Ca, Mg and Na. The pH of the leachate from the Shear Zone tailings sample was acidic (pH 3.19) with elevated concentration of SO_4 (1105 mg/L), moderate concentrations of major cations Ca, K, Mg, Mn, Na and Si and elevated trace metals including Al (59 mg/L), As (0.006 mg/L), Cd (0.004 mg/L), Cr (0.02 mg/L), Cu (0.1 mg/L), Fe (4.2 mg/L), Ni (0.5 mg/L) and Zn (0.2 mg/L). The pH of the B Zone tailings leachate, on the other hand, was near neutral at pH 7.52. The B Zone leachate did have a somewhat elevated SO_4 concentration (662 mg/L), moderate concentrations of typical cations Ca, K, Mg, Na and Si, but negligible concentrations of associated trace metals other than As (0.006 mg/L) and Fe (0.4 mg/L).

These results indicate that the Shear Zone tailings are acid generating and metal leaching, while the B Zone tailings are non-acid generating and have negligible potential for metal leaching. Exposed tailings, in particular if from the Shear Zone area, may provide localized acidity and metal leaching. Consideration may be given to recontouring and recovering the area in which tailings are currently exposed and armoring the Shear Zone tailings from contact with rainfall and run-off.

CONCLUSIONS

Based on the field pH and EC measurements collected during the site inspection and water quality data provided by INAC and Barrick, it appears that the natural water quality around the B Zone and the Shear Zone areas is substantially different. The pH is generally 1 to 1.5 pH units higher around the B Zone (~ 7.5 to 8) than that reported around the Shear Zone areas (~ 6 to 6.5) and SO_4 concentrations are unexpectedly low around the Shear Zone areas (with the exception of the acidic pond). It is anticipated that the bedrock geology may have an influence on the 'background' or natural water quality in the two areas. The bedrock geology at B Zone is comprised of clastic sediments (turbidites), pillow lavas and iron formations (BGC, 2007). The host rock for the Shear zone ore was orthoquartzite reported to be fine grained to glassy and varying from thin bedded to thick bedded and massive in nature. The orthoquartzite was typically 97% quartz with minor to trace sericite, feldspar and magnetite. The geology suggests a presence of carbonate minerals (calcite and dolomite) in the B Zone area that are not present around Shear Zone.

This difference also seems to reflect itself in the geochemistry of the rock and tailings produced from the two different zones and in the water in contact with the different materials. The orange Shear Zone tailings are acidic, as is the ponded water at Shear Zone located adjacent to the sulphidic quartzite pile. The grey B Zone tailings are currently well buffered and contain an excess of buffering capacity. No signs of acidic seepage were identified at the B Zone area and in the tailings storage facility. This would suggest that the buffering, or neutralization potential, available at B Zone has been sufficient to balance any localized acidity produced to date.

This cannot be said of the immediate footprint area around Shear Zone. The sulphidic quartzite pile appears to be producing acidity and does not contain any buffering capacity with which to neutralize acidity produced. This has resulted in the acidic pond adjacent to this pile with elevated concentrations of parameters of concern. It is not apparent however whether this pond drains and therefore impacts the surrounding area. There does not appear to be any surface evidence of flow from the pond into the local vicinity.

In summary, based on field observations and a preliminary review of the water quality data and geochemical test results of 2 tailings samples it would appear that there is the potential for ARD/ML from the Shear Zone area and associated tailings produced from Shear Zone. Current conditions appear to have largely accounted for this potential with measures such as the encapsulation of the Shear Zone waste rock and the placement of the till and water cover over the tailings storage facility.

Minor maintenance efforts on areas of localized exposed tailings (e.g. recontouring and recovering) may be warranted and some consideration to options for the management of the source of the ARD pond at Shear Zone could be given. Both these issues would likely be included in a risk assessment, should one be conducted as was recommended in the BGC 2006 Site Inspection Report and Mine Closure Review (BGC, 2007). It would also be advantageous to compile and cross reference historic water quality data with that currently being collected including the production of a proper site map with water sampling stations indicated.

We trust that this memorandum providing field observations during the recent site inspection to the Cullaton Lake property meets with your current needs and expectations. If you have any comments or questions at this time please don't hesitate to contact the undersigned.

Best Regards,

MESH Environmental Inc.

per:

Shannon Shaw, M.Sc.
Senior Geochemist

Reviewed by,

per:

Peri Mehling, P.Eng.
Senior Engineer

REFERENCES

BGC Engineering Inc., (2007). 2006 Site Inspection Report and Mine Closure Review. Report prepared for Indian and Northern Affairs Canada, Cullaton Lake Mine, March 30th, 2007.

FIGURES

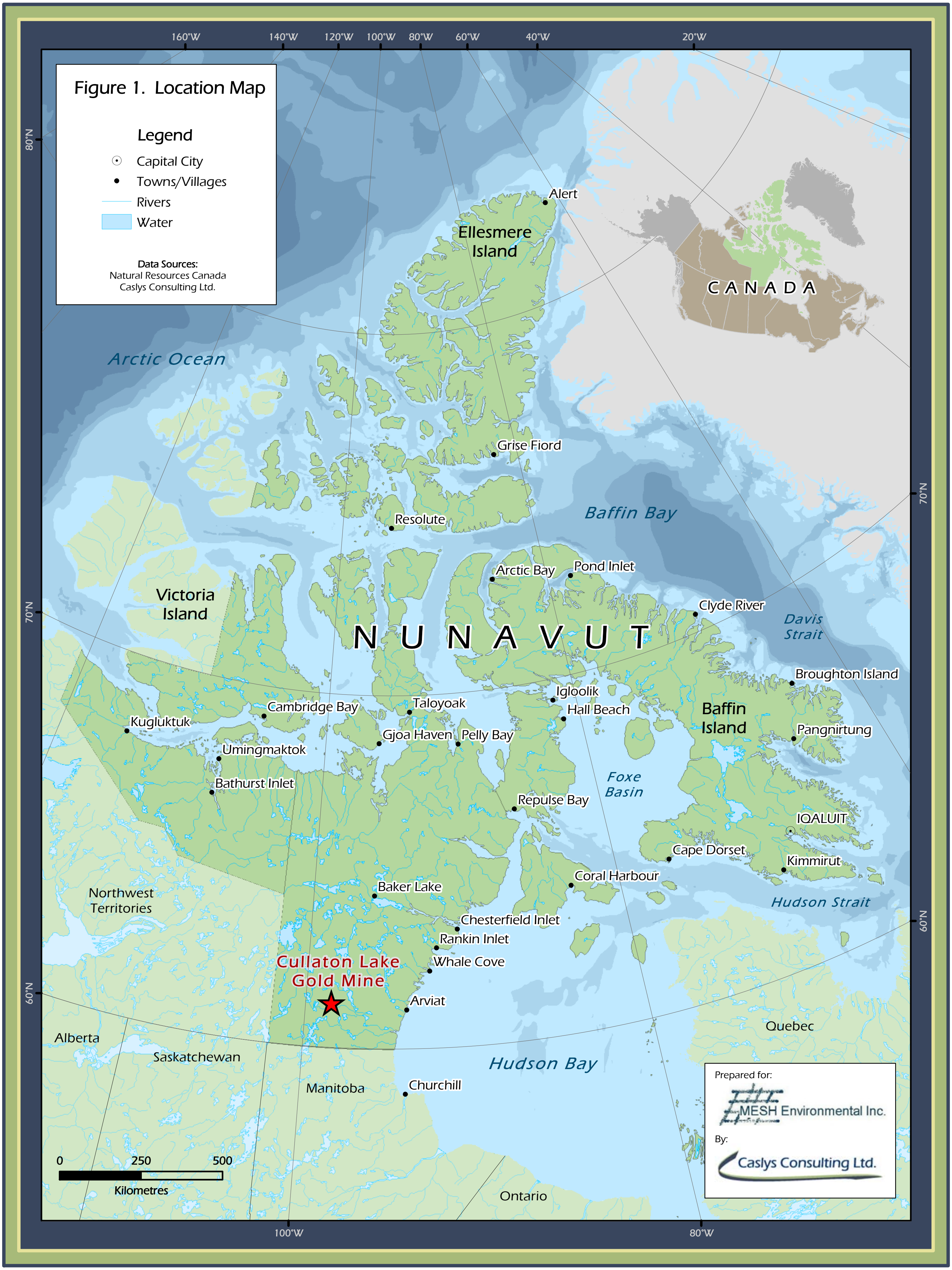

Figure 1. Location Map

Figure 2. Project Area

Legend

The image is a false colour Landsat 7 satellite image (bands 5,4,3).

0 2 4

Kilometres

Projection:
UTM Zone 14 NAD83

Data sources:
Natural Resources Canada
Geobase®

Produced for:
MESH Environmental Inc.

Produced by:
Caslys Consulting Ltd.

August 27, 2007

TABLES

Table 1. Summary of Water Quality Sampling

Sampling Date: July 5, 2007		B Zone Area																				Shear Zone Area						
Sample ID		**940-19**	**940-19A**	**940-19B**		**940-2A**	**940-2B**	**940-3**	**940-3A**	**940-3B**	**940-18**	**940-18A**	**940-18B**	**940-20**	**940-20A**	**940-20B**	**940-23**	**940-23A**	**940-23B**	**940-24**								
Site description		**Piezometer stations, TP #1 west side (at shoreline)**			**TP #1 adjacent to point of discharge to TP #2**			**Southeast dam of TP #1, adjacent to marshland**			**Pond at inlet end of spillway, discharge from spillway**			**Seepage pond at southeast of Dam #1**			**Quarry pond at ditch**			**Ditch entering TP #1**		**Shear Creek**			**U/S Shear**		**pond at toe of quarzite pile**	
Data result from		Taiga	Maxxam		Taiga	Maxxam		Taiga	Maxxam		Taiga	Maxxam		Taiga	Maxxam		Taiga	Maxxam		Taiga		Taiga	Maxxam			Maxxam	Taiga	Maxxam
Physical Tests	**Units**																											
Hardness (CaCO3)	mg/L	217	220	220	not sampled by INAC	220	210	89.8	88	89	223	230	230	231	620	630	77.4	78	72	215	not sampled by Barrick Gold Inc.	13.7	14	13	not sampled by INAC	14	267	260
pH	pH	8.01	7.8	7.8		7.7	7.8	7.43	7.8	7.9	7.98	7.8	7.8	7.86	8.2	8.3	7.77	7.7	7.6	7.89		6.62	6.5	6.7		**6.1**	**2.59**	**2.6**
Total Suspeed Solids	mg/L	< 3						< 3			< 3			< 3			< 3			< 3		< 3					< 3	
Dissolved Sulphate (SO4)	mg/L	199	199	185		200	196	33	36	35	198	181	187	204	479	429	42	57	45	195		8	8	8			680	594
Total Cyanide (CN)	mg/L	0.033						0.001			0.021	0.005	0.005	0.012			0.001		0.025	0.02		0.001					0.001	
Alkalinity (Total as CaCO3)	mg/L	50	51	52		51	51	20.6	64	65	49.4	63	63	60.4	300	302	31.6	33	33	50.4		4.6	4	4		2		
Metals																												
Total Aluminum (Al)	ug/L	33.4	54	60		71	70	39	66	52	79.8	54	45	37	60	49	18.8	45	40	67		**136**	**180**	**190**		**130**	**24900**	**29000**
Total Antimony (Sb)	ug/L	< 0.1						0.1			< 0.1			< 0.1			0.2			< 0.1		< 0.1					< 0.1	
Total Arsenic (As)	ug/L	1.8	2	2		2	2	4.8	5	5	2	2	2	2.3	5	5	1	1		1.8		0.3					3.3	1
Total Barium (Ba)	ug/L	12.2	14	14		14	14	12.5	14	14	14	17	17	17.1	36	35	5.9	7	7	13.8		10.4	12	11		10	9.7	12
Total Beryllium (Be)	ug/L	< 0.1						< 0.1			< 0.1			< 0.1			< 0.1			< 0.1		< 0.1					3	3
Total Cadmium (Cd)	ug/L	< 0.05						< 0.1			< 0.05			< 0.1			< 0.05			< 0.1		< 0.1				**0.1**	**3.33**	**4.6**
Total Calcium (Ca)	mg/L	3.7	5.5	5.5		5.5	5.5	22.5	24	24	55.9	62	62	57.8	17	17	20.5	20	20	53.6		3.7	3.6	3.6		3	58.2	57
Total Chromium (Cr)	ug/L	< 0.1						0.3			0.4			< 0.3			< 0.1			< 0.3		0.5					**44.3**	**51**
Total Cobalt (Co)	ug/L	1.2	1.7	1.7		1.8	1.7	0.3	0.6		1.2	1.6	1.5	1.1	5.1	5.1	< 0.1			1.1		1.3	1.9	1.9			482	530
Total Copper (Cu)	ug/L	1	1			1	1	**4.5**	**6**	4	1.3	2	2	1.5	**5**	**7**	1			1.4		3.2	3	3		2	**303**	**330**
Total Iron (Fe)	ug/L	99				78	71	**384**	**370**	**320**	203	150	170	226	**620**	**640**	52			133		**559**	**590**	**550**		**460**	**34700**	**37000**
Total Lead (Pb)	ug/L	0.2				0.6		< 0.1			0.4			0.2			< 0.1			0.3		< 0.1					3	3.7
Total Lithium (Li)	ug/L	0.4						0.6			0.5			0.5			< 0.2			0.5		0.5					36.6	34
Total Magnesium (Mg)	mg/L	20	19	19		20	20	8.2	8.7	8.3	20.2	21	21	21.1	60	60	6.4	6.2	6.1	19.8		1.1	1	1		0.9	29.7	28
Total Manganese (Mn)	ug/L	85.5	84	87		81	79	87.3	100	87	73.6	98	99	106	170	170	13.6	14	14	64.8		51.1	56	54		58	9010	9500
Mercury (Hg)	mg/L	< 0.02						0.02			< 0.02			< 0.02			< 0.02			< 0.02		< 0.02					< 0.02	
Total Molybdenum (Mo)	ug/L	0.3						0.6			0.3			0.4	3	3	0.4			0.3		< 0.1					0.2	
Total Nickel (Ni)	ug/L	2.1	2	2		2	2	4.6	5	5	2.2	1	1	1.9	8	9	1.4	1	1	2.3		3.5	4	3		3	**334**	**340**
Total Potassium (K)	ug/L	2.7	3	3		3	3	1.2	1.5	1.5	2.7	3.3	3.4	2.8	10	10	0.6	0.79	0.76	2.7		0.6	0.7	0.71		0.64	1.6	1.7
Total Selenium (Se)	ug/L	**4.2**						**3**			**2.7**			**2**			**2.1**			**2**		1					**4.3**	
Total Silicon (Si)	ug/L	462	250	300		270	290	745	150	140	440	410	390	683	310	300	326	190	180	501		1170	660	620		700	33.7	17
Total Silver (Ag)	ug/L	< 0.1						**0.2**			0.1			< 0.1			< 0.1			< 0.1		< 0.1					< 0.1	
Total Sodium (Na)	mg/L	22.9	24	25		25	25	7.2	8.6	8.3	23	28	28	24.3	78	78	2.3	2.8	2.8	22.4		0.4	0.61	0.59		0.64	2.1	2.5
Total Strontium (Sr)	ug/L	205	220	220		220	220	89.9	110	100	194	240	250	227	720	740	94.8	110	110	202		10.8	12	12		11	154	200
Total Thallium (Tl)	ug/L	< 0.1						< 0.1			< 0.1			< 0.1			< 0.1			< 0.1		< 0.1					0.1	0.2
Total Titanium (Ti)	ug/L	0.3						1.2			2.6			1			0.6			2.2		0.9					4.4	
Total Uranium (U)	ug/L	0.3	0.5	0.4		0.5	0.5	0.4	0.5	0.5	0.3	0.6	0.6	0.5	19	19	0.3	0.4	0.4	0.4		0.2	0.2	0.2			33.2	35
Total Vanadium (V)	ug/L	< 0.1						0.3			0.2			0.1			< 0.1			0.2		0.2					< 0.1	
Total Zinc (Zn)	ug/L	0.7						< 10			2.2			< 10			6.4	6		< 10		< 10					**311**	**320**

CCME Water Quality Guidelines				**Maximum Concentration of any Grab Sample (Water License NWB1CUL0207)**	
		Min	**Max**		
Physical Tests					
Hardness	mgCaCO$_3$/L				
pH		6.5	9	6.5	9
Total Suspeed Solids	mg/L			50	
Sulphate	mg/L				
Alkalinity-Total	mgCaCO$_3$/L				
Metals					
Aluminum	ug/L	5	100		
Antimony	ug/L				
Arsenic	ug/L	5		600	
Barium	ug/L				
Beryllium	ug/L				
Cadmium	ug/L	0.017			
Calcium	ug/L				
Chromium	ug/L	1	8.9		
Cobalt	ug/L				
Copper	ug/L	2	4	400	
Iron	ug/L	300			
Lead	ug/L	1	7	400	
Lithium	ug/L				
Magnesium	ug/L				
Manganese	ug/L				
Mercury	ug/L	0.026			
Molybdenum	ug/L	73			
Nickel	ug/L	25	150	600	
Potassium	ug/L				
Selenium	ug/L	1			
Silicon	ug/L				
Silver	ug/L	0.1			
Sodium	ug/L				
Strontium	ug/L				
Thallium	ug/L	0.8			
Titanium	ug/L				
Uranium	ug/L				
Vanadium	ug/L				
Zinc	ug/L	30		600	

NOTES:

Bold indicates exceeding CCME water quality guidelines
Yellow shading indicates exceeding water license criteria

Table 2. Results of Sobek Acid-Base Accounting for Cullaton Lake Tailings Samples

Sample ID	General Description	Rinse pH	Rinse EC µS/cm	Paste pH	Fizz Test	TIC %	CaCO3 NP	S(T) %	S(SO4) %	S(S-2) %	AP	NP	Net NP	NP:AP	CaCO3 NP:AP	Classification
CL-TL-01	Shear Zone tailings (orange)	3.42	1053	3.42	None	<0.01	<0.8	0.19	0.14	0.05	1.6	-8.4	-10.0	0.0	0.5	PAG
CL-TL-02	B Zone tailings (grey)	6.06	926	7.27	Strong	1.52	126.7	2.37	0.17	2.20	68.8	149.0	80.3	2.2	1.8	non-PAG/uncertain
Duplicate																
CL-TL-01				3.49	None	<0.01		0.17	0.14			-9.2				PAG

Note:

AP = Acid potential in tonnes CaCO3 equivalent per 1000 tonnes of material. AP is determined from calculated sulphide sulphur content: S(T) - S(SO4).

NP = Neutralization potential in tonnes CaCO3 equivalent per 1000 tonnes of material.

NET NP = NP - AP

Carbonate NP is calculated from TIC originating from carbonates and is expressed in kg CaCO3/tonne.

Table 3. Leachate Analysis for Cullaton Lake Tailings Samples

Sample ID			**CL-TL-01**	**CL-TL-02**	**Blank**
Parameter	**Method**	**Units**			
Volume Nanopure water		mL	750	750	750
Sample Weight		g	250	250	250
pH	meter		3.19	7.52	6.80
Redox	meter	mV	<1	370	384
Conductivity	meter	uS/cm	1739	1273	<1
Acidity (to pH 4.5)	titration	mg CaCO3/L	237.5	#N/A	#N/A
Total Acidity (to pH 8.3)	titration	mg CaCO3/L	394.3	11.4	3.2
Alkalinity	titration	mg CaCO3/L	#N/A	57.6	1.9
Sulphate	Turbidity	mg/L	1105	662	<1
Ion Balance					
Major Anions	Calc	meq/L	23.02	14.94	#N/A
Major Cations	Calc	meq/L	20.86	15.73	#N/A
Difference	Calc	meq/L	2.16	-0.78	#N/A
Balance (%)	Calc	%	4.9%	-2.6%	#N/A
Dissolved Metals					
Hardness CaCO3		mg/L	527	755	<0.5
Aluminum Al	ICP-MS	mg/L	58.9	0.0011	<0.0002
Antimony Sb	ICP-MS	mg/L	<0.0003	0.00014	<0.00005
Arsenic As	ICP-MS	mg/L	0.006	0.0061	<0.0001
Barium Ba	ICP-MS	mg/L	0.0109	0.0184	0.00005
Beryllium Be	ICP-MS	mg/L	0.0058	<0.00005	<0.00005
Bismuth Bi	ICP-MS	mg/L	<0.0003	<0.00005	<0.00005
Boron B	ICP-MS	mg/L	0.046	0.036	<0.008
Cadmium Cd	ICP-MS	mg/L	0.00378	<0.00001	<0.00001
Calcium Ca	ICP-MS	mg/L	137	237	<0.05
Chromium Cr	ICP-MS	mg/L	0.024	<0.0002	<0.0002
Cobalt Co	ICP-MS	mg/L	0.501	0.00822	<0.00002
Copper Cu	ICP-MS	mg/L	0.11	0.001	0.0004
Iron Fe	ICP-MS	mg/L	4.21	0.449	<0.005
Lead Pb	ICP-MS	mg/L	0.0034	0.00004	0.00003
Lithium Li	ICP-MS	mg/L	0.075	0.003	<0.0002
Magnesium Mg	ICP-MS	mg/L	44.8	39.4	<0.05
Manganese Mn	ICP-MS	mg/L	15	0.231	0.00009
Mercury Hg	CVAA	ug/L	<0.05	<0.05	<0.05
Molybdenum Mo	ICP-MS	mg/L	<0.0001	0.0007	0.00006
Nickel Ni	ICP-MS	mg/L	0.472	0.0015	<0.0005
Phosphorus P	ICP-MS	mg/L	<0.1	<0.1	<0.1
Potassium K	ICP-MS	mg/L	6.79	4.18	<0.05
Selenium Se	ICP-MS	mg/L	<0.003	0.0022	<0.0005
Silicon Si	ICP-MS	mg/L	2.96	0.97	<0.05
Silver Ag	ICP-MS	mg/L	<0.00005	0.00006	<0.00001
Sodium Na	ICP-MS	mg/L	65.5	12.7	<0.05
Strontium Sr	ICP-MS	mg/L	0.339	0.694	0.0001
Sulphur (S)	ICP-MS	mg/L	350	301	<0.1
Thallium Tl	ICP-MS	mg/L	<0.0003	<0.00005	<0.00005
Tin Sn	ICP-MS	mg/L	<0.0003	<0.00005	<0.00005
Titanium Ti	ICP-MS	mg/L	<0.003	0.0006	<0.0005
Uranium U	ICP-MS	mg/L	0.0294	0.00092	<0.00001
Vanadium V	ICP-MS	mg/L	<0.0003	<0.00005	<0.00005
Zinc Zn	ICP-MS	mg/L	0.227	<0.0005	0.0007
Zirconium Zr	ICP-MS	mg/L	<0.005	<0.005	<0.005

Note:

Procedure: 24 Hour NanoPure Water Leach Extraction Test at 3:1 Liquid to Solid Ratio

PHOTOS

Photo 1. Panoramic photo of water covered tailings in TSF taken from the spillway.

Photo 2. Typical composition of north end of dam construction material, note sulphide-rich quartzite locally stained.

Photo 3. Panoramic photo of the spillway, water flow was noted, pH=7.9, EC=0.6 mS/cm.

Photo 4. Photo of tailings dam, southeast end, note constructed of meta-volcanics (below) and quartzite (orange, above).

Photo 5. Edge of water cover, southeast end of TSF, pH=8.1, EC=0.7 mS/cm.

Photo 6. Ponded water south of TSF, pH=8.2, EC=1.8 mS/cm.

Photo 7. Area of surface stained quartzite rock at water level on north end of dam.

Photo 8. Exposed tailings along upstream side of north end of dam

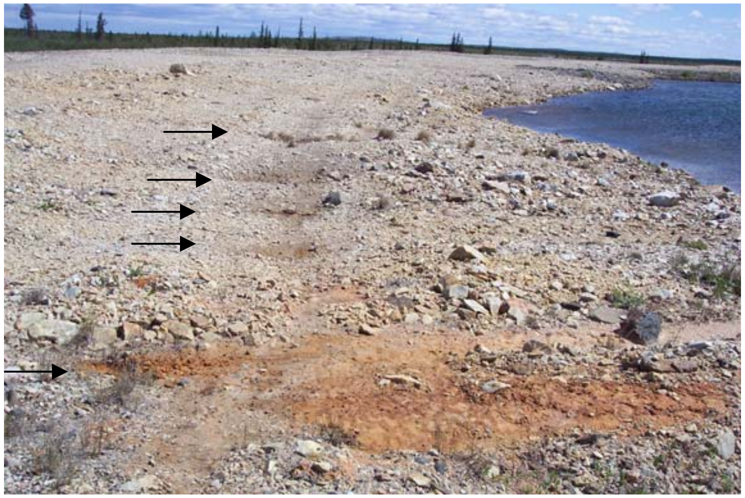

Photo 9 (right). Close-up of exposed tailings – shear zone tailings (orange) with blackened surface coating. Tailings sample collected.

Photo 10 (left). Regularly recurring 'patches' of exposed tailings along north end of dam

Photo 11. Panoramic photo of water covered tailings in TSF taken from northwest transition zone area (i.e. till versus water cover).

Photo 12. Panoramic photo of till covered tailings in TSF taken from central location of beach near water – till cover transition zone. Standing ponded water on top of till cover ranged in pH from 8.2 to 8.4 and EC ranged from 3.9 to 4.6 mS/cm.

Photo 13. Photo showing tailings excavated from beneath the till cover, predominantly B zone tailings (grey). Tailings sample collected.

Photo 14. Hole through till cover to tailings beneath consisting of approximately 90 cm of till overlying 30 cm of unfrozen tailings (predominantly B zone tailings with thin (~5cm) layer of Shear zone tailings immediately above frozen layer.

Photo 15. Photo looking eastward across tailings beach to water cover in background, note core storage on old mill foundation in foreground.

Photo 16. Excavated ditch previously connecting TSF with quarry pond.

Photo 17. Quarry pond, pH=7.9, EC=0.1 mS/cm.

Photo 18. Covered quarry area.

Photo 19. Ponded water at south end of the quarry/topsoil stripped area, pH=7.9, EC=0.0 mS/cm.

Photo 20. Photo looking towards B zone portal from area immediately west of old mill area.

Photo 21. Panoramic photo of B zone portal area, showing remnant rock in vicinity of old raise.

Photo 22. Panoramic photo of B zone portal area, showing backfilled portal and road towards Shear Zone.

Photo 23. Overview of Shear zone area from air looking south.

Photo 24. Overview of Shear zone area from air looking southeast.

Photo 25. View of encapsulated waste rock dump looking south.

Photo 26. Panoramic photo of north end of encapsulated waste rock dump.

Photo 27. Looking south along west side of encapsulated waste rock dump.

Photo 28. Panoramic photo of shear zone area looking over old waste rock dump area (left side) and quartzite pile (right side).

Photo 29. Dam in north end of Shear Lake constructed of pyritic quartzite.

Photo 30. Ponded water on northeast end of Shear zone area.

Photo 31. Close-up of ponded water, pH=5.5, EC=0.0 mS/cm.

Photo 32. Overview of backfilled Shear zone portal (note backfill is pyritic quartzite).

Photo 33. Localized 'heavy' iron staining on area of pyritic quartzite.

Photo 34. Photo looking south on eastern side of pyritic quartzite 'pile' adjacent to quartzite outcropping.

Photo 35. Photo looking south from top of quartzite pile, acidic pond being sampled in left-centre of photo.

Photo 36. Acidic seep pond at bottom of quartzite 'pile'.